CHAPTER 6
Alternatives Analysis

6.1 Introduction

The National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) require that an Environmental Impact Statement (EIS) and an Environmental Impact Report (EIR) describe and evaluate a range of reasonable alternatives to a project or to the location of a project, which would feasibly attain most of the basic project objectives and avoid or substantially lessen significant project impacts. This chapter describes the development of the project alternatives, presents the project alternatives, evaluates the alternatives for consistency with stated project objectives, summarizes and compares the environmental impacts and economic feasibility of the alternatives, in order to make recommendations on the environmentally superior alternative.

CEQ regulations require federal agencies to:

a. Rigorously explore and objectively evaluate all reasonable alternatives and, for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

b. Devote substantial treatment to each alternative considered in detail (reasonable alternatives), including the preferred alternative, so that reviewers may evaluate their comparative merits.

c. Include reasonable alternatives not within the jurisdiction of the lead agency.

d. Include the No Action Alternative. "No action" is defined as the most likely future that could be expected to occur in the absence of the project. Where this future is different from the existing conditions, the differences should be clearly defined.

The CEQA Guidelines set forth the following criteria for selecting alternatives:

1. ". . . [T]he discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." §15126.6(b))

2. "The range of potential alternatives shall include those that could feasibly accomplish most of the basic purposes of the project and could avoid or substantially lessen one or more of the significant effects." §15126.6(c)

3. "The specific alternative of 'no project' shall also be evaluated along with its impacts." §15126.6(e)(1)

4. "The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could meet most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making." §15126.6(f)

According to NEPA, alternatives considered, but not found to be technically feasible or reasonable, should be presented briefly, along with the reasons they were eliminated from further analysis. Examples of reasons for elimination are: (1) failure of the alternative to meet the requirements of the purpose of and need for the action, (2) the alternative cannot be technically implemented, (3) the alternative is prohibitively greater in cost or in environmental impacts than the other alternatives, or (4) the alternative cannot be reasonably implemented. A complete listing of all alternatives seriously considered or publicly discussed in the scoping process should be included.

In general, there are two types of alternatives that may be reviewed in an EIR: (1) alternatives *to* the project that are other projects entirely, or other approaches to achieving the project objectives rather than the project or modified project; and (2) alternatives *of* the project that include modified project components, such as alternative project sites or processes and/or modified facilities, layout, size, and scale. This chapter evaluates both types of alternatives in order to develop a reasonable range of alternatives for evaluation in this EIR/EIS and describes the alternatives of the project that were carried forward for further analysis. This chapter also describes alternatives to the project that were not discussed further and the reasons for which they were not carried forward for analysis.

6.2 Alternatives Development

The development of alternatives for the NBWRP was completed as part of the Feasibility Study process required under Reclamation's Title XVI Program. Alternatives development included three phases, as described below.

- In 2005, NBWRA prepared the *Phase 1 Engineering and Economic/ Financial Analysis Report* that represented the initial results of a recycled demand study in the project area, possible scenarios using different areas and facilities, and preliminary cost estimates.

- In 2006-2007, NBWRA prepared the *Phase 2 Engineering and Economic/ Financial Analysis Report* presented a more detailed engineering development and evaluation of best agreed alternatives.

- In 2008, as part of Phase 3, NBWRA completed the engineering and financial evaluation and the final feasibility report. The *Phase 3 Engineering and Economic/ Financial Analysis Report* or Phase 3 Feasibility Study refined the engineering evaluation and includes the economic analysis of alternatives and documentation of the financial capability of the Member Agencies. The Phase 3 Feasibility Study described the action area and the key management issues and needs within the action area, identifies recycled water opportunities in the action area, develops and analyzes alternative measures that could address the

identified water management needs, presents an economic and financial analysis of the project, and presents an overview of associated legal and institutional requirements (CDM, 2008).

Phase 3 Feasibility Study

NBWRA undertook a comprehensive planning process that first identified a wide range of preliminary alternatives for the Proposed Action and then screened this array for selection of alternatives that would be developed for detailed analysis. Criteria such as the ability to achieve Member Agency water management goals, to meet projected future water supply needs, and to maintain environmental and water quality directed the initial development of the alternatives (CDM, 2008).

The first step in the alternatives development process was to identify the broad characteristics that could be used to formulate alternatives. The initial alternatives were formed as combinations of options under the following characteristics:

- Existing and potential recycled water projects in the action area: Water and wastewater agencies in the action area 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 areas. Fifteen recycled water projects, including six new water reuse areas, were identified (see **Table 6-1**).

TABLE 6-1
RECYCLED WATER PROJECTS CONSIDERED

Existing Projects	Agency-Identified Projects	New Potential Water Reuse Areas
Sonoma Valley County Sanitation District Reuse Area	Peacock Gap Golf Course	Petaluma South
Marin Municipal Water District Reuse Area	North Marin Water District Urban Reuse Project	Southern Sonoma Valley
Stone Tree Golf Course Reuse Area	Sonoma Valley Recycled Water Project	Sears Point
	Carneros East	Central Sonoma Valley
	Milliken-Sarco-Tulucay Creeks Area	North Central Sonoma
	Napa Salt Marsh Restoration	Napa Valley

SOURCE: CDM, 2008

- Extent of the recycled water distribution network: The recycled water projects were grouped into alternatives based on different sizes and different connections of the future recycled water system. The options for the recycled water distribution system varied from virtually independent operation of each wastewater treatment plants (WWTP) to all WWTPs operating jointly serving demand throughout the entire action area. **Table 6-2** provides the six distribution system approaches that were studied.

TABLE 6-2
RECYCLED WATER PROJECTS CONSIDERED

Service Area Approaches	Features
Basic Regional System	Emphasis on local area near each WWTP
Regional Systems	Linkage of local systems to allow multiple treatment plants primarily in Petaluma/Novato and Napa/Sonoma.
Regional Systems with Ponds	Connect several WWTPs and add ponds for storage.
Expanded Regional System without Petaluma	Provide larger agricultural area, emphasis on environmental benefits to Napa salt marsh (Petaluma would not be served).
Expanded Regional System with Petaluma	See above. The area will include Petaluma.
Interconnected Regional System	Connect all five WWTPs and maximize reuse.

SOURCE: CDM, 2008

- Storage options to increase use of recycled water: Three options for water storage were developed to formulate initial alternatives.
  - *No New Storage*: The only storage available in the recycled water system would be existing storage at the WWTPs and a portion of existing individual landowner storage ponds.
  - *Partial Storage*: Storage would include existing storage at the WWTPs, some existing landowner storage ponds and new low-impact storage.
  - *Full Storage*: This option would include as much storage as needed to reuse all available recycled water supplies. New surface storage would be necessary.

The 15 recycled water projects (see Table 6-1) and six recycled water distribution systems (see Table 6-2) were evaluated with the six storage options (discussed above) to develop a total of 18 initial alternatives.

The next step in the alternatives development process was to screen the initial alternatives. The characteristics of the alternatives were examined to verify that they were technically, environmentally, politically, and legally feasible. The screening was based on the quantity of recycled water served, quantity of the discharge from the WWTP reduced, amount of storage required, and planning-level cost estimates.

Alternatives Identified but Not Considered Further

The alternatives not considered further include the "Regional System," "Expanded Regional System without Petaluma," and "Expanded Regional System with Petaluma" (CDM, 2008). The "Regional System" was rejected due to prohibitive costs and insufficient use of recycled water. The "Expanded Regional System without Petaluma" was similar to the Partially Connected System, but did not include Petaluma. Although Petaluma has declined participation in the Proposed Action, Petaluma's inclusion during the initial project development process was important to demonstrate regional coordination. The third alternative, the "Expanded Regional

System with Petaluma", included connection to Petaluma, but the design did not provide adequate storage for the anticipated recycled water demand

The NBWRA screened the 18 alternatives based upon storage options, cost, regional partnership opportunities, and system logistics to select three alternatives that would be carried forward to further analysis. Thus, the alternatives that are analyzed in this EIR/EIS in addition to the required No Project and No Action Alternatives (under CEQA and NEPA) are: the Basic System, the Partially Connected System, and the Fully Connected System.

6.3 Alternatives of the Project Analyzed in the EIR/EIS

The alternatives that were carried forward and analyzed in this EIR/EIS are described below:

No Project Alternative: Discussion of the No-Project Alternative must examine the existing conditions and reasonably foreseeable future conditions that would exist if the project were not approved (CEQA §15126.6(e)). Under the No Project Alternative, the NBWRA would not implement construction of facilities identified under the Proposed Action to provide a reliable recycled water distribution system to serve the water users in the LGVSD, Novato SD, SVCSD, and Napa SD service areas.

No Action Alternative: Consideration of the No Action Alternative is required under NEPA. 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 is 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 water 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 Project (SVRWP) EIR, based upon the ability to fund such construction. 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.

Basic System: The Basic System would expand recycled water programs currently in operation within the Member Agency service areas. It is the most localized of the three alternatives and emphasizes the implementation of local recycled water projects. 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 SVRWP, the Napa Salt Marsh Pipeline, 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. The Basic System would include implementation of a system consisting of 83 miles of pipeline, construction of facilities onsite at existing WWTPs to provide an additional 7.8 million gallons per day (mgd) of tertiary treatment capacity, and development of 1,020 acre-feet of

storage, primarily at existing or planned storage ponds at the WWTPs. In total, the Basic System would provide 6,655 acre-feet of new recycled water for irrigation use, and an additional 5,825 for habitat enhancement.

Partially Connected System: The Partially Connected System represents the median alternative. 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 SVRWP, and projects in Napa MST, and the Carneros East areas. Interconnectivity between WWTPs would be expanded between Novato SD and LGVSD to serve the Sear's Point Area, in addition to the connection between SVCSD and Napa SD WWTPs. The Partially Connected System would provide 11,250 AFY of new recycled water for irrigation use and an additional 2,933 AFY for habitat enhancement. Under this alternative, SCWA would implement a system consisting of installation of 139 miles of new pipelines, construction of facilities onsite at the existing WWTPs to provide 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.

Fully Connected System: The Fully Connected System would maximize the local and regional reuse of recycled water, and incrementally, would have the greatest facility requirements of the three alternatives considered. It would include all of the components described under the Partially Connected System in addition to pipelines to extend service and connect all four WWTPs. The Fully Connected System requires a total of 153 miles of conveyance pipeline, 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. The Fully Connected System would provide 12,761 AFY of new recycled water for irrigation use, and an additional 3,085 AFY for habitat enhancement.

Table 6-3 summarizes the elements of each of the three alternatives.

6.4 Alternatives Analysis

In accordance with the CEQA Guidelines, the alternatives considered in this EIR include those that 1) could accomplish most of the basic objectives of the project, and 2) could avoid or substantially lessen one or more of the significant effects of the project. To provide the appropriate context for this alternatives analysis, the project objectives and key significant effects are summarized below.

6.4.1 Project Objectives

NBWRA developed the following objectives for the Proposed Action to promote the expanded beneficial use of recycled water in the North Bay region to:

- Offset urban and agricultural demands on potable supplies;
- Enhance local and regional ecosystems;
- Improve local and regional water supply reliability;
- Maintain and protect public health and safety;

TABLE 6-3
SUMMARY OF PROJECT COMPONENTS UNDER THE ACTION ALTERNATIVES

Project Components	No Action Alternative	Basic System	Partially Connected System	Fully Connected System
Pipeline (in miles)				
LGVSD	0.0	5.88	17.94	17.94
Novato SD	4.4	12.44	35.90	47.00
SVCSD	13.1	33.72	42.00	44.20
Napa SD	0.0	31.14	44.08	44.08
Total Pipeline	**17.5**	**83.00**	**139.00**	**153.00**
Pump Station (in horsepower)				
LGVSD	0.0	71	91	424
Novato SD	250	258	586	966
SVCSD	662	1,328	2,037	2,912
Napa SD	0.0	2,896	3,280	3,175
Total Pump Stations	912	**4,553**	**6,115**	**7,477**
Storage Capacity				
LGVSD	0.0	0.0	0.0	0.0
Novato SD	0.0	0.0	0.0	0.0
SVCSD	65.0	1,020.0	2,220.0	2,220.0
Napa SD	0.0	0.0	0.0	0.0
Total New Storage[(1)]	**65.0**	**1,020.0**	**2,220.0**	**2,220.0**
Tertiary Treatment Capacity Increase (million gallons per day)				
LGVSD	0.0	0.4	1.2	1.2
Novato SD	0.5	1.2	5.1	10.0
SVCSD	0.0	0.0	0.0	0.0
Napa SD	0.0	5.9	9.6	9.6
Total Tertiary Treatment Capacity Increase	**0.5**	**7.5**	**15.9**	**20.8**
Potable Offset (acre-feet per year)				
LGVSD	0	202	409	409
Novato SD	193	542	2,038	3,701
SVCSD	874	2,719	4,381	4,230
Napa SD	0	2,992	4,221	4,221
Total Potable Offset	**1,067**	**6,655**	**11,250**	**12,761**

[1] This total only represents new storage. The Proposed Action will rely on existing storage and retrofit existing facilities to accommodate storage needs. Please refer to Chapter 2, Project Description for a break down of new versus existing storage by alternative.

NOTE: The No Project Alternative would be equivalent to existing conditions and no project elements would be implemented, therefore not included in the table.

SOURCE: CDM, 2009

- Promote sustainable practices;
- Give top priority to local needs for recycled water, and;
- Implement recycled water facilities in an economically viable manner.

6.4.2 Significant Effects

Chapter 3, Environmental Setting and Impact Analysis, presents the impact analysis for the three project alternatives. No significant and unavoidable environmental impacts are anticipated

for projects under the Basic, Partially Connected, or Fully Connected Systems. Based on the analysis presented in **Chapter 3**, implementation of the Proposed Action could result in significant short-term construction and long-term operational impacts to aesthetics, air quality, biological resources, hazards and hazardous materials, water quality, land use, noise, public services and utilities, and traffic. The impacts would be reduced to a less-than-significant level by mitigation measures listed in **Chapter 3**. Provided below is a summary of the significant, but mitigable, environmental impacts identified by resource area that are considered in the evaluation of the alternatives to identify the alternative(s) that can avoid or reduce the environmental effects and still meet the basic project objectives.

There are no significant and unavoidable impacts anticipated for the Proposed Action, therefore the project alternatives are compared by assessing the impacts under each alternative to demonstrate environmental superiority. In general, the magnitude of significant impacts would be in proportion to the extent of facilities required under each of the project alternatives. Greater infrastructure involves greater construction activities or construction over a larger area for a longer duration as well as a greater extent of operational activities. **Table 6-4** summarizes the potentially significant, but mitigable impacts identified. In general, impacts would be the least for the Basic System, which has the least amount of infrastructure, and greatest for the Fully Connected System, which has the greatest amount of infrastructure. A summary of individual issue areas is provided below.

TABLE 6-4
SIGNIFICANT BUT MITIGABLE IMPACTS IN PROPORTION TO THE PROPOSED FACILITIES UNDER EACH ALTERNATIVE

Temporary/ Construction-Related Impacts	Long-Term Impacts
• Erosion-related water quality impacts or loss of topsoil. • Increased potential for fuels and hazardous material release into surface water. • Important Farmland: dust and disruption of irrigation. • Dewatering that could result in discharge of turbid waters into the storm drain systems/ creeks. • Temporary emissions of criteria pollutants. • Disturbance to recreational facilities. • Impacts to scenic corridors. • Disruption of utilities. • Disturbance of historical or cultural sites, including from ground borne vibration. • Increase in noise levels and vibration. • Exposure to and/ or release of hazardous chemicals. • Effect on response times of emergency providers. • Need for assistance in traffic management. • Wildland fire hazard.	• Increased surface area of impervious surfaces. • Permanent impact to visual character. • Risk from fault rupture, severe ground shaking, liquefaction, or earthquake induced landslides capable of causing injury, structural damage, pipeline rupture and service interruption. • Location on an unstable geologic unit / soil that that could result in landslide, lateral spreading, subsidence, liquefaction or collapse causing damage to structures and service disruptions. • Increased exposure of the public and structures to flooding. • Increased stormwater runoff. • Increases to ambient noise. • Increase in water/ sewer charges.

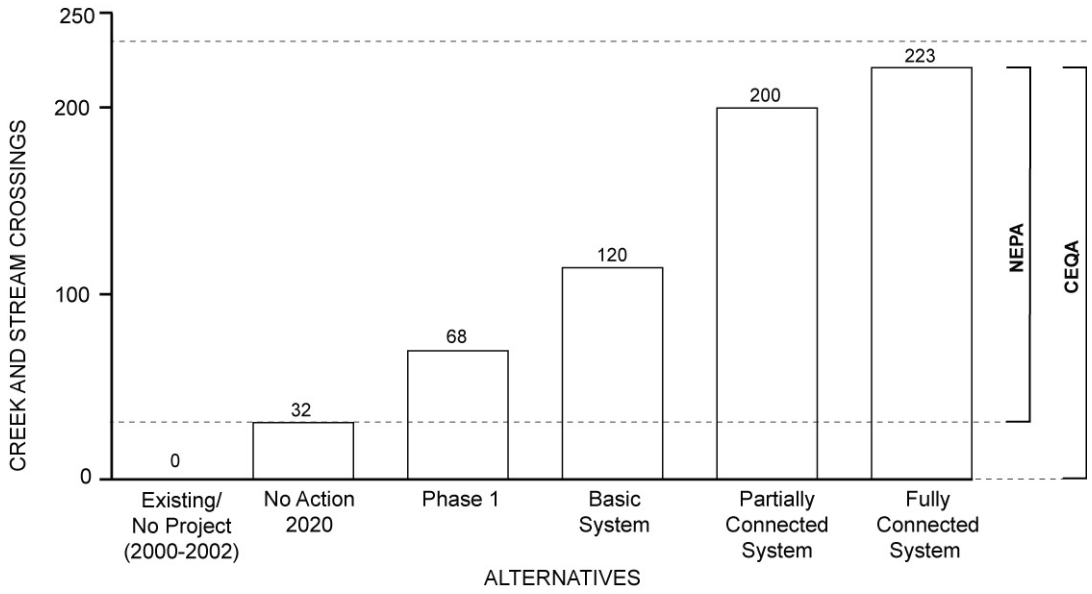
SOURCE: ESA, 2009.

Surface Hydrology

Based on the analysis conducted in **Section 3.2, Surface Hydrology,** potentially significant impacts under all the alternatives, including exposure of new facilities to flooding, increased impervious surface area, and alteration of storm flow patterns, would occur in proportion to the amount of facilities required under each alternative. The impacts would be mitigated to a less-than-significant level with incorporation of recommended mitigation measures. There would be no significant and unavoidable impacts on surface hydrology. A series of comparisons of stream crossings, discharge reduction, and number of facilities potentially impacted by sea level rise, which are generally in proportion to the amount of infrastructure, illustrates the differences in impacts for all the alternatives.

Chart 6-1 summarizes the number of stream crossings for the Basic System, Partially Connected, and Fully Connected Systems. Similarly, the Basic System would have the least amount of impervious surface area due to new facilities. Based on this comparison, the Basic System would require the least amount of stream crossings, and therefore cause the least impact on existing drainage patterns.

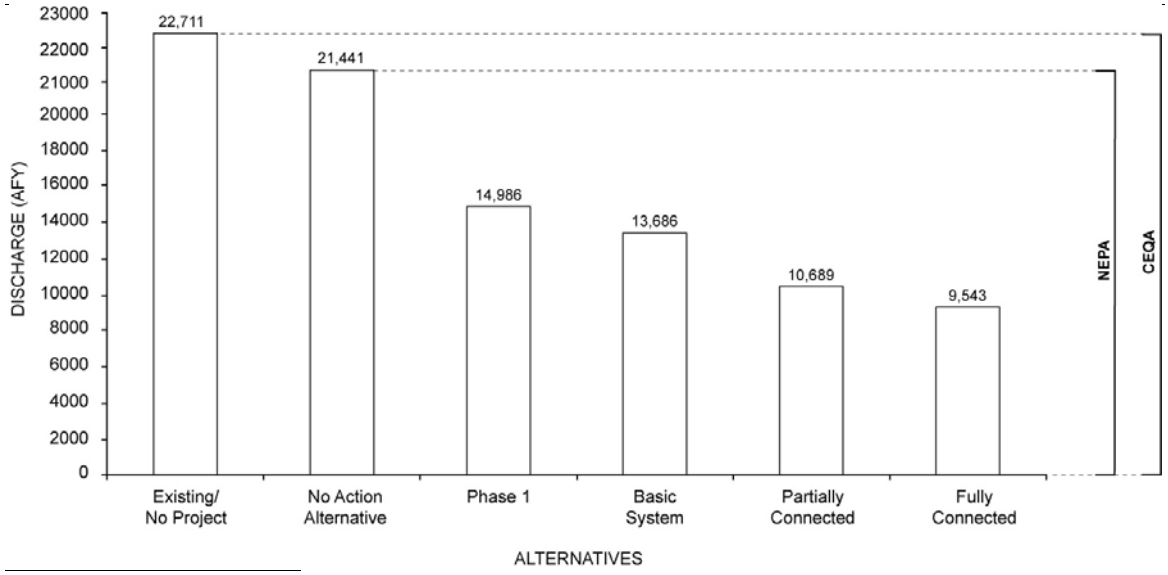
CHART 6-1
SUMMARY OF STREAM CROSSINGS BY ALTERNATIVE



SOURCE: ESA, 2009.

One of the project objectives is to enhance local and regional ecosystems, which can be partially achieved by reducing the treated wastewater discharge to surface water. The Fully Connected System would distribute the most recycled water for beneficial use, resulting in the largest reduction in treated effluent discharge to surface waters compared to the other alternatives. As shown in **Chart 6-2**, the amount of discharge reduction under the Basic System and the Partially

CHART 6-2
SUMMARY OF WASTEWATER DISCHARGE BY ALTERNATIVE



SOURCE: CDM, 2009; ESA, 2009.

Connected System is similar. The Partially Connected System would discharge approximately 20 percent less effluent than the Basic System, while the Fully Connected System would discharge approximately 11 percent less effluent than the Partially Connected System.

The potential for the number of new facilities that could be affected by sea level rise is summarized in **Table 6-5**. The Basic System has the least number of facilities that would potentially be affected. Therefore, although it would provide the least amount of recycled water, the Basic System would have the least amount of infrastructure construction, the least amount of stream crossings, and the least amount of new facilities that could be affected by sea level rise.

TABLE 6-5
COMPARISON OF ALTERNATIVES BASED ON SURFACE HYDROLOGY

	No Project Alternative	No Action Alternative	Phase 1	Basic System	Partially Connected System	Fully Connected System
Stream Crossings	0	32	68	120	200	223
Discharge (AFY)	22,711	21,441	14,986	13,686	10,689	9,543
Number of Facilities Potentially Affected by Sea Level Rise	0	1	3	5	8	8

SOURCE: CDM, 2009; ESA, 2009.

Groundwater

The analysis in **Section 3.3, Groundwater,** determined that proposed facilities would not significantly affect shallow groundwater levels and natural groundwater fluctuations. The Proposed Action would not cause localized increases in groundwater levels over the long-term, therefore the impact on structures or flooding patterns would be less than significant. The use and storage of recycled water would not significantly affect groundwater quality for potable and agricultural uses. Similarly, impervious surfaces constructed under the Proposed Action would not significantly affect groundwater recharge in the action area. There would be no significant and unavoidable impacts on groundwater. Comparison of groundwater pumping reduction, which is generally in proportion to the size and number of facilities under each alternative, illustrates the environmentally superior alternative.

Charts 6-3 and **6-4** demonstrate the amount of potential groundwater pumping reduction for the project alternatives in the Sonoma Valley and Napa MST areas. The impact under CEQA is shown as the difference between the No Project Alternative and the project alternatives and the impact under NEPA is shown as the difference between the No Action Alternative and the project alternatives. **Chart 6-3** shows that the groundwater pumping reduction in the Sonoma Valley area would be the same under all three alternatives except for the No Project and No Action Alternatives. Chart 6-4 focuses on the amount of groundwater pumping reduction in the MST area only, to provide a better basis for comparison among the alternatives. Based on the comparison in Chart 6-4, both the Partially Connected System and the Fully Connected System would provide a substantial offset of potable demand and would have the potential to reduce total groundwater pumping requirements by approximately 52 percent in the Napa MST area (see **Chart 6-3**). The Basic System would provide a 39 percent reduction in groundwater pumping compared to the No Project and No Action Alternatives. Based on these comparisons, as summarized in **Table 6-6**, the Fully Connected System would provide the greatest environmental benefit by offsetting the most groundwater use.

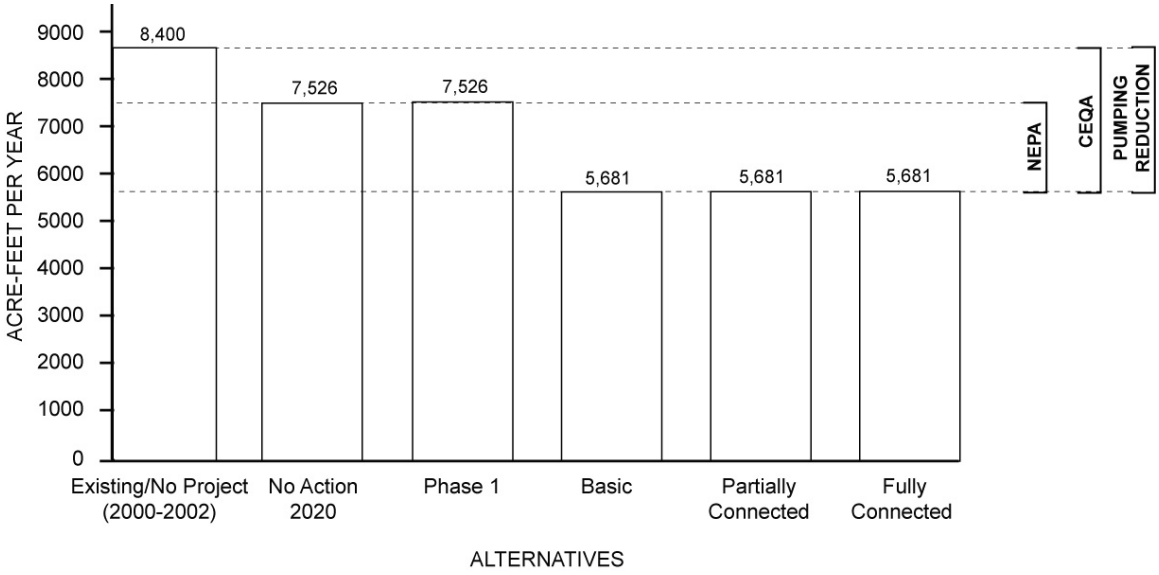
Water Quality

As discussed in **Section 3.4, Water Quality,** the impacts would include short-term construction-related stormwater impacts and long term effects related to recycled water use such as incidental runoff and beneficial impacts such as reduced discharge to surface water and water reuse for habitat restoration. The level of significant short-term construction impacts would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in fewer impacts.

Biological Resources

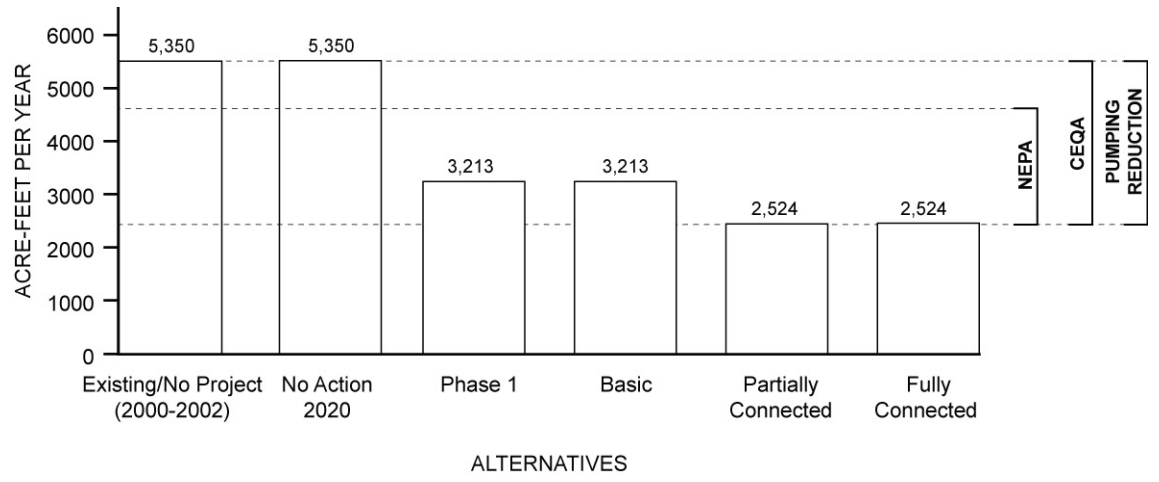
As discussed in **Section 3.5, Biological Resources,** the impacts to biological resource would include short-term construction-related impacts to wetlands, streams, and riparian habitat and special-status species such as California Red-Legged Frog and burrowing owl, fish and invertebrates. Based on this comparison of significant impacts on biological resources, the level of significant short-term construction impacts would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in the least amount of disturbance to biological resources.

CHART 6-3
SUMMARY OF POTENTIAL OFFSET IN
SONOMA VALLEY GROUNDWATER PUMPING UNDER EACH ALTERNATIVE



SOURCE: CDM, 2009; ESA, 2009.

CHART 6-4
SUMMARY OF POTENTIAL OFFSET IN
NAPA MST AREA GROUNDWATER PUMPING UNDER EACH ALTERNATIVE



SOURCE: CDM, 2009; ESA, 2009.

TABLE 6-6
COMPARISON OF ALTERNATIVES BASED ON SURFACE HYDROLOGY

	No Project Alternative	No Action Alternative	Phase 1	Basic System	Partially Connected System	Fully Connected System
Total Groundwater Pumping (AFY)						
Sonoma Valley	8,400	7,526	7,526	5,681	5,681	5,681
Napa MST	5,350	5,350	3,213	3,213	2,524	2,524
Percent Reduction						
Sonoma Valley	0	10	10	32	32	32
Napa MST	0	0	39	39	52	52

SOURCE: CDM, 2009; ESA, 2008.

	No Project Alternative	No Action Alternative	Phase 1	Basic System	Partially Connected System	Fully Connected System
Total Groundwater Pumping (AFY)						
Sonoma Valley	8,400	7,526	7,526	5,681	5,681	5,681
Napa MST	5,350	5,350	3,213	3,213	2,524	2,524
Percent Reduction						
Sonoma Valley	0	10	10	32	32	32
Napa MST	0	0	39	39	52	52

SOURCE: CDM, 2009; ESA, 2009.

Land Use

Based on the analysis conducted in **Section 3.6, Land Use,** the Proposed Action would not divide existing communities or conflict with land use plans and policies; the impacts would be less-than-significant. There could be significant construction-related impacts to agricultural resources under all three alternatives, in proportion to the size and number of facilities implemented under each alternative. However, these impacts would be mitigated to a less-than-significant level.

As noted in Section 3.6, the temporary impacts to agricultural land could occur only during the short-term construction period and would be mitigated to a less-than-significant level. This impact assumes a worst case scenario regarding right of way acquisition along pipeline routes. It is anticipated that all pipelines would be constructed within public rights of way, such that this impact would be completely avoided. A comparison between the alternatives shows that the amount of temporarily affected farmland would be similar under both the Partially Connected and Fully Connected Systems, and lower under the Basic System. The impact under CEQA is shown as the difference between the No Project Alternative and the project alternatives and the impact under NEPA is shown as the difference between the No Action Alternative and the project alternatives. **Table 6-7** provides a comparison of alternatives based on affected acres of farmland.

TABLE 6-7
COMPARISON OF ALTERNATIVES BASED ON AFFECTED FARMLAND (acres)

	No Project Alternative	No Action Alternative	Basic System	Partially Connected System	Fully Connected System
Prime Farmland	0	26.5	44.6	69.2	72.2
Farmland of Statewide Importance	0	15.9	85.3	106.1	107.4
Unique Farmland	0	0.0	24.3	31.0	37.0
Farmland of Local Importance	0	52.8	109.3	166.6	175.9
Total Important Farmland	**0**	**95.3**	**263.5**	**372.9**	**392.5**

SOURCE: CDM, 2009; ESA, 2009.

Traffic

As discussed in **Section 3.7, Transportation and Traffic,** the impacts would include short-term construction-related impacts to level of service, circulation patterns, alternative transportation, parking demand, accident potential, and wear and tear on haul routes. The level of significant short-term construction impacts would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in the least amount of disturbance to traffic conditions.

Air Quality

As discussed in **Section 3.8, Air Quality,** the impacts would include increase in criteria pollutants, toxic air contaminants, and greenhouse gas emissions. The level of significant short-term construction impacts would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in fewer impacts.

Noise

As discussed in **Section 3.9, Noise,** the potentially significant, but mitigable impacts would include short-term construction-related noise and vibration. The level of short-term construction impacts would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in the least amount of construction related noise. Similarly, the Basic System would have the least amount of recycled water delivery, and therefore, the least amount of pumping related noise.

Hazardous Materials

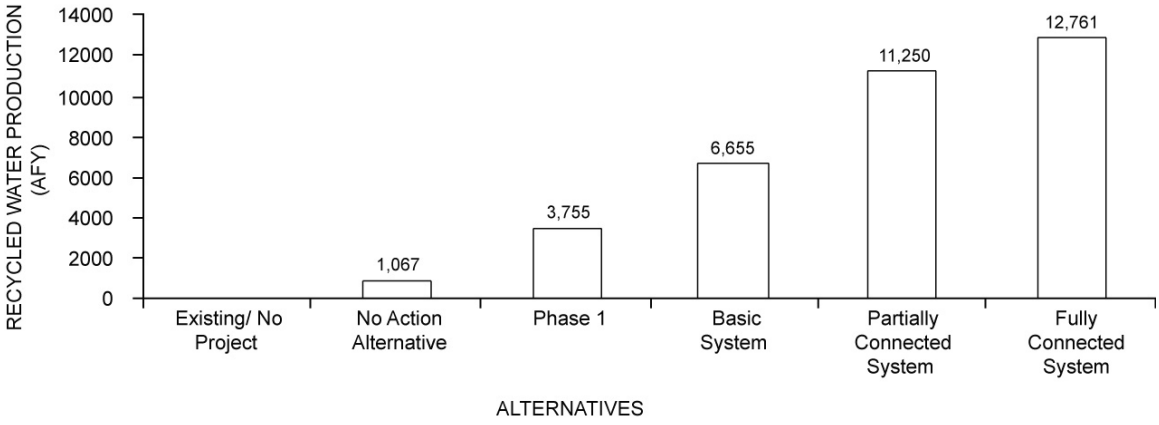
As discussed in **Section 3.10, Hazardous Materials,** the impacts would include the potential for short-term construction-related exposure or accidental release of materials common to construction. Additionally, some facilities would be located within wildland fire hazard areas. The level of significant short-term construction impacts would be similar under the Partially

Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in the least amount of potential exposure during construction.

Public Services and Utilities

Based on the analysis conducted in **Section 3.11, Public Services and Utilities,** the Proposed Action would create a less-than-significant demand for power. There could be significant impacts to public services under all the alternatives except the No Project Alternative and the impacts would be in proportion to the size and number of facilities implemented under each alternative. **Chart 6-5** differentiates among alternatives based on the increase in recycled water use and offset of potable water supply. Significant temporary and long-term impacts to public services as a result of construction and operational activities, such as increased response times for emergency service providers, need for police and fire assistance during construction, and temporary disruption to utility services, would occur in proportion to the size and number of facilities proposed under each alternative, however the impact would be mitigated to a less-than-significant level. Implementation of the Proposed Action would have a beneficial impact to the offset of potable water supply use.

CHART 6-5
SUMMARY OF PRODUCTION OF RECYCLED WATER FOR BENEFICIAL USE AND OFFSET OF POTABLE WATER DEMAND BY ALTERNATIVE



SOURCE: CDM, 2009; ESA, 2009.

The Fully Connected System would require maximum emergency service assistance during construction, create the most barriers within emergency access routes, and provide the most opportunity for disruption of public services, such as power outages, road closures, and water service interruption. However, based on Chart 6-5, the Fully Connected System would generate the most recycled water to offset potable demand, which would include Russian River water offsets (see **Table 6-8**).

TABLE 6-8
COMPARISON OF ALTERNATIVES BASED ON REUSE AND OFFSET

	Basic System	Partially Connected System	Fully Connected System
Total Recycled Water (AF)	6,655	11,250	12,761
Russian River Demand Offset (AF)*	1,179	2,022	2,148

* Equivalent to recycled water use for urban landscape and irrigation purposes in Marin and Sonoma areas.

SOURCE: CDM, 2009; ESA, 2009.

Cultural Resources

Based on the analysis conducted in **Section 3.12, Cultural Resources,** the Proposed Action would not significantly affect the setting of historic or archaeological resources. There could be significant impacts to unidentified human remains and buried archaeological materials in sensitive areas from construction activities and ground-borne vibration under all the alternatives, except the No Project Alternative and the impacts would occur in proportion to the number and size of the facilities implemented under each alternative. However, the significant impacts would be mitigated to a less-than-significant levels after implementation of the recommended mitigation measures. There would be no significant and unavoidable impacts to cultural or historic resources.

Based on this comparison of significant cultural resource impacts under the different alternatives, the Basic System involves the least amount of facilities, and therefore would result in the least significant impacts. There would be fewer construction sites and less excavation required for the implementation of the Basic System.

Recreation

Based on the analysis conducted in **Section 3.13, Recreation,** there would be a significant temporary impact to recreational facilities under all the alternatives except for the No Project Alternative, in proportion to the number and size of the facilities implemented under each alternative. However, incorporation of the recommended mitigation measures would reduce the impacts to recreational resources to a less-than-significant level. Thus, there would be no significant impacts on recreation.

Based on this comparison of significant impacts on recreational resources, the level of significant short-term construction impacts would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in the least amount of disturbance to recreational facilities.

Aesthetics

As discussed in **Section 3.14, Aesthetics,** the impacts would include short-term construction-related impacts to scenic vistas, scenic corridors, impacts from new sources of light, and permanent

impacts to visual character. The level of significant short-term construction impacts and long-term effects would be similar under the Partially Connected and Fully Connected Systems, while the Basic System involves the least amount of facilities, and therefore would result in the least amount of construction related visual effects and permanent impacts to scenic vistas.

Socioeconomics

Section 3.16, Socioeconomics, describes the increase in jobs, wages and salaries, and output in the regional economy, as part of the project impacts, which would occur in proportion to the number and size of facilities implemented under each alternative. Construction of the treatment plant upgrades, pipelines, pump stations, and storage reservoirs, would require employment of engineers, construction supervisors, and general construction laborers. These activities would result in economic effects, or increases in jobs, wages and salaries, and economic output in the regional economy. There would be no adverse significant and unavoidable impacts to the regional economy under the individual alternatives.

To differentiate among the three project alternatives, **Chart 6-6** provides for a comparison of regional economic impacts. **Chart 6-6** illustrates the direct and secondary economic benefits that would be experienced under each alternative. The impact under CEQA is shown as the difference between the No Project Alternative and the project alternatives and the impact under NEPA is shown as the difference between the No Action Alternative and the project alternatives. Based on this analysis, the Fully Connected System would result in the greatest amount of economic benefits.

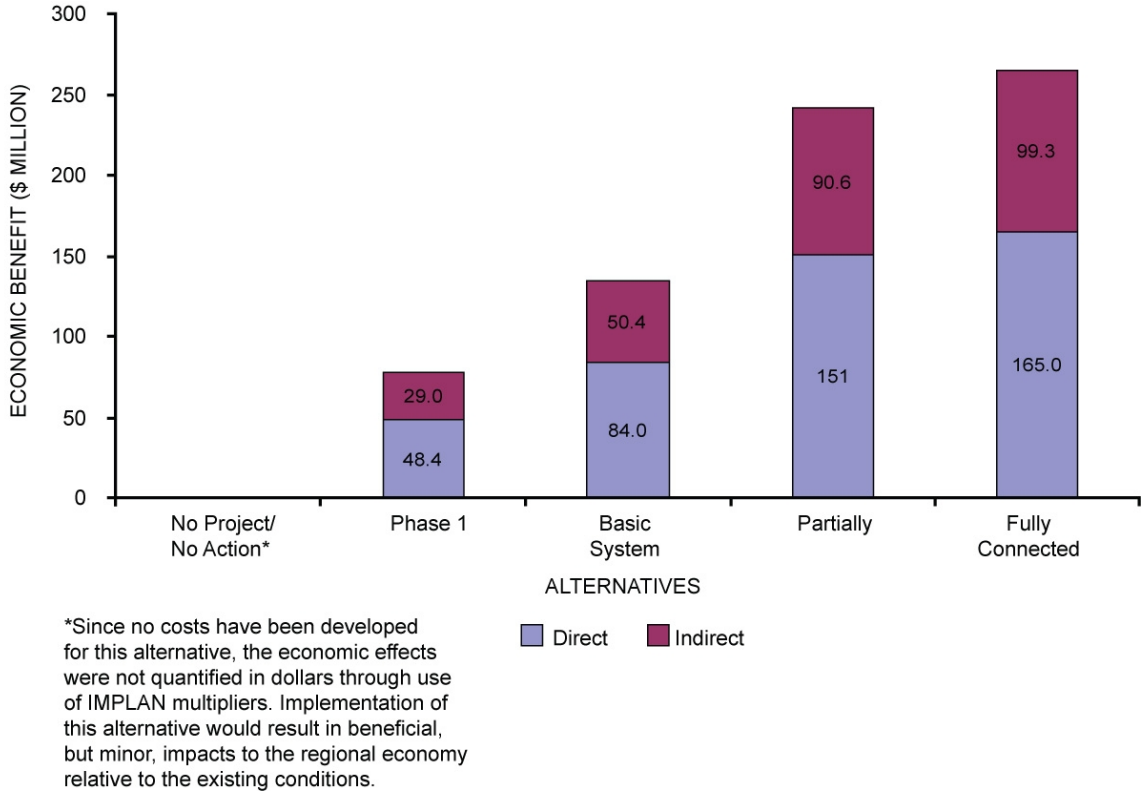
The analysis in Section 3.16, Socioeconomics, also concluded that customer fees would increase as the project costs increase. As a basis of comparison between alternatives, notwithstanding that funding plans have not been formulated for any of the alternatives, the Fully Connected System would have the potential for the greatest adverse impact to disposable incomes because it is the most expensive of all the alternatives.

Based on this comparison of significant adverse socioeconomic impacts under the three alternatives (see **Table 6-9**), the Basic System would involve the least amount of facilities, which would result in the least amount of economic benefit from construction labor requirements, however would have the least overall project costs and result in the least amount of customer fees.

6.4.3 Economic Feasibility

The economic feasibility of the project alternatives was assessed by comparing the costs that would be incurred for implementation of the individual alternatives. The Phase 3 Feasibility Study presented an economic and financial capability analysis to determine the cost-effectiveness of the Proposed Action. The economic and financial capability analysis is prepared according to the U.S. Department of the Interior Bureau of Reclamation (Reclamation) Title XVI Water Reclamation and Reuse Program Feasibility Study Directives and Standards WTR 11-01 (CDM, 2008).

CHART 6-6
SUMMARY OF IMPACTS ON REGIONAL ECONOMY BY ALTERNATIVE



SOURCE: CDM, 2008; ESA, 2009.

TABLE 6-9
COMPARISON OF ALTERNATIVES BASED ON SOCIOECONOMIC IMPACTS

	No Project Alternative	No Action Alternative	Basic System	Partially Connected System	Fully Connected System
Economic Benefit					
Direct (million $)	0	48.4	84.0	151.0	165.0
Indirect (million $)	0	29.0	50.4	90.6	99.3

SOURCE: CDM, 2008; ESA, 2009.

The life cycle costs analysis calculates annual capital costs of implementation of Phase 1 projects over a 50-year period of analysis using a 3 percent real discount rate and adds annual operations and maintenance (O&M) costs (see **Table 6-10**). As shown in Table 6-10, the life cycle cost analysis indicates the lowest costs for the Basic System.

TABLE 6-10
LIFE CYCLE COST ANALYSIS

Life Cycle Costs (dollars $)	Basic System	Partially Connected System	Fully Connected System
	Phase 1	Phase 1	Phase 1
Total Capital Costs	$100,400,000	$101,100,000	$102,300,000
Annual Capital Costs	$3,902,096	$3,929,301	$3,975, 940
Annual O&M Costs	$1,270,000	$1,272,000	$1,277,000
Total Annual Costs	$5,172,096	$5,202,301	$5,252,940
Supply (AF)	3,756	3,756	3,756
$ per acre-foot	$1,377	$1,385	$1,339

6.5 Summary of Comparison of Project Alternatives

The following analysis examines each of the proposed alternatives (i.e., No Project Alternative, No Action Alternative, the Basic System, Partially Connected System, and Fully Connected System) for their ability to meet the stated project objectives (see summary in **Table 6-11)**, their ability to reduce or avoid potential impacts, and their implementation costs. **Table 6-12**, at the end of this section, provides a summary the various trade-offs associated with each Action Alternative.

Comparison of Action Alternatives

Table 6-4 describes the ability of the project alternatives to meet each objective listed above. In general, each of the Proposed Action Alternatives has the ability to meet the stated Project Objectives. The level to which these objectives are met varies with the alternatives. Based upon this rating, all the Action Alternatives are capable of meeting the project objectives, but to varying degrees.

6.5.1 No Project Alternative

Ability to Meet Project Objectives

As noted in Table 6-11, the No Project Alternative fails to achieve any of the project objectives, which are directed at improving water supply reliability, recharging groundwater, offsetting surface water demand, minimizing environmental impacts, achieving financial sustainability, and protecting human health; therefore implementation of an alternative water project is required.

Environmental Effects

Implementation of the No Project Alternative would avoid the construction related impacts and operational impacts identified for the Proposed Action. However, implementation of the No

TABLE 6-11
ABILITY OF PROJECT ALTERNATIVES TO MEET PROJECT OBJECTIVES

Project Objectives	Project Alternatives				
	Basic System	**Partially Connected System**	**Fully Connected System**	**No Action Alternative**	**No Project Alternative**
Offset urban and agricultural demands on potable supplies.	**Yes.** Basic System would provide 6,655 acre-feet of recycled water per year for beneficial use. Water recycling alleviates demand on potable supplies by providing an alternate water supply.	**Yes.** Partially Connected System would provide 11,250 acre-feet of recycled water per year for beneficial use. Water recycling alleviates demand on potable supplies by providing an alternate water supply.	**Yes.** Fully Connected System provides the maximum amount of recycled water per year for beneficial use. Development of 12,761 AFY of recycled water would alleviate demand on potable supplies by providing an alternate water supply.	**Yes.** Individual projects reasonably anticipated to occur would provide 1,067 acre-feet of recycled water per year that could offset potable demand, but to a substantially lesser degree than any of the Project Alternatives.	**No**. No projects that could offset potable demand would be implemented.
Enhance local and regional ecosystems.	**Yes.** Provides potable demand offset of 6,455 AFY, reduces discharge to receiving waters, and provides 5,825 AFY to Napa Salt Marsh for habitat enhancement.	**Yes.** Provides potable demand offset of 11,060 AFY, reduces discharge to receiving waters, and provides 2,933 AFY to Napa Salt Marsh for habitat enhancement.	**Yes.** Provides potable demand offset of 12,561 AFY, reduces discharge to receiving waters, and provides 3,085 AFY to Napa Salt Marsh for habitat enhancement.	**Partial**. Provides reduce potential demand offset of 1,067 AFY, reduces discharge to receiving waters, and provides 3,257 AFY for habitat restoration assuming Napa Salt Marsh Pipeline is constructed.	**No.** The Proposed Action establishes an allocation of recycled water to be used for habitat restoration; this would not be implemented under the No Action Alternative.
Improve local and regional water supply reliability.	**Yes.** Provides potable demand offset of 6,655 AFY for local surface and groundwater supplies, as well as imported Russian River supplies.	**Yes.** Provides potable demand offset of 11,250 AFY, for local surface and groundwater supplies, as well as imported Russian River supplies.	**Yes.** Provides potable demand offset of 12,761 AFY, for local surface and groundwater supplies, as well as imported Russian River supplies.	**Partial**. Provides reduce potential demand offset of 1,067 AFY, for local surface and groundwater supplies, as well as imported Russian River supplies.	**No**. No infrastructure would be implemented; there would be no improvement in water supply reliability.
Maintain and protect public health and safety.	**Yes.** All treatment distribution and use of recycled water would be in compliance with Title 22.	**Yes.** All treatment distribution and use of recycled water would be in compliance with Title 22.	**Yes.** All treatment distribution and use of recycled water would be in compliance with Title 22.	**Yes.** All treatment distribution and use of recycled water would be in compliance with Title 22.	**No**. No Proposed Action facilities would be implemented.
Promote sustainable practices.	**Yes.** Provides potable demand offset of 6,655 AFY for local surface and groundwater supplies, as well as imported Russian River supplies. Recycles treated effluent that would be discharged to receiving waters. Provides reliable water supply that has low energy and cost requirements compared to development of new water supply sources.	**Yes.** Provides potable demand offset of 11,279 AFY for local surface and groundwater supplies, as well as imported Russian River supplies. Recycles treated effluent that would be discharged to receiving waters. Provides reliable water supply that has low energy and cost requirements compared to development of new water supply sources.	**Yes.** Provides potable demand offset of 12,761 AFY for local surface and groundwater supplies, as well as imported Russian River supplies. Recycles treated effluent that would be discharged to receiving waters. Provides reliable water supply that has low energy and cost requirements compared to development of new water supply sources.	**No.** Provides potable demand offset of 1,067 AFY for local surface and groundwater supplies, as well as imported Russian River supplies. Recycles treated effluent that would be discharged to receiving waters. Provides reliable water supply that has low energy and cost requirements compared to development of new water supply sources.	**No**. The No Action Alternative does not provide sustainable benefits or promote sustainable practices.

TABLE 6-11 (Continued)
BASIC SYSTEM, PARTIALLY CONNECTED SYSTEM, AND FULLY CONNECTED SYSTEM– ABILITY TO MEET PROJECT OBJECTIVES

	Project Alternatives*				
Objectives	**Basic System**	**Partially Connected System**	**Fully Connected System**	**No Action Alternative**	**No Project Alternative**
Give top priority to local needs for recycled water.	**Yes.** Basic System emphasizes delivery of recycled water within the individual service areas. Recycled water will remain be used to offset potable demand within each the four local service areas.	**Yes.** Interconnectivity between service areas will be expanded to improve the ability to provide recycled water to offset potable demand within each the four service areas.	**Yes.** Fully Connected System represents maximum build- out of recycled water facilities and maximum connectivity between service districts. Recycled water service will be extended throughout the service areas.	**Yes.** Projects reasonably likely to occur under the No Action Alternative are strictly individual projects designed to serve local uses. No benefit of cooperative facilities or funding.	**No**. The No Project Alternative does not support local water needs, and does not establish any priority for recycled water delivery.
Implement recycled water facilities in an economically viable manner.	**Yes.** Over the long-term, development of the water recycling facilities proposed under the Basic System is a cost-effective approach to addressing water supply issues. This alternative represents the lowest cost of the three project alternatives.	**Yes.** Over the long-term, development of the water recycling facilities proposed under the Partially Connected System is a cost-effective approach to addressing water supply issues. This Alternative represents the mid-range cost of the three project alternatives. There is potential for cost-sharing among Member Agencies.	**Yes.** Over the long-term, development of the water recycling facilities proposed under the Fully Connected System is a cost-effective approach to addressing water supply issues. This Alternative represents the highest cost of the three project alternatives, but also allows for the most cost sharing between Member Agencies.	**No.** Individual projects that are reasonably anticipated to occur would be forced to rely on local funding and would not receive federal and state funding.	**No**. No Proposed Action facilities would be implemented.

SOURCE: ESA, 2009.

Project Alternative would not provide the benefits of water reclamation which include recycled water use, potable supply savings, reduced reliance on surface and groundwater, reduced groundwater pumping, and habitat enhancement. Under current conditions, the No Project Alternative would not assist in alleviating current water reliability, either locally or regionally, particularly during peak demand periods. The No Project Alternative would not comply with State goals for water recycling, and would not reduce or assist in management of discharges to San Pablo Bay.

Implementation of the No Project Alternative would amount to a continuation of the current conditions, which would not involve construction-related impacts, like those anticipated under the proposed Action Alternatives. All the other project alternatives would cause environmental impacts, which are discussed above and in **Chapter 3**; the impacts would not occur if the No Project Alternative were implemented. However, the No Project Alternative would fail to improve water quality and groundwater overdraft. Therefore, the No Project Alternative is not considered environmentally superior.

6.5.2 No Action Alternative

Ability to Meet Project Objectives

Implementation of the No Action Alternative would partially meet some the project objectives, as it assumes that a smaller subset of recycled water projects, providing approximately 1,067 afy of recycled water, would be implemented (see Table 6-11). The No Action Alternative would not satisfy any of the project objectives to the degree provided by the three Action Alternatives, and it would not meet the objective of providing regional water supply reliability, as no connections between the WWTPs would occur. The No Action Alternative would also have a subset of the impacts identified in Section 3.0, primarily associated with the construction of the facilities that individual member agencies would be able to implement without the benefit of regional coordination or federal funding.

This alternative would not involve the capital costs associated with the Basic, Partially Connected, and Fully Connected Systems; however it would not be the most economically superior alternative. Financial constraints would limit implementation to local projects (e.g., SVCSD would only implement Alignment 1A) and these projects would be ineligible for federal or state funding.

Environmental Effects

Under the No Action Alternative, projects in the Novato SD and SVCSD service areas would likely occur, and would provide approximately 1,067 AFY of recycled water. Adverse environmental impacts associated with the construction of pipelines and pump stations would occur under the No Action Alternative, however to a lesser degree than the Basic, Partially Connected, and Fully Connected Systems. The impacts would likely be shorter in duration and would affect fewer sensitive receptors than those expected under implementation of the Proposed Action. In general, construction-related emissions and impacts to air quality, and increased

ambient noise would result under the other action alternatives except for the No Project Alternatives. Similarly, the No Action Alternative would potentially affect cultural, surface water, or biological resources in the SVCSD, Novato SD, and Napa SD service areas. The four service areas would experience some level of beneficial socioeconomic impact under the three action alternatives, while there would be no impact under the No Action Alternative.

Although the level of environmental impacts related to construction impacts would be of a smaller scale, the No Action Alternative would not result in the level of potable offset for imported surface water, local surface water and groundwater supplies that would be provided under the Action Alternatives. Similarly, it would not substantially alter the amount of treated effluent discharged to tributaries to North San Pablo Bay. Over time, demand pressures on imported surface water, local surface water, and groundwater supplies would be increased, and current water supply and delivery reliability issues would be exacerbated as growth under the approved General Plans within the NBWRP service area occurs. The No Action Alternative would not take advantage of a local, sustainable, and energy efficient water supply.

Because it would not substantially offset potable demand or reduce groundwater pumping, and would not significantly reduce or assist in management of effluent discharge to San Pablo Bay, the No Action Alternative is not considered environmentally superior.

6.5.3 Alternative 1: Basic System

Ability to Meet Project Objectives

The Basic System would be consistent with the Proposed Action's stated objectives, as discussed in Table 6-11. From an economic standpoint, projected capital costs associated with the Basic System are estimated at $209 million[1], with annual operations and maintenance costs estimated a $1.8 million. This represents the lowest capital cost of the three action alternatives.

Environmental Effects

Based on the comparison of environmental effects in Section 6.3, the Basic System is the environmentally superior alternative in almost all resource areas. As noted in Section 6.3, there would be no significant and unavoidable impacts associated with the Basic System. Chapter 3 recommends measures to mitigate any significant impacts to a less-than-significant level. Effects on natural resources would be in proportion to the size and number of facilities proposed. Most of the adverse environmental impacts would be associated with construction activities; the Basic System requires construction of the least amount of infrastructure, therefore would result in less construction-related impacts. Of all of the action alternatives, the Basic System requires the least amount of storage, making use of existing storage or land available at the WWTPs. Implementing the larger recycled water distribution systems would require additional storage. However, the facilities proposed under the Basic System would have the lowest capacity to treat and distribute

[1] Costs are shown in 2008 dollars. All costs were escalated to April 2008 dollars using the Building Cost Index. (CDM, 2008)

recycled water, and would therefore reduce the least amount of discharge to the tributaries of North San Pablo Bay.

6.5.4 Alternative 2: Partially Connected System

Based on the comparison of environmental effects in Section 6.3, the Partially Connected System is not the environmentally superior alternative in any resource area. In most cases, the impacts for the Partially Connected System would be greater than the impacts under the Basic System, and would be similar to impacts under the Fully Connected System. Although most significant impacts would be mitigated to a less-than-significant level, the Partially Connected System would require more infrastructure than the Basic System, and therefore result in more construction-related impacts.

The Partially Connected System would be consistent with the Proposed Action's stated objectives. It would expand regional interconnectivity, provide a greater amount of recycled water to offset potable demand, and provide greater amount of water for habitat restoration. From an economic perspective, the Partially Connected Alternative is moderately economically viable, as it represents the mid-range cost of the three action alternatives. Projected capital costs associated with the Partially Connected System are estimated at $377.5 million, with annual operations and maintenance costs estimated at $2.8 million.

6.5.5 Alternative 3: Fully Connected System

Based on the comparison of environmental effects in Section 6.3, the Fully Connected System is the environmentally superior alternative in several impact areas. The Fully Connected System would reduce the maximum amount of discharge to the Bay, offset the maximum amount of groundwater pumping, and provide the maximum amount of recycled water use. Although, most of these benefits are related to water supply and water quality, the Fully Connected System could result in adverse impacts to existing drainage patterns and stormwater flow, as well as temporary construction-related impacts to water quality.

The Fully Connected System would be consistent with the project objectives. By providing maximum recycled water, the Fully Connected Alternative would be capable of significantly offsetting potable demand and increasing water supply reliability, expanding regional interconnectivity, and supporting habitat restoration. From an economic perspective, the Fully Connected System would be beneficial to the regional economy, as discussed above. However, projected capital costs associated with the Fully Connected System are estimated at $414 million, with annual operations and maintenance costs estimated at $3.1 million. This represents the highest cost alternative, which is not the most economically viable alternative.

The tradeoffs associated with implementing one alternative over another are summarized below in **Table 6-12**.

TABLE 6-12
TRADEOFFS ASSOCIATED WITH EACH ALTERNATIVE

Alternative	Benefits	Disadvantages
No Project Alternative	No cost to individual Member Agencies	No additional recycled water for potable offset or habitat enhancement
	No adverse environmental impacts as a result of project construction and operation	No reduction of discharge to San Pablo Bay
		No regional interconnectivity or improvement of regional water supply reliability.
No Action Alternative	Lower costs than Proposed Alternatives	Minimum amount of recycled water for beneficial reuse and habitat enchantment
		Projects would be implemented without federal funding
		No regional interconnectivity
		Minimal improvement of local water supply reliability
Basic System	Lowest cost of Action Alternatives Lowest adverse environmental impacts	Minimum amount of recycled water for potable offset.
Partially Connected System	Medium costs, recycled water reuse, environmental impacts	Greater costs than Basic System
		Greater impacts from construction
Fully Connected System	Maximum amount of wastewater discharge reduction Maximum amount of recycled water for beneficial reuse and habitat enhancement	Maximum costs; Maximum impacts from construction

SOURCE: ESA, 2008.

6.6 Alternatives to the Project

A number of potential alternatives to the project were considered by NBWRA, however were not carried forward and not evaluated at level equal to the Action Alternatives in this EIR/EIS due to factors such as lack of feasibility; lack of environmental advantages; and/or inability to meet the basic objectives of the project.

6.6.1 Importation of Water

Under this alternative, potable or treated recycled water would be imported to Sonoma, Napa, or Marin counties from another community not participating in the NBWRA, such as Windsor, Yountville, Petaluma, Rohnert Park, Vallejo or Santa Rosa. For recycled water importation, a pipeline would be constructed from a sanitation district of another community to the users in Sonoma, Napa, or Marin, with booster pump stations to maintain sufficient water pressure.

Even if water were imported from the nearest community, this alternative would require construction of a large conveyance pipeline network to serve the LGVSD, Novato SD, SVCSD,

and Napa SD service areas. This alternative would require installation of a minimum of 50 miles of pipeline through a combination of roadways and undeveloped areas (ESA, 2006). This alternative was analyzed for the three criteria that were used to assess the alternatives of the project above.

For potable water importation into the region, expansion of the Department of Water Resources (DWR) North Bay Aqueduct (NBA), the capacity of which is fully allocated, would be necessary. This would also entail identification and acquisition of additional State Water Project (SWP) entitlements to serve additional supplies to the MST area, or other NBWRA service areas. For cost comparison, the Phase 3 Feasibility Study (CDM, 2008) included expansion of the NBA to provide 1,937 AFY of imported water to Napa MST area. Facility expansion would require a series of new pipeline alignments and booster pump station from Barker Slough. The cost of this type of system is estimated at $40 million, plus an additional $8 million in legal fee and bonding fees. Additional local cost beyond NBA expansion costs would include a new potable distribution system to the MST Area, and long-term water supply costs. Importation of SWP supplies to the MST area are estimated at approximately $96 million (CDM, 2008).

Ability to Meet Project Objectives

Table 6-13 summarizes the ability of Imported Water Alternatives, both recycled and potable supplies, to meet the stated project objectives. Importation of recycled water into the NBWRP service area would have the potential to meet some of the objectives, in that it would provide a recycled water supply to offset the use of potable supplies for irrigation. However, it is not anticipated that these alternatives would provide a more sustainable or cost effective water supply, given the pipeline distances involved.

Fundamentally, these alternatives would not offset potable supplies currently used for irrigation. Rather, they would continue to use imported potable supplies to meet irrigation demands. These alternatives would not reduce the amount of treated effluent discharge to tributaries of North San Pablo Bay, and would not provide a reliable habitat enhancement water supply for the Napa Salt Ponds. Additional importation of potable supplies would not improve the reliability to local water supplies, as SWP supplies are subject to drought year reliability.

Significant Effects

Importation of recycled water from an outside community would incur similar impacts as the alternatives of the project discussed above. Impacts associated with pipeline construction would include short-term impacts to aesthetics, air quality, biological resources, hazards and hazardous materials, water quality, land use, noise, public services and utilities, and traffic. Pipeline construction could also result in temporary and permanent disturbance to jurisdictional wetlands and other waters, riparian habitat, special-status plant and animal species, and known or unknown cultural resources.

This alternative would cause lesser impacts to surface hydrology and reduce groundwater pumping; however, these effects would occur outside the action area and would not address

TABLE 6-13
ABILITY OF ACTION ALTERNATIVES TO MEET PROJECT OBJECTIVES

	Alternatives of the Project			Alternatives to the Project		
				Importation of Water		Desalination
Objectives	Basic System	Partially Connected System	Fully Connected System	Importation of Recycled Water	Importation of Potable Water (SWP via the NBA)	MMWD or SVCSD Plant
Offset urban and agricultural demands on potable supplies.	**Yes**	**Yes**	**Yes**	**Yes.** If new infrastructure is established to convey recycled water from the outside community's treatment facility, importation and use of recycled water would offset potable water use in the action area.	**No**. If potable water (i.e. SWP water) is imported from an outside community, potable demand and impacts to surface water would be shifted to a different location, but would fail to offset potable demand.	**Yes**. Desalination of sea water would offset potable demand by processing seawater.
Enhance local and regional ecosystems.	**Yes**	**Yes**	**Yes**	**Yes**. Although this alternative does not directly incorporate habitat restoration, it could result in reduced groundwater pumping, improve the groundwater overdraft situation, and contribute to improved stream flow hydrology and riparian habitat. However, this alternative would not reduce wastewater discharge produced in the action area.	**Yes**. Although this alternative does not directly incorporate habitat restoration, it could result in reduced groundwater pumping, improve the groundwater overdraft situation, and contribute to improved stream flow hydrology and riparian habitat. However, this alternative would not reduce discharge produced in the action area.	**No.** Brine effluent/ discharge could affect aquatic ecosystems. This alternative does not allocate water for habitat restoration.
Improve local and regional water supply reliability.	**Yes**	**Yes**	**Yes**	**No.** Importation of recycled water would connect an outside community to part of the action area, but would not effectively improve interconnectivity within the action area. It could improve water supply reliability within portions of the action area, but the effect on outside water supply reliability is unclear.	**No**. Increased reliance on potable water would not improve overall water supply reliability.	**Yes**. This alternative emphasizes local water supply. Seawater is an accessible and available water supply source.
Maintain and protect public health and safety.	**Yes**	**Yes**	**Yes**	**Yes.** Elements of the alternative would not compromise human health.	**Yes**. Elements of this alternative would not compromise public health.	**Yes**. Elements of this alternative would not compromise public health.
Promote sustainable practices.	**Yes**	**Yes**	**Yes**	**No.** Although this alternative promotes reuse of water, it would potentially incur greater construction-related impacts.	**No**. Importation of potable water from an outside community would not holistically address water supply issues. It would require extensive construction, incur construction-related impacts, and have high capital costs.	**Yes**. Desalination is would use seawater as source, and the impacts would most likely be mitigated to a less-than-significant level. However, it may not improve long-term sustainability of the regional water system or enhance sensitive ecosystems, from a water supply, groundwater management, or habitat restoration perspective.

TABLE 6-13 (Continued)
SUMMARY OF THE BASIC, PARTIALLY CONNECTED, AND FULLY CONNECTED SYSTEMS COMPARED TO IMPORTATION OF WATER AND DESALINATION– ABILITY TO MEET PROJECT OBJECTIVES

	Alternatives of the Project			Alternatives to the Project		
				Importation of Water		Desalination
Objectives	Basic System	Partially Connected System	Fully Connected System	Importation of Recycled Water	Importation of Potable Water (SWP via the NBA)	MMWD or SVCSD Plant
Give top priority to local needs for recycled water.	**Yes**	**Yes**	**Yes**	**No.** Importation of recycled water from an outside community to the study area would not emphasize local water delivery.	**No**. Importation of potable water would exacerbate potable demand in the exporting community.	**Yes**. A desalination facility would provide water to the local water districts.
Implement recycled water facilities in an economically viable manner.	**Yes**	**Yes**	**Yes**	**Yes/ No.** This would be a cost-effective alternative. However, the potential for cost-sharing among agencies is reduced.	**No**. The capital costs to construct a distribution system would be equivalent to the cost to import recycled water. But, importation of potable water would be delivered via the NBA, the capacity of which is fully allocated; therefore importation of potable water would require expansion of the NBA, which makes costs prohibitive. Furthermore, the potential for cost-sharing among agencies would be reduced.	**Yes/ No**. The MMWD Plant, for example, would be cost-effective. However, the potential for cost-sharing among agencies is prohibited.

groundwater pumping issues within the action area in Sonoma, Napa, or Marin Counties. Similarly, importing recycled water would not reduce wastewater discharge within the action area, since recycled water sources would lie outside the action area.

Importation of potable water would require additional infrastructure, which would result in construction-related environmental impacts and a potential increase in potable demand outside the action area. Importing potable water would not reduce wastewater discharge within the action area.

Economic Feasibility

Under this alternative, the Member Agencies would face the institutional constraints of developing an agreement to obtain either recycled water or potable water supplies, prepare the cost estimates associated with purchase of the water, the costs of constructing new distribution infrastructure. Importing water from outside communities to individual service areas could require pipelines in excess of what would be required to develop connections between the four Member Agencies. For example, if water were imported to SVCSD from a community located at greater distances from Napa, such as Santa Rosa or Windsor, approximately 55 to 65 miles of pipeline would need to be constructed. It would require approximately 20 to 30 miles of pipeline to connect SVCSD to the LGVSD WWTP, Novato SD WWTP, or the Napa SD WWTP. For cost comparison, the Phase 3 Feasibility Study (CDM, 2008) included expansion of the NBA to provide 1,937 AFY of imported water to Napa MST area. **Table 6-14** provides a summary comparison of the NBWRA Phase I versus alternatives reviewed, but not considered further. Facility expansion would require a series of new pipeline alignments and booster pump station from Barker Slough. The cost of this type of system is estimated at $40 million, plus an additional $8 million in legal fee and bonding fees. Additional local cost beyond NBA expansion costs would include a new potable distribution system to the MST Area, and long-term water supply costs. Importation of SWP supplies to the MST area are estimated at approximately $96 million (CDM, 2008). Expansion of the NBA for this cost would only meet the needs of one of the NBWRP service areas.

TABLE 6-14
COMPARISON OF CAPITAL COSTS AND COST-EFFECTIVENESS FOR ALTERNATIVES TO THE PROPOSED ACTION

	NBWRA Alternative 1 Phase 1	Water Project (Sonoma and Marin Counties Portion of Action Area)	Import Water to MST Area (Napa County portion of Action Area)	Desalination (MMWD)
Annual Capital Costs ($)	4,702,725	6,781,232	3,719,428	121,100,000
Annual O&M Costs ($)	1,381,000	N/A	N/A	7,100,000*
Total Annual Costs ($)	6,083,725	6,781,232	3,719,428	
Supply (AF)	4,654	3,613	1,937	5,300
Dollar per acre-foot	1,307	1,877	1,920	24,169.80

SOURCE: CDM, 2008; ESA, 2009

6.6.2 Desalination

Desalination of saline water from San Pablo Bay would provide a reliable supply of water for irrigation. Currently, reverse osmosis (RO) treatment is the most cost-effective and feasible treatment option for desalination. The desalination plant could be sized and operated to provide a continuous source of supply. Due to the higher salinity of the source water and depending upon the efficacy of the RO process, the high salinity (~35,000 milligrams per liter of total dissolved solids), a flow of 5,500 AF of source water would produce approximately 2,750 AF of desalinated water.[2] As such, higher feed pressure and need to increase the treatment capacity would result in a high electric power requirement.

Desalination has been previously proposed for both Marin and Sonoma counties. The Marin Municipal Water District has developed a desalination project that would serve the City of San Rafael and Marin County. Construction of a 5-mgd desalination plant is proposed, and capacity could be expanded in 5 mgd increments, up to a maximum capacity of 15 mgd. The source water from San Rafael Bay would undergo several treatment processes at the facility including solid removal, reverse osmosis, and disinfection and addition of materials for taste. The potable product water generated at the facility would be 50 percent of the source water flowing into the facility. The brine produced in the reverse osmosis process would be blended with treated wastewater prior to discharge into the Bay. The solids would be disposed in the Redwood Landfill.

In Sonoma County, the desalination alternative would provide desalination of seawater to provide water supply for irrigation. The desalinated water would require blending with either recycled water or groundwater at the SVCSD WWTP prior to irrigation use. One option would be to size the plant to supply 2,750 AFY to the Sonoma Valley during irrigation months. Another option is a regional desalination plant that would provide irrigation as well as augmenting drinking water supplies for both the City of Sonoma and unincorporated areas of Sonoma County. The project would consist of an RO plant, an onshore pumping station and chemical treatment unit, a seawater intake structure, an onshore/offshore seawater supply pipeline between the onshore pump station and offshore seawater intake, pipelines to transport seawater and chemicals between the desalination plant and onshore pump station/chemical treatment area, and a pipeline to transport concentrated seawater brine from the desalination plant site to an ocean outfall. A desalination project could also require construction of a power substation (ESA, 2006).

Ability to Meet Project Objectives

Table 6-13 presents a summary of project alternative's consistency with stated project objectives and an analysis of alternatives of the project consistency with the objectives to support the decision to reject these alternatives. As noted above, some alternatives to the project would, in fact, be cost-effective; however, these alternatives do not achieve a majority of the project objectives. The desalination alternative (MMWD proposed plant) is more cost-effective than the three action alternatives, but does not satisfy stated project objectives (Table 6-11).

[2] Assuming 50 percent efficacy, the RO process would generate 50 percent desalinated water of the source water.

Environmental Effects

The environmental impacts associated with the desalination alternative would occur during construction of the project facilities similar to other alternatives. Construction activities would include construction of the RO plant, pipeline, and rebuilding the pier. Environmental impacts to aesthetics, ambient noise, and water quality are typically associated with desalination facilities.

Long-term effects would include water quality impacts from the discharge of the brine generated by the desalination process. The discharge would be dispersed by currents in San Pablo Bay, affecting temperature, nutrients, and turbidity and, therefore, the abundance and diversity of marine organisms. Areas of potential concern in relation to oceanography and marine water quality include temperature, dissolved oxygen, or salinity; possible localized changes in currents or in turbidity, due to the presence of intake pipes on the ocean bottom or due to the pumping/discharge of effluents from the desalination plant; and possible changes in dispersion of sewage plume effluent due to added discharge of brine effluent from the desalination plant. As such, a desalination project would require a baseline study to establish offshore conditions prior to desalination plant startup; and perform quarterly marine water quality/biological monitoring in accordance with the San Francisco Bay Regional Water Quality Control Board requirements during operational phase (ESA, 2006). Implementation of a desalination plant would also require construction of new facilities, which would incur construction-related impacts similar to those anticipated under the Proposed Action; therefore the desalination alternative would have a similar level of temporary environmental impact when compared to the three action alternatives.

Economic Feasibility

The capital costs and operations and maintenance costs could be prohibitive: the estimated capital cost of the MMWD plant is estimated at $121.1 million, with annual operations and maintenance costs as high as $7.1 million (Table 6-14). When compared to the proposed Basic System, a desalination plant would be more cost-effective[3], but the project may be ineligible for federal funding. Further, there are high energy costs associated with this alternative in addition to the costs for land acquisition, construction of seawater intake and potentially a brine water discharge line and brine water outfall. In addition, considering the extremely high cost for desalination, coupled with its greater dependency on large quantities of power, this alternative was not carried forward for further analysis.

6.6.3 Variations of Proposed Action Alternatives

During the scoping process for the NBWRP, members of the public requested that additional alternatives be developed and reviewed that addressed two central themes: 1) Prioritization of recycled water to offset urban demands that are served by Russian River supplies, and; 2) prioritization of recycled water to meet local demands first, thereby minimizing the carbon footprint of the selected alternative.

[3] Cost-effectiveness is based on the cost per AFY, calculated using estimated total AFY and costs.

The NBWRA recognizes that an infinite number of facility configurations are available within the region, and has formulated this analysis to most cost effectively serve identified users within the region. In effort to address this request, a "landscape only" alternative was reviewed. This alternative would include the following elements:

- Complete buildout of the NMWD Urban Recycled Water Plan, including all of the facilities envisioned under the Fully Connected Alternative, in Phase 1;
- Implementation of all LGVSD Projects in Phase 1;
- Reduction of Napa SD supplies for agricultural irrigation; and
- Reduction of supplies to SCVSD for agricultural irrigation.

A landscape-only alternative would provide approximately 3,920 afy of recycled water, and would require construction of 73 miles of pipeline, 4.0 mgd of tertiary treatment capacity, 6 acre-feet of storage, and 1,614 horsepower of pumping. The amount of pipeline is greater than Phase 1 by approximately 14 miles, due to the greater geographic distribution of end users.

Ability to Meet Project Objectives

A landscape-only alternative would not meet the stated project objective to offset urban and agricultural demands on potable supplies, as all recycled water would be prioritized to urban uses, and no recycled water would be made available to meet agricultural demands. Offset of groundwater pumped for agricultural uses would not occur, which is only of the clearly identified local needs for recycled water. A landscape-only alternative would focus funding to recycled water facilities in Marin, creating an equity issue among the NBWRA Member Agencies, and reducing the regional nature of the NBWRP.

Environmental Effects

The environmental effects of a landscape-only alternative would generally be similar to those associated with the Action Alternatives. Implementation of Phase 1 targeting this end user group would increase the miles of pipeline construction by approximately 14 miles, which would increase the scale and geographic distribution of impacts identified for Phase 1. This alternative would not avoid any impacts associated with the proposed Action Alternatives.

Economic Feasibility

Projected capital costs associated with a landscape-only variation are estimated at $108.4 million, making it comparable to Phase 1 of the Basic System. However, at the local level, this would shift a disproportionate application of funds to the NMWD/Novato SD and LGVSD projects, essentially building out 100% of those agency's recycled water programs as part of Phase 1. This would be an equity issue for NBWRP, but would also place a substantial financial burden on NMWD, Novato SD, and LGVSD to provide matching local funds in order to build out their local recycled water programs.

Because this alternative would not meet one of the stated project objectives, and would not be economically feasible due to the over-prioritization projects within certain Member Agencies, consideration of this alternative was not carried forward for further analysis.

6.7 Environmentally Superior Project Alternative

The lead agency is not required by CEQA or NEPA to adopt an environmentally superior alternative that will not feasibly attain project objectives or reduce environmental effects. In the process of selecting the environmentally superior alternative, NBWRA has evaluated several factors, including environmental effects, engineering and operational criteria, system reliability and flexibility, cost, and efficient coordination with other water recycling efforts, in determining which alternative is the best project to approve and implement.

CEQA and NEPA require that a lead agency demonstrate why a project or an alternative is selected. This is provided in the findings document that is adopted by the Board of Supervisors. The CEQA Guidelines indicate that when the No Project Alternative is the environmentally superior alternative, the EIR should identify an environmentally superior alternative from among the Proposed Action and other "action" alternatives. In this case, based on the discussion above the No Project Alternative is not the environmentally superior alternative. The No Action Alternative would cause the least amount of environmental impact, incrementally, due to its reduced facility requirements. The Basic, Partially Connected, and Fully Connected Systems may offer some advantage by increasing connectivity between the service areas.

The Basic System has been identified as the most environmentally, equitably, and financially sustainable alternative that will effectively fulfill the project objectives. The Basic System would provide adequate conveyance, pumping, and storage capacity that would result in 6,655 AFY of recycled water, therefore offsetting a substantial amount of potable demand and reducing wastewater discharge to San Pablo Bay. The Basic System would achieve the project objectives with least environmental impacts and costs, although would not provide the benefits from increased connectivity that would occur under the Partially and Fully Connected Systems. The Basic System would have the capacity to provide recycled water to offset potable demand and improve water supply reliability, although to a lesser degree than the Partially Connected and Fully Connected Alternatives. The Basic System appears to best meet the stated objectives of the project, for the following reasons:

1) The Basic System provides offset for urban and agricultural demands on potable supplies, although not to the degree provided by the Partially Connected and Fully Connected Systems.

2) The Basic System includes the greatest provision of recycled water to Napa Salt Ponds, as well as secondary benefit to local surface and groundwater supplies;

3) The Basic System would improve local and regional water supply reliability, although not to the degree provided by the Partially Connected and Fully Connected Alternatives.

4) The Basic System would maintain and protect public health and safety, as would all of the alternatives. The No Project Alternative was actually rated highest, as it would not construct or operate any proposed facilities.

5) The Basic System would promote sustainable practices by providing recycled water, although not to the degree provided by the Partially Connected and Fully Connected Alternatives.

6) The Basic System is the most local of the alternatives, as no connections between WWTPs would be provided, with the exception of provision of recycled water to the Napa Salt Ponds. Therefore, the ability to "export" water from one service area to another is limited.

7) The Basic System is the least expensive of the alternatives considered, with the exception of the No Action and No Project Alternatives.

The Basic System would provide some connectivity between service areas with a major emphasis on local water use. Water reuse would provide environmental benefits by offsetting surface and groundwater use, reducing the need to develop additional water supplies, and reducing discharge to the Bay. Although an incrementally smaller amount of recycled water would be available, it would represent an economically feasible alternative. Implementing the Basic System would cost 80 percent less than the Partially Connected System, and 200 percent less than the Fully Connected System (CDM, 2008). Since the Basic System would represent the lower cost alternative and would be implemented through federal and state funding options, it is the most cost-effective for the Member Agencies. The Basic System would require the least amount of new storage and relies on the use of existing facilities by rehabilitating reservoirs and using ponds at the WWTPs.

Compared to the Basic System, the Partially and Fully Connected Systems would increase regional connectivity and provide incrementally more recycled water treatment and distribution facilities, albeit with greater costs for greater costs for the Member Agencies, construction impacts, and greater potential for conflict with natural resources. Therefore, the Partially and Fully Connected Systems are not the most environmentally superior alternatives (see Table 6-13).

In general, all the three proposed alternatives would meet the stated project objectives and comply with applicable regulations and policies. In relation to the stated project objectives and environmental impacts, the Fully Connected System would involve the greatest capital costs and maximum adverse environmental impacts due to the proportion of facilities that would be required. The benefit of reducing the amount of wastewater discharged to the Bay is counterbalanced by the detriment cause during construction and facility operation; therefore, the Fully Connected System is not considered environmentally superior.

In general, the Partially Connected System represents the middle ground between the Basic System and the Fully Connected System, balancing the potential environmental impacts, implementation costs, and risk issues associated with the alternatives. In comparison, the Partially Connected System would cause greater environmental impacts than the Basic System, and would cause impacts similar to the Fully Connected System. The Partially Connected System could fulfill the objectives to improve water supply reliability and offset potable demand to a higher

degree than the Basic System, however the Partially Connected System would not necessarily be the most financially or environmentally sustainable option, due to increased infrastructure requirements.

Based on the criteria set previously in the chapter for alternatives analysis, with respect to their ability to meet the stated project objectives, their potential environmental impacts, and the cost of implementation, it was determined that the Basic System is identified as the environmentally superior alternative. Of the action alternatives, the Basic System would achieve the project objectives, result in lesser environmental impacts, and would incur lower costs. The Basic System would thus achieve all of the project objectives while simultaneously providing a means for Member Agencies to achieve water management goals, meet future water demand, augment surface water use, and sustain environmental and water quality.

References – Alternatives Analysis

Camp Dresser McKee, Inc. (CDM), *Phase 3 Engineering and Economic/ Financial Analysis Report*, June 2008.

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