

H2O FUTURES

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SALTON SEA, CALIFORNIA

H2O Futures: Salton Sea Master Plan

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What is an Integrated Seawater Farm?

A seawater farm is a farm that uses clean, untreated seawater to raise its crops instead of freshwater. This represents the second invention of agriculture based this time on the almost infinite supply of water that resides in the world's oceans. An integrated farm is a farm that combines the growing of field and orchard crops with the husbandry of animals. Until the advent of factory farming in the last century, almost all freshwater agriculture integrated the breeding and raising of animals with the cultivation of green crops. In the case of integrated seawater farming, the animals we raise are shrimp and fish.

The green crops are salt-loving edible plants and mangrove trees. Because integrated seawater farming was developed in our time, we have engineered it to address the problems of our time — hunger, environmental degradation, rising temperatures, drought and desertification, collapsing fisheries, shrinking cropland, disappearing forests, the loss of plant and animal species, poverty, and indirectly, the growth of population.

Our Goals:

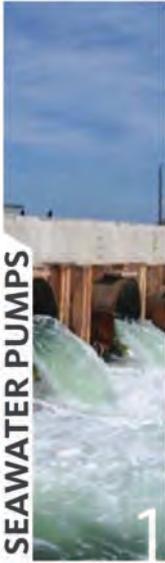
Land has already been set aside for the establishment of a new seawater-based community providing homes and jobs for some of Salton Seas disadvantaged people. Training will be provided to equip workers with the skills necessary to operate downstream industries creating the byproducts of integrated seawater farming. new factories will make edible oil, particle board, fire bricks, modular lumber, fish leather goods, goat cheese, cereals, shrimp and fish specialties, and numerous other products.

We can ship shrimp and fish to European/American markets as a way of earning much-needed hard currency. In the long run we envision duplicating this farm many times up and down the coast of the Salton Sea sharing this development with other nations in the region and providing a dependable source of food for all the people in the region and for their livestock as well. We see this as a giant step forward toward creating new wealth in the region, building stable new communities with new industries and rewarding employment. We see this as a major guarantor of prosperity in the region and of self-sufficiency for its people. We see it as a way of greening the desert coastline, remaking the environment, creating comfortable new micro-climates, and encouraging tourism. Ultimately we believe this new technology will make the region one of the most productive shrimp and fish producers as well as one of its more productive agricultural areas using saltwater to irrigate new forests and to produce vegetables, oil, meal, and biomass for fuel, building materials, fodder and grazing.

With your help we can make the revival of the Salton Sea a reality.



SEAWATER PUMPS



1
Pumps bring seawater inland, with a rise of 2-3 meters above sealevel.

AQUACULTURE



2
Shrimp enrich seawater with nutrients through effluent, and can be eaten or sold at market.

MACROALGAE



3
Algae is a food source for the bivalves and fin fish.

BIVALVES



4
Bivalves or Mussels can be eaten or sold at market.

FIN FISH



5
Fin Fish like Tilapia can be eaten or sold at market.

MANGROVES



6
Mangroves take carbon out of the atmosphere and put it in the soil. Their leaves are fodder for local livestock.

SALICORNIA



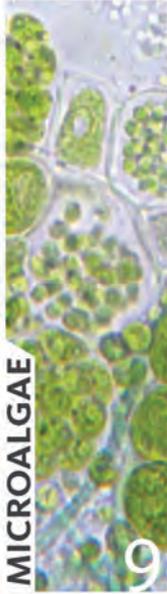
7
Salicornia oil can be refined into biofuels, and the meal can be used in food production like soybeans.

WETLANDS



8
Wetlands support life and bring new species of birds to the area.

MICROALGAE



9
Microalgae can be used to produce biofuels.

ARTEMIA



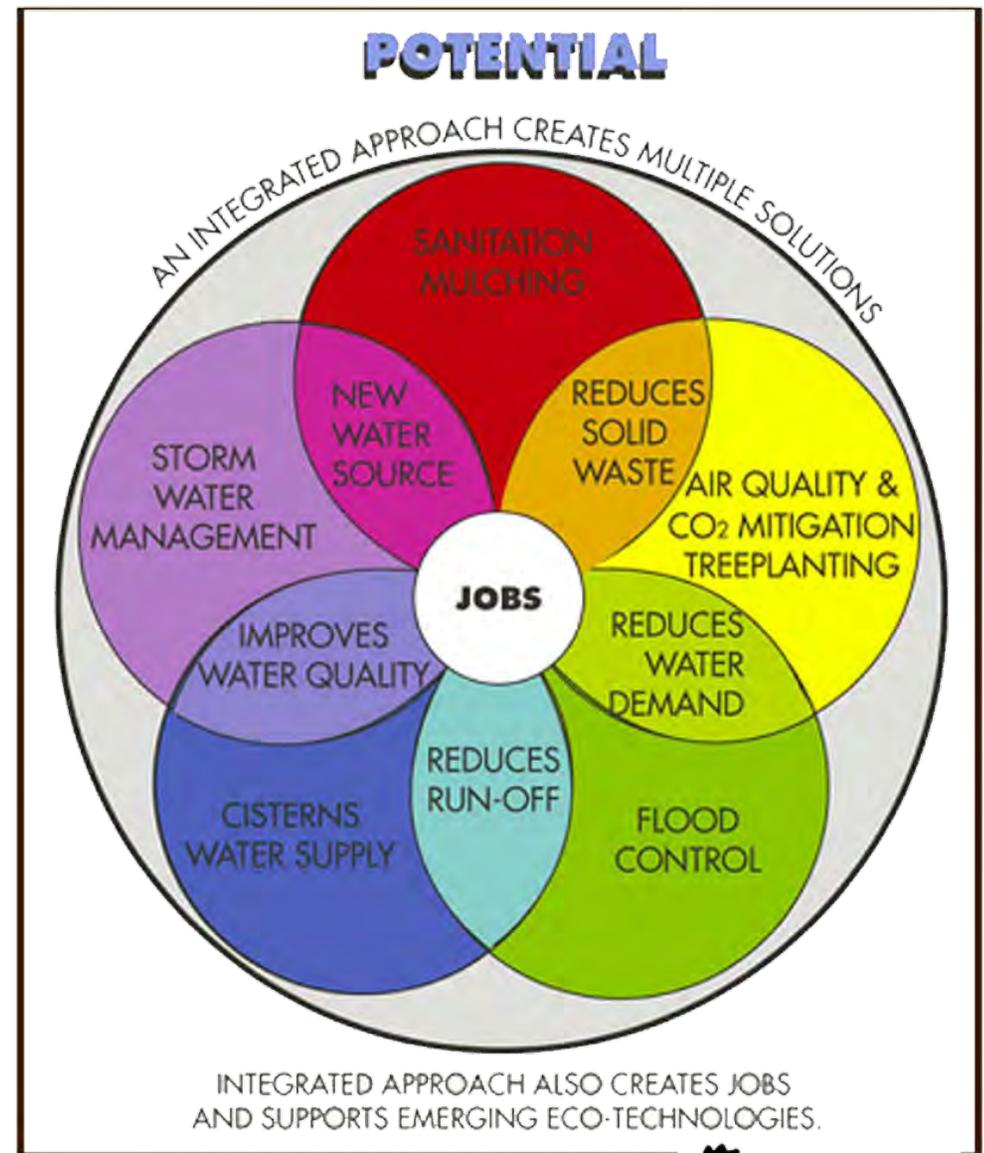
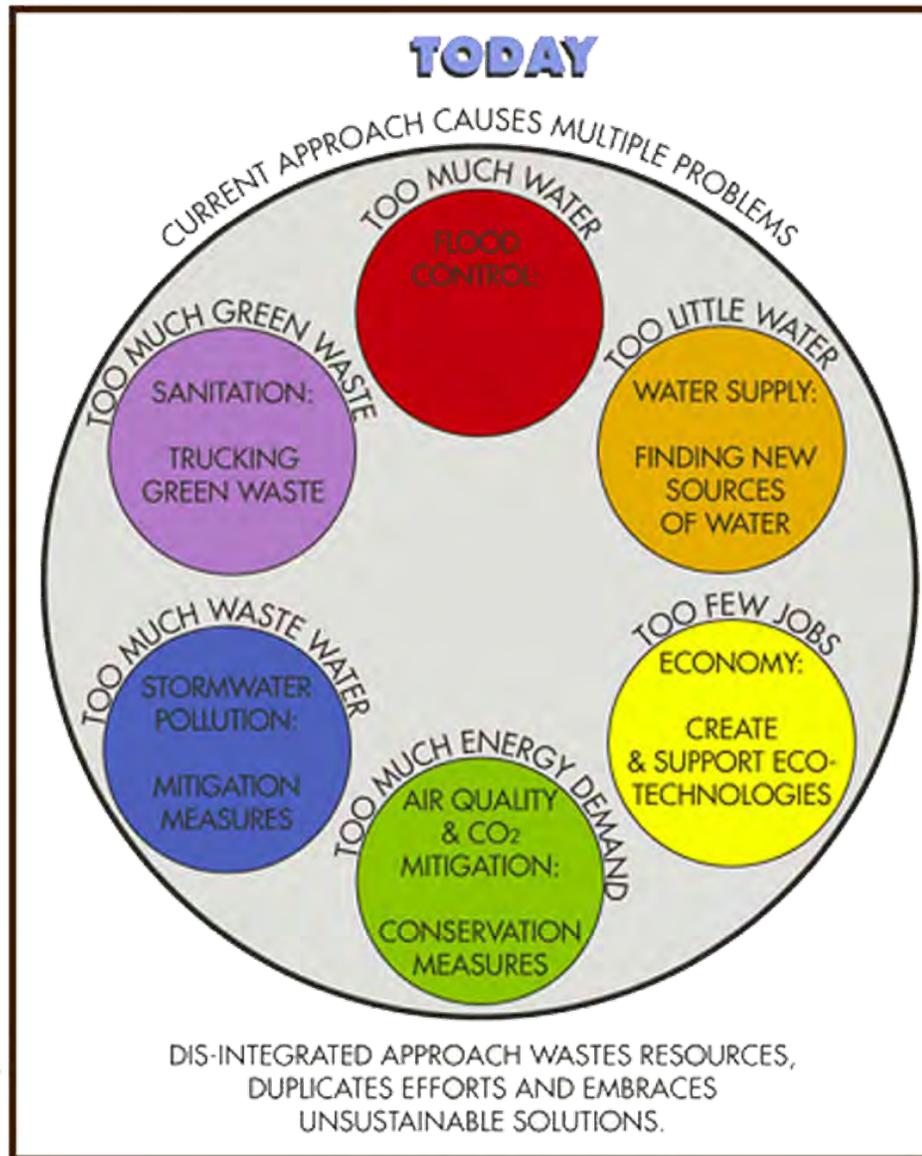
10
Artemia or brine shrimp filter the seawater so that little else remains.

SALT

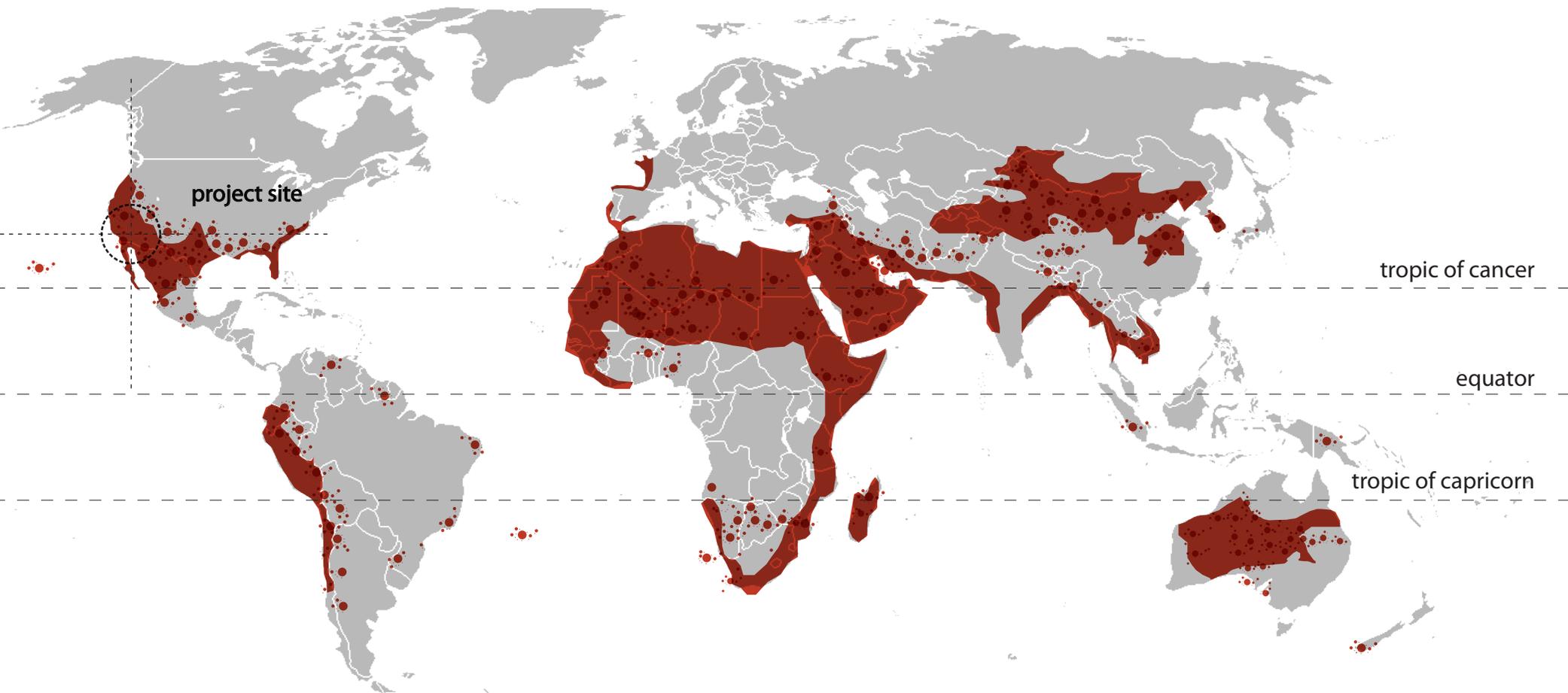


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Seawater is left in shallow pools to evaporate, leaving pure salt to be packaged and sold at market.

H2O Futures Goal: eco-system regeneration



World Map: drylands + salt water accessible



Global Scalability:

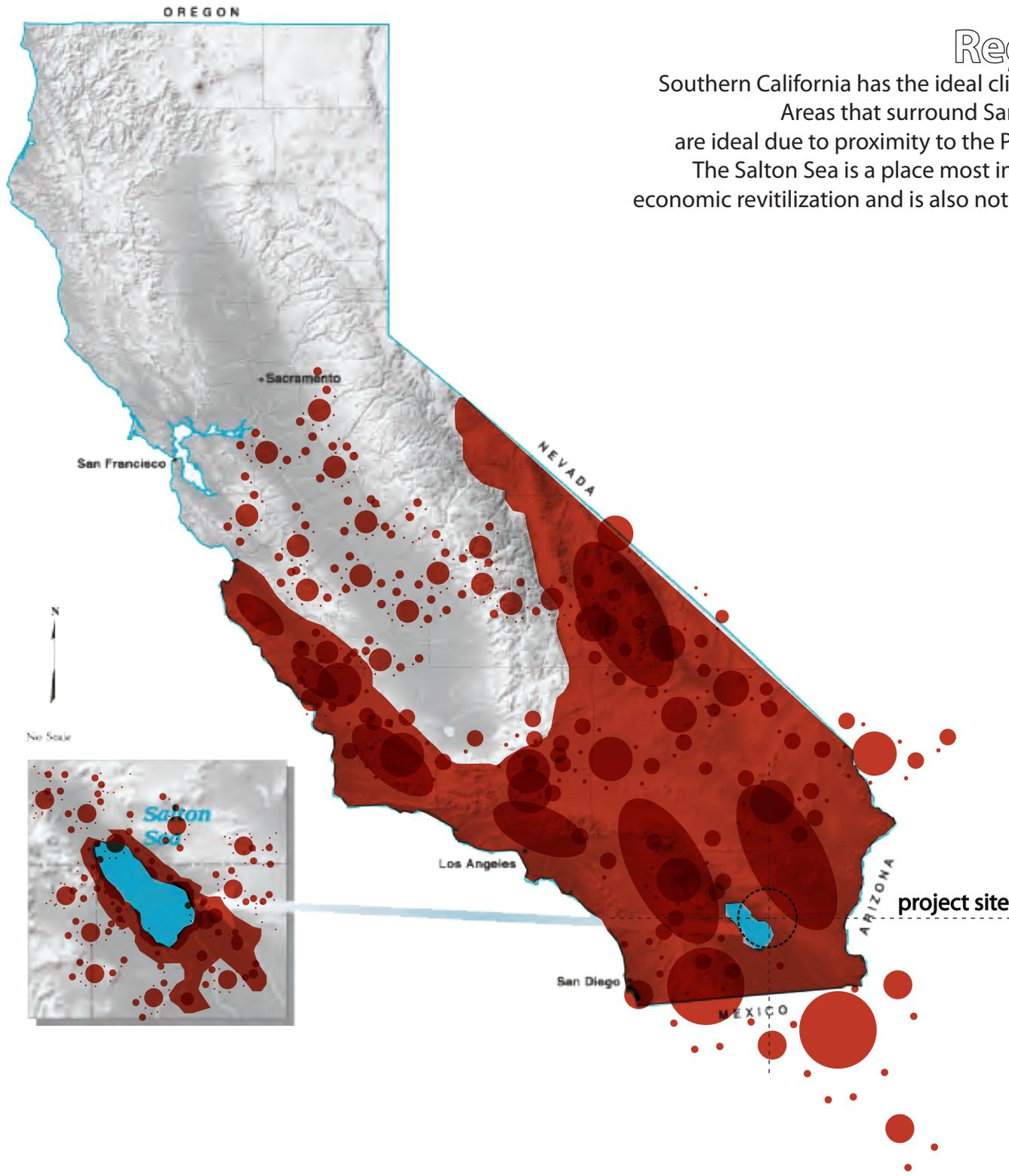
The process of desertification can be inverted into lush marsh land teeming with life.
Cultivating high yielding cash crops such as salicornia can turn fallow land into edens.
This plant can be easily refined into bio-diesel jet fuel for use on the open market.
Gardens could power our next major economic revival by putting communities to work.

Regional Replicability:

Southern California has the ideal climatic conditions for a prototype project.

Areas that surround San Diego, San Bernadino and Los Angeles are ideal due to proximity to the Pacific Ocean abundant salt water source.

The Salton Sea is a place most in greatest need of ecological restoration, economic revitalization and is also not lacking saline water needed for farming.



vicinity map: IDC + Launch Project

Understanding ISAS [Integrated Seawater Agricultural Systems]
ISAS is unlike traditional biofuel (which can displace food products) and food production systems that utilize freshwater and arable land. Rather, an ISAS is a completely closed loop, fully integrated system that combines untreated seawater with arid, desert lands to facilitate the practice of aquaculture and agriculture, yielding biofuels, food and other products. Simply put, a series of manmade seawater rivers and canals are used for aquaculture operations, the effluent from which is then used as a natural fertilizer for halophyte-based (i.e. naturally salt tolerant plants such as salicornia and mangroves) agriculture operations. Collectively, these interdependent aquaculture and agriculture operations yield biofuels (liquid and solid), jet fuel, vegetable oil, seafood (shrimp, fish and sea cucumbers) and a host of co-products including biomass, protein meal, building materials, animal feed and salt.

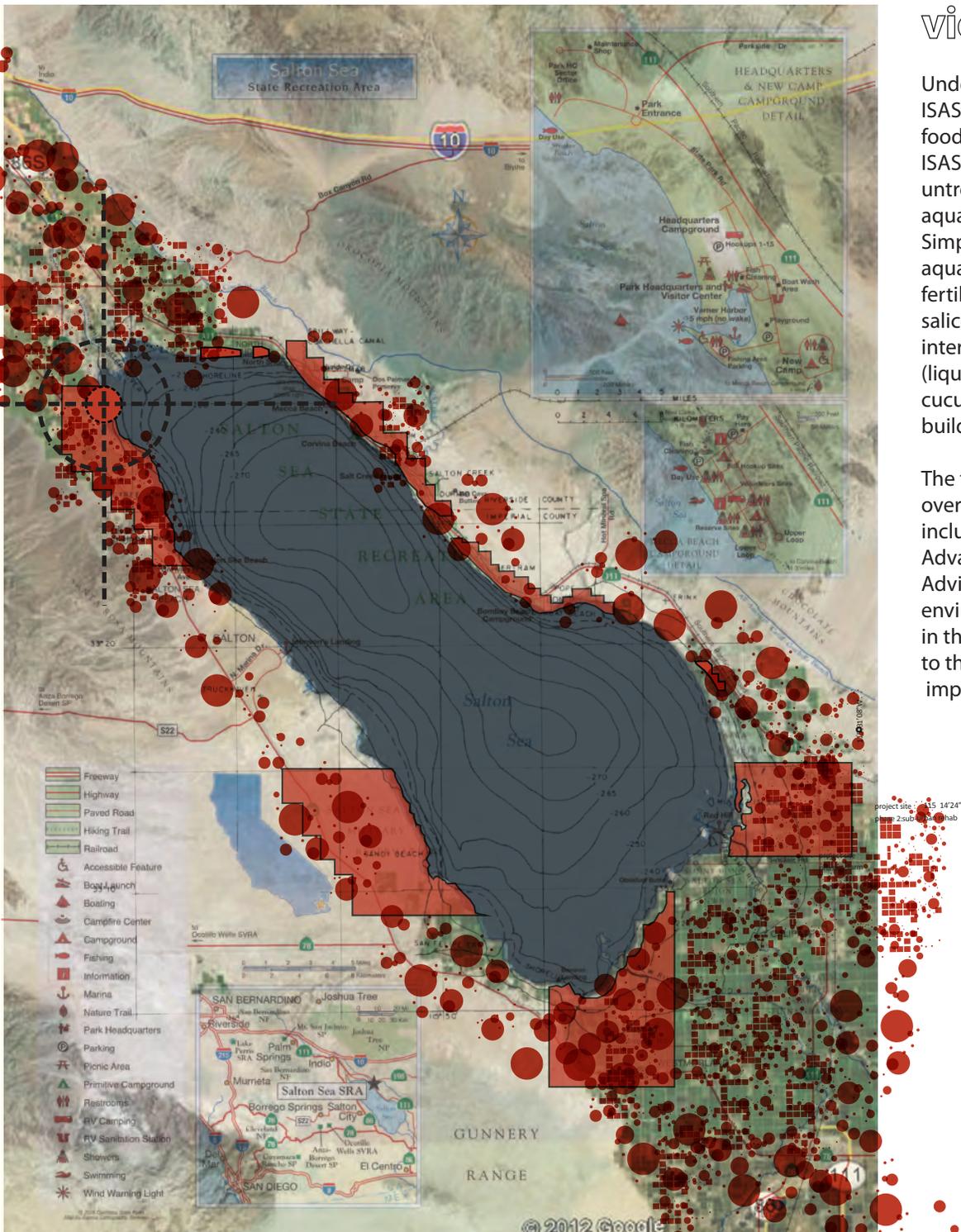
The technologies underlying ISAS have been proven to be sustainable for over thirty years in Mexico and are supported by leading scientific authorities including Dr. Nina Fedoroff, President of the American Association for the Advancement of Science (former US Secretary of State's Science & Technology Adviser) and Dr. Mohamed El Raey, one of Egypt's most renowned environmental physicists. Moreover, ISAS has been demonstrated effectively in the east African nation of Eritrea. We are excited to introduce this technology to the Salton Sea to create habitat, purify water through bio-filters, and most importantly create jobs through eco-development.

Benefits to Salton Sea:

- Employment Creation
- Industry Diversification
- Increase Exports
- Increase Food Security
- Reduced Water Scarcity
- Create Habitat for Fish and Birds
- Increase Land Value
- Convert/Sequester Carbon into rich top soils

Socio-Economic Benefits:

- Bio-Fuel Production
- Productive Desert Land Utilization
- Stemming Rural-to-Urban Migration
- Environmental Enhancement
- Increased Regional Direct Investment





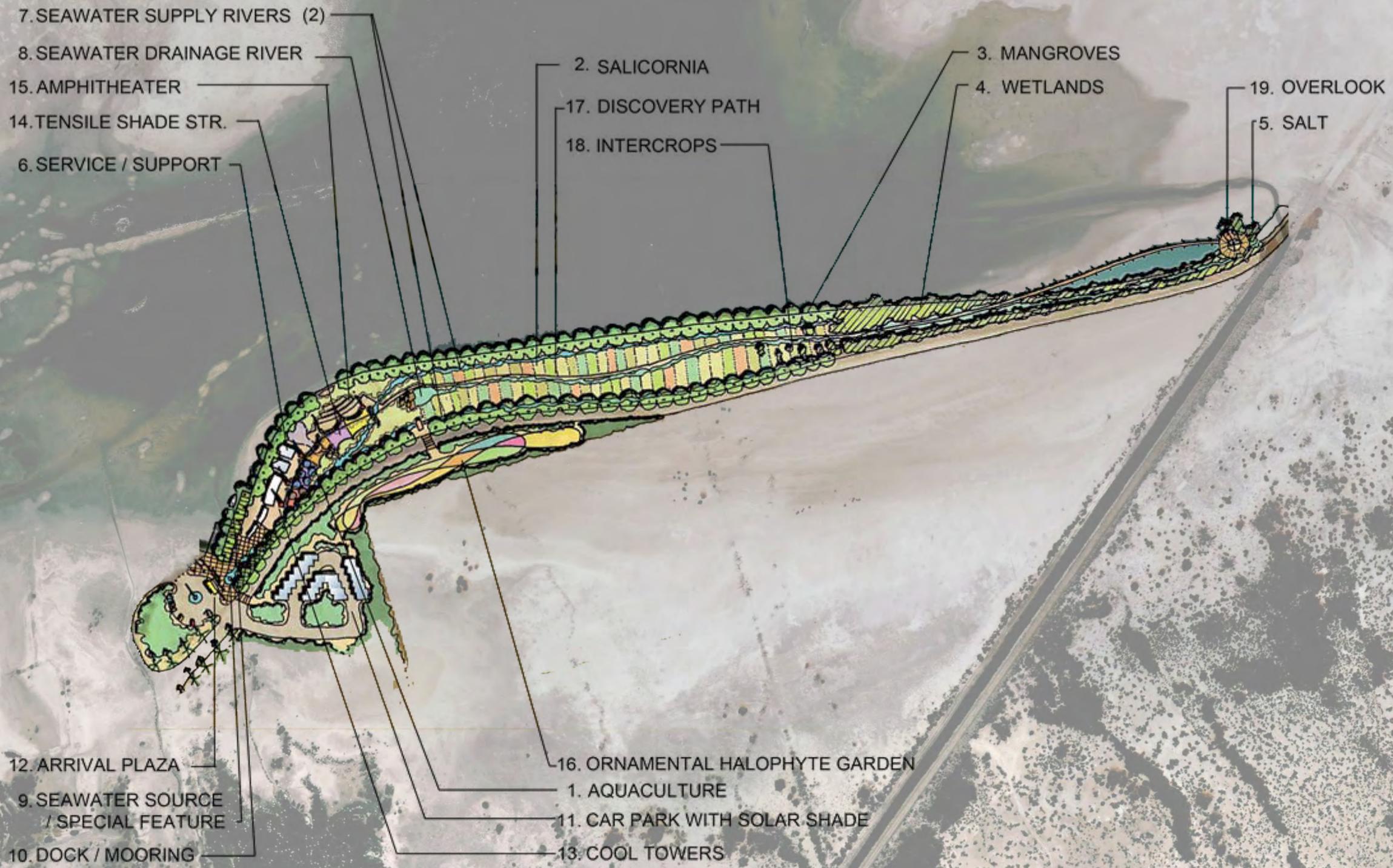
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Salton Sea Farms:
ISAS Discovery Center

Salton Sea Farms:
Launch Project

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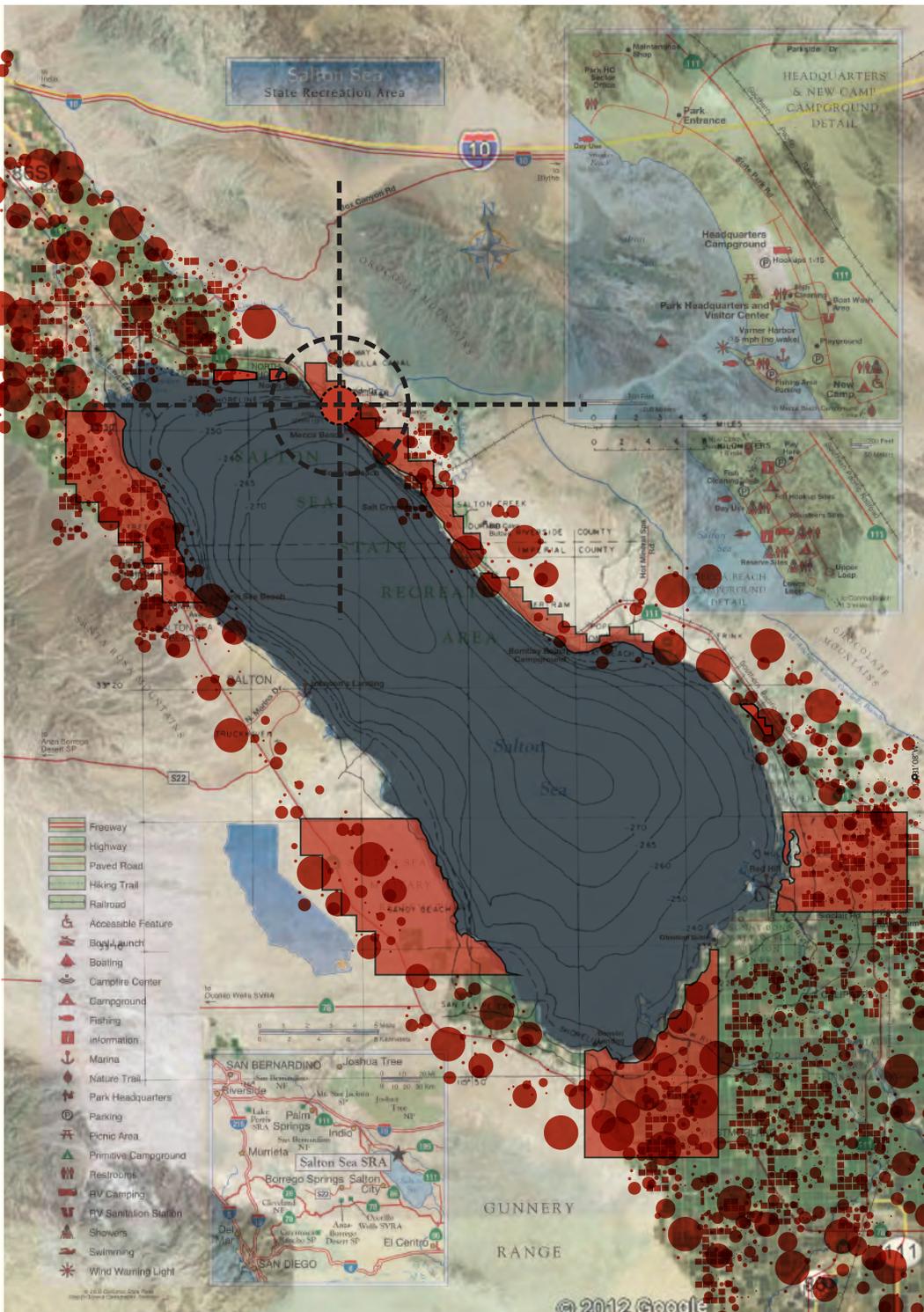




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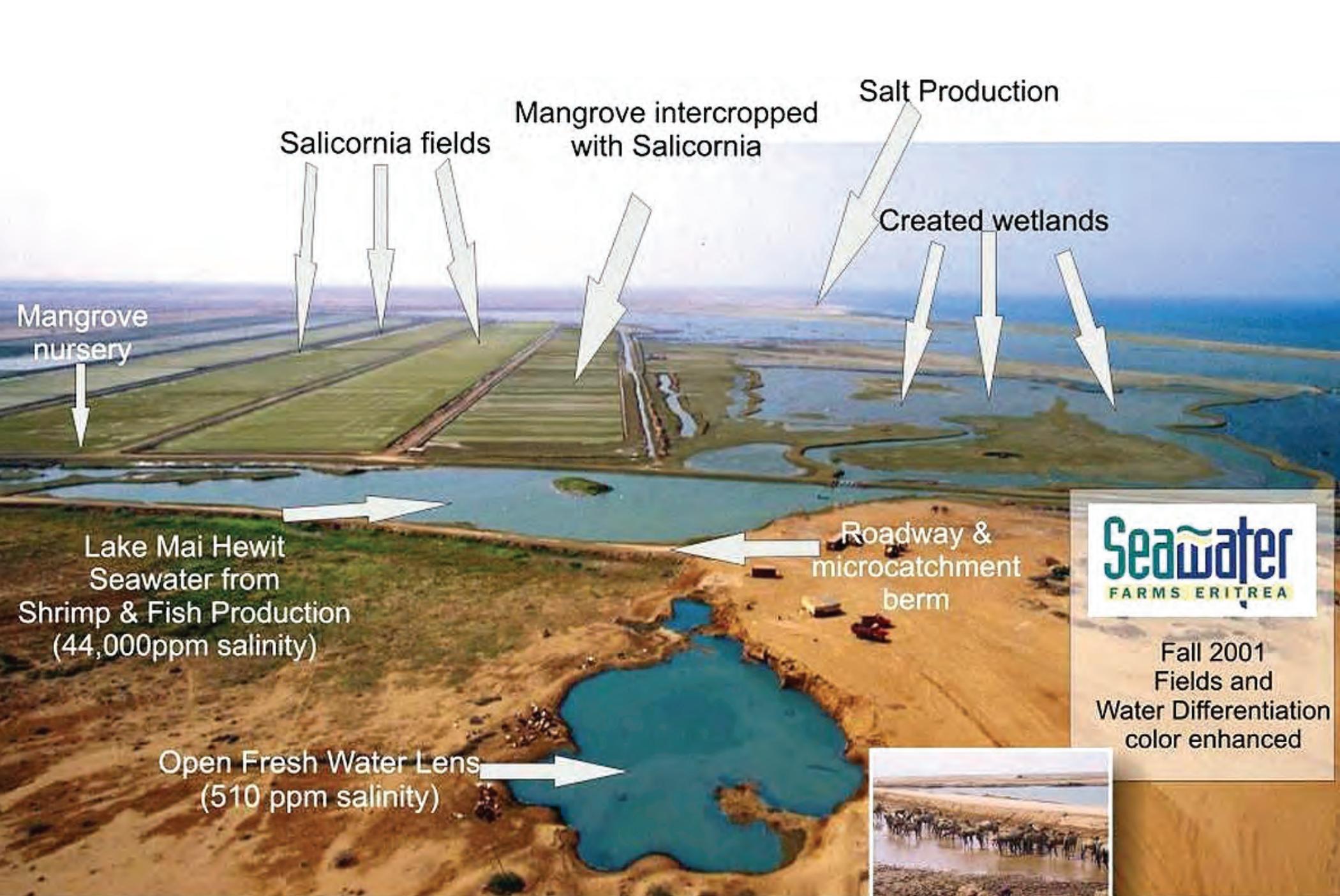


vicinity map: california state park

As the project expands we will be able to open up lease agreement options with staff and supervisors to look at the possibility of being a prospect for funds generation so the visitors center and camp grounds are financial independent and/or profitable. The Park and Rec owns and operates 17 miles of beach front along the sea coast as well as many more acres inland.

This will be an area of high visibility and effectively open the lines of communication with the state and federal government. This can be a pilot project to show how we can put our citizens back to work, create fuel self sufficiency and enhance the local eco-systems while turning a profit.

project site: 35 14'24"N
Range 22sub 01hab



Mangrove nursery

Salicornia fields

Mangrove intercropped with Salicornia

Salt Production

Created wetlands

Lake Mai Hewit
Seawater from
Shrimp & Fish Production
(44,000ppm salinity)

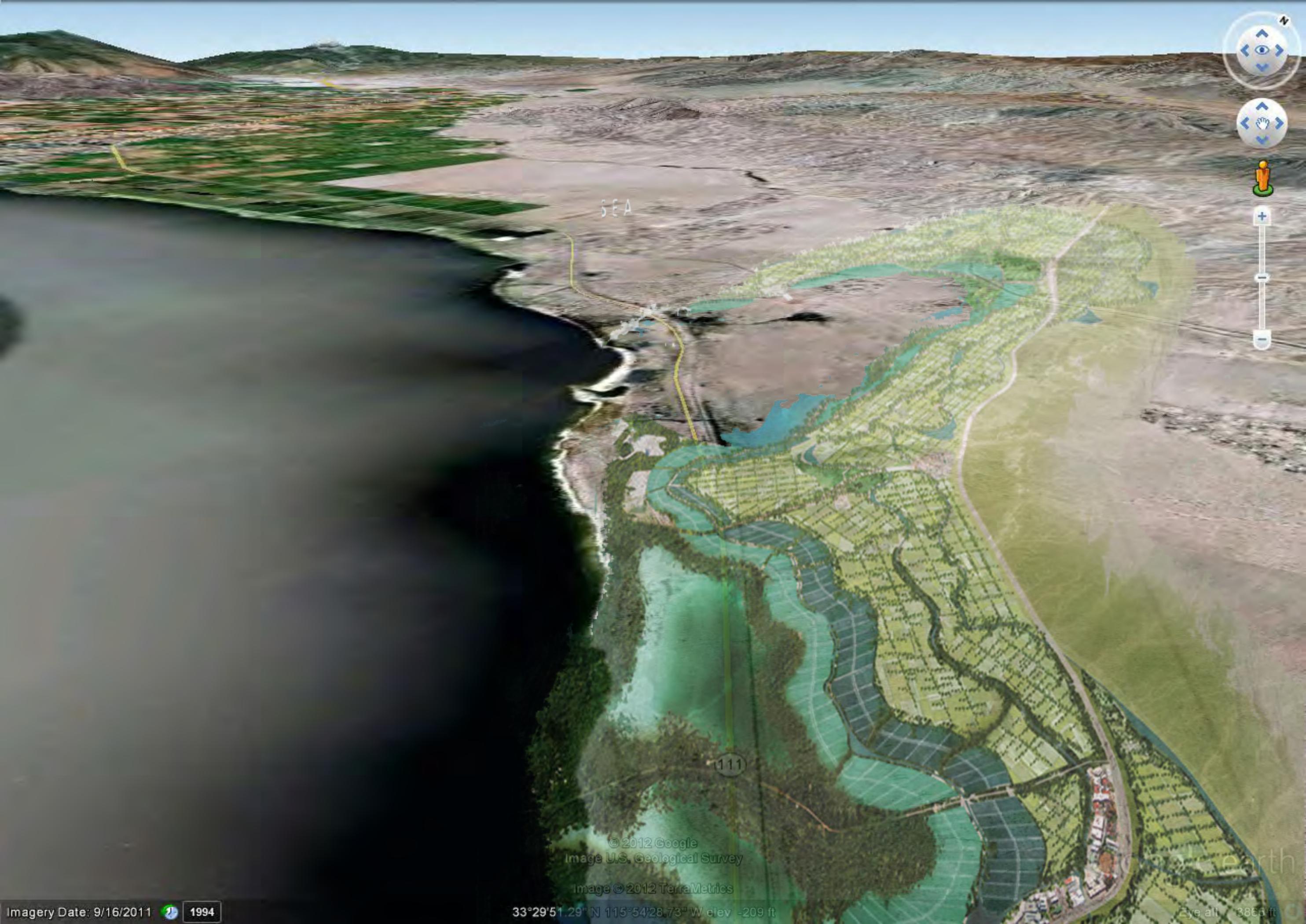
Open Fresh Water Lens
(510 ppm salinity)

Roadway &
microcatchment
berm

Seawater
FARMS ERITREA

Fall 2001
Fields and
Water Differentiation
color enhanced





SEA

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© 2012 Google
Image U.S. Geological Survey
Image © 2012 TerraMetrics



JQ Way, Sag

Marina Dr

© 2012 Google

Image U.S. Geological Survey

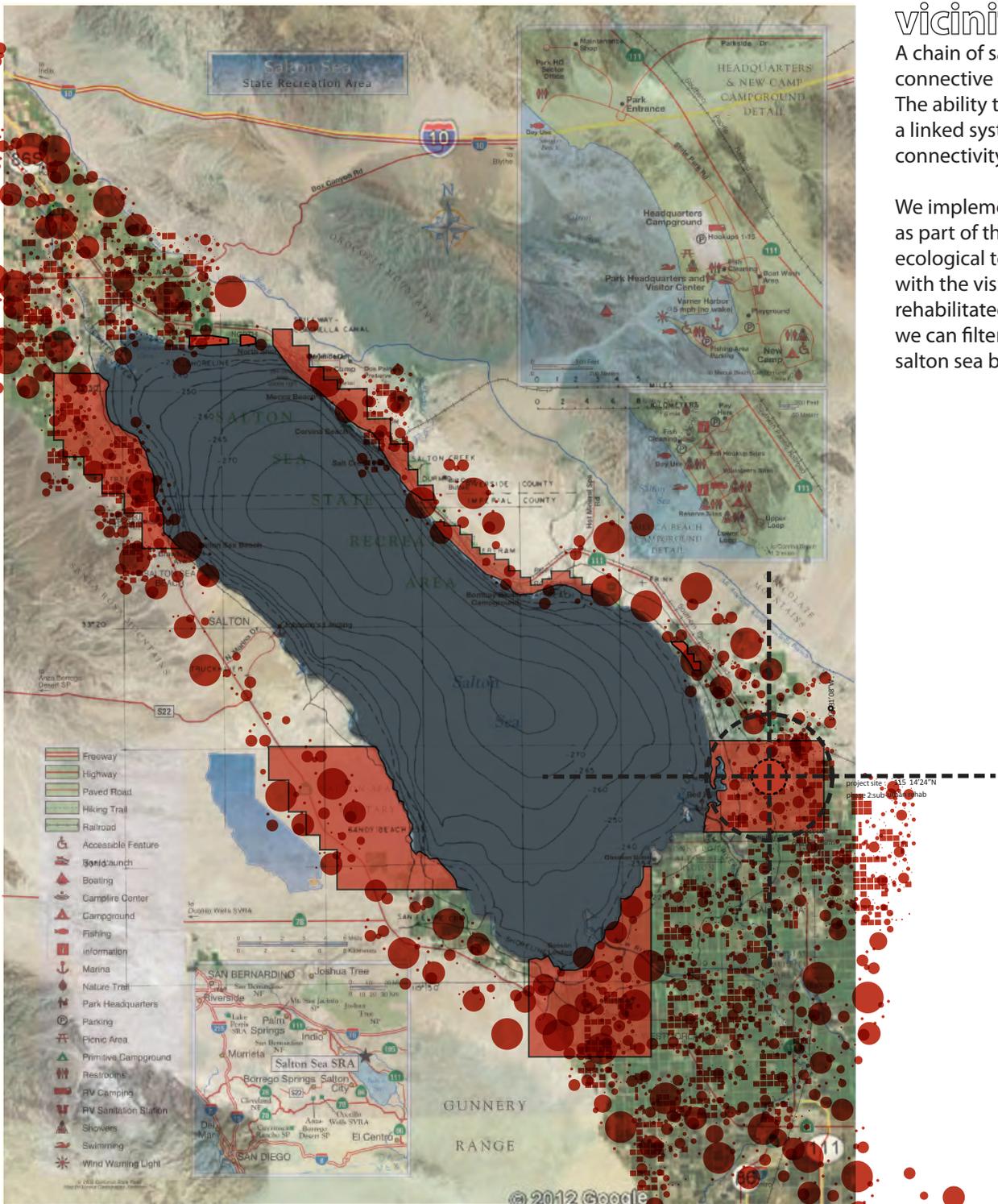
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JG Way, Sag

Marina Dr

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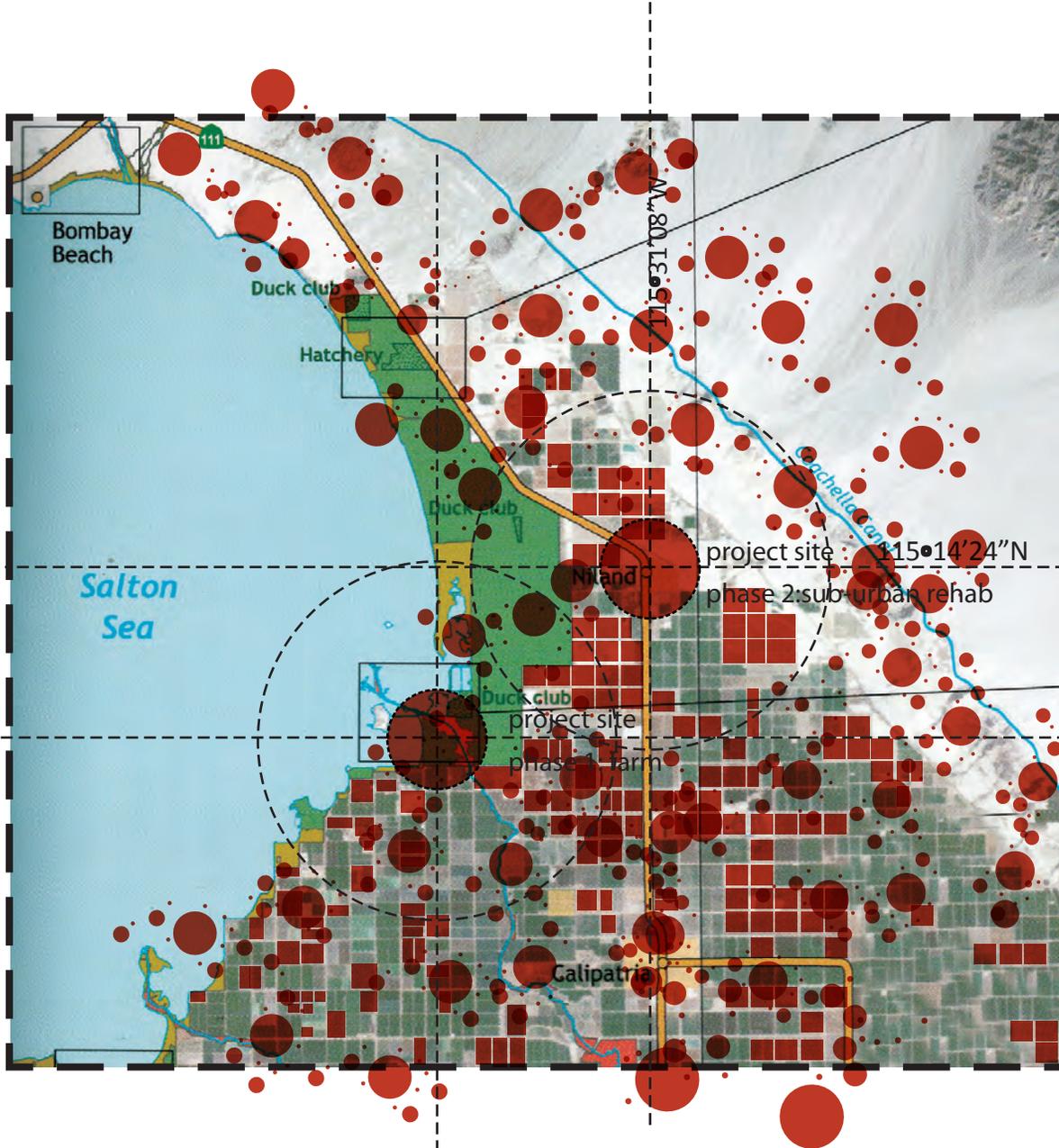
vicinity map: downtown niland

A chain of saline aqueducts will link individual farms into a larger connective network that feeds from and into those before and after. The ability to pass knowledge, supplies, and products easily through a linked system of nodes will help bring a sense of community and connectivity to residents, farmers and consumers.

We implement interventions along major veins that service the area as part of the demonstration. Turning desolate arid deserts into thriving ecological tourist destinations. This area as long since been stigmatized with the vision of death and plague can be reinvented and rehabilitated into a recreational hub. Through the use of salinated water we can filter and reintroduce fresh water to restabilize salinity levels in the salton sea by means of plants, animals and human ingenuity.

Local Context:

The solution is to apply the virtually infinite resources of sunlight, water (salin, storm and 'waste'), soil and human intelligence to enhance natural bio-ecological process for abundance. This template for DRYLANDS COMMUNITIES creates replicable change by encouraging NEW MINDSETS and EMPOWERING SOCIO-ECONOMIC / ENVIRONMENTAL RESPONSIBILITY: We start with cost effective implementation measures for ecological stabilization, remediation, and proliferation while concurrently creating opportunities for economic investment options and through showcasing lowtech means of energy production.



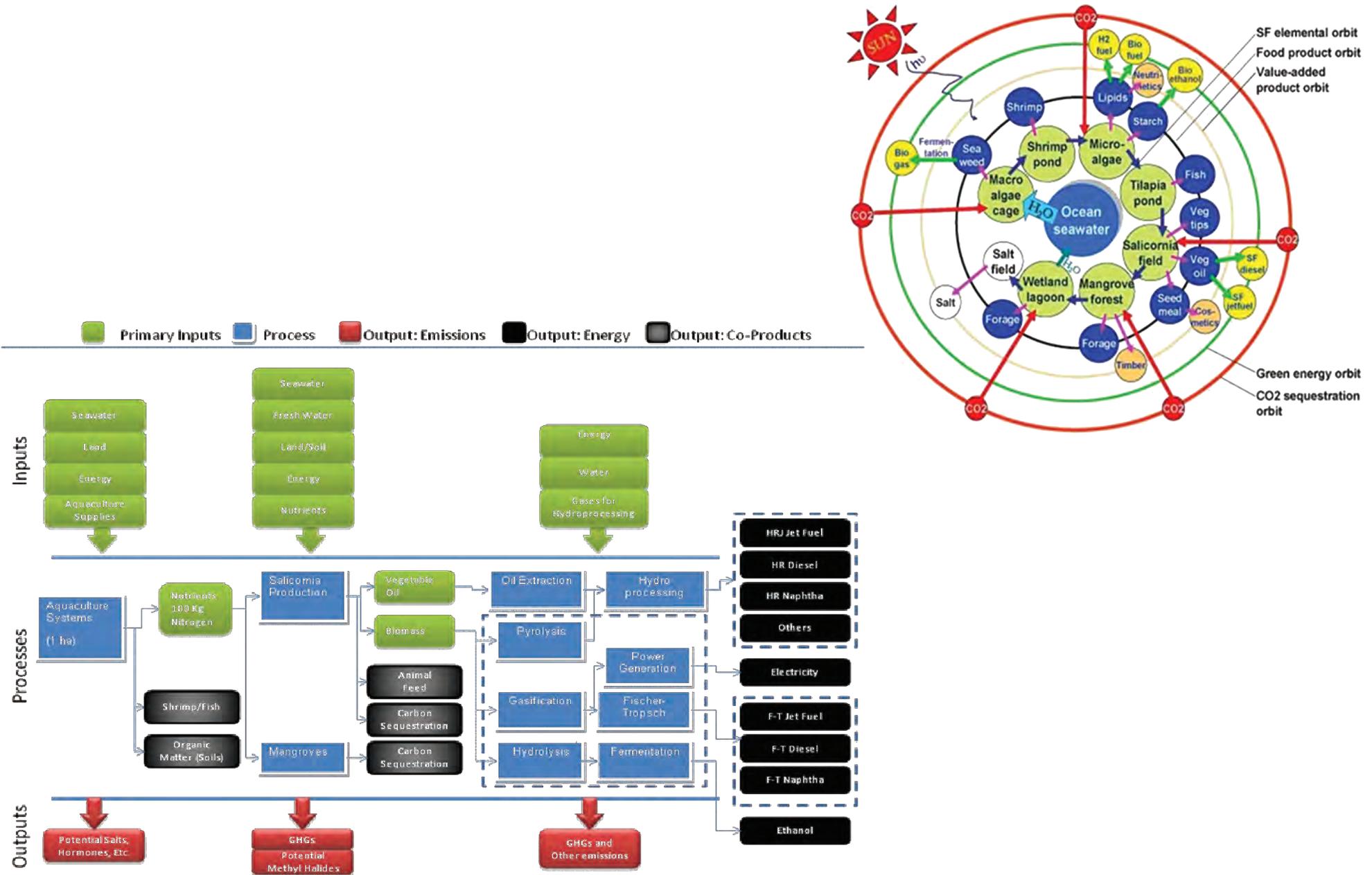
phase 1: the farm

The most cost effective means of launching this product and production initiative is by means of planting and exhibiting on site. While production and marketing strategies are launched. Many of the agricultural are no longer in use due to the price of water, set to double in the next year, as well as the diminished demand for local produce. Since the Salton Sea will be our water source we eliminate this cost and provide seminars to local farmers to start production of salicornia, talapia, shirmp, mangrove trees and a large spectrum of fruits and vegetables using filtered salin water.

phase 2: sub-urban rehab

Through extensive socioeconomic analysis we have discovered an impoverished and opportunity for rehabilitation of the area known as Niland. This will become a new hub for salin farming demonstrations, sustainable desert housing prototypes, ecological and economic stimulation. By transforming a degraded ecosystem into a thriving marsh land will convert fallow and unused area into export hubs. Each micro hub will feed from and back into the larger network. Local farmers markets will be a place for exchange of local produced goods. Bio-diesel fuel production can be use locally as well as regionally and globally for planes, trains and automobiles. This education, farming, production and distribution methodology can then spred to other arid climates globally.

[[ISAS] Integrated Seawater Agriculture Systems: diagrams

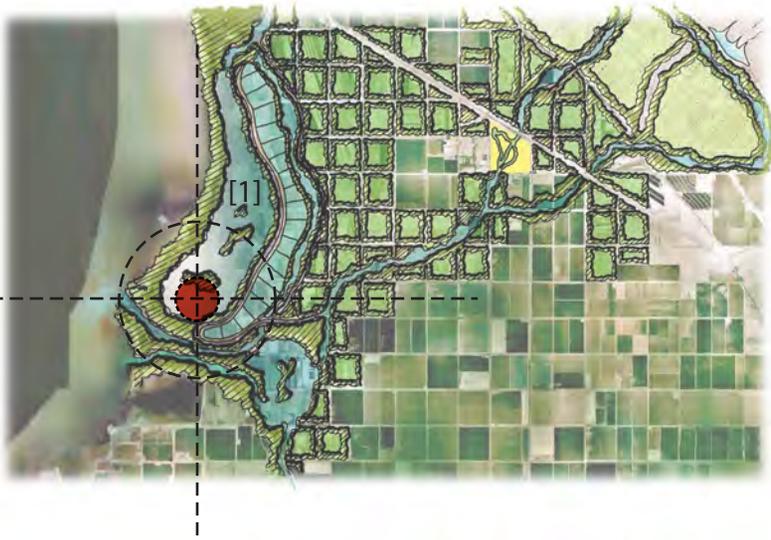


*ISAS PRODUCT FLOW DIAGRAM

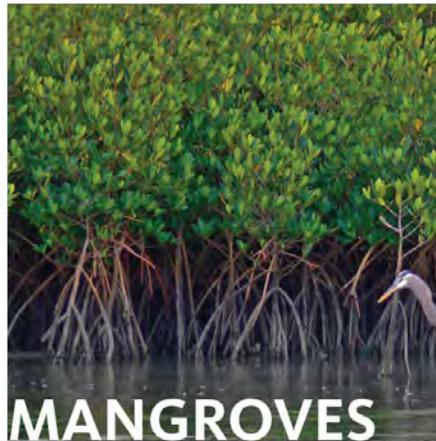
phase 1: farm and marsh land site plan



phase 1_step 1: mangrove wetlands

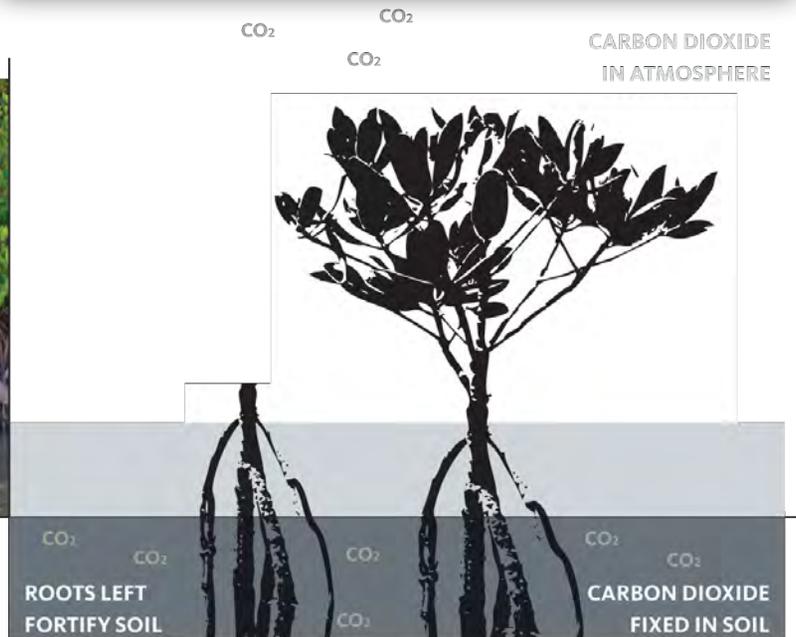


15 tons/h
CARBON CREDITS



MANGROVES

TO MEET THE CHALLENGES OF CLIMATE CHANGE, NOT ONLY WILL THE RATE OF CARBON EMISSIONS HAVE TO BE BROUGHT UNDER CONTROL, BUT CARBON WILL NEED TO BE TAKEN OUT OF THE ATMOSPHERE. **THE MANGROVE FORESTS PERMANENTLY SEQUESTER LARGE QUANTITIES OF ATMOSPHERIC CARBON**, THEREBY REDUCING THE GREEN HOUSE GAS LEVELS IN THE ATMOSPHERE. FURTHERMORE, CARBON SEQUESTRATION RATES CAN BE TAILORED FOR SPECIFIC ENVIRONMENTAL OR CARBON BENEFIT ASSOCIATED WITH THE PORTFOLIO.



phase 1_step 2: talapia farming



phase 1_step 3: salicornia production

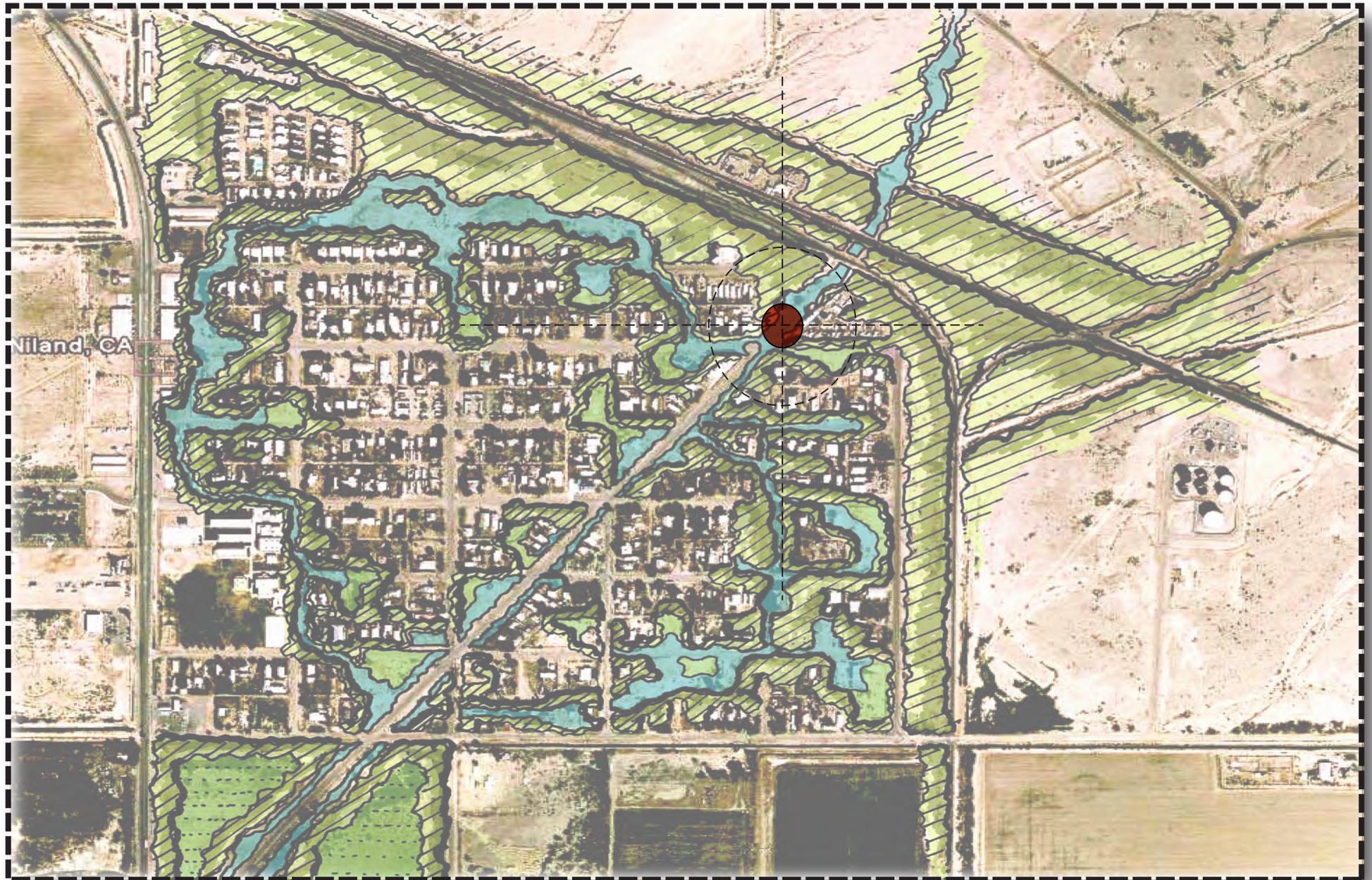


phase 2: downtown niland rehab goals

Community:

- Immediate job creation
- Sense of worth given to citizens
- ability to cultivate communal + individual farms
- educate residence with a trade
- create local refineries to boost micro economy
- start the stewardship of salton sea by citizens
- start with a single low-cost site to showcase
- digitally + physically link residence together on a monitoring database to show net zero energy use, amount produced, income generated.

phase 2: city of niland proposal

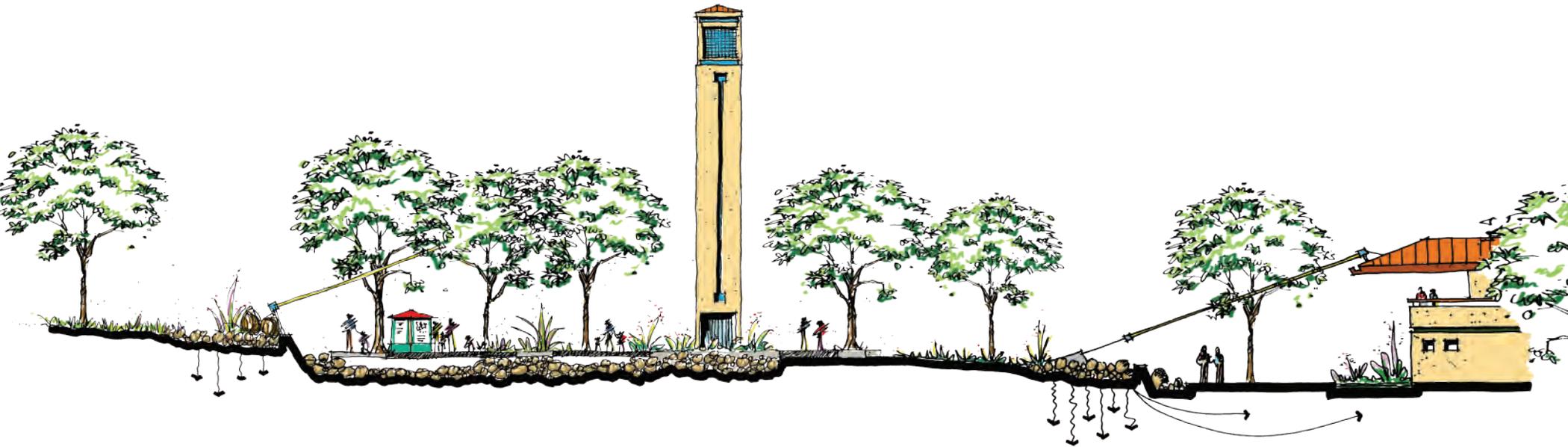


phase 2: downtown niland rehab



*DOWNTOWN NILAND SALT / FRESH WATER PONDS + CANNALS + FARMS

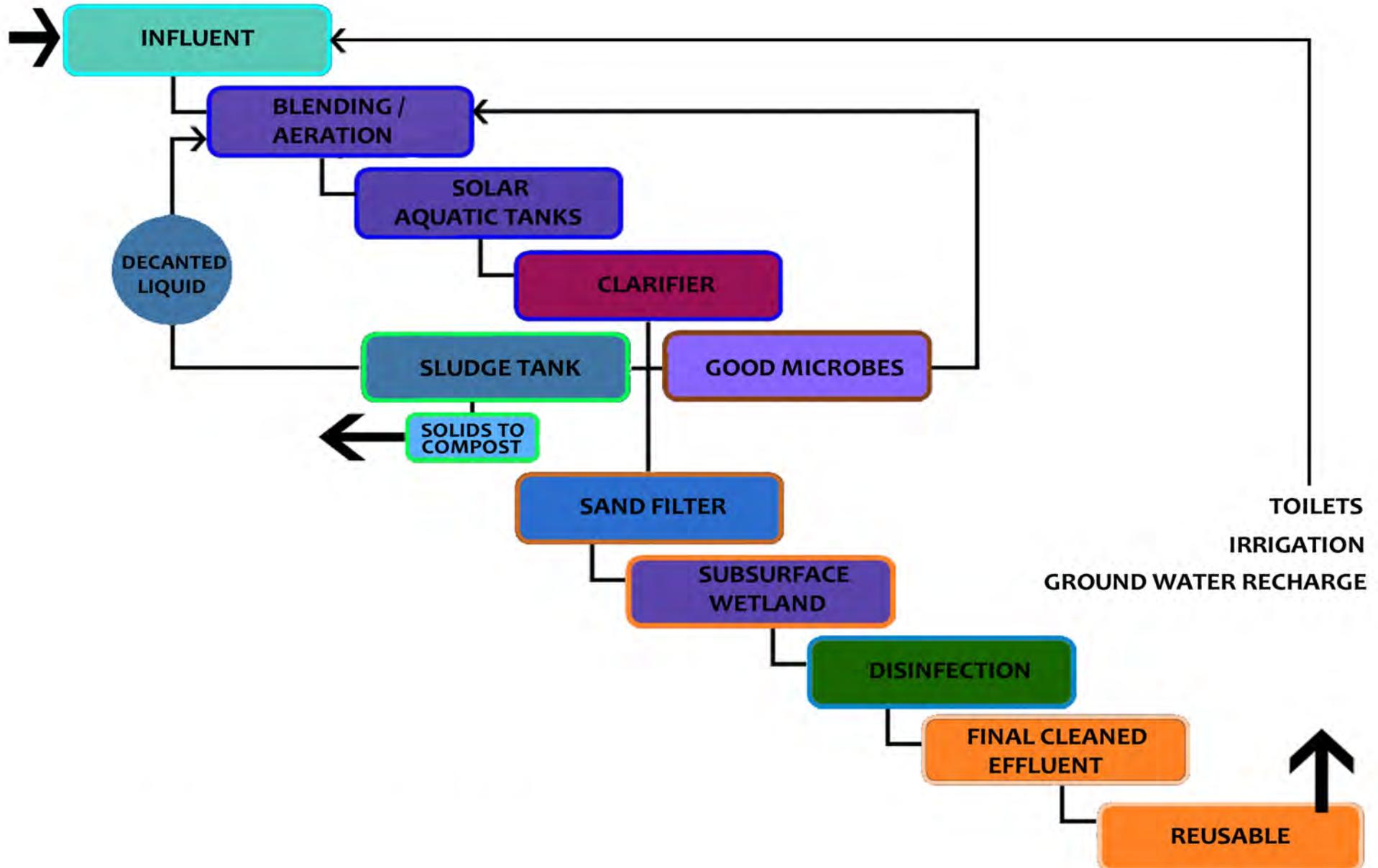
downtown niland: civic core_rendering + section



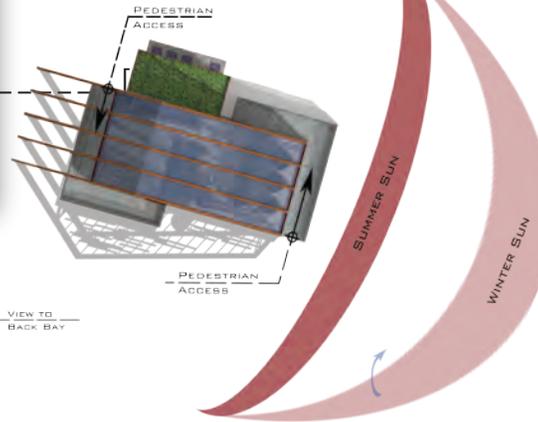
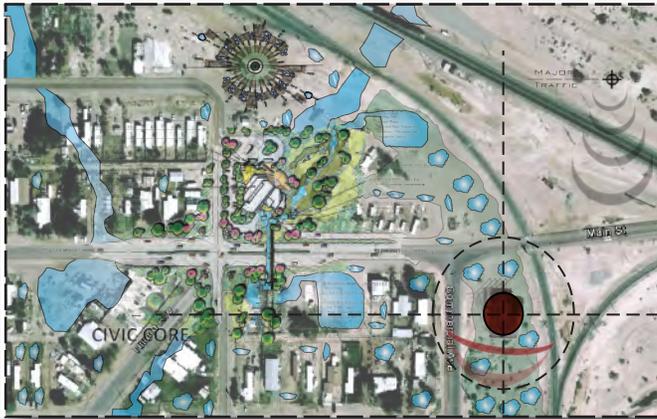
downtown niland: pocket park + lagoon



[sabr] solar aquatic bio-remediation center: process diagram

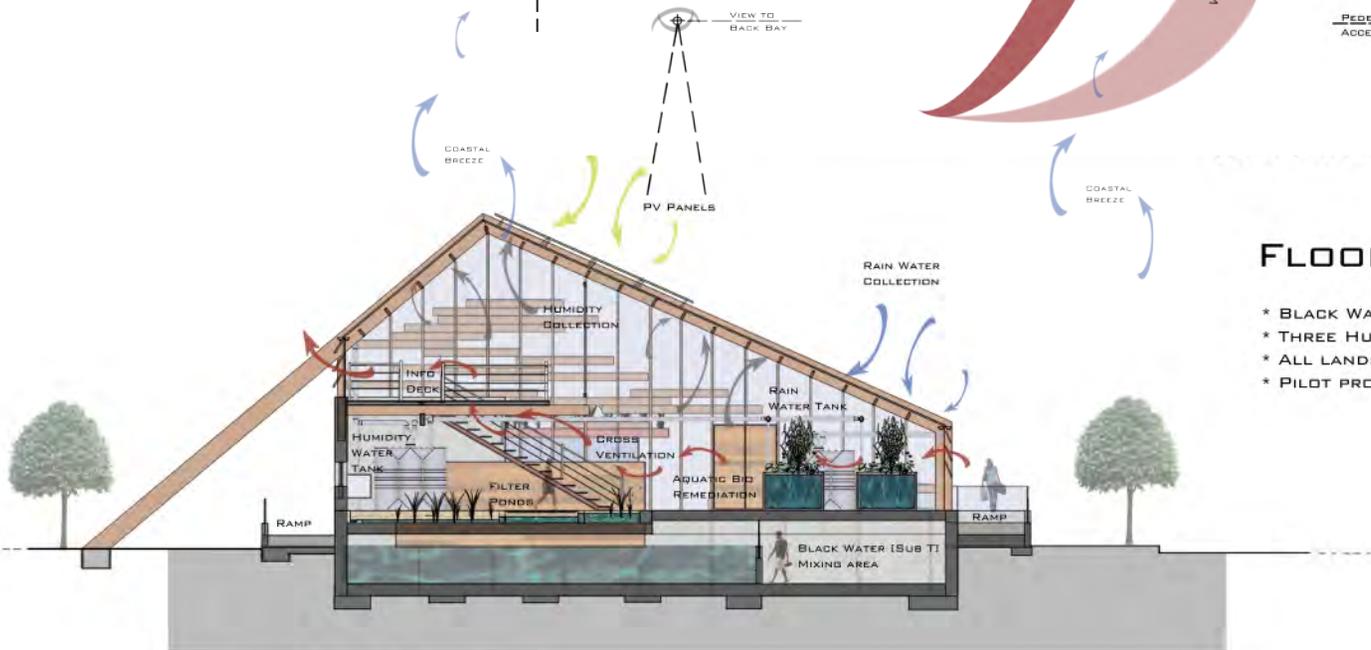


[sabr] solar aquatic bio-remediation center



FLOOR PLAN [LEVEL 1]

- * BLACK WATER IS FILTERED ON SITE FROM PUMP STATION NUMBER 2
- * THREE HUNDRED GALLONS CAN BE TREATED PER DAY
- * ALL LANDSCAPE WILL UTILIZE PURIFIED WATER FROM THE SABR CENTER
- * PILOT PROJECT FOR LARGER WASTE WATER TREATMENT FACILITIES



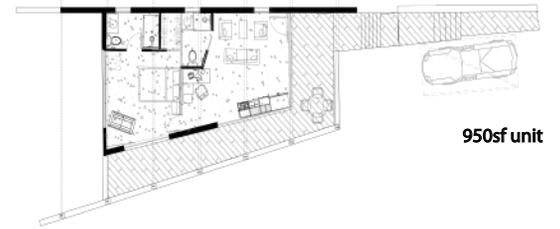
NORTH / SOUTH SECTION

- * RAIN WATER COLLECTION [1ST PHASE OF RECLIMATION]
- * HUMIDITY COLLECTION IS A NATURAL PROCESS IN THE GREEN HOUSE AND DRIPS DOWN TO SPOUTS [2ND PHASE OF RECLIMATION]
- * PHOTO VOLTAIC PANELS WILL COLLECT SOLAR ENERGY TO POWER OUR TREATMENT PLANT [1ST PHASE OF ENERGY PRODUCTION]
- * CROSS VENTILATION LOUVERS ALLOW THE HOT AIR TO FLOW OUT AND DRAW COOLER AIR IN [2ND PHASE OF ENERGY SAVINGS]

[sabr] solar aquatic bio-remediation center: renderings



desert housing: case study development [plans + sections]

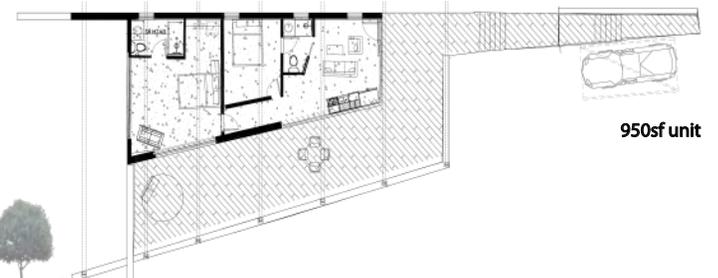


950sf unit

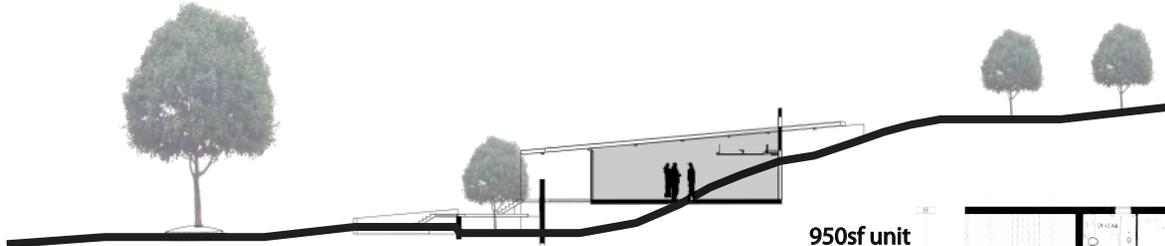


550sf unit

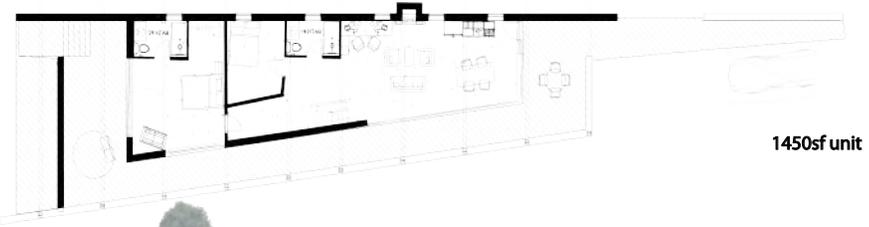
750sf unit



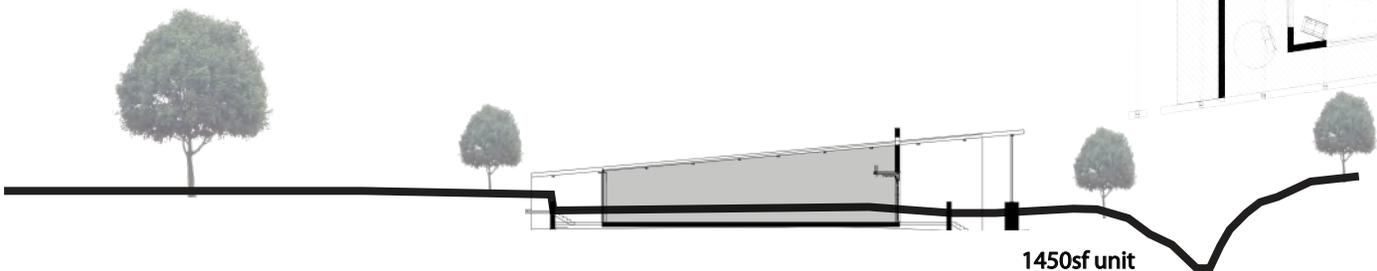
950sf unit



950sf unit

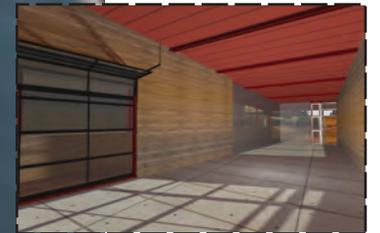
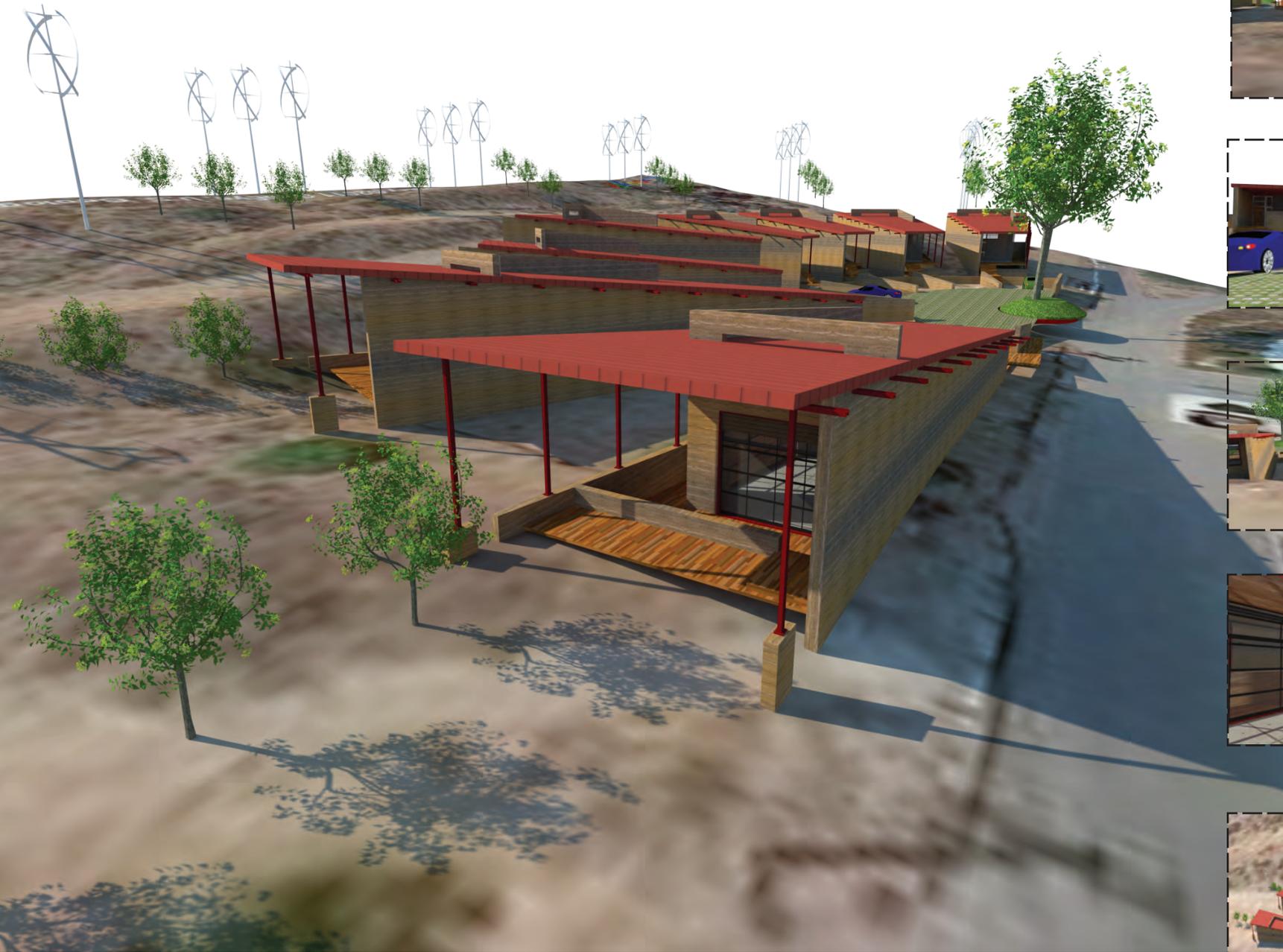


1450sf unit



1450sf unit

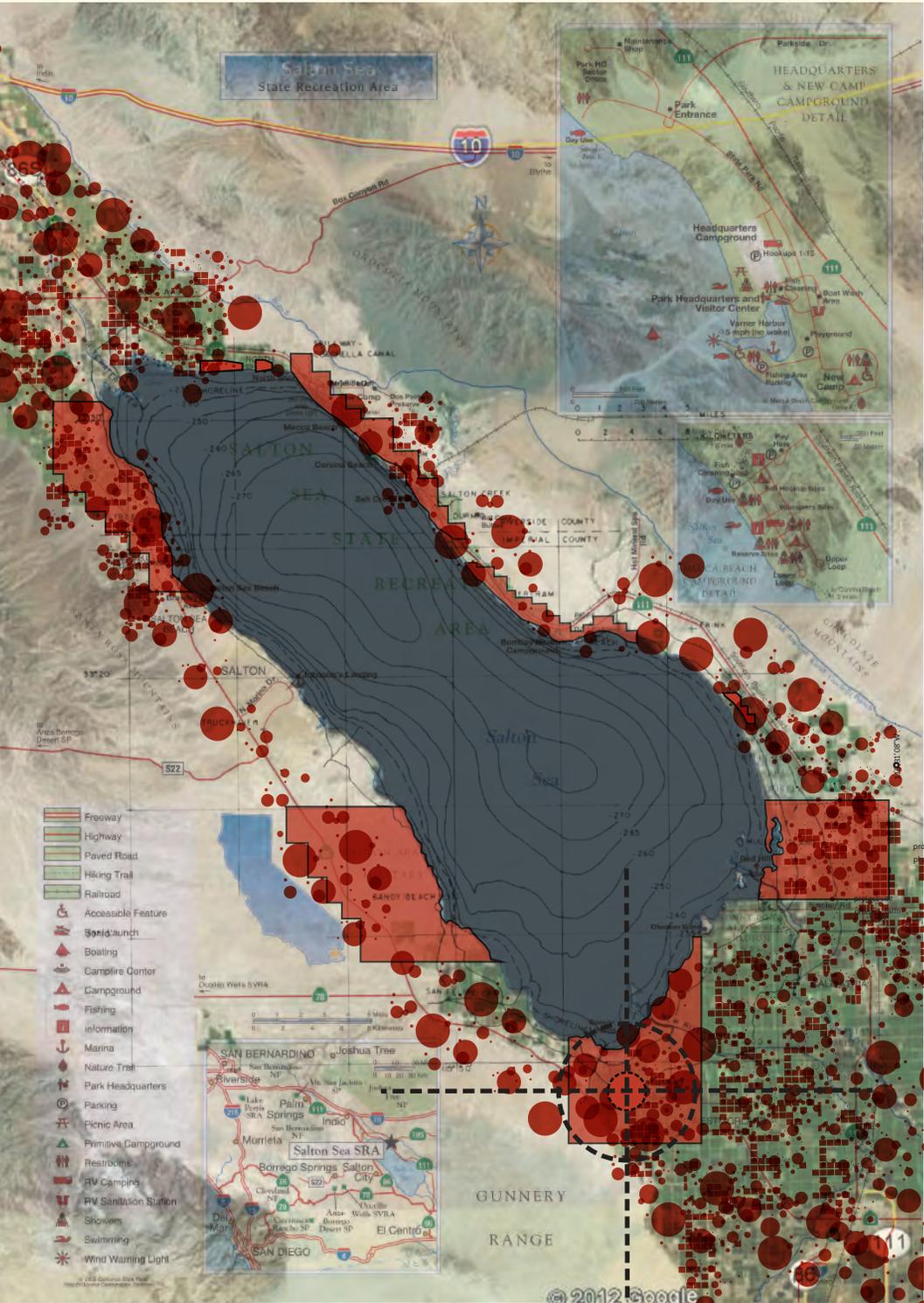
desert housing: case study development [renderings]



vicinity map: sonny bono farms

On the southern end of the Salton Sea we find many opportunities for interventions. The ability to have access to large areas of fallow land may be the best place to start interventions. The Imperial Water District has offered large areas along the coast at a minimal lease fee if our team is able to mitigate the blowing sand as the sea recedes.

We will not only mitigate blowing sand but can also filter the sea water through our plants and return it cleaner than it entered. The geothermal operations that are currently in use have to pull salt water from under ground treat and reinject into the soil. We may be able to collect income by being the treatment plant and charge them half of what it costs to treat and reinsert.

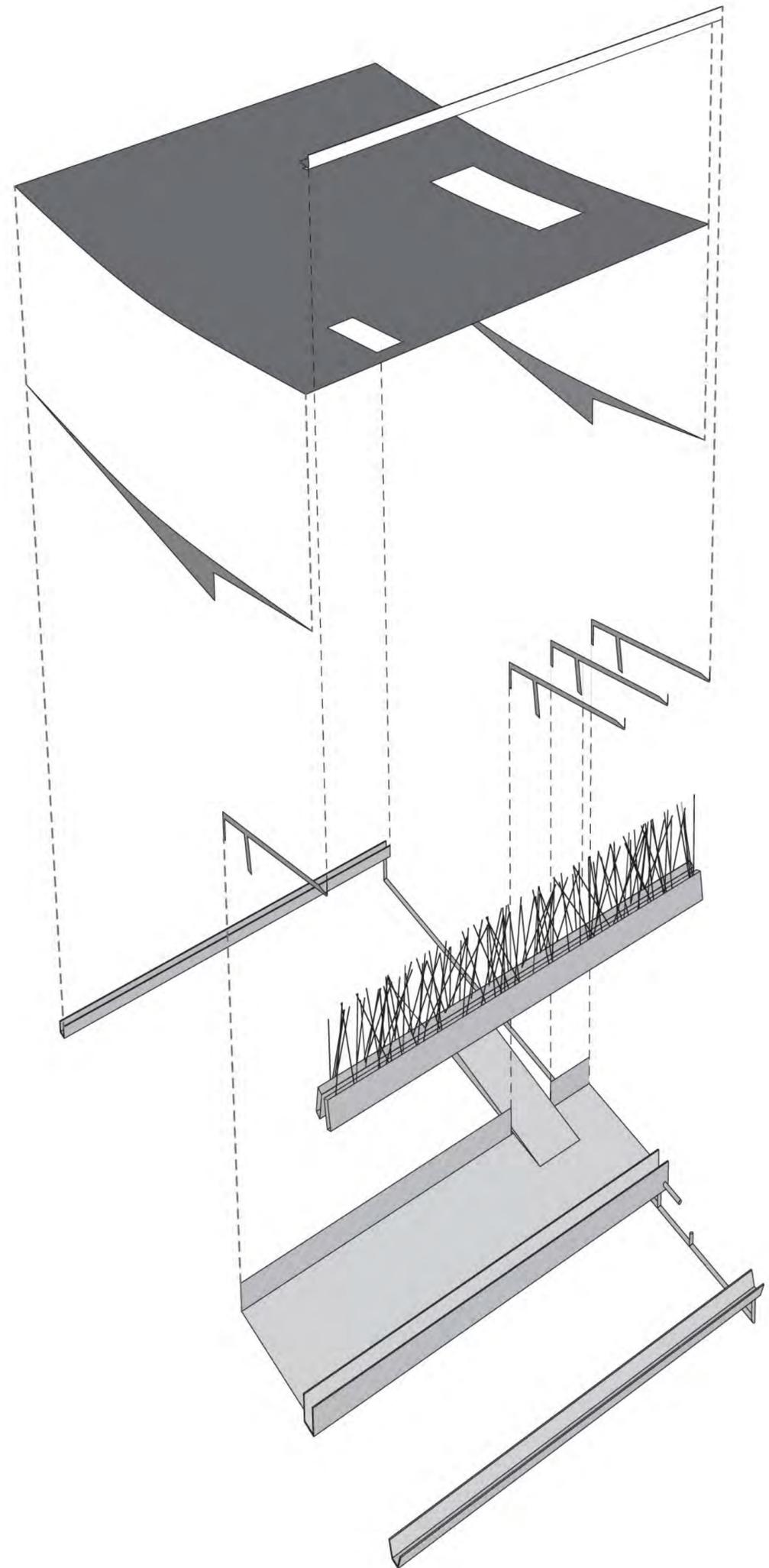
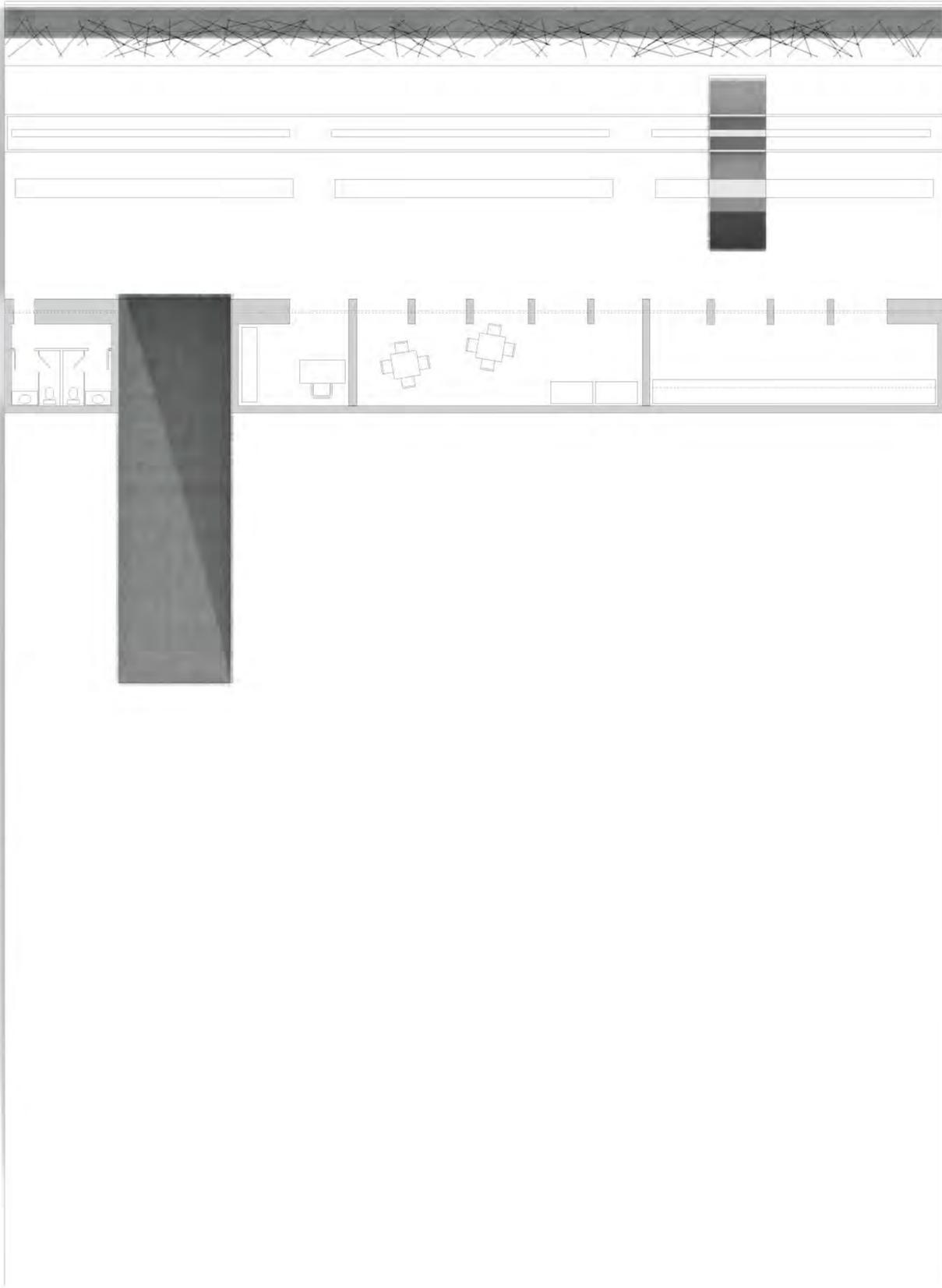


project site 35 14'24"N
range 2 sub 10 hab

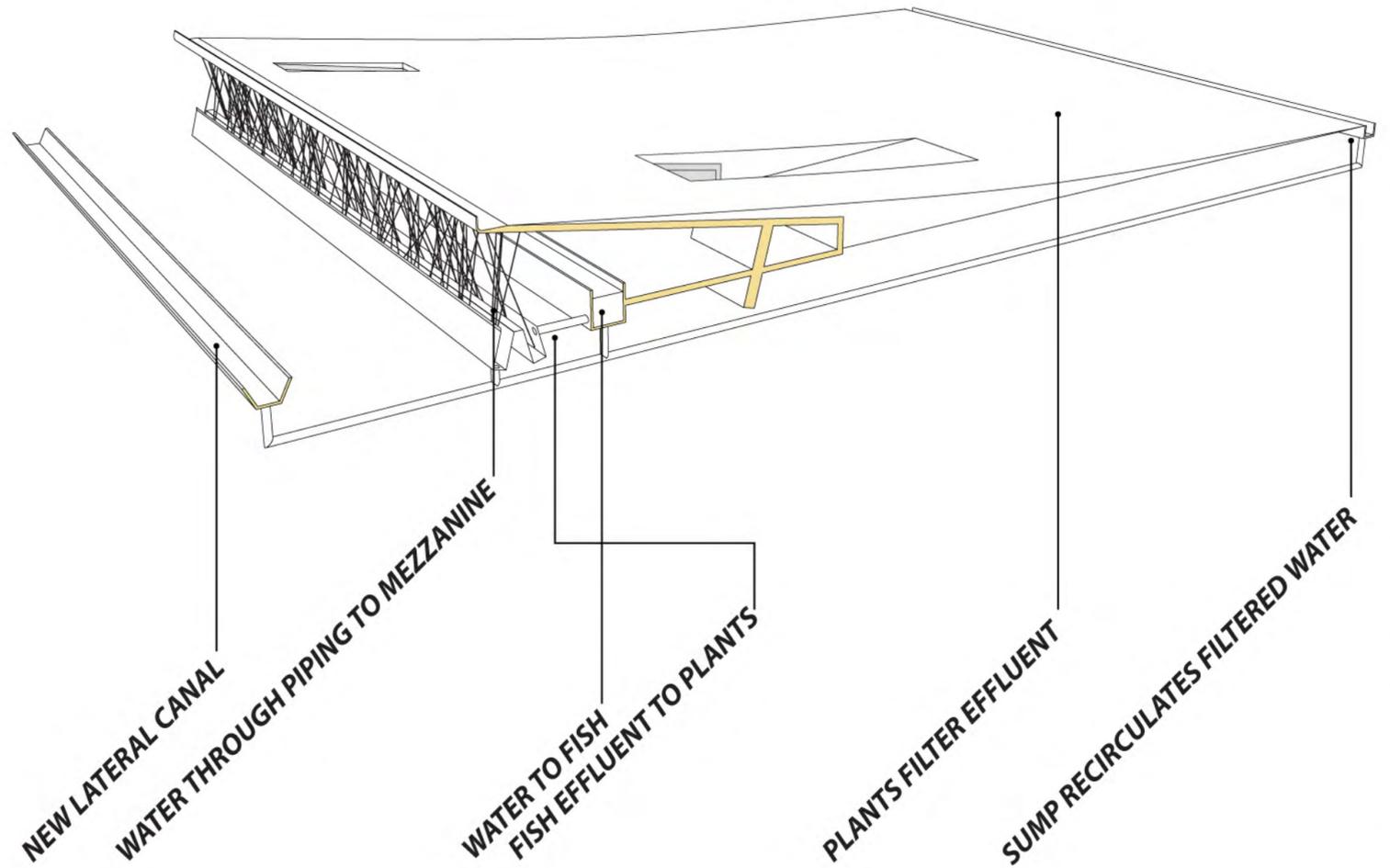
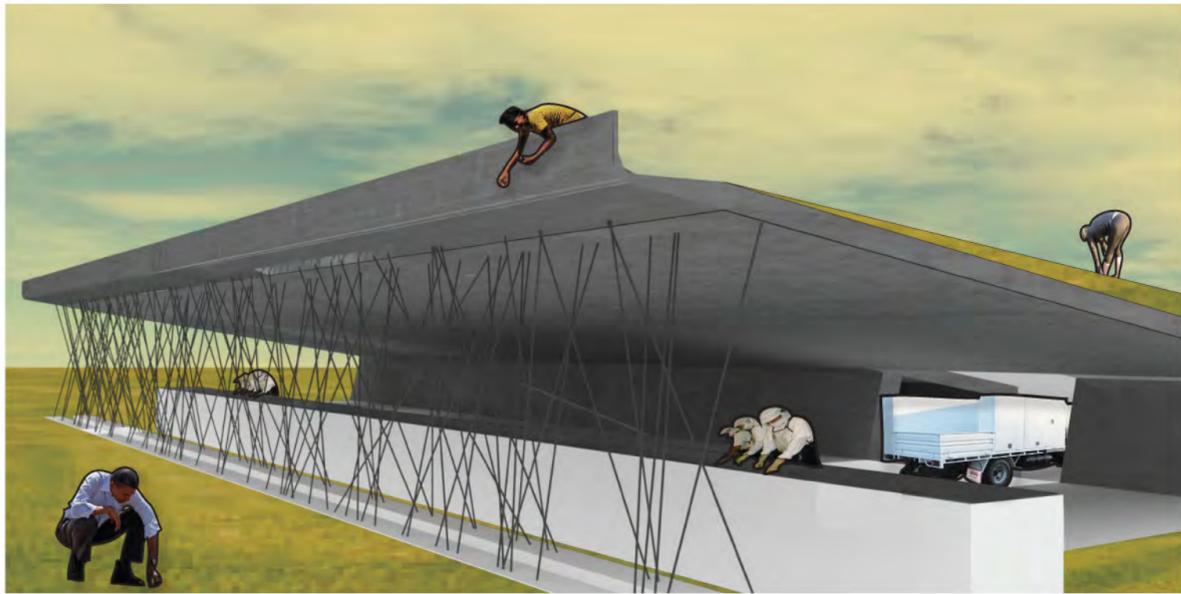
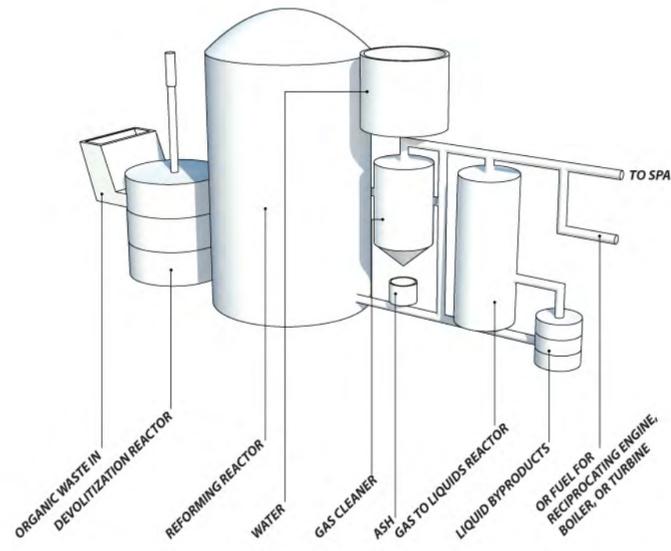
SALTON SEAFARM NETWORK

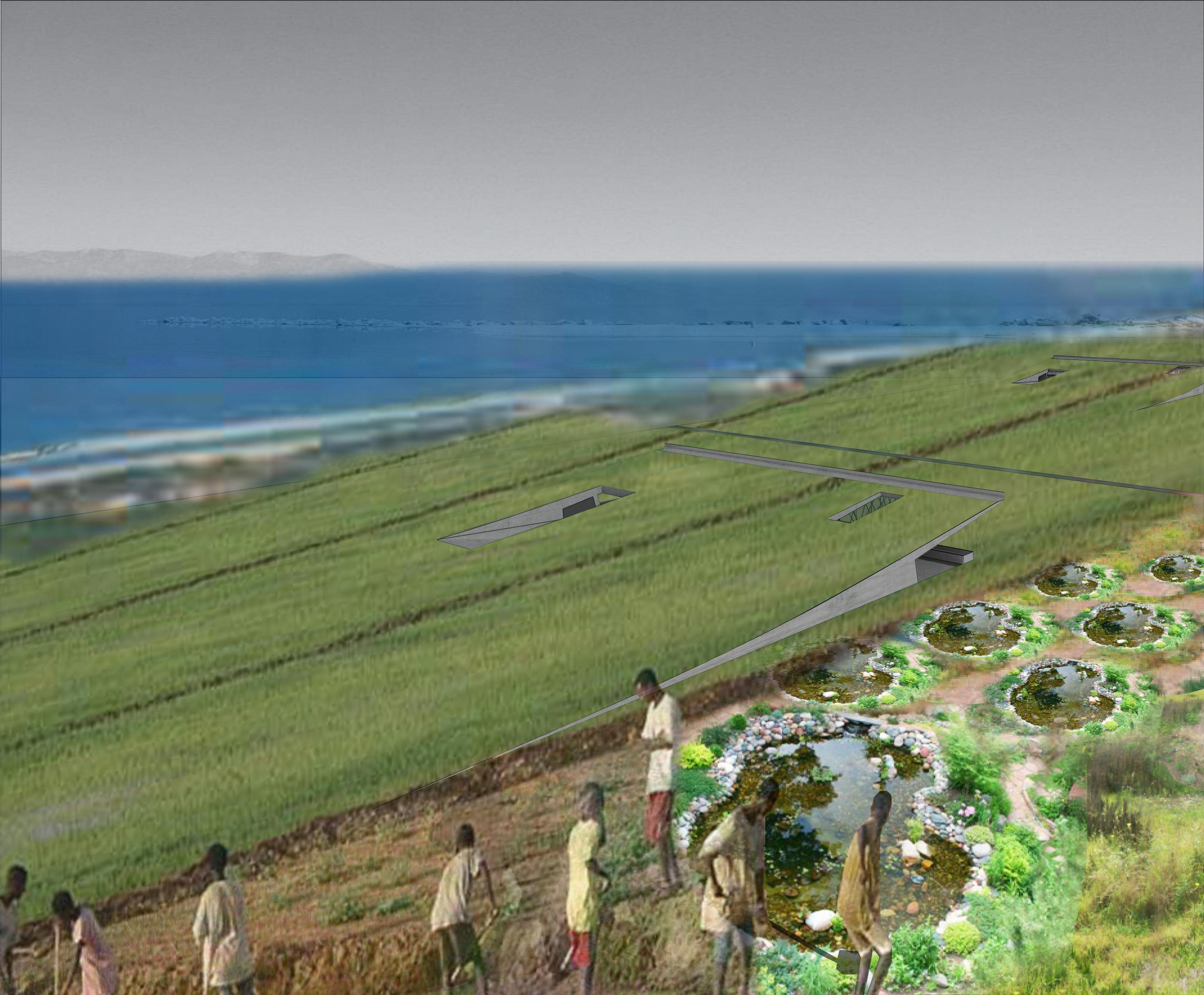


- A PUMP STATION
- B SALT PONDS
- C EXISTING WILDLIFE REFUGE
- D HIGHWAYS 78/86
- E NEW POWER PLANT ROAD
- F BIOMASS POWER PLANT
- G AUGMENTED WILDLIFE REFUGE
- H SPA
- I WESTMORELAND

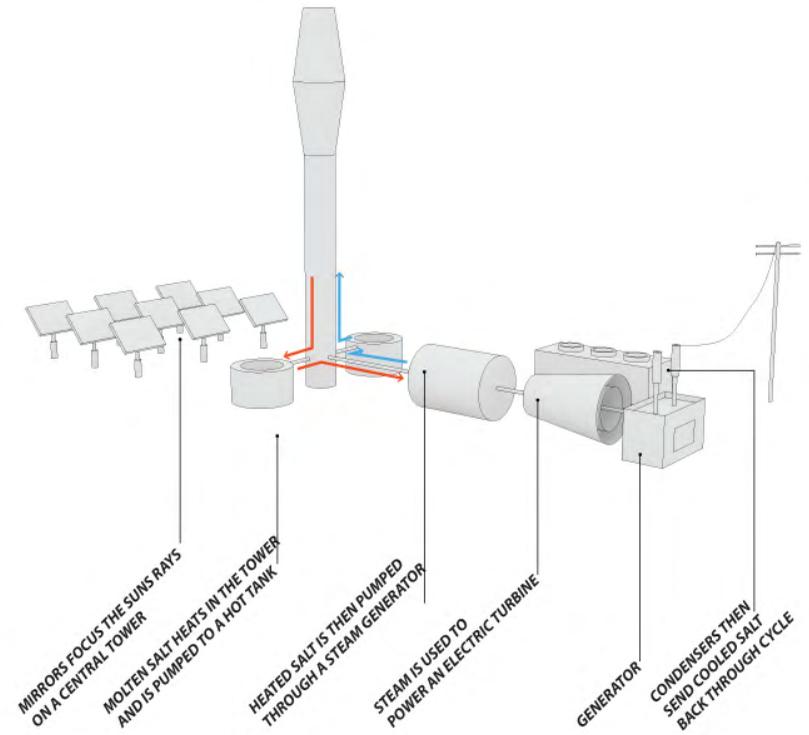
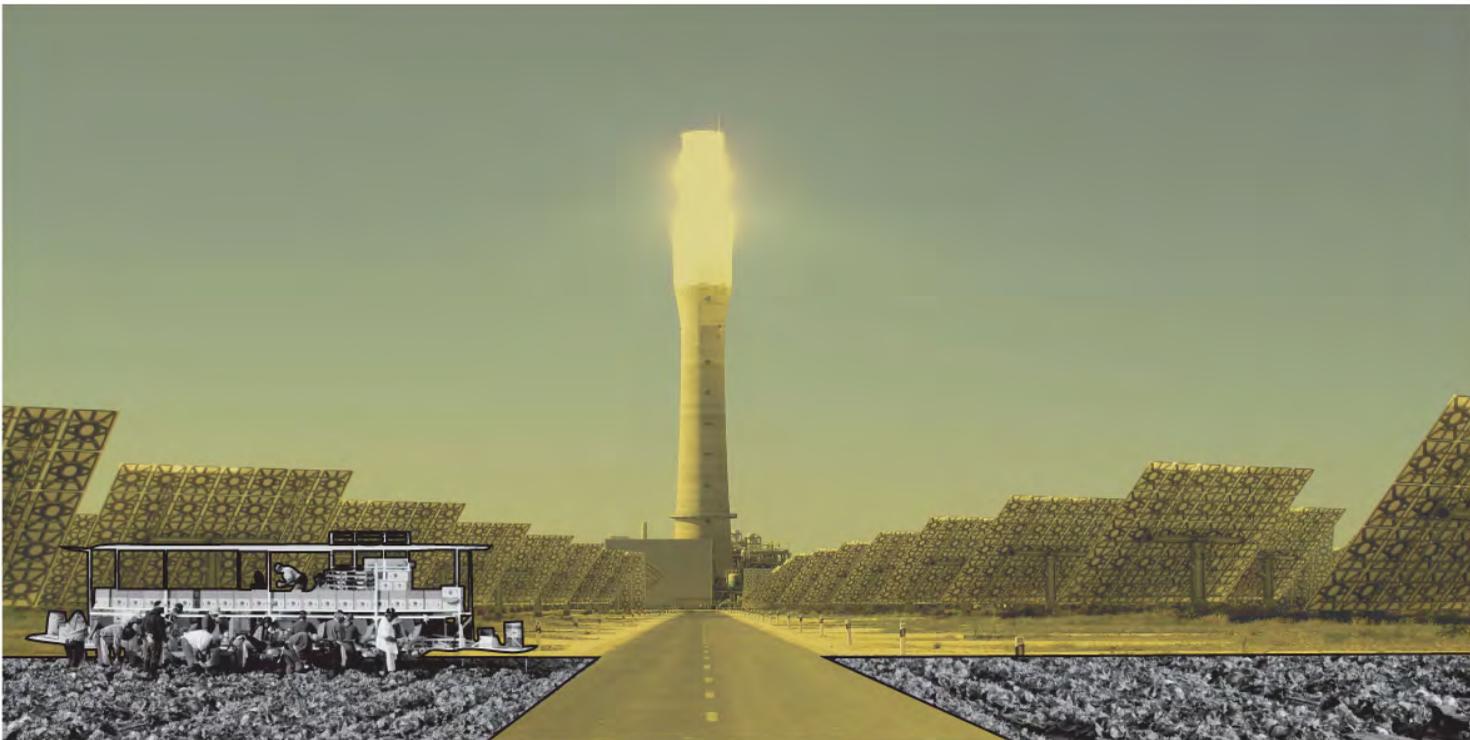


NEW FARM
TYPOLOGY











ECONOMIES/ ECOLOGIES

The Imperial Irrigation District canal system irrigates 630,000 acres in the Mojave Desert. The IID is the world's largest irrigation system, carrying 26,155 cubic feet per second. Nutrient-rich agricultural runoff then drains into the Salton Sea, with no means of outflow.

PACIFIC FLYWAY

The Salton Sea is an essential stop on the bird migration route known as the "Pacific Flyway." Millions of birds make the Salton Sea a stop on southbound travels; for many, it is their final destination. 400 of North America's 600 bird species have been spotted here.

INFRASTRUCTURE FINANCE DISTRICT

A portion of property tax will provide improvements to public property (a \$1.1 billion tax increment over 40 years). Because the property straddles the Imperial and Riverside county lines, the taxes that would have gone into the general fund would come from both counties. The money projected to come from Imperial County is \$734 million, with \$402 million from Riverside County over the 40-year timeline.

SALTON SEA ECOSYSTEM

The Salton Sea is a saline lake. In 2010, the total dissolved solids in the Salton Sea were 47% greater than that of ocean water, or 51,000 ppm (mg/L)—some 400 million tons of salt. The sea is California's largest surface area lake and has been famous for sportfishing and recreational use. It is a federally designated repository to receive and store agricultural, surface, and subsurface drainage waters from the Imperial and Coachella Valleys. The Salton Sea's water surface elevation was 231 feet below mean sea level in 2010.

Wildlife and aquatic species dependent upon the habitat created by agricultural return flows are threatened by the Sea's increasing salinity as salts concentrate through evaporation rates of 6 feet per year. The Sea's importance to wildlife has grown as 95% of California's natural wetlands in other areas have disappeared through land use changes.

QUANTIFICATION SETTLEMENT AGREEMENT ("QSA") (2003)

Rapid growth in the desert cities and substantial completion of Arizona's CAP infrastructure and water banking systems have increased pressure on California to reduce its Colorado River water consumption to within its annual apportionment of 4.4 million acre feet. The QSA contains provisions for agriculture to urban water transfer between the Imperial Irrigation District and San Diego County Water Authority, eventually providing San Diego with 90 billion gallons annually (30% of projected water needs).

STATISTICAL DATA

175,234 (2010) POPULATION
36% UNEMPLOYMENT

90 BILLION GALLONS/YEAR IID COLORADO RIVER ENTITLEMENT SOLD TO SAN DIEGO

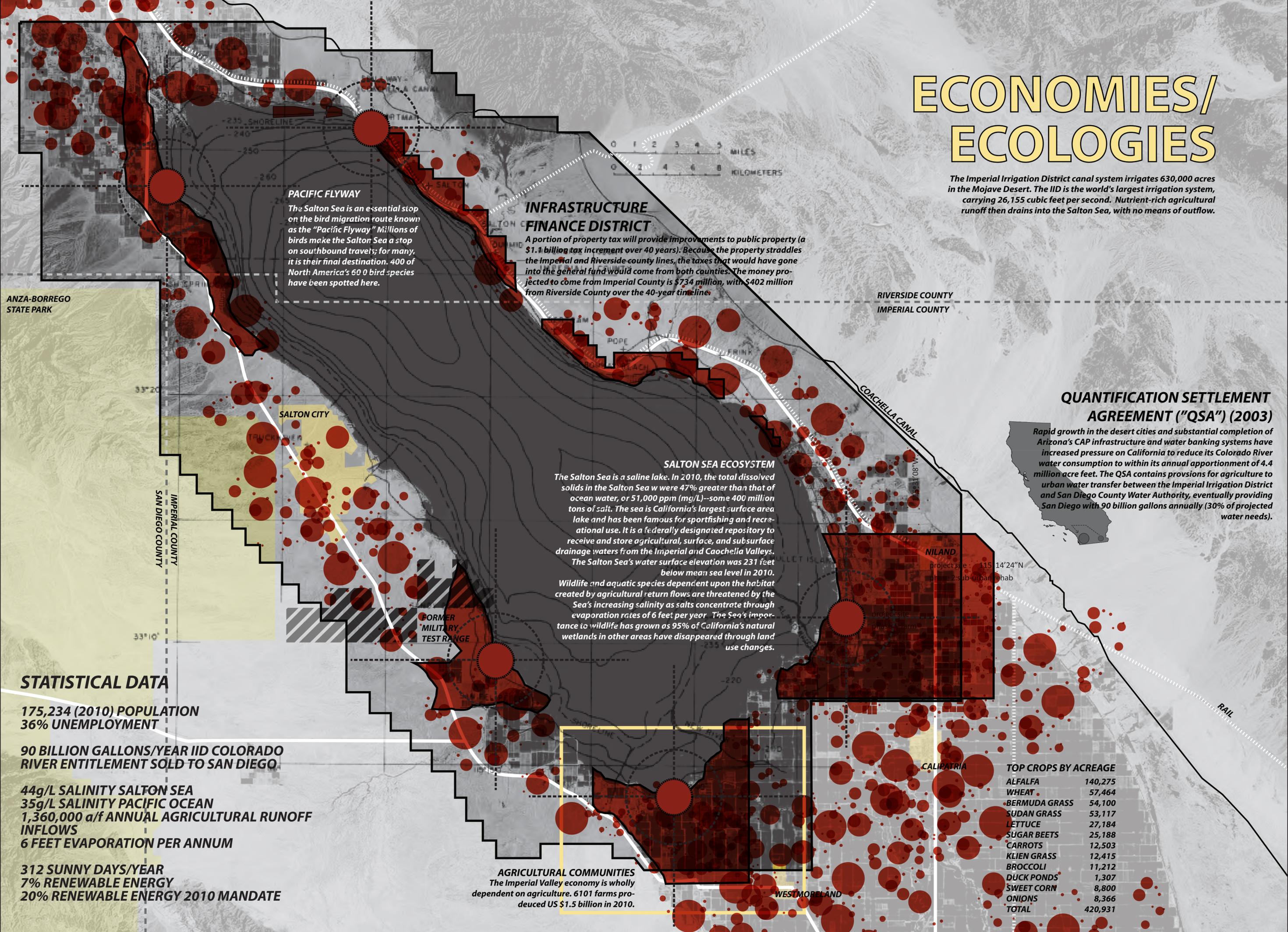
44g/L SALINITY SALTON SEA
35g/L SALINITY PACIFIC OCEAN
1,360,000 a/f ANNUAL AGRICULTURAL RUNOFF INFLOWS
6 FEET EVAPORATION PER ANNUM

312 SUNNY DAYS/YEAR
7% RENEWABLE ENERGY
20% RENEWABLE ENERGY 2010 MANDATE

AGRICULTURAL COMMUNITIES
The Imperial Valley economy is wholly dependent on agriculture. 6101 farms produced US \$1.5 billion in 2010.

TOP CROPS BY ACREAGE

ALFALFA	140,275
WHEAT	57,464
BERMUDA GRASS	54,100
SUDAN GRASS	53,117
LETTUCE	27,184
SUGAR BEETS	25,188
CARROTS	12,503
KLIEN GRASS	12,415
BROCCOLI	11,212
DUCK PONDS	1,307
SWEET CORN	8,800
ONIONS	8,366
TOTAL	420,931



SALTON SEA







IID

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September 06, 2012

Mr. Ned Daugherty
Principal
Water Futures
2845 Nimitz Blvd., Suite I
San Diego, CA 92106

Dear Mr. Daugherty:

The IID is pleased to provide this letter in support of the H2O Futures grant application to the Salton Sea Financial Assistance Program. The combination of economic and environmental sustainability provided by your project proposal is an exciting prospect.

The IID has long been a proponent of Salton Sea restoration and recognizes that innovative approaches may well be the solution to the complex problem of implementing a successful restoration program. Your approach has the potential to provide some of the economic development that will be key to developing a viable financial model to fund Salton Sea restoration.

We appreciate the effort your team has contributed in the development of the project proposal and in taking the time to present it to us. IID will continue to support this and like projects at the Salton Sea as the State moves forward with Salton Sea restoration.

Sincerely,



Bruce Wilcox
Environmental Project Manager
Agricultural Water Management



September 7, 2012

Ned Daugherty, Principal
H2O Futures
2845 Nimitz Blvd., Ste. i
San Diego, CA 92106
619.225.2337

RE: Salton Sea Farms Project Proposal – in response to: *Salton Sea Financial Assistance Program (FAP) Guidelines and Proposal Solicitation Package (PSP)*

Dear Mr. Daugherty,

I enjoyed talking with you and your partners about your proposed project. As President and CEO of Imperial Valley Economic Development Corporation (IVEDC), I am supportive of your Salton Sea Farms Project proposed by H2O Futures and its partners. The nature of the integrated seawater and freshwater treatment and utilization concept, as proposed would hold potential for academic and commercial pursuits. It will also be an important facet of economic development as well as habitat creation and enhancement. Should the project be funded, we look forward to learning about opportunities concerning water quality, water conservation, and hydrology.

Should funding prove positive, we may facilitate and assist with procurement services during the design and engineering phases.

Should you have any questions or need additional information, please don't hesitate to contact me at (760) 353-8332.

Sincerely,

Timothy E. Kelley
President/CEO
Imperial Valley Economic Development Corporation



Nag, Inc.

d.b.a. Engineering Systems

Wells Fargo Center • 355 South Grand Avenue, Suite #2450 • Los Angeles • California 90071
Phone: (213) 625-7636 • Email swapan.nag@naginc.net

September 10, 2012

Ned Daugherty, Principal
H2O Futures
2845 Nimitz Blvd., Ste. I
San Diego, CA 92106

RE: Salton Sea Farms Project Proposal – in response to: *Salton Sea Financial Assistance Program (FAP) Guidelines and Proposal Solicitation Package (PSP)*

Dear Mr. Daugherty,

I enjoyed talking with Nathan White about your proposed project. As CEO of NAG Inc., I am supportive of the Salton Sea Farms Project proposed by H2O Futures and its partners. The nature of the integrated seawater and freshwater treatment and utilization concept, as proposed or as some variant thereof, would likely be of interest to our participation. Should the Project be approved, we look forward to collaborating with you to achieve the outcomes since there may be potential opportunities for our scientists and engineers to support you in the field of geospatial technologies relating to water quality, water conservation, and hydrology. Our firm has over 20 years of public sector experience: <http://nag.co/Clients.php> that would be of value to the project.

Should funding be approved, we provisionally agree to participate in design and engineering phases, sufficient to assure that our objectives and infrastructure are upheld, particularly the flow-through seawater system.

Thank you for including us among the stakeholders.

Sincerely,
Nag, Inc. d.b.a. Engineering Systems

Swapan Nag, CEO



Imperial Valley Campus
San Diego State University
720 Heber Avenue
Calexico CA 92231 · 2403
Tel: 760 · 768 · 5500
Fax: 760 · 768 · 5568

5 September, 2012

Ned Daugherty, Principal
H2O Futures
2845 Nimitz Boulevard
San Diego, CA 92106

RE: Salton Sea Farms Project Proposal – in response to: *Salton Sea Financial Assistance Program (FAP) Guidelines and Proposal Solicitation Package (PSP)*

Dear Mr. Daugherty,

I was very interested in learning about your proposed project. As Dean of San Diego State University's Imperial Valley campus, please know that I am supportive of the Salton Sea Farms Project proposed by H2O Futures and its partners. The nature of the integrated seawater and freshwater treatment and utilization concept, as proposed or in some close variant, has the potential to engage both commercial and academic interests. It will also be a contributor to economic development and habitat creation/enhancement in our region. Should the Project be approved, we look forward to learning more, since there may be opportunities for our scientists and students in the areas of water quality, water conservation, hydrology, energy, ecology, public health, and public safety, in proximity to our Center for Energy Sustainability in Brawley.

Thank you for including us among the stakeholders.

Sincerely,

David E. Pearson, Ph.D.
Dean of the Campus