APPENDIX H

Ecosystem Restoration Study

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APPENDIX H
ECOSYSTEM RESTORATION STUDY

This introduction to Appendix H describes the use of the Ecosystem Restoration Study to provide technical analyses that were used in the development of conceptual design criteria and the final range of alternatives evaluated in the Draft Programmatic Environmental Impact Report (PEIR). The Ecosystem Restoration Study includes information presented in Appendices H-1 through H-7.

SALTON SEA ECOSYSTEM RESTORATION PROGRAM

The Salton Sea ecosystem is an extremely valuable resource for resident and migratory birds, including a large number of threatened, endangered, and species of concern. Until recently, the Salton Sea also supported a robust marine sport fishery. Increasing salinity and declining water quality have eliminated the marine fish species, and, with inflows that will be diminishing in the future, threaten the continued ability of the Salton Sea ecosystem to support birds and other wildlife. In recognition of the importance of the Salton Sea ecosystem, the State Legislature established a State policy for restoring the sea and permanently protecting the fish and wildlife resources dependent upon it.

The discussion of Salton Sea restoration cannot take place without recognizing the Quantification Settlement Agreement (QSA) signed in 2003. It addresses water allocation issues between the holders of water rights to Colorado River water and enables California to stay within its 4.4 million acre-foot annual apportionment of Colorado River water. It also establishes a water transfer from agricultural water users to urban water users. During the first 15 years of the transfer, the Imperial Irrigation District (IID) is providing water to the Salton Sea to meet the inflow trajectory that would have occurred without the transfer. The inflow trajectory includes other activities in the watershed unrelated to the QSA that will result in declining water levels in the Salton Sea. After the first 15 years, this transfer will reduce agricultural return flows to the Salton Sea and accelerate progressive increases in salinity. This will decrease the time that the Salton Sea can continue to support fish, avian, and other wildlife species. The reduced agricultural return flows projected under the QSA will also reduce the physical size of the Salton Sea and expose lake bed sediments (playa) that, with the prevailing winds in this area, could exacerbate dust problems for an already degraded air basin.

One of the conflicts identified during negotiations of the QSA was the extent of ecosystem mitigation and associated need for restoration within the Salton Sea watershed, and specifically for the Salton Sea. The Salton Sea restoration legislation requires the Secretary for Resources to undertake a restoration study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the permanent protection of wildlife dependent on that ecosystem. The preferred alternative, when determined, is to provide the maximum feasible attainment of the following objectives:

- Restoration of long term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea;
- Elimination of air quality impacts from the restoration project; and
- Protection of water quality.

In response to these objectives, it was necessary to define a range of reasonable alternatives and eventually evaluate the environmental benefits and impacts of the alternatives. The Ecosystem Restoration Study provided technical analyses used in the development of the alternatives and presented the conceptual design details of the alternatives evaluated in the PEIR.

DEVELOPMENT OF THE ALTERNATIVES

Issues to be considered in the development of alternatives were specifically defined by the objectives described in the legislation (see Chapter 1 and Appendix A of the PEIR) and identified by Salton Sea Advisory Committee members, other stakeholders, and members of the public. In addition, alternatives identified and evaluated in more than 20 previous studies completed over the past 40 years were reviewed to understand and consider technical and engineering issues identified in past studies, and physical, biological, and community related issues associated with the Salton Sea ecosystem.

The following issues were discussed at Salton Sea Advisory Committee meetings and public workshops:

- Protection and/or restoration of habitat for threatened or endangered species;
- Consideration of the importance of the Salton Sea with respect to the Pacific Flyway;
- Consideration of unique habitats that cannot be specifically duplicated in other locations or that become unique due to the synergy between habitats at or near the Salton Sea;
- Approaches that reduce potential risks due to selenium and nutrients in various habitats;
- Consideration of approaches that include adaptive management;
- Preservation of agricultural land that provides habitat in the watershed;
- Preservation of the Salton Sea for storage of agricultural runoff and seepage from irrigated lands in the Imperial and Coachella valleys;
- Protection of the micro-climate along lands adjacent to the existing Salton Sea shoreline;
- Consideration of tribal interests at the Salton Sea and in the watershed;
- Consideration for integrating potential geothermal power generation;
- Implement air quality management methods for Exposed Playa;
- Assume land use general plans of Imperial and Riverside counties and the Torres Martinez Tribe would be fully implemented along the Salton Sea shoreline and throughout the watershed;
- Consideration for local recreational and economic development opportunities; and
- Establishment of a long term monitoring and research program because many aspects of the Salton Sea ecosystem existing conditions are not understood or fully defined.

Previous studies identified and evaluated alternatives that include dividing the Salton Sea into multiple water bodies with barriers across the Sea Bed, importing water supplies, and exporting salt for disposal, as described in Chapter 2 of the PEIR. Many of these alternatives were developed to provide salinity and elevation control to support recreational and local economic opportunities. Habitat and water quality improvements were considered for the purpose of supporting fish and wildlife that provided recreational opportunities.

This information was used in a multi-step process in the PEIR to develop the final range of alternatives, as described in Chapters 2 and 4 of the PEIR. This approach required:

- Identification of specific ecosystem restoration objectives for various components in the alternatives;

- An evaluation of the range of inflows that could occur over 75 years based upon many factors not related to the Salton Sea Ecosystem Restoration Program, and the related changes in water quality and quantity available for ecosystem restoration activities;
- Identification of air quality management methods to reduce potential dust emissions from exposed portions of the Sea Bed as the water recedes;
- An evaluation of geotechnical conditions in the Sea Bed that would require specific construction methods and design criteria for large dam-like structures, referred to as Barriers and Perimeter Dikes in the alternatives;
- An evaluation of the availability of rock for construction of the Barriers and Perimeter Dikes within 50 miles of the Salton Sea; and
- Identification of conceptual design criteria that could be used to define the alternatives to a level of detail that would allow development of estimated costs, time periods for construction, and estimated levels of disturbance to the Salton Sea and surrounding environment.

PREPARATION OF THE ECOSYSTEM RESTORATION STUDY

The purpose of the Ecosystem Restoration Study is to summarize the results of the efforts described above. The Ecosystem Restoration Study is comprised of the following seven separate reports:

- **Appendix H-1: Habitat Components of the Salton Sea Ecosystem Restoration -** This appendix provides information on the historical context and need for restoration, and information on fish and wildlife species found at the Salton Sea. This appendix also identifies possible habitat components that could comprise a restored Salton Sea ecosystem, including the physical and biological requirements needed to support fish and wildlife dependent on the Salton Sea. These components were developed in consideration of the realities of water supply and feasibility of the infrastructure needed to maintain habitat values over the long term. This appendix also provides the technical basis for the habitat creation and restoration components, and the configuration of the alternatives. As part of this effort, a Habitat Working Group conducted meetings to develop objectives, collect information, present draft technical analyses, receive comments, and allow for discussions;
- **Appendix H-2: Hydrology and Hydrologic Models -** This appendix describes historical and future hydrology of the Salton Sea to estimate the water and salt budgets at the Salton Sea under both existing and future conditions. As part of this effort, an Inflows/Modeling Working Group conducted meetings to collect information, present draft technical analyses, receive comments, and allow for discussions;
- **Appendix H-3: Identify and Outline Measures to Control Playa Emissions -** The alternatives include varying amounts and configurations of exposed Salton Sea Bed soils, referred to as Exposed Playa. A range of Air Quality Management methods was evaluated for inclusion in the alternatives in the PEIR. A combination of methods that include long term monitoring, future pilot projects, temporary approaches such as access controls, and permanent methods such as water efficient vegetation and stabilization with brine were identified for inclusion in the PEIR alternatives. As part of this effort, an Air Quality Working Group conducted meetings to collect information, present draft technical analyses, receive comments, and allow for discussions;

- **Appendix H-4: Conceptual Design for In-Sea Rock Barriers Interim Report -** A conceptual design using rockfill for the construction of the Barriers and Perimeter Dikes in many of the PEIR alternatives was developed based on subsurface deposit investigations and subsequent soil testing of samples retrieved at varying depths over a wide area of the Sea Bed. These investigations were conducted during previous studies, and the results were used in the Ecosystem Restoration Study. This appendix documents the work activities by the Department of Water Resources (DWR) to develop a concept which employs the use of rockfill materials to construct barriers of varying heights located anywhere in the Salton Sea. The level of the conceptual design is programmatic in level of detail and was used to develop estimated ranges of rock required to construct Barriers and Perimeter Dikes and associated construction costs. Should the preferred alternative include a Barrier and/or Perimeter Dike, additional subsurface investigations and analyses would have to be performed for specific alignments and barrier performance objectives;

- **Appendix H-5: Potential Rock Sources -** This appendix describes an evaluation of potential sources for large diameter rock to construct Barriers and Perimeter Dikes. The evaluation included an initial reconnaissance survey and a subsequent data collection effort for three potential sites;

- **Appendix H-6: Description of Infrastructure Components -** This appendix summarizes the technical assumptions and conceptual design criteria related to the infrastructure for major components in the alternatives. The major components included Sedimentation/Distribution Basins, canals, distribution channels, pipelines, pumping plants, water treatment plants, Air Quality Management facilities, Barriers, Perimeter Dikes, and Berms. This appendix includes typical cross-section and profile details, design criteria such as minimum operating capacities for water structures, and construction considerations for each component. One Infrastructure Working Group meeting was conducted to present draft technical analyses and allow for discussions; and

- **Appendix H-7: Design and Construction Considerations for Final Alternatives -** This appendix describes the proposed layouts, construction issues, and operations and maintenance requirements for the alternatives evaluated in the PEIR. This appendix describes assumptions related to inflows, construction schedule, operations and maintenance requirements, and estimated construction and operations and maintenance costs.

The information presented in the Ecosystem Restoration Study also was used in the impact assessment presented in Chapters 5 through 22 of the PEIR.