

# Bi-National Canal for Salton Sea Restoration and Colorado River Augmentation

Proposal to the California Natural Resources Agency in Response to December 8, 2017 Request for Information for Salton Sea Water Importation Projects

Submitted by: GEI Consultants, Inc. and Michael Clinton Consulting, LLC March 12, 2018



# TABLE OF CONTENTS

---

Executive Summary Letter.....	1
1 Identification of Project Team.....	4
2 Narrative Description of Project Concepts and How/When it Will Benefit the Lake .....	5
3 Planning and Design Process of the Project .....	10
3a Project Feasibility.....	12
3b Water Source Identification.....	15
3c Land Use .....	16
3d Environmental impact .....	17
3e Salton Sea Salinity, Elevation, and Brine Disposal .....	21
3f Water Use.....	23
3g Cross Border Governmental Coordination .....	24
3h Project Development Schedule.....	25
4 Cost Projections.....	26
5 Plan for Funding of Proposed Project .....	27

Appendix A – Staff Resumes

Appendix B – Engineering Drawings

Appendix C – Project Development Schedule

Appendix D – Appraisal Level Cost Estimates

Appendix E – GEI Firm Overview

## EXECUTIVE SUMMARY LETTER

---

March 12, 2018

Bruce Wilcox, Assistant Secretary for Salton Sea Management  
California Natural Resources Agency  
1416 Ninth Street, Suite 1311  
Sacramento, CA 95814

**Subject: Request for Information for Salton Sea Water Importation Projects**

Dear Mr. Wilcox:

In response to the Agency's Request for Information dated December 8, 2017, GEI Consultants, Inc. (GEI) and Michael Clinton Consulting, LLC (MCC) are pleased to present our proposal to the California Natural Resources Agency ("the Agency") to provide professional water resource development services to formulate and implement a comprehensive program to restore the Salton Sea, augment Colorado River water supplies, and contribute to balancing statewide water supply security. As suggested in the first paragraph of the RFI, our proposal is "designed to address public and ecological health issues at the Salton Sea while securing Colorado River water supplies for the state."

The Agency's "Ten Year Plan" sets in motion a series of actions that will help to mitigate dust generated from the exposed playa as the elevation of the Sea recedes. The Ten Year Plan will also create a series of small open water habitat areas on the playa to help sustain migrating and local fish and bird species. This will maintain essential functions of this critical portion of the Pacific Flyway. It will also intend to address a looming public health crisis by stabilizing the playa surface to minimize wind-blown particulates. However, the salinity of the much-larger Salton Sea will continue to approach a level poisonous to fish and birds, and there is uncertainty regarding the effectiveness of dust control methods over such a large area of exposed playa.

An equally perilous concern is that the structural water supply deficit on the Colorado River and the declining Lake Mead elevations will create a growing jeopardy to the future of Colorado River water supplies of the State of California, the other Basin States, and Mexico. This proposal is designed to address each of these critical concerns. Not only would the Colorado River Augmentation included in this proposal be a means to support statewide water supply security but would also be the last-best opportunity to meet the mandate of Section 202 of Public Law 90-537 which made the delivery of water to Mexico a "national obligation" and directed the Secretary of the Interior to develop a Colorado River augmentation plan for consideration by the Congress. All previous attempts were ceased. The 1960's studies of imports from the Columbia River were halted by the Congress; the 1970's Westwide Studies were stopped by the Carter Administration; and the suggestion by the

Southern Nevada Water Authority to bring Missouri River water to the Colorado front-range cities was rejected. The last great source of proximate, unobligated water supply is in the Gulf of California.

GEI is a nation-wide consulting engineering firm with five offices in California and a diverse staff that has expertise in virtually all aspects of California and Colorado River water management. GEI is experienced in a wide portfolio of water resources engineering that has ranged from very broad regional studies to very project-specific undertakings. GEI's Team will provide the Agency with its invaluable local knowledge and extensive experience in water resources planning and management throughout the Colorado River System, in the Colorado River Delta area of Mexico, the Imperial, Coachella and Mexicali valleys and the Salton Sea.

GEI, through Program Manager, Marc Rozman, PE, and Project Manager, Mark Williamson, PE, bring to the program a long history of successfully completing projects on time and within budget. GEI provides a strong link to the Agency through its Sacramento Office, which will have the lead for keeping Sacramento staff informed as the project evolves.

Mike Clinton, PE has conceived the proposed program and managed the extensive four-year inter-agency dialog that has refined the Project concepts to those displayed in the proposal. Through the Feasibility Stage and on into implementation, Mike will continue the needed liaison with interested parties and agencies and will take the lead in developing the multitude of contracts and agreements needed for Project implementation.

Jeff Harvey, PhD, brings the experience of managing environmental compliance for many large water and power projects in the Sonoran Desert area of southern California, including representing the San Diego County Water Authority in matters related to the Salton Sea and the transfer of IID conserved water to San Diego. Jeff brings to the project terrestrial biologists that know the area and have experience in dealing with the resource agencies and interested parties in the area. Jeff will oversee the environmental compliance aspects of the Project, providing quality control and high-level agency and interest group coordination. For example, Jeff, located in Palm Desert, will also provide needed local liaison with the Agency Assistant Secretary for Salton Sea Management who is located nearby.

Our proposed partner, CEMEX, brings world-class project management and construction experience within both the United States and Mexico, both crucial ensure that the Salton Sea Water Importation Project and Colorado River Augmentation Program will be implemented on time and within budget. CEMEX will focus their outstanding international expertise and project construction capabilities on the early restoration of the Salton Sea and augmentation of the Colorado River water supply.

Overall, working along with CEMEX's noteworthy background and capabilities, GEI will leverage their own local knowledge and prior work experience to trade time spent in getting up to speed for more time spent on adding value. Our interdisciplinary structure allows the GEI Team to assume full responsibility for this entire project from concept through operation.

We have outlined what we believe will be a very successful strategy and program to implement this important work.

Thank you for the opportunity to outline our scope of work to help the Agency with this effort. We look forward to speaking with you further about this project. If you have any questions, please contact Marc Rozman at 818.552.6430 (mrozman@geiconsultants.com), Mark Williamson at 916.631.4559 (mwilliamson@geiconsultants.com), or Mike Clinton at 702.807.9071 (mcenginr@aol.com).

Respectfully submitted,

**GEI Consultants, Inc.**

Handwritten signature of Marc Rozman in blue ink.

Marc Rozman, PE  
Vice President, Program Manager

**Michael Clinton Consulting, LLC**

Handwritten signature of Michael J. Clinton in blue ink.

Michael J. Clinton, PE  
President, Michael Clinton Consulting, LLC

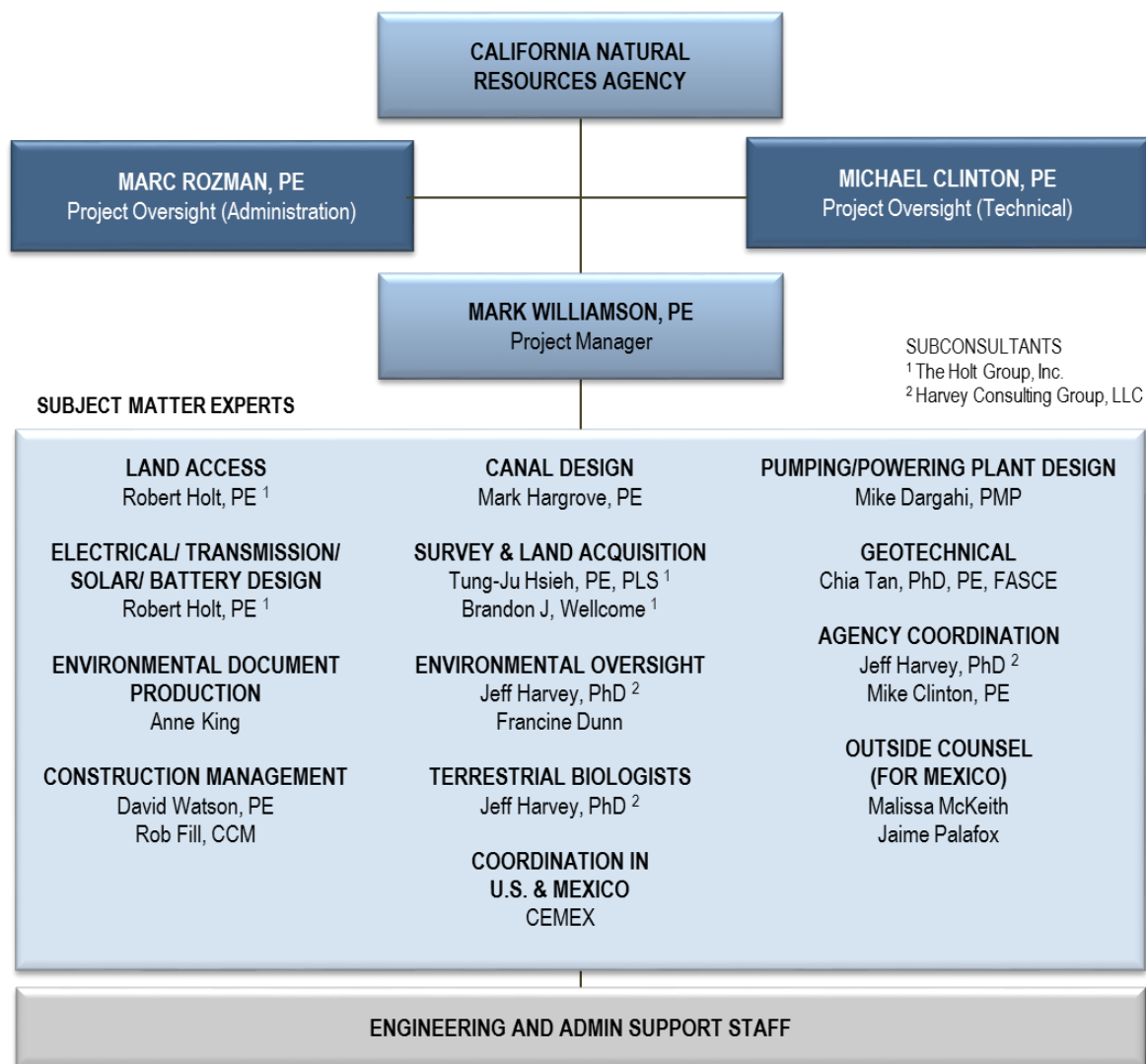
# 1 IDENTIFICATION OF PROJECT TEAM

**NOTE:** Text requirements from the RFI are shown in italics at the beginning of each section.

*Identification of Project Team – Members of the project team, and their roles on the project should be identified.*

GEI and MCC have assembled a world class team of subject matter specialists for this work. These individuals are identified in the organizational chart (**Figure 1**) below. Resumes for key staff are provided in **Appendix A**. Resumes for the other staff shown in the organization will be provided on request.

FIGURE 1. PROJECT TEAM ORGANIZATION



## 2 NARRATIVE DESCRIPTION OF PROJECT CONCEPTS AND HOW/WHEN IT WILL BENEFIT THE LAKE

*Narrative Description of Project Concept and How/When it Will Benefit the Lake – A brief description of the proposed project is required that includes a general discussion of the project concept, the business plan and the implementation of the project. The project concept discussion should include a description of the project and how it will improve conditions at the lake. The business plan should include a discussion of the ownership of the proposed project and the plan for generating revenue from the project.*



**Proposed Project Plan:** The proposed project would be implemented in two phases, as follows:

**Phase 1.** Importation of water from the Gulf of California to the Salton Sea (a State of California responsibility)

**Phase 2.** Withdrawal and desalination of a portion of the imported water to remove salts from the Salton Sea; deliver the desalinated water to the canals of the Imperial Irrigation District (IID) and Coachella Valley Water District (CVWD); and, by exchange through reduction in demands on the Colorado River and Lake Mead, accomplish the augmentation of the Colorado River that was anticipated in 1968 when the Central Arizona Project was authorized by the Congress (a federal and seven basin states responsibility)

**Implementation of Salton Sea Restoration:** Import of water from the Gulf will use known and proven technology to convey the water approximately 135 miles from an intake located on the Gulf

northeast of San Felipe, north to the Salton Sea. The conveyance system will use a single 100 foot-lift pumping plant, a single four-mile long tunnel under the International Boundary and about 130 miles of 3,200 cubic feet per second (cfs) gravity canals, comparable in size to the recently lined All American Canal near Drop 2.<sup>1</sup> At the north end of the canal system, a penstock will convey the water to the Salton Sea outlet. This penstock segment includes a 225-foot drop, which will be equipped with a hydroelectric generator to produce peaking power during an estimated 5,000 hours per year.

With an expedited schedule of two years to complete a feasibility study, fully mitigated Environmental Review, and the form of needed agreements, followed by a two- to three-year construction period, Gulf water could be flowing to the Salton Sea by 2023. Using a three-year fill period to minimize seismic risks associated with the weight of the restored Salton Sea on the crust of the earth, the sea would be at elevation -225 by mid-2025/2026 with the playa fully submerged. The dilution effect of the Gulf water would bring the Salton Sea salinity to about 50,000 mg/l in 2025. The Salton Sea salinity would continue to decline over a period of several years to a steady state of about 39,000 mg/l, which is the blend of the salinity of Gulf water and waters from the New, Alamo and Whitewater Rivers, less exported salts.

### **Salton Sea Restoration Business**

**Plan:** Since the State of California agreed in 2003 to assume the financial obligation for Salton Sea Restoration, the cost of constructing the needed importation facilities would be provided through a Continuing Appropriation by the California Legislature. It is proposed that the facilities be constructed by the GEI Team, that facilities in Mexico be owned, operated, and maintained by the Mexico Federal Water Agency, CONAGUA, and that facilities in the United States be owned by the State of California and operated and maintained by the IID. Funding for all operations, maintenance, and repair of facilities in Mexico and in the United States would derive from hydropower generation revenue, and remuneration for water from the IID and CVWD entitlements that can be transferred to other basin states. Funding contributions for the infrastructure should also be sought from the federal government and other basin states that will benefit from the Colorado River water supply augmentation. Additional revenue sources will be explored in the feasibility study, including possible sale of minerals recovered in the desalination process, and increased property tax revenues from Salton Sea shoreline communities.



---

<sup>1</sup> GEI was responsible for the design and construction management for lining the All American Canal and the Coachella Canal, and our environmental team leader, Dr. Jeff Harvey, was Environmental Program Advisor for those projects as well.



Power to operate the pumps at the 100-foot lift pumping plant near the Mexicali/San Felipe Highway would be provided by a solar panel array placed on the west bank of the canal alignment north of the pumping plant and battery-storage system. Power for the 100-mm fish screen and ozone disinfection equipment located at the mouth of the tunnel will be provided by IID through an interchange with San Diego Gas and Electric (SDG&E) at its Imperial Valley Substation; SDG&E would arrange for a five-mile 12.5 kV under build on an existing CFE 230-kV lattice-tower power line between the existing SDG&E substation west of Mexicali and the tunnel inlet site.

**Implementation of Colorado River Augmentation Program:** To maintain the reduced salinity of the Salton Sea, the tons of salt entering the Sea from the Gulf of California, and the New, Alamo and Whitewater Rivers (about 60 million tons per year) must be removed. The proposed Project anticipates removing this mass of salt along with about 2.0 million acre-feet per year (MAF/year) with an initial salinity of about 60,000 mg/l and a long-term salinity of about 39,000 mg/l. Desalination of this 2.0 MAF/year provides the opportunity to augment the Colorado River.

The desalination will use a proprietary distillation process powered by three 50-MW sled mounted natural gas-fired generators, which will provide power for operation of the Project, and heat for the desalination process. Since the product of the process is distilled water which is chemically very aggressive, the Project includes a two-pipeline exchange of 200,000 AF/year of



distilled product water for 200,000 AF/year of Colorado River water in the nearby Coachella Canal. This exchange will reduce the salinity of Colorado River water used by CVWD from about 600 mg/l to about 300 mg/l. The 200,000 AF/year of Colorado River water received from the Coachella Canal will be blended with the remaining 1.8 MAF/year of distilled product water from the desalination facility and delivered into the IID canals for use in lieu of water ordered from the Colorado River and Lake Mead. Delivery of that blend to the IID system will be through lining of the East Highline Canal and using a system in which water in the lower pool is pumped up and over the check structures, ultimately reaching the All American Canal below Drop 3. This delivery of desalinated water will reduce the salinity of Colorado River water used by the Imperial Irrigation District from about 600 mg/l to about 300 mg/l, and as a result, over time, the salinity of the New River and Alamo River waters entering the Salton Sea should also decrease significantly.

The distillation desalination process is a zero-liquid-discharge process with the outputs being distilled water and salts and minerals. Through a sequential distillation process, different salts will precipitate and be removed at different stages, some of which may have commercial value. A three-mile conveyor system will deliver the solid materials to the Union Pacific Railroad siding near the

turnoff to the Niland Marina Road. The UP Railroad would be contracted with to transport the solid material to markets and disposal sites.

**Phase 2 – Colorado River Desalination Business Plan:** The Lower Colorado System now delivers about 9.5 MAF/year to water users in the United States and Mexico. The sustainable supply at Hoover Dam is about 8.4 MAF/year, leaving a “structural water supply deficit” of about 1.1 MAF/year. Resolving this deficit is the objective of this part of the proposed Project.

When the Central Arizona Project (CAP) was authorized by the Congress in 1968, it was widely recognized that there was not enough water in the Colorado River to meet future demands. Accordingly, studies of augmentation were authorized but no project was identified. Also, Section 202 of P.L. 90-537 stipulates that:

“The Congress declares that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River *constitutes a national obligation* which shall be the first obligation of any water augmentation project planned pursuant to section 201 of this Act and authorized by the Congress.” *(Emphasis Added)*

Accordingly, the business plan for this portion of the Project contemplates the United States funding the cost of the desalination and exchange/delivery systems. The form of federal legislation would be developed during the two-year Feasibility Study and Environmental Review period.

**Relations with Mexico:** An important component of the Project will be providing an appropriate quid-pro-quo for Mexico for allowing diversion and delivery of Gulf water to the Salton Sea. Augmentation and eliminating the structural water supply deficit on the Lower Colorado River will be a significant benefit to Mexico, which agreed in Minute 323 to share Colorado River shortages with water users in the United States. This agreement is a long-term insurance policy for Mexico and will not provide any immediate benefit. Therefore, some immediate asset transfer to Mexico is needed. Accordingly, the Project would include a commercial sale of 100,000 AF/year IID water conserved by lining the East Highland Canal. This water could be delivered to Mexicali from the All American Canal or to another location agreed to with Mexico.



**Relationship with Upper Basin States:** Section 202 of P.L. 90-537 stipulates:

“SEC. 202. The Congress declares that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation which shall be the first obligation of any water augmentation project planned pursuant to section 201 of this Act and authorized by the Congress. Accordingly, the States of the Upper Division (Colorado, New Mexico, Utah, and Wyoming) and the States of the Lower Division

(Arizona, California, and Nevada) shall be relieved from all obligations which may have been imposed upon them by article III(c) of the Colorado River Compact so long as the Secretary shall determine and proclaim that means are available and in operation which augment the water supply of the Colorado River system in such quantity as to satisfy the requirements of the Mexican Water Treaty together with any losses of water associated with the performance of that treaty: Provided that the satisfaction of the requirements of the Mexican Water Treaty (Treaty Series 994, 59 Stat. 1219), shall be from the waters of the Colorado River pursuant to the treaties, laws, and compacts presently relating thereto, until such time as a feasibility plan showing the most economical means of augmenting the water supply available in the Colorado River below Lee's Ferry by two and one-half million acre-feet shall be authorized by the Congress and is in operation as provided in this Act.

Therefore, when the Colorado River is augmented by 2.5 MAF/year., "the States of the Upper Division (Colorado, New Mexico, Utah, and Wyoming) ... shall be relieved from all obligations which may have been imposed upon them by article III(c) of the Colorado River Compact..." Thus, the Upper Basin States that now must deliver half of the Mexican Treaty obligation (750,000 AF/year) will be relieved of that obligation and be allowed to further develop their Upper Basin Compact entitlement.

**Lining the East Highline Canal:** The lining of the canal will conserve up to an estimated 100,000 AF/year of conserved water. It is proposed that 100,000 AF/year be offered for sale to Mexico by IID on a commercial basis so that it can be delivered in addition to Mexico's 1.5 MAF/year treaty entitlement. A phased delivery schedule may be considered to match the Project implementation schedule.

The Mexico Section of the International Boundary and Water Commission (IBWC) has suggested that a new Minute to the treaty be developed to memorialize the Project relationships and responsibilities among various stakeholders. Accordingly, such a draft Minute will be prepared during the two-year Feasibility Study and Environmental Review development period.

**Implementation Schedule:** The distillation Facility is being designed to operate with the Salton Sea at or above elevation -225. Since this would occur in about 2025, construction of the Phase 2 facilities would be scheduled in the 2022 to 2025 period. During the 2019-2021 period, modeling, design and pilot project demonstration of the proposed distillation facility will be conducted.



### 3 PLANNING AND DESIGN PROCESS OF THE PROJECT

*Planning and Design Process of Project – Describe the planning process completed to date and detail how the planning process will be completed.*

The planning and design process for the project began in 2014 with development of the initial project configuration. As presented on February 24, 2016, to a gathering hosted by Assistant Secretary Wilcox, the concept presentation included development of a deep-water port in the Laguna Salada with a set of locks and a dam. It also included delivery of Gulf water to the Salton Sea and a return canal to return salt concentrate to the Gulf at a location south of San Felipe. With feedback from various interests, the locks, dam, port facility and return of salt concentrates to the Gulf were removed from the plan. This left the accumulation of salts in the Salton Sea needing to be resolved.

After calculating the volume of water (and salt) that would need to be removed from the Sea to maintain a sustainable salt balance in the Sea, it was observed that the volume approached the quantity of water needed to address the structural water supply deficit in the Lower Colorado River Basin. In the process of evaluating various locations for the desalination facility, it was determined that a site at the end of the East



Highline Canal, at the terminus of the Niland Marina Road closest to the Coachella Canal and near a siding on the UP Railroad addressed most siting issues. Some plans included a peaking forebay in Mexico at the north end of the Laguna Salada, but that reservoir was moved to the West Mesa and near to the Salton Sea to reduce canal costs. The current configuration was then finalized, hydrologic and energy balances completed with cost estimates and preliminary identification of environmental issues completed.

Section 202 of P.L. 90-537 stipulates:

“That the satisfaction of the requirements of the Mexican Water Treaty (Treaty Series 994, 59 Stat. 1219), shall be from the waters of the Colorado River pursuant to the treaties, laws, and compacts presently relating thereto, until such time as a feasibility plan showing the most economical means of augmenting the water supply available in the Colorado River below Lee’s Ferry by two and one-half million acre-feet shall be authorized by the Congress and is in operation as provided in this Act.”

The diversion of 2.5 MAF/year of water from the Gulf and the use of that water to restore the Salton Sea and augment the Colorado River appear to satisfy that mandate.

The planning process has also included extensive consultation with the California Natural Resources Agency, U.S. Bureau of Reclamation, Imperial Irrigation District, the Coachella Valley Water District and the U. S. and Mexico Sections of the International Boundary and Water Commission. We have also had preliminary discussions with the Pacific Institute and the Salton Sea Authority.

## 3A PROJECT FEASIBILITY

*Project Feasibility – Documentation of the engineering feasibility of the project. Documentation should include at a minimum: system capacity; pumping requirements; channel and pipe size; water quality; other associated infrastructure such as desalinization, fish or trash screens, etc.; and expected energy use.*

### Engineering Feasibility

Engineering Feasibility of the Project is demonstrated by facility layout on topographic maps, including time-tested facilities such as canals, tunnels and pumping/power plants; inclusion of facilities to address environmental issues; use of renewable energy at the only pumping plant (avoiding power line construction in a sensitive area) and anticipating use of a desalination process that has no liquid discharge and relies on natural gas for needed heat and electric energy.



**Appendix B** includes the plan and profile topographic maps for each of the Project facilities as well as cross-sectional drawings of various canal reaches and facilities. The cross-sectional drawings also include the hydraulic characteristics (slope, area, velocity, etc.) of the various canal reaches.

Note that Appendix B referenced above does not include detail on the proposed distillation process which we consider to be proprietary. We are prepared to discuss those concepts with the evaluation team.

### Economic Feasibility

**Phase 1.** The Salton Sea restoration component is estimated to cost about \$2 billion dollars, including land acquisition and environmental compliance/mitigation, and would have an annual O&M cost of about of about \$8 million per year. As to the benefits of Phase 1, they can be compared to the early plan advanced by the State of California with a cost of \$9 billion. Another measure of benefits could be expressed as avoided damages. The Pacific Institute has suggested that the present worth of such damages would be in the \$50 billion or more range. The peaking power

produced at the hydro-drop (225') into the Salton Sea would generate about 205,000 MWH/hours per year and at a value of \$50 per MWH/hour would have a value of about \$10 million per year.

Other benefits would be expected, including construction and O&M jobs in the disadvantaged areas of Imperial County and Baja, California, improved air quality, recreation opportunities, and fish and wildlife enhancement. As a part of the proposed feasibility study, a more complete evaluation of costs and benefits in both the United States and Mexico would be developed.

***Phase 2.*** Desalination of water from the Salton Sea and its use to augment the Colorado River by 1.9 MAF/year is estimated to cost about \$1 billion with annual OM&R costs of \$42 million per year.

### **Environmental Feasibility**

In configuring the Project, care has been taken to avoid, where feasible, sensitive environmental areas. For example, no Indian Reservation lands are used and the U.S. Navy bombing ranges on the West Mesa of Imperial County are avoided. In addition, the water imported from the Gulf will be screened with a 1-mm traveling screen located in the mouth of the tunnel passing under the International Boundary and water in the tunnel will be sterilized with Ozone, thus preventing any biota transfer between the two nations.

Some sensitive environmental areas could not be avoided. These include, but are not limited to, the canal crossing of the Alto Golfo de California Biosphere Reserve at the north end of the Sea of Cortez, the lining of the East Highline Canal where the existing seepage sustains some valuable habitat as well as the new canal alignment, re-regulating reservoir, penstock and power plant on the West Mesa, all of which are in areas populated by the flat-tailed horned lizard. Desert tortoise habitat will be crossed by the canal in both Mexico and the United States. During the proposed Feasibility Study, our team of environmental scientists may identify other areas of environmental concern.

In developing the Environmental Review, the GEI team will consult with resource agencies and interest groups in the United States and Mexico to identify procedures to mitigate all significant environmental impacts. Therefore, when the draft Environmental Review is presented for approval it will include strategies to mitigate all significant environmental impacts, confirming the environmental feasibility of the Project.

We will also undertake to inventory and recognize all of the significant environmental benefits of the proposed Project. For example, restoring the Salton Sea to full volume and reduced salinity will provide tremendous environmental benefits ranging from air quality and public health locally and regionally, to high quality habitat for endangered species and the full host of migratory bird species that have come to depend upon this area as a critical link in the Pacific Flyway, a benefit which extends to State, national and international interests. Resolution of the Lower Colorado River Basin structural water supply deficit will also avoid a wide range of environmental impacts that may otherwise be incurred as each of the seven basin states and Mexico independently implements myriad projects to enhance and improve reliability of their water supplies, including additional dams and reservoirs, over-pumping of groundwater, and desalination of brackish groundwater. Finally,

through mitigation measures to be explored, we believe we can develop opportunities to provide additional water that can be applied for some level of restoration of the Colorado River delta.





## 3B WATER SOURCE IDENTIFICATION

---

*Water Source Identification – Either provide documentation from the water rights holder that establish the willingness of the water rights holder to allow use of their water right or provide a detailed description of the process to establish those rights.*

### **Water Source Identification**

The source of water for the Project is the Gulf of California (Gulf), sometimes called “The Sea of Cortez.” In consultation with the Commissioner of the Mexico Section of the International Boundary and Water Commission, we learned that a “water right” to divert water from the Gulf of California would be included with the permission to build all necessary facilities in Mexico. IBWC and CONAGUA would take the lead in obtaining these permissions from various entities within Mexico. As suggested by Mexico IBWC Commissioner Salmon, all necessary actions of various agencies in the United States and Mexico would be identified and scheduled in a new Treaty Minute supporting the Project. The form of this Minute would be developed during the Feasibility Study.

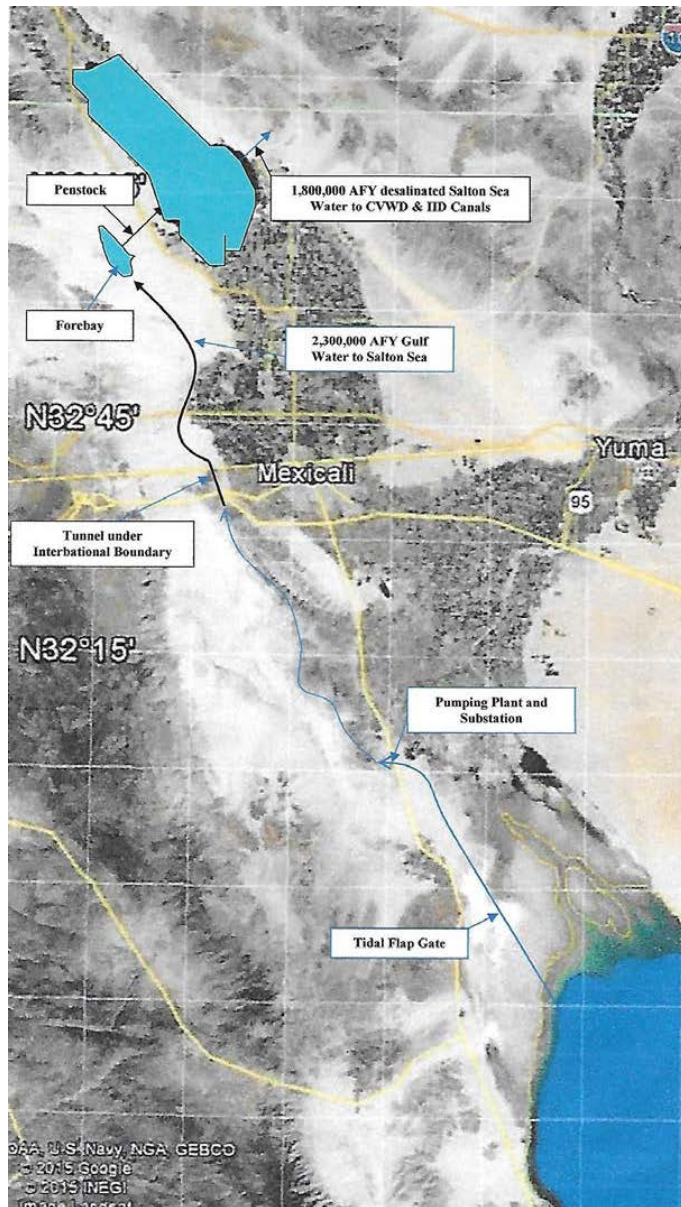
## 3C LAND USE

*Land Use – Provide project route alignment and status of land use permission for the conveyance route both in the United States and in Mexico.*

### Land Use

Land Use Project facilities have been sited, to the extent possible, on lands owned by the governments of the United States and Mexico and on land owned and controlled by the Imperial Irrigation District. However, some lands where facilities would be located, such as on the West Mesa and at the desalination site may be encumbered with private ownership. We do not anticipate encumbering any privately-owned properties in Mexico. Appendix B includes the detailed route maps and preliminary engineering drawings.

The first step in the land acquisition process would be to seek landowner permission to enter the property for biological, cultural and geotechnical suitability study. Once facility location and alignments are finalized, title searches would be conducted, and purchase and relocation costs would be negotiated. Once the environmental documents have been certified, the Treaty Minute has been completed, and other Presidential Permits or legislative approvals have been obtained making funds available, acquisition of needed lands and rights of way will be completed.



## 3D ENVIRONMENTAL IMPACT

***Environmental Impact** – Provide information on any anticipated environmental impacts from the project in both Mexico and the US and how those will be generally mitigated. This should include a discussion of any anticipated impacts to existing surface water use, groundwater basins, and wildlife resulting from the introduction of ocean water to existing, or new, river channels or canals. If the project is proposed within the Alto Golfo de California Biosphere Reserve, please identify any anticipated impacts to that area and expected mitigation measures.*



### **Environmental Impact and Mitigation Strategies**

It must be emphasized that the entire Project constitutes a comprehensive environmental mitigation solution to the very substantial environmental effects on the Salton Sea, the Pacific Flyway, and the entire Colorado River Basin. As noted above, restoring the Salton Sea to full volume and reduced salinity will provide tremendous environmental benefits ranging from air quality and public health locally and regionally, to high quality habitat for endangered species and the full host of migratory bird species that have come to depend upon this area as a critical link in the Pacific Flyway, a benefit which extends to State, national and international interests. Resolution of the Lower Colorado River Basin structural water supply deficit will also avoid a wide range of environmental impacts that may otherwise be incurred as each of the seven basin states, Indian Tribes, and Mexico independently implement myriad projects to enhance and improve their water supplies, including additional dams and reservoirs, over-pumping of groundwater, and desalination of brackish groundwater. Finally, through mitigation measures to be explored, we believe we can develop opportunities to provide a volume of Gulf-water that can be applied for some level of restoration of the Colorado River delta.

In configuring the Project, care has been taken to avoid, where feasible, sensitive environmental areas. For example, no Indian Reservation lands are used and the U.S. Navy bombing ranges on the West Mesa of Imperial County are avoided. In addition, the water imported from the Gulf will be screened with a 1-mm traveling screen located in the mouth of the tunnel passing under the International Boundary and water in the tunnel will be sterilized with Ozone, thus preventing any biota transfer between the two nations. The entire water conveyance system will be lined preventing seepage that could impact surrounding groundwater basins.

Some sensitive environmental areas could not be avoided. These include, but are not limited to, the canal crossing of the Alto Golfo de California Biosphere Reserve at the north end of the Sea of Cortez, the lining of the East Highline Canal where the existing seepage sustains some valuable habitat as well as the new canal alignment, Re-regulating Reservoir, Penstock and Power Plant on the West Mesa, all of which are in areas populated by the flat-tailed horned lizard. Canal segments in Mexico and the United States will also cross desert tortoise habitat.

On a recent GEI Team visit to the area of the Alto Golfo de California Biosphere Reserve, where the intake canal would be located, it was observed that very little vegetation exists. Therefore, the impact would largely be associated with loss of the 35-mile long, 400-foot wide right-of-way (approximately 1,700 acres) needed for the canal. A likely mitigation strategy would be to purchase additional acreage of concession rights to properties adjacent to the Reserve and add those properties to the Reserve. Another mitigation concept could involve bringing additional Gulf water through the intake canal and using that water to hydrate tributaries that start near Project facilities, including The Old Man River.

In developing the Environmental Review, the GEI team will consult with resource agencies and interest groups in the United States and Mexico to identify procedures to mitigate all significant environmental impacts. Therefore, when the draft Environmental Review is presented for approval it will include strategies to avoid, minimize, or offset all significant environmental impacts, confirming the environmental feasibility of the Project.

### **Environmental and Related Benefits of the Proposed Plan**

The proposed Project described herein is a comprehensive environmental mitigation program that includes: 1) conveyance of ocean water from the Gulf of California north to the Salton Sea for refilling and restoring the Sea, 2) desalination of Salton Sea water to produce fresh water that can be blended for use in the Imperial Irrigation District and Coachella Valley Water District offsetting each district's need to take full delivery of its Colorado River supplies from Lake Mead 3) water can then be made available to other entitlement holders in the Lower Basin States and Mexico (California, Arizona, Nevada, Mexico and the Indian Tribes). Pursuant to Section 202 of P.L. 90-537, the Upper Basin States of Colorado, New Mexico, Utah and Wyoming would also benefit as the delivery obligation at Lee Ferry would be reduced from 8.25 MAF/year to 7.50 MAF/year, thus allowing those Upper Basin States to use more of their Compact entitlement.

***Benefits of the Proposed Plan:*** The proposed Project described herein is a comprehensive environmental mitigation program that includes Salton Sea restoration to conditions approximating

those that existed in the 1960s-1970s, with the Sea sustained at -225 elevation, water quality that can support a thriving population of tilapia, and ocean fish species such as corvina and orange roughy, as well as the endangered pupfish. Conditions at the Sea would be at a premium value for the resident species and migratory birds that have come to rely upon the Sea as a critical segment of the Pacific Flyway, including numerous threatened and endangered species.

The shoreline would be completely submerged, eliminating the pending public health threat posed by an emissive exposed playa. Current odor conditions and frequent mass fish die-offs will be drastically improved or eliminated, and the Sea would be suitable for boating, fishing and related recreational activities. Finally, with the Sea intact, and full entitlements secured for the adjoining agricultural districts, the agriculture to urban water transfers that have been undertaken pursuant to the Quantification Settlement Agreement (QSA) would be secure, ensuring that Southern California's coastal cities have adequate water without placing extra pressure on water supplies from Northern California. Securing the QSA supplies is a critical feature of the proposed Plan, contributing to statewide water supply security.

The comprehensive environmental mitigation program also includes total resolution of the "structural deficit" of water supplies within the Lower Colorado River Basin, ensuring availability of full entitlements and drastically reduced shortage risk to each of the seven basin states, the Indian Tribes, and to Mexico. This includes all of the environmental benefits to the river fisheries, aquatic and riparian habitat, and related recreational uses of the river and its reservoirs. Resolving the structural deficit may also make greater water available for pulse flows that can contribute to restoration of the Colorado River Delta.

Further, under the laws governing allocations of the river between the Upper Basin States (Wyoming, Colorado, Utah and New Mexico) and Lower Basin States, when the Colorado River below Lee's Ferry is augmented by 2.5 million-acre feet per year, the Upper Basin deliveries at Lee Ferry to satisfy half of the Mexican Treaty obligation under the Colorado River Compact will no longer be required. Accordingly, with implementation of the Project, releases from Lake Powell can be reduced, thus directly benefiting the Upper Basin states in securing their Compact entitlements.

If, and when, higher yields or surplus conditions occur again on the Colorado River, the augmentation program would be reduced. Diversion from the Gulf would be reduced to the quantity needed to maintain the Salton Sea and the desalination system product water would be adjusted accordingly.

***Beneficiaries of the Proposed Plan:*** This comprehensive environmental mitigation program for Salton Sea restoration and full Colorado River augmentation provides benefits to a wide variety of parties and interests directly and indirectly. The full inventory of beneficiaries and expected supporters is extensive, but should include all of the following:

- State of California and Northern Mexico, with significant benefits addressing public health, statewide water security, critical habitat, and environmental quality throughout Southern California.

- All water users that rely in full or in part on the Colorado River, including all of the upper and lower basin states in the U.S., Indian Tribes, and Mexico.
- All involved resource agencies, including but not limited to the California Natural Resources Agency, California Department of Fish and Wildlife, the Imperial Valley Air Quality Management District, Salton Sea Authority, U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, International Boundary and Water Commission, and others.
- All private environmental advocate interests, including all of the non-governmental organizations that have collectively been working on Salton Sea, Colorado River and Colorado River Delta solutions for decades.
- The Pacific Flyway, a major migratory corridor that extends from Canada through the western United States, to all Central American countries and South America.

There are no parties adversely affected with this comprehensive mitigation plan, and with mitigation for impacts associated with the environmental footprint of the conveyance system, desalination plant, and related electrical power systems, the environmental trade-offs are relatively minimal. This is particularly true when compared to the environmental impacts associated with long-term Salton Sea management plans that do not include restoration of the Sea, or any resolution of Colorado River shortages. The time for comprehensive action is now.



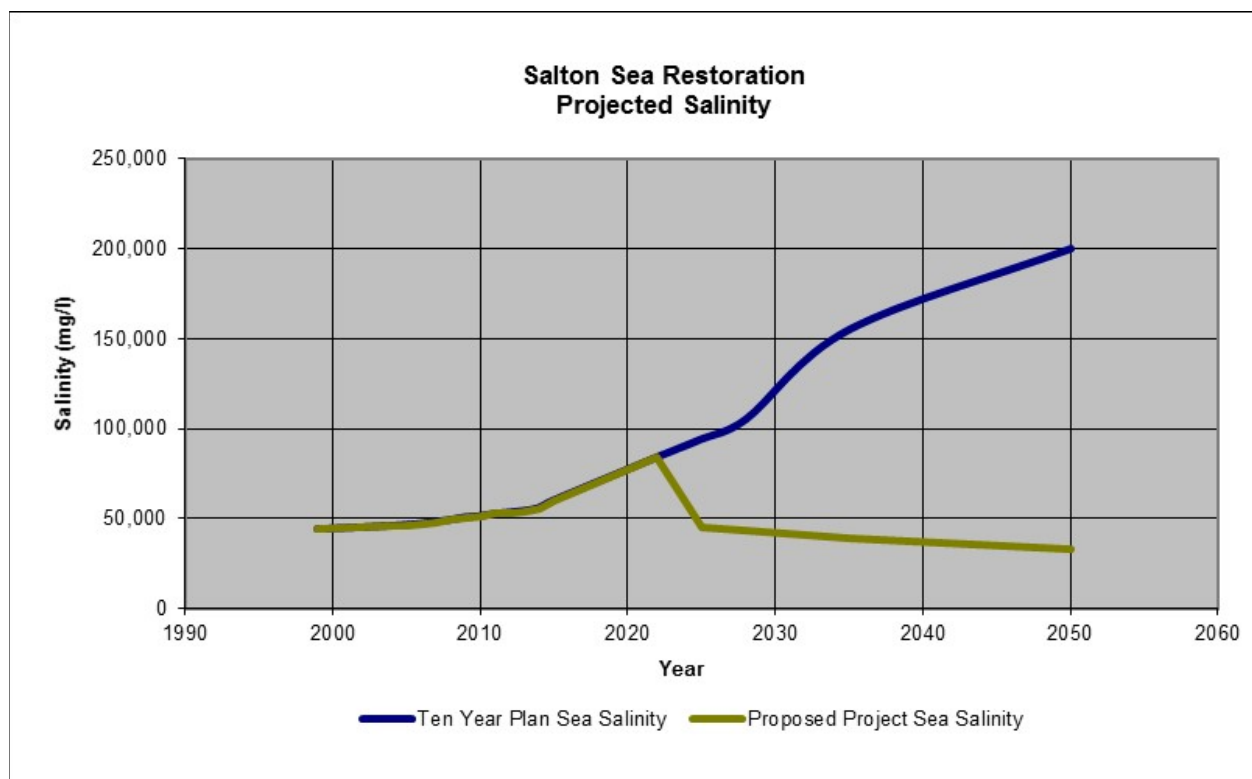
## 3E SALTON SEA SALINITY, ELEVATION, AND BRINE DISPOSAL

*Salton Sea Salinity – How does the project plan to deal with increased salinity at the Salton Sea from the imported ocean water? If the proposed project includes a desalinization system, where will the resulting brine be deposited?*

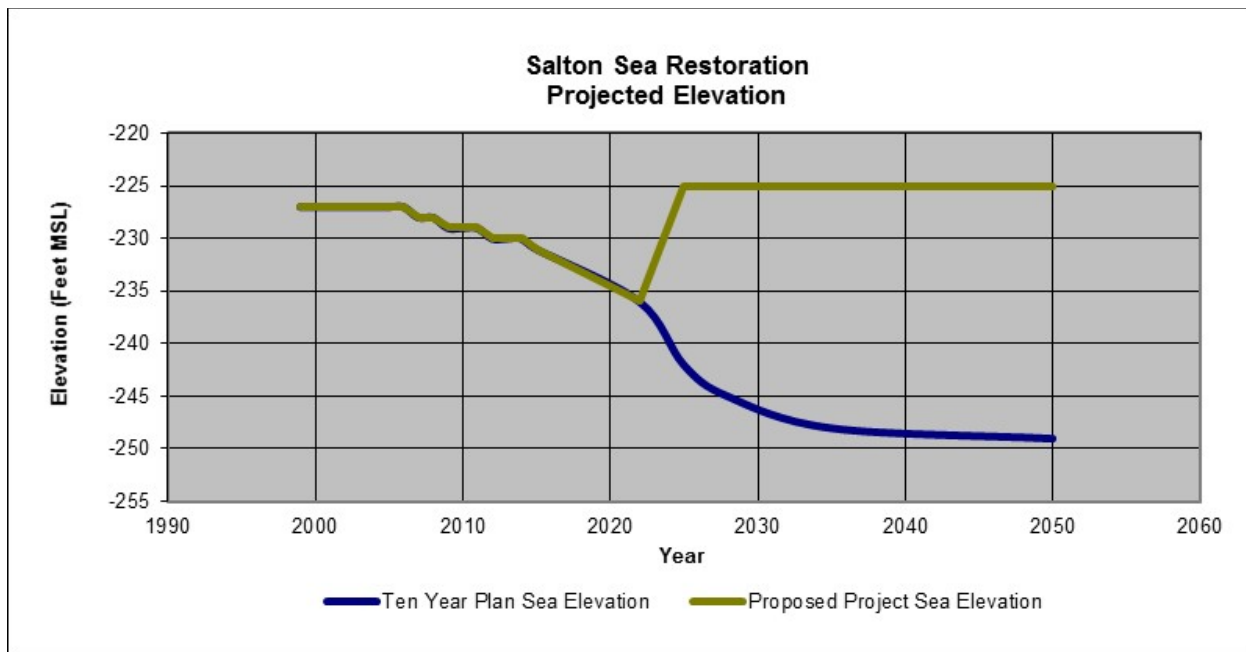
### Salton Sea Salinity

The dilution effect of the Gulf water would bring the Salton Sea salinity to about 50,000 mg/l by 2025. The Salton Sea salinity would continue to decline over a period of several years to a steady state of about 39,000 mg/l, which is the blend of the salinity of Gulf water and waters from the New, Alamo and Whitewater Rivers.

The salinity of the Salton Sea with and without the Project is displayed in the following graphic.



The elevation of the Salton Sea with and without the Project is displayed in the following graphic.



**Brine Disposal:** The proposed desalination facility uses a proprietary distillation desalination process that is a zero-liquid-discharge process with the outputs being distilled water, salts and minerals. Therefore, no brine is produced. Through a sequential distillation process, different salts and minerals will precipitate and be removed at different stages, some of which may have commercial value. A three-mile conveyor system will deliver the solid materials to the Union Pacific Railroad Siding near the turnoff to the Niland Marina Road. The Union Pacific Railroad would be contracted with to transport the solid material to markets and disposal sites.



## 3F WATER USE

*Water Use – Describe the projected water balance including consumptive use, system loss, evaporation etc. and ability of the proposed project to operate successfully with decreased flows.*

### Water Use

The Project proposes to divert 2.5 MAF/year from the Gulf of California into the Salton Sea. The water will be used in the following ways:

<b>Water Budget Component</b>	<b>Acre-Feet per Year</b>
<b>Salton Sea</b>	
Delivery from Gulf	2,500,000
Offset Salton Sea Inflow due to QSA	(500,000)
Delivery of Blended Salton Sea and Gulf water to Desalination	<u>2,000,000</u>
<b>Desalination Facility</b>	
Delivery of Blended Salton Sea and Gulf water to Desalination	2,000,000
Delivery to IID/CVWD canals for exchange in Lake Mead	(1,800,000)
Commercial delivery of water to Mexico	(100,000)
Losses allowance	(100,000)
Net	<u>0</u>
<b>Colorado River</b>	
Offset Salton Sea Inflow loss due to QSA	500,000
Delivery to IID/CVWD canals for exchange in Lake Mead	<u>1,800,000</u>

There will be miscellaneous losses and seepage from various facilities when in actual operation. During the feasibility study, the extent of miscellaneous losses/seepage will be quantified, and a detailed water budget will be developed.

## 3G CROSS BORDER GOVERNMENTAL COORDINATION

*Cross Border Governmental Coordination and Permitting – Provide details of conducted or needed coordination and permitting from governmental agencies from both Mexico and the United States that deal specifically with cross border project development. Agencies include but are not limited to the International Boundary Water, Commission, Mexico federal agencies, tribal governments, and necessary United States agencies.*

### **Cross Border Governmental Coordination and Permitting**

Over the past three years members of the GEI team have briefed representatives of various governmental agencies on various aspects of the project.

#### **Key briefings have been with:**

- February 14, 2018 – Briefing in Ontario, California for Colorado River Board of California
- February 9, 2018 – Briefing in Palm Springs, California for Urban Water Institute
- February 7, 2018 – Briefing in Mexicali for Commissioner Salmon (Mexico) & Commissioner Drucina (U.S.) and their staffs of IBWC
- December 15, 2017 – Briefing in Las Vegas, Nevada for Michael Cohen of Pacific Institute
- December 14, 2017 – Briefing in Las Vegas, Nevada for Bureau of Reclamation; Commissioner Brenda Burman and Lower Colorado Regional Director Terry Fulp
- December 14-15, 2017 – Informal Briefing in Las Vegas, Nevada for Commissioner Salmon (Mexico) and Commissioner Drucina (U.S.) and their staffs of IBWC
- Various Dates in 2015, 2016, and 2017 – Briefings for IID (Board Presentation on October 3, 2017), Members of Imperial County Board of Supervisors, Assistant Secretary Wilcox and others



The purpose of these briefings has been to make the agencies and individuals aware of the proposed project and seek guidance regarding needed changes and additions/deletions to the Project Plan. Valuable insights were received, and many changes were incorporated into the Project plan. No endorsements were sought or received, but importantly, no party on either side of the border rejected the proposed plan or indicated unwillingness to pursue it through the feasibility study.

## 3H PROJECT DEVELOPMENT SCHEDULE

*Project Development Schedule – Schedule for project development from current stages through implementation.*

### Project Development

A detailed schedule of major activities is provided in **Appendix C**. Key activities and completion dates are as follows:

<u>Activity</u>	<u>Completion Date</u>
<b>Phase 1 Activities:</b>	
• Submittal of proposals	03/09/2018
• Selection of winning proposal	06/01/2018
• Award of feasibility study/implementation contract	07/01/2018
• Enactment of State funding authorization	12/30/2018
• Completion of 24-month feasibility study & ER	06/30/2020
• Concurrent 20-month design and specifications – Phase 1	06/30/2020
• Complete required approvals and award of construction contracts	09/01/2020
• Phase 1 Construction Completion and Start-up	09/01/2022
• Complete Salton Sea Re-fill	09/01/2025
<b>Phase 2 Activities:</b>	
• Design calibration for distillation facility	08/01/2018 to 12/30/2018
• Passage of Federal legislation	12/30/2019
• Availability of Federal Appropriations	10/01/2020
• Complete designs of Phase 2 facilities	12/01/2022
• Completion/start-up of Phase 2 facilities	12/31/2025
• Colorado River augmentation of 1.8 MAF	Calendar year 2026

## 4 COST PROJECTIONS

---

***Cost Projection** – Provide a cost projection for the proposed project. The projection should be documented to the extent that the reviewers can review the cost projection process and determine the validity of the projections.*

### **Cost Projection**

**Appendix D** includes pre-feasibility engineering cost estimates for all project facilities, prepared using topographic maps and other available electronic media. The estimates include appropriate allowances for unlisted items and contingencies, conforming to industry cost-estimating standards.

- **Phase 1** facilities are expected to have a capital cost of about \$2 billion and an OM&R cost of about \$8 million per year.
- **Phase 2** facilities are expected to have a capital cost of about \$1 billion and an OM&R cost of about \$42 million per year.

Facility layouts, designs and cost estimates have been developed using the judgment of professionals having many decades of experience with similar large-scale water conveyance and desalination projects. During the proposed feasibility study, alternative locations and sizing of facilities will be considered to determine the most cost-effective and environmentally benign project plan that can then be implemented.

## 5 PLAN FOR FUNDING OF PROPOSED PROJECT

*Plan for Funding of Proposed Project – Describe how the planning, design and construction implementation of the project will be funded. Identify the responsible parties for the operation and maintenance for the project and estimate annual cost.*

### **Plan for Funding of Proposed Project**

**Phase 1** – Construction of Phase 1 facilities is expected to cost about \$2-billion dollars. Based upon the QSA legislation enacted by the State of California in 2003, it is assumed that the capital cost of constructing Phase 1 facilities will be borne by the State of California. Some funding is already available for implementing the Ten-Year Plan and other funds are anticipated from a proposed bond issue that will be considered by the electorate later this year. It is recommended that a part of these available funds be used to fund the cost of the proposed feasibility study and environmental Review.

On a long-term basis, however, reliance upon the State legislature to provide State approval of the Project and make available funding through the annual appropriation process would not provide the assurance needed by contractors to complete the Phase 1 work on a timely basis. The urgency of the potential regional health crisis and impending Colorado River shortages will not wait for the potential delays caused by a start and stop funding process. Accordingly, it is proposed that the State of California authorize the Project and enact a “Continuing Appropriation” of \$3 billion for implementation of Phase 1 and for pre-construction activities on Phase 2.

**Phase 1 OM&R Costs** – As the operator of Project facilities constructed in the United States, the IID will receive the peaking power developed by the hydro-plant where 2.5 MAF/year of Gulf water is dropped about 225 feet into the Salton Sea. The value of this power (\$10 million per year) plus revenue from the sale of water from the desalination facility should equal or exceed the OM&R cost of facilities in the United States and Mexico. To fund OM&R costs of facilities in Mexico, a form of agreement between IID and the appropriate agency in Mexico (likely CONAGUA) would be developed during the feasibility study

**Phase 2** – Construction of Phase 1 facilities is expected to cost about \$1 billion. As previously mentioned, the Colorado River Basin Project Act (P. L. 90-537) at Section 202 declared

*“that the satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation”*

Furthermore, Section 204 of P. l. 90-537 states:



*“SEC. 204. There are hereby authorized to be appropriated such sums as are required to carry out the purposes of this title.”*

Accordingly, the cost of implementing Phase 2 should be borne by the Federal Government.

Therefore, it is recommended that the State of California and the other Basin States and Mexico, with the GEI Team, approach the Secretary of the Interior with a request that:

1. Funding be included in the President’s FY 2020 budget for implementation of Phase 2 facilities; and
2. The Secretary, with the assistance of the Bureau of Reclamation, submits a report to the Congress describing the proposed augmentation project and seeking congressional authorization of said plan.

When Federal funding becomes available, any Phase 2 costs previously advanced by the State of California should be returned to the State.

# APPENDIX A – KEY STAFF RESUMES

---

## Marc Rozman, P.E.

Vice President, Program Manager



Marc Rozman is a registered civil engineer with almost three decades of experience in water, wastewater, reclaimed water, and drainage facility design and construction. Areas of expertise include hydraulic analyses, civil/site engineering, and the design/construction of pipelines (including force mains, trunk and interceptor sewers, and transmission mains), pumping stations (lift stations and booster pumping stations), and treatment facilities (water treatment plants, and secondary and tertiary wastewater treatment plants).

### RELEVANT PROJECT EXPERIENCE

**East Porterville Water Supply, California Department of Water Resources, Porterville, CA.** Project manager of the design team and engineer-of-record for the water pipeline design and appurtenant structures for the Phase 1 work. The work consisted of expanding the City of Porterville's East Porterville Booster Pump Station (adding vertical pump, motor, VFD, piping, valves and appurtenances, electrical, and controls), constructing 12 miles of potable water pipelines (8-inches to 18-inches), connecting 320 water services and restoring road pavement sections. Oversaw the team that reviewed site conditions; collected utility data; coordinated utility investigation work; participated in stakeholder document review meetings; prepared calculations, drawings, specification, cost estimates; reviewed calculations, drawings, specifications, cost estimates; responded to RFI's; reviewed submittals; prepared record drawings. The project was brought from conception to final design in less than five months and the construction was completed in less than eleven months from the commencement of planning and design.

**Bear River Setback Levee, Three Rivers Levee Improvement Authority, Yuba City, CA.** Project manager overseeing the construction management team. The project primarily consisted of over 9000 feet of slurry wall installation to a depth up to 70 feet deep. The foundation for the future 30 foot high levee embankment was also constructed. Additional project components included: irrigation pipeline relocations, site drainage management, relief well installation and well abandonment. The contract was awarded in September, 2005 and the slurry wall had to be completed by the end of October of the same year. The Contractor worked double shifts during the week and single shifts on Saturday and Sunday to meet the schedule requirements. Oversaw inspection of all the Contractor's activities, including the slurry wall and foundation work to assure that the work was completed as required. Also oversaw the construction management of the Contractor's activities and administered the contract requirements. The future levee foundation work was added as a contract change order to facilitate the future levee construction.

### EDUCATION

B.S. Civil Engineering, Oregon State University

### EXPERIENCE IN THE INDUSTRY

33 years

### EXPERIENCE WITH GEI

14 years

### REGISTRATIONS AND LICENSES

Professional Engineer, CA No. 42862



Diligently monitored and documented the Contractor's activities for this work and then was the primary negotiator for the final change order amount.

**Antelope Valley Groundwater Banking Program, Semitropic-Rosamond Water Bank Authority, Antelope Valley, CA.** Project manager and engineer of record for the design and construction management of the AVWB Initial Recharge and Recovery Facility Improvement Project. A total of \$5M in grant funds were secured from the Bureau of Reclamation (2009 American Recovery and Reinvestment Act) for the development of the AVWB project. Total Project costs were \$10.8M which included construction of project elements that will deliver water for recharge and recovery into local and regional conveyances using existing and new recovery wells. Facilities developed under this contract included 160 acres of recharge basins, four fully equipped recovery wells, 1.5 miles of 54-inch diameter steel pipe for the main transmission line, 1.75 miles of well discharge pipeline that varies from 18 inches to 48 inches, and a tie-in connection, with a magnetic flow meter and flow control valve, to the Antelope Valley East Kern Water Agency (AVEK) 60-inch West Feeder Pipeline. Also oversaw the design of a turnout with a capacity of 350 cfs off of the California State Aqueduct.

**Baseline Feeder Extension South Pipeline, San Bernardino Valley Municipal Water District, San Bernardino, CA.** Project manager and engineer of record for the design and construction management of the 78-inch diameter welded steel transmission pipeline. The pipeline will ultimately be an integral component of the District's master planned facilities. The City of San Bernardino uses the pipeline for transmission to their distribution system. Western Municipal Water District may utilize a portion of the pipeline capacity for conveyance to their Riverside-Corona Feeder, a planned major transmission pipeline. The project included: roughly 25,000 feet of pipeline, two major creek crossing (one lined and the other unlined), major street crossings, large utility and substructure crossings, right-of-way acquisition, and a railroad crossing. The pipeline's regional use and application mandates close coordination of participating agencies-namely the City of Riverside, the City of San Bernardino and Western Municipal Water District. Due to each of these agencies varied intended use consensus building is a critical project element.

**Forrest Frick Pumping Plant Electrical Upgrades, Arvin Edison Water Storage District, Arvin, CA.** Project manager for the engineering, inspection and construction management for the multiple phased project to modernize the nearly 50-year old pumping station with new electrical equipment and provided existing building upgrade recommendations and design documents to meet current building code requirements (seismic upgrades). The initial phase replaced the old main 115 kV oil-filled circuit breaker with a dead-tank, three-pole SF6 filled outdoor power circuit breaker with three SF6 interrupters. The initial project also included installation of a new 125 VDC battery system. The second phase provided the replacement of the two existing transformers with two new 12.5/15MVA liquid filled substation type transformers, including load tap changers (LTC). The work also included furnishing, testing, delivering, and installing new 5kV Switchgear, 5kV Starters, 115kV Relay Control Panel, PLC Panel, Distribution Panelboards, Power Panelboards, DC Panelboard, DC Battery Charger, Control Building lighting, and all wires and cables.

**Mid-Valley Pipeline and Pump Station, Coachella Valley Water District, Coachella, CA.** Construction manager for the construction of more than 16,500 linear feet of 4-inch thick concrete lining of the Calloway Canal, a trenchless railroad crossing consisting of double barrel 120-inch reinforced concrete pipe and the turnin/turnout connection of the Calloway Canal to the Cross Valley Canal. The facilities have a capacity of greater than 400 CFS. The work was completed utilizing three separate construction contracts. The CVC to Calloway connection and a short interconnecting canal segment were completed in 2013. The railroad crossing was completed in 2014 and the last canal lining contract was completed in 2015. The last concrete lining contract lined more than 12,000 linear feet of canal and included connection to the existing overcrossing of the Calloway Canal over the Friant-Kern Canal.

## Mark S. Williamson, P.E.

Vice President, Principal Engineer

Mark Williamson is a registered civil engineer with 36 years of experience in both the public and private sectors. He has provided civil engineering expertise in numerous aspects of water resources, including hydroelectric, water supply, design, construction management, water distribution system modeling, dam safety, surface and groundwater hydrology, flood control, and project management.

### PROJECT EXPERIENCE

#### **Water Management Planning**

Significant experience managing water supply studies and water source investigations. Client services provided include technical and policy assistance in water supply reliability, conjunctive use and groundwater banking, reservoir system analysis, and regulatory compliance.

- Led the development of an Integrated Regional Water Management Plan for the Eastern San Joaquin Groundwater Basin Authority in 2007, and is the project manager the 2014 IRWMP Update.
- Performed surface and groundwater hydrologic balance of Salton Sea, California, in support of litigation.
- Project manager for completion of the Imperial Integrated Regional Water Management Project.
- Project manager for Coachella Valley Water District Wastewater Master Plan
- Served as the project manager for development and environmental screening of a range of implementable supply and groundwater recharge options for use of San Joaquin County water rights filings as part of the Freeport Element of the American River Utilization Project.
- Managed the Mojave Water Agency's 2005 Regional Water Management Plan Update, a stakeholder-driven process to screen and select the best water management strategy to match projected supplies with forecasted 2020 demands. The Plan was developed to meet the requirements of an Integrated Regional Water Management Plan, a Groundwater Management Plan, and a Regional Urban Water Management Plan. This effort included development of a Programmatic Environmental Impact Report.
- Developed recommendations on long-term water acquisition options for Mojave Water Agency and facilitated a 14,000 acre-foot transfer to the agency.
- Developed groundwater storage and conjunctive use projects to meet projected demands. Project Manager on the San Joaquin County/EBMUD Mokelumne Aquifer Recharge and Storage Project.
- Performed EIR/EIS review of 130,000 acre-foot Pamo Dam and Reservoir for the City of San Diego to determine feasibility of supplying emergency supply to San Diego County.



### EDUCATION

M.S. Civil Engineering, University of Washington

B.S. Civil Engineering, University of California, Berkeley

### EXPERIENCE IN THE INDUSTRY

38 years

### EXPERIENCE WITH GEI

12 years

### REGISTRATIONS AND LICENSES

Professional Engineer, CA No. C035671

### **Hydraulic/Water Supply Studies:**

- Project Manager for assessment of four competing desalination projects in the Monterey Bay area.
- Principal for development of EBMUD's Water Supply Management Program Environmental Impact Report, an alternatives evaluation and integrated resources plan.
- Performed assessment of yield of American and Sacramento rivers to EBMUD using the Bureau of Reclamation's PROSIM model of the Central Valley Project and State Water Project.
- Project Engineer for the Mountain Tunnel Flow Study for the City of San Francisco's Hetch Hetchy Water and Power Department. The project involved the testing and modeling of this 20-mile tunnel to determine the reasons for decreasing flow capacity, and recommending and implementing remedial measures.
- Project Manager for the Balboa and Francisco Reservoirs Needs Assessment for the San Francisco Water Department. Future water demand estimates were updated and incorporated into KYPIPES and LIQSS (Stoner) distribution system models for pressure zones serving 80 percent of the City. Using these models, areas of deficient pressure or storage were identified and solutions formulated using both remedial piping or the presently unused Balboa and Francisco Reservoir sites.
- Project Manager for engineering alternatives analysis for replacement of Hetch Hetchy Reservoir.

### **Water Resource Development Projects**

Responsible for negotiation and development of surface water and groundwater development projects, including groundwater recharge/banking projects and major surface water diversion and conveyance projects.

- Directed technical studies and developed agreements for joint development of the Freeport Water Supply Project by EBMUD and Sacramento County Water Agency. Directed technical studies and developed agreements for joint development of the Freeport Water Supply Project by EBMUD and Sacramento County Water Agency, including participation in Water Forum fisheries management planning.
- Performed environmental analysis of groundwater recharge options for Joshua Basin Water District.
- Performed analysis of local groundwater banking projects for the Kern County Water Agency.
- Performed Indian Public Trust (Winters) water rights quantification, groundwater depletion studies, flooding studies, surface and groundwater hydrology, irrigation and drainage system design, well design, and utility rate studies.

### **Design**

- Design Engineer for the North Stockton Water Pipeline, a nine-mile, 48-inch diameter transmission pipeline for the City of Stockton. Included design of 42- and 30-inch distribution mains. Project included preparation of plans, specifications, cost estimates and bid documents, and acquisition of permits, easements and agreements from more than 20 agencies and utilities. \$8 million construction cost.
- Design Engineer for upgrade and 8 MGD expansion of two 20 MGD, 400-foot lift pump stations on the Whale Rock Water Conduit, San Luis Obispo County.
- Design of Farmington Canal Siphons, three twin bore eight-foot diameter inverted siphons approximately 500, 550 and 1300 feet long, together with intake and discharge structures and related facilities for the Stockton East Water District.
- Oversight for design and construction of groundwater recharge, recovery, and conveyance facilities in San Joaquin County and within the East Bay Plain, California.
- Preliminary design of stream diversion, intake, and pumping facilities for the Coastal Streams Project, San Luis Obispo County.
- Preliminary design of spillway modifications for Salinas Dam, San Luis Obispo County.
- Preliminary design of pipeline and pumping facilities to serve emergency storage reservoirs in San Diego County.

## **MIKE CLINTON, PE**

Michael J. Clinton is the President of Michael Clinton Consulting, L.L.C., a sole proprietorship in Las Vegas, Nevada, where he provides consulting engineering services to clients throughout the southwest. Throughout his entire career, beginning with being a surveyor and inspector during construction of Glen Canyon Dam, its power plant and transmission system, Mike has specialized in the operation of the River, management of its water quality and determination of entitlements to the waters of the Colorado River.

Previously, he served as General Manager of the Imperial Irrigation District, California, where he was responsible for managing one of the largest irrigation districts in the United States and the sixth largest electric utility in the State of California. He oversaw a staff of over 1,000 employees and an annual budget exceeding \$300 million.

From 1987 to 1995, Mike was Senior Vice President of Bookman-Edmonston Engineering in Glendale, California. In that position, he developed and oversaw processing of authorizing legislation, permitting and implementation of client projects throughout the western States.

From 1961 to 1987, Mike was with the United States Department of the Interior – Bureau of Reclamation and Geological Survey.

- 1961 to 1964 – Construction inspector and surveyor during construction of Glen Canyon Dam, Power Plant and Transmission Line Systems;
- 1965 to 1966 – Hydrologic Technician measuring and evaluating stream flow data for the Utah District, USGS;
- 1967 – 1979 – Civil Engineering Technician and Civil Engineer in Reclamation's Salt Lake City, Boulder City and Washington DC Offices; During the 1971 through 1974 period, Mike was Reclamations representative dealing with the International Boundary and Water Commission regarding measures to manage the salinity of Colorado River waters going to Mexico (Helped manage and develop Minutes 218, 241 & 242);
- 1979 to 1984 – Manager of the Federal/State Colorado River Water Quality Improvement Program – Oversaw the implementation of the injection well brine disposal strategy for the Paradox Unit, completion of Meeker Dome Unit and construction of Grand Valley Unit; and,
- 1984 to 1987 – Special Assistant to the Under Secretary of the Department of the Interior – Provided trouble shooting, policy formation and technical guidance for the Office of the Secretary.

Mike holds a B.S. Degree in Civil Engineering from the University of Utah; is a Graduate of the Federal Executive Institute in Charlottesville, VA; is a Fellow and Life Member of the American Society of Civil Engineers and is licensed to practice as a Civil Engineer in Arizona, California, Colorado, Nevada, Utah, Texas, Wyoming and other Western States.

## **Jeffrey G. Harvey, Ph.D.**

**Harvey Consulting Group, LLC**

81776 Corte Valdemoro, Indio, CA 92203

(916) 799-6065 [Harvey-Jeff@sbcglobal.net](mailto:Harvey-Jeff@sbcglobal.net)

Dr. Jeff Harvey has more than 30 years of experience as a consultant in environmental planning and reporting pursuant to requirements of the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), and related permitting. Reports have been prepared for local, state, and federal government agencies, and private developers. Special emphasis has been placed on development of economically sound mitigation strategies, active coordination with agency staff and government decision-makers, and effective public involvement and public testimony. Jeff has organized and managed the preparation of more than 300 environmental impact reports and environmental assessments, and special resource analyses for a variety of projects including water resources, public infrastructure, resource management, power generation, electric transmission, land development, and mining and mine reclamation.

In managing and planning document preparation, Dr. Harvey has streamlined the reporting and regulatory process through development of detailed project objectives and focused identification of issues; effective consultation and liaison with regulatory agency staff and the applicant's representatives; and preparation of concise, organized, and readable reports. He has developed cost-effective mitigation strategies to resolve regulatory issues without impairing project goals, and has prepared long term monitoring criteria to measure successful project implementation.

Dr. Harvey has worked on western water, energy and related natural resources policy issues since 1983, including power plant and hydroelectric power development, water development, management, and planning, and analyses of land and agricultural water use practices and conservation. Special emphasis has been placed on client representation, active coordination with agency staff and government decision-makers, and effective presentations and public testimony. Dr. Harvey also specializes in development of public involvement programs and consensus building through education, information management, and negotiations.

### **Representative Water and Power Projects**

#### ***San Diego County Water Authority 1998-2018***

*Water Transfer Program Consultant* for special projects, including:

- IID Water Transfer EIR/EIS
- QSA EIR/EIS
- Coachella Canal Lining Project
- All American Canal Lining Project
- Salton Sea Ecosystem Restoration Program

#### **Transfer Program Consultant: Quantification Settlement Agreement, Water Transfer Agreement between San Diego County Water Authority and Imperial Irrigation District, and Related Water Conservation and Environmental Mitigation Projects (1998-2008)**

Dr. Harvey has served as the Transfer Program Consultant to SDCWA providing strategy guidance, technical analyses, and policy support for compliance with NEPA, CEQA, and State and federal endangered species acts; and implementation of the Lower Colorado River (LCR)

Basin Quantification Settlement Agreement (QSA). Projects have included the SDCWA/IID Water Transfer, support for development of the QSA and related CEQA documentation, Coachella Canal and All-American Canal lining projects, and technical oversight of elements of the Salton Sea Ecosystem Restoration Program. Tasks have included definition of analytical scope, assistance with scoping and public involvement, agency coordination and consultation, technical review and critique of impact analyses, definition of mitigation requirements and assignment of responsibilities for mitigation, and production of legally defensible draft and final documents. For the water transfer, Dr. Harvey assisted SDCWA in negotiations with the USFWS on Section 7 consultation for the Lower Colorado River, and with CDFG on related California Endangered Species Act consultation.

### **Salton Sea Ecosystem Restoration Program, 2003-2008 and 2015-2018**

As the Transfer Program Consultant to SDCWA, Dr. Harvey worked originally on the Salton Sea Ecosystem Restoration Program EIR, as a technical team member for the air quality impact analyses, and for the cost assessment for Salton Sea mitigation measures that became a part of the QSA. In the past several years, he has worked on assessment of ongoing air quality conditions in Imperial County and the Salton Sea area, and effectiveness of implementation of air quality mitigation measures.

### **Coachella Canal Lining Project - SDCWA and CVWD (2005-2008)**

Dr. Harvey was the assigned Environmental Coordinator for this 33-mile water supply and conservation project funded by the San Diego County Water Authority and the Coachella Valley Water District. The purpose of this project is for the CVWD to conserve water through replacement of an unlined canal with a lined canal and then transfer the conserved water to the SDCWA as part of Lower Colorado River Basin Quantification Settlement Agreement (QSA). Dr. Harvey was responsible for general project oversight and ensuring that construction activities were completed in compliance with the Environmental Commitment Program.

### **All-American Canal Lining Project - SDCWA and IID (2005-2007)**

Dr. Harvey was responsible for monitoring the progress of this project under his role as the SDCWA Transfer Program Consultant. The purpose of this project was to conserve water and then transfer the conserved water to the SDCWA as part of the Lower Colorado River Basin QSA. Dr. Harvey advised the SDCWA on mitigation requirements and costs for construction. Primary issues involved elimination of large mammal safety ridges and conduct of a deer presence investigation, permitting for construction roads, and issues pertaining to threatened and endangered species that could be affected by canal realignment and siting of staging areas recommended as part of final design planning.

### **Oasis Area Irrigation Expansion Project – Coachella Valley Water District Project Environmental Impact Report (2014)**

Dr. Harvey was the Project Manager for the Oasis Project, involving a 20-mile pipeline, three regulating reservoirs, three pump stations and upgraded power system for a water delivery system intended to replace groundwater use with the District's surface water supplies for agricultural irrigation. The EIR focused on biological and cultural resources, as well as traffic

management, noise, and related land use conflicts associated with construction of a long linear pipeline project. Jeff worked closely with the design engineers to develop an alignment that minimizes potential environmental impacts by avoiding sensitive areas and collocating the alignment with existing roads and utility corridors to the greatest extent feasible.

**Program EIR for Regional Water Facilities Master Plan, San Diego County Water Authority (2005 and 2014)**

Dr. Harvey was Senior Project Manager for the Program Environmental Impact Report for the Water Authority's Regional Water Facilities Master Plan (Master Plan). The purpose of the Master Plan is to evaluate the ability of the Water Authority to continue to meet its goals for current plans for water supply and facility improvements, and to recommend new facilities or improvements to existing facilities needed to meet water demands through 2030.

**Eagle Mountain Pumped-Storage Project (1,300 MW), Eagle Crest Energy Company (2007-2018)** Project Director for licensing of a 1,300 MW pumped-storage hydroelectric project located in the western portion of the Chuckwalla Valley in eastern Riverside County, California. Coordination of environmental and engineering teams and strategy development for water supply, water quality permitting, land use right-of-way, biological and cultural resources, and transmission interconnection. License application, Water Quality Certification application, and consultation have been ongoing with the Federal Energy Regulatory Commission, State Water Resources Control Board, Bureau of Land Management, U.S. Fish and Wildlife Service, California Department of Fish and Game, National Park Service, and Bureau of Reclamation.

**Blythe and Palen Solar Power Projects, Solar Millennium, LLC (2011-2013)**

Senior Scientist for coordination of groundwater resources investigations, analyses of the proposed water source in relation to the Bureau of Reclamation's proposed Colorado River Accounting Surface, and development of water offset plans to fulfill mitigation requirements. The Blythe Project is a 1,000 MW solar thermal plant located west of Blythe on the Palo Verde Mesa in eastern Riverside County. The Palen Project is a 500 MW solar thermal plant located in the Chuckwalla Valley, also in eastern Riverside County. Provided oversight and critical review of hydrogeologic modeling conducted by the applicant's consultant. Tasks have also included consultation and negotiations with CEC staff, the Bureau of Reclamation, Bureau of Land Management, Palo Verde Irrigation District, Colorado River Board of California, and testimony for CEC hearings.

**Genesis Solar Energy Project, NextEra Energy Resources, Inc. (2013-2015)**

Senior Scientist for coordination of groundwater resources investigations, analyses of the proposed water source in relation to the Bureau of Reclamation's proposed Colorado River Accounting Surface, and development of water offset plans to fulfill mitigation requirements. The Genesis project is a 250 MW solar thermal project located in the eastern Chuckwalla Valley. Provided oversight and critical review of hydrogeologic modeling conducted by the applicant's consultant from the firm of Worley Parsons. Tasks included consultation and negotiations with CEC staff, the Bureau of Reclamation, Bureau of Land Management, Palo Verde Irrigation

District, Colorado River Board of California, testimony for CEC hearings, and development and implementation of the Water Offset Plan.

### **Blythe Energy Project and Blythe Energy Project II (1997-2003)**

Project Manager for *Application for Certification and Related Permitting*, January 1998 to 2004. Comprehensive analyses and report preparation for permitting two 520 MW natural gas-fired power plants in southern California. In addition to coordination of technical teams, Dr. Harvey managed water resources investigations and development of water conservation offset programs, air permitting (including emission reduction credits), gas pipeline routing, wastewater management plans, and land annexation to the City of Blythe.

### ***Other Major Water and Energy Projects - Senior Project Manager / Principal Investigator***

- CALFED Bay-Delta Planning Program: Potential Effects on Federal Hydropower Generation
- Sacramento Voltage Support Project, Western Area Power Administration, EIS
- San Joaquin Valley Drainage Program, Water Transfers Analyses
- California Public Utilities Commission Preferred Policy for Restructuring the Electric Utility Industry in California, *Environmental Report*

### **Education**

**Ph.D. in Geography**, University of California at Los Angeles, 1994

Hydrology and Water Resources, Environmental Law and Policy, Natural Resources Management, and Impact Assessment. Dissertation: *Water Labyrinth: Policy Reforms for Reallocation of California's Water Resources*

**M.A. in Geography**, California State University Chico, 1983

Environmental Planning, Water Resources/Hydropower Development, and Impact Assessment. Thesis: *Small Hydroelectric Development: Process, Issues and Methodology for Cumulative Impact Assessment, 1983*

**B.A. in Geography**, California State University, Chico, 1981

Physical Geography; minor concentrations in Anthropology and Geology.

### **Relevant Publications, Presentations, and Invited Speaking**

*The Role of and Need for Pumped Storage Hydroelectric Generation to Support Renewable Energy Growth*; HydroVision 2008 Conference, Sacramento, California

*Regional Water and Power Environmental Issue Case Studies – The All American Canal Lining Project, Coachella Canal Lining Project, Salton Sea Ecosystem Restoration Program, and the Sunrise Powerlink Transmission Project*, California Chapter of the American Planning Association, Imperial County Chapter

*Water Supply Planning and CEQA Review: Impact Assessment Strategies*; California Chapter of the American Planning Association, Palm Springs



*Regional Water Supply Planning: Does securing a water supply induce growth?* American Water Resources Association, Santa Barbara, California

*Restructuring the Electric Utility Industry: Environmental Realities and Opportunities;* Proceedings of the Edison Electric Institute, Natural Resources Subcommittee, Mobile, Alabama

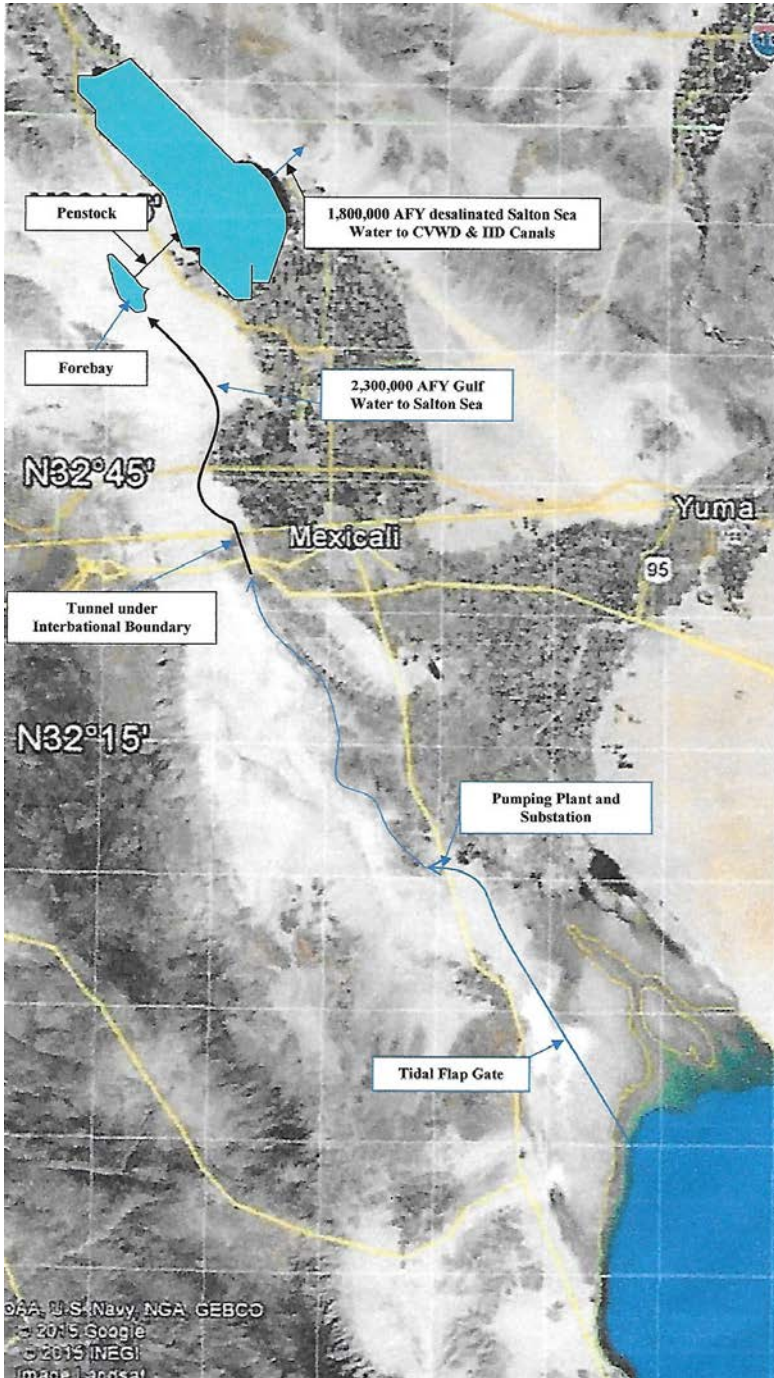
*Water Labyrinth: Policy Reforms for Reallocation of California's Water Resources;* (Abstract and dissertation) Proceedings of the Association of American Geographers, Washington, D.C.

*Investigation of Water Supply Agencies & Institutions: Institutional Analysis for the San Joaquin Valley Drainage Program,* Natural Heritage Institute, San Francisco, California.

## APPENDIX B – ENGINEERING DRAWINGS

---

## APPENDIX B



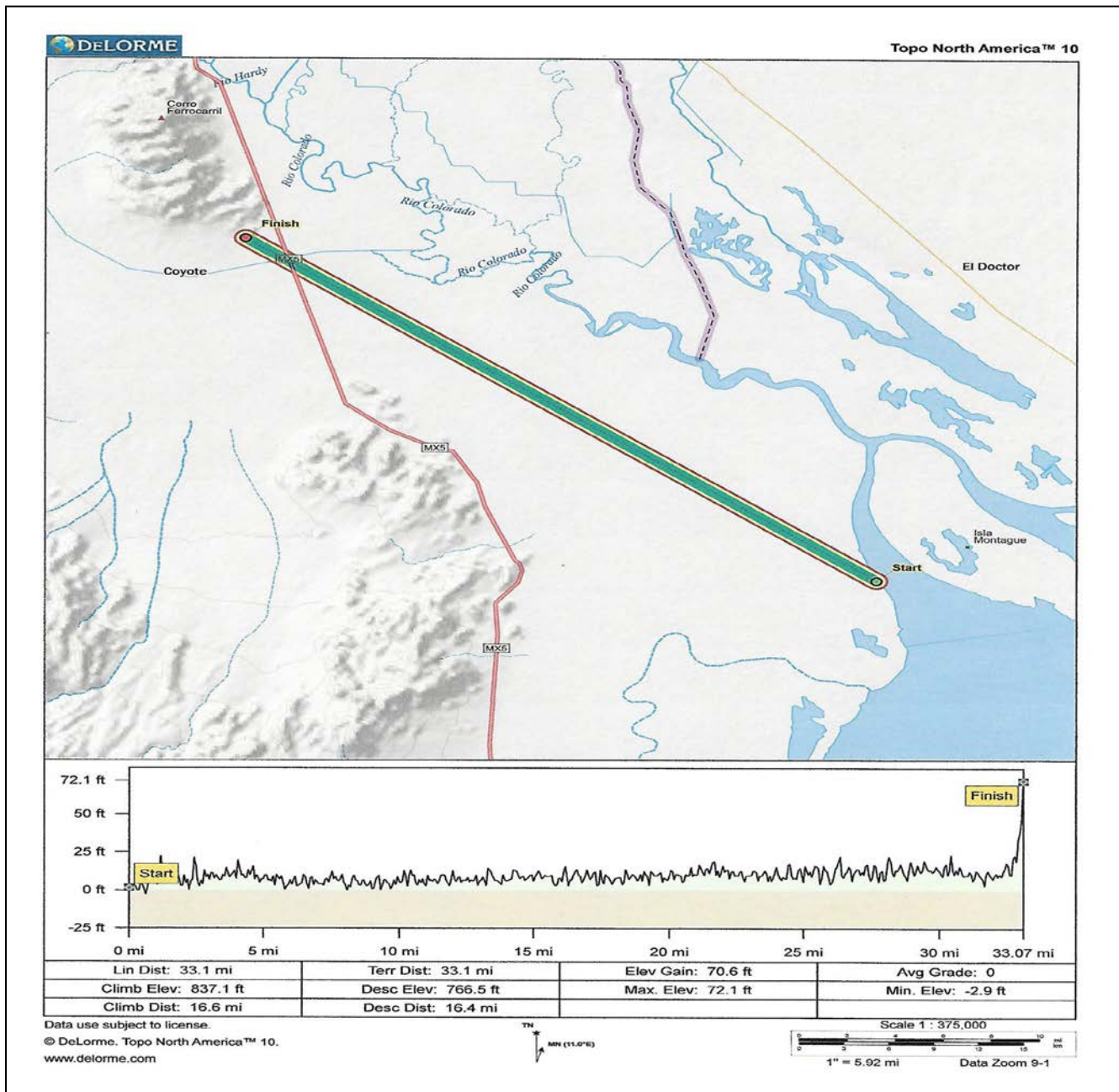
# Bi-National Canal for Salton Sea Restoration and Colorado River Augmentation

Proposal to the California Natural Resources Agency in Response to December 8, 2017 Request for Information for Salton Sea Water Importation Projects

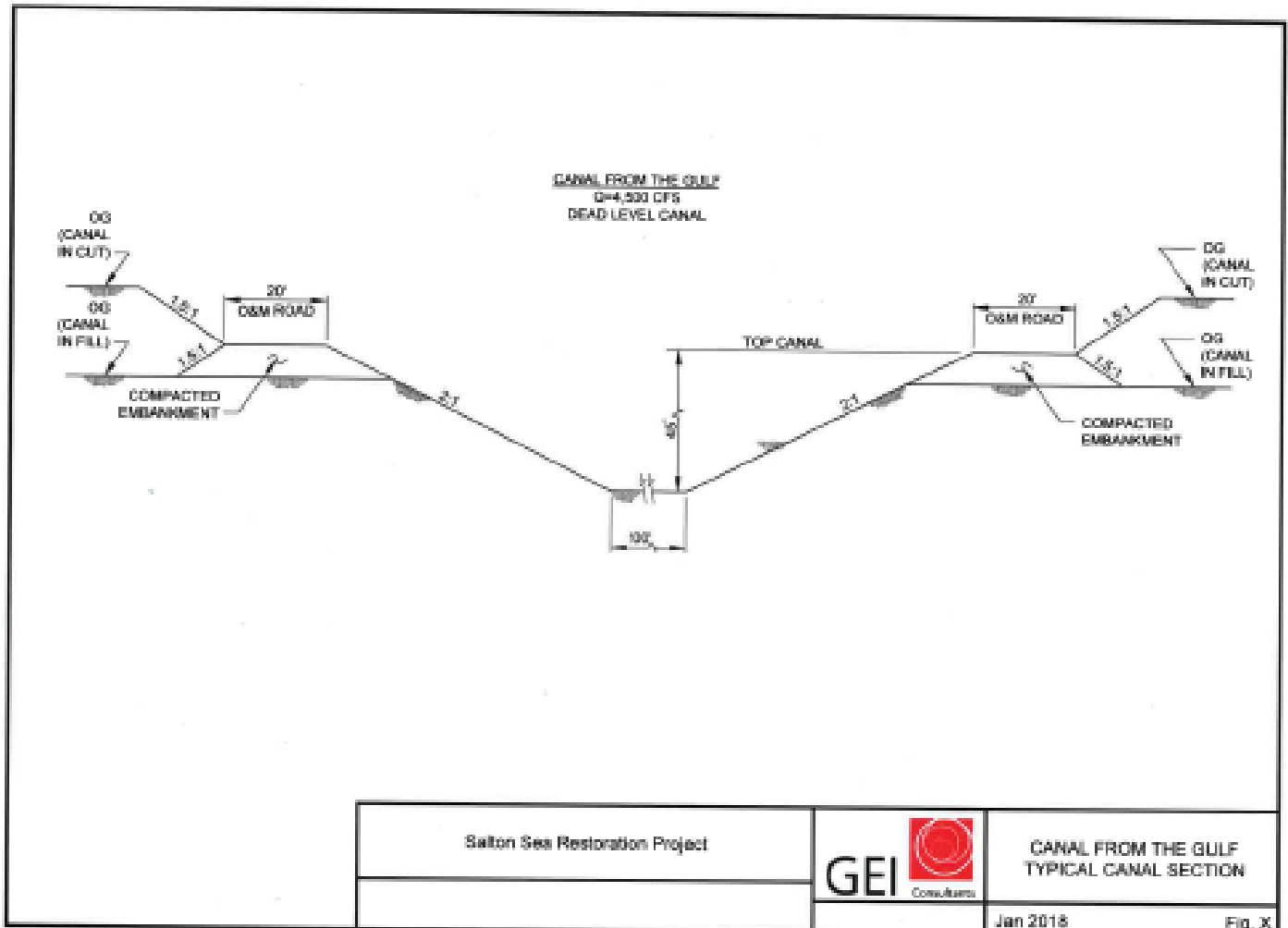
Submitted by:  
GEI Consultants, Inc.  
and Michael Clinton Consulting, LLC

March 9, 2018



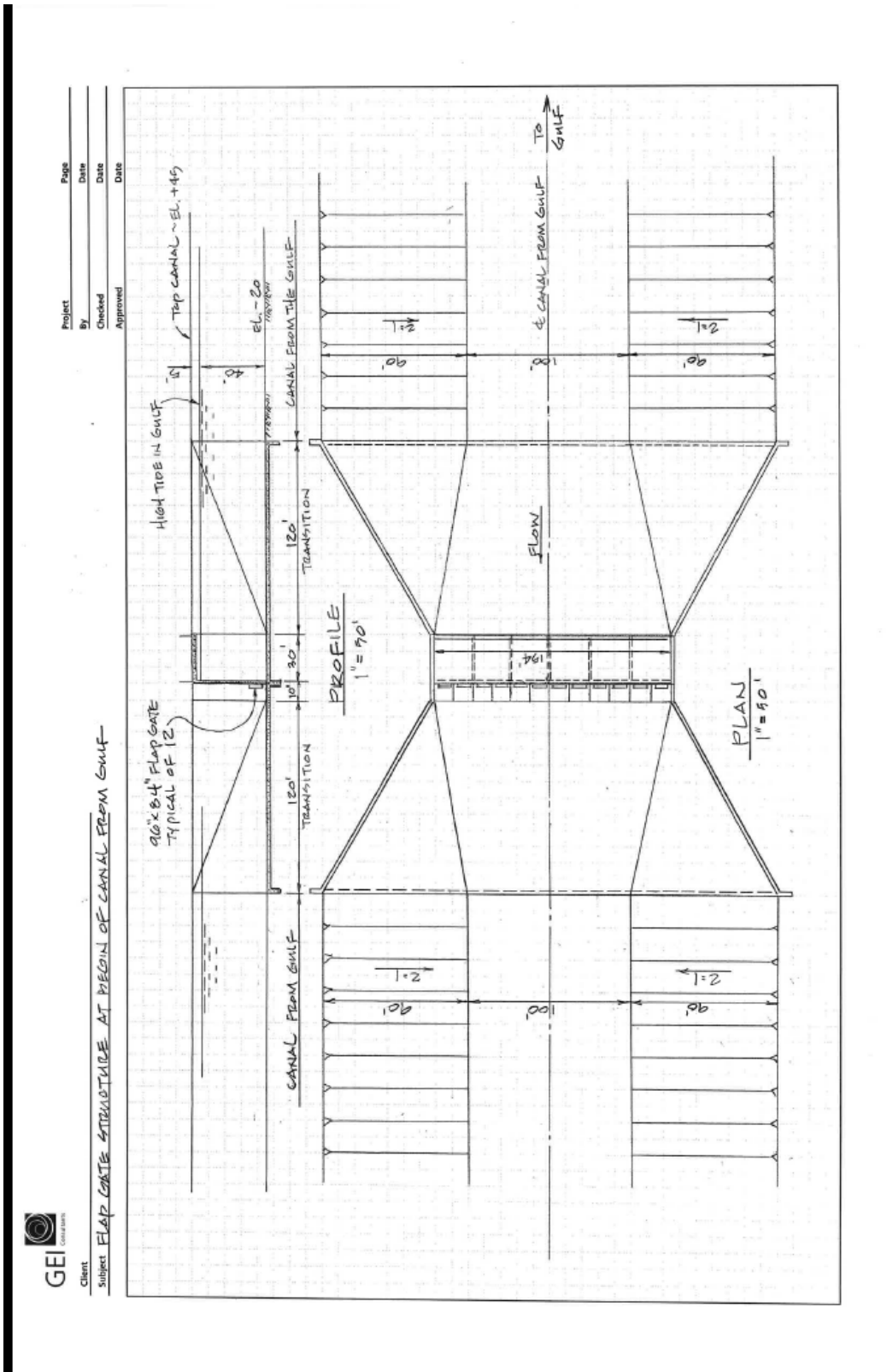


**Canal from the Gulf** - A 4,500 cfs dead level canal would be built from the gulf to the southeast side of the Laguna Salada near the Mexicali/San Felipe Highway and would be filled twice daily with water from the Gulf at high tide.



NGLEJL-400104H E:\000\Projects\0553-Business Development\Salton Sea Restoration.dwg - 1/4/2018

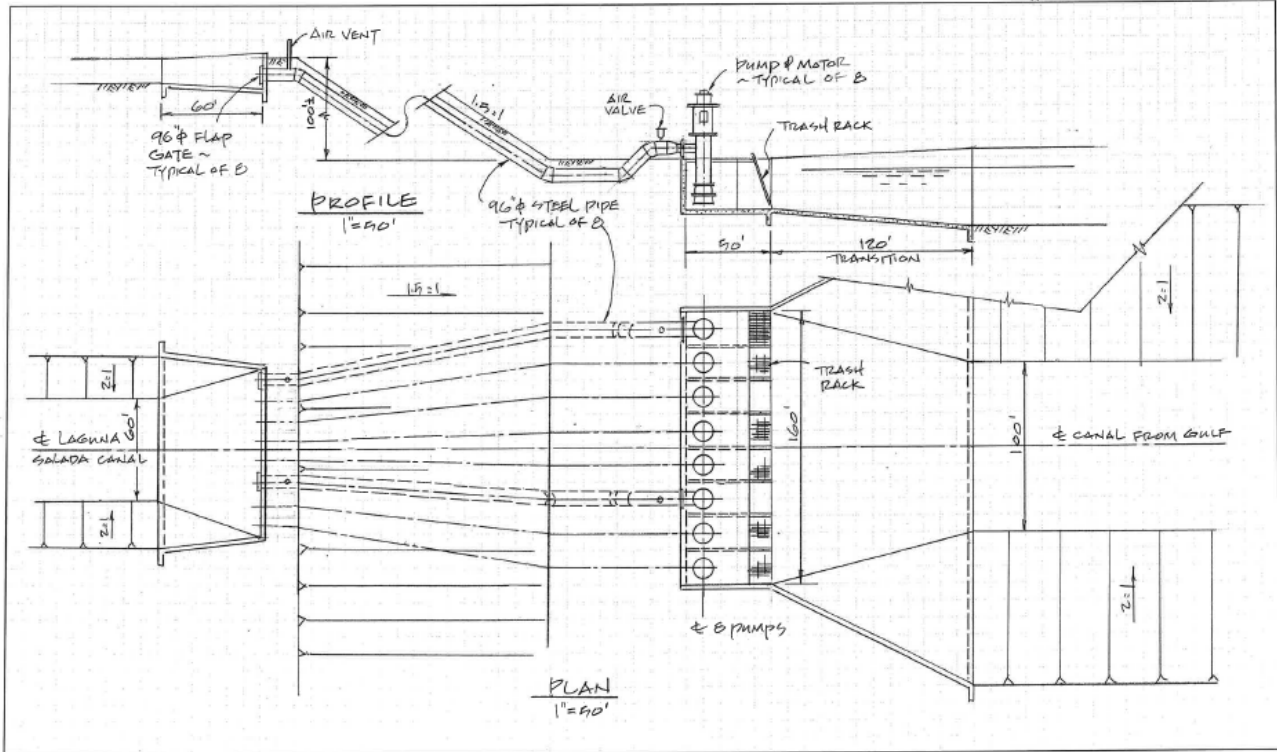
## Canal From Gulf – Flap Gate Structure



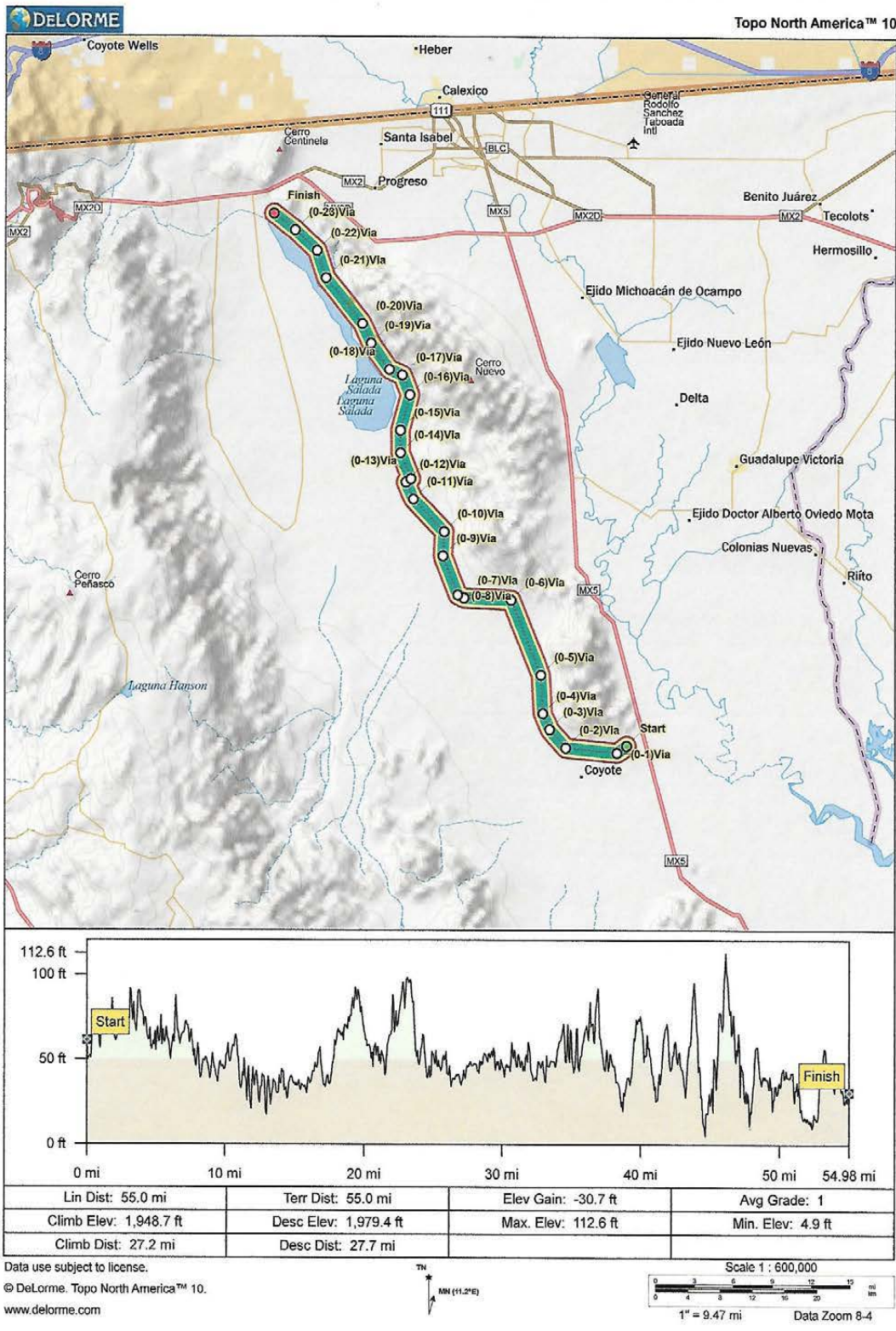


Client \_\_\_\_\_  
 Subject **PUMPING PLANT ~ FROM CANAL FROM GULF TO LAGUNA SALADA CANAL**

Project	Page
By	Date
Checked	Date
Approved	Date



**San Felipe Highway Pumping Plant** – At the end of the canal from the Gulf, a pumping plant would lift the water about 95 feet to the heading of the Laguna Salada Canal. Since no power lines are in the area, we would locate an array of solar panels along the west bank of the Laguna Salada Canal and use a commercial storage battery to store daytime energy for nighttime use.



**Laguna Salada Canal** – The 3,200 cfs Laguna Salada Canal would begin at the outlet of the Mexicali/San Felipe Highway Pumping Plant and would have a gradient of about one foot per mile and follow contours on the east side of the Laguna Salada, bringing water near the International Boundary at an elevation of about 50 feet above mean sea level.



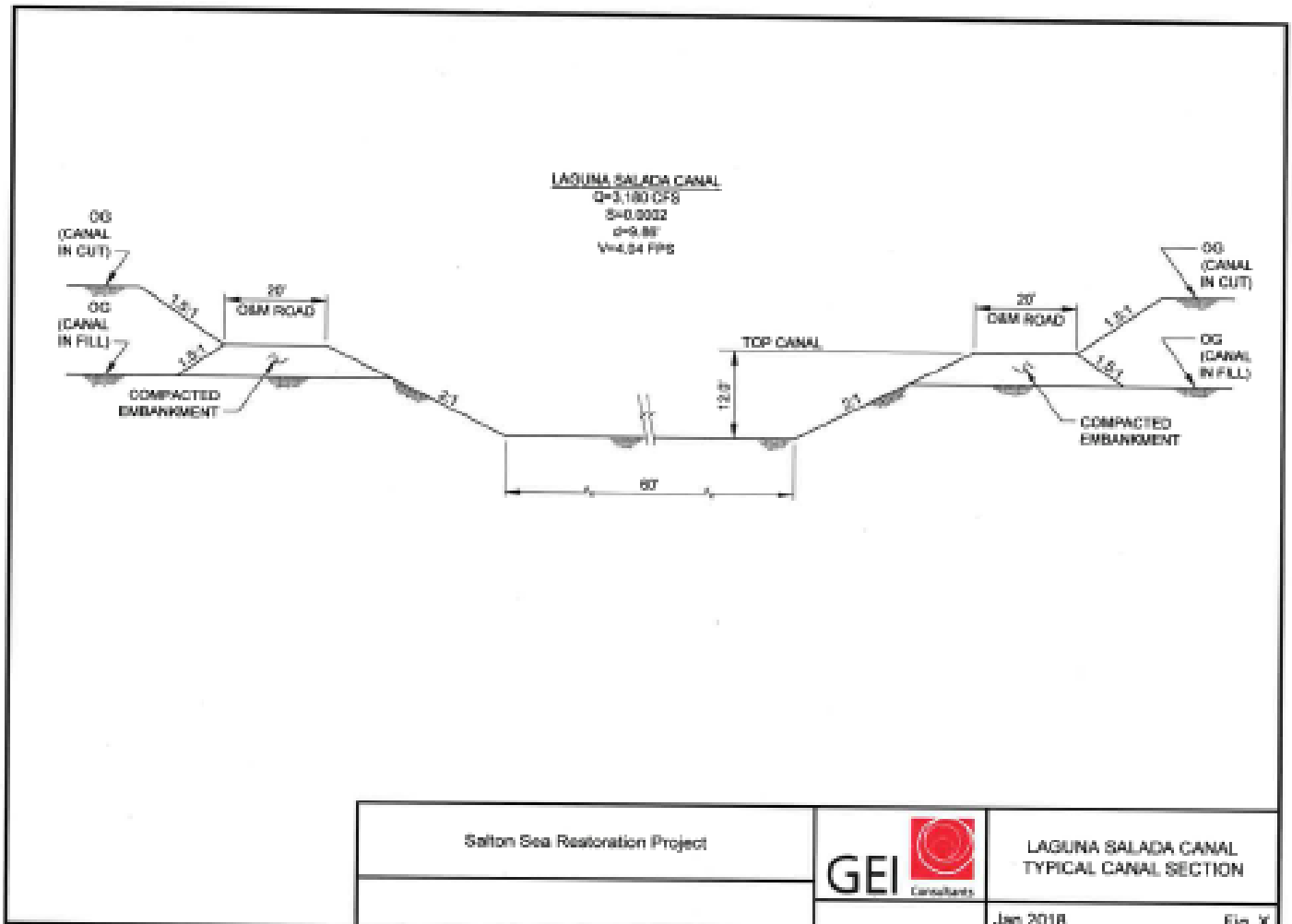
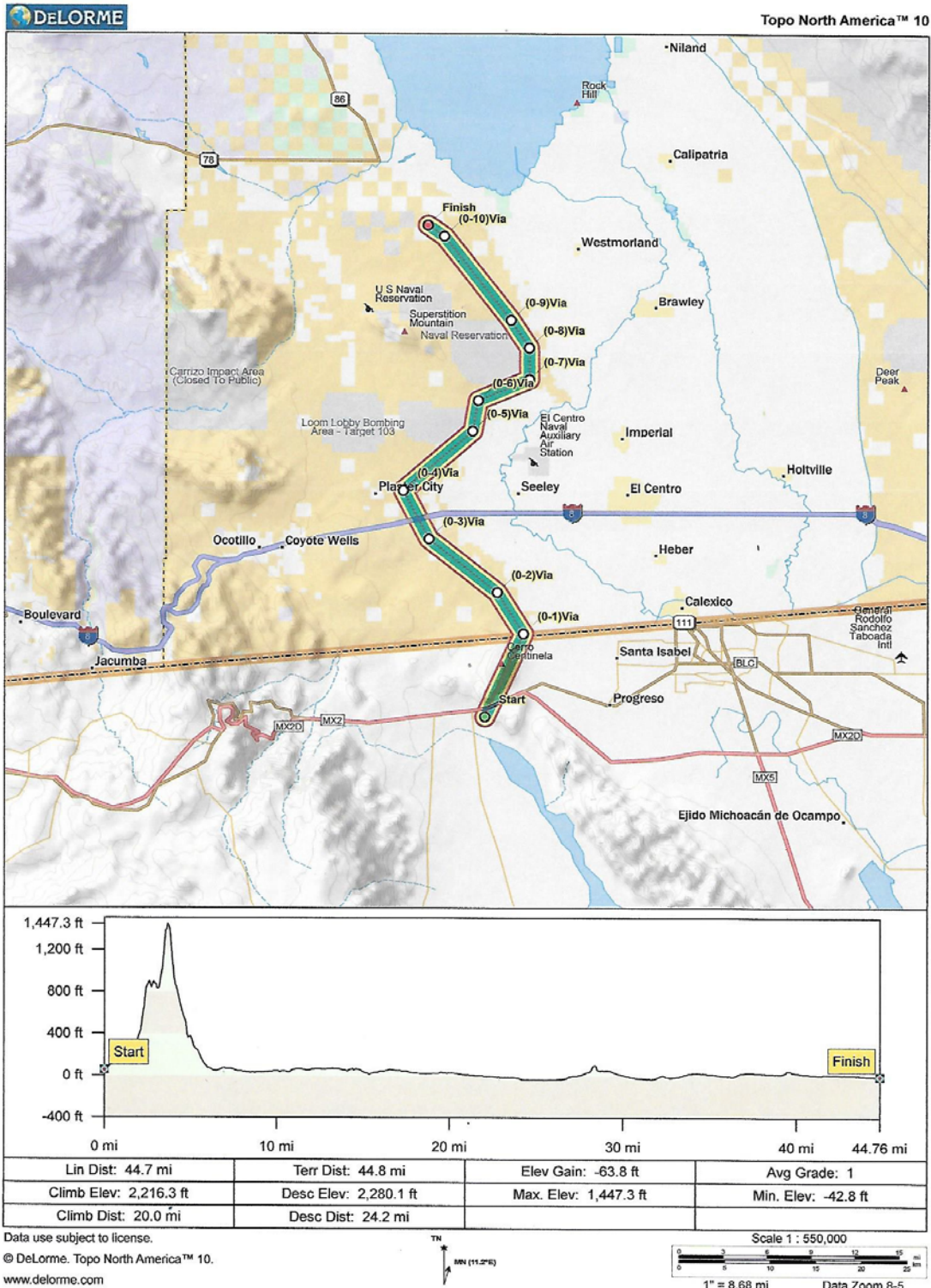


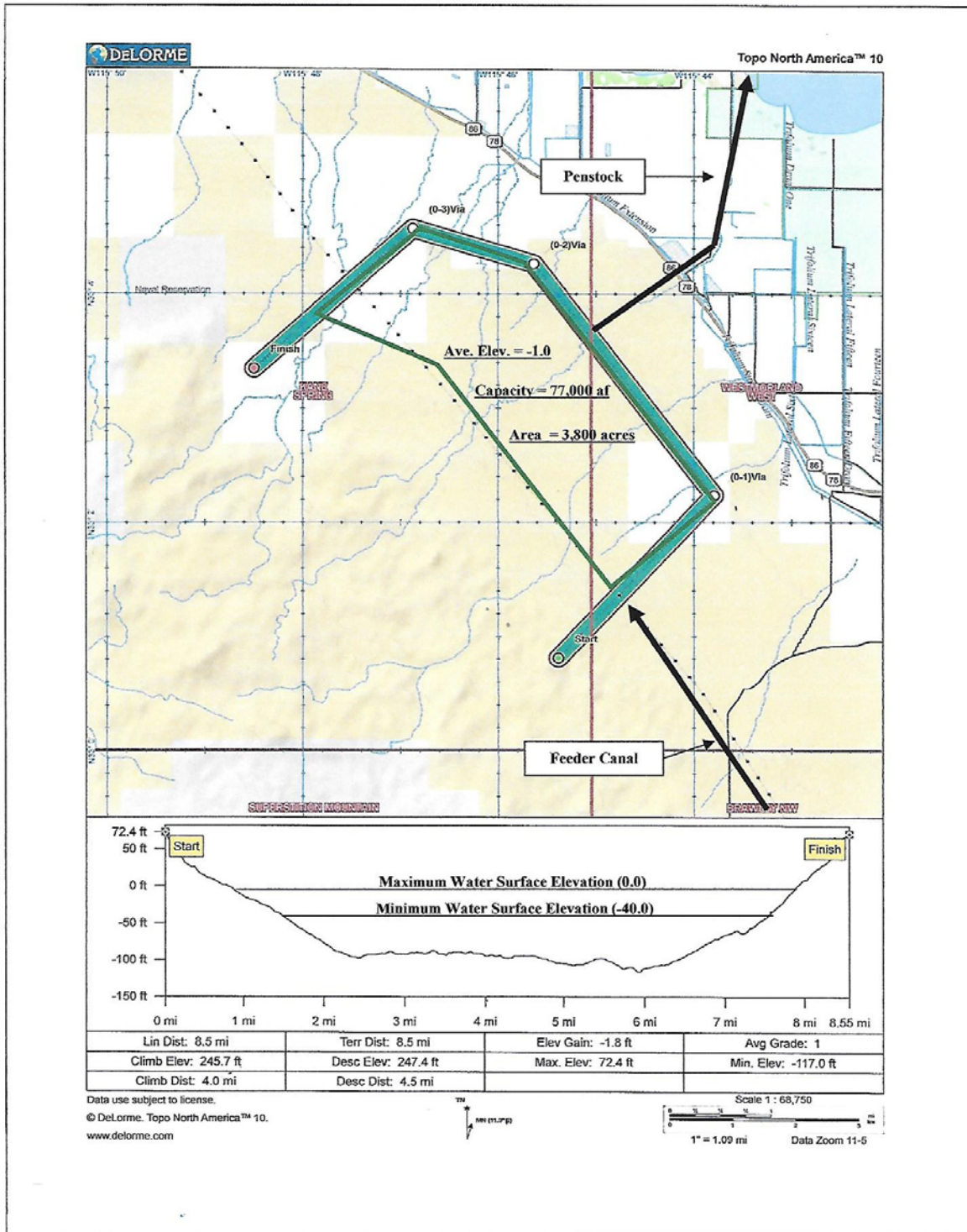
TABLE 10-10-1: E-1021 Project/601-Business Development/Salton Sea Restoration Jan. - 1/2018



**Tunnel, Environmental Protections and Feeder Canal** – A four-mile long tunnel carries the water under the International Boundary. At the heading of the tunnel, at about 50 feet above mean sea level, a one mm screen will prevent fish and most gulf biota from leaving Mexico through the tunnel. Inside the tunnel, the Gulf water will be sterilized using either UV lights or Ozone.

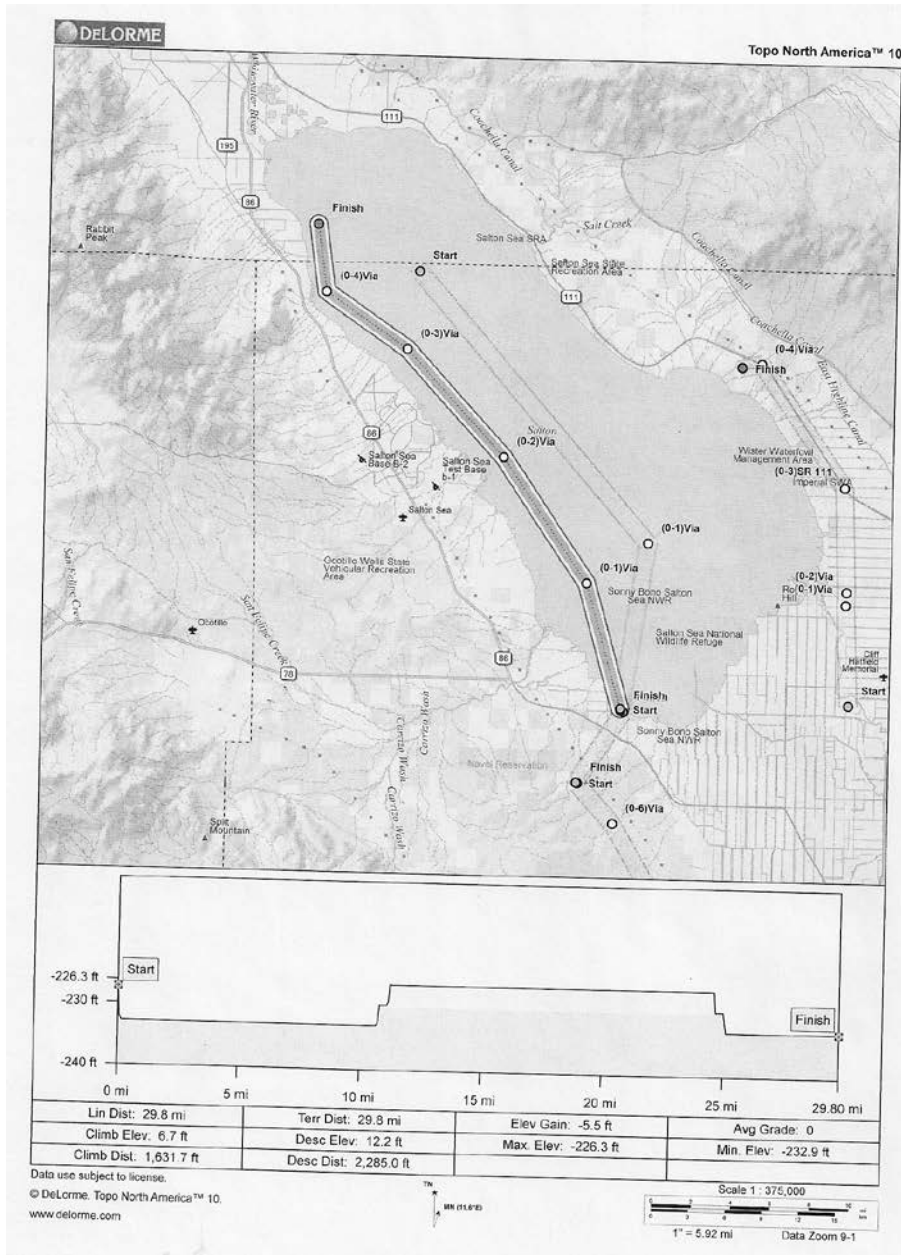
Figure 5

West Mesa Dam and Reservoir



**West Mesa Dam, Forebay, Penstock and Power Plant** – A 30-foot high dam and forebay reservoir would be constructed about 15 miles west of Westmoreland. Gulf water will fill this reservoir in a continuous steady flow. The Penstock will carry 5,500 cfs to the power plant which will operate about 5,000 hours per year, on peak, generating about 40 MW (dispatchable), supplementing renewables.

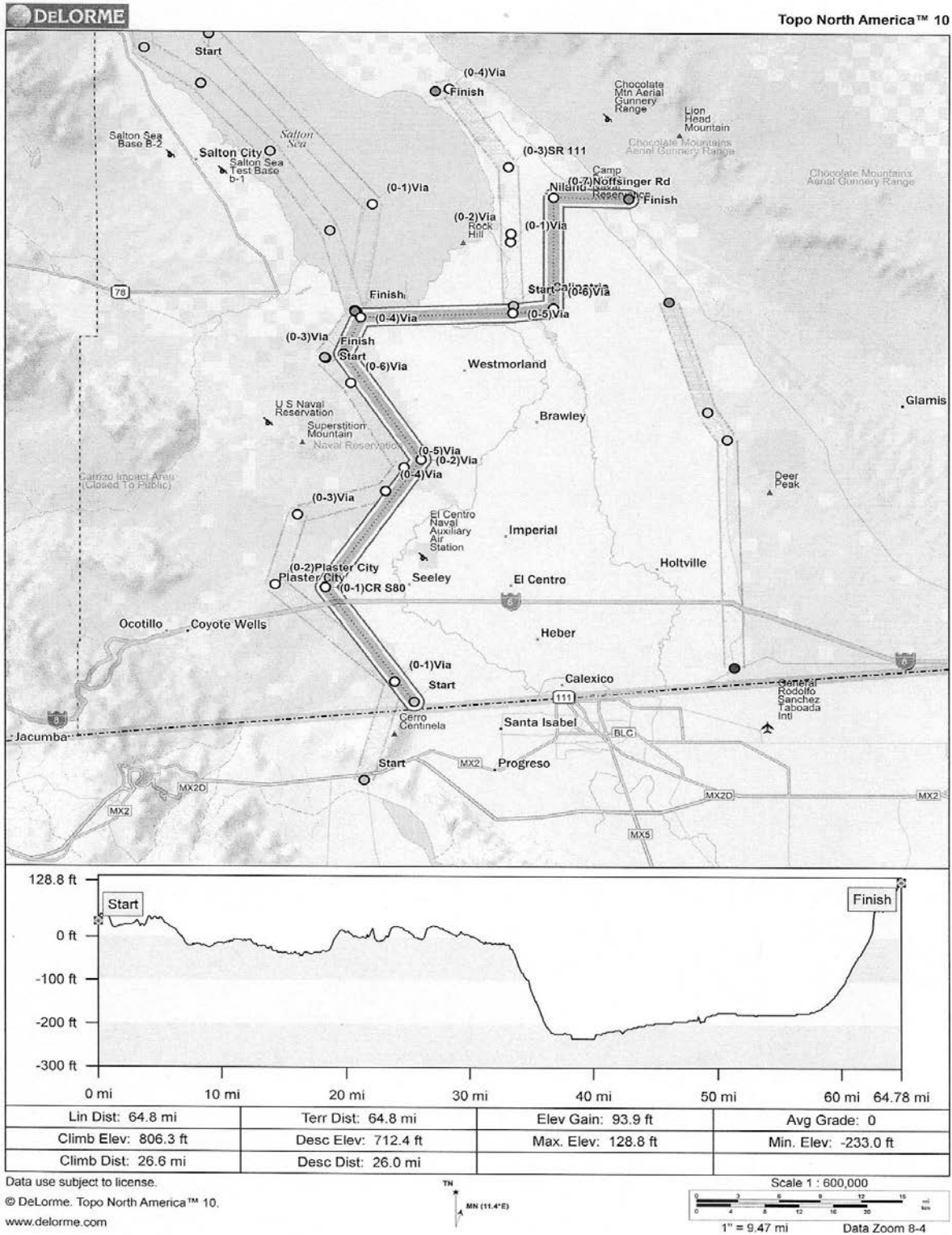
## Sheet Pile Discharge Training Wall



**Sheet Pile Discharge Training Wall** - To avoid upsetting the limnology of the Sea the power-plant discharge will be dispersed along the west side of the Sea using a sheet pile training structure driven into the bed of the Sea.

Top elevation of sheet pile will be at -225' elevation.

Every 1,000 feet, a section of sheet pile will be driven to an elevation of -230-foot elevation to provide an outlet to the Sea. In operation, flash boards would be used to partially close these openings so Gulf water enters the Salton Sea gradually along the entire length of the structure.

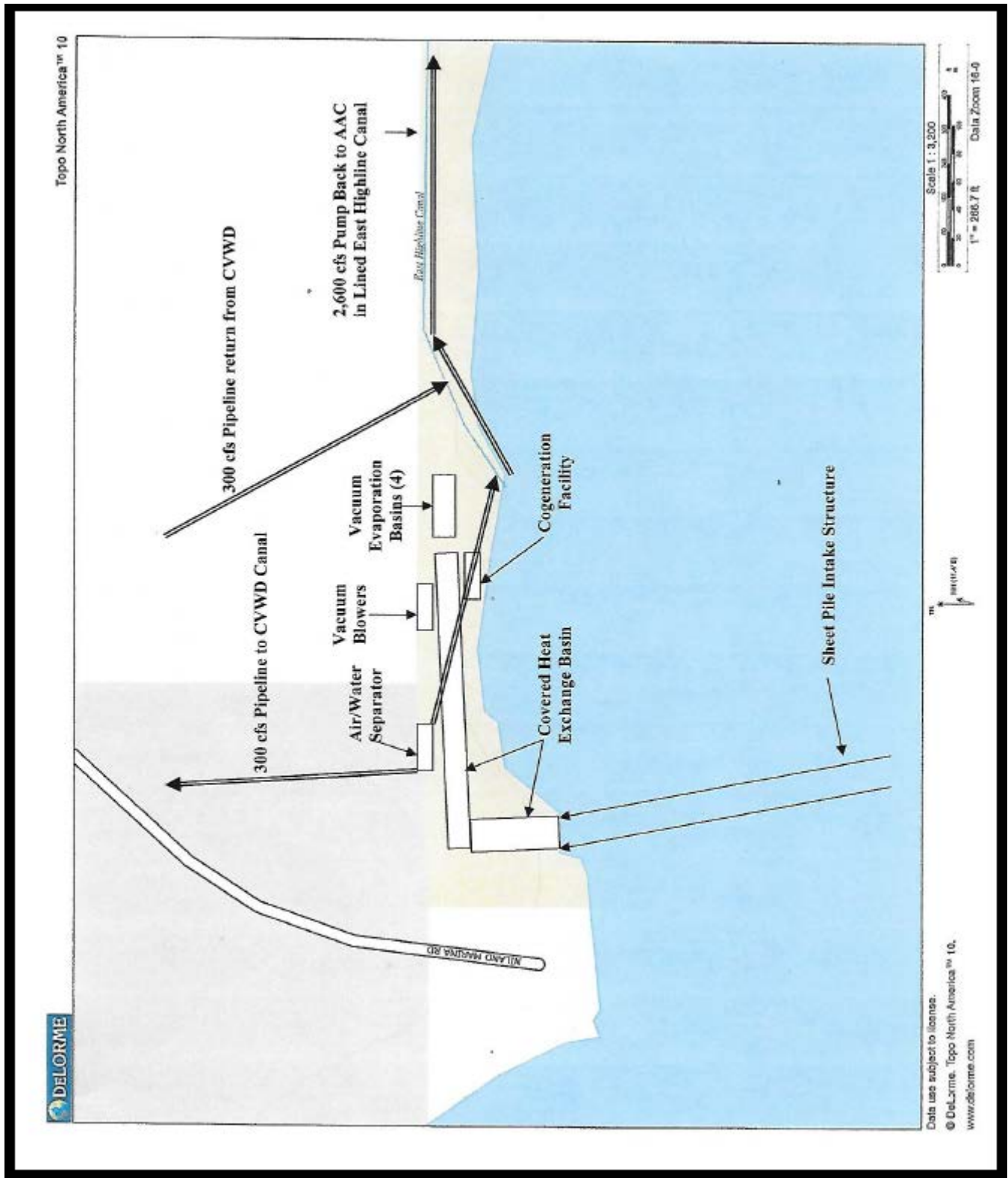


**Power Transmission System** – To connect the peaking power plant to the regional power grid, a 230 kV transmission line would be constructed from the SDG&E Imperial Valley substation to a new 230 kV substation at the hydro power peaking facility, continuing on to the IID Midway substation.

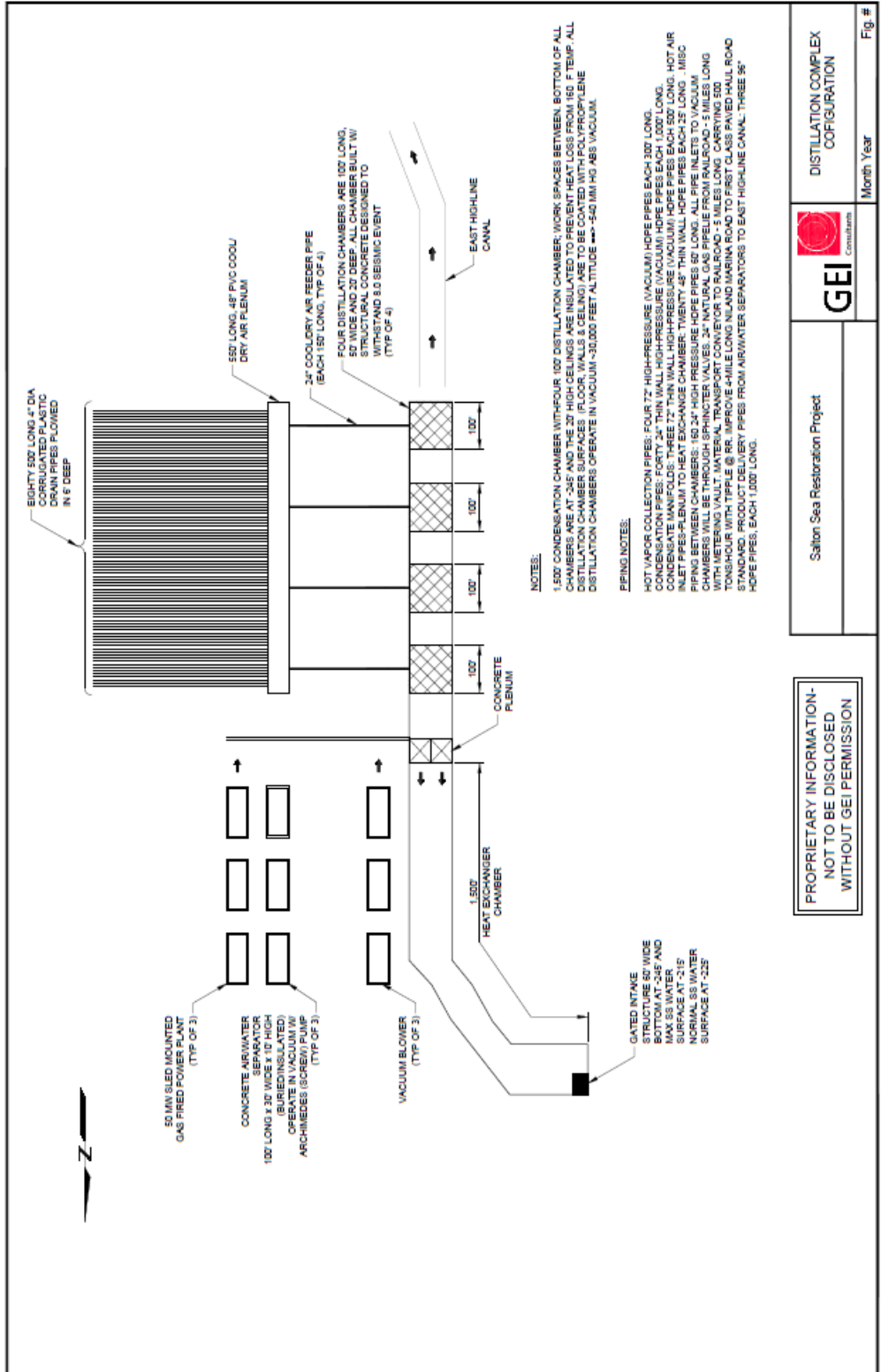
***Water Supply*** – The canal delivery system is designed to carry **2.3 to 2.5 MAF/year** of Gulf water into the Salton Sea for the following purposes:

- To offset the **500,000 AFY** being withheld from the Salton Sea under the QSA;
- To allow about 1.8 MAF/year of 60,000 PPM salinity Salton Sea water to be removed from the Sea to offset the tonnage of salt brought in from the Gulf plus the tonnage of salt contributed annually by the New, Alamo and Whitewater Rivers, thus maintaining salt balance in the Sea; and,
- For desalination of **1.8 MAF/YEAR** that would **offset** the **Lower Basin structural water supply deficit**.

## Desalination Complex Layout



# Desalination Complex Design - Proprietary

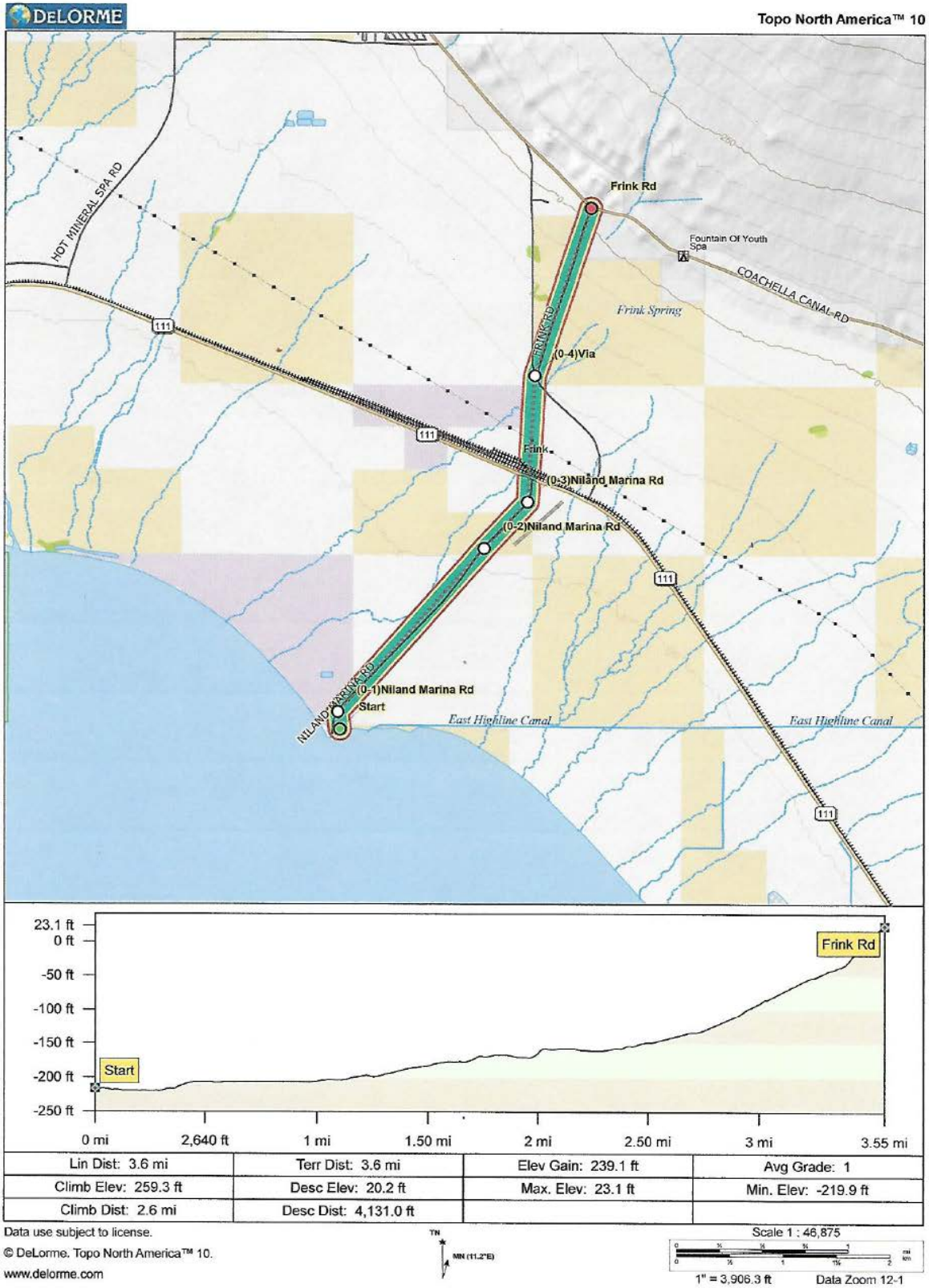


 <b>GEI</b> <small>CONSULTANTS</small>	<b>Salton Sea Restoration Project</b> DISTILLATION COMPLEX CONFIGURATION
PROPRIETARY INFORMATION - NOT TO BE DISCLOSED WITHOUT GEI PERMISSION	Month Year <span style="float: right;">Fig. #</span>

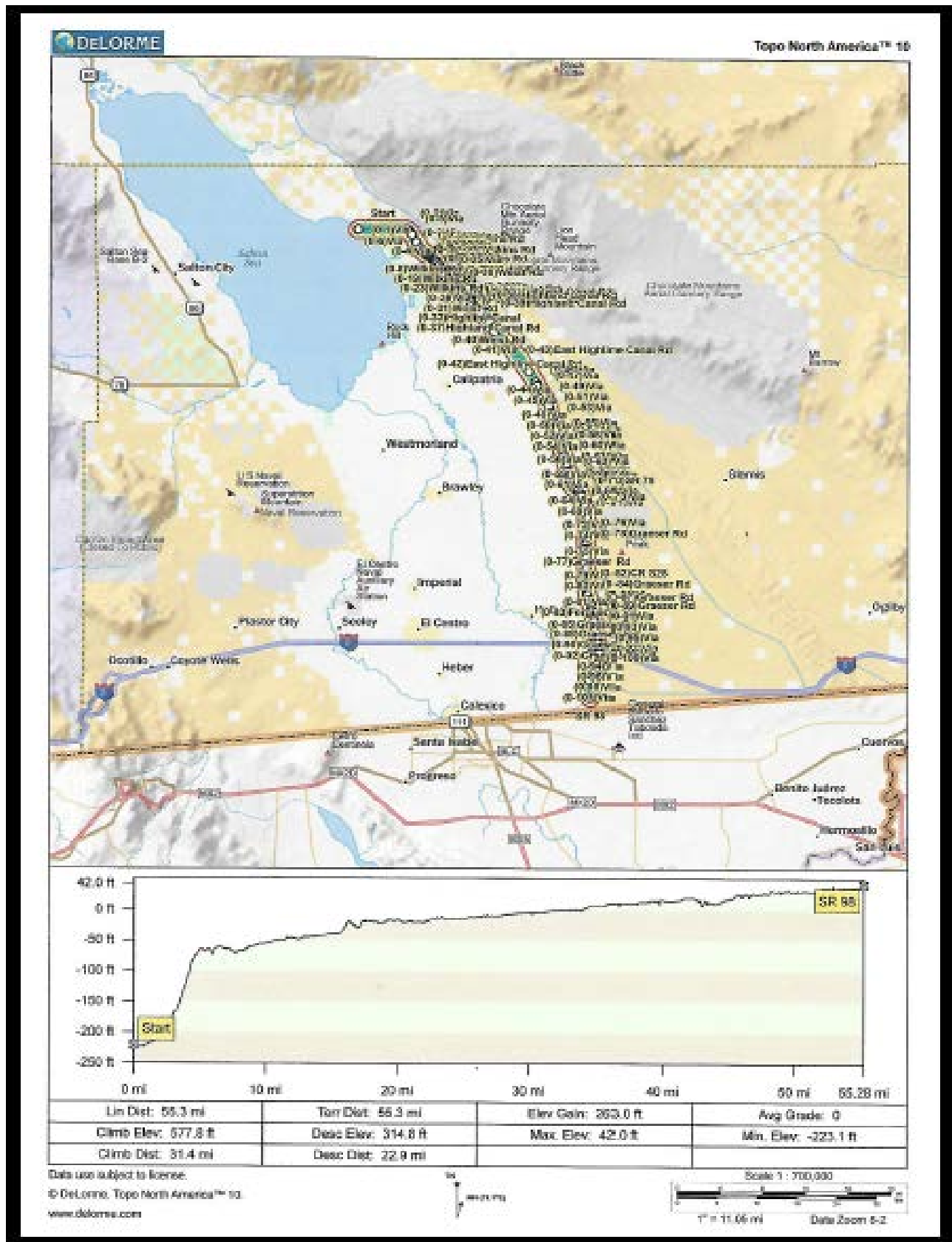
102.021-02.000M E:\021 Projects\021-Business Development\Salton Sea-Mile Characterization Sea Restoration.dwg - 14/02/18



## Coachella Canal Exchange Pipelines – Plan and Profile

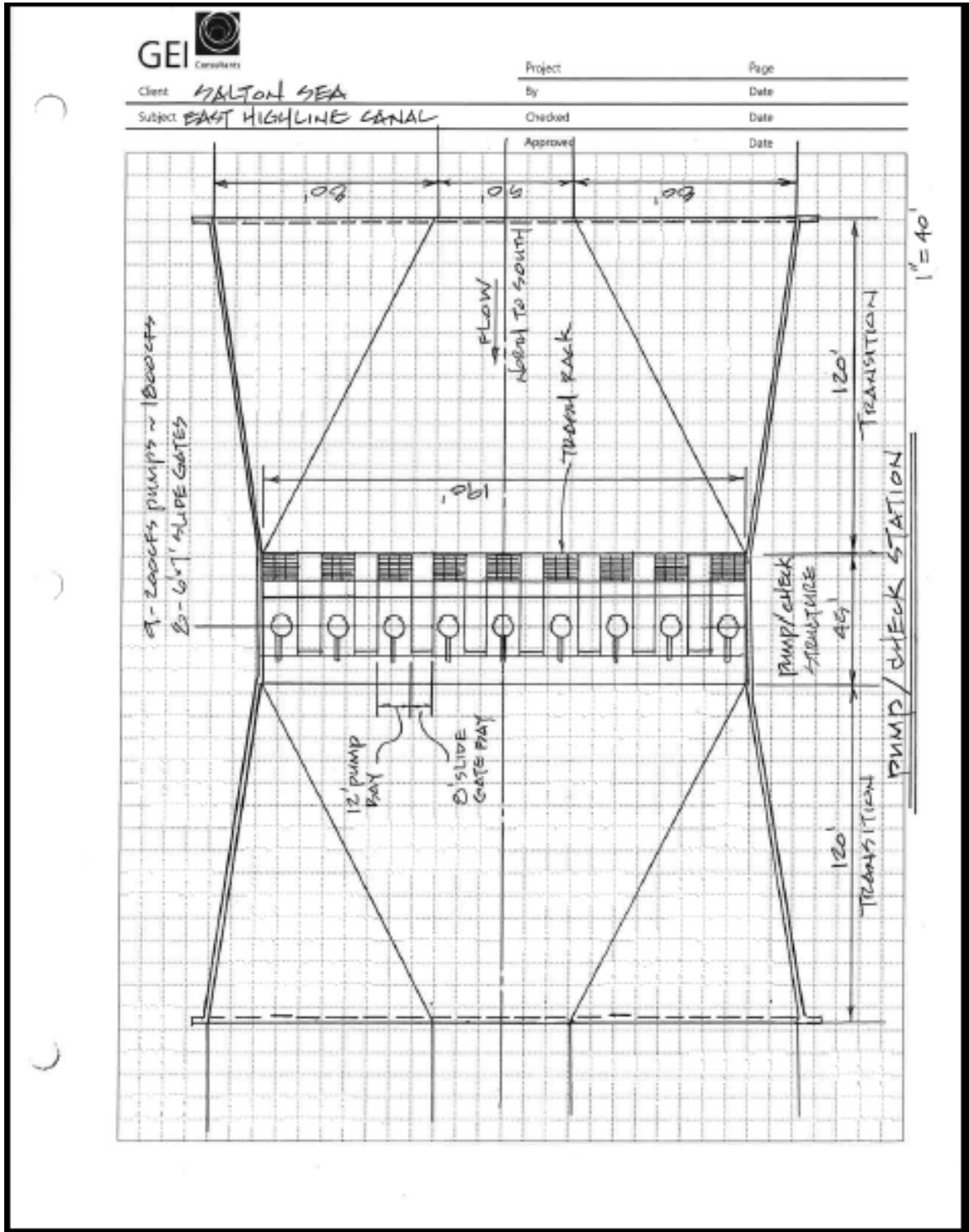


## East Highline Canal Pumpback – Plan and Profile



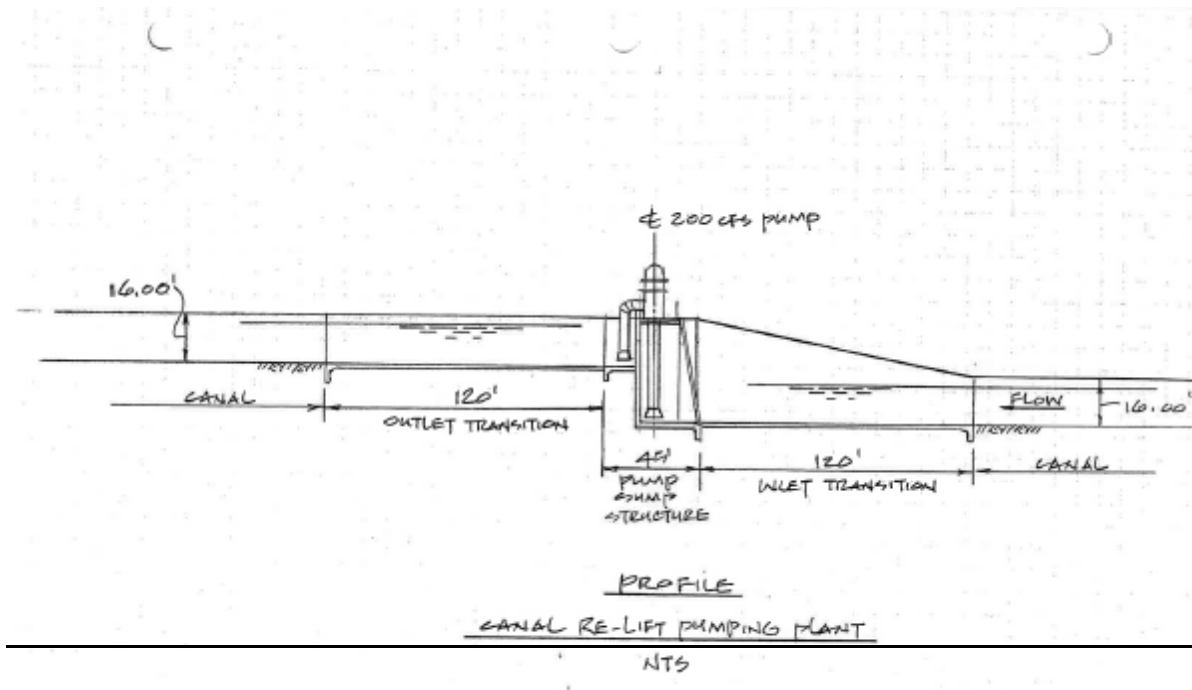
# East Highline Canal Pumpback – Check/Pumpback Structure

## Plan View (Typical)



# East Highkine Canal Pumpback – Check/Pumpback Structure

## Profile View



# APPENDIX C – PROJECT DEVELOPMENT SCHEDULE

---



## APPENDIX D – APPRAISAL LEVEL COST ESTIMATES

---

**Salton Sea Restoration and Southern CA Water Supply Project**  
**Pre-Feasibility Study Cost Estimates – DRAFT 3/2/2018**

**Phase 2**

<u>Item</u>	<u>Facility</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Field Cost</u>
<b>Desalination Component</b>					
1	Gated Intake Structure 60' wide with Closure Gates; Low water at -245', Max Salton Sea Water Surface at -220'	LS		1	\$0
2	Excavate Heat Exchange Chamber, Distillation Chambers (4) and Work Spaces (4) ; 2,200' long x 50' wide x 20' deep w / floor elevation - 245'	Cu. Yards	\$12	500,000	\$6,000,000
3	Structural Concrete to survive 8.0 Seismic Event - Heat Exchange Chamber, Distillation Chambers (4) and Work Spaces (4) ; 2,200' long x 50' wide x 20' deep w / floor elevation -245'	Cu. Yards	\$1,200	30,000	\$36,000,000
4	Insulated Ceiling to survive 8.0 Seismic Event and retain 150 degree F heat in Heat Exchange Chamber, De-pressurized Distillation Chambers (4) and Work Spaces (4) ; 2,200' long x 50 wide - Bottom of Ceiling & Top of Water at -225' elevation	Cu. Yards	\$1,200	16500	\$19,800,000
5	Divider Partitions (pressurized) between Work Spaces 50' wide & 25' high	ea	\$150,000	9	\$1,350,000
6	Polypropylene Coating inside Distillation Chambers	Sq. Ft.		1	\$1,240,000
7	HDPE Pipe, as follows:				\$0
8	- HOT VAPOR COLLECTION PIPES: FOUR 72" HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 300' LONG.	lin. Ft.	\$550	1200	\$660,000
9	- CONDENSATION PIPES: FORTY 24" THIN WALL HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 1,000' LONG.	lin. Ft.	\$175	40000	\$7,000,000
10	- CONDENSATE MANIFOLDS: THREE 72" THIN WALL HIGH-PRESSURE (VACUUM) HDPE PIPES EACH 500' LONG.	lin. Ft.	\$550	1500	\$825,000
11	- HOT AIR INLET PIPES-PLENUM TO HEAT EXCHANGE CHAMBER: TWENTY 48" THIN WALL HDPE PIPES EACH 25' LONG .	ea	\$8,500	20	\$170,000
12	- MISC PIPING BETWEEN CHAMBERS; 24" HIGH PRESSURE HDPE PIPES 60' LONG.	ea	\$10,000	160	\$1,600,000
13	- 24' Cool/Dry air delivery pipes; 150' long	ea	\$25,000	4	\$100,000
14	- 550' long, 48" Cool/dry Air Plenum	ea	\$175,000	1	\$175,000
15	- ALL PIPE INLETS TO VACUUM CHAMBERS WILL BE THROUGH SPHINCTER VALVES.				
16	- Deliver Pipes from Air/Water Separators to E. Highline Canal - Three 72" Pipes 1,000' long	ea	\$500,000	3	\$1,500,000
17	Concrete Air/Water Separation Chambers 100' long x 30' wide x 10 'high (buried/insulated)	LS	\$400,000	3	\$1,200,000
18	MAN' type RT71-1 single-stage TURBAIR Vacuum Blower	ea	\$2,066,000	3	\$6,198,000
19	50 MW sled Mounted Power Generating Units	ea	\$25,000,000	3	\$75,000,000
20	24" NATURAL GAS PIPELINE FROM RAILROAD - 5 MILES LONG WITH METERING VAULT.				
21	MATERIAL TRANSPORT CONVEYOR TO RAILROAD - 5 MILES LONG CARRYING 18,000 TONS/HOUR WITH TIPPLE @ RR.	lin. Ft.	\$275	26400	\$7,260,000
22	IMPROVE 4-MILE LONG NILAND MARINA ROAD TO FIRST CLASS PAVED HAUL-ROAD STANDARD	SF	\$6	450000	\$2,700,000
				<b>Subtotal</b>	<b>\$168,778,000</b>
				<b>Contingency (45%)</b>	<b>\$75,950,100</b>
				<b>Subtotal</b>	<b>\$337,556,000</b>
				<b>Engineering, Legal, Adm. (15%)</b>	<b>\$50,633,400</b>
				<b>Estimated Desalination Facility Component Capital Cost</b>	<b>\$388,189,400</b>



**Salton Sea Restoration and Southern CA Water Supply Project**  
**Pre-Feasibility Study Cost Estimates – DRAFT 3/2/2018**

**Phase 2**

<u>Item</u>	<u>Facility</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Field Cost</u>
<b><u>Coachella Canal Exchange System</u></b>					
23	Two pipelines each with 300 cfs capacity 3.55 miles long 102" steel Pipe	Lineal Feet	\$650	37,500	\$24,375,000
24	Pumping Plant - Static Head =243'; Friction = 22'; TDH=270'. HP= 11,500	HP	\$600	11,500	\$6,900,000
25	Pumping Plant inlet for 300 cfs	CFS	\$1,000	300	\$300,000
26	Energy Recovery Plant - Static Head =243'; Friction = 22'; TDH=220'. HP= 9,400	HP	\$600	9,400	\$5,640,000
27	Inlet/Outlet Structure at Coachella Canal	LS	\$750,000	1	\$750,000
28	Surge Protection	LS	\$1,000,000	1	\$1,000,000
				<b>Subtotal</b>	<b>\$38,965,000</b>
				<b>Contingency (45%)</b>	<b>\$17,534,250</b>
				<b>Subtotal</b>	<b>\$56,499,250</b>
				<b>Engineering, Legal, Adm. (15%)</b>	<b>\$5,844,750</b>
				<b>Estimated Power System Capital Cost</b>	<b>\$62,344,000</b>
<b><u>East Highline Canal Lining &amp; Pump-back Conveyance System</u></b>					
29	East Highline Canal Lining 2,600 cfs, 55.28 miles long	lin. Ft.	\$127	292,000	\$34,813,000
30	Relift Pumping Check Stations with Thirteen 200 cfs (500 HP) pumps and twelve slide gates	Ea.	\$11,252,000	16	\$180,032,000
31	Power for Relift Pumps Thirteen 200 cfs (500 HP) pumps	Ea.	\$720,000	55	\$39,600,000
32	Canal Crossing Bridges - 230' long & 26' wide	Ea.	\$50,000	55	\$2,750,000
33	Lateral Turnouts				
				<b>Subtotal</b>	<b>\$257,195,000</b>
				<b>Contingency (45%)</b>	<b>\$115,737,750</b>
				<b>Subtotal</b>	<b>\$514,390,000</b>
				<b>Engineering, Legal, Adm. (15%)</b>	<b>\$38,579,250</b>
				<b>Estimated Power System Capital Cost</b>	<b>\$552,969,250</b>
				<b>GRAND TOTAL</b>	<b>\$1,003,502,650</b>

Salton Sea Restoration and Southern CA Water Supply Project									
Pre-Feasibility Study Cost Estimates – DRAFT 3/2/2018									
Phase 2 - O, M & R Costs									
Desalination Facility O&M									
34	Natural Gas	mcf	\$5.00	7,500,000					\$37,500,000
35	Labor (3 shifts 7 days per week + time off = 5 employees for each position) Need five employees at all times	Salary	\$100,000	15					\$1,500,000
36	Parts & Outside Services	LS	\$2,500,000	1					\$2,500,000
Canal O&M - Based on IID's AAC Section 5 (22.8 miles) Experience having Costs near \$900,000/yr. or \$20,500/ mile									
Coachella Canal Exchange System									
37	Two pipelines each with 300 cfs capacity 3.55 miles long 102" steel Pipe	miles	\$20,500	7.1					\$145,550
East Highline Canal Lining & Pump-back Conveyance System									
38	East Highline Canal Lining 2,600 cfs, 55.28 miles long	miles	\$20,500	55.28					\$1,133,240
<u>Energy Use</u>									
18	MAN type RT71-1 single-stage TURBAIR Vacuum Blower								\$187,916
19	50 MW sled Mounted Power Generating Units (Sale Credit)								-\$3,780,000
24	Pumping Plant - Static Head =243'; Friction = 22'; TDH=270'. HP= 11,500								\$360,173
25	Pumping Plant inlet for 300 cfs								
26	Energy Recovery Plant - Static Head =243'; Friction = 22'; TDH=220'. HP= 9,400								-\$294,402
27	Power for Relift Pumps Thirteen 200 cfs (500 HP) pumps								\$203,576
28	O&M, including Outside Services for EHL Pumpback IID's 24 MW Hydro system costs about \$2.7 million per year or \$112,000 per MW,	MW	\$112,000	25					\$2,800,000
Estimated Phase 2 Desalination Facility/delivery Component Net Annual O, M & R Cost									\$42,256,053

## APPENDIX E – GEI FIRM OVERVIEW

---

GEI provides geotechnical, environmental, water resources and ecological consulting and engineering services. Professional staff provide these services from planning and design through construction and operations. Clients include government agencies, institutions, industries, developers, utilities, attorneys and other professional service firms.

Since 1970, providing creative engineering and science for holistic, collaborative solutions

## Project Types

- Airports
- Bridges
- Commercial Buildings
- Dams and Levees
- Educational Facilities
- Garages and Parking Decks
- Government Facilities
- Harbors, Jetties, Piers, and Marinas
- Hospitals and Medical Facilities
- Industrial Buildings and Manufacturing Plants
- Manufactured Gas Plant Sites
- Mine Sites and Quarries
- Pipelines and Pumping Stations
- Railroads
- Rivers, Canals, and Waterways
- Tunnels and Subways
- Urban Renewals
- Utilities and Power Generation
- Water Supply, Treatment and Distribution



## Geotechnical Services

- Foundations
- Excavation Support Systems
- Trenchless Technology and Tunneling
- Embankments and Dams
- Forensic Engineering & Litigation Support
- Groundwater
- Coastal Planning and Engineering

## Environmental Services

- Compliance and Permitting
- Expert Services
- Investigation through Remediation
- Manufactured Gas Plant (MGP) Sites
- Real Estate & Brownfields Redevelopment

## Civil Design

- Civil Engineering
- Geostructural
- Design-Build
- Construction Support

## Water Resources Services

- Conveyance
- Flood Control
- Water Management
- Water Supply and Storage
- Water Resources Support
- Hydropower

## Ecological Services

- Biomonitoring
- Ecotoxicology and Water Quality Assessments
- Environmental Impact Assessment
- Aquatic Habitat Enhancement
- Inventories and Surveys of Aquatic Ecosystems
- Permitting
- Laboratory Services



# Our Office Locations

**Massachusetts – Boston (HQ)**

400 Unicorn Park Drive  
Woburn, MA 01801  
781.721.4000 phone

**California – Bakersfield**

5100 California Avenue, Suite 227  
Bakersfield, CA 93309-0718  
661.327.7601 phone

**California – San Diego**

2141 Palomar Airport Road, Suite 300  
Carlsbad, CA 92011  
760.795.1960 phone

**California – Los Angeles**

99 South lake Avenue, Suite 300  
Pasadena, CA 91101  
818.552.6400 phone

**California – Oakland**

180 Grand Avenue, Suite 1410  
Oakland, CA 94612  
510.350.2900 phone

**California – Sacramento**

2868 Prospect Park Drive, Suite 400  
Rancho Cordova, CA 95670  
916.631.4500 phone

**Colorado – Denver**

4601 DTC Boulevard, Suite 900  
Denver, CO 80237  
303.662.0100 phone

**Colorado – Fort Collins**

2625 Redwing Road, Suite 370  
Fort Collins, CO 80526  
970.224.7342 phone

**Connecticut – Hartford**

455 Winding Brook Drive, Suite 201  
Glastonbury, CT 06033  
860.368.5300 phone

**Georgia – Atlanta**

1375 Peachtree Street NE, Suite A15  
Atlanta, GA 30309  
404.592.0050 phone

**Illinois – Chicago (Downtown)**

30 N. LaSalle Street, Unit 1515  
Chicago, IL 60602  
312-985-0359 phone

**Illinois – Chicago**

400 N. Lakeview Parkway, Suite 140  
Vernon Hills, IL 60061  
847-984-3401 phone

**Maine – Portland**

5 Milk Street  
Portland, ME 04101  
207.797.8901 phone

**Massachusetts - Franklin**

3 Bent Street  
Franklin, MA 02038  
774.277.6001 phone

**Michigan - Ann Arbor**

940 N. Main Street  
Ann Arbor, MI 48104-1035  
734.680.1600 phone

**Michigan – Grand Rapids**

5225 Edgewater Drive  
Allendale, MI 49401  
616.384.2710

**Michigan - Iron Mountain**

407 S. Stephenson Avenue, Suite B  
Iron Mountain, MI 49801  
906.828.9303

**Michigan - Iron River**

990 Lalley Road  
Iron River, MI 49935  
906.214.4140 phone

**Michigan - Lansing**

230 N. Washington Square, Suite 201  
Lansing, MI 48933

**Michigan - Marquette**

109 W. Baraga Avenue, Suite B,  
Marquette, MI 49855  
906.451.4021 phone

**Michigan - Traverse City**

806 Hastings Street, Suite M  
Traverse City, MI 79686  
517.525.3882 phone

**Nevada – Las Vegas**

1070 Wigwam Parkway  
Henderson, NV 89074  
888.434.9679 phone

**New Jersey – Bloomfield**

300 Broadacres Drive, Suite 100  
Bloomfield, NJ 07003  
973.873.7110 phone

**New Jersey - Mount Laurel**

18000 Horizon Way, Suite 200  
Mount Laurel, NJ 08054  
856.608.6860 phone

**New York - Buffalo**

90B John Muir Drive, Suite 104  
Amherst, NY 14228  
716.204.7154 phone

**New York - Long Island**

110 Walt Whitman Road, Suite 204  
Huntington Station, NY 11746  
631.760.9300 phone

**New York - Ithaca**

1301 Trumansburg Road, Suite N  
Ithaca, NY 14850  
607-216-8955 phone

**New York - New York**

1385 Broadway, 20th Floor  
New York, NY 10018  
212.687.8282 phone

**North Carolina - Raleigh**

4000 CentreGreen Way, Suite 180  
Cary, NC 27513  
919.322.8700 phone

**Oregon – Portland**

700 NE Multnomah Street, Suite 230  
Portland, OR 97232  
503.697.1478 phone

**Pennsylvania - PA**

100 Cambell Boulevard, Suite 103  
Exton, PA 19341  
484.872.7000 phone

**Rhode Island – Providence**

5586 Post Road, Suite 1  
East Greenwich, RI 02818  
401-533-5153 phone

**Tennessee - Knoxville**

616 W. Hill Street, Suite 100  
Knoxville, TN 37902

**Texas - Fort Worth**

1862 Keller Parkway  
Keller, TX 76248  
682.593.0220 phone

**Washington DC**

1620 I Street, NW, Suite 800  
Washington, DC 20006  
202.828.9510 phone

**Wisconsin - Green Bay**

3159 Voyager Drive  
Green Bay, WI 54311  
920.455.8200 phone

**Wisconsin – Madison**

406 Science Drive, Suite 404  
Madison, WI 53711  
608.807.0502 phone