CHAPTER 3
DESCRIPTION OF PROGRAM ALTERNATIVES

This chapter describes the alternatives analyzed in the Salton Sea Ecosystem Restoration Program Draft Programmatic Environmental Impact Report (PEIR), including the assumptions, limitations of the assumptions, potential implementation concepts and schedules, and estimated costs. This chapter also summarizes the results of the impact assessment described in Chapters 5 through 24. The transfer of (c)(1) and (c)(2) water, as described in Chapter 1, is also discussed in this chapter.

The final alternatives considered in the PEIR are listed in the following order to represent an increasing amount of complexity and number of components:

- Alternative 1 – Saline Habitat Complex I;
- Alternative 2 – Saline Habitat Complex II;
- Alternative 3 – Concentric Rings;
- Alternative 4 – Concentric Lakes;
- Alternative 5 – North Sea (includes Saline Habitat Complex cells);
- Alternative 6 – North Sea Combined (includes Saline Habitat Complex cells);
- Alternative 7 – Combined North and South Lakes (includes Saline Habitat Complex cells); and
- Alternative 8 – South Sea Combined (includes Saline Habitat Complex cells).

The alternatives were developed as a range of programmatic alternatives to meet the program objectives described in Chapter 1. The alternatives include various combinations of different components, such as Saline Habitat Complex, Marine Seas, Air Quality Management, Brine Sink, conveyance facilities, and water treatment facilities. These components could have been combined into thousands of permutations. However, to facilitate the review of potential alternatives, eight programmatic alternatives were defined to allow evaluation of different sizes and locations of a variety of open water habitats. For example, the alternatives allow for comparison of larger and smaller areas of Saline Habitat Complex and Marine Seas in different parts of the Sea Bed. The eight alternatives provide bookends for inclusion of different components.

ASSUMPTIONS AND LIMITATIONS IN THE ALTERNATIVES AND NEED FOR PROJECT-LEVEL ANALYSES

The alternatives in the PEIR could not be fully defined with respect to all factors because there are uncertainties related to other projects or conditions that need to be better understood prior to final design. It is anticipated that implementation of a preferred alternative will require one or more project-level analyses to further evaluate design inflows, biological criteria, locations of facilities, water demands of components, surface water elevations and areas, types of Air Quality Management needed on Exposed Playa, seismic risks, availability of construction material, and acquisition of easements or deeds for lands affected by restoration activities.

The PEIR could have considered multiple permutations to consider a range of possibilities for these uncertainties. However, that approach would have increased the complexity of the PEIR. Instead, the alternatives were based upon a common set of uncertainties and assumptions, as summarized in Table 3-1. This provided a uniform basis for comparison of the eight alternatives to the No Action Alternative and Existing Conditions.

Land Ownership Assumptions

The No Action Alternative and Alternatives 1 through 8 assume that easements or deeds would be obtained for the entire Sea Bed from -228 feet msl to allow construction and operations and maintenance. Costs of acquisition of easements and deeds are not included in the cost estimates included in the PEIR.

If other land uses extend into the sea bed, the alternatives would need to be modified in project-level analyses. For example, if exposed lands are converted to cultivated agriculture to an elevation of -235 feet msl, either the components would need to be constructed at lower elevations or displacement dikes would be required to protect the agricultural land.

Construction Schedule Assumptions

The schedules assumed that the alternatives could be funded, designed, and permitted in a reasonable time period following the selection of a preferred alternative. This analysis does not include specific assumptions related to the implementing agency, methods to make funding available, or land or easement acquisition. The following assumptions were used in this analysis for pre construction activities:

- PEIR completed by mid-2007;
- Preferred alternative approved by the Legislature by late 2007;
- Implementing agencies and funding identified by late 2007;
- Project-level analyses and environmental documentation completed by 2010 (including detailed field investigations of geotechnical and chemical characteristics of sediment, bathymetry, and water quality characteristics);
- Final design completed by 2012;
- Permits, approvals, and easements or deeds obtained by 2013; and
- Major construction initiated by 2014 following a one-year construction bid period.

The study period was divided into four phases. Phase I (present to 2020) represents the period with most of the construction activity for large facilities such as Barriers, Perimeter Dikes, Air Quality Management Canals, and Sedimentation/Distribution Basins. During Phases II and III (2020 to 2030 and 2030 to 2040, respectively), construction would continue for Saline Habitat Complex and Air Quality Management facilities in the Sea Bed as the water recedes, and operations and maintenance activities would be initiated for previously constructed facilities. During Phase IV (2040 to 2078), operations and maintenance activities would continue for all facilities, and additional Air Quality Management actions would be completed if portions of the Exposed Playa become emissive.

Table 3-1
Assumptions in the Alternatives and Related Need for Further Evaluation

Uncertainty	Assumption in Alternatives	Limitations in the Alternatives	Need for Further Evaluation
INFLOW ASSUMPTIONS Potential changes in inflows as other projects are implemented in California, other six states along the Colorado River, and Mexico. Timing of reductions in inflows.	An inflow was selected to define the sizes of components to provide full operations based upon a long term average flow with an 80 percent exceedance probability. The alternatives were evaluated with another inflow scenario that represents the median value developed under a stochastic analysis. A stochastic analysis was conducted to determine surface water elevation and salinity with average inflows of 600,000, 700,000, 800,000, and 900,000 acre-feet/year for the 2018 to 2078 period. It was assumed that most of the less defined actions that could reduce inflows would occur in the mid-2020s. Therefore, most of the reduction in future flows is projected to occur between 2018 and 2030. Development and use of these assumptions are described in detail in Appendix H-2.	If inflows are higher than the design flow, excess flows are assumed to be conveyed to the Brine Sink. The Brine Sink would be larger and the Exposed Playa would be smaller than projected in the alternative. If inflows are less than the design flow, surface water elevations and water depths would be less than projected, and the benefits of the facilities may be reduced. In addition, the Brine Sink would be smaller and the Exposed Playa would be larger than projected in the alternative. The timing of inflow reductions is also limiting. If the reductions do not occur until later, Saline Habitat Complex and Air Quality Management facilities would be constructed later than projected in the alternatives.	At the time of final design, updated inflow assumptions should be evaluated. If additional flow would be available on a long term basis, Marine Seas could be increased in size and Air Quality Management efforts could be decreased. Final designs could be delayed for facilities located at lower elevations on the Sea Bed until the water recedes.
SURFACE WATER ELEVATION ASSUMPTIONS Surface water elevations of components adjacent to the shoreline could be designed at several locations Locations of canals and pipelines could be at different locations based upon the use of pumping plants	A design surface water elevation of -230 feet mean sea level was assumed for all components along the shoreline. Canals and pipelines were located as close to the existing shoreline as possible to minimize or avoid pumping.	If the design surface water elevation was lower, the water surface area of Marine Seas or Saline Habitat Complex may be larger or smaller, depending upon the bathymetry at each location. This would also affect the surface area and location of the Exposed Playa. If more pumping plants were included in an alternative, canals and pipelines could be located away from the shoreline.	For the preferred alternative, a range of configurations with different surface water elevations and conveyance assumptions should be evaluated to develop the cost-effective method to meet the design criteria.

Table 3-1
Assumptions in the Alternatives and Related Need for Further Evaluation

Uncertainty	Assumption in Alternatives	Limitations in the Alternatives	Need for Further Evaluation
AIR QUALITY MANAGEMENT FOR EXPOSED PLAYA ASSUMPTIONS Potential for particulate emissions from Exposed Playa. Ability of water efficient vegetation and other methods to control particulate emissions at the Salton Sea Appropriate densities of vegetation to control particulate emissions Application rates of brine to control particulate emissions	Six of the eight alternatives and the No Action Alternative include a combination of areas irrigated with a portion of the inflows to maintain water efficient vegetation, areas stabilized with brine from the Brine Sink, and areas that would not require management (See No Action Alternative-CEQA Conditions for detailed information) One of the eight alternatives includes Brine Stabilization with Crystallizer Ponds (See Alternative 7 for additional information). One of the eight alternatives includes only short term irrigation methods (See Alternative 4 for additional information).	Because the soil emissivity under the Salton Sea cannot be specifically determined until the water recedes and the soils dry, a conservative approach was developed that assumed that an aggressive program using water efficient vegetation and Brine Stabilization would be required to control particulate emissions. This conservative approach was selected because it reduced the amount of inflows available for other components. Therefore, the alternatives would not overstate the benefits that could be achieved. Brine Stabilization could require water from inflows to dilute brine to allow conveyance and application on the Exposed Playa. Brine Stabilization application rates were assumed based upon information from commercial salt ponds and similar projects. If more brine is required than available in the Brine Sink, other methods would need to be implemented.	The Salton Sea would remain relatively stable until 2017 when (c)(2) water is eliminated, as described in Chapter 1. Surface water elevation of the Salton Sea would decline to 8 to 12 feet from Existing Conditions by 2020. Facility construction for all alternatives would occur in the Exposed Playa area before 2020. The remaining Exposed Playa probably would not be emissive until the soils become dry. This could occur two to four years after the water recedes. Therefore, Air Quality Management methods probably would not be needed before the 2020s. As the water recedes and the soils dry, the Exposed Playa should be tested, and if necessary, pilot studies can be conducted.
AIR QUALITY MANAGEMENT - VEHICLE EMISSIONS ASSUMPTIONS If the cumulative amount of emissions from vehicles exceed established limits, annual construction activities could be limited	The alternatives assume use of vehicles with emission controls based upon existing technology.	Construction would not occur for about 8 years following completion of the PEIR. It is possible that new technology for construction equipment could be developed that would minimize controlled vehicle emissions.	Specific construction actions and types of equipment should be considered in project-level analyses for each phase.

Table 3-1
Assumptions in the Alternatives and Related Need for Further Evaluation

Uncertainty	Assumption in Alternatives	Limitations in the Alternatives	Need for Further Evaluation
BARRIER, PERIMETER DIKE, AND BERM DESIGN ASSUMPTIONS Geotechnical and soil conditions for the Sea Bed	Six alternatives assume the need for conservative foundation treatment and design criteria because the geotechnical conditions are not completely known. Two alternatives assume that conservative design criteria would not be required.	If the preferred alternative requires conservative foundation treatment for Barriers, Perimeter Dikes, and Berms, the amount of imported rock and gravel and the amount of excavated Sea Bed material could be greater than what is described in the PEIR.	Specific geotechnical evaluations would be required for each facility placed on the Sea Bed during the project-level analysis.
ROCK SOURCE ASSUMPTIONS The availability of millions of cubic yards of rock and gravel for construction of Barriers, Perimeter Dikes, Berms, and roads	The alternatives assumes that the rock and gravel are available from a permitted quarry located within 10 miles of the Salton Sea, or the rock and gravel can be transported to within 10 miles of the Salton Sea by existing rail facilities.	If the preferred alternative requires development of a quarry, the impacts of the alternative could be greater than considered in the PEIR and may require additional efforts to compare alternatives.	Specific rock and gravel quantities would be determined during project-level analyses. Then, quarries that can provide rock and gravel would be identified.
EASEMENT AND/OR LAND ACQUISITION ASSUMPTIONS Construction cannot be initiated until easements and/or deeds are acquired	The alternatives assume that easements and/or deeds would be acquired in a timely manner that would not cause delays.	If easements and/or deeds cannot be acquired, construction of some or all of the alternatives would be delayed or become infeasible.	During project-level analyses, the need for easements and deeds should be considered immediately. If easements or deeds cannot be obtained, the alternative would need to be modified.

Based upon these assumptions, the alternatives would be constructed over the next 15 to 30 years, as shown in Figure 3-1. The Saline Habitat Complex areas would be constructed as the water recedes when the soils are no longer influenced by high groundwater. Saline Habitat Complex in all alternatives except Alternative 4 would achieve salinity goals within a one-year period following construction. Marine Seas in Alternatives 3, 5, 6, 7, and 8 and Concentric Lakes in Alternative 4 would be constructed when the Sea Bed is inundated to accommodate barges. However, except for Alternative 3, the water bodies would not achieve salinity goals for several years or decades, depending on the alternative.

Early Start Habitat

All eight alternatives would include up to 2,000 acres of shallow saline habitat for use by birds after the Salton Sea salinity becomes too high to sustain some species. This habitat would be constructed prior to construction of full-scale habitat components, and is referred to as Early Start Habitat. Early Start Habitat was assumed to be located at elevations between -228 and -232 feet msl. Early Start Habitat would be a temporary feature for two to six years and would be eliminated or assimilated as the alternatives are constructed along the southern shoreline prior to 2020. These lands could subsequently be used for other purposes, including geothermal development, agriculture, and open space.

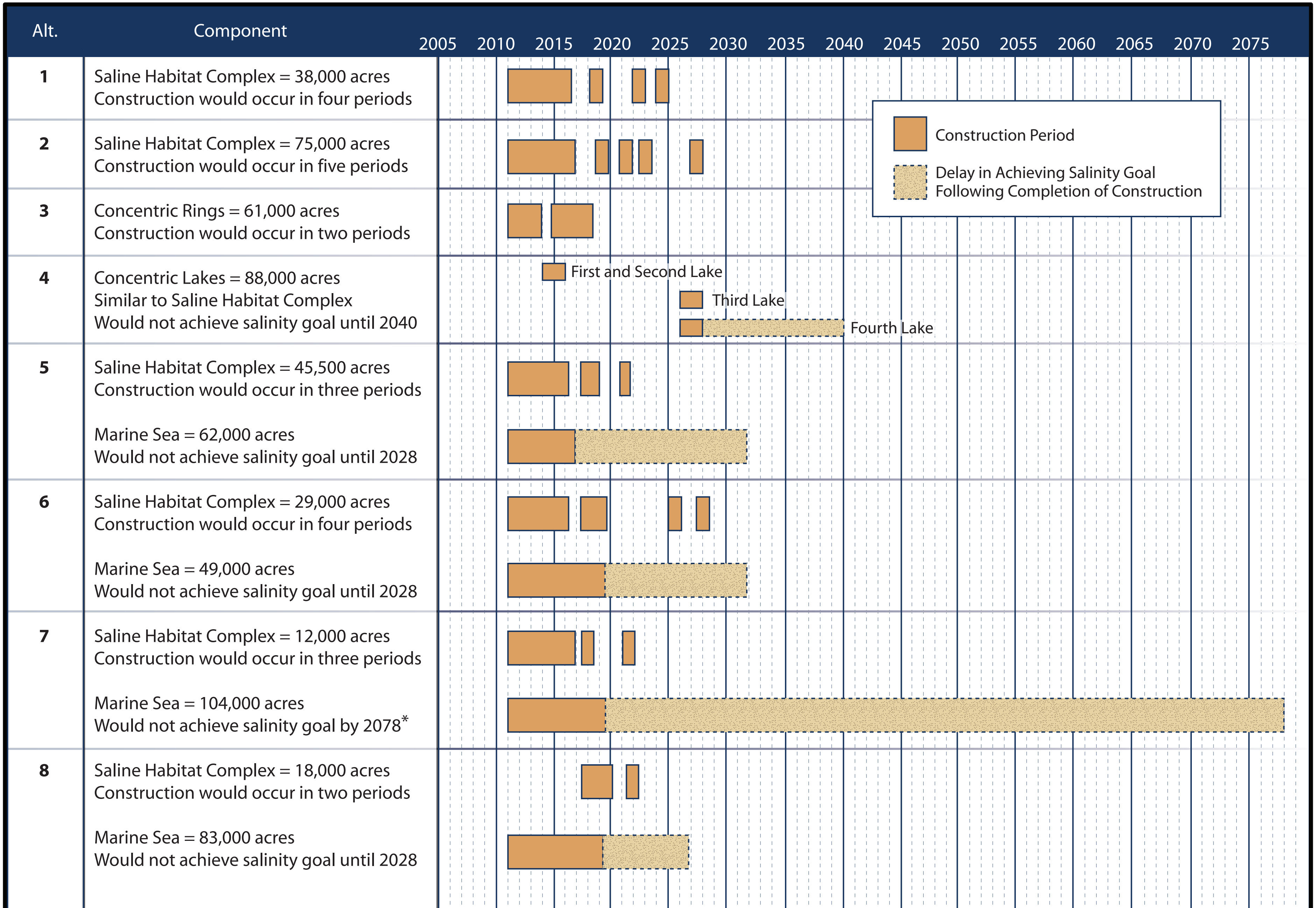
For the purposes of the PEIR, it was assumed that the Early Start Habitat area would be located along the southern shoreline because the flat slope of the sea bed would provide a large area for the shallow water cells. The area is currently used by many birds. Most agricultural drains in this area are pumped into the Salton Sea and could provide a stable source of inflows into the Early Start Habitat. Saline water from the Salton Sea would be pumped into the cells to be mixed with freshwater from the drains to provide salinity between 20,000 and 60,000 mg/L.

The area would be divided into cells with berms excavated from sea bed materials. Average water depths within each cell would be less than four feet. Temperatures outside the tolerance range of fish, such as tilapia, could cause fish kills or reduce their sustainability. Specific design criteria would be developed in a project-level analysis that could incorporate findings from the U.S. Department of the Interior, Geological Survey (USGS) Salton Sea Shallow Water Habitat Pilot Project.

The Early Start Habitat would require completion of additional studies, environmental documentation, permit applications, and deeds or easements for the land. It is assumed that the Early Start Habitat could be implemented before 2011 if easements or deeds could be acquired.

Implementing Entities

The alternatives have been defined and evaluated as if one entity or group of entities implemented the alternative in a uniform manner. However, it would be possible for several entities to implement facilities under separate programs with some level of coordination. For example, facilities located in the northern and southern portions of the Sea Bed could be implemented by separate entities with coordinated operations for conveyance of inflows. As another example, separate entities could implement components with different functions, such as conveyance, Air Quality Management, Marine Seas, and/or Saline Habitat Complex.



* Would meet salinity objective in 2056 if inflows averaged 800,000 acre-feet per year.

FIGURE 3-1
ESTIMATED CONSTRUCTION SCHEDULE FOR ALTERNATIVES 1 THROUGH 8

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DEFINITION OF ALTERNATIVES

The components in each alternative are summarized in Figures 3-2 through 3-11 and Table 3-2. Results from the hydrologic/hydraulic model are summarized in Table 3-3 for salinity, surface water area, and surface water elevation. Estimates of imported rock and gravel, disturbed soils, vehicles required for construction and operations and maintenance, and employment for construction and operations and maintenance for each alternative also are presented in Table 3-3. The values were calculated at the end of each phase for all alternatives. The alternatives were defined based upon inflows as described under the No Action Alternative-Variability Conditions.

No Action Alternative

The No Action Alternative is intended to reflect Existing Conditions at the time of the Notice of Preparation (NOP) plus changes that are reasonably expected to occur in the foreseeable future if none of the alternatives are implemented, based on current plans and consistent with available infrastructure and community services.

As described in Chapter 2, two scenarios were developed for the No Action Alternative. The No Action Alternative-CEQA Conditions was developed using the following process:

- Identification of existing projects and management policies that were implemented as of the date of issuance of the NOP for the PEIR, February 27, 2004;
- Identification of potential projects that have been considered for implementation within the study area by Tribal, federal, State, regional, and local agencies;
- Development and application of screening criteria for the No Action Alternative to identify projects that would be implemented without Salton Sea restoration actions considered in the PEIR alternatives; and
- Identification of changes to management policies that have been or would have been implemented after February 27, 2004 without Salton Sea restoration actions considered in the PEIR alternatives; and
- Projects included in the No Action Alternative-CEQA Conditions generally have secured agency approvals including mitigation measures and permit requirements and are not considered to be speculative in nature.

The 75-year study period includes a long planning horizon, and, therefore, the No Action Alternative-CEQA Conditions may not accurately reflect future conditions. A No Action Alternative-Variability Conditions was developed to reflect these future uncertainties. The No Action Alternative-Variability Conditions includes a wider range of projects, plans, and climate conditions. Based upon input from the Salton Sea Advisory Committee, it was determined that the PEIR should consider future variability because it would be difficult to modify the locations and sizes of facilities if inflows changed, as described above.

No Action Alternative-CEQA Conditions

Under the No Action Alternative-CEQA Conditions, actions that could affect inflows include:

- Quantification Settlement Agreement (QSA) Projects;
- Imperial Irrigation District (IID) Water Conservation and Transfer Project (and associated required mitigation measures);

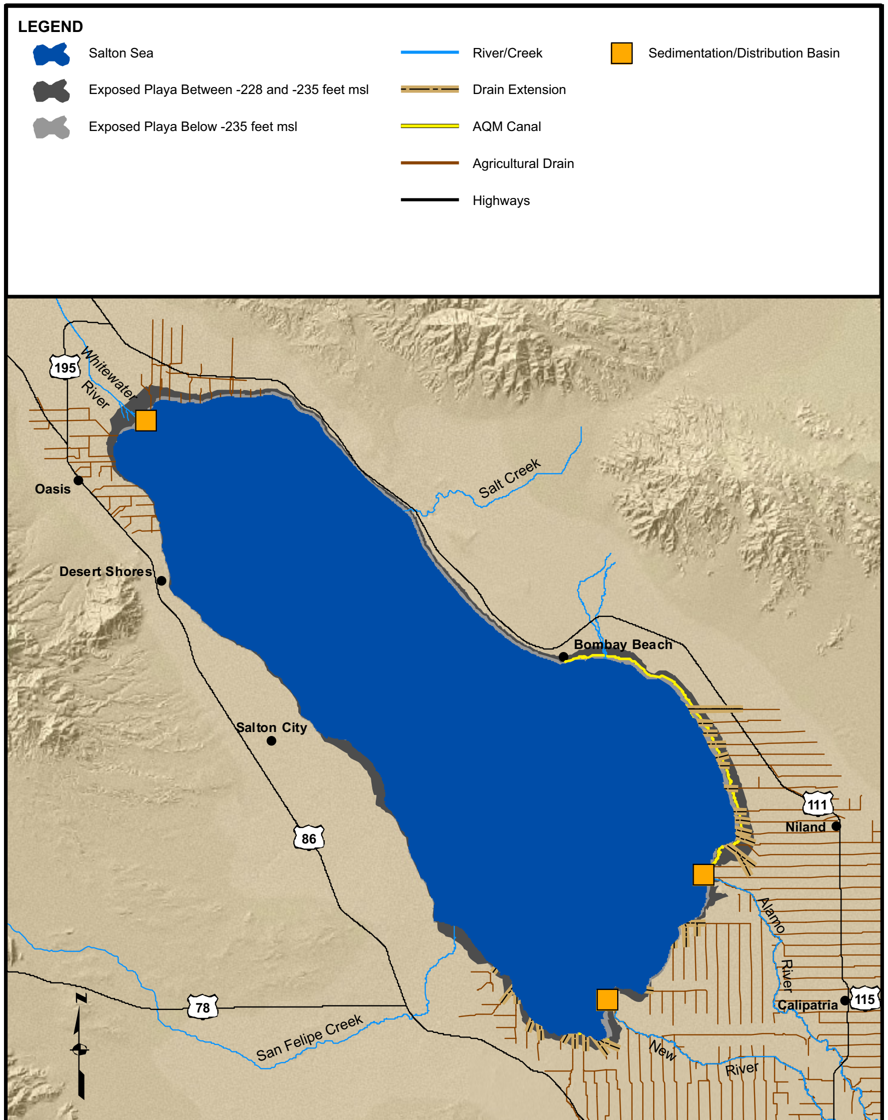
- Coachella Canal Lining Project;
- All-American Canal Lining Project;
- Colorado River Basin Salinity Control Program;
- Mexicali wastewater improvements;
- Mexicali power production;
- Total Maximum Daily Loads implementation; and
- Coachella Valley Water Management Plan.

Inflows from Mexico were based upon historical patterns adjusted for potential reductions in Colorado River water deliveries that would reduce agricultural return flows into the New and Alamo rivers, wastewater system improvements to the Mexicali II Service Area that would divert effluent to the Gulf of California, and recently constructed power plants that would use a portion of the New River flows for cooling water. Historical inflows from the Imperial Valley also were based upon historical patterns adjusted for implementation of the QSA and IID Water Conservation and Transfer Project. Under the QSA, the amount of water to be conserved and transferred would increase over the first 24 years until 2026 when the transferred amount would be 303,000 acre-feet/year. The (c)(2) water, also known as mitigation water (described in Chapter 1), would minimize the effect of other actions on inflows through 2017. Historical inflows from the Coachella Valley also were adjusted for implementation of the QSA related projects and the Coachella Valley Water Management Plan. Under the QSA, IID would conserve water and transfer the water to Coachella Valley Water District (CVWD). This amount would increase to 103,000 acre-feet/year by 2026. This amount of water would continue until 2047. After 2047, IID would provide 50,000 acre-feet/year, and Metropolitan Water District of Southern California (Metropolitan) would provide 50,000 acre-feet/year. The Coachella Valley Water Management Plan includes water conservation measures, acquisition of additional water supplies, and groundwater recharge that would result in a net increase in inflows and salt loads to the Salton Sea.

These actions would result in an average inflow of 965,000 acre-feet/year over the total 75-year study period (2003 to 2078). Under Alternatives 1 through 8, most facilities would not be functional until 2018. Therefore, inflows for all alternatives also were evaluated for the 2018 to 2078 period. Under the No Action Alternative-CEQA Conditions, average inflows for 2018 to 2078 would be 922,000 acre-feet/year. Changes in the inflows would result in changes in surface water elevations and salinity in the Salton Sea, as summarized in Table 3-3.

Facilities included in No Action Alternative-CEQA Conditions

Under implementation of the QSA, there would be three actions that would be modified in the PEIR alternatives. These actions include: Air Quality Management on the playa that would be exposed due to implementation of the QSA, protection of desert pupfish at the Salton Sea to mitigate impacts of the QSA, and modification of recreational facilities at the Salton Sea to mitigate impacts of the QSA.



Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-2A
PHASE 1 (2020)
NO ACTION ALTERNATIVE
CEQA CONDITIONS

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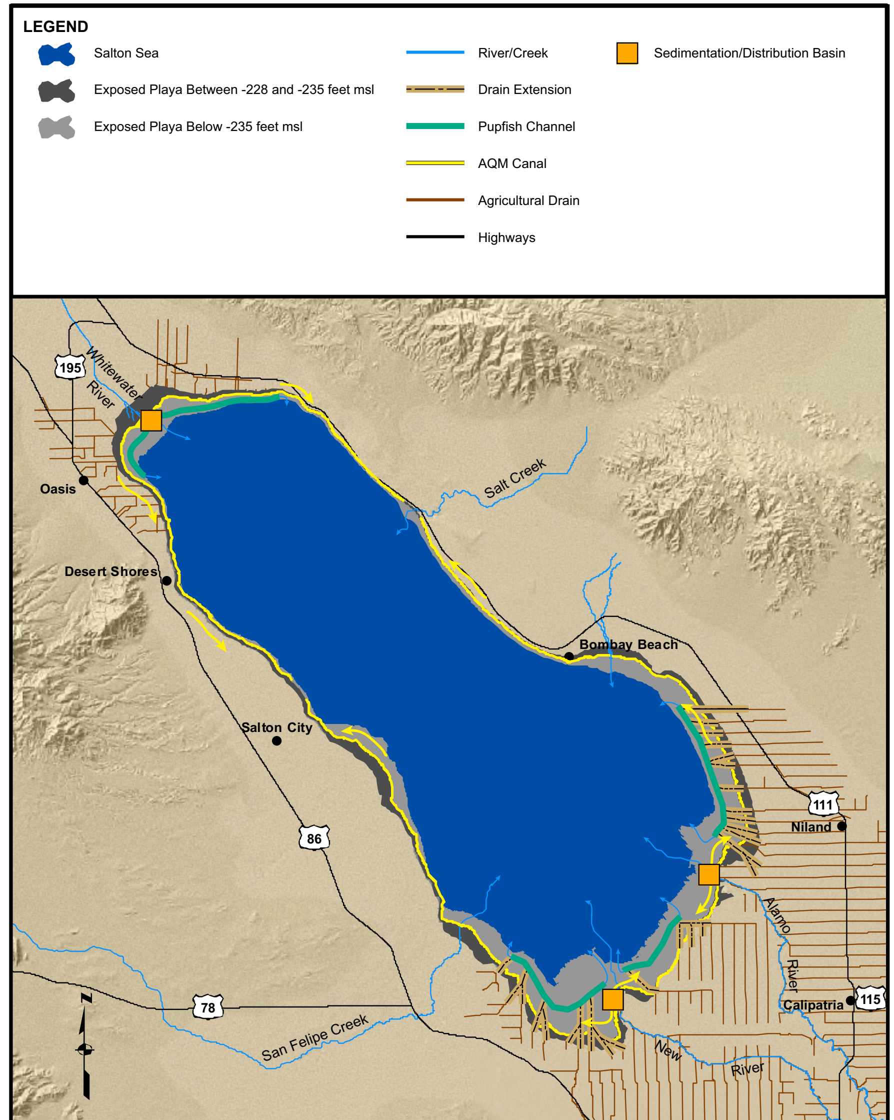

Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-2B
PHASE 2 (2030)
NO ACTION ALTERNATIVE
CEQA CONDITIONS

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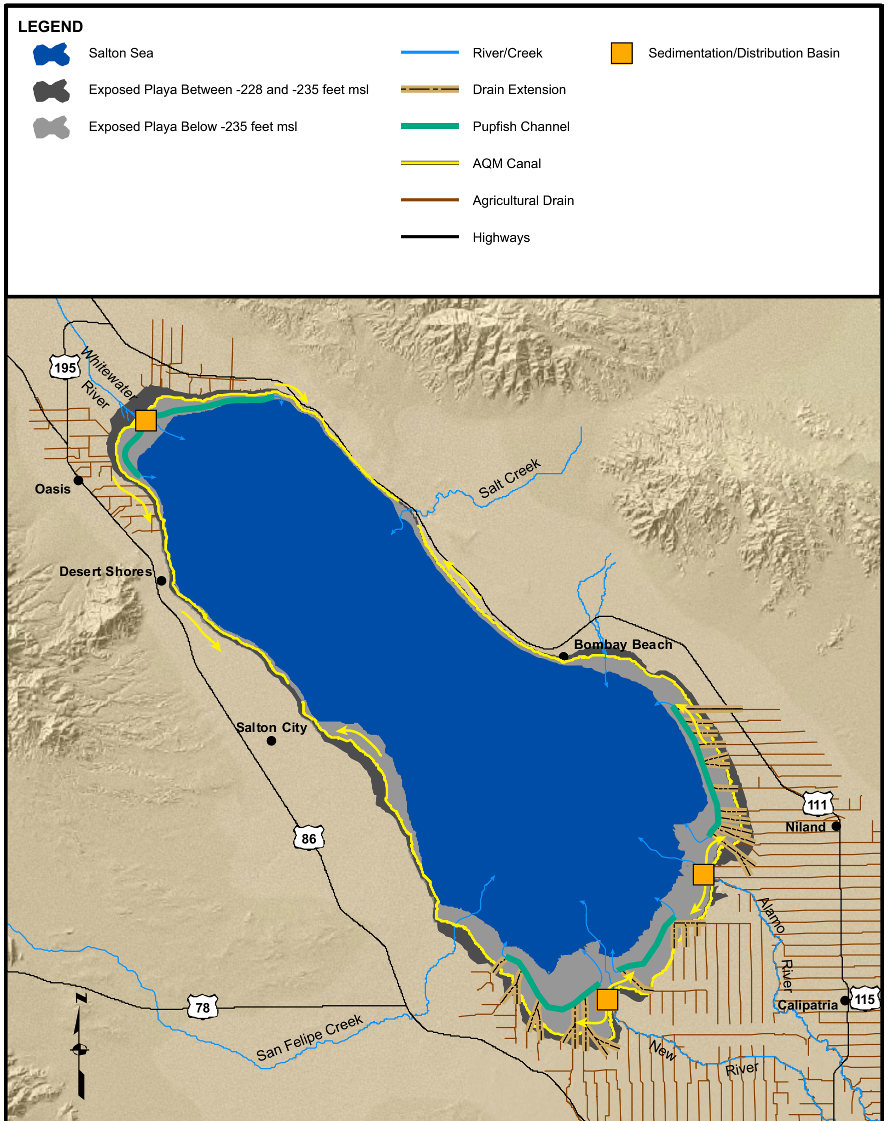

Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-2C
PHASE 3 (2040)
NO ACTION ALTERNATIVE
CEQA CONDITIONS

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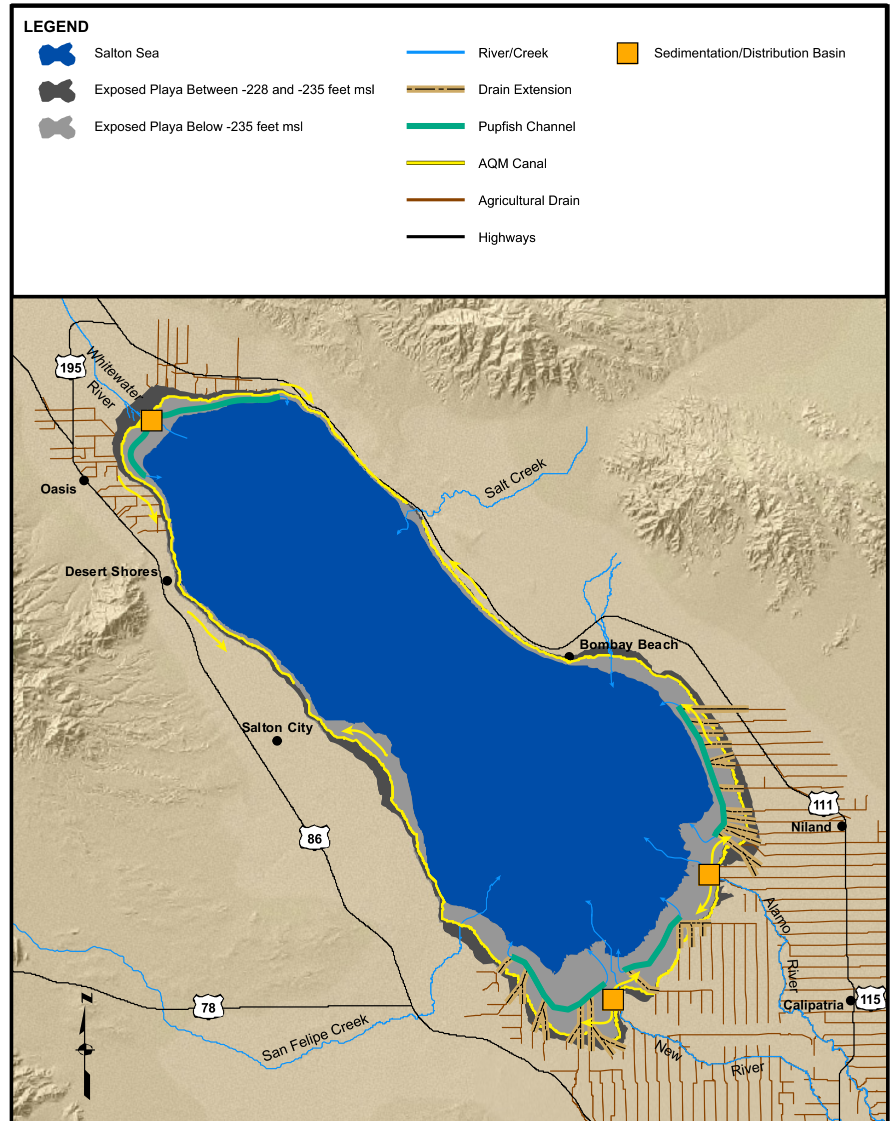

Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-2D
PHASE 4 (2078)
NO ACTION ALTERNATIVE
CEQA CONDITIONS

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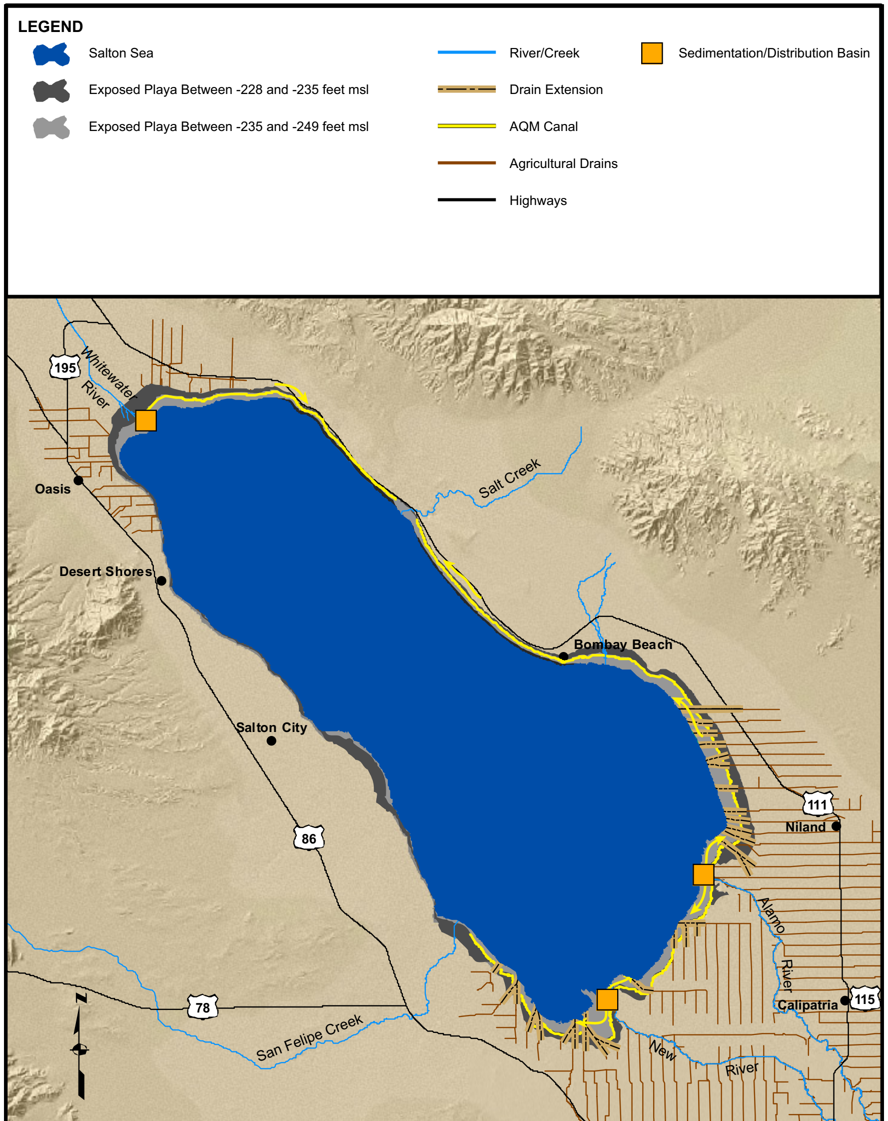

Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-3A
PHASE 1 (2020)
NO ACTION ALTERNATIVE
VARIABILITY CONDITIONS

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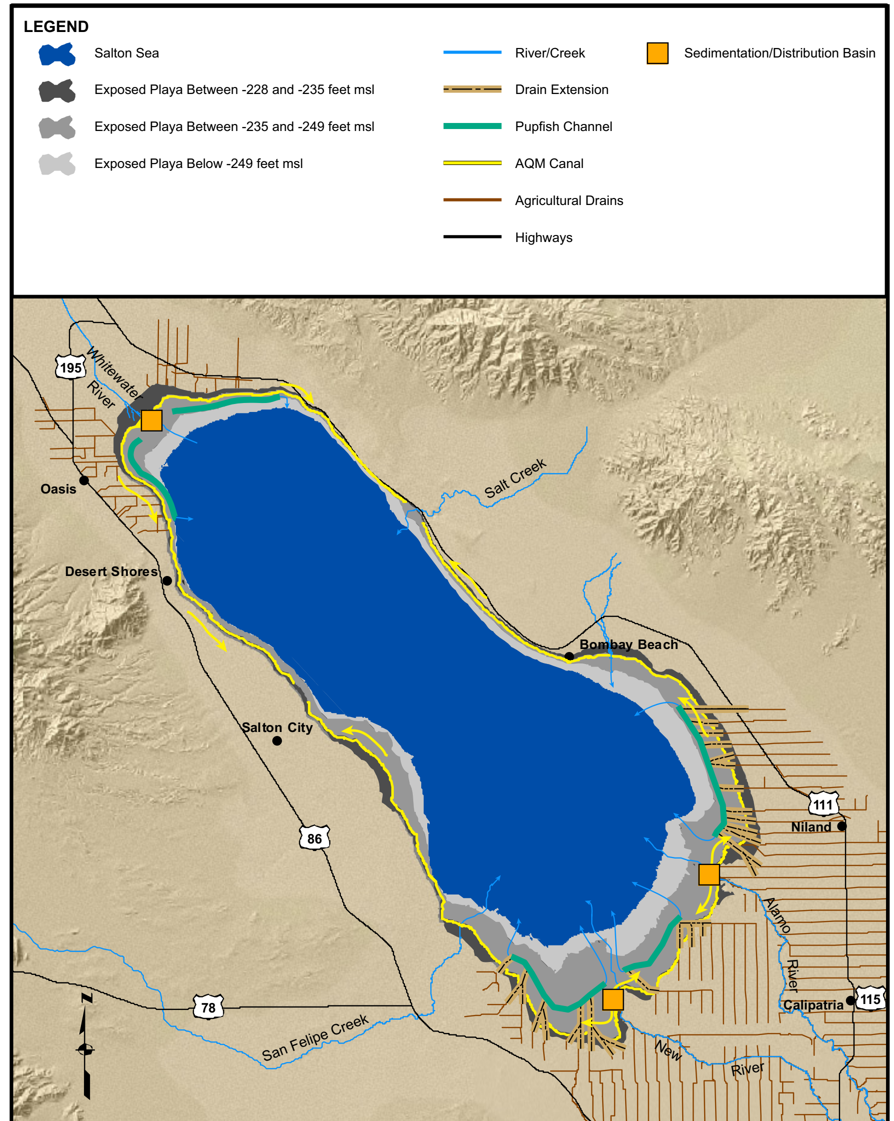

Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-3B
PHASE 2 (2030)
NO ACTION ALTERNATIVE
VARIABILITY CONDITIONS

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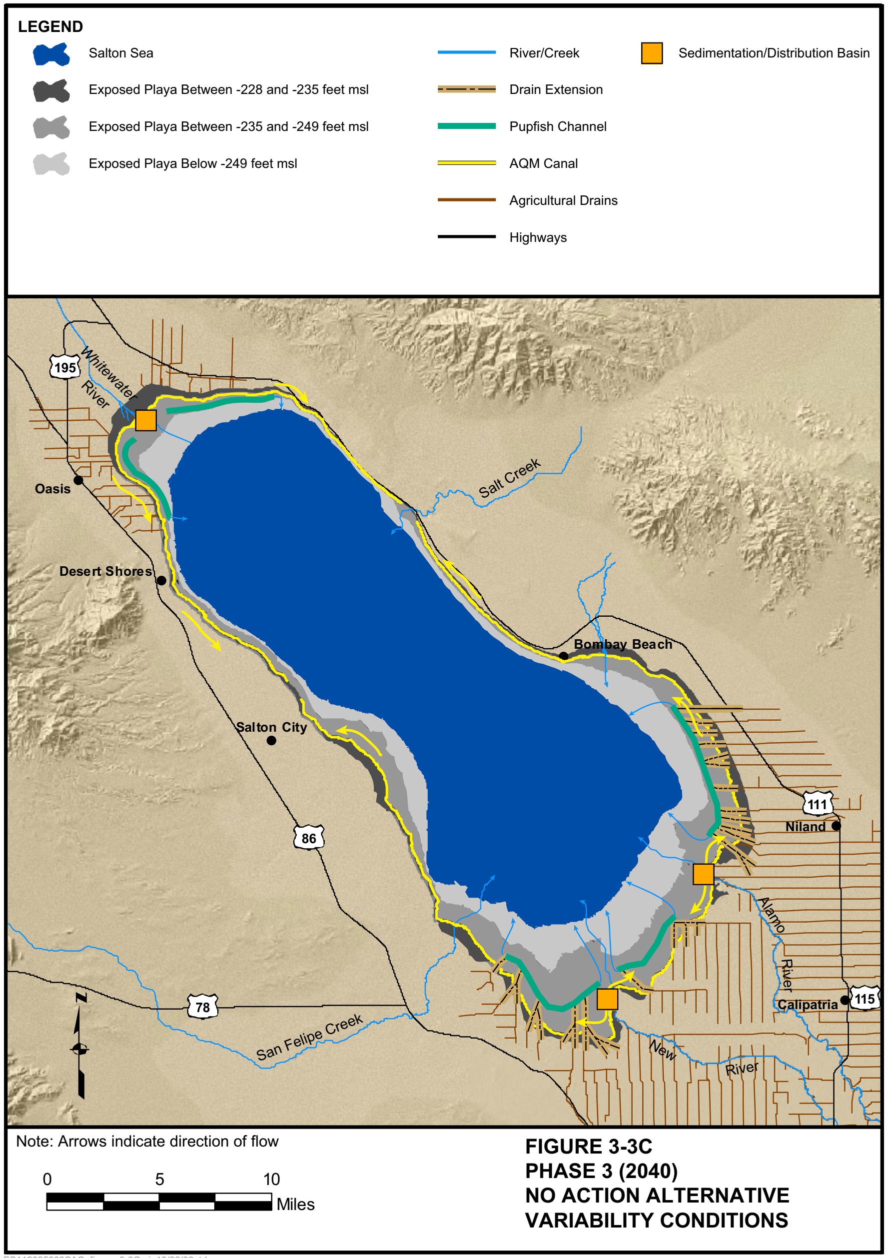

FIGURE 3-3C
PHASE 3 (2040)
NO ACTION ALTERNATIVE
VARIABILITY CONDITIONS

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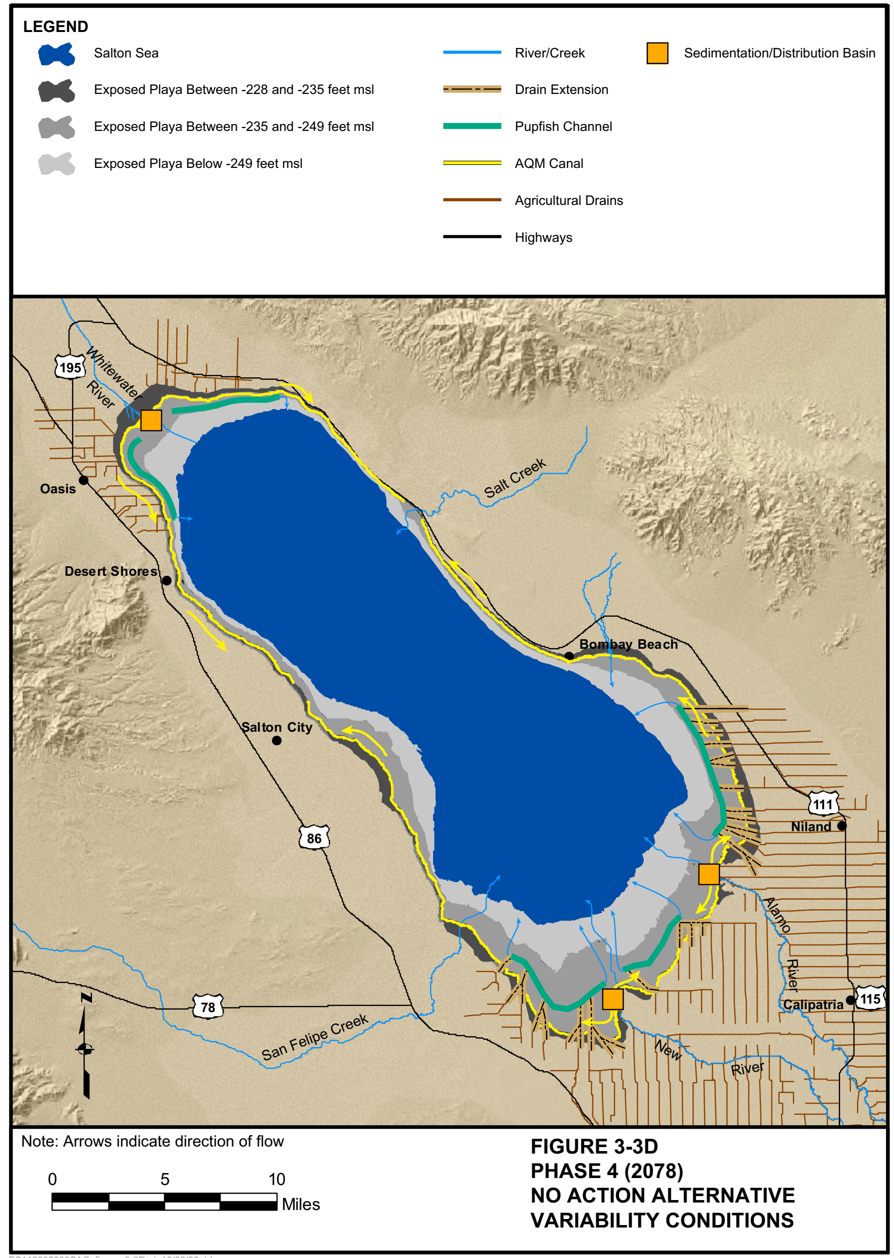

FIGURE 3-3D
PHASE 4 (2078)
NO ACTION ALTERNATIVE
VARIABILITY CONDITIONS

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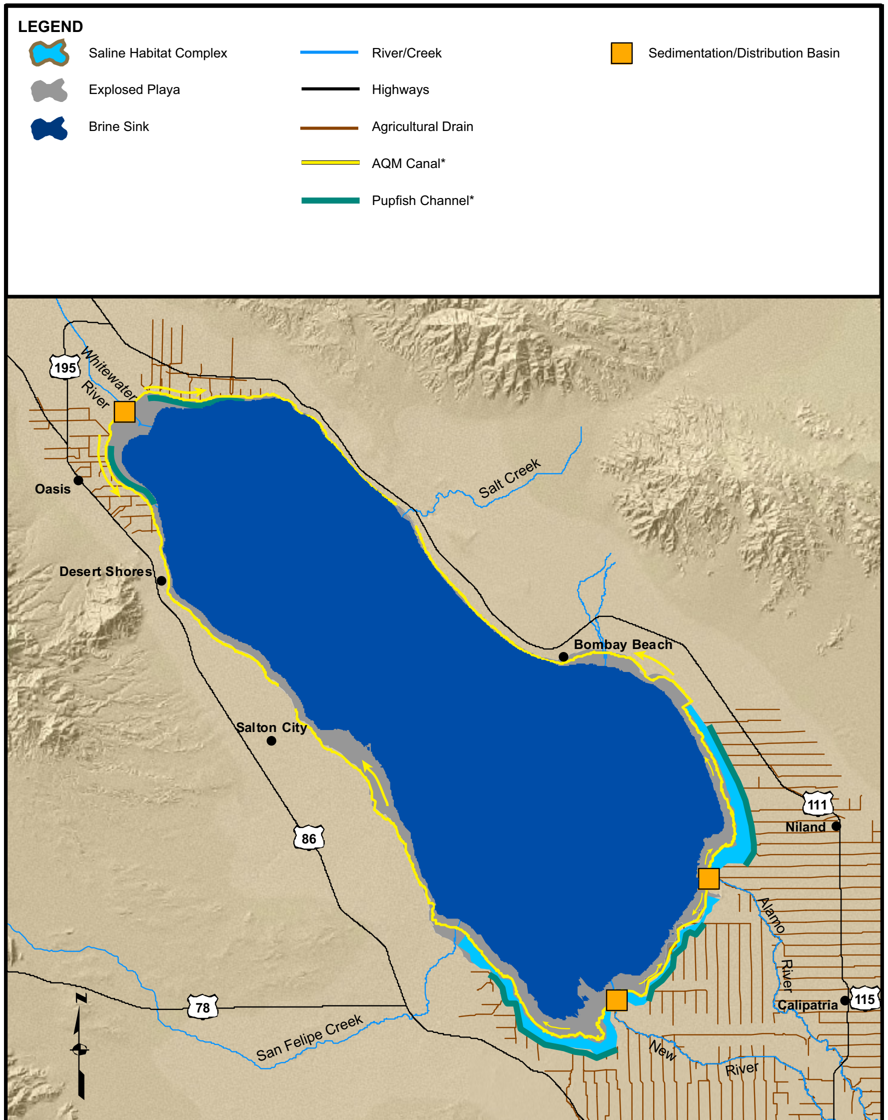

Note: Arrows indicate direction of flow

* Canal also supplies water to SHC

0 5 10 Miles

FIGURE 3-4A
PHASE 1 (2020)
ALTERNATIVE 1
SALINE HABITAT COMPLEX I

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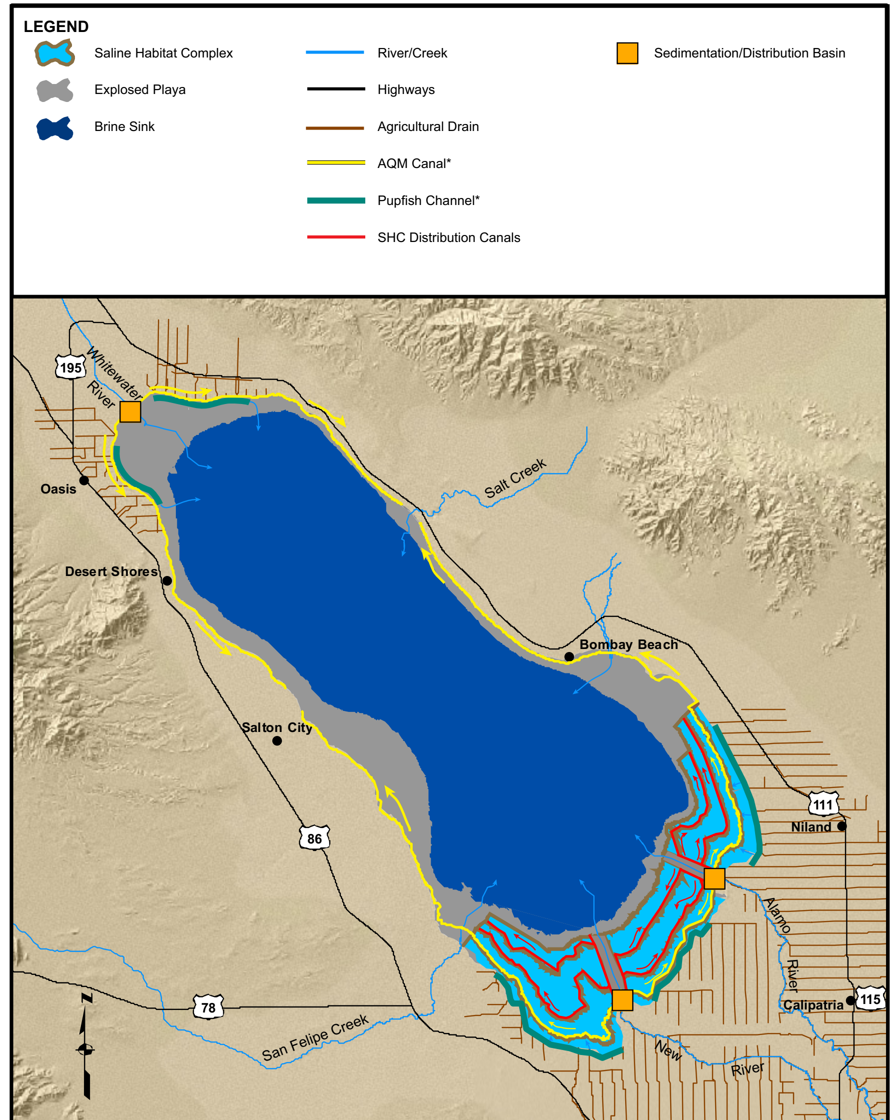

Note: Arrows indicate direction of flow

* Canal also supplies water to SHC

0 5 10 Miles

FIGURE 3-4B
PHASE 2 (2030)
ALTERNATIVE 1
SALINE HABITAT COMPLEX I

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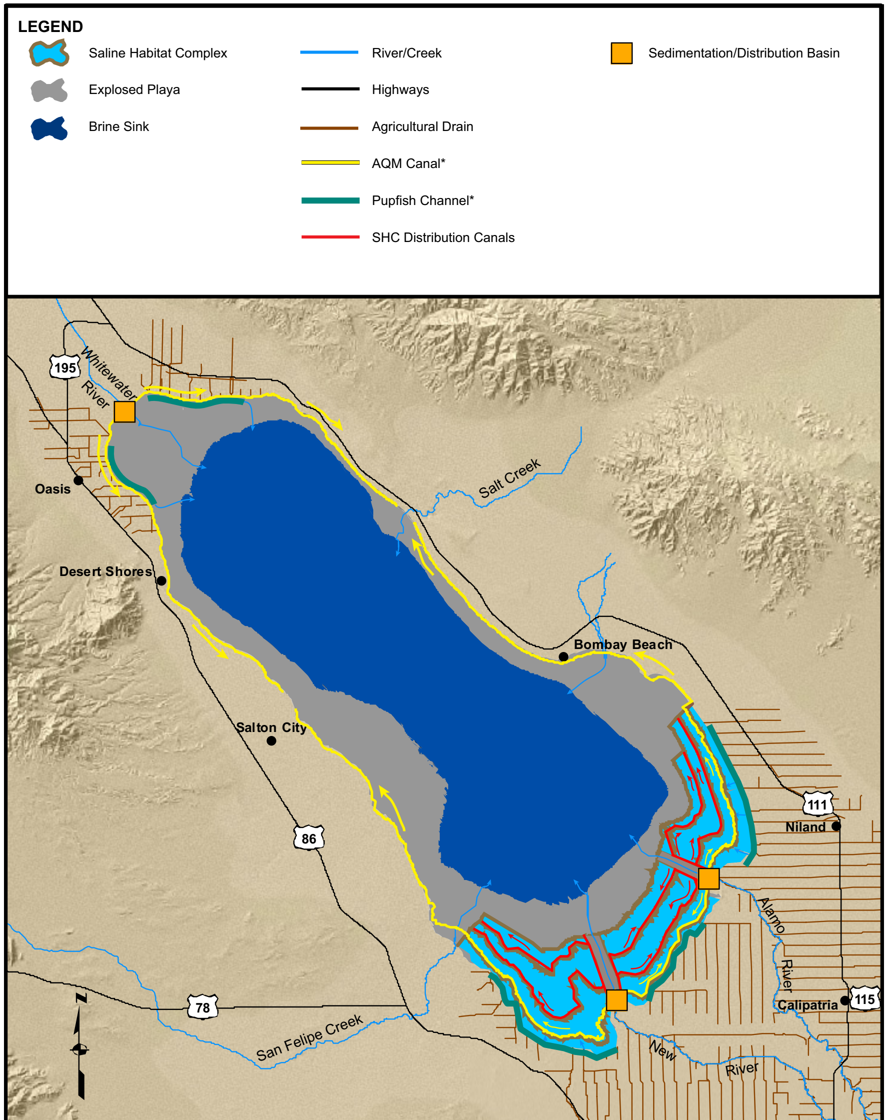

Note: Arrows indicate direction of flow

* Canal also supplies water to SHC

0 5 10 Miles

FIGURE 3-4C
PHASE 3 (2040)
ALTERNATIVE 1
SALINE HABITAT COMPLEX I

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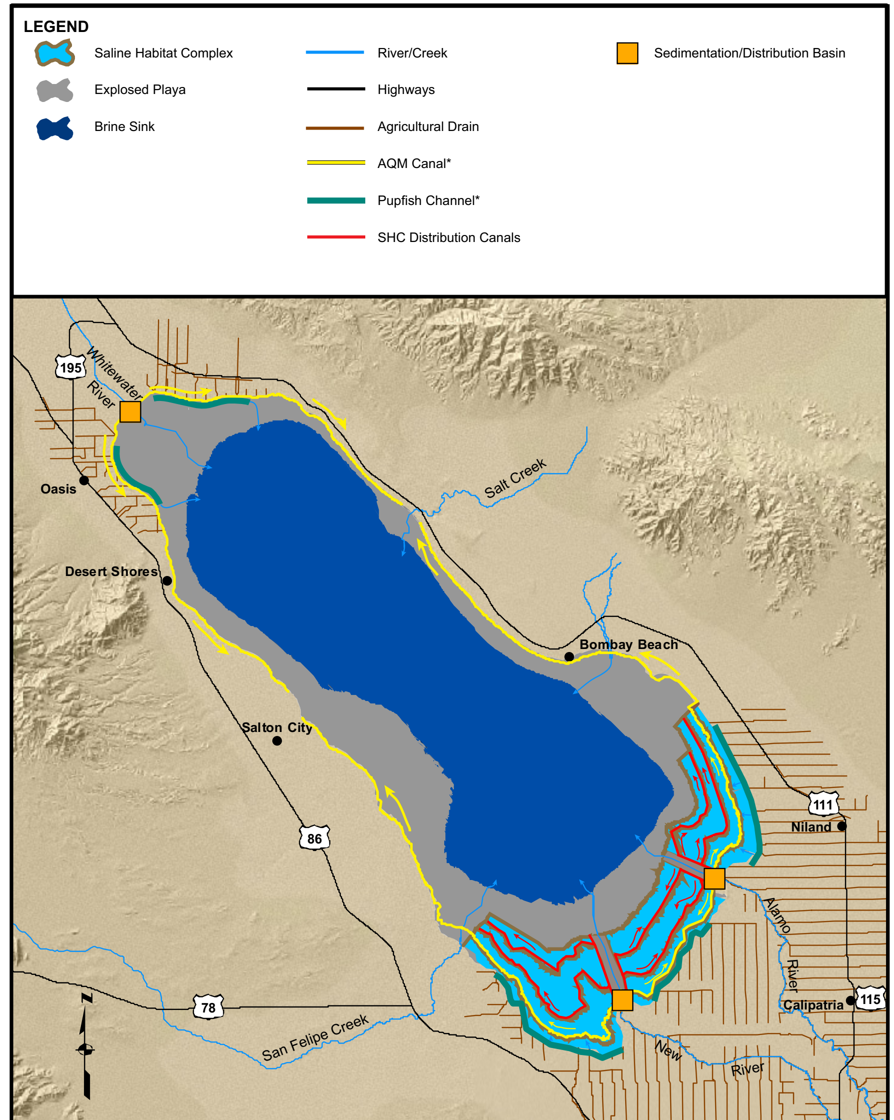

Note: Arrows indicate direction of flow

* Canal also supplies water to SHC

0 5 10 Miles

FIGURE 3-4D
PHASE 4 (2078)
ALTERNATIVE 1
SALINE HABITAT COMPLEX I

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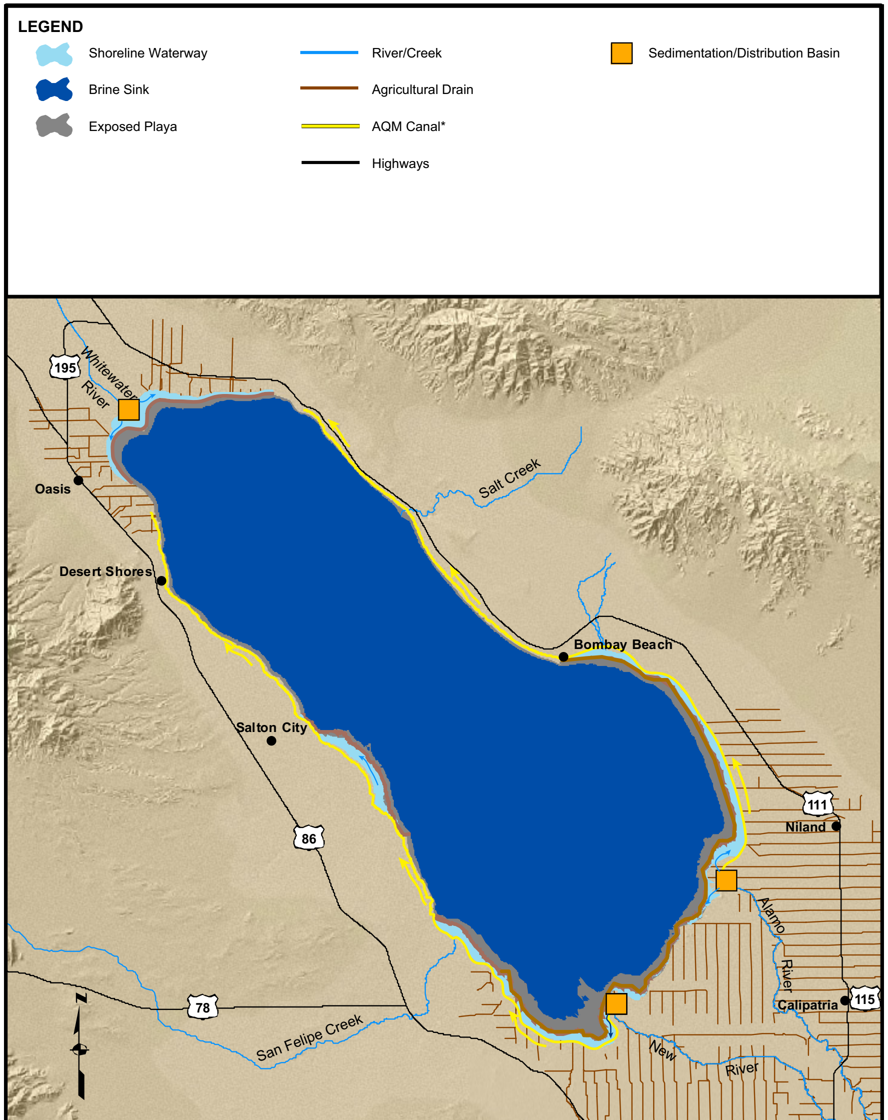

Note: Arrows indicate direction of flow

*Canal also supplies water to Shoreline Waterway

0 5 10 Miles

FIGURE 3-5A
PHASE 1 (2020)
ALTERNATIVE 2
SALINE HABITAT COMPLEX II

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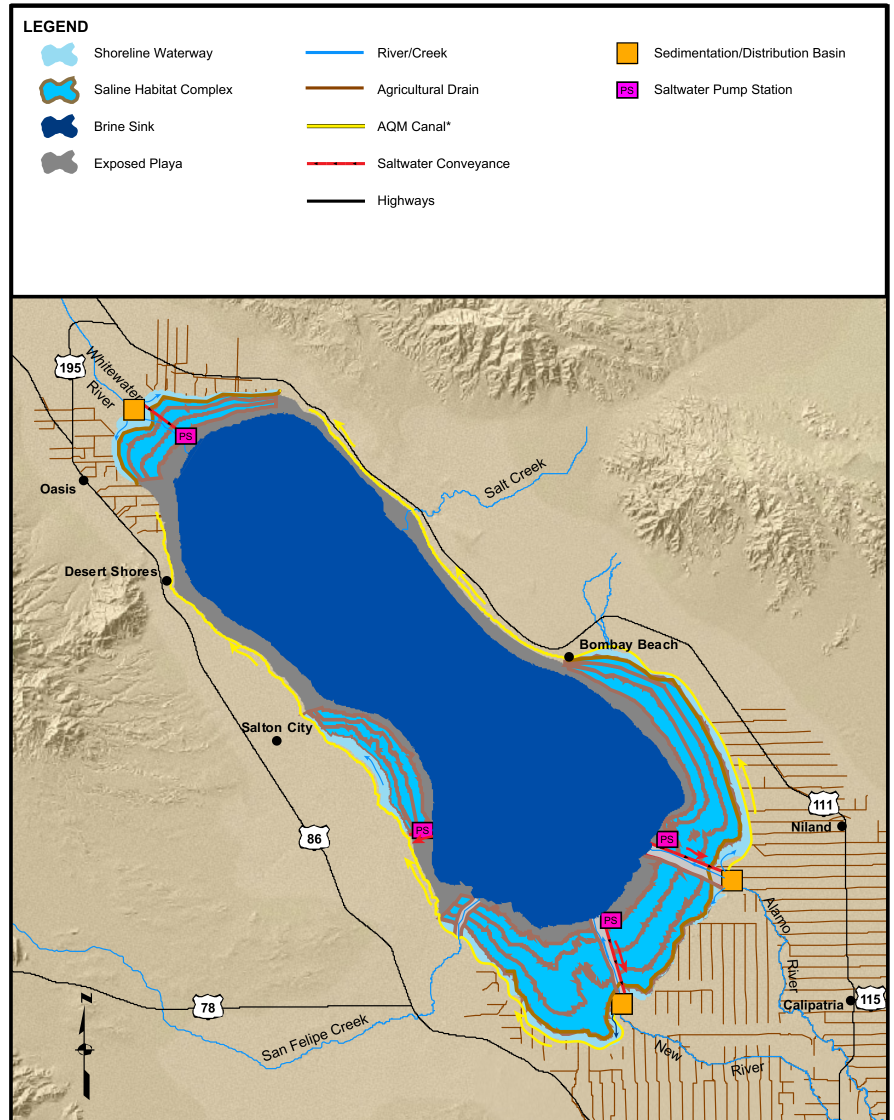

Note: Arrows indicate direction of flow

*Canal also supplies water to Shoreline Waterway

0 5 10 Miles

FIGURE 3-5B
PHASE 2 (2030)
ALTERNATIVE 2
SALINE HABITAT COMPLEX II

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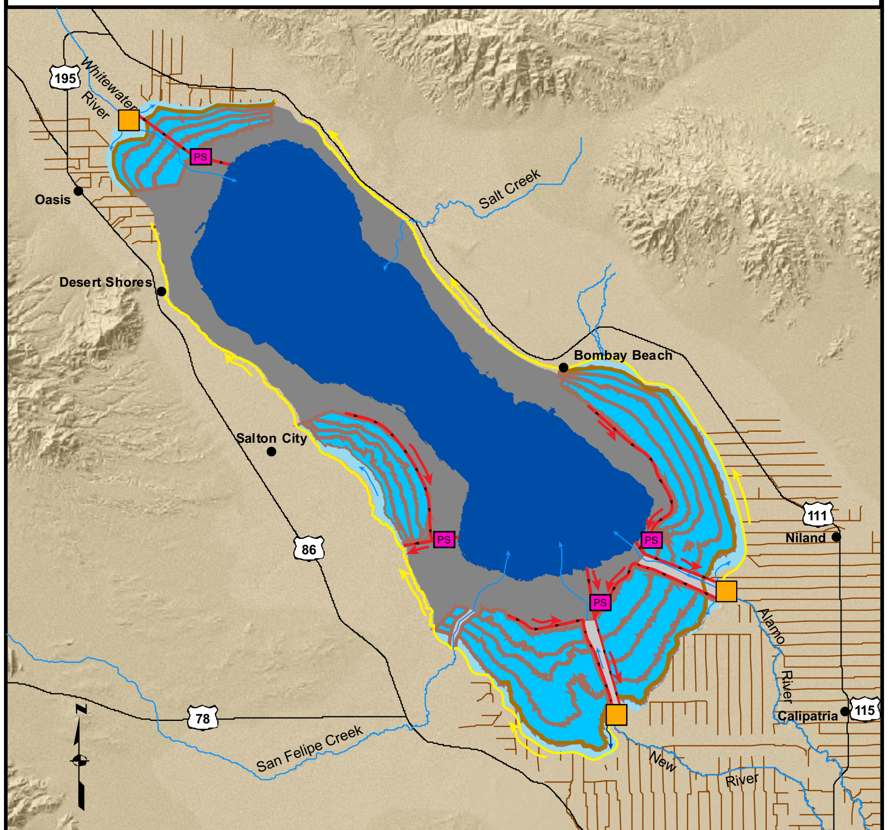
LEGEND

- Shoreline Waterway
- Saline Habitat Complex
- Brine Sink
- Exposed Playa
- River/Creek
- Agricultural Drain
- AQM Canal*
- Saltwater Conveyance
- Highways
- Sedimentation/Distribution Basin
- PS Saltwater Pump Station



Note: Arrows indicate direction of flow

*Canal also supplies water to Shoreline Waterway

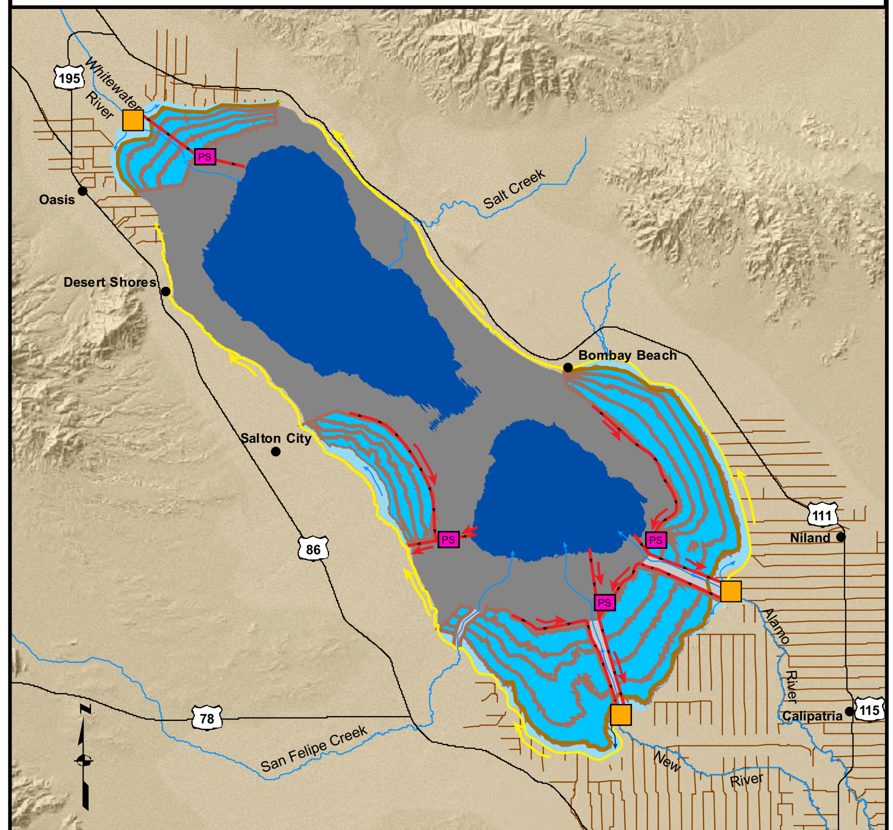
0 5 10 Miles

FIGURE 3-5C
PHASE 3 (2040)
ALTERNATIVE 2
SALINE HABITAT COMPLEX II

ES112005003SAC figure_3-5C.ai 10/06/06 tdaus

LEGEND

- Shoreline Waterway
- Saline Habitat Complex
- Brine Sink
- Exposed Playa
- River/Creek
- Agricultural Drain
- AQM Canal*
- Saltwater Conveyance
- Highways
- Sedimentation/Distribution Basin
- PS Saltwater Pump Station



Note: Arrows indicate direction of flow

*Canal also supplies water to Shoreline Waterway

0 5 10 Miles

FIGURE 3-5D
PHASE 4 (2078)
ALTERNATIVE 2
SALINE HABITAT COMPLEX II

ES112005003SAC figure_3-5D.ai 10/06/06 tdaus

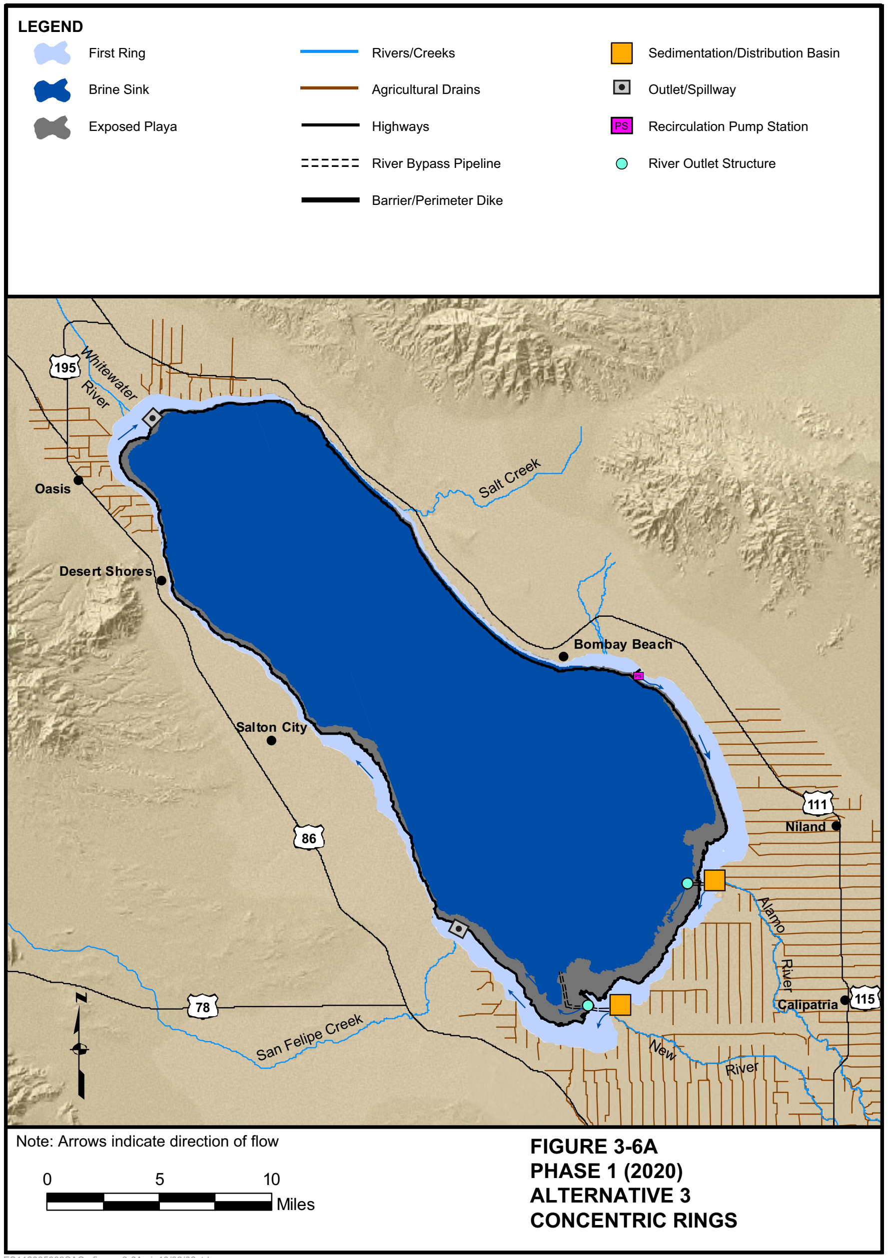


FIGURE 3-6A
PHASE 1 (2020)
ALTERNATIVE 3
CONCENTRIC RINGS

ES112005003SAC figure_3-6A.ai 10/06/06 tdaus

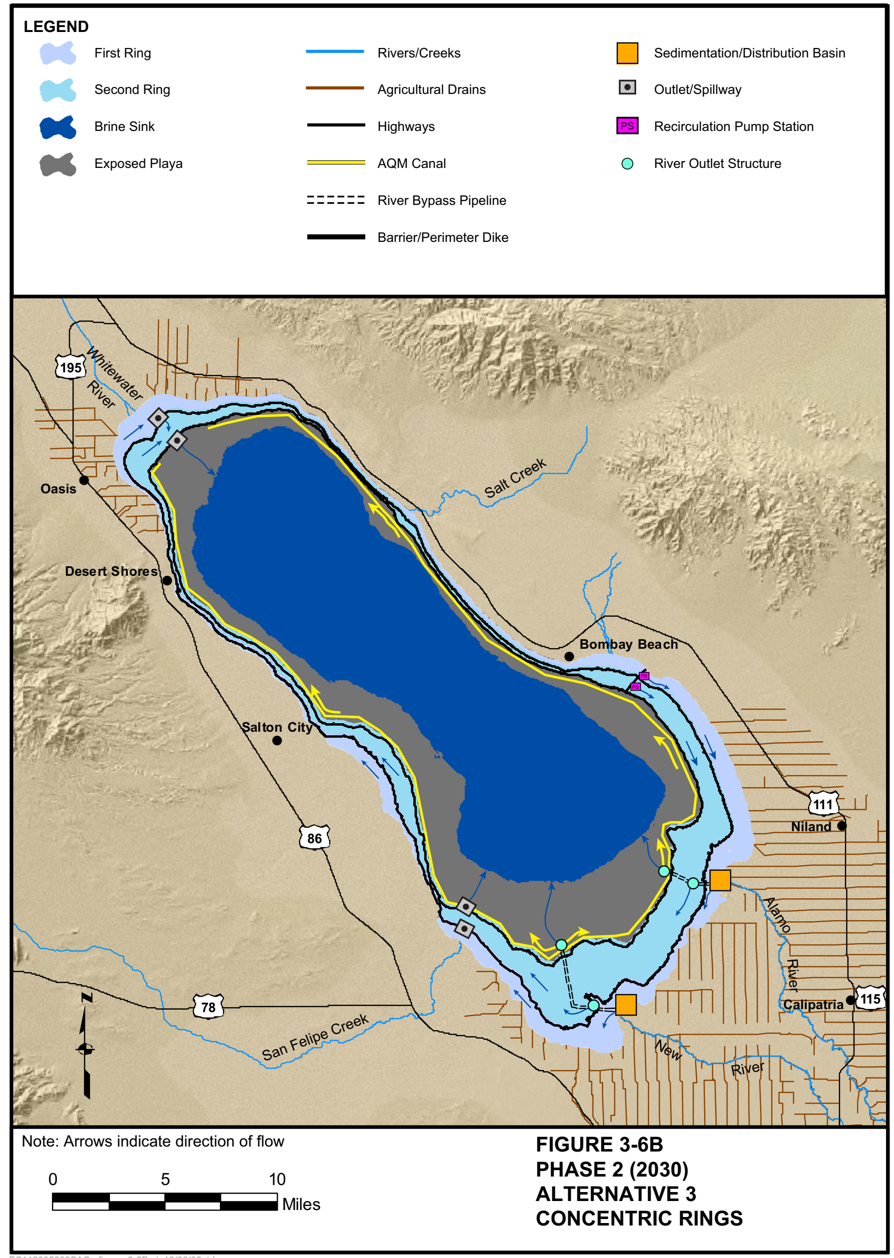


FIGURE 3-6B
PHASE 2 (2030)
ALTERNATIVE 3
CONCENTRIC RINGS

ES112005003SAC figure_3-6B.ai 10/06/06 tdaus

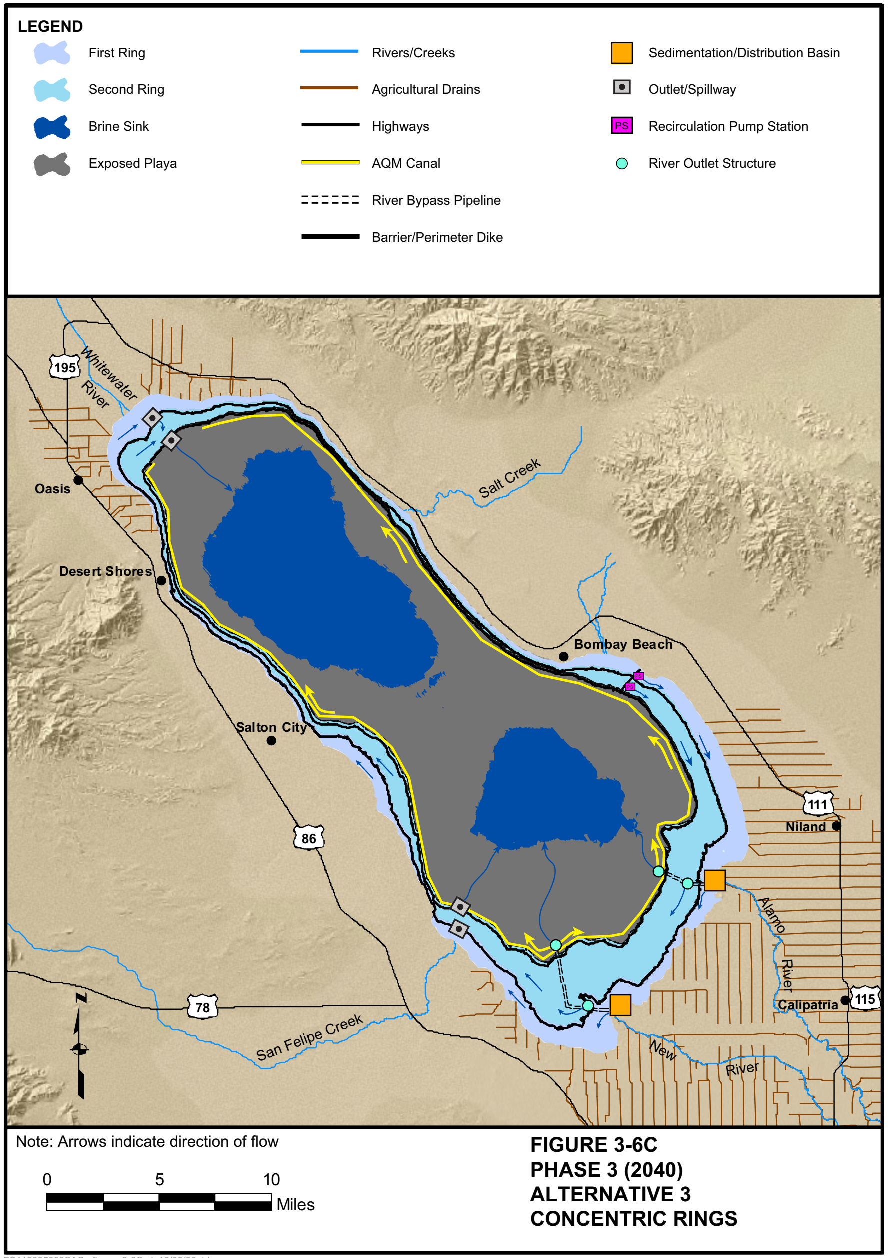


FIGURE 3-6C
PHASE 3 (2040)
ALTERNATIVE 3
CONCENTRIC RINGS

ES112005003SAC figure_3-6C.ai 10/06/06 tdaus

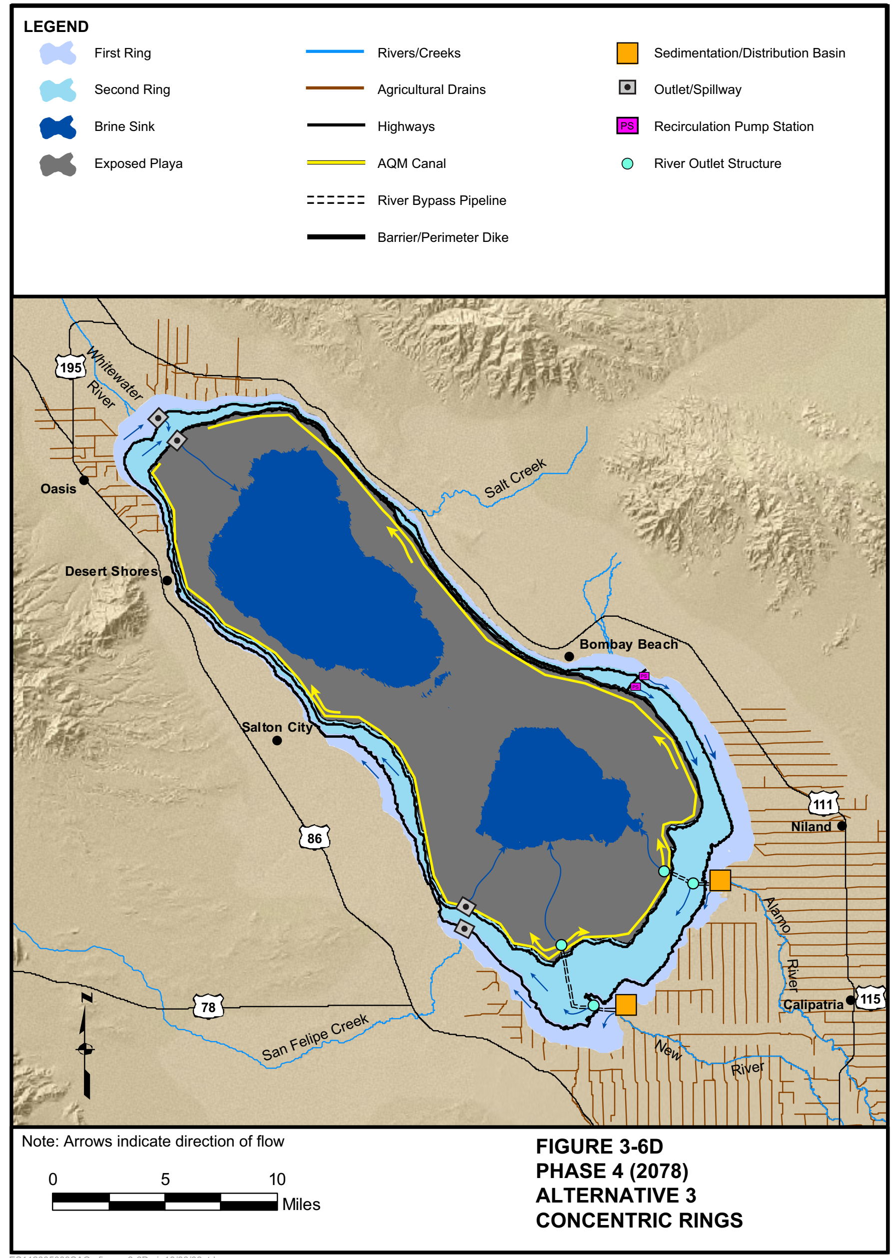
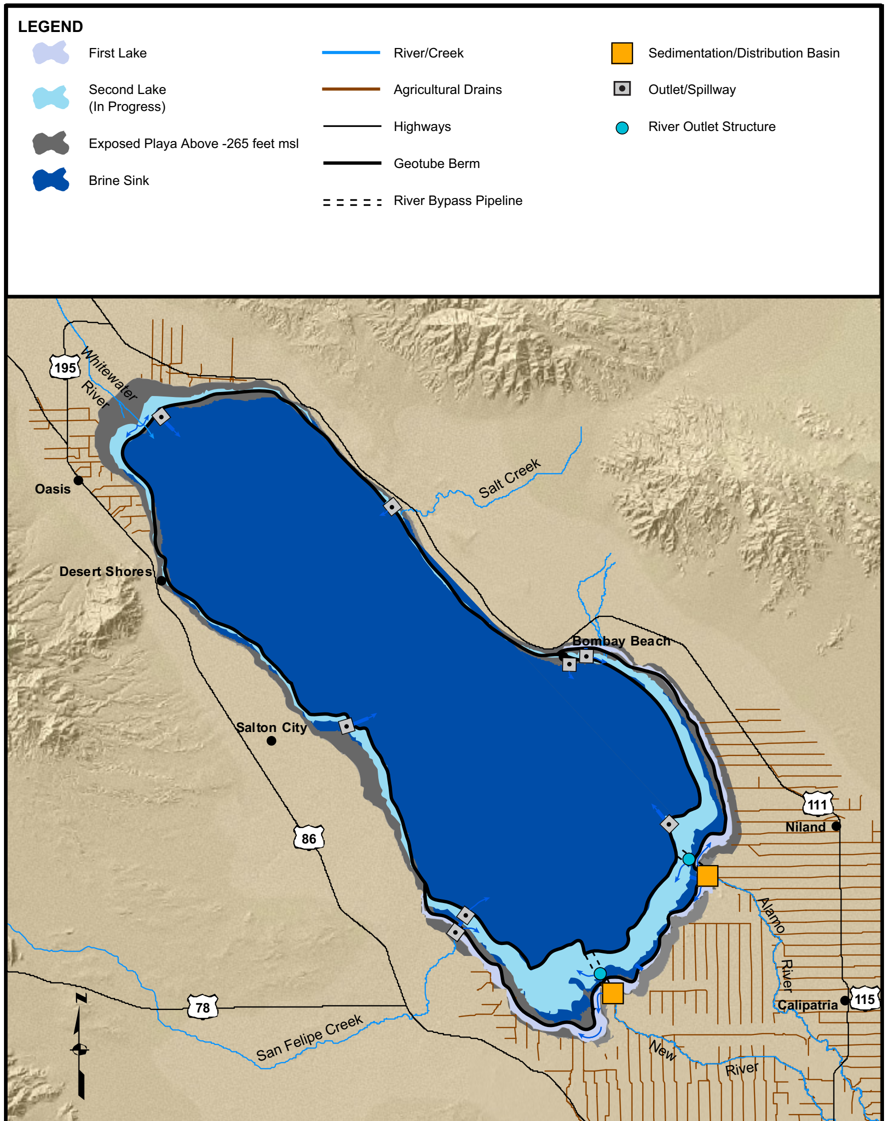


FIGURE 3-6D
PHASE 4 (2078)
ALTERNATIVE 3
CONCENTRIC RINGS

ES112005003SAC figure_3-6D.ai 10/06/06 tdaus

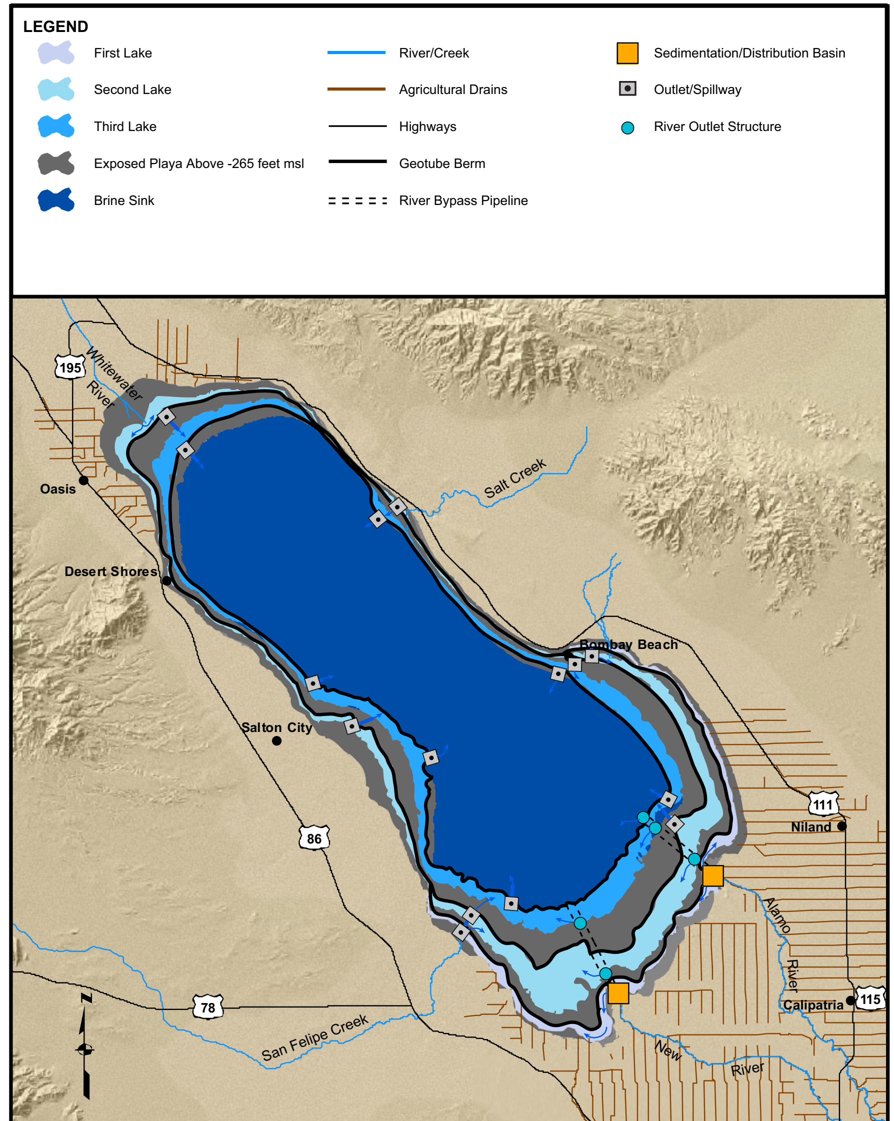


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-7A
PHASE 1 (2020)
ALTERNATIVE 4
CONCENTRIC LAKES

ES112005003SAC figure_3-7A.ai 10/06/06 tdaus

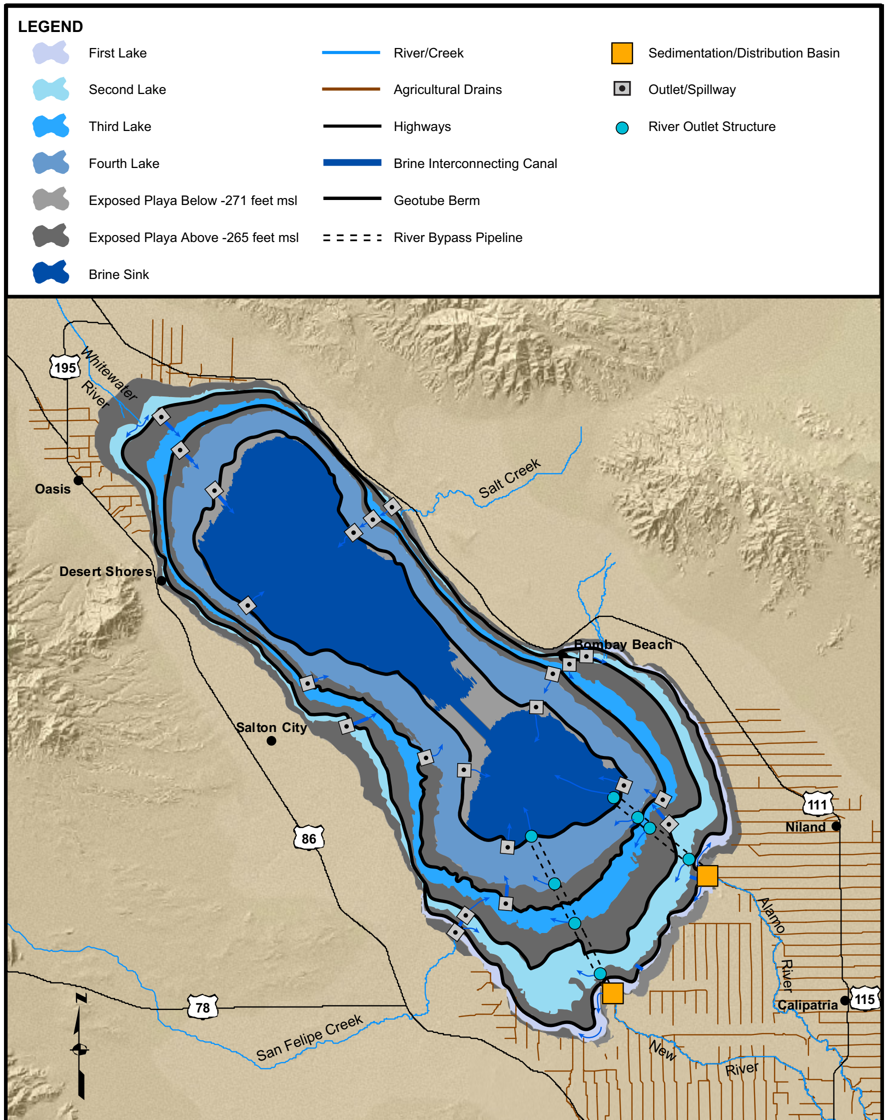


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-7B
PHASE 2 (2030)
ALTERNATIVE 4
CONCENTRIC LAKES

ES112005003SAC figure_3-7B.ai 10/06/06 tdaus

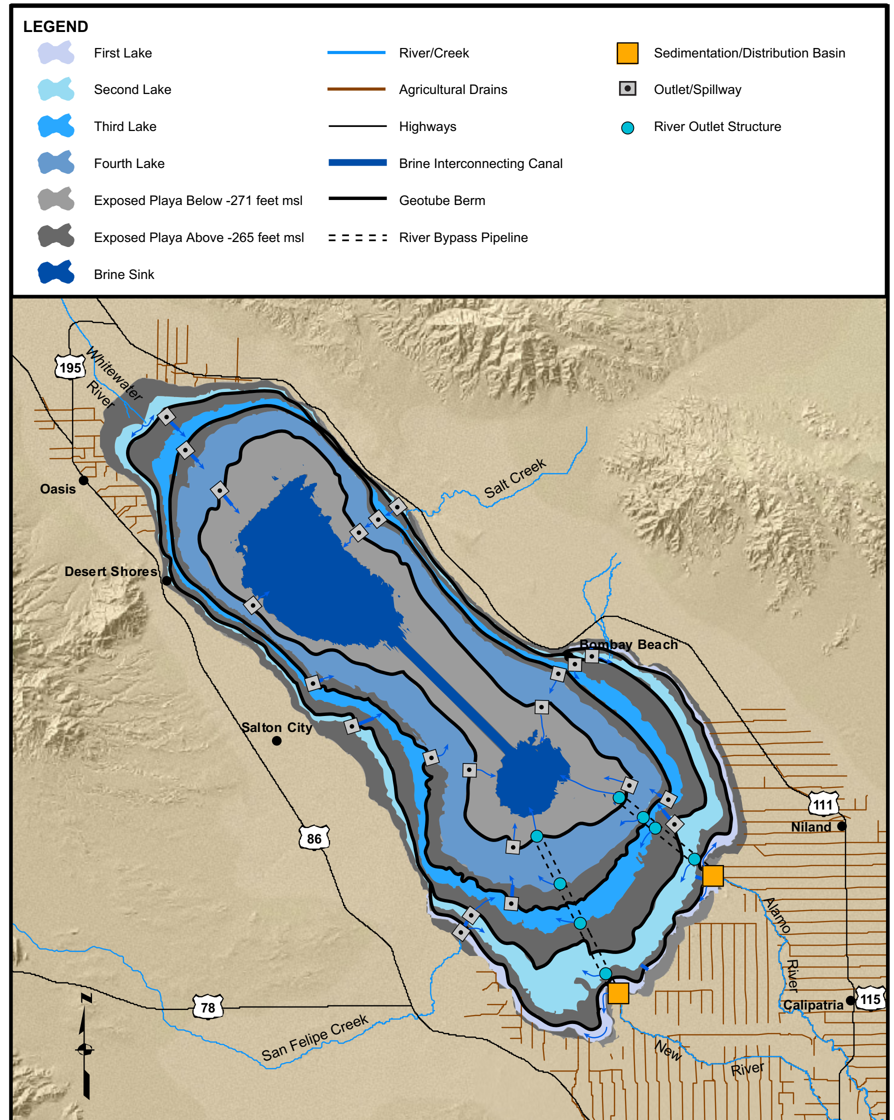


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-7C
PHASE 3 (2040)
ALTERNATIVE 4
CONCENTRIC LAKES

ES112005003SAC figure_3-7C.ai 10/06/06 tdaus



Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-7D
PHASE 4 (2078)
ALTERNATIVE 4
CONCENTRIC LAKES

ES112005003SAC figure_3-7D.ai 10/06/06 tdaus

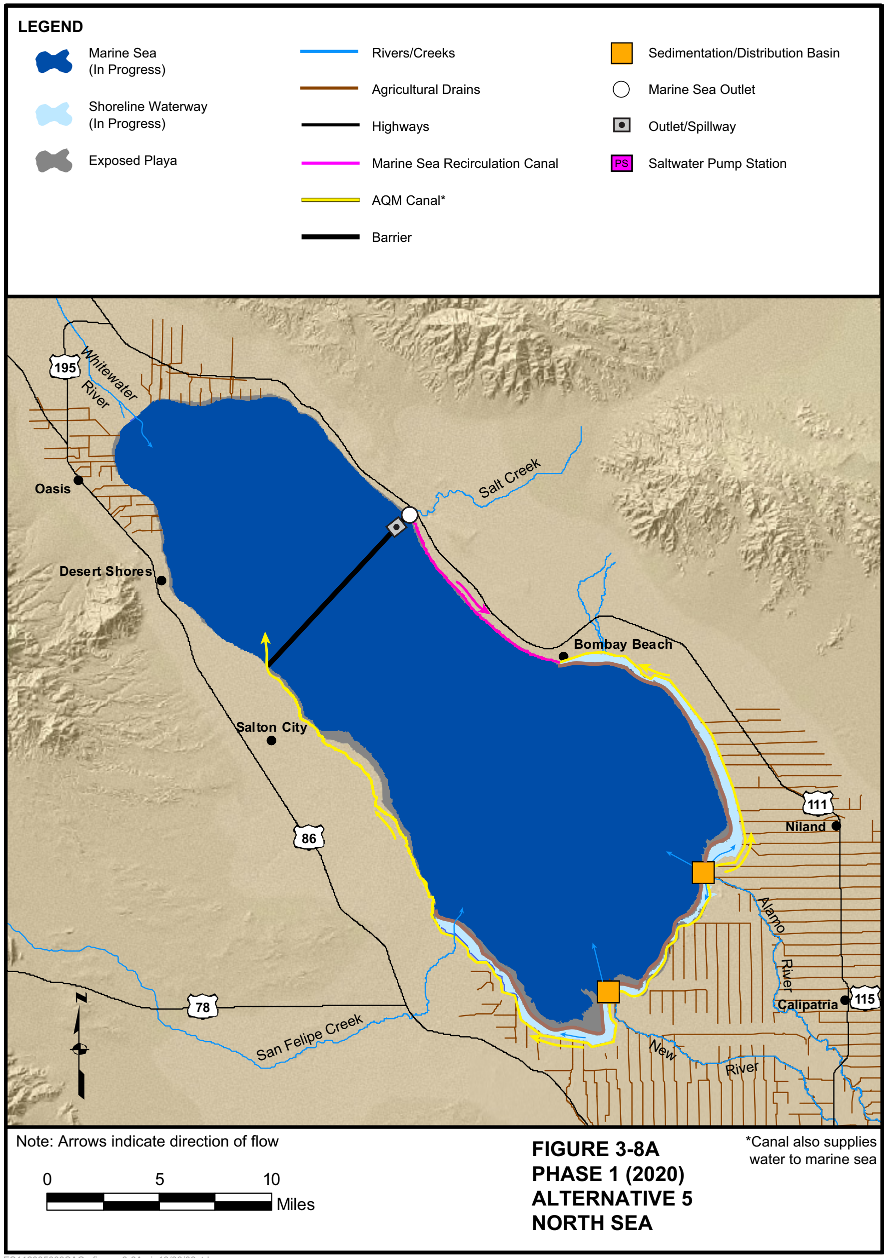


FIGURE 3-8A
PHASE 1 (2020)
ALTERNATIVE 5
NORTH SEA

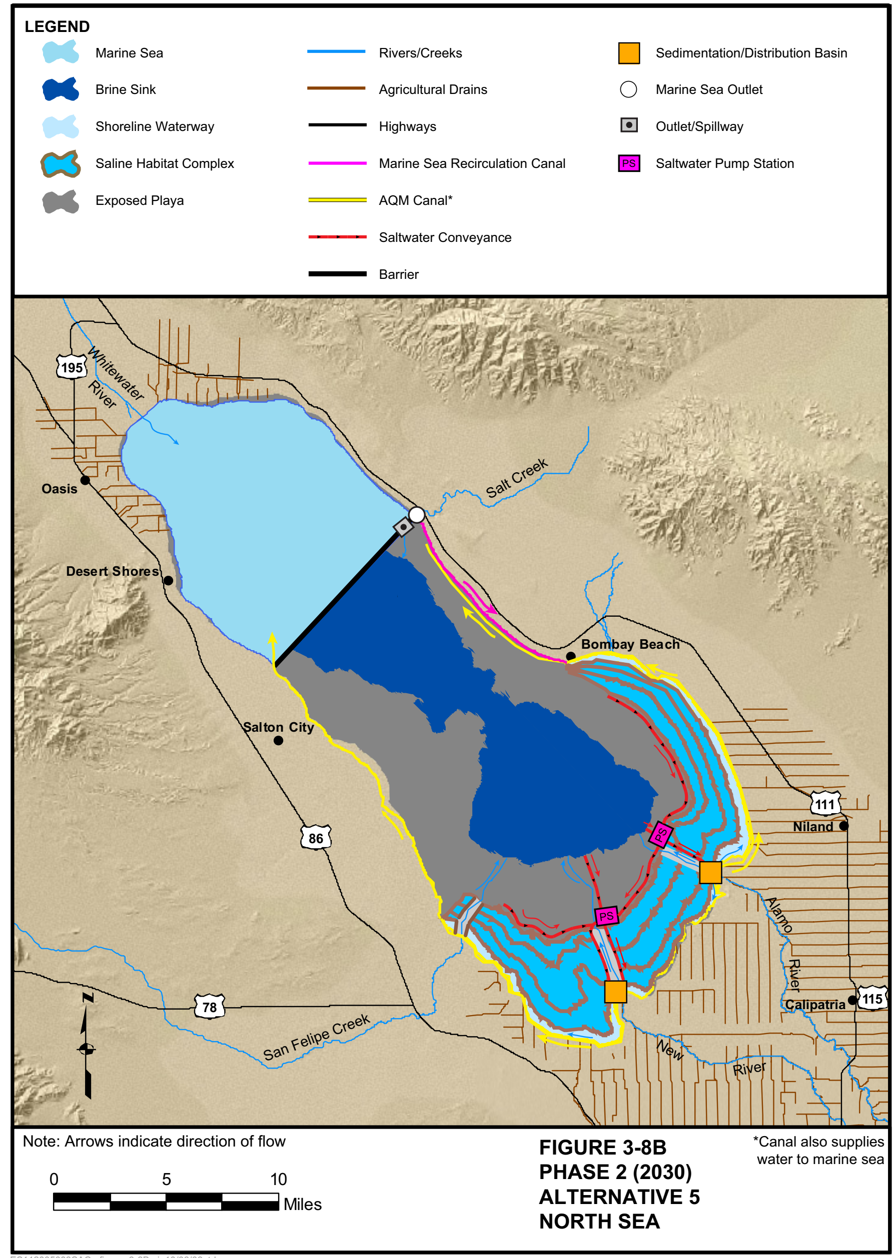
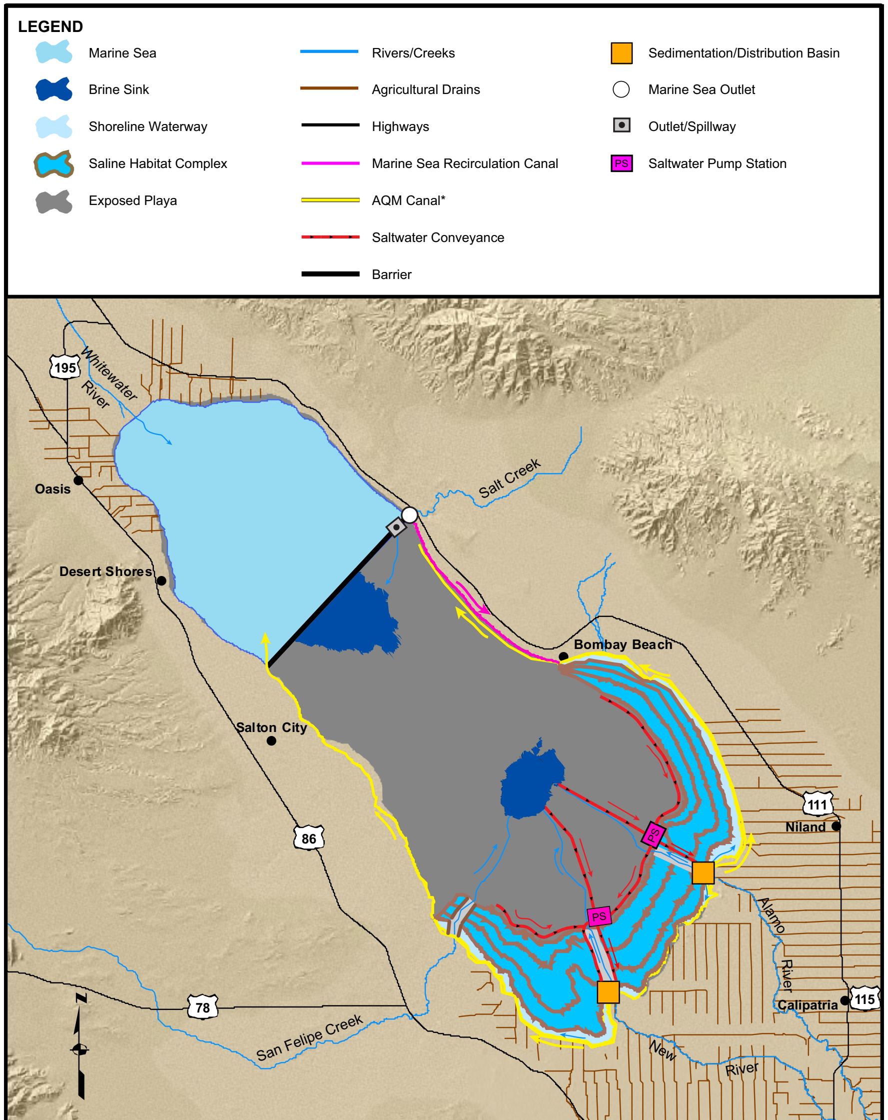


FIGURE 3-8B
PHASE 2 (2030)
ALTERNATIVE 5
NORTH SEA



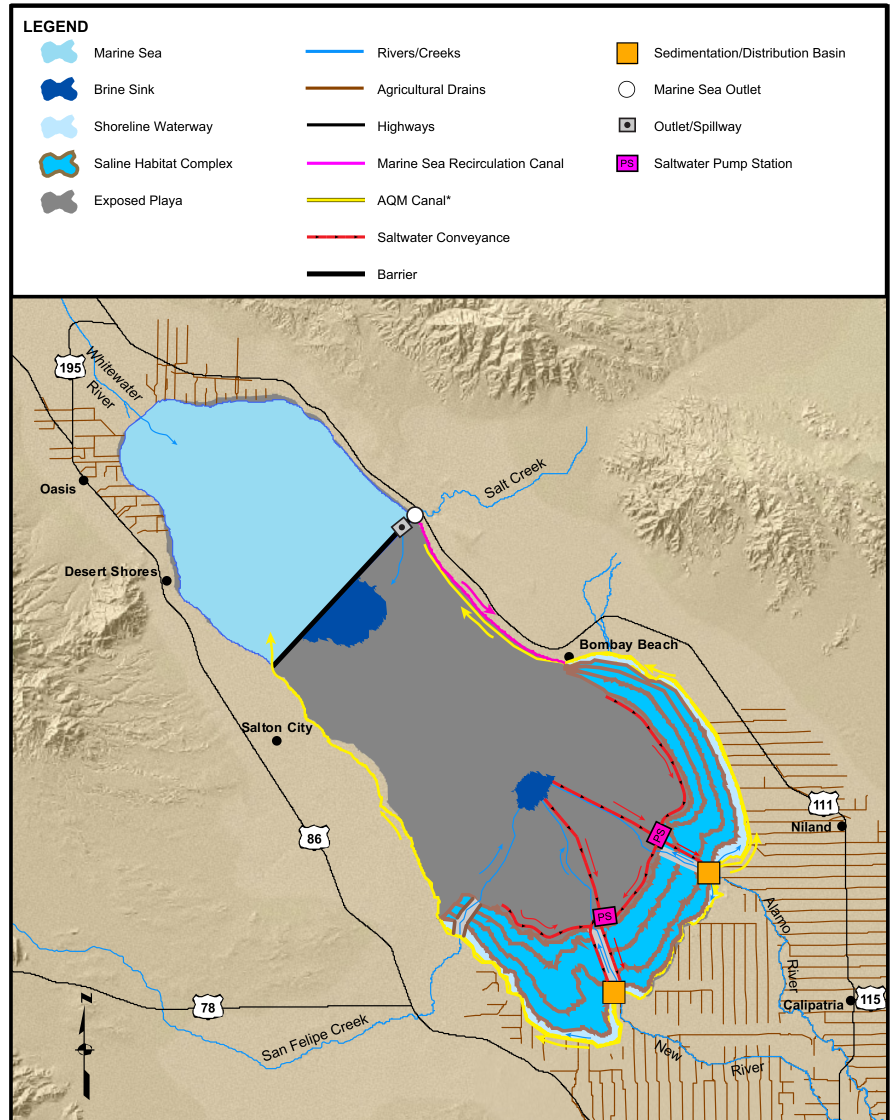
Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-8C
PHASE 3 (2040)
ALTERNATIVE 5
NORTH SEA

*Canal also supplies water to marine sea

ES112005003SAC figure_3-8C.ai 10/06/06 tdaus



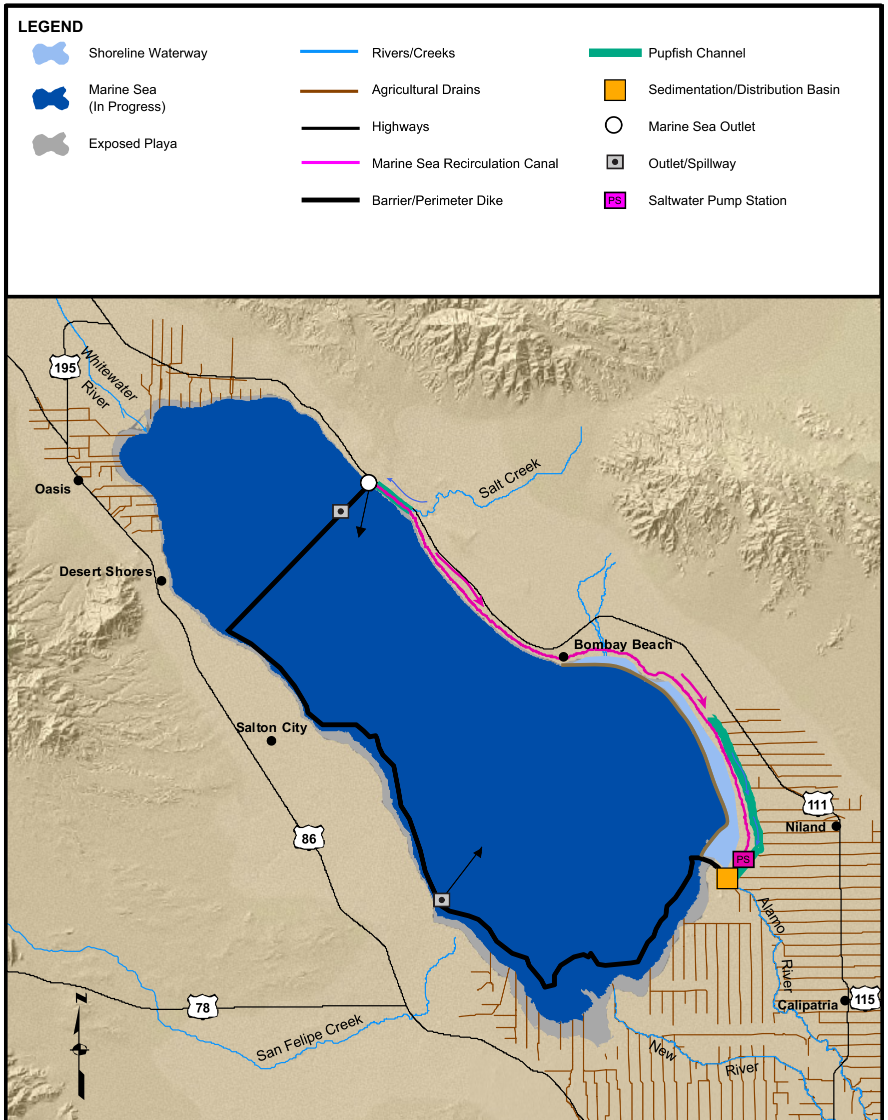
Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-8D
PHASE 4 (2078)
ALTERNATIVE 5
NORTH SEA

*Canal also supplies water to marine sea

ES112005003SAC figure_3-8D.ai 10/06/06 tdaus

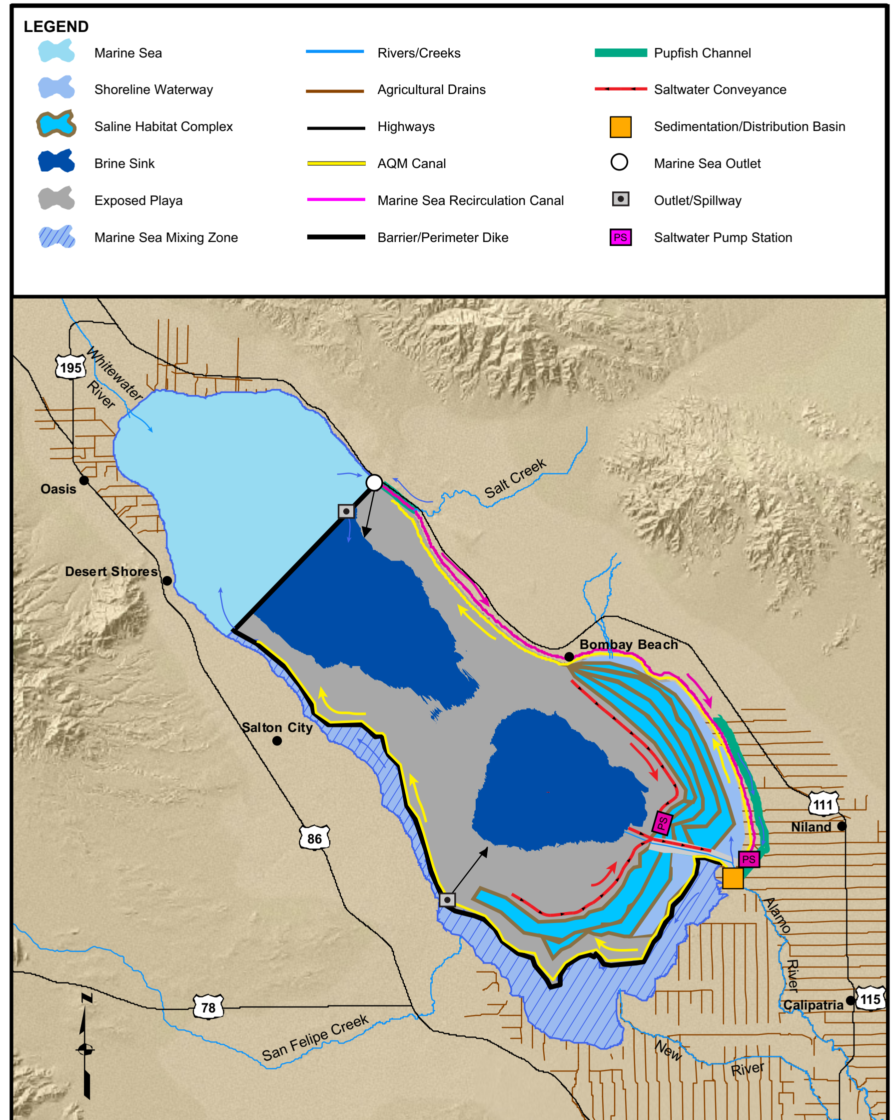


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-9A
PHASE 1 (2020)
ALTERNATIVE 6
NORTH SEA COMBINED

ES112005003SAC figure_3-9A.ai 10/06/06 tdaus



Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-9B
PHASE 2 (2030)
ALTERNATIVE 6
NORTH SEA COMBINED

ES112005003SAC figure_3-9B.ai 10/06/06 tdaus

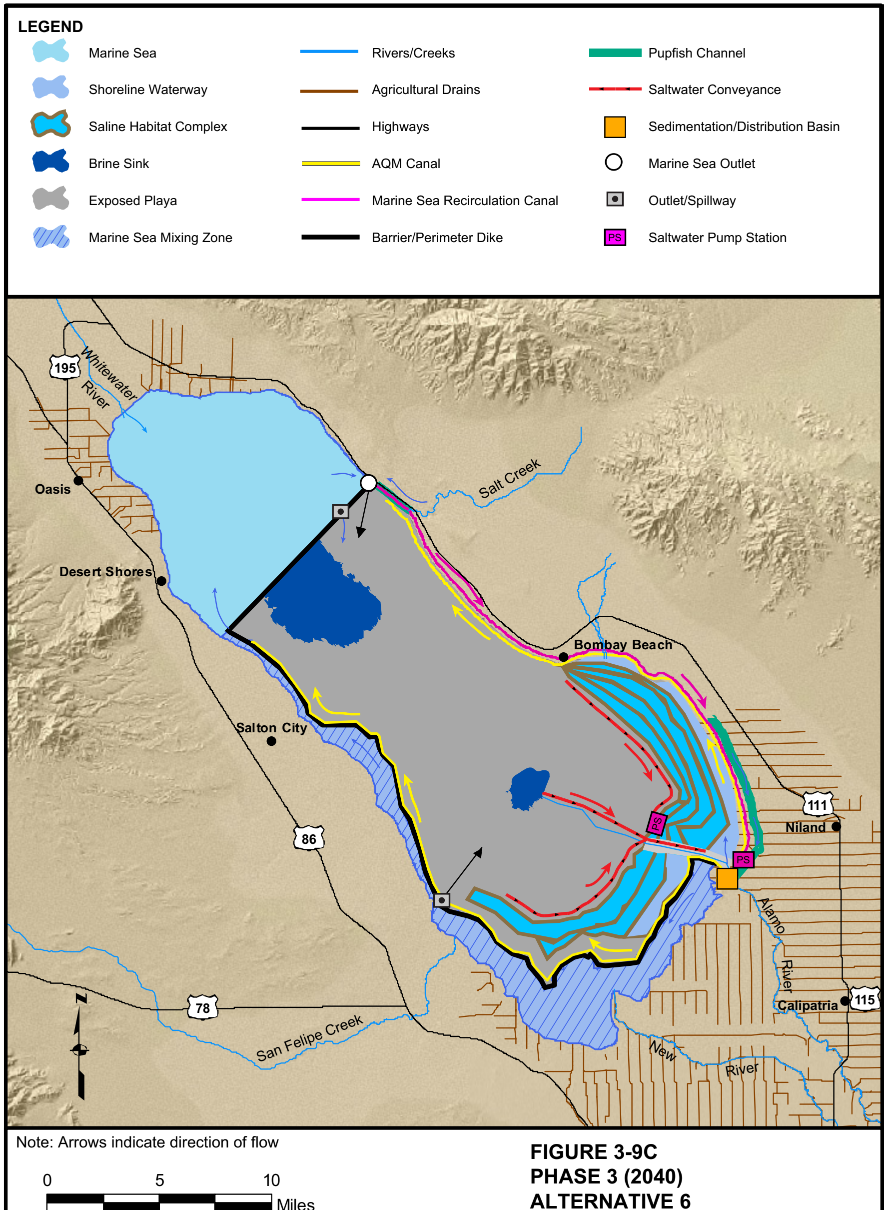


FIGURE 3-9C
PHASE 3 (2040)
ALTERNATIVE 6
NORTH SEA COMBINED

ES112005003SAC figure_3-9C.ai 10/06/06 tdaus

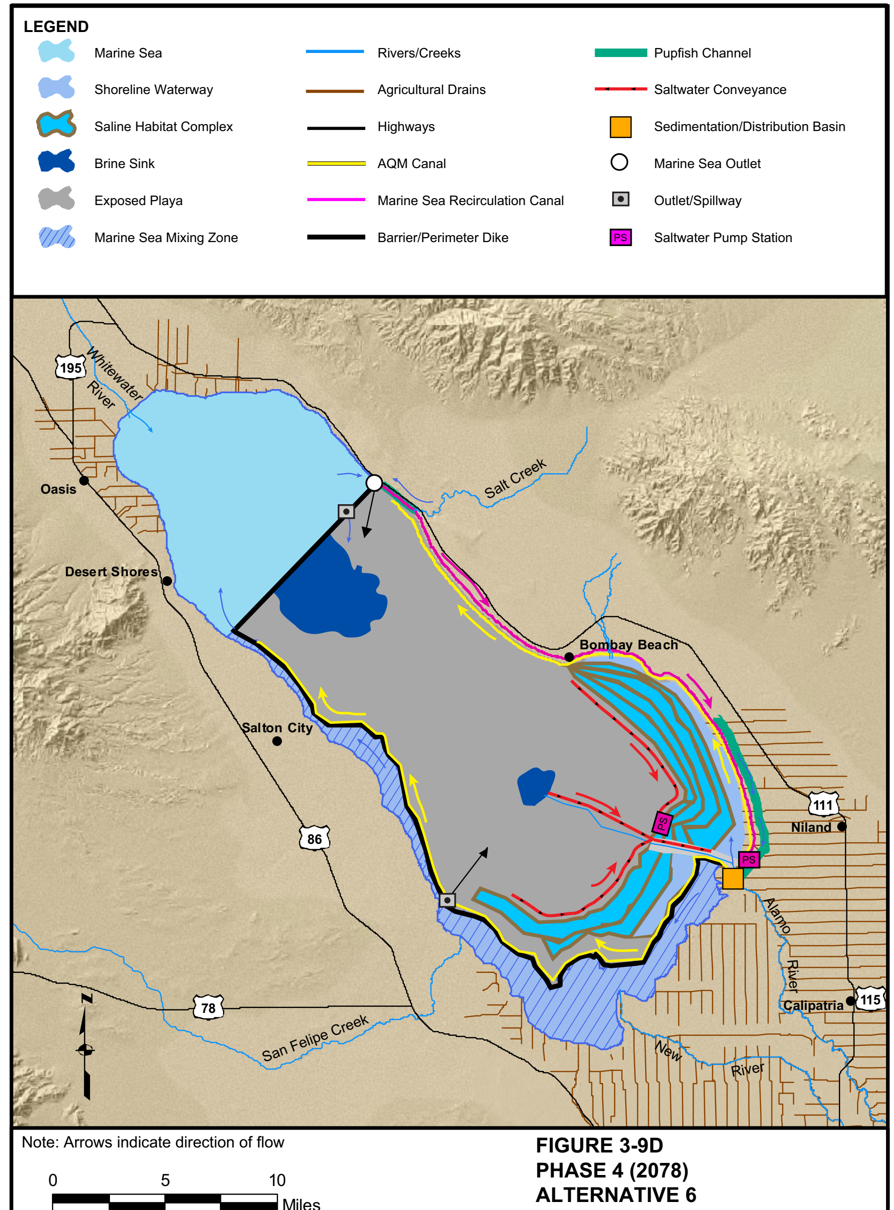
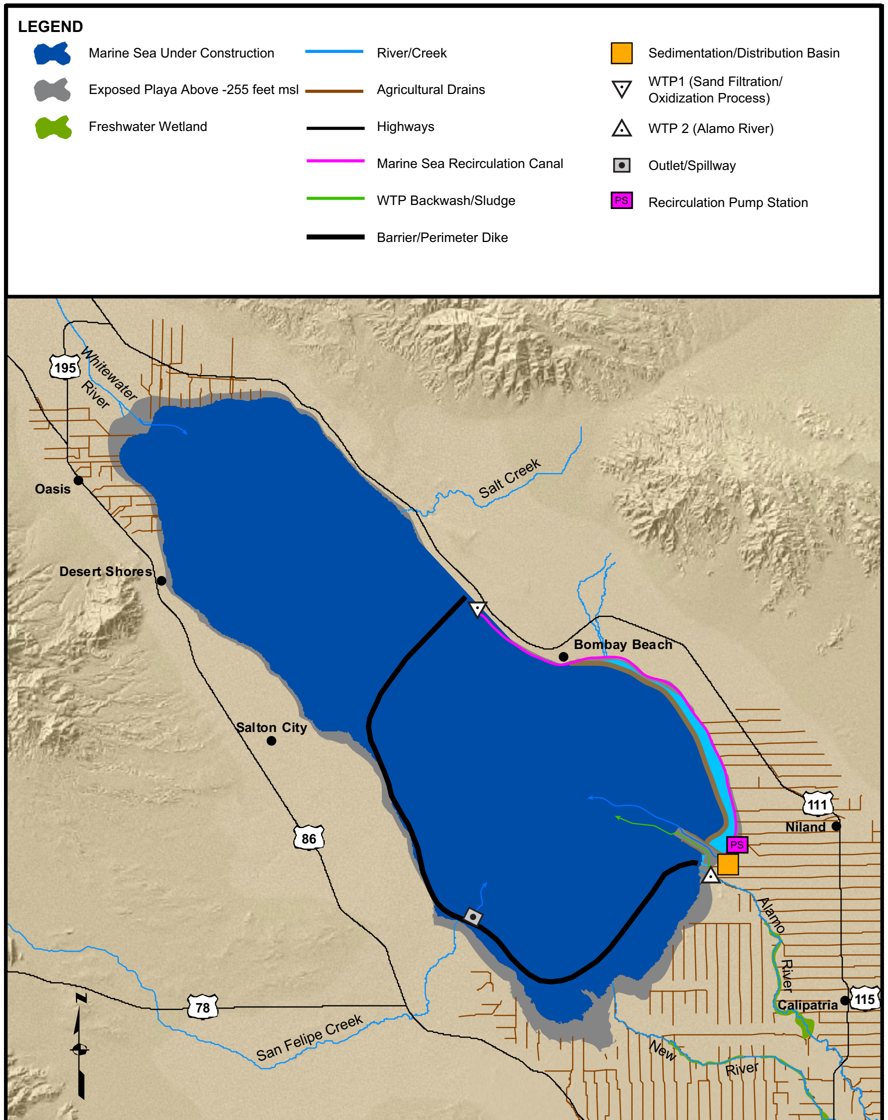


FIGURE 3-9D
PHASE 4 (2078)
ALTERNATIVE 6
NORTH SEA COMBINED

ES112005003SAC figure_3-9D.ai 10/06/06 tdaus

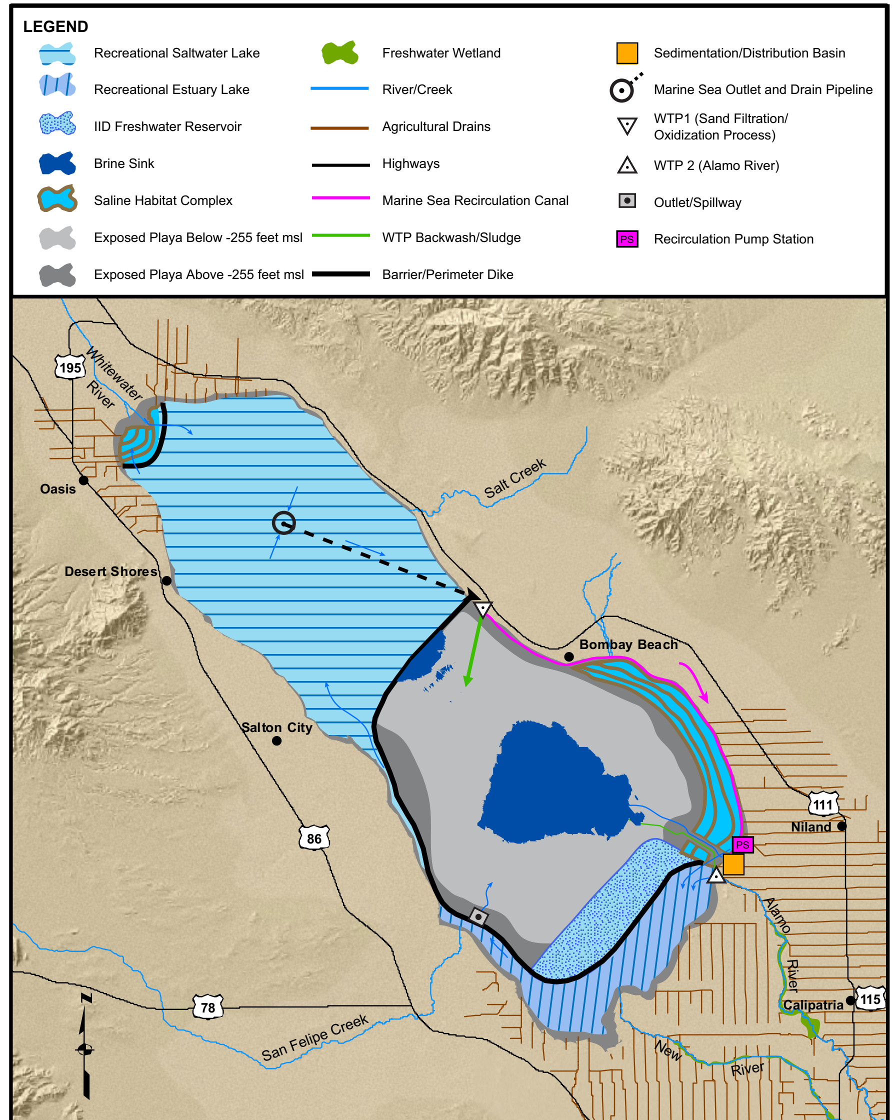


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-10A
PHASE 1 (2020)
ALTERNATIVE 7
COMBINED NORTH AND SOUTH LAKES

ES112005003SAC figure_3-10A.ai 10/06/06 tdaus

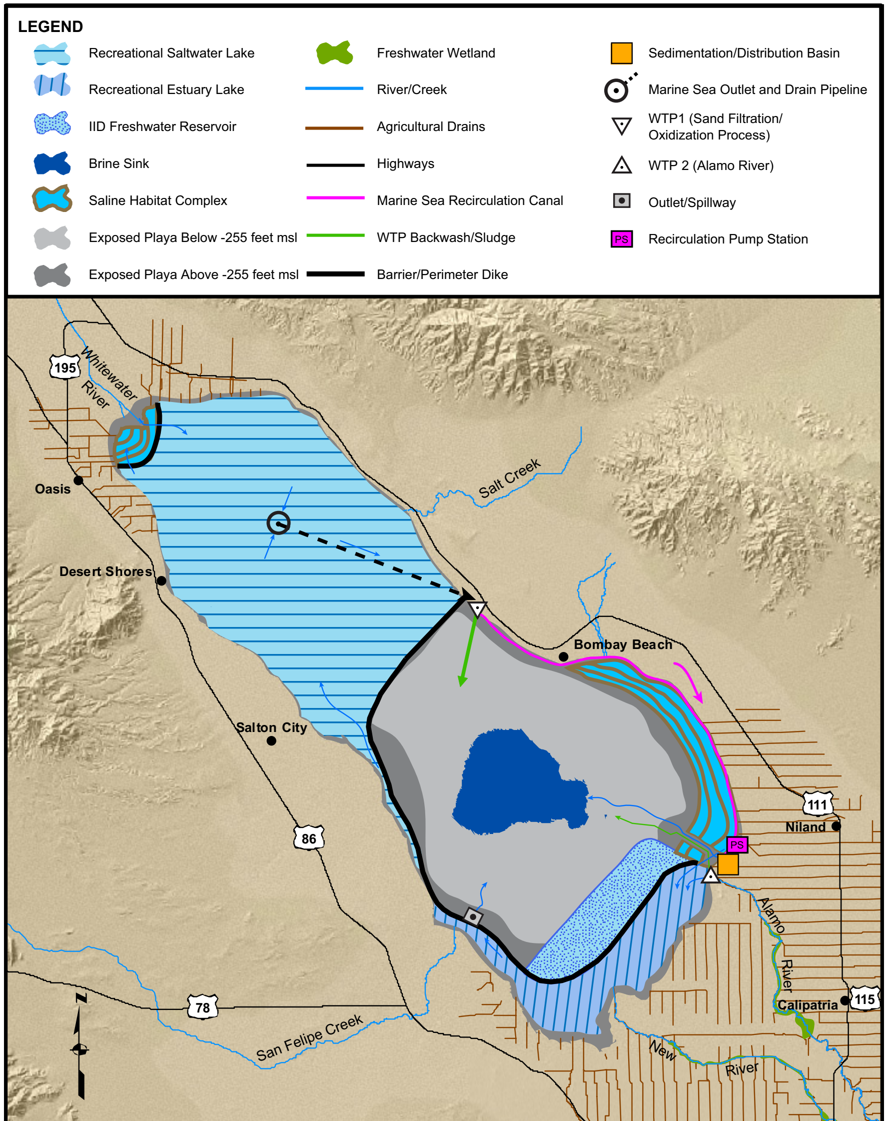


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-10B
PHASE 2 (2030)
ALTERNATIVE 7
COMBINED NORTH AND SOUTH LAKES

ES112005003SAC figure_3-10B.ai 10/06/06 tdaus

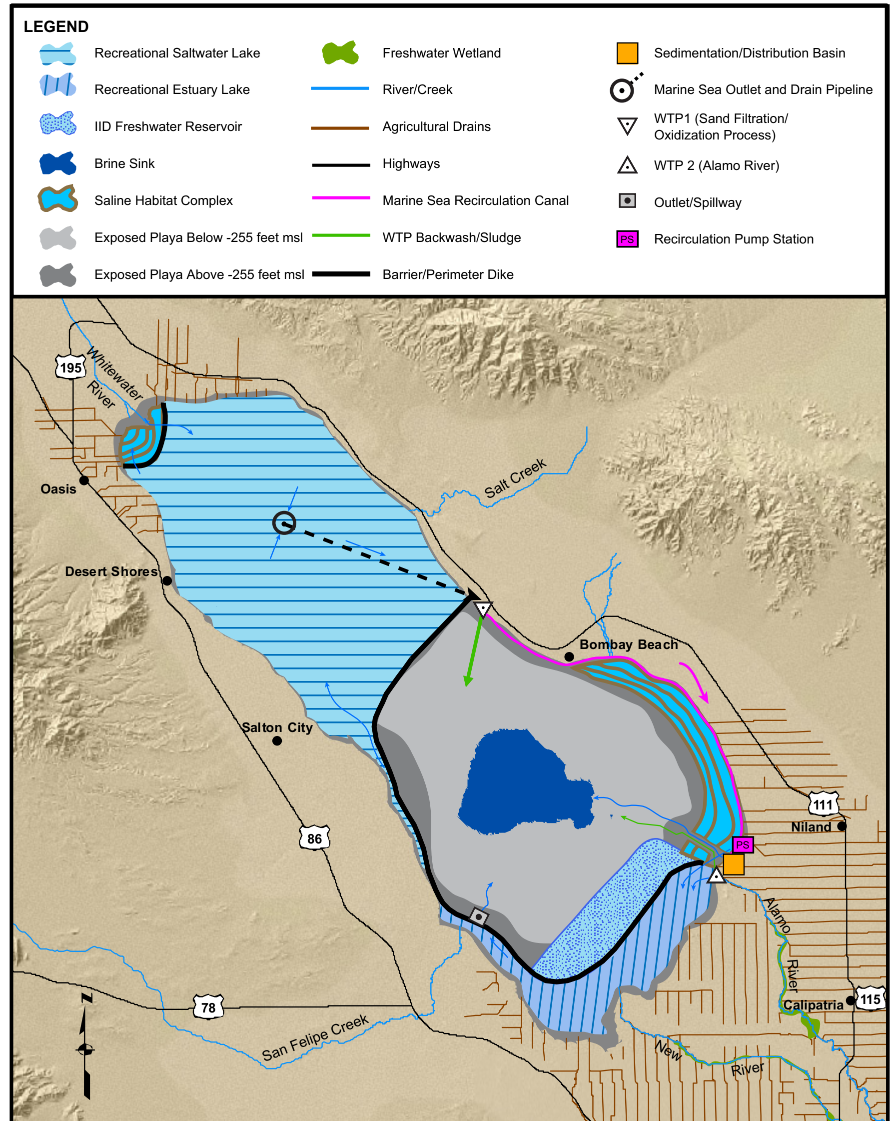


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-10C
PHASE 3 (2040)
ALTERNATIVE 7
COMBINED NORTH AND SOUTH LAKES

ES112005003SAC figure_3-10C.ai 10/06/06 tdaus

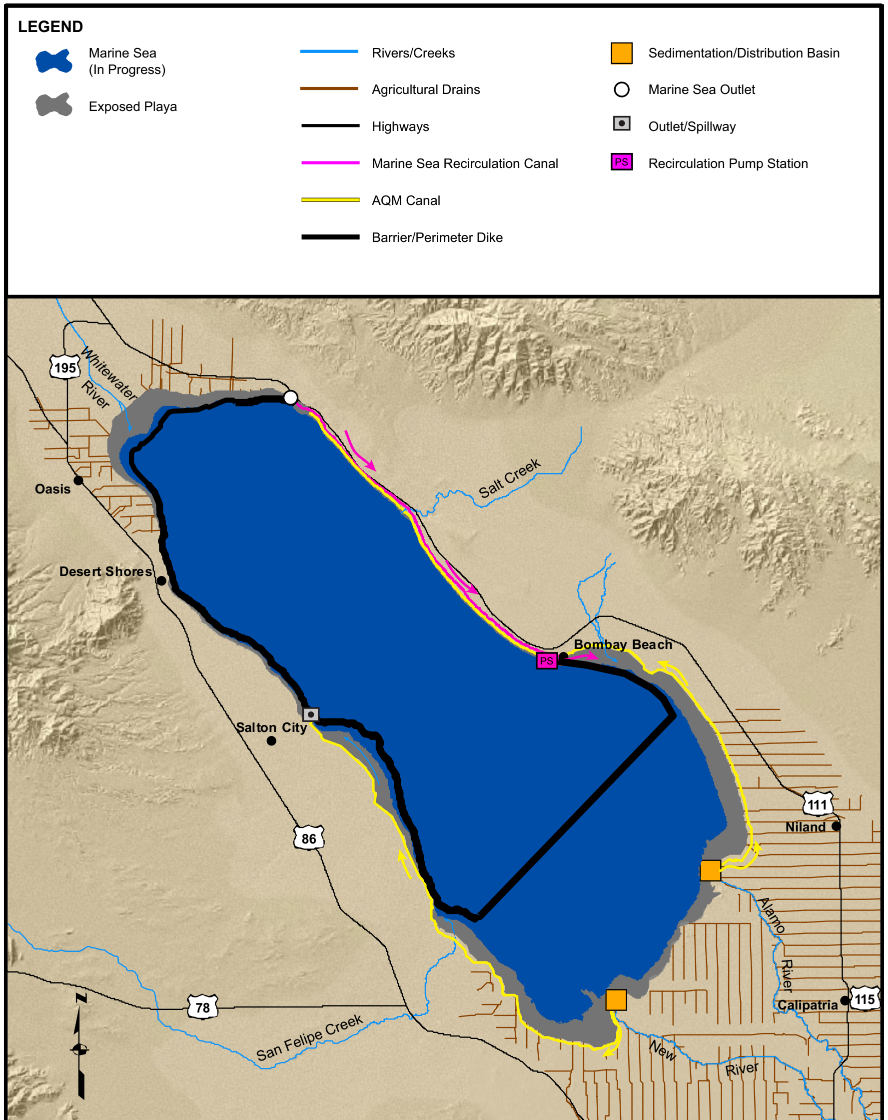


Note: Arrows indicate direction of flow

0 5 10 Miles

FIGURE 3-10D
PHASE 4 (2078)
ALTERNATIVE 7
COMBINED NORTH AND SOUTH LAKES

ES112005003SAC figure_3-10D.ai 10/06/06 tdaus



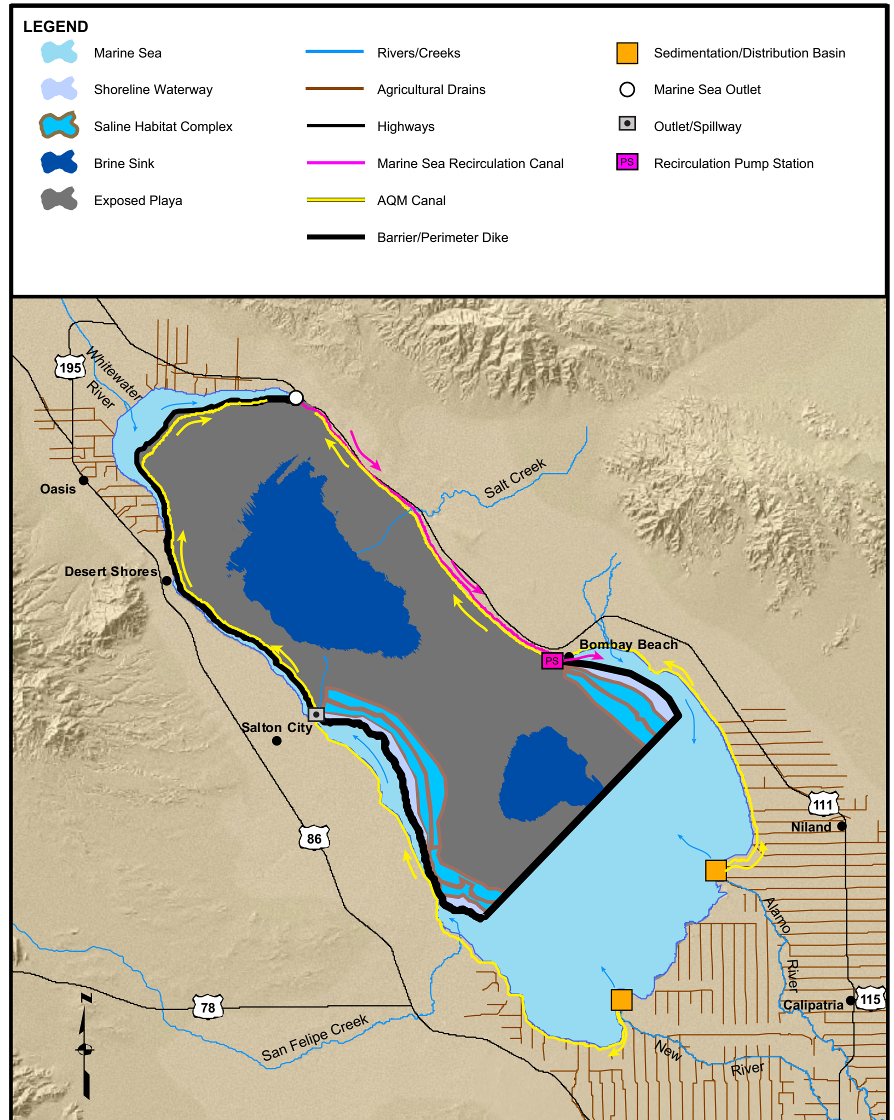
Note: Arrows indicate direction of flow

*Canal also supplies water to SHC

0 5 10 Miles

FIGURE 3-11A
PHASE 1 (2020)
ALTERNATIVE 8
SOUTH SEA COMBINED

ES112005003SAC figure_3-11A.ai 10/06/06 tdaus



Note: Arrows indicate direction of flow

*Canal also supplies water to SHC

0 5 10 Miles

FIGURE 3-11B
PHASE 2 (2030)
ALTERNATIVE 8
SOUTH SEA COMBINED

ES112005003SAC figure_3-11B.ai 10/06/06 tdaus

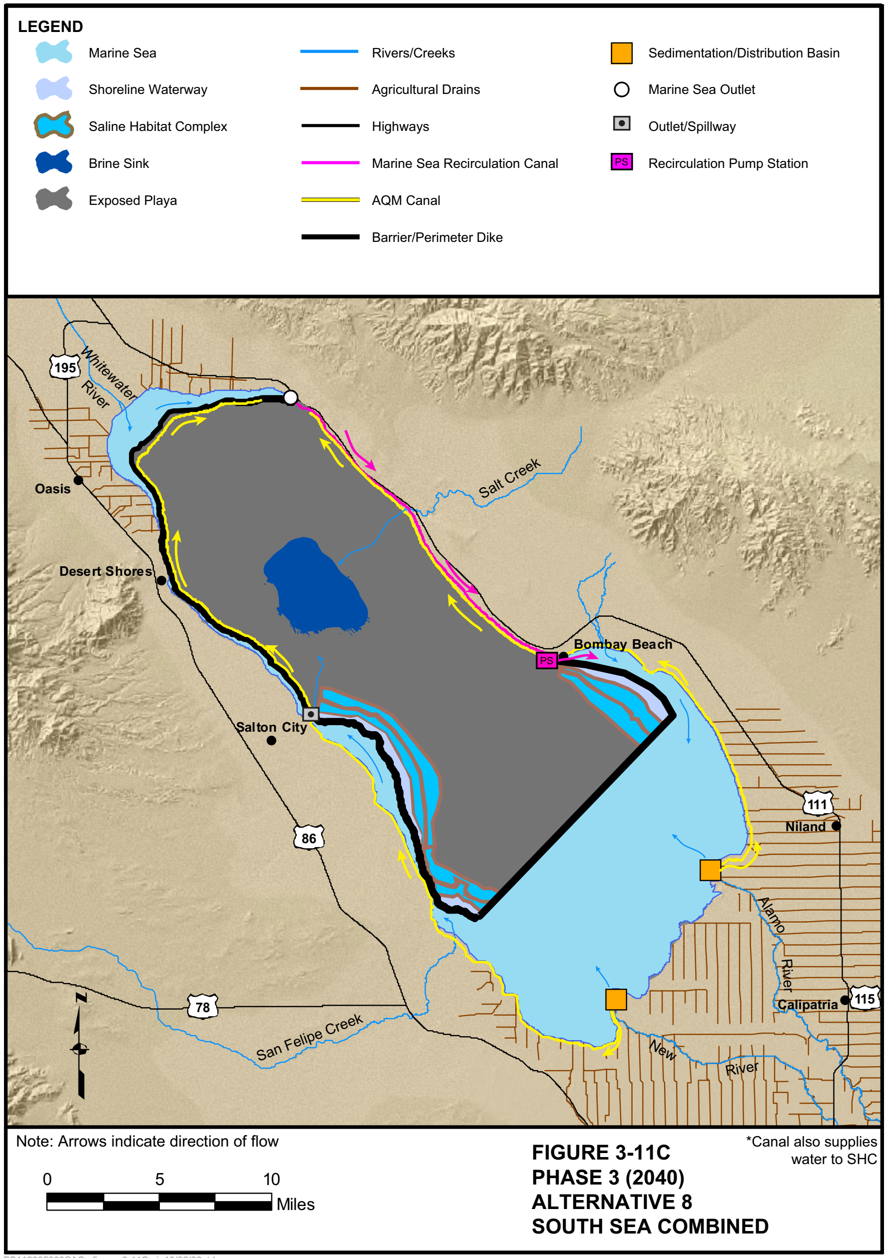


FIGURE 3-11C
PHASE 3 (2040)
ALTERNATIVE 8
SOUTH SEA COMBINED

ES112005003SAC figure_3-11C.ai 10/06/06 tdaus

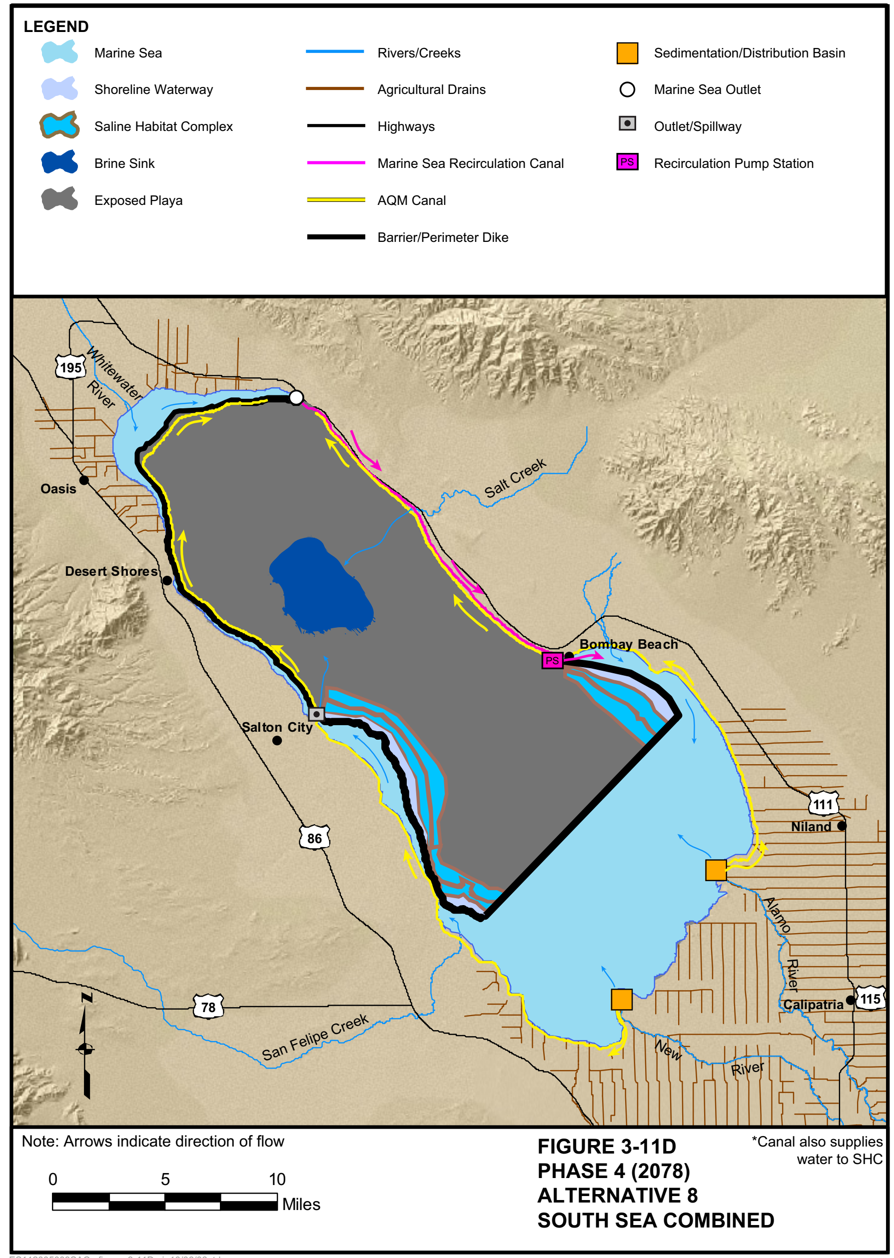


FIGURE 3-11D
PHASE 4 (2078)
ALTERNATIVE 8
SOUTH SEA COMBINED

ES112005003SAC figure_3-11D.ai 10/06/06 tdaus

Table 3-2
Comparison of Infrastructure Features in Alternatives

Component	Alternatives									
	No Action Alternative - CEQA Conditions	**No Action Alternative - Variability Conditions**	**Alternative 1 Saline Complex Habitat I**	**Alternative 2 Saline Habitat Complex II**	**Alternative 3 Concentric Rings**	**Alternative 4 Concentric Lakes**	**Alternative 5 North Sea**	**Alternative 6 North Sea Combined**	**Alternative 7 Combined North and South Lakes**	**Alternative 8 South Sea Combined**
Air Quality Management Canals and Pumping plants	92 miles 19 pumping plants	92 miles 19 pumping plants	88 miles 28 pumping plants	73 miles 30 pumping plants	78 miles 34 pumping plants	251 miles of temporary irrigation	52 miles 32 pumping plants	55 miles 35 pumping plants	-	79 miles 42 pumping plants
Pupfish Channel	30 miles	30 miles	30 miles	-	-	-	-	10 miles	-	-
Marine Sea Recirculation Canal and Pumping plant	-	-	-	-	1 pumping plant	-	20 miles 1 pumping plant	28 miles 1 pumping plant	20 miles 1 pumping plant	17 miles 1 pumping plant
Deep Marine Sea and Moderately Deep Marine Sea	-	-	-	-	61,000 acres	-	62,000 acres	74,000 acres	104,000 acres	83,000 acres
Saline Habitat Complex Component	-	-	38,000 acres	75,000 acres	-		45,500 acres	29,000 acres	12,000 acres	18,000 acres
Concentric Lakes - Similar to Saline Habitat Complex without separate cells and wide range of salinity						88,000 acres				
Salton Sea or Brine Sink at 2078	172,000 acres	140,000 acres	123,000 acres	85,000 acres	68,000 acres	22,000 acres	13,000 acres	11,000 acres	15,000 acres	9,000 acres
Sedimentation and Distribution Basins	3 basins of 200 acres each	3 basins of 200 acres each	3 basins of 200 acres each	3 basins of 200 acres each	2 basins of 200 acres each	2 basins of 200 acres each	2 basins of 200 acres each	1 basin of 200 acres	1 basin of 200 acres	2 basins of 200 acres each
Air Quality Management with water efficient vegetation	24,000 acres	24,000 acres	41,000 acres	46,000 acres	63,000 acres	-	59,000 acres	66,000 acres	-	64,000 acres
Air Quality Management with Brine Stabilization	9,000 acres	9,000 acres	17,000 acres	18,000 acres	26,000 acres	-	24,000 acres	26,000 acres	66,500 acres	26,000 acres

Table 3-2
Comparison of Infrastructure Features in Alternatives

Component	Alternatives									
	No Action Alternative - CEQA Conditions	**No Action Alternative - Variability Conditions**	**Alternative 1 Saline Complex Habitat I**	**Alternative 2 Saline Habitat Complex II**	**Alternative 3 Concentric Rings**	**Alternative 4 Concentric Lakes**	**Alternative 5 North Sea**	**Alternative 6 North Sea Combined**	**Alternative 7 Combined North and South Lakes**	**Alternative 8 South Sea Combined**
Imperial Irrigation District Reservoir	-	-	-	-	-	-	-	-	11,000 acres	-
Treatment Plants	-	-	-	-	-	-	-	-	2	-
Volume of imported rock and gravel	1,680,000 cubic yards	1,680,000 cubic yards	6,720,000 cubic yards	11,670,000 cubic yards	85,150,000 cubic yards	7,420,000 cubic yards	53,730,000 cubic yards	93,650,000 cubic yards	79,650,000 cubic yards	100,270,000 cubic yards
Volume of Sea Bed soils excavated or dredged	5,050,000 cubic yards	5,050,000 cubic yards	77,140,000 cubic yards	136,530,000 cubic yards	18,810,000 cubic yards	154,215,000 cubic yards	86,770,000 cubic yards	66,970,000 cubic yards	33,522,000 cubic yards	47,230,000 cubic yards
Trucks to import rock and gravel per day during peak construction periods	4	4	50	100	1,200	90	1,400	2,500	2,200	2,700
Employees per day during peak construction period (does not include drivers of trucks in previous row of this table)	500	500	1,000	1,500	1,500	1,500	1,500	2,000	2,000	2,000
Employees per day during operations and maintenance	100	100	200	300	300	25	300	350	200	300
Energy demand during operations and maintenance	10 Gigawatt-hour/year	10 Gigawatt-hour/year	16 Gigawatt-hour/year	19 Gigawatt-hour/year	27 Gigawatt-hour/year	8 Gigawatt-hour/year	26 Gigawatt-hour/year	30 Gigawatt-hour/year	44 Gigawatt-hour/year	29 Gigawatt-hour/year

Notes:
\- = component not included

Table 3-3
Comparison of Alternatives Descriptions by Phase

End of Phase	No Action Alternative - CEQA Conditions	No Action Alternative - Variability Conditions	Alternative 1 Saline Habitat Complex I	Alternative 2 Saline Habitat Complex II	Alternative 3 Concentric Rings	Alternative 4 Concentric Lakes	Alternative 5 North Sea	Alternative 6 North Sea Combined	Alternative 7 Combined North and South Lakes	Alternative 8 South Sea Combined
Brine Sink Salinity (mg/L) (includes Salton Sea under No Action Alternative)										
Phase I	65,000	76,000	78,000	78,000	88,000	79,000	76,000	76,000	76,000	76,000
Phase II	103,000	164,000	210,000	249,000	>350,000	299,000	>350,000	>350,000	>350,000	>350,000
Phase III	129,000	249,000	>350,000	>350,000	>350,000	>350,000	>350,000	>350,000	>350,000	>350,000
Phase IV	138,000	308,000	>350,000	>350,000	>350,000	>350,000	>350,000	>350,000	>350,000	>350,000
Maximum Brine Sink Elevation (feet msl) (includes Salton Sea under No Action Alternative)										
Phase I	-236	-240	-241	-241	-244	-240	-240	-240	-240	-240
Phase II	-245	-254	-257	-259	-267	-260	-270	-270	-272	-274
Phase III	-248	-259	-264	-269	-273	-271	-275	-276	-273	-277
Phase IV	-248	-260	-264	-271	-273	-276	-276	-276	-273	-277
Brine Sink Area (acres) (includes Salton Sea under No Action Alternative)										
Phase I	217,000	208,000	207,000	207,000	166,000	202,000	207,000	207,000	208,000	207,000
Phase II	186,000	159,000	149,000	144,000	115,000	132,000	68,000	72,000	28,000	62,000
Phase III	172,000	143,000	127,000	105,000	68,000	71,000	14,000	11,000	15,000	9,000
Phase IV	172,000	140,000	123,000	85,000	68,000	22,000	13,000	11,000	15,000	9,000
Exposed Playa (acres) (includes Air Quality Management areas)										
Phase I	4,000	16,000	30,000	30,000	6,000	12,000	30,000	30,000	30,000	30,000
Phase II	36,000	63,000	57,000	34,000	65,000	40,000	73,000	86,000	89,000	96,000
Phase III	48,000	78,000	72,000	63,000	123,000	66,000	115,000	130,000	92,000	128,000
Phase IV	48,000	81,000	77,000	91,000	127,000	111,000	117,000	131,000	97,000	128,000
Marine Sea and Marine Sea Mixing Zone (acres) (includes Recreational Saltwater and Recreational Estuary Lakes in Alternative 7)										
Phase I	-	-	-	-	-	-	Brine Sink	Brine Sink	Brine Sink	Brine Sink
Phase II	-	-	-	-	-	-	62,000	74,000	104,000[a]	83,000
Phase III	-	-	-	-	-	-	62,000	74,000	104,000	83,000
Phase IV	-	-	-	-	-	-	62,000	74,000	104,000	83,000
Saline Habitat Complex (wetted acres) (including Shoreline Waterways)										
Phase I	-	-	4,000	10,000	-	-	7,500	4,000	-	4,000
Phase II	-	-	26,000	42,000	-	-	33,500	21,500	6,000[b]	13,500

Table 3-3
Comparison of Alternatives Descriptions by Phase

End of Phase	No Action Alternative - CEQA Conditions	No Action Alternative - Variability Conditions	Alternative 1 Saline Habitat Complex I	Alternative 2 Saline Habitat Complex II	Alternative 3 Concentric Rings	Alternative 4 Concentric Lakes	Alternative 5 North Sea	Alternative 6 North Sea Combined	Alternative 7 Combined North and South Lakes	Alternative 8 South Sea Combined
Phase III	-	-	26,000	54,000	-	-	33,500	21,500	6,000[b]	13,500
Phase IV	-	-	26,000	54,000	-	-	33,500	21,500	6,000[b]	13,500
Saline Habitat Complex (total acres)										
Phase I	-	-	6,000	10,000	-	-	7,500	4,000	-	4,000
Phase II	-	-	38,000	61,000	-	-	45,500	29,000	12,000[b]	18,000
Phase III	-	-	38,000	75,000	-	-	45,500	29,000	12,000[b]	18,000
Phase IV	-	-	38,000	75,000	-	-	45,500	29,000	12,000[b]	18,000
First Ring or Lake Area (acres)										
Phase I	-	-	-	-	25,000	7,000	-	-	-	-
Phase II	-	-	-	-	25,000	7,000	-	-	-	-
Phase III	-	-	-	-	25,000	7,000	-	-	-	-
Phase IV	-	-	-	-	25,000	7,000	-	-	-	-
Second Ring or Lake Area (acres)										
Phase I	-	-	-	-	Brine Sink	Brine Sink	-	-	-	-
Phase II	-	-	-	-	36,000	21,000[c]	-	-	-	-
Phase III	-	-	-	-	36,000	21,000	-	-	-	-
Phase IV	-	-	-	-	36,000	21,000	-	-	-	-
Third Lake Area (acres)										
Phase I	-	-	-	-	-	Brine Sink	-	-	-	-
Phase II	-	-	-	-	-	20,000[c]	-	-	-	-
Phase III	-	-	-	-	-	20,000[c]	-	-	-	-
Phase IV	-	-	-	-	-	20,000	-	-	-	-
Fourth Lake Area (acres)										
Phase I	-	-	-	-	-	-	-	-	-	-
Phase II	-	-	-	-	-	-	-	-	-	-
Phase III	-	-	-	-	-	40,000[c]	-	-	-	-
Phase IV	-	-	-	-	-	40,000	-	-	-	-

Table 3-3
Comparison of Alternatives Descriptions by Phase

End of Phase	No Action Alternative - CEQA Conditions	No Action Alternative - Variability Conditions	Alternative 1 Saline Habitat Complex I	Alternative 2 Saline Habitat Complex II	Alternative 3 Concentric Rings	Alternative 4 Concentric Lakes	Alternative 5 North Sea	Alternative 6 North Sea Combined	Alternative 7 Combined North and South Lakes	Alternative 8 South Sea Combined
Power Demands during Operations and Maintenance (Gigawatts-hour/year)										
Phases III and IV	10	10	16	19	27	8	26	30	44	29
Imported Gravel and Rock (cubic yards)										
Phases I and II	1,680,000	1,680,000	6,720,000	11,670,000	85,150,000	7,420,000	53,730,000	93,650,000	79,650,000	100,270,000
Disturbed Area on Exposed Playa (acres)										
Phases I and II	35,800	35,800	136,700	206,400	155,450	96,950	230,450	224,250	131,950	209,550
Excavated and Dredged Soils on Sea Bed (cubic yards)										
Phases I and II	5,050,000	5,050,000	77,140,000	136,530,000	18,810,000	154,215,000	86,770,000	66,970,000	33,522,000	47,230,000
Trucks to Transport Gravel and Rock during Peak Construction Period (trucks/day)										
Phases I and II	4	4	50	100	1,200	60	1,400	1,400	2,200	2,700
Employees during Peak Construction Period (employees/day)										
Phases I and II	500	500	1,000	1,500	1,500	1,500	1,500	2,000	2,000	2,000
Employees during Operations and Maintenance Period (employees/day)										
Phases III and IV	100	100	200	300	300	25	300	350	200	300

Note
All values presented in this table assume average inflows of 717,000 acre-feet/year as described under the No Action Alternative-Variability Conditions.

[a] This water body would be formed through the completion of the Barrier at this time, however, salinity would be greater than 40,000 mg/L for the entire range of inflows. If average inflows would be 800,000 acre-feet/year or higher, water surface area would be about 115,000 acres.

[b] Does not include 1,600 acres of Saline Habitat Complex formed by displacement dike in Recreational Saltwater Lake near confluence with Whitewater River. The 1,600 acres is included as part of Marine Sea/Recreational Saltwater Lake

[c] These water bodies would be formed through the completion of Berms at this time, however, salinity would be greater than 40,000 mg/L

Air Quality Management

Implementation of the QSA and the related IID Water Conservation and Transfer Project would result in the additional exposure of playa between -235 and -248 feet msl. To mitigate the potential air quality impacts from this area, the IID Water Conservation and Transfer Project Mitigation Monitoring and Reporting Plan included the following four-step air quality mitigation and monitoring plan:

- Restrict access to Exposed Playa;
- Conduct a Research and Monitoring Program to:
  - Study historical information on dust emissions;
  - Evaluate the rate of exposure of the playa and identify land ownership of exposed areas;
  - Conduct sampling of sediments, including determination of toxic substances;
  - Analyze response of salt crusts and sediments to rainfall, humidity, temperature, and wind;
  - Implement a meteorological, PM10, and toxic air contaminant monitoring program; and
  - Conduct a health risk assessment and evaluate dust control measures if toxic air contaminants or other health effects are observed from the Exposed Playa caused by QSA actions;
- Create or Purchase Offsetting Emission Reduction Credits; and
- Direct Emission Reductions at the Salton Sea by implementing feasible dust mitigation measures or supplying water to the Salton Sea to maintain moisture on the playa exposed by QSA actions.

The No Action Alternative includes implementation of this four-step air quality plan, as described in the IID Water Conservation and Transfer Project Environmental Impact Report/Environmental Impact Statement, Addendum, and Mitigation, Monitoring, and Reporting Program (IID, 2003) and the State Water Resources Control Board (SWRCB) Order 2002-0013 (SWRCB, 2002).

In accordance with the Environmental Cost Sharing Agreement of the QSA, CVWD, IID, and the San Diego County Water Authority (SDCWA) jointly fund the costs of mitigation measures required to implement the IID Water Conservation and Transfer Project. The QSA and related legislative requirements, as described in Chapter 1, limited the costs to IID, CVWD, and SDCWA for environmental mitigation (including air quality mitigation but excluding socioeconomic mitigation measures) to a total of $133,000,000. The State of California accepted responsibility for some of the environmental mitigation costs that exceed $133,000,000.

During preparation of the PEIR, it was discussed with the Salton Sea Advisory Committee and associated working groups that the Air Quality Management actions under the No Action Alternative would more than likely be expanded for mitigation on Exposed Playa caused by the Alternatives 1 through 8. It is not known if the Exposed Playa would cause dust problems. The California Environmental Quality Act (CEQA) Guidelines provide that analyses with high uncertainty should consider technically feasible worst-case projections. Therefore, with respect to Air Quality Management, it was assumed that the results of the four-step process would identify significant dust emissions from the playa exposed due to QSA actions and that specific actions would be required. A range of methods was considered, as described in detail in Appendix H-3. The most feasible worst-case method involved a combined approach using irrigation of water efficient vegetation to reduce dust emissions and application of brine from the Salton Sea to maintain areas near the Salton Sea in a moist condition. For the purposes of the PEIR, the following assumptions were used to define facilities in the alternatives, based upon information developed on similar projects, as described in Appendix H-3:

- 30 percent of the total Exposed Playa is assumed to be non-emissive and require no actions;

- 20 percent of the Exposed Playa would use management options that do not require freshwater supplies, such as Brine Stabilization, sand fences, or chemical stabilizers; and
- 50 percent of the Exposed Playa would use water efficient vegetation that is irrigated with a portion of the inflows to the Salton Sea.

For the No Action Alternative, this approach was defined for Air Quality Management for areas between -235 and -248 feet msl

Air Quality Management Facilities

Facilities to support the use of water efficient vegetation would include Sedimentation/Distribution Basins to remove sediment and divert inflows from the rivers into the Air Quality Management Canals that would convey water to a series of 2-square mile units on the Exposed Playa. Each 2-square mile unit would include water filtration and chemical treatment units to prevent clogging and scale in the irrigation system, pumps, and buried distribution and drip irrigation pipes. The drip irrigators would be buried to reduce potential for selenium toxicity to wildlife from ponded water. Facilities would be included in each unit to pump brine from the Salton Sea to the treatment plant to increase the salinity of the water to 10,000 mg/L, if needed. Drains would be constructed under the irrigated area and drainage water would be conveyed to the Salton Sea. These facilities would require excavating trenches up to 8 feet deep throughout the Exposed Playa and into the Salton Sea edges. The vegetation would be planted every 5 feet along rows that would be separated by 10 feet. The units could not be constructed until the water recedes and the soils dry over several months or years, depending upon the groundwater under the soils. The Air Quality Management Canals would convey water to any area around the perimeter of the Sea Bed. The Air Quality Management Canals would be constructed under San Felipe and Salt creeks and other drainages to avoid conflicts with stormwater runoff.

Air Quality Management by Other Landowners

As described above, the Air Quality Management measures under the No Action Alternative would only be located between -235 and -248 feet msl. In accordance with the requirements of the local air quality management districts, landowners would be responsible for the remaining Exposed Playa between the existing shoreline and -235 feet msl. Although it is possible that Air Quality Management for these areas also would require a water supply, no water has been allocated for lands above -235 feet msl. If water based methods are used to control dusts on these lands, there would be further reductions in the Salton Sea surface elevations and more Exposed Playa below -248 feet msl. Owners of these areas also would be responsible for Air Quality Management. The primary owners of lands in the Sea Bed are the federal government, IID, and Torres Martinez Tribe, as shown on Figure 3-12.

Sedimentation/Distribution Basins

Inflows from the New, Alamo, and Whitewater rivers would be captured in three 200-acre Sedimentation/Distribution Basins to divert desilted river water into one of several Air Quality Management Canals or bypass flows into the Salton Sea. The unlined Sedimentation/Distribution Basins would be excavated along the shoreline and would be located from -228 to -230 feet msl. Sediment collected in the basins would be periodically dredged and flushed into the Salton Sea.

Pupfish Connectivity

The IID Water Conservation and Transfer Project required that IID extend the drains in the Imperial and Coachella valleys into the Salton Sea as the water surface level recedes to increase available habitat for desert pupfish in the drains. When conditions in the Salton Sea become unsuitable for desert pupfish and preclude their movement among drains, Pupfish Channels would be constructed to interconnect the drains and eliminate the connection to the hypersaline Salton Sea. The Salton Sea is projected to become unsuitable for desert pupfish when salinity reaches about 90,000 mg/L or sooner. The Pupfish Channels would not be connected to the extended river or creek channels. Therefore, five separate desert pupfish areas would be developed. Along the southern shoreline, separate Pupfish Channels would be located north of the New River, between the New and Alamo Rivers, and north of the Alamo River. Along the northern shoreline, separate Pupfish Channels would be constructed to the east and west of the Whitewater River.

Extension of Recreational Facilities

The IID Water Conservation and Transfer Project also required that IID extend boat ramps located around the shoreline and trails at the Salton Sea State Recreation Area. These facilities are to be extended as the Salton Sea recedes.

Activities in Phases I through IV

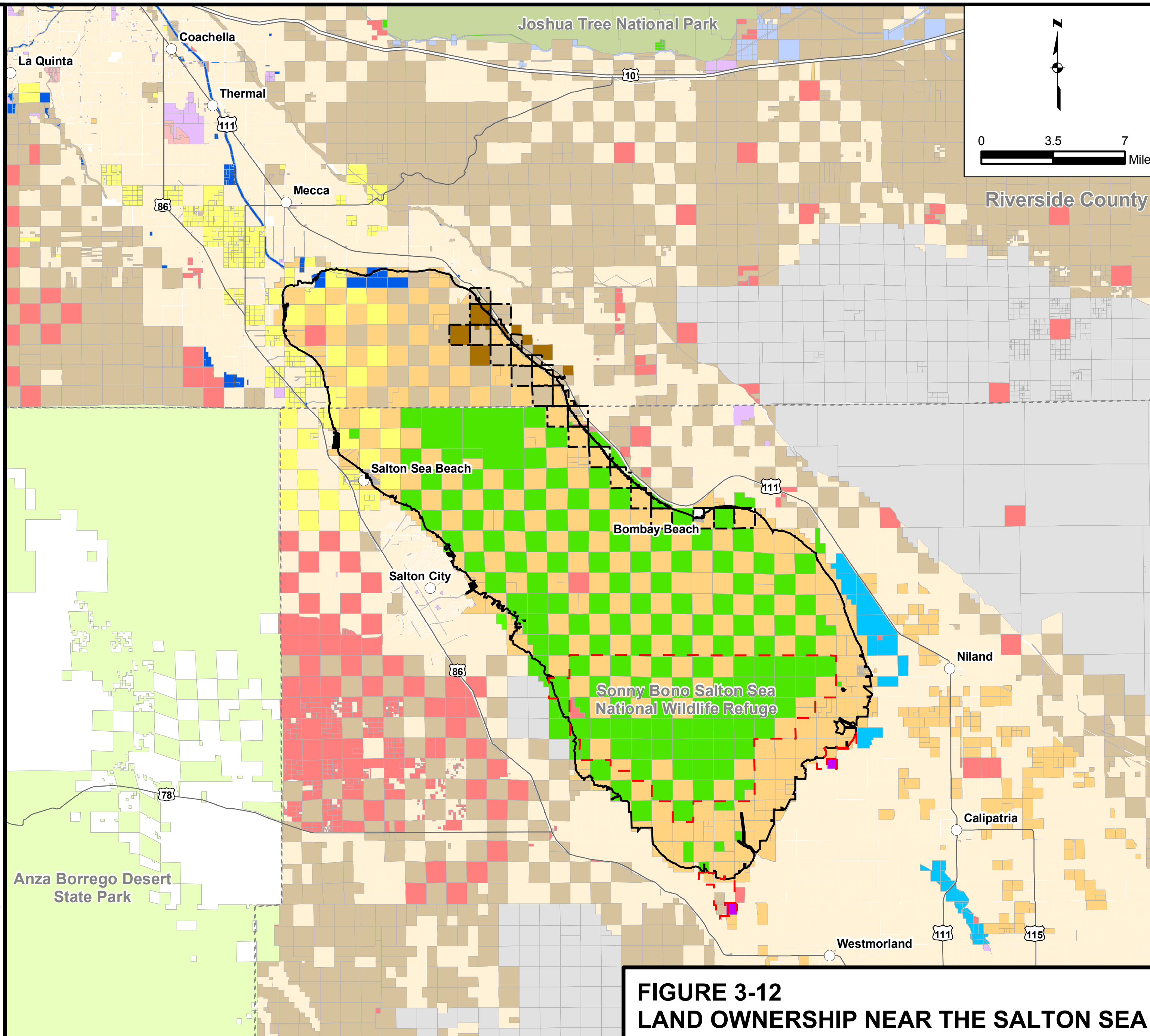
Inflows would slowly decline until 2018 and more rapidly decline through the mid-2030s. Inflows would relatively stable from the mid-2030s to 2078. Air Quality Management facilities would not be implemented until the surface water elevation is below -235 feet msl and the soils are dry. This would not occur until Phase II. Pupfish Channels would not be constructed until the Salton Sea salinity exceeds 90,000 mg/L in Phase II.

Cost estimates are summarized in Table 3-4 for the Air Quality Management and Pupfish Channel facilities described above under the No Action Alternative. These are not the only facilities required under the No Action Alternative. However, these facilities are described and presented in the PEIR because they would not be required under implementation of Alternatives 1 through 8. All other mitigation measures for the IID Water Conservation and Transfer Project would be included without modification under Alternatives 1 through 8.

Table 3-4
Estimated Costs for Air Quality Management and Pupfish Channels for the No Action Alternative-CEQA Conditions and No Action Alternative-Variability Conditions (in million dollars)

Items	Phase I (Present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	-	-	-	-	-	-
Constructed Habitat	-	-	-	-	-	-
Water Conveyance	-	$191	-	-	$191	Pupfish Channels and Air Quality Management Canals
Water Treatment	-	-	-	-	-	-
Air Quality Management	-	$50.8	$406.7	$152.5	$610	
Total Construction		$241.8	$406.7	$152.5	$801	
Annual Operations and Maintenance		$9	$38	$49		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.



Sources:

Imperial County Assessor Data dated 1/2005.

Riverside County Assessor Data dated 1/2005.

California Spatial Information Library, Government Ownership GIS dataset, 1/1/1998.

Imperial Irrigation District, Map of Salton Sea Property Ownership, March 1998.

Salton Sea Digital Atlas, 2003.

CVAG Land ownership GIS data, 2005.

FIGURE 3-12
LAND OWNERSHIP NEAR THE SALTON SEA

No Action Alternative-Variability Conditions

Under the No Action Alternative-Variability Conditions, the inflows would decline to a greater extent, especially between 2018 and mid-2030s, than under the No Action Alternative-CEQA Conditions.

The No Action Alternative-Variability Conditions include the assumptions for the No Action Alternative-CEQA Conditions and consider other potential actions. Additional actions that could influence inflows from Mexico include conveyance of recycled flows from the Mexicali area and reductions in agricultural return flows due to changes on the Colorado River water supply system. Imperial Valley flows could be reduced due to changes in agricultural return flows due to modifications in irrigation methods in response to TMDLs, changes on the Colorado River water supply system, improved irrigation efficiencies, changes in cropping patterns, and conversion of land to urban uses. Inflows from the Coachella Valley could be changed if the CVWD Water Management Plan was not implemented as projected. Because it is difficult to specifically project changes associated with these actions, probability distributions were developed and used with a Monte Carlo statistical analysis to project inflows. The results of this analysis indicated that the average inflows to the Salton Sea would be 795,000 acre-feet/year over the total 75-year study period (2003 to 2078) and 717,000 acre-feet/year for the 2018 to 2078 period. Changes in the inflows would result in changes in surface water elevations and salinity in the Salton Sea, as summarized in Table 3-3.

Facilities constructed in accordance with QSA would be identical to those described under No Action Alternative-CEQA Conditions.

Owners of land between the existing shoreline and -235 feet msl and from -248 feet msl to the Salton Sea (at -260 feet msl in 2078) would be responsible for Air Quality Management. As described under No Action Alternative-CEQA Conditions, no water was allocated for management of these areas.

Activities in Phases I through IV

Construction and operations and maintenance for the Air Quality Management and Pupfish Channels as mitigation for the QSA would be as described under No Action Alternative-CEQA Conditions.

Alternative 1 – Saline Habitat Complex I

Alternative 1 represents a minimum amount of Saline Habitat Complex to provide habitat that is similar to historic shoreline areas at the Salton Sea. Saline Habitat Complex in Alternative 1 would be located in the southern portion of the existing Sea Bed. To protect desert pupfish, Pupfish Channels would be constructed between direct irrigation drainages on the shoreline. Air Quality Management facilities and Sedimentation/Distribution Basins on the New, Alamo, and Whitewater river confluences would be similar to those described in the No Action Alternative-CEQA Conditions. The Salton Sea would become the Brine Sink at the lower elevations of the Sea Bed.

Saline Habitat Complex

The Saline Habitat Complex is intended to provide a diversity of habitats to support food web organisms (e.g., invertebrate and fish), which would provide an avian forage base similar to that which developed at the Salton Sea.

Salinity within the Saline Habitat Complex could range from near 20,000 mg/L to 200,000 mg/L, as described in Chapter 2. Maintaining most of the Saline Habitat Complex with saline water (greater than 20,000 mg/L) would reduce vegetation growth, selenium ecorisk, and vector populations.

Constructed habitat features associated with the Saline Habitat Complex would provide variable water depths and salinity levels. Berms, islands, peninsulas, and snags would contribute to use by a variety of shorebirds and wading birds. These physical features also would enhance the value of the Saline Habitat Complex by providing foraging, nesting, and roosting opportunities for other birds. Variable substrates would be provided, including some hard substrates (rock) to support attachment and production of certain invertebrates (barnacles) and algae. Excavated areas up to 15 feet in depth would be incorporated to increase habitat diversity and provide shelter for fish and invertebrates.

The design of the individual cells within the Saline Habitat Complex would be flexible and could be modified to respond to environmental changes or the results of performance monitoring. For the purpose of evaluating the Saline Habitat Complex in the alternatives, three conceptual cell types were developed, as described in Appendix H-1. Each cell would be about 1,000 acres. The characteristics that would vary among cells likely would include salinity, overall water depth of the cell, presence or absence of islands and deep pools, number and arrangement of roosting and nesting structures, amount of shoreline, presence or absence of hard substrates, and bottom slope. The ratio of water to land, salinity, and arrangement of the cells would be developed in project-level analyses.

This alternative would include the phased construction of 38,000 acres of Saline Habitat Complex in the southern Sea Bed. Berms would be built on 6-foot contour intervals and used to divide individual habitat cells. The drains would flow directly into the first row of Saline Habitat Complex cells. This area would be constructed within Phase I. The remaining rows would be constructed as the water recedes in Phase II.

Immediately following construction, saline water from the Brine Sink would be conveyed through temporary pumping facilities into the first row of Saline Habitat Complex cells. The saline water would be mixed with the drain flows to provide salinity of at least 20,000 mg/L. After this initial mixing, salinity in each cell would be managed by controlling inflows and outflows, and evapo-concentrating the water in each cell to create cells with salinities ranging from 20,000 to 200,000 mg/L. During operations of the Saline Habitat Complex, water quality monitoring would need to be conducted to determine if constituents of concern accumulated to concentrations that would cause adverse impacts to fish and wildlife that used these areas.

Berms

Berms would be constructed of suitable earthfill materials excavated from the Sea Bed and compacted in layers on the Sea Bed. The Berms would be constructed with 3:1 side slopes and have a top width up to 20 feet wide for a gravel access road. Rock slope protection would be placed in the water side of the Berm. The top three feet of soil could be excavated prior to construction of the Berm. Therefore, the area would need to be relatively dry prior to construction.

Saline Habitat Complex Water Management and Conveyance

Water diversions into and out of each Saline Habitat Complex cell would be managed to maintain a salinity between 20,000 and 200,000 mg/L. Inflow salinity from the drains would be between 3,000 and 7,000 mg/L. Salts must be concentrated in each cell through evaporation to achieve the desired salinity. Some outflow would be required to manage the salt balance and provide limited circulation. This management would be possible by monitoring the salinity in each cell and controlling inflow and outflow gates. It may take several years or more to concentrate the inflow salts to meet target salinity depending on the volume of each cell, inflow salinity, inflow rate, and outflow rate. Salinity in each cell may be increased by periodically pumping saltwater directly into each cell using mobile equipment.

Due to the passive method of salinity management in this alternative that avoids recirculation of saline water from the Brine Sink into the Saline Habitat Complex, large amounts of freshwater from the New and Alamo rivers would be diverted around the first row of the Saline Habitat Complex, and added to the second, third, and fourth rows of the Saline Habitat Complex to dilute the salinity. To supply water to the second, third, and fourth rows of the Saline Habitat Complex, Saline Habitat Complex Distribution Canals would be constructed down gradient of the Berms.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be the same as described under No Action Alternative-CEQA Conditions. Rivers would be extended from the Sedimentation/Distribution Basins into the Brine Sink.

Air Quality Management

This alternative includes Air Quality Management for all lands below -230 feet msl. It was assumed that these areas would be managed or monitored for Air Quality Management using the same assumptions as described under No Action Alternative-CEQA Conditions. These facilities could be funded as part of the Salton Sea Ecosystem Restoration, especially in areas that would be disturbed by construction of habitat facilities. However, as described under the No Action Alternative, the landowners of the Exposed Playa from the shoreline (at -228 feet msl) to -235 feet msl and below -248 feet msl to the Brine Sink would be responsible for Air Quality Management if the PEIR alternatives are not implemented, and possibly under the implementation of the PEIR alternatives.

To provide a consistent basis for comparison of alternatives, Air Quality Management facilities have been developed in this alternative for all of the Exposed Playa.

Air Quality Management Facilities

A canal from the southern Sedimentation/Distribution Basins would flow into a dual purpose Air Quality Management Canal and Saline Habitat Distribution Canal located below -236 feet msl within the Saline Habitat Complex area. This canal would flow just downstream of and parallel to the Berm of the first Saline Habitat Complex row. This canal would convey water to supply the second row of the Saline Habitat Complex cells and extend past the Saline Habitat Complex to a canal pumping plant where the water would be pumped up to the Air Quality Management Canal located at -230 feet msl.

The Air Quality Management Canals would be constructed north of the Saline Habitat Complex along the western and eastern shorelines at -230 feet msl. Turnouts would be located along the Air Quality Management Canal to provide water for irrigation of water efficient vegetation.

Pupfish Connectivity

Desert pupfish connectivity could not be provided in the Saline Habitat Complex because there would be no method for the desert pupfish to move upstream into the drains from the cells. Therefore, separate Pupfish Channels would be located along the southern shoreline (northwest of the New River, between the New and Alamo rivers, and northeast of the Alamo River), and along the northern shoreline (east and west of the Whitewater River). No desert pupfish connectivity is provided for San Felipe and Salt creeks under this alternative.

Weirs would be used on the Pupfish Channels to control the amount of water in each channel. The weirs would be designed to ensure that there was adequate water in each channel for pupfish sustainability. The weirs would reduce the potential for desert pupfish and other fish to enter the Saline Habitat Complex cells. However, it is anticipated that some fish would enter the Saline Habitat Complex cells and would not be able to return to the Pupfish Channel or the drains.

Brine Sink

The Brine Sink would provide the repository necessary to store excess salts, water discharged from the Saline Habitat Complex and Air Quality Management areas, and excess inflows. The elevation would fluctuate seasonally based upon the patterns of these tributary flows.

During project-level analyses, partitioning of the Brine Sink could be considered to provide another area with salinities of less than 200,000 mg/L that could support invertebrates and provide additional habitat on the Sea Bed.

Activities in Phases I through IV

Inflows would slowly decline until 2018 and more rapidly decline through the mid-2030s. Inflows are relatively stable from the mid-2030s to 2078. Air Quality Management facilities would not be implemented until the surface water elevation is below -235 feet msl and the soils are dry. Pupfish Channels would be constructed as soon as possible in Phase I and prior to the first row of Saline Habitat Complex. Cost estimates are summarized in Table 3-5.

Table 3-5
Estimated Costs for Alternative 1 (in million dollars)

Items	Phase I (Present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	-	-	-	-	-	-
Constructed Habitat	$166.1	$886.1	-	-	$1,052.2	Saline Habitat Complex and Early Start Habitat
Water Conveyance	$215	-	-	-	$215	Pupfish Channels and Air Quality Management Canals
Air Quality Management	$412.7	$371.4	$275.2	-	$1,059.3	
Total Construction	$793.8	$1,257.5	$275.2	-	$2,326	
Annual Operations and Maintenance	$37	$72	$91	$91		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 2 – Saline Habitat Complex II

Alternative 2 represents a maximum amount of Saline Habitat Complex along the shoreline based upon the slope of the Sea Bed. Alternative 2 provides Saline Habitat Complex, located in northern, eastern, western, and southern portions of the existing Sea Bed. The Saline Habitat Complex would be formed by the construction of Berms, as described in Alternative 1. This alternative also includes Air Quality Management facilities for the Exposed Playa and a Brine Sink.

Saline Habitat Complex and Shoreline Waterway

This alternative would include the phased construction of 75,000 acres of Saline Habitat Complex, which includes 10,000 acres of Shoreline Waterway in the existing Sea Bed. Berms would be built on 6-foot contour intervals and used to divide individual habitat cells. Water from the drains and Sedimentation/Distribution Basins would be mixed with more saline water in the Shoreline Waterway.

The Shoreline Waterway would function as a mixing zone and a distribution facility for the Saline Habitat Complex. The water supply would be from the New, Alamo, and Whitewater rivers plus water diverted in the Saltwater Conveyance, as described below. The inflows would be blended with saltwater from the Saltwater Conveyance in the Shoreline Waterway to achieve a minimum salinity of 20,000 mg/L.

The Shoreline Waterway would be constructed in Phase I. The Saline Habitat Complex cells would be constructed in Phase II as the water recedes.

Berms

Berms would be constructed as described under Alternative 1.

Saline Habitat Complex Water Management and Conveyance

The Shoreline Waterway would be part of the Saline Habitat Complex with salinities of 20,000 to 30,000 mg/L. Water from the Coachella Valley and IID direct drains would flow into the northern and southern Shoreline Waterways, respectively. The northern Shoreline Waterway would provide connectivity for desert pupfish residing in the Coachella Valley direct drains, while the southern Shoreline Waterway would provide connectivity for desert pupfish residing in the IID direct drains. The southern Shoreline Waterways would be divided into three areas: north of New River, between New and Alamo rivers, and north of Alamo River. The northern Shoreline Waterways would be divided into two areas: east and west of the Whitewater River.

Saltwater canals and pumping plants would be constructed down gradient of the Saline Habitat Complex to collect saline discharges from the cells and convey the saltwater to the Shoreline Waterway.

Water captured in the Sedimentation/Distribution Basin and not used in the Shoreline Waterway would be conveyed in the river extensions or river bypass pipelines to the Brine Sink. The river extensions would be used in areas where there are no other components or facilities. River bypass pipelines would be used in areas where the surface features, such as Saline Habitat Complex cells, could not be separated by the river channel and a pipeline is needed to convey water under the cells. These pipelines would be sized to convey maximum anticipated flood flows.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be the same as described under No Action Alternative-CEQA Conditions. Rivers would be extended from the Sedimentation/Distribution Basins into the Brine Sink.

Air Quality Management

This alternative includes Air Quality Management as described under Alternative 1 based upon assumptions described under the No Action Alternative.

Water for Air Quality Management would be conveyed either through the Shoreline Waterway portion of the Saline Habitat Complex or in Air Quality Management Canals. Water would flow from the southern Shoreline Waterways into the Air Quality Management Canals located on the -230 feet msl elevation contour. The canals would extend north to about 1 mile south of the northern Saline Habitat Complex. Distribution canals would extend from the end of the Air Quality Management Canals towards the Exposed Playa near the Whitewater River. There would be no water for Air Quality Management supplied from the Whitewater River in Alternative 2.

Pupfish Connectivity

Desert pupfish connectivity would be provided between southern drainages and between northern drainages in Shoreline Waterways. The southern Shoreline Waterways would be divided into three areas:

north of New River, between New and Alamo rivers, and north of Alamo River. The northern Shoreline Waterways would be divided into two areas: east and west of the Whitewater River.

San Felipe Creek would be connected to the southern Shoreline Waterway during low flow periods. During high flows, San Felipe Creek would flow into the Brine Sink to protect operations of the Shoreline Waterway. There would be no desert pupfish connectivity between the southern and northern drainages. There would be no connectivity for desert pupfish in Salt Creek with other drainages.

The Air Quality Management Canals would be constructed under the drains and San Felipe Creek to avoid conflicts with desert pupfish connectivity.

Brine Sink

The Brine Sink characteristics would be similar to those described under Alternative 1.

Activities in Phases I through IV

Air Quality Management facilities would not be implemented until the surface water elevation is below -235 feet msl. The Shoreline Waterway would be constructed in Phase I and the Saline Habitat Complex cells would be constructed in Phases II and III. Cost estimates are summarized in Table 3-6.

Table 3-6
Estimated Costs for Alternative 2 (in million dollars)

Items	Phase I (Present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	-	-	-	-	-	-
Constructed Habitat	$257.8	$1,322.3	$353.1	-	$1,993.2	Saline Habitat Complex and Early Start Habitat
Water Conveyance	$150	$73			$223	Pupfish Channels, Saltwater Conveyance, and Air Quality Management Canals
Air Quality Management	$388.1	$51.7	$375.2	$362.2	$1,177.2	
Total Construction	$795.9	$1,447.6	$728.3	$362.2	$3,333.4	
Annual Operations and Maintenance	$35	$51	$81	$107		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 3 – Concentric Rings

Alternative 3 was developed to simulate a plan developed in 2004 by the Salton Sea Restoration Consortium, an interest group led by the Imperial Group. This represents a moderately deep Marine Sea contained in two Concentric Rings. The Rings would be formed by the construction of Perimeter Dikes.

Each ring would have a maximum water depth of 10 feet adjacent to the Perimeter Dike. This alternative would include Air Quality Management facilities and a Brine Sink.

Saline Habitat Complex was not included in Alternative 3 to provide a range of alternatives to be considered in the PEIR. However, during project-level analyses, Saline Habitat Complex could be added down gradient of the Second Ring or as part of the First or Second rings.

First Ring

The First Ring would maintain a stable shoreline at -230 feet msl with salinity from 20,000 mg/L to 30,000 mg/L. It would be created by a Perimeter Dike that would encircle the -240 feet msl contour, and would provide desert pupfish connectivity along the entire shoreline. The Whitewater River would flow unimpeded into the First Ring. The New and Alamo Rivers would supply only a portion of the flow for this ring to maintain salinity and elevation control. The First Ring would be 0.1 to 1.3 miles in width. Water would flow from the First Ring to the Second Ring and the Brine Sink.

Circulation and salinity blending in the First Ring would be provided by a low head Recirculation Pumping Plant. This circulation would ensure that the fresher inflows are blended with higher salinity flows. The pumping plant location would be the only location that would have a embankment across the ring.

Second Ring

The Second Ring would maintain a stable water body at -240 feet msl with salinity from 30,000 to 40,000 mg/L. It would be created by a Perimeter Dike that would encircle the -250 feet msl contour, and would be supplied from the New and Alamo rivers and spills from the First Ring. The Second Ring would be 0.3 to 1.7 miles in width. Water would flow from the Second Ring to the Brine Sink. A circulation pump would be provided as described under the First Ring.

Perimeter Dike

The Perimeter Dike would be constructed of rock and a seepage barrier, as described in Appendix H-6. The Perimeter Dike would be up to 15 feet above the existing Sea Bed and up to 400 feet wide at the base. The Perimeter Dike would be constructed partially from barges until a barge can no longer access the area, and then the Perimeter Dike would be finished by land-based equipment. The final slope of the Perimeter Dike would be 10:1 on the water side and 15:1 on the down gradient side. The Perimeter Dikes would be of sufficient size to require compliance with the requirements of the California Department of Water Resources, Division of Safety of Dams.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be similar to those described under No Action Alternative-CEQA Conditions. However, the basins would only be constructed at the New and Alamo rivers. The rivers would be extended from the Sedimentation/Distribution Basins into the Brine Sink.

Air Quality Management

Exposed Playa from -230 feet msl to the Brine Sink would be considered for Air Quality Management, as described in Alternative 1. Saltwater conveyance would be provided for blending with the inflows.

An Air Quality Management Canal would be located at the downstream toe, or Brine Sink side, of the Perimeter Dike that forms the Second Ring.

Pupfish Connectivity

Desert pupfish connectivity would be provided for all drains and creeks in the First Ring. All drainages along the shoreline would flow unimpeded into the First Ring, except the New and Alamo Rivers. The velocity in the First Ring would be less than 0.1 feet/second to accommodate desert pupfish.

Although the entire population would be connected, the recirculation pumping plant located in the First Ring would obstruct fish passage at that location and prevent desert pupfish from moving around the entire perimeter of the Ring. During project-level analyses, the need for the pumping plants would be evaluated.

Brine Sink

The Brine Sink characteristics would be similar to those described under Alternative 1.

Activities in Phases I through IV

Both Concentric Rings would be constructed from barges when the surface water elevation of the Brine Sink would be high. The First Ring would be completed in Phase I and the Second Ring would be completed in early Phase II. Air Quality Management facilities would not be implemented until the surface water elevation is below -250 feet msl and the soils are dry in Phase II. Cost estimates are summarized in Table 3-7.

Table 3-7
Estimated Costs for Alternative 3 (in million dollars)

Items	Phase I (Present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	$1,493	$1,466	-	-	$2,959	Perimeter Dikes
Constructed Habitat	$76.4	-	-	-	$76.4	Early Start Habitat
Water Conveyance	-	$138.4	$124.3	-	$262.7	Saltwater Conveyance and Air Quality Management Canals
Air Quality Management	-	$832.5	$794.1	-	$1,626.6	
Total Construction	$1,569.4	$2,436.9	$918.3	-	$4,924.7	
Annual Operations and Maintenance	-	$71	$138	$138		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 4 – Concentric Lakes

Alternative 4 was defined by the Imperial Group in spring of 2006. Information submitted by the Imperial Group to define this alternative is included in Appendix I.

Alternative 4 would include a partial Concentric Lake water body and three whole Concentric Lake water bodies located in the Sea Bed. All of the Concentric Lakes would be constructed using a dredge-filled Geotube® covered with earthen materials to form a low barrier (Geotube® Berm). The Berms would be constructed from barges.

The Concentric Lakes would function in a similar manner as Saline Habitat Complex with islands, peninsulas, and deep holes. The Concentric Lakes would not include any cross Berms, but the waterways would meander on the Sea Bed and water flow would be interrupted by the islands and peninsulas.

Outlet/spillways, to be located at several locations along each Geotube® Berm, would allow the bypass of water from the First Lake to the Second Lake, from the Second Lake to the Third Lake, from the Third Lake to the Fourth Lake, and from the Fourth Lake to the Brine Sink. These outlet/spillways would provide flexibility in accommodating high flows, achieving salinity targets, and improving the ability of operators to control circulation in each lake by selectively operating each outlet/spillway.

First Lake

The First Lake is a partial lake and would maintain a stable shoreline at -230 feet msl at a salinity of 20,000 mg/L. The surface area would be 7,000 acres. This lake would be formed by a Geotube® Berm along the -236 feet msl contour. Only a portion of the New and Alamo rivers would be diverted into the First Lake for salinity and elevation control. The remaining inflows would be diverted to the other lakes or the Brine Sink. The First Lake would be 0.2 miles in width.

Second Lake

The Second Lake would maintain a water surface elevation of -240 feet msl with salinity of 35,000 mg/L. The surface area would be 21,000 acres. This lake would be formed by a Geotube® Berm along the -246 feet msl contour. The Second Lake would provide desert pupfish connectivity for the Coachella Valley direct drains, Salt Creek, and other local drainages. The Whitewater River would flow directly into the Second Lake. Only a portion of the New and Alamo rivers would be diverted into the Second Lake from the river bypass pipelines. The Second Lake would be 0.1 to 0.8 miles in width.

Third Lake

The Third Lake would maintain a water surface elevation of -255 feet msl with salinity of 45,000 mg/L. The surface area would be 20,000 surface acres. This lake would be formed by a Geotube® Berm along the -261 feet msl contour. Only a portion of the New and Alamo rivers would be diverted into the Third Lake from the river bypass pipelines. The Third Lake would be 0.1 to 0.9 miles in width.

Fourth Lake

The Fourth Lake would maintain a surface water elevation of -265 feet msl with a salinity of 60,000 mg/L. The surface area would be 40,000 surface acres. This lake would be formed by a Geotube® Berm along the -271 feet msl contour. Only a portion of the New and Alamo rivers would be diverted into the Fourth Lake from the river bypass pipelines. The Fourth Lake would be 0.3 to 1.4 miles in width.

Geotube® Berm

Each of the lakes would be constructed using a dredge to fill and cover the Geotube® with earthen materials to form a low barrier. The construction method would use barges to convey materials and and dredging equipment for most of the construction period. Harbors or extended rail trestles would be needed to deliver rock to the barges used in construction.

The Geotube® Berm would be designed to limit the maximum water depth adjacent to the Berm to 6 feet.

The 60-foot circumference Geotube® would be placed on a geogrid over the existing Sea Bed to provide additional foundation support for the Geotube® Berm. The Geotube® would be filled with dredged materials from the Sea Bed, and then covered by additional soils from the Sea Bed for Geotube protection and for slope stability. The final side slopes would be constructed at 5:1. Rock-slope protection would be placed on the lake side of the Geotube® Berm.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be similar to those described under Alternative 3.

Air Quality Management

Air Quality Management for Alternative 4 would include irrigation ditches constructed on the down gradient side of the Geotube® Berms to provide water supply for short term irrigation of vegetation. These facilities would be used only for one or two years after the Brine Sink recedes from the areas adjacent to the Geotube® Berms. It is anticipated that there may be minor areas with vegetation that would grow between the Geotube® Berms where seepage could occur. Based upon information provided by the Imperial Group and presented in Appendix I, this alternative includes an irrigation water supply. However, no long term irrigation facilities were described. Therefore, no long term air quality management facilities are included in this alternative. A salt crust could develop as the Brine Sink recedes. However, no long term measures were identified by the Imperial Group to maintain the salt crust.

Pupfish Connectivity

Desert pupfish connectivity would be provided in the First and Second lakes. Coachella Valley drains would be extended to the Second Lake.

Brine Sink

The Brine Sink characteristics would be similar to those described under Alternative 1.

Activities in Phases I through IV

The Geotube® Berms would be constructed from barges when the surface water elevation of the Brine Sink would be high. The First and Second lakes would be completed in Phase I and the Third and Fourth lakes would be completed in Phase II. Cost estimates are summarized in Table 3-8.

Table 3-8
Estimated Costs For Alternative 4 (In Million Dollars)

Items	Phase I (present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	$372.4	$744	-	-	$1,116.4	Geotube® Berms
Constructed Habitat	$291.9	$625.4	-	-	$917.3	Early Start Habitat and Lakes
Water Conveyance	$30.4	$71	$66	$114.2	$281.6	Saltwater Conveyance
Air Quality Management	-	-	-	-	-	
Total Construction	$694.7	$1,440.4	$66	$114.2	$2,315.3	
Annual Operations and Maintenance	$8	$16	$20	$20		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 5 – North Sea

Alternative 5 was developed to provide a Marine Sea in the northern Sea Bed and Saline Habitat Complex in the southern Sea Bed. Saline Habitat Complex and Air Quality Management facilities would be developed as the water recedes. The Saline Habitat Complex would be constructed as described under Alternative 2.

Marine Sea

A Marine Sea would be formed through the construction of a Barrier located north of Salton City and extending across the Sea Bed near Salt Creek on the eastern shoreline. The Marine Sea surface water elevation would eventually stabilize at -230 feet msl and at salinity between 30,000 mg/L and 40,000 mg/L. Salinity in the Marine Sea would be managed through regulation of inflows and discharges. The Marine Sea Recirculation Canal would convey saltwater from the Marine Sea outlet along the eastern shoreline for use in the Saline Habitat Complex.

Inflows to the Marine Sea would include direct flows from the Whitewater River, Coachella Valley drains, Salt Creek, and local drainages. Flows from the New and Alamo rivers would be blended in the Air Quality Management Canal located along the southern shoreline. Flows would be conveyed to the Marine Sea in an enlarged Air Quality Management Canal along the southern and western shorelines. This excavated canal would convey up to 400 cubic feet/second in a large open channel system with a low lift pumping station to the Marine Sea. The alignment would follow the approximate contours between -230 and -235 feet msl. This large canal would be siphoned under major drainages and agricultural drains. This would ensure that existing drainages are not impacted by the flow of water. This canal also would supply the Air Quality Management areas on the western shoreline.

Flood flows into the Marine Sea would be spilled to the Brine Sink to maintain salinity and elevation control, if necessary.

Barrier

The Barrier would be constructed of rock and a seepage barrier on the upstream face. The Barrier would be up to 55 feet above the existing Sea Bed and up to a quarter mile wide at the base. It would be constructed primarily using barges. The final slope of the barrier would be 10:1 on the Marine Sea side and 15:1 on the down gradient side. The Barrier would be of sufficient size to require compliance with the requirements of the California Department of Water Resources, Division of Safety of Dams.

The construction method would use barges to construct the Barrier. Harbors or extended rail trestles would be needed to deliver rock to the barges used in construction.

Saline Habitat Complex and Shoreline Waterway

This alternative includes the phased construction of Saline Habitat Complex in the southern Sea Bed, including the Shoreline Waterway to distribute the water to the Saline Habitat Complex and provide desert pupfish connectivity. Following the construction of the Sedimentation/Distribution Basins, and prior to completion of the Marine Sea Barrier, the Shoreline Waterway would be constructed between -230 and -236 feet msl. As the water recedes, the Saline Habitat Complex cells would be constructed.

The Marine Sea Recirculation Canal would convey water from the Marine Sea to provide salinity of at least 20,000 mg/L in the Shoreline Waterway. A Saltwater Conveyance system would be used to pump saltwater from the Brine Sink to the Saline Habitat Complex to maintain salinity from 20,000 and 200,000 mg/L and to ensure some circulation through the cells.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be similar to those described under Alternative 3.

Air Quality Management

The Air Quality Management would be as described under Alternative 1.

On the eastern shoreline, The Air Quality Management Canal would convey water from the Sedimentation/Distribution Basin on the Alamo River. This canal would also follow an alignment between the -230 and -235 feet msl contour below the Marine Sea Recirculation Canal, and would require at least one pumping plant. The canals would be separated by up to 100 feet. The Air Quality Management Canal would cross under major drainages and irrigation drainages to provide desert pupfish connectivity and protect the canal from flood flows.

Pupfish Connectivity

Desert pupfish connectivity would be provided along the southern shore in the Shoreline Waterway. The northern drainages would be connected to the Marine Sea. San Felipe Creek would be connected to the Shoreline Waterway during low flow periods. During high flow periods, San Felipe Creek would be bypassed directly into the Brine Sink to protect operations of the Shoreline Waterway. Salt Creek would be connected to the Marine Sea.

Brine Sink

The Brine Sink characteristics would be similar to those described under Alternative 1.

Activities in Phases I through IV

The Barrier would be constructed in Phase I from barges when the surface water elevation of the Brine Sink would be high. Conveyances, Saline Habitat Complex, and Air Quality Management primarily would be constructed in Phases I and II. Cost estimates are summarized in Table 3-9. It is assumed that the Barrier would be completed by 2022. If the Barrier construction is delayed, salinity would remain high for a longer period of time.

Table 3-9
Estimated Costs for Alternative 5 (in million dollars)

Items	Phase I (present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	$1,598.1	-	-	-	$1,598.1	Barrier
Constructed Habitat	$184.8	$936.2	-	-	$1,121	Early Start Habitat and Saline Habitat Complex
Water Conveyance	$223.1	$55.8	-	-	$278.9	Saltwater Conveyance, Air Quality Management Canals, Marine Sea Canal
Air Quality Management	$389.6	$558.5	$571.5	-	$1,519.6	
Total Construction	$2,395.6	$1,550.5	$571.5	-	$4,517.6	
Annual Operations and Maintenance	$40	$95	$134	$134		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 6 – Combined North Sea

Alternative 6 was developed to maximize the shoreline areas with a moderate to deep Marine Sea as well as provide benefits of shallower Saline Habitat Complex. Alternative 6 would include a Marine Sea in the northern portion of the Sea Bed, a shallower Marine Sea Mixing Zone along the western and southern shorelines, Saline Habitat Complex along the southern and southeastern portions of the Sea Bed, and Air Quality Management facilities for the Exposed Playa. Saline Habitat Complex and Air Quality Management facilities would be constructed as described under Alternative 2 and No Action Alternative, respectively.

Marine Sea and Marine Sea Mixing Zone

The Marine Sea would be formed by a Barrier (as described under Alternative 5). The Marine Sea Mixing Zone would serve as a wide conveyance channel along the shoreline to supply water to the Marine Sea. This area would be formed by a 32 mile Perimeter Dike (as described under Alternative 3) along the -245 feet msl contour on the western and southern portion of the Sea Bed. Salinity would vary from 20,000 mg/L in the Marine Sea Mixing Zone up to 40,000 mg/L in the Marine Sea. Salinity would be regulated in these water bodies by controlling inflows from the Alamo River and outflow through the Marine Sea. The water surface elevation would be maintained at -230 feet msl. A large Marine Sea Recirculation Canal would be constructed, as described under Alternative 5, to transport water from the Marine Sea to the Marine Sea Mixing Zone and the Saline Habitat Complex to maintain salinity in these waterbodies.

The Barrier and Perimeter Dikes would be constructed as described under Alternatives 5 and 3, respectively, and would be of sufficient size to require compliance with the requirements of the California Department of Water Resources, Division of Safety of Dams. The construction method would use barges to construct the Barrier and Perimeter Dikes. Harbors or extended rail trestles would be needed to deliver rock to the barges used in construction.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be similar to those described under the No Action Alternative-CEQA Conditions. However, the basin would only be constructed at the Alamo River. The Alamo River would be extended into the Brine Sink.

Air Quality Management

Exposed Playa from -230 feet msl to the Brine Sink would be considered for Air Quality Management, as described under Alternative 1.

Inflows for the Air Quality Management Canals would originate from the Sedimentation/Distribution Basin on the Alamo River. The canal would be located on the down gradient side of the Perimeter Dike on the southern and western portions of the Sea Bed. The canal would be located down gradient of the Marine Recirculation Canal on the eastern shoreline. Saltwater from the Marine Sea Recirculation Canal, Marine Sea Mixing Zone, Saline Habitat Complex outflow, or the Brine Sink would be mixed with the water in the Air Quality Management Canals prior to conveyance to the treatment facilities for water efficient vegetation.

Saline Habitat Complex and Shoreline Waterway

This alternative would include Saline Habitat Complex, including the Shoreline Waterway. In this alternative, there are two Shoreline Waterways. One is located between -230 and -236 feet msl contours to the east of the Alamo River, and the other one is located between -248 and -254 feet msl contours to the west of the Alamo River.

The Marine Sea Recirculation Canal would convey water from the Marine Sea to the Shoreline Waterway to provide salinity of at least 20,000 mg/L in the Shoreline Waterway. A Saltwater Conveyance system would be used to pump saltwater from the Brine Sink to the Marine Sea Mixing Zone and Saline Habitat Complex.

Pupfish Connectivity

Desert pupfish connectivity would be provided between all drainages connected to the Marine Sea and Marine Sea Mixing Zone, including Coachella Valley and IID drains and San Felipe and Salt creeks.

Desert pupfish connectivity with the IID drains west of the Alamo River would occur in the Marine Sea Mixing Zone. To the east of the Alamo River, the Marine Sea Recirculation Canal would be located between the shoreline and the Saline Habitat Complex. A Pupfish Channel would be constructed along the shoreline to provide connectivity for drains in this area.

Brine Sink

The Brine Sink characteristics would be similar to those described under Alternative 1.

Activities in Phases I through IV

The Barrier and Perimeter Dikes would be constructed in Phase I from barges when the surface water elevation of the Brine Sink would be high. The conveyance, Saline Habitat Complex, and Air Quality Management primarily would be constructed in Phases I and II. Cost estimates are summarized in Table 3-10.

It is assumed that the Barrier would be completed by 2022. If the Barrier construction is delayed, the salinity projections included in Table 3-3 also would be delayed.

Table 3-10
Estimated Costs for Alternative 6 (in million dollars)

Items	Phase I (present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	$3,137.7	-	-	-	$3,137.7	Barrier and Perimeter Dikes
Constructed Habitat	$645.8	$161.4	-	-	$807.2	Early Start Habitat and Saline Habitat Complex
Water Conveyance	$31.7	$126.8	$71.3	-	$229.8	Saltwater Conveyance, Air Quality Management Canals, Marine Sea Canal
Air Quality Management	$387.2	$722.8	$580.8	-	$1,690.8	
Total Construction	$4,202.4	$1,011	$652.1	-	$5,865.5	
Annual Operations and Maintenance	$47	$82	$148	$148		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 7 – Combined North and South Lakes

Alternative 7 was defined by the Salton Sea Authority in spring of 2006. Information submitted by the Salton Sea Authority to define this alternative is included in Appendix I.

Alternative 7 would include a Recreational Saltwater Lake predominantly in the northern portion of the Sea Bed, a shallower Recreational Estuary Lake along the western and southern shorelines, a freshwater reservoir for IID, and Saline Habitat Complex along the southeastern shoreline. Two different water quality management facilities and Brine Stabilization facilities would be included in this alternative. It should be noted that the Salton Sea Authority refers to the Brine Sink area as a Salt Sink.

Recreational Saltwater Lake and Recreational Estuary Lake

The Recreational Saltwater Lake would be located predominately in the northern portion of the Sea Bed and formed by a Barrier constructed near mid-Sea. The Recreational Saltwater Lake would extend along the western shoreline and would be connected to the Recreational Estuary Lake. The portion of the Recreational Saltwater Lake along the western shoreline and the Recreational Estuary Lake would be formed by a Perimeter Dike.

The surface water elevation would range from -228 feet msl in the Recreational Estuary Lake to -230 feet msl in the Recreational Saltwater Lake if the inflows are 800,000 acre-feet/year. Average annual salinity in the water bodies would range from 20,000 mg/L in southern portion of the Recreational Estuary Lake to 35,000 mg/L in the Recreational Saltwater Lake if the average annual inflows are 800,000 acre-feet/year.

If the average annual inflows decrease to 717,000 acre-feet/year, as under the No Action Alternative-Variability Conditions, the water surface elevation would decline to -235 feet msl in the Recreational Estuary Lake and -237 feet msl in the Recreational Saltwater Lake. The average annual salinity under these conditions would be 58,000 mg/L in the Recreational Saltwater Lake and 20,000 mg/L in the Recreational Estuary Lake.

Water Treatment

The Alamo River would flow into either a water treatment plant to remove phosphorus or into a Sedimentation/Distribution Basin. Water from the treatment plant or Sedimentation/Distribution Basin would flow into the Recreational Estuary Lake. The New River, San Felipe Creek, and IID drains would flow directly into the Recreational Estuary Lake. Water would flow along the western shoreline in the Recreational Estuary Lake into the Recreational Saltwater Lake.

Water would be diverted from the Recreational Saltwater Lake through a deep outlet located in the deepest portion of the Recreational Saltwater Lake. The outlet would be elevated above the Sea Bed to avoid diverting sediment. The water would flow through a submerged drain culvert and would be pumped into a sand filtration and ozonation water treatment plant located on the eastern shoreline. The treated flows would be transported along the eastern shoreline in a 20 mile long Marine Sea Recirculation Canal at 1,000 cubic feet/second to a low-lift pumping plant near the confluence of the Alamo River and the Recreational Estuary Lake. The saltwater flows would be blended in the Recreational Estuary Lake to maintain the salinity of at least 20,000 mg/L. Up to 40,000 acre-feet/year of the treated water would be allocated to the Saline Habitat Complex.

Barrier and Perimeter Dike

The 7.5 mile long Barrier would be constructed by first excavating poor foundation materials, up to 35 feet deep, and backfilling the area with rockfill using barges. The final slope would be constructed at 3:1 on the water side and 4:1 on the down gradient side.

The foundation of the Perimeter Dike would be excavated up to 20 feet deep and backfilled with rockfill using barges. The final slope would be constructed at 3:1 on the water side and 4:1 on the down gradient side.

The Barrier and Perimeter Dike would be of sufficient size to require compliance with the requirements of the California Department of Water Resources, Division of Safety of Dams. The construction method would use barges to construct the Barrier and Perimeter Dikes. Harbors or extended rail trestles would be needed to deliver rock to the barges used in construction. The Barriers and Perimeter Dikes would be constructed in a different manner than described under Alternatives 5 and 3, respectively. Under Alternative 7, seepage control would be provided using a slurry wall in the core of the Barrier and vinyl sheet piles in the core of the Perimeter Dike.

Imperial Irrigation District Reservoir

In this alternative, a 250,000 acre-foot reservoir would be constructed over 11,000 acres of the Sea Bed immediately to the north of the Perimeter Dike that forms the Recreational Estuary Lake. This reservoir would be owned and operated by IID for storage of Colorado River flows. This reservoir would not be used to store inflows from the rivers, creeks, or drains. The reservoir operations have not been defined and there are no facilities in the alternative to convey water between the reservoir and the IID distribution system. It is assumed that the surface water level would not be stable and that IID would be responsible for all operations and maintenance, including Air Quality Management, within the reservoir lands. This reservoir was proposed by the Salton Sea Authority, as described in Appendix I. This type of facility could be added to any of the alternatives.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be similar to those described under Alternative 6.

Air Quality Management

Portions of the Exposed Playa located below -255 feet msl would be mitigated through the creation of a Protective Salt Crust. Initially, the Protective Salt Crust would begin to be formed as the Brine Sink recedes. Water from the Saline Habitat Complex would be diverted into a series of salt crystallizer ponds located at elevations of -255 feet msl and lower, as described in Appendix I. The ponds would be formed by berms located on contours every 3 to 5 feet. The series of ponds would be used to form concentrated brine that would be primarily sodium chloride. The brine would be applied on the Exposed Playa to form a salt crust that would minimize emissions. The Protective Salt Crust would need to be replenished at least every 10 years.

Saline Habitat Complex

This alternative includes the phased construction of 12,000 acres of Saline Habitat Complex in the southeastern shoreline area of Sea Bed based upon the allocation of 40,000 acre-feet/year from the Marine Sea Recirculation Canal. There would be no Shoreline Waterway associated with this Saline Habitat Complex because the flows would be diverted directly from the Marine Sea Recirculation Canal. For this configuration, a land-to-water ratio of 50:50 was used as compared to a ratio of 30:70 for Saline Habitat Complex in Alternatives 1, 2, 5, 6, and 8. The salinity of the Saline Habitat Complex would be managed between 35,000 and 200,000 mg/L. The Saline Habitat Complex cells would be formed by Berms, as described in Alternative 1.

An additional 1,600 acres of Saline Habitat Complex would be located along the northern shoreline. This portion of Saline Habitat Complex would be formed by Berms or Perimeter Dikes in the Recreational Saltwater Lake. The minimum salinity of these cells would be equal to the salinity in the Recreational Saltwater Lake and the maximum salinity would be 200,000 mg/L.

Pupfish Connectivity

Desert pupfish connectivity would be provided for IID drains along the southern and western shorelines and San Felipe and Salt creeks into the Recreational Saltwater and Estuary lakes. The drains along the eastern shoreline would flow into the Saline Habitat Complex.

Brine Sink

The Brine Sink characteristics would be similar to those described under Alternative 1.

Activities in Phases I through IV

The Barrier and Perimeter Dikes would be constructed in Phase I from barges when the surface water elevation of the Brine Sink would be high. The Saline Habitat Complex and Air Quality Management primarily would be constructed in Phases I and II. Cost estimates are summarized in Table 3-11.

It is assumed that the Barrier would be completed by 2022. If the Barrier construction is delayed, the salinity projections included in Table 3-3 also would be delayed. The Salton Sea Authority has projected that the Barrier would be completed by 2017, about five years earlier than projected in this PEIR. If this occurred, salinity would be lower in Recreational Saltwater Lake in all phases.

Table 3-11
Estimated Costs for Alternative 7 (in million dollars)

Items	Phase I (present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	$3,363.1	-	-	-	$3,363.1	Barrier and Perimeter Dikes, Including For The Freshwater Reservoir
Constructed Habitat	$220.5	$440.9	-	-	$661.4	Early Start Habitat and Saline Habitat Complex
Water Conveyance	$78	-	-	-	$78	Marine Sea Canal
Water Treatment	$504.6	-	-	-	$504.6	
Air Quality Management	-	$559.2	-	-	$559.2	Brine Stabilization
Total Construction	$4,166.2	$1,000.1	-	-	$5,166.3	
Annual Operations and Maintenance	-	$82	$82	$82	$82	

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

Alternative 8 – Combined South Sea

Alternative 8 was developed to provide a deep Marine Sea near the southern shoreline, moderately deep Marine Sea along the western and northern shorelines, Saline Habitat Complex, and Air Quality

Management facilities for the Exposed Playa. Saline Habitat Complex and Air Quality Management facilities would be constructed as described under Alternative 2 and No Action Alternative, respectively, and be developed as the water recedes.

Marine Sea

The Marine Sea would be located predominately in the southern portion of the Sea Bed with extensions to Bombay Beach on the east side and beyond the confluence of the Whitewater River along the western and northern shorelines. This Marine Sea would be formed by a Barrier across the Sea Bed, and a Perimeter Dike located along the -245 feet msl contour. The Marine Sea would be up to 45 feet deep in the southern area and up to 15 feet deep in the other areas.

The Marine Sea surface water elevation would be at -230 feet msl and the salinity would be between 30,000 mg/L and 40,000 mg/L. A Marine Sea Recirculation Canal would be used to convey 1,000 cubic feet/second to enhance circulation and salinity management, as described under Alternative 6. The canal would include a low-lift pumping plant. This flow would supply a portion of the water needed for the Saline Habitat Complex.

Direct inflows to the Marine Sea would include flows from the Whitewater River, Coachella Valley drains, Salt and San Felipe creeks, IID drains, and local drainages that connect to the Marine Sea area. A portion of the flows from the New and Alamo rivers would be captured in Sedimentation/Distribution Basins on each river and distributed to the Marine Sea. The remaining flows would be diverted to the Air Quality Management Canals and Saline Habitat Complex. Flood flows entering the Marine Sea would be spilled to the Brine Sink through the Marine Sea outlet or an overflow spillway.

The Barrier and Perimeter Dikes would be similar as those described under Alternatives 5 and 3, respectively. The Barrier and Perimeter Dikes would be of sufficient size to require compliance with the requirements of the California Department of Water Resources, Division of Safety of Dams. The construction method would use barges to construct the Barrier and Perimeter Dikes. Harbors or extended rail trestles would be needed to deliver rock to the barges used in construction.

Sedimentation/Distribution Basins

The Sedimentation/Distribution Basins would be similar to those described under Alternative 3.

Air Quality Management

Exposed Playa from -230 feet msl to the Brine Sink would be considered for Air Quality Management, as described under Alternative 1. Inflows for the Air Quality Management Canals would originate from the Sedimentation/Distribution Basins on the New and Alamo rivers. To supply water for exposed areas on the western side of the Sea Bed, water would be conveyed in a canal from the New River Sedimentation/Distribution Basin. This same canal would convey water for the Saline Habitat Complex along the western shoreline. At Salton City, the Air Quality Management Canal would be redirected under the Marine Sea and Perimeter Dike in a pipeline and would discharge into a canal down gradient of the Perimeter Dike.

The eastern Air Quality Management Canal would flow from the Alamo River Sedimentation/Distribution Basin along the eastern shoreline above -230 feet msl. At Bombay Beach, the water would be conveyed under the Marine Sea Recirculation Canal and would discharge into a canal located down gradient of the Marine Sea Recirculation Canal. These canals would be separated by up to 100 feet.

Both canals along the shoreline would cross under major drainages and drains in a siphon pipeline to maintain desert pupfish connectivity and drain activities.

Saline Habitat Complex and Shoreline Waterway

This alternative would include construction of 18,000 acres of Saline Habitat Complex with a Shoreline Waterway to distribute the water to the Saline Habitat Complex. In this alternative, there would be limited areas to establish Saline Habitat Complex because of the steep side slopes on exposed shoreline.

Pupfish Connectivity

Desert pupfish connectivity would be provided between Coachella Valley and IID drains,and San Felipe Creek in the Marine Sea. Desert pupfish in Salt Creek would be isolated.

Brine Sink

The Brine Sink characteristics would be similar to that described under Alternative 1.

Activities in Phases I through IV

The Barrier and Perimeter Dikes would be constructed in Phase I from barges when the surface water elevation of the Brine Sink would be high. Conveyances, Saline Habitat Complex, and Air Quality Management primarily would be constructed in Phases I and II. Cost estimates are summarized in Table 3-12.

It is assumed that the Barrier would be completed by 2022. If the Barrier construction is delayed, the salinity projections included in Table 3-3 also would be delayed.

Table 3-12
Estimated Costs for Alternative 8 (in million dollars)

Items	Phase I (present - 2020)	Phase II (2020 - 2030)	Phase III (2030 - 2040)	Phase IV (2040 - 2078)	Total	Comments
Barrier and Perimeter Dikes	$3,415.5	-	-	-	$3,415.5	Barrier and Perimeter Dikes
Constructed Habitat	$50	$460.8	-	-	$510.8	Early Start Habitat and Saline Habitat Complex
Water Conveyance	$25.1	$226.3	-	-	$251.4	Saltwater Conveyance, Air Quality Management Canals, Marine Sea Canal
Air Quality Management	$386.2	$849.8	$412	-	$1,648	
Total Construction	$3876.9	$1,536.9	$412	-	$5,825.7	
Annual Operations and Maintenance	$45	$116	$145	$145		

Notes:
In 2006 dollars and includes contingences, engineering, administration, and legal. Does not include cost of permits or land or easement acquisition. See Appendix H-7 for details.

EVALUATION OF TRANSFERS ALLOWED UNDER THE QUANTIFICATION SETTLEMENT AGREEMENT

Various permits related to the water transfer between IID and SDCWA, under the QSA, require up to 800,000 acre-feet of water conserved by IID to be conveyed into the Salton Sea until the year 2017 to mitigate a portion of the adverse impacts caused by the transfer of water from IID to SDCWA (SWRCB Order WRO 2002-0013). This water is frequently referred to as the (c)(2) water. The QSA and legislation allow for sale of this water to Metropolitan prior to 2017 if the Secretary for Resources determines that the transfer is consistent with the preferred alternative.

The legislation also allows for the transfer of a separate 800,000 acre-feet of conserved water from IID to DWR at $175/acre-foot in 2003 dollars and adjusted for inflation (Fish and Game Code Section 2081.7(c)(1)). This water is frequently referred to as (c)(1) water. The QSA and legislation allow for sale of this water to Metropolitan if certain conditions are met. The QSA includes a schedule for delivery of this water, as summarized in Table 3-13.

Table 3-13
Schedule for Delivery of Potential Transfer Water under the Quantification Settlement Agreement

Year	(c)(2) Water[a] (acre-feet)	(c)(1) Water[b] (acre-feet)	Total (acre-feet)
2003	5,000	0	5,000
2004	10,000	0	10,000
2005	15,000	0	15,000
2006	20,000	0	20,000
2007	25,000	0	25,000
2008	25,000	20,000	45,000
2009	30,000	40,000	70,000
2010	35,000	60,000	95,000
2011	40,000	80,000	120,000
2012	45,000	100,000	145,000
2013	70,000	100,000	170,000
2014	90,000	100,000	190,000
2015	110,000	100,000	210,000
2016	130,000	100,000	230,000
2017	150,000	100,000	250,000

Notes:
[a] Water to be provided to the Salton Sea through fallowing
[b] Water to be provided to the Salton Sea through efficiency methods

DWR would be responsible for mitigating any environmental impacts related to the transfer of (c)(1) water and for environmental impacts due to changes in Salton Sea salinity related to the transfer of (c)(2) water.

Transfer of these waters was not considered under the No Action Alternative. However, potential impacts and benefits were considered for Alternatives 1 through 8. A hydrologic/hydraulic model run was conducted to determine the impact on surface water elevations and salinity of the Brine Sink if these waters were transferred starting in 2008. The results, summarized in Table 3-14, indicate that the transfers would cause an additional decline in the Brine Sink surface water elevation by up to two feet by 2020 with the transfer of either (c)(2) or (c)(1) water, and up to four feet with the transfer of both of these waters. The Brine Sink salinity in 2020 would increase by about seven percent with the transfer of either (c)(2) or (c)(1) water, and up to 18 percent with the transfer of both of these waters. There would be minimal or no differences by the end of Phase II or in Phases III and IV.

Table 3-14
Comparison of Brine Sink Characteristics with Water Transfers under the Quantification Settlement Agreement

	No Action Alternative-CEQA Conditions	With Transfer of (c)(2) Water	With Transfer of (c)(1) Water	With Transfer of (c)(2) and (c)(1) Water
Brine Sink Elevation (feet msl)				
End of Phase I	-236	-238	-238	-240
End of Phase II	-245	-246	-246	-247
End of Phase III	-248	-248	-248	-248
End of Phase IV	-248	-248	-248	-248
Brine Sink Salinity (mg/L)				
End of Phase I	65,000	70,000	70,000	77,000
End of Phase II	103,000	106,000	106,000	110,000
End of Phase III	129,000	129,000	129,000	129,000
End of Phase IV	138,000	138,000	138,000	138,000

These changes would affect implementation of the alternatives. For Alternatives 3, 4, 5, 6, 7, and 8, the Brine Sink surface water elevation must remain as high as possible to facilitate construction with the barges. If a water transfers occurred, more of the construction would need to be completed from the shoreline, which would increase the construction costs.

Under Alternatives 1 and 2, transfer of (c)(2) or (c)(1) water could be beneficial because areas for Saline Habitat Complex would be exposed earlier than without the water transfers. However, these benefits would only occur if the environmental documentation, design efforts, and easement or land acquisitions could be completed prior to 2016 when construction of the Saline Habitat Complex would be initiated without the water transfer.

Transfer of the (c)(1) water also would require mitigation of impacts associated with that transfer. The impacts would include exposure of playa earlier than anticipated under the alternatives, and this could change the phasing of implementation of air quality management. In addition, the salinity would increase at a more rapid rate than projected under the alternatives. The higher salinities could result in the need to expand the Early Start Habitat or construct pupfish channels along the shoreline under all alternatives as a short term mitigation measure until habitat components are implemented.

Therefore, the analysis indicates that the transfer of (c)(2) or (c)(1) water could increase the construction costs of Alternatives 3 through 8 because the use of barges would become limited due to the loss of water in the Brine Sink. In addition, there would be a need to accelerate implementation of the air quality management actions and possibly construct short term pupfish channels on the shoreline. These measures would increase the costs of the alternatives. Specific cost estimates were not developed for these short term measures, however, the monetary benefit from the sale of (c)(2) or (c)(1) water does not appear to be significantly greater than the costs associated with the mitigations.

COMPARISON OF ALTERNATIVES

The results of the impact assessment indicate that all of the alternatives would provide more habitat and water along the shoreline than under the No Action Alternative throughout the study period. The results also indicated that all of the alternatives would provide similar or increased habitat benefits relative to Existing Conditions.

Construction impacts would occur related to soil disturbance, biological resources, air quality, cultural resources, paleontological resources, noise, visual resources, traffic, and power demands, even after implementation of mitigation measures (referred to as Next Steps in the PEIR). Long term operations and maintenance would result in significant impacts to the resource categories of soils and geology, biology, air quality, and visual as compared to the No Action Alternative or Existing Conditions, even after implementation of mitigation measures. The results of the impact assessment are summarized in Table 3-15, presented at the end of this chapter.

Areas of Known Controversy

During the development and evaluation of the alternatives, preliminary information was discussed with the Salton Sea Advisory Committee and the Habitat Working Group, agencies, and the public. Concerns were raised by some members of these groups about the ability to develop and/or restore habitat for fish and piscivorous birds. Pilot studies for similar habitat are being conducted by USGS. Information from those studies should be considered prior to design of Saline Habitat Complex habitat types.

There also is a lack of information about how eutrophic processes would respond to reductions in nutrient loadings from inflows and associated changes in internal resuspension. The water quality of inflows should be monitored to determine if nutrient and selenium loads would decrease as TMDLs are implemented in the next five years. Sediment should be monitored to determine current nutrients and selenium, and if the concentrations change as inflow loadings change in the future.

Environmentally Superior Alternative

In accordance with the CEQA Guidelines, Sections 15120 and 15126.6(e)(2), the PEIR identifies an environmentally superior alternative. To identify the environmentally superior alternative, each of the alternatives was evaluated based on the significance thresholds in Appendix G of the CEQA Guidelines for each resource category. The alternative with the fewest adverse impacts was identified for each resource category, as summarized below.

Overall, and for the reasons summarized below, Alternative 3 would have the least amount of adverse impacts, and, therefore, would be the environmentally superior alternative.

The environmentally superior alternative is not the preferred alternative, which is required to be identified as a result of the Ecosystem Restoration Study, in accordance with the Salton Sea Restoration Act. The Secretary for Resources will present the preferred alternative to the California Legislature following additional public participation, including input from stakeholders and interested agencies, consideration of comments received during the public review period for the Draft PEIR, and after receiving a recommendation from the Salton Sea Advisory Committee.

Water Resources

None of the alternatives would have any adverse impacts on surface waters outside of the sea bed. Water quality impacts would occur in the Marine Seas and Saline Habitat Complex due to eutrophic conditions. However, Alternative 8 would have the least adverse impacts because the Marine Sea in the shallower southern Sea Bed would be better mixed, thereby reducing the accumulation of hydrogen sulfide. Alternative 7 also would have few adverse impacts if proposed use of water treatment plants was effective. The No Action Alternative and Alternative 4 would have the least adverse impacts to groundwater because both alternatives would reduce potential saltwater intrusion into the Coachella Valley.

Biological Resources

Impacts to special status species would result primarily from construction of sedimentation and distribution basins at river deltas, isolation of the desert pupfish downstream of Pupfish Channels, and general disturbance associated with construction along the shoreline, particularly at the southern shore. Alternatives 6 and 7 would have the fewest sedimentation and distribution basins and pupfish channels. Therefore, Alternatives 6 and 7 would have the least impact on special status species due to construction. For a similar reason, Alternatives 6 and 7 would have the least adverse impacts on riparian, sensitive natural communities, and wetlands along the shoreline. Alternative 3 would have the least long term impact on desert pupfish populations because all drains and creeks would be connected into the First Ring. Alternatives 3 and 5 through 8 would have the least adverse impacts related to compliance with local policies that address biological resources because these alternatives include Marine Seas with salinity of 30,000 to 40,000 mg/L. Overall, the impact on desert pupfish movement and connectivity was given the greatest priority because of its status as an endangered species and the long term nature of the impact. Therefore, Alternative 3 was determined to have the least amount of adverse biological impacts.

Geology and Soils Resources

The alternatives that would have the least amount of adverse impacts on soils due to the amount of soils excavated and rock and gravel imported would be Alternatives 1 and 3. Alternatives 1 and 2 would have the least adverse impacts due to seismic risks because these alternatives would have the smallest volumes of water that could be released if all Berms, Barriers, and Perimeter Dikes failed simultaneously during a major seismic event.

Air Quality

Air quality impacts would result from fugitive dust associated with construction activities and wind erosion of exposed playa, and exhaust emissions from the combustion of fossil fuels used in equipment and vehicles. Priority was placed on analysis of impacts associated with the nonattainment pollutants: particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) and oxides of nitrogen (NO_x), an ozone precursor. The No Action Alternative and Alternatives 1 and 2 would have the lowest PM10 and NO_x emissions because these alternatives would have the least amount of dredging, imported rock and gravel, and exposed playa. Emissions of PM_{10} during the Peak Construction Year are primarily related to truck travel on unpaved roads. During the Peak Operations and Maintenance Year, PM_{10} emissions are primarily related to fugitive dust from Exposed Playa areas, after implementation of control measures. Alternative 8, followed by Alternatives 1 and 2, would have the least potential for adverse odor impacts because the shallower and comparatively well mixed nature of the water bodies would reduce the potential for stratification and build up of hydrogen sulfide, ammonia, and other odorous compounds.

Land Use, Population, and Housing

Adverse impacts to land use were measured by the ability to provide compliance with local land use plans and to provide water along the existing shoreline. Alternatives 3 and 5 through 8 would comply with the Imperial County General Plan provisions to support a Marine Sea. The No Action Alternative and Alternative 4 would have the least impacts on implementation of the Torres Martinez Indian Tribe land use plans because areas near the northern shoreline would be exposed. Alternatives 3 and 8 would provide major water bodies along most of the shoreline, and would have the least adverse impacts on current shoreline land uses.

None of the alternatives would have any impacts on population and housing during construction or operations and maintenance activities.

Recreational Opportunities

All of the alternatives would provide recreational opportunities. However, the opportunities would vary depending upon the type of water bodies contained in a particular alternative.

Hazards

Alternatives 3 and 7 would have the least adverse impacts due to potential exposure to hazards in the Sea Bed because these alternatives would have the least disturbance of the soils.

Cultural and Paleontological Resources

Alternatives 3 and 7 would have the least adverse impacts to cultural or paleontological resources in the Sea Bed because these alternatives would have the least disturbance of the soils.

Noise

Alternatives 1 and 3 would have the least adverse impacts due to noise because these alternatives would have the least excavation and imported rock and gravel.

Visual Resources

Alternative 3 would provide major water bodies along all of the current shoreline, and would have the least adverse impacts on aesthetics from the existing shoreline land uses.

Public Services

The need for public services would be related to the extent of construction activities. The amount of excavation and imported rock and gravel were used to identify the alternatives with the most construction activities. Based on this analysis, Alternatives 1 and 3 would have the least adverse impacts on public services.

Traffic

Alternative 4, followed by Alternative 1, would result in the least amount of vehicles during both construction and operations and maintenance activities.

Power and Energy Demands

Alternative 1, followed by Alternative 4, would result in the least amount of power demand during operations and maintenance activities.

Significant Unavoidable Adverse Impacts and Irreversible Environmental Changes

The unavoidable adverse impacts that are projected to occur after implementation of mitigation measures are indicated in Table 3-15 and summarized below.

During construction, there would be adverse impacts to biological resources near or at construction activities for the Sedimentation/Distribution Basins, Berms, Barriers, Perimeter Dikes, conveyance, and Air Quality Management components. Most of these adverse impacts only would occur during construction. However, construction in all alternatives would have the potential to isolate some desert pupfish in the Brine Sink. The isolated desert pupfish population in the Brine Sink would not be sustainable when salinity exceeds 90,000 mg/L or sooner. The Sedimentation/Distribution Basins would eliminate portions of riparian, wetlands, or agricultural lands, depending upon the location of the facilities.

Construction on the Sea Bed would cause short term impacts during construction that would affect benthic habitat, cultural and paleontological resources, risk of release of hazardous materials and air-borne diseases, risk from unexploded ordnances, noise, and potential need for emergency services. The construction and operations and maintenance activities also would increase dust, vehicle emissions, and traffic. Large amounts of rock, gravel and pipe materials required for all alternatives would result in a loss of mineral resources.

Alternatives 2, 3, 5, 6, 7, and 8 would continue inundation of Torres Martinez Tribal lands; and, therefore, preclude full implementation of the Torres Martinez Tribe Land Use, Zoning and Development Plan. All of the alternatives would change the proximity and/or extent of water along the current shoreline. This change would affect visual resources.

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Surface Water Resources						
Criterion: Cause alteration of surface waters that would cause erosion, siltation, or flooding.						
No Action Alternative	Existing Conditions	L	L	L	L	Best Management Practices in accordance with the Stormwater National Pollutant Discharge Elimination System permits.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Criterion: Cause structures to be placed within 100-year flood hazard area in the Sea Bed.						
No Action Alternative	Existing Conditions	L	L	L	L	Define specific locations and use of elevated platforms for facilities on the Sea Bed to protect against flooding.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 -8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Criterion: Create or contribute runoff water that could cause polluted runoff.						
No Action Alternative	Existing Conditions	L	L	L	L	Best Management Practices in accordance with Stormwater National Pollutant Discharge Elimination System permit. Collect sludge at the water treatment plant(s) and haul to a certified disposal site.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Criterion: Cause inundation by seiche.						
No Action Alternative	Existing Conditions	B	B	B	B	None available.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 -8	Existing Conditions	B	B	B	B	
	No Action Alternative	B	B	B	B	
Surface Water Quality						
Criterion: Violate water quality standard.						
No Action Alternative	Existing Conditions	O	O	O	O	Additional studies of influent concentrations and relationships between nutrients in the inflows, sediment, and water column could identify methods to improve water quality.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Substantially degrade water quality.						
No Action Alternative	Existing Conditions	S	S	S	S	Additional studies of influent concentrations and relationships between nutrients in the inflows, sediment, and water column could identify methods to improve water quality.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 – 4 and 6	Existing Conditions	L	L	L	L	
	No Action Alternative	L	B	B	B	
Alternatives 5, 7, and 8	Existing Conditions	L	L	L	L	Additional studies of influent concentrations and relationships between nutrients in the inflows, sediment, and water column could identify methods to improve water quality.
	No Action Alternative	L	L	L	L	
Groundwater Resources						
Criterion: Substantially deplete groundwater supplies, interfere with groundwater recharge, or cause saltwater intrusion						
No Action Alternative	Existing Conditions	O	B	B	B	None available.
	No Action Alternative	NA	NA	NA	NA	
Alternative 1	Existing Conditions	O	B	B	B	
	No Action Alternative	O	O	O	O	
Alternatives 2 - 8	Existing Conditions	O	O	O	O	Determine if the design criteria for the surface water elevation of water adjacent to the Indio Subbasin of the Coachella Valley Basin should be designed to further reduce saltwater intrusion.
	No Action Alternative	O	S	S	S	
Criterion: Cause groundwater quality degradation, not including saltwater intrusion						
No Action Alternative	Existing Conditions	L	L	L	L	A Stormwater Pollution Prevention Plan would be prepared.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Biological Resources						
Criterion: Overall effects (benefits) of implementation on fish and wildlife						
No Action Alternative	Existing Conditions	S	S	S	S	Monitor biological resources to inform project-level design and adaptive management. Implement measures to avoid disturbance of fish and wildlife resources during construction and maintenance.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 and 3 - 8	Existing Conditions	S	L	L	L	Conduct pilot studies and monitoring programs. Avoid disturbance during construction. Studies to further characterize the distribution of selenium in the sediments, and collect additional co-located biota, sediment, and water samples to refine predictions of selenium risk and reduce uncertainty. Modify design to minimize selenium uptake in the food web.
	No Action Alternative	B	B	B	B	
Alternative 2	Existing Conditions	S	B	B	B	
	No Action Alternative	B	B	B	B	
Criterion: Substantial adverse effect on candidate, sensitive, or special status species						
No Action Alternative	Existing Conditions	S	S	S	S	Implement measures to avoid or minimize impacts on breeding or roosting special status birds and desert pupfish during construction or maintenance activities.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 -2	Existing Conditions	S	L	L	L	Same as No Action Alternative.
	No Action Alternative	O	B	B	B	Evaluate the need and methods for incorporating areas of freshwater within Saline Habitat Complex to accommodate the requirements of breeding birds and their young. Determine the appropriate ratio of wetted to dry areas within the Saline Habitat Complex necessary to maximize the habitat value. Prior to project-level design, implement studies to further characterize the distribution of selenium in the sediments, especially in the interior portion of the Salton Sea, and collect additional co-located biota, sediment, and water samples to refine predictions of selenium risk and reduce uncertainty. Modify design to minimize selenium uptake in the food web.
Alternative 3 - 8	Existing Conditions	S	L	L	L	
	No Action Alternative	B	B	B	B	
Criterion: Substantial adverse effect on any riparian habitat, other sensitive natural community, or wetlands						
No Action Alternative	Existing Conditions	S	O	O	O	Implement measures for Sedimentation/Distribution Basins to reduce losses of riparian vegetation and wetland values during construction and encourage development of riparian vegetation and wetland values along channels that route water over the exposed Sea Bed to the Salton Sea.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 3 and 5 - 7	Existing Conditions	S	O	O	O	
	No Action Alternative	L	L	L	L	
Alternatives 4 and 8	Existing Conditions	S	S	S	S	
	No Action Alternative	L	L	L	L	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Interfere substantially with the movement of any resident or migratory fish or wildlife species						
No Action Alternative	Existing Conditions	S	S	S	S	Develop genetic exchange program for desert pupfish.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 and 2	Existing Conditions	S	S	S	S	
	No Action Alternative	S	O	O	O	
Alternative 3	Existing Conditions	S	O	O	O	
	No Action Alternative	S	B	B	B	
Alternative 4 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	B	B	B	
Geology, Soils, Faults, Seismicity, And Mineral Resources						
Criterion: Exposure of people to risks related to fault rupture, seismic shaking, and seismic-induced ground failure						
No Action Alternative	Existing Conditions	S	S	S	S	Facilities would be constructed in accordance with the California Building Code and applicable design standards.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Exposure of people to risks related to unstable soils						
No Action Alternative	Existing Conditions	S	S	S	S	Facilities would be constructed in accordance with the California Building Code and applicable design standards.
	No Action Alternative	NA	NA	NA	NA	
Alternative 1 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Loss of availability of a known mineral resource or a locally important mineral resource recovery site						
No Action Alternative	Existing Conditions	S	S	S	O	Facilities could be sited to minimize disturbance of mineral resources that are identified as the water recedes. Future construction methods and materials may be able to minimize use of mineral resources.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	O	
	No Action Alternative	S	S	S	O	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Climate and Air Quality[b]						
Criterion: Construction fugitive dust (PM_{10}) emissions exceed local significance thresholds of 150 pounds/day (daily threshold) or 70 tons/year (annual threshold)						
No Action Alternative	Existing Conditions	L	L	L	L	Project-level analyses would need to do more detailed emissions estimation, impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	N	N	N	
	No Action Alternative	S	N	N	N	
Criterion: Hazardous air pollutants (HAPs) in fugitive dust (PM_{10}) emissions associated with construction expose sensitive receptors to substantial pollutant concentrations						
No Action Alternative	Existing Conditions	S	S	S	S	Project-level analyses would need to do more detailed emissions estimation, exposure and health impact analysis, and mitigation planning. Control of fugitive dust would reduce human exposures.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	N	N	N	
	No Action Alternative	U	U	U	U	
Criterion: Construction exhaust (NO_x) emissions exceed local significance thresholds of 100 pounds/day or 50 tons/year						
No Action Alternative	Existing Conditions	L	L	L	L	Project-level analyses would need to do more detailed emissions estimation, impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternative 1	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Alternatives 2 - 8	Existing Conditions	S	N	N	N	
	No Action Alternative	S	N	N	N	
Criterion: Diesel PM_{10} emissions associated with construction expose sensitive receptors to substantial pollutant concentrations						
No Action Alternative	Existing Conditions	S	N	N	N	Project-level analyses would need to do more detailed emissions estimation, exposure and health impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	N	N	N	
	No Action Alternative	N	N	N	N	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Operations and maintenance related fugitive dust (PM_{10}) emissions exceed local significance thresholds of 150 pounds/day or 70 tons/year						
No Action Alternative	Existing Conditions	L	L	L	L	Project-level analyses would need to do more detailed emissions estimation, impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1, 2, and 4	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Alternatives 3 and 5	Existing Conditions	L	N	N	S	
	No Action Alternative	L	N	N	S	
Alternatives 6 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Operations and maintenance related exhaust (NO_x) emissions exceed local significance thresholds of 55 pounds/day or 50 tons/year						
No Action Alternative	Existing Conditions	L	L	L	L	Project-level analyses would need to do more detailed emissions estimation, impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 and 2	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Alternative 3	Existing Conditions	S	N	N	S	
	No Action Alternative	S	N	N	S	
Alternative 4	Existing Conditions	L	N	N	S	
	No Action Alternative	L	N	N	S	
Alternatives 5 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Fugitive dust (PM_{10}) emissions associated with exposed playa, after air quality management and control measures, exceed local significance thresholds of 150 pounds/day or 70 tons/year						
No Action Alternative	Existing Conditions	L	N	S	S	Project-level analyses would need to do more detailed emissions studies and estimation, control measure identification, impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Hazardous air pollutants (HAPs) in fugitive dust (PM_{10}) emissions associated with playa expose sensitive receptors to substantial pollutant concentrations						
No Action Alternative	Existing Conditions	S	S	S	S	Project-level analyses would need to do more detailed emissions estimation, exposure and health impact analysis, and mitigation planning. Control of fugitive dust would reduce human exposures.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Net emissions increase of nonattainment pollutants exceed general conformity de minimis thresholds of 70 tons/year (PM_{10}) and 50 tons/year (NO_x)						
No Action Alternative	Not Applicable.					
Alternative 1	Existing Conditions	S	L	L	L	Project-level analyses would need to do more detailed emissions estimation, impact analysis, and mitigation planning.
	No Action Alternative	S	L	L	L	
Alternatives 2 - 8	Existing Conditions	S	N	N	S	
	No Action Alternative	S	N	N	S	
Criterion: Odorous emissions associated with changes in water quality affect a substantial number of people						
No Action Alternative	Existing Conditions	S	S	B	B	Project-level analyses would need to do more detailed emissions estimation, exposure and health impact analysis, and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 4	Existing Conditions	S	B	B	B	
	No Action Alternative	S	B	B	B	
Alternatives 5 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Changes substantially modify the existing microclimate characteristics adjacent to the Salton Sea						
No Action Alternative	Existing Conditions	S	S	S	S	Project-level analyses would need to do more detailed microclimatic impact analysis and mitigation planning.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	U	U	U	U	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Land Use						
Criterion: Conflict with Imperial County General Plan provisions related to conditions in the Salton Sea						
No Action Alternative	Existing Conditions	S	S	S	S	None available.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 4	Existing Conditions	S	S	S	S	
	No Action Alternative	L	L	B	B	
Alternatives 5 - 8	Existing Conditions	S	B	B	B	
	No Action Alternative	L	B	B	B	
Criterion: Conflict with Torres Martinez Tribe Land Use Plans						
No Action Alternative	Existing Conditions	L	B	B	B	Facilities could be located to reduce impacts to land uses along the shoreline.
	No Action Alternative	NA	NA	NA	NA	
Alternative 1	Existing Conditions	L	B	B	B	
	No Action Alternative	L	B	B	B	
Alternatives 2, 3, 4, and 8	Existing Conditions	L	B	B	B	Provisions could be included to provide access to exposed Tribal lands or locations of the rings could be modified to expose these lands.
	No Action Alternative	L	L	L	L	
Alternatives 5 - 7	Existing Conditions	O	O	O	O	Displacement dikes could be used to expose Tribal lands.
	No Action Alternative	S	S	S	S	
Criterion: Conversion of agricultural land						
No Action Alternative	Existing Conditions	L	L	L	L	To the extent possible, Sedimentation/Distribution Basins should be located away from agricultural lands.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 2	Existing Conditions	L	L	L	L	
	No Action Alternative	O	O	O	O	
Alternatives 3 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	B	B	B	B	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Distance from shoreline to open water						
No Action Alternative	Existing Conditions	S	S	S	S	None available.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 2 and 4 - 8	Existing Conditions	S	S	S	S	Displacement Dikes to contain water near shorelines.
	No Action Alternative	O	S	S	S	
Alternative 3	Existing Conditions	S	S	S	S	None available.
	No Action Alternative	B	B	B	B	
Population And Housing						
Criterion: Induce population growth directly due to construction activities						
No Action Alternative	Existing Conditions	O	O	O	O	None required
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	O	O	O	O	
	No Action Alternative	O	O	O	O	
Recreation						
Criterion: Substantially change recreational opportunities						
No Action Alternative	Existing Conditions	O	S	S	S	During project-level analyses, evaluate opportunities.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	O	B	B	B	
	No Action Alternative	O	B	B	B	
Hazards, Hazardous Waste And Public Health						
Criterion: Increased exposure to hazardous materials						
No Action Alternative	Existing Conditions	L	L	L	L	Coordinate with U.S. Navy to confirm removal of ordnance prior to disturbance. Training provided to workers to reduce risk of handling and transporting hazardous materials. Life-support equipment may need to be available for all workers when in boats on the water.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Increased risk of consumption of fish and wildlife tissue with high selenium concentrations						
No Action Alternative	Existing Conditions	B	B	B	B	Continued coordination with regulatory agencies and monitoring of fish and wildlife tissue.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	B	B	B	B	
	No Action Alternative	B	B	B	B	
Criterion: Increased risk due to exposure to vectors or disease						
No Action Alternative	Existing Conditions	L	L	L	L	Continued coordination with mosquito abatement agencies. Monitoring programs and worker training to reduce exposure to vectors and disease as soils are disturbed.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Cultural Resources						
Criterion: Cause substantial adverse change in the significance of a historical or unique archaeological resource or disturb human remains						
No Action Alternative	Existing Conditions	S	S	S	S	Implement mitigation measures required by implementation of the IID Water Conservation and Transfer Project from -235 to -248 feet msl.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	Implement same measures as described in the No Action Alternative. If disturbed lands are federal or tribal lands, complete analyses subject to federal oversight following Section 106 compliance pathways of the NHPA and implementing regulations under 36 CFR 800, as amended. Discovered sites should be properly recorded with the appropriate California Historic Resource Information System (CHRIS) office.
	No Action Alternative	S	S	S	S	
Paleontological Resources						
Criterion: Physical damage to a scientifically useful fossil or unearthing of fossils and removal without appropriate scientific recordation						
No Action Alternative	Existing Conditions	S	S	S	S	Implement mitigation measures required by implementation of the IID Water Conservation and Transfer Project from -235 to -248 feet msl.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	Implement same measures as described in the No Action Alternative.
	No Action Alternative	S	S	S	S	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Noise						
Criterion: Exposure of people to or generate noise levels in excess of standards						
No Action Alternative	Existing Conditions	L	L	L	L	Use hydraulically or electrically powered impact tools and exhaust mufflers. Install manufacturer's standard noise control devices. Locate equipment as far as possible from noise sensitive receptors. Notify property users when noisy work might occur. Keep idling of construction equipment to a minimum. Install acoustic barriers and noise enclosures.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 and 2	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Alternatives 3 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Exposure of people to or generate excessive ground-borne vibration or ground-borne noise levels						
No Action Alternative	Existing Conditions	S	S	S	O	Potentially could reduce vibrations by isolating the pile-driving equipment.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	O	
	No Action Alternative	L	L	L	O	
Aesthetic And Visual Resources						
Criterion: Substantially degrade visual character, quality, or scenic vistas						
No Action Alternative	Existing Conditions	S	S	S	S	Several locations would be evaluated in project-level analyses for all facilities. Methods to camouflage large facilities could be considered.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	S	
	No Action Alternative	S	S	S	S	
Criterion: Create a new source of light or glare						
No Action Alternative	Existing Conditions	L	L	L	L	Use non-glare lighting with on-demand switching.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Public Services And Utilities						
Criterion: Results in impacts to or requires new or altered facilities for fire and police protection or emergency care						
No Action Alternative	Existing Conditions	L	L	L	L	Develop traffic plans and emergency response plans for construction sites. Construction sites could provide private security and fire protection at the sites. Fee schedules for construction permits could include re-imbursements to provide funds for emergency services.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Criterion: Results in non-compliance or requires new or altered solid waste facilities						
No Action Alternative	Existing Conditions	S	S	S	O	Fee schedule at solid waste facilities could be developed specifically for construction of the alternative to promote recycling and minimize solid wastes. Mandate hauling of solid waste outside of the study area.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	S	S	S	O	
	No Action Alternative	S	S	S	O	
Transportation And Traffic						
Criterion: Cause a substantial increase in traffic						
No Action Alternative	Existing Conditions	L	L	L	L	Comply with all applicable traffic regulations and maintain emergency access. Traffic studies would be conducted to identify methods to minimize impacts.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	
Power Production And Energy Resources						
Criterion: New or physically altered power facilities, the construction of which could cause significant environmental impacts						
No Action Alternative	Existing Conditions	L	L	L	L	Energy savings measures including conservation and use of alternative energy sources would be considered during project-level analyses. Placement of the extended facilities would need to be evaluated in project-level analyses.
	No Action Alternative	NA	NA	NA	NA	
Alternative 4	Existing Conditions	L	L	L	L	
	No Action Alternative	O	O	O	O	
Alternatives 1 - 3 and 5 - 8	Existing Conditions	L	L	L	L	
	No Action Alternative	L	L	L	L	

Table 3-15
Summary of Impacts and Benefits

Alternative	Basis of Comparison	Changes by Phasea				Next Steps
		I	II	III	IV	
Criterion: Loss of access to a known geothermal resource area that would substantially affect existing and future resource extraction activities						
No Action Alternative	Existing Conditions	B	B	B	B	Coordinate with geothermal industry to minimize conflicts between Air Quality Management and geothermal facilities. Air Quality Management measures may be reduced if geothermal industries become responsible for dust control near the generation facilities. Reduce size of water bodies to provide corridors for geothermal areas.
	No Action Alternative	NA	NA	NA	NA	
Alternatives 1 - 6 and 8	Existing Conditions	O	O	O	O	
	No Action Alternative	L	L	L	L	
Alternative 7	Existing Conditions	B	B	B	B	
	No Action Alternative	B	B	B	B	

Note
[a]

S = Significant or Potentially Significant Impact
L = Less than Significant
O = No Change
B = Benefit
U = Unknown
NA = Not Applicable
N = Not Analyzed.

[b] The air quality analysis focused on a Peak Construction Year in Phase I, and a Peak Operations Year in Phase IV. For the most part, Phases II and III were not analyzed. Exceptions to this occurred if inferences could be made from the available information. For example, if construction impacts were predicted to be less than significant in the Peak Construction Year, it was inferred that construction impacts would be less than significant in all phases. As another example, if significant or potentially significant impacts were predicted in both Phase I and Phase IV, it was inferred that significant or potentially significant impacts would occur in all phases.