

Owens lake

MASTER PROJECT



*transitioning
to waterless
and water-
wise solutions*

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Los Angeles
Department of
Water & Power

document
and graphics
prepared by:


N Ū V I S

LANDSCAPE ARCHITECTURE
AND PLANNING
April 2013 (1.0)

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Project
Goals



BACKGROUND

For more than a decade, the Los Angeles Department of Water and Power (LADWP) has controlled dust at Owens Lake, primarily through shallow flooding of the dry lakebed, plus a small amount of vegetation and gravel. This practice has resulted in the use of up to 95,000 acre-feet of drinking water each year for dust control. Additional dust control measures, such as plowing, have also been tested and found to not only significantly reduce dust emissions at the Lake, but in some cases, also provide habitat for native birds and waterfowl, which are returning to Owens Lake.

LADWP also recognizes that the use of drinking water for dust suppression is not sustainable. Increases in population, rising temperatures due to climate change, reductions in water imported from Northern California and the potential for drought due to increased heat are factors affecting Southern California water supplies. LADWP is not attempting to get out of its obligation to control dust at Owens Lake. We are, however, evaluating the uncertainties of the future and proposing to begin work on a more environmentally sustainable approach to dust control in the Owens Valley.



PROJECT





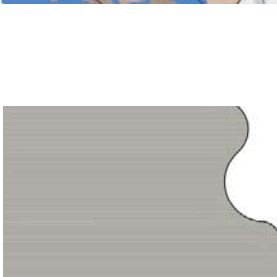
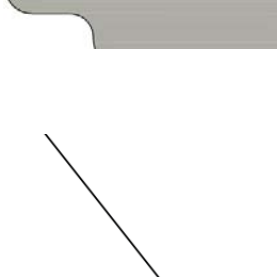
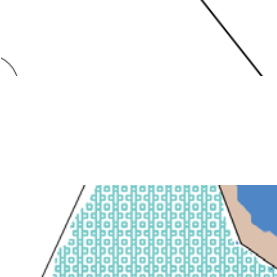
LADWP, along with a diverse group of stakeholders including state and local agencies, non-governmental organizations, and interested individuals, has been an active participant and supporter of the development of an Owens Lake Master Plan. Based upon, and in the spirit of this planning effort, LADWP proposes the Master Project described in this concept document. The proposed Master Project will build upon current planning efforts and begin implementation of a more environmentally friendly solution for Owens Lake. This solution considers California's environmental challenges inside and outside of the Owens Valley, such as endangered species, water supply, water reliability and habitat creation throughout the State.

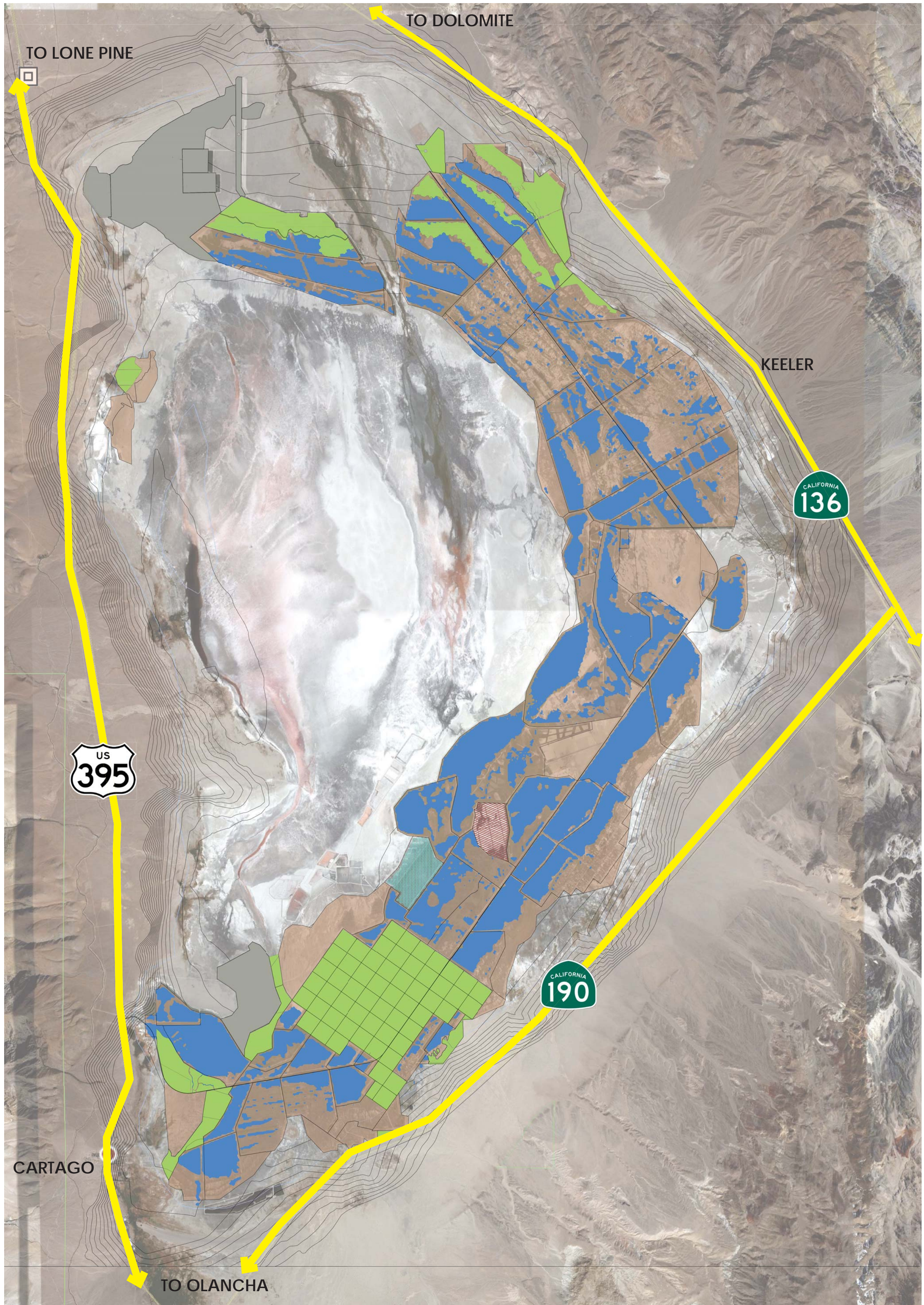
This Master Project will enhance the design and effectiveness of Owens Lake dust control, through a combination of water conservation, dust control and habitat management. This new design will utilize a mix of tillage, vegetation, water, gravel, roads, and brine to control dust, while preserving and creating habitat for diving waterbirds, shorebirds, waterfowl and the public.

PROJECT COSTS

Estimated project implementation costs could range from \$600 million to \$1 billion depending upon waterless dust controls and implementation schedule.

LEGEND

-  TILLAGE
-  MANAGED VEGETATION
-  STANDING WATER (UP TO 5')
-  LATERAL (SHEET FLOW) SHALLOW FLOOD
-  GRAVEL
-  BERM ROAD
-  BRINE



Map includes existing facilities plus proposed Phase 7a (45 square miles total).
 Map based on January 2013 satellite imagery during typical operating conditions.

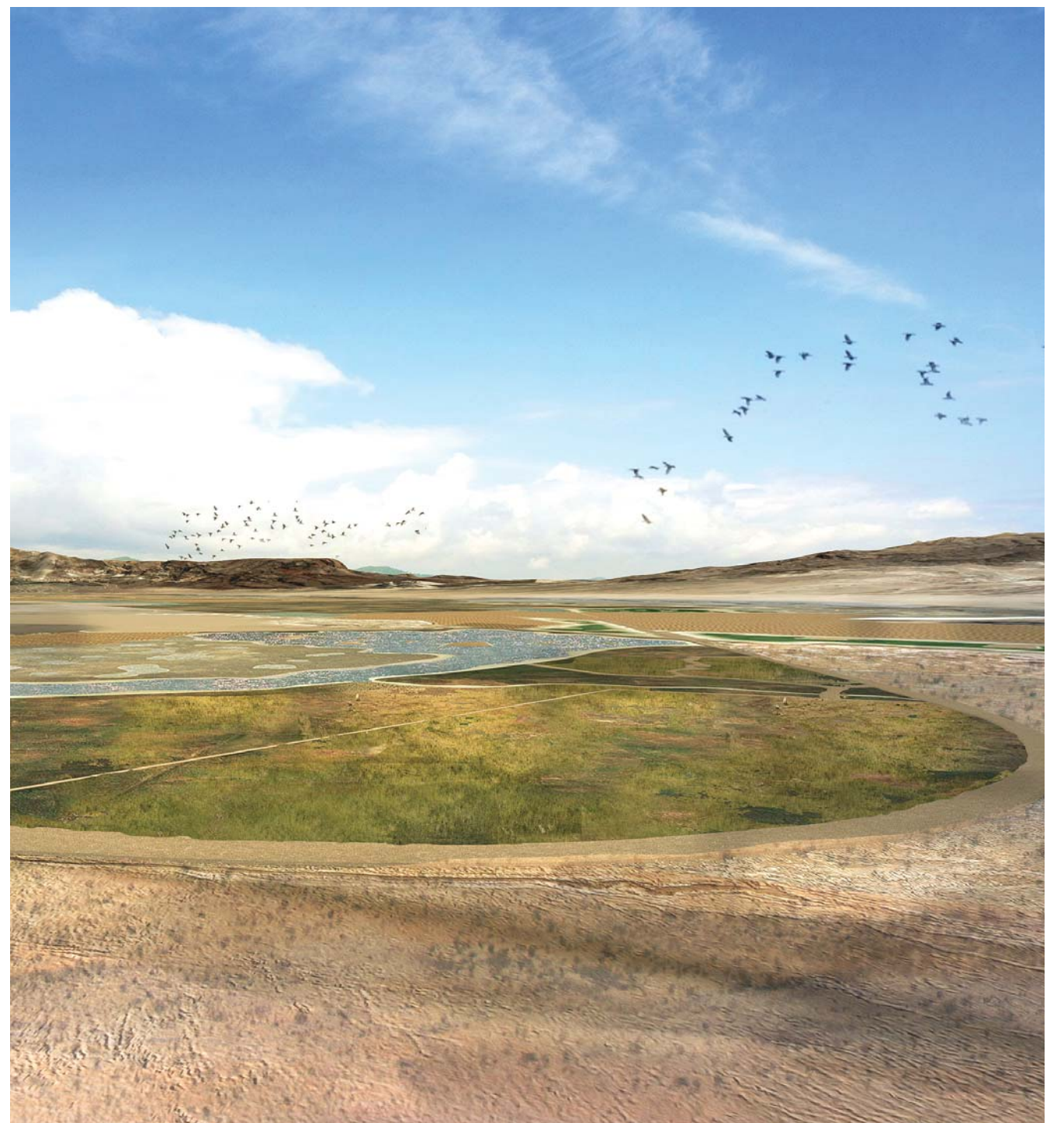
SCALE
 0 0.5 1
 in miles



THE GOALS

LADWP's Owens Lake Solutions Team proposes a balanced approach to dust management that is based on goals developed through the Owens Lake Master Planning process:

- 1 Control dust to obtain good air quality and reduce dust related risk to public health
- 2 Protect, create, and enhance habitat
- 3 Protect cultural resources, including Native American heritage sites
- 4 Promote area-wide economic development, including tourism and public use of Owens Lake
- 5 Explore opportunities for renewable energy development
- 6 Create a viewshed that is in harmony with the surrounding rural environment
- 7 Create a flexible adaptive management plan that allows future alterations in response to changing conditions in the Owens Valley and statewide
- 8 Reduce total lake-wide water use by at least 50%, through the strategic use of waterless or water efficient control measures and groundwater under Owens Lake for dust control



A phased approach will be utilized to achieve these goals. Full build-out will result in a substantial decrease in overall aqueduct water use.

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Broader
Public
Benefits



CULTURAL RESOURCES

Previous habitation of the Owens Lake by Native Americans has left artifacts and cultural resources that must be respected. While research continues on the best ways to preserve and manage the cultural artifacts, there are a number of steps that can be taken to protect these resources such as focusing public access opportunities in areas that are not in close proximity to cultural sites, eliminating access points in sensitive areas, and educating the visiting public on the importance of cultural resource protection.



ECONOMICS AND TOURISM

Increased public access, along with enhanced aesthetics associated with hybrid dust control, will provide a park-like public experience and promote tourism. This includes parking areas, walking trails, shelters and educational signs and kiosks. Inyo County is geographically the second largest county in California and one of the few counties that does not have a State Park.



OPPORTUNITIES FOR ALTERNATIVE ENERGY DEVELOPMENT

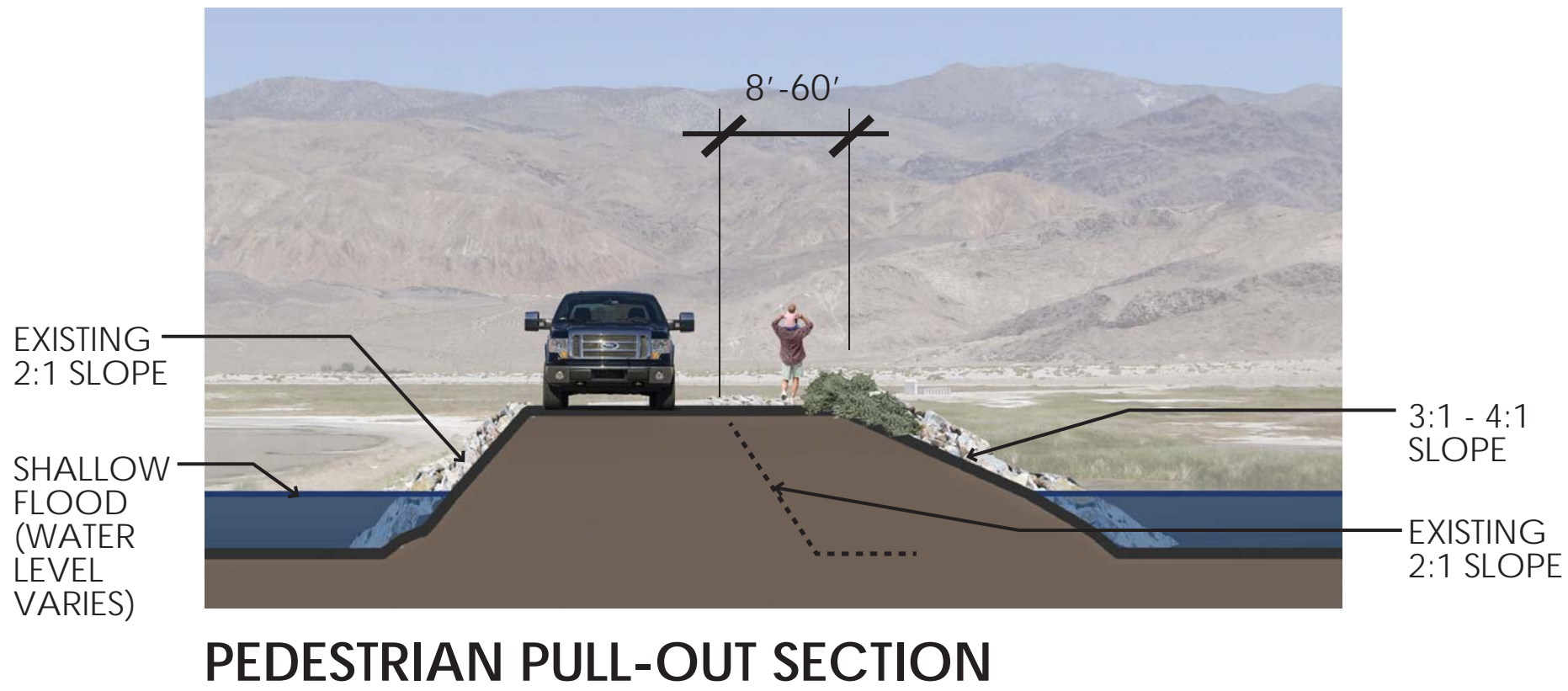
Owens Lake is located in one of the highest rated areas for solar energy development. Additionally, it may be feasible to farm algae on Owens Lake with the potential for economic benefits. While there are many challenges associated with development of alternative energy projects, areas designated for waterless dust control measures will be available to facilitate development of such projects.



PUBLIC ACCESS

Roadways on the lakebed were non-existent until the Dust Mitigation Project was constructed, and are not designed for public use. There are a number of considerations and challenges associated with improved public access and safety:

- Should some roadways be widened to enhance safety and enable public access?
- Should turnouts be provided for public parking and access?
- What sort of public amenities should be provided and to what extent?
- Should some roadways be paved to control dust given increases in traffic?



PEDESTRIAN PULL-OUT SECTION



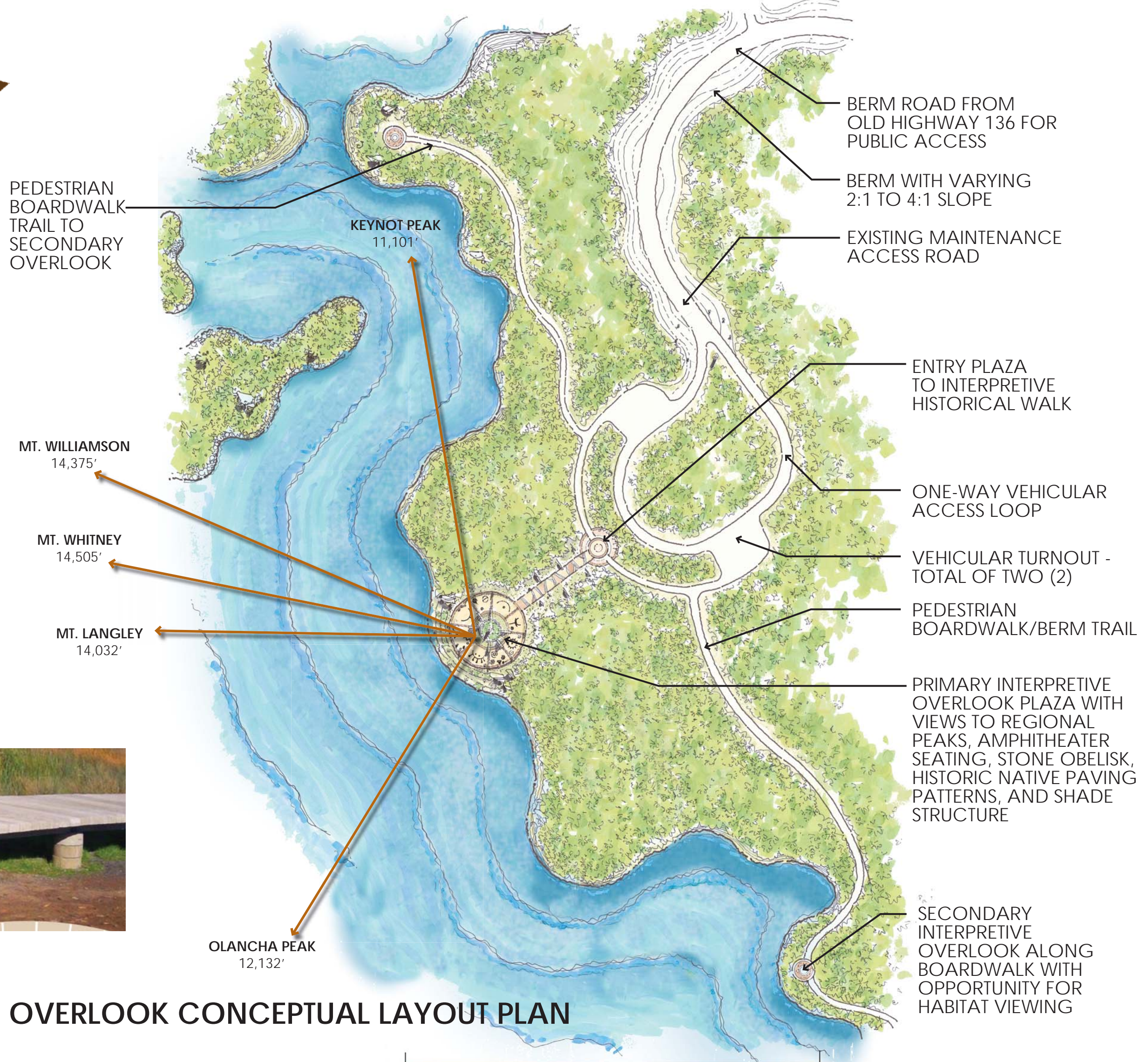
PLOVER WING SHADE STRUCTURE



EDUCATIONAL/ INTERPRETIVE GRAPHICS



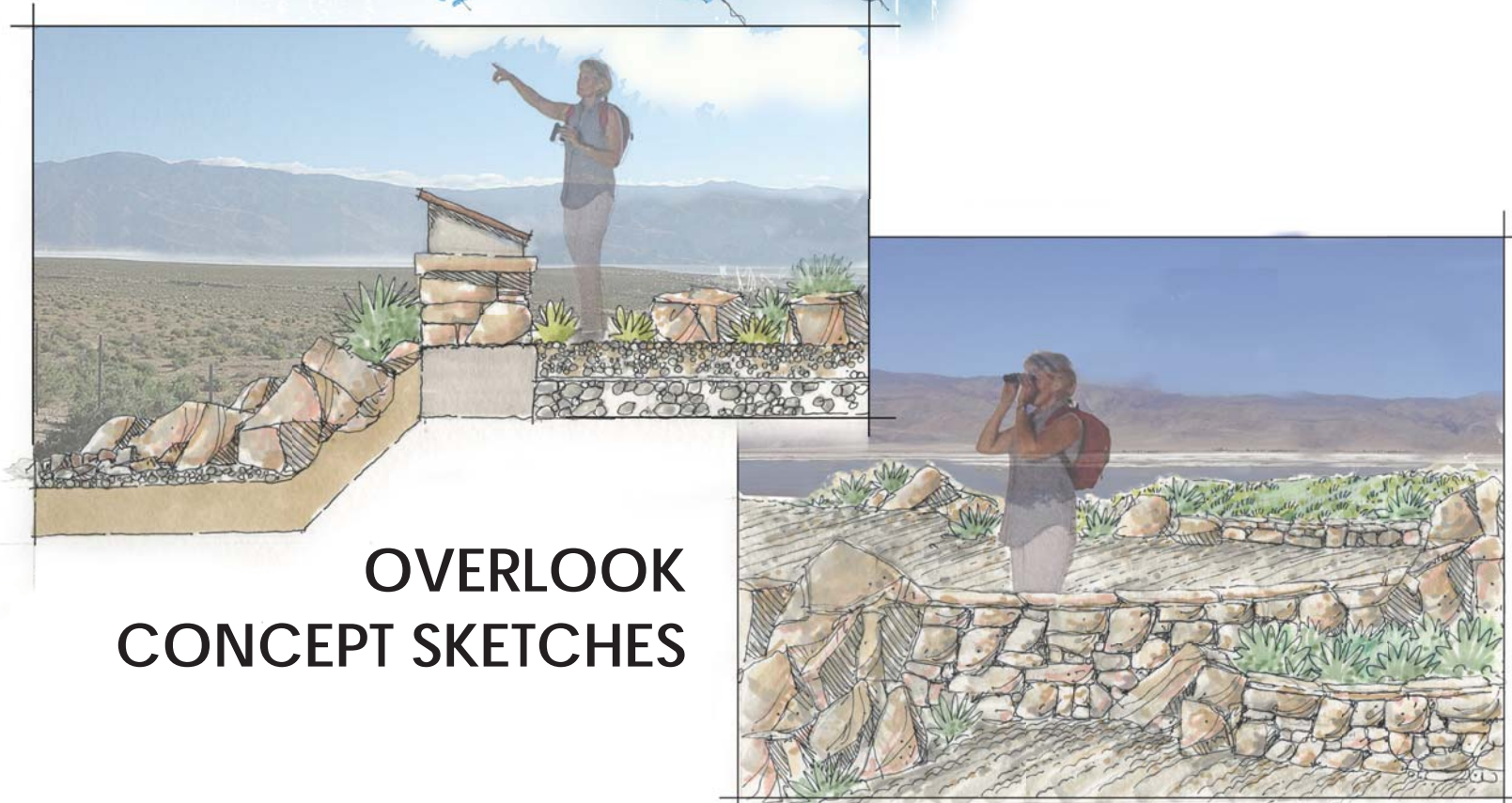
PERMATRAK BOARDWALK



OVERLOOK CONCEPTUAL LAYOUT PLAN



SECONDARY PLAZA SECTION

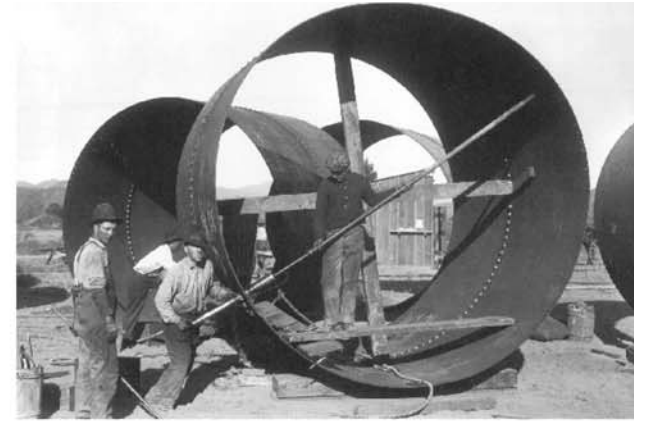


OVERLOOK CONCEPT SKETCHES

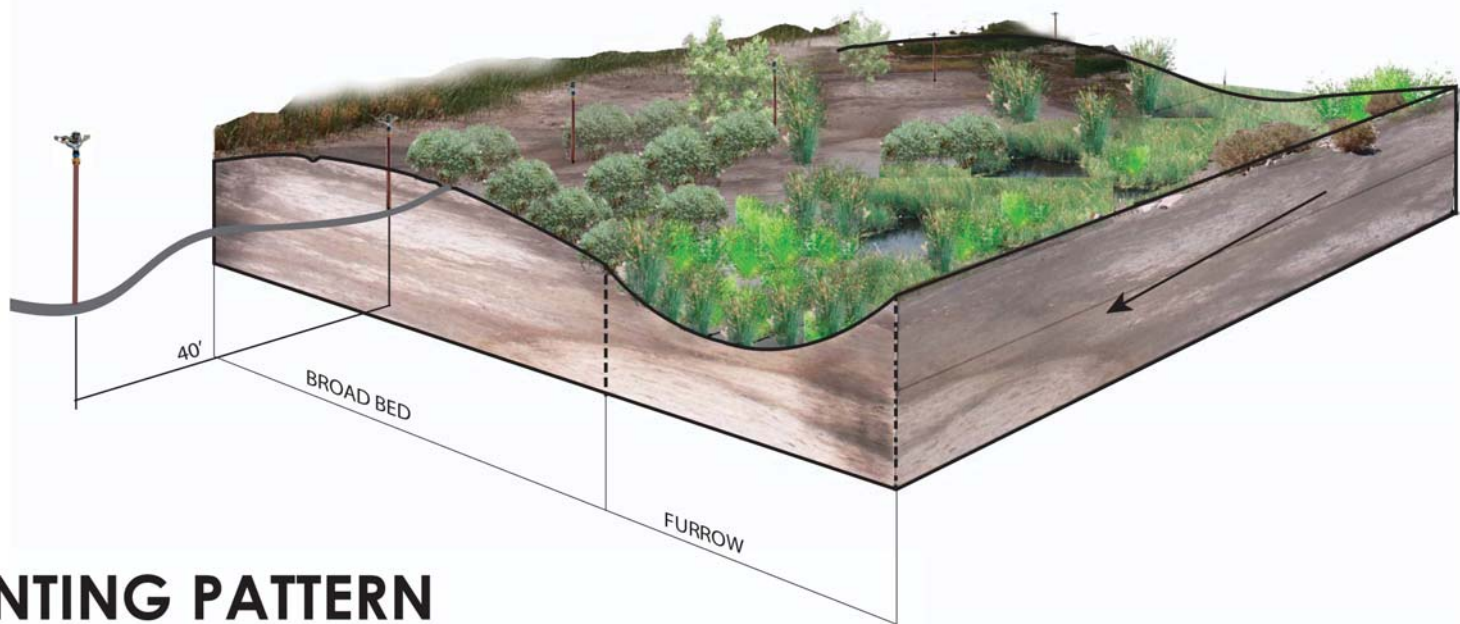
graphics prepared by: NUVIS



SEATING STUDY



HISTORIC IMAGES



PLANTING PATTERN



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Land Cover
Plan &
Phasing



BLUES



GREENS



BROWNS

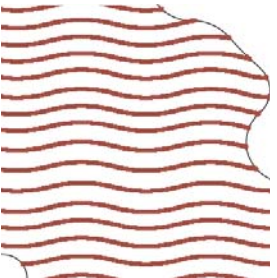
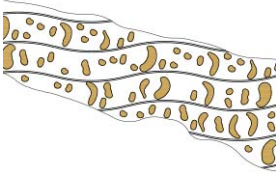

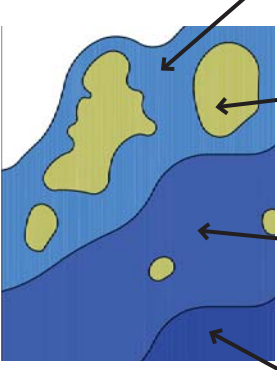



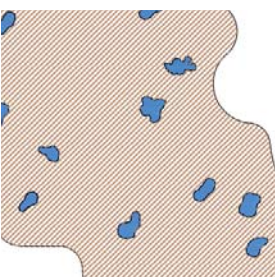
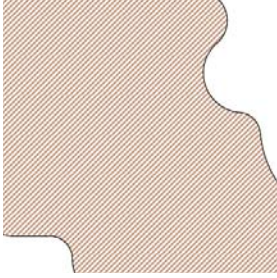






GREYS

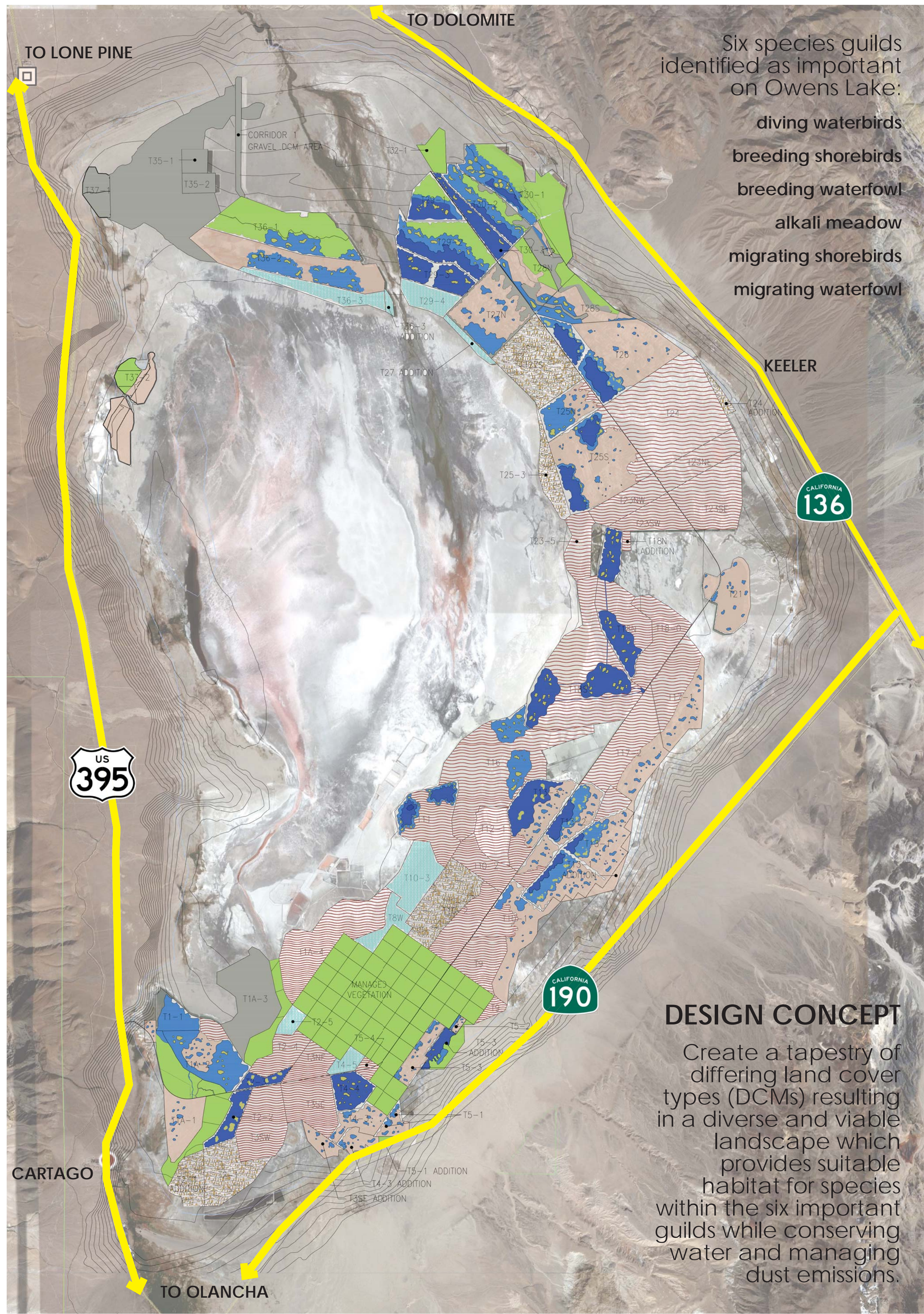


The Owens Lake playa: a tapestry of colors, textures, and forms

LEGEND

-  * CURVING TILLAGE
-  * NON-UNIFORM MEANDERING RIDGES
-  MANAGED VEGETATION
-  SHALLOW POND
-  ISLAND
-  DEEP POND
-  DEEPER POND
-  SPRINKLER IRRIGATION (WITH INTERMITTENT PONDS)
-  SPRINKLER IRRIGATION (WITHOUT INTERMITTENT PONDS)
-  * GRAVEL
-  BERM ROAD
-  TOE OF BERM ROAD SLOPE
-  * BRINE

* Implemented dust control type may change as necessary based on actual conditions encountered in the field.



Six species guilds identified as important on Owens Lake:

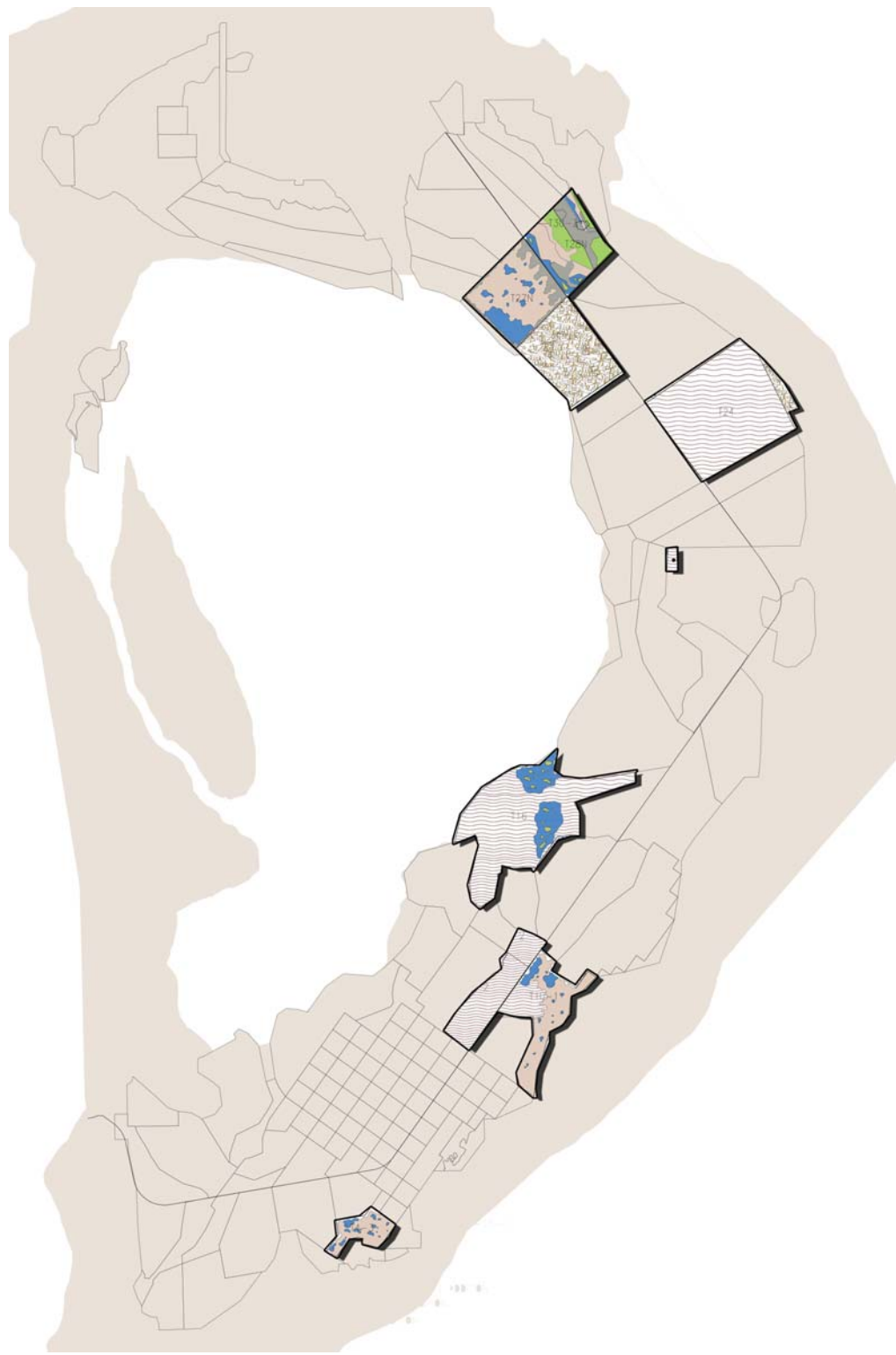
- diving waterbirds
- breeding shorebirds
- breeding waterfowl
- alkali meadow
- migrating shorebirds
- migrating waterfowl

DESIGN CONCEPT

Create a tapestry of differing land cover types (DCMs) resulting in a diverse and viable landscape which provides suitable habitat for species within the six important guilds while conserving water and managing dust emissions.

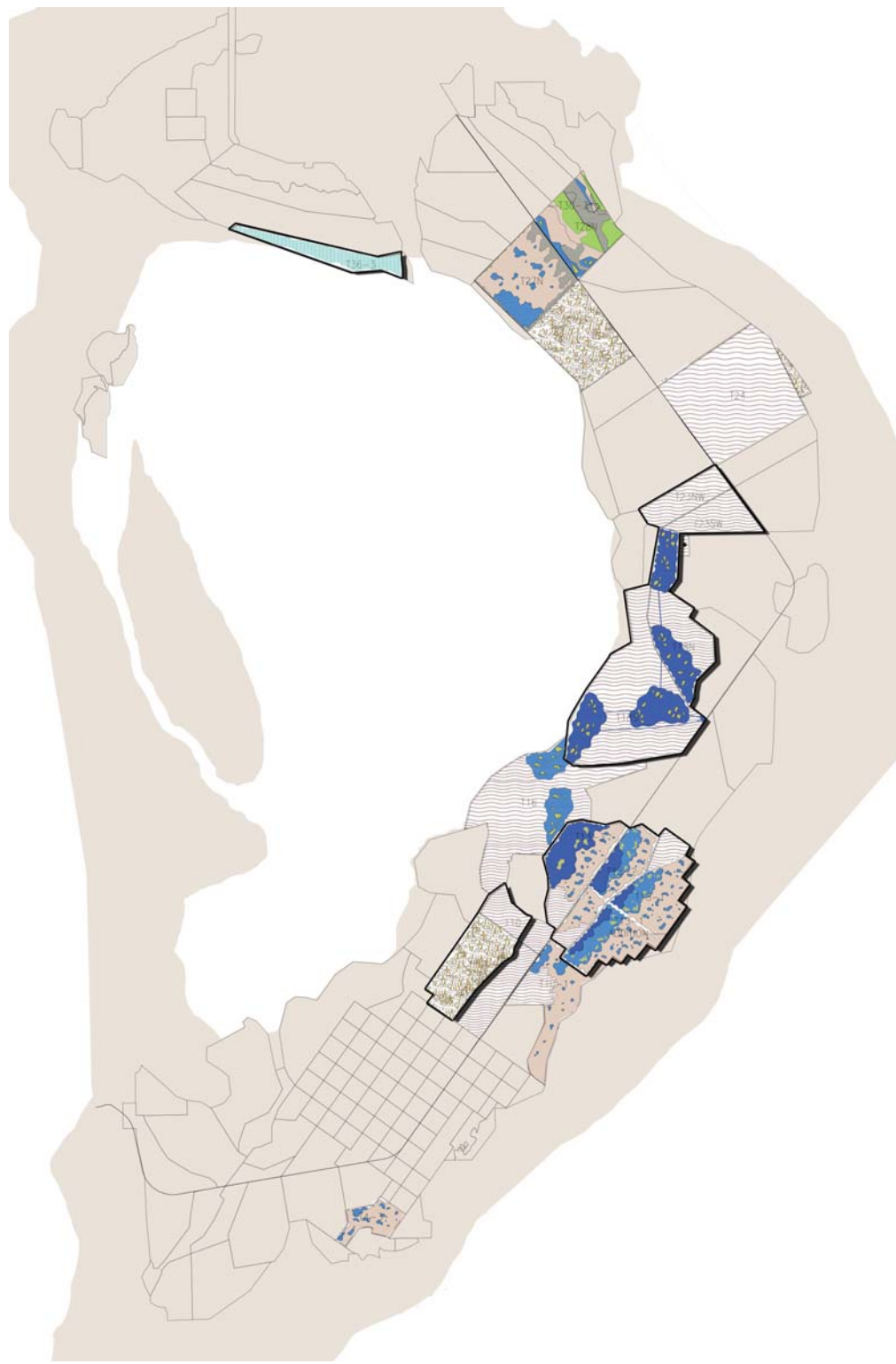


PROJECT IMPLEMENTATION WILL PROCEED IN 5 PHASES AS SHOWN IN THE GRAPHICS BELOW.



PHASE 1

WATER USE AT
85% OF CURRENT LEVELS
(APPROX. 7.0 SQUARE MILES)



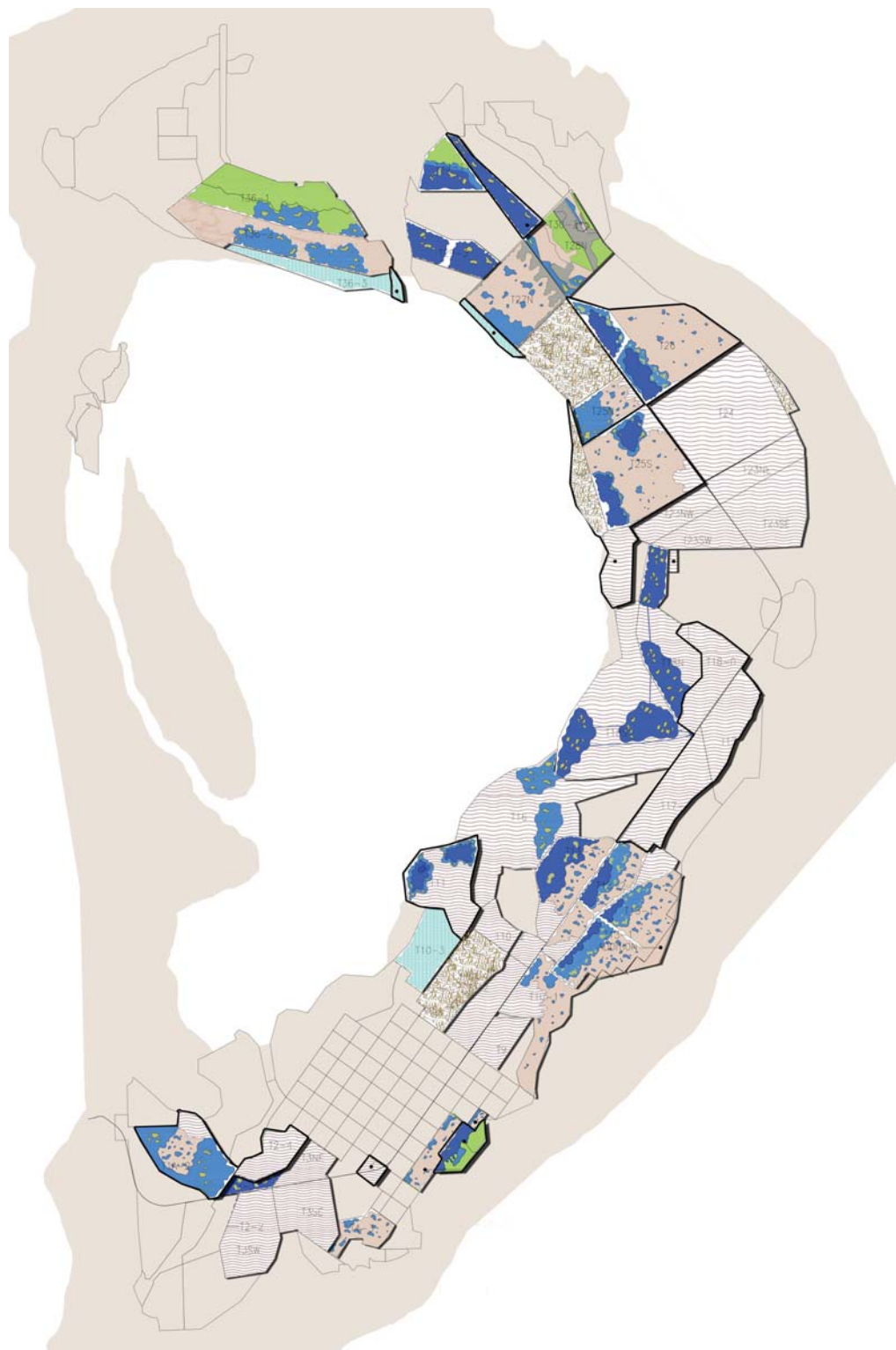
PHASE 2

WATER USE AT
73% OF CURRENT LEVELS
(APPROX. 6.3 SQUARE MILES)



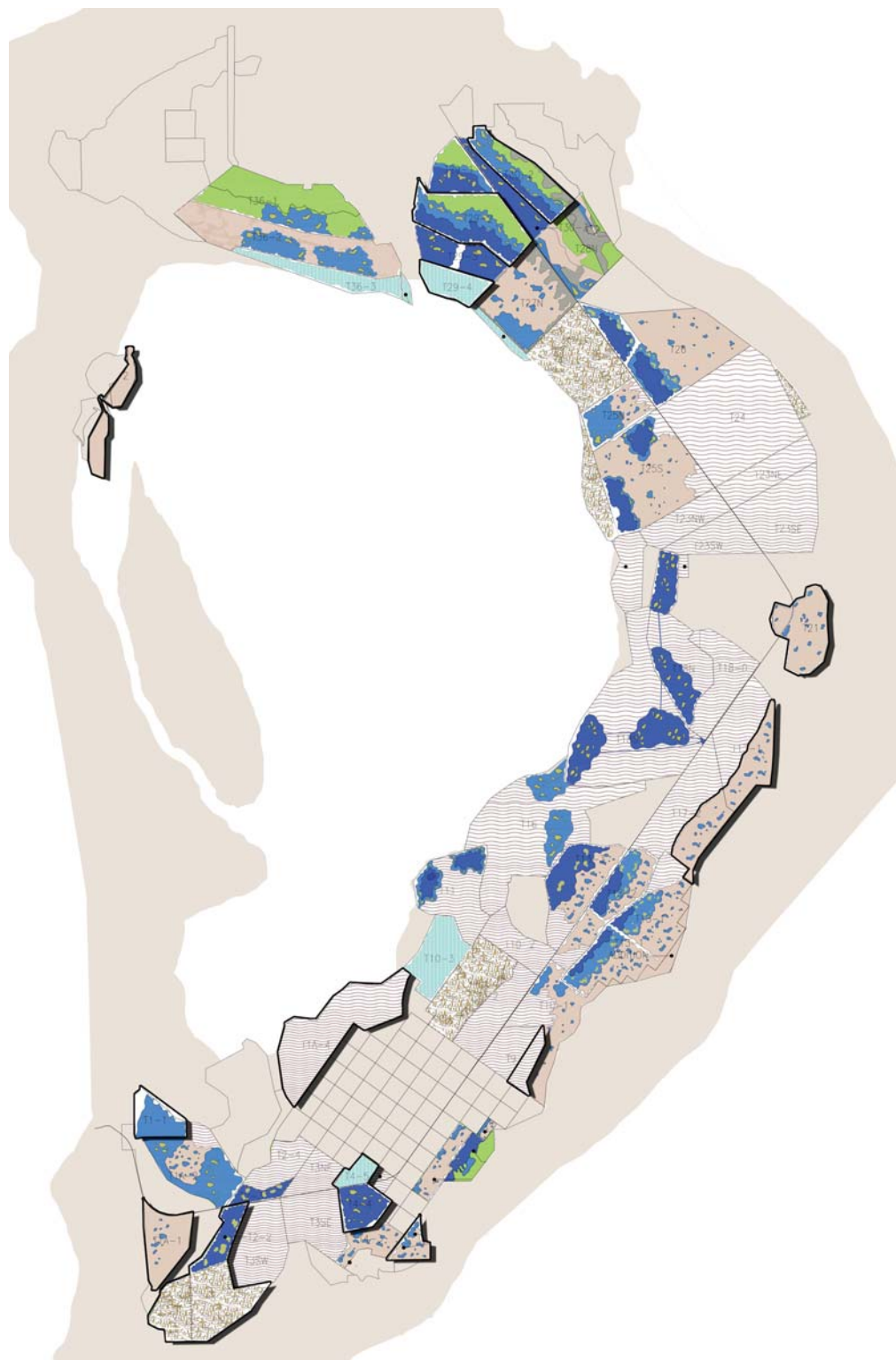
PHASE 3

WATER USE AT 61% OF CURRENT
LEVELS
(APPROX. 6.9 SQUARE MILES)



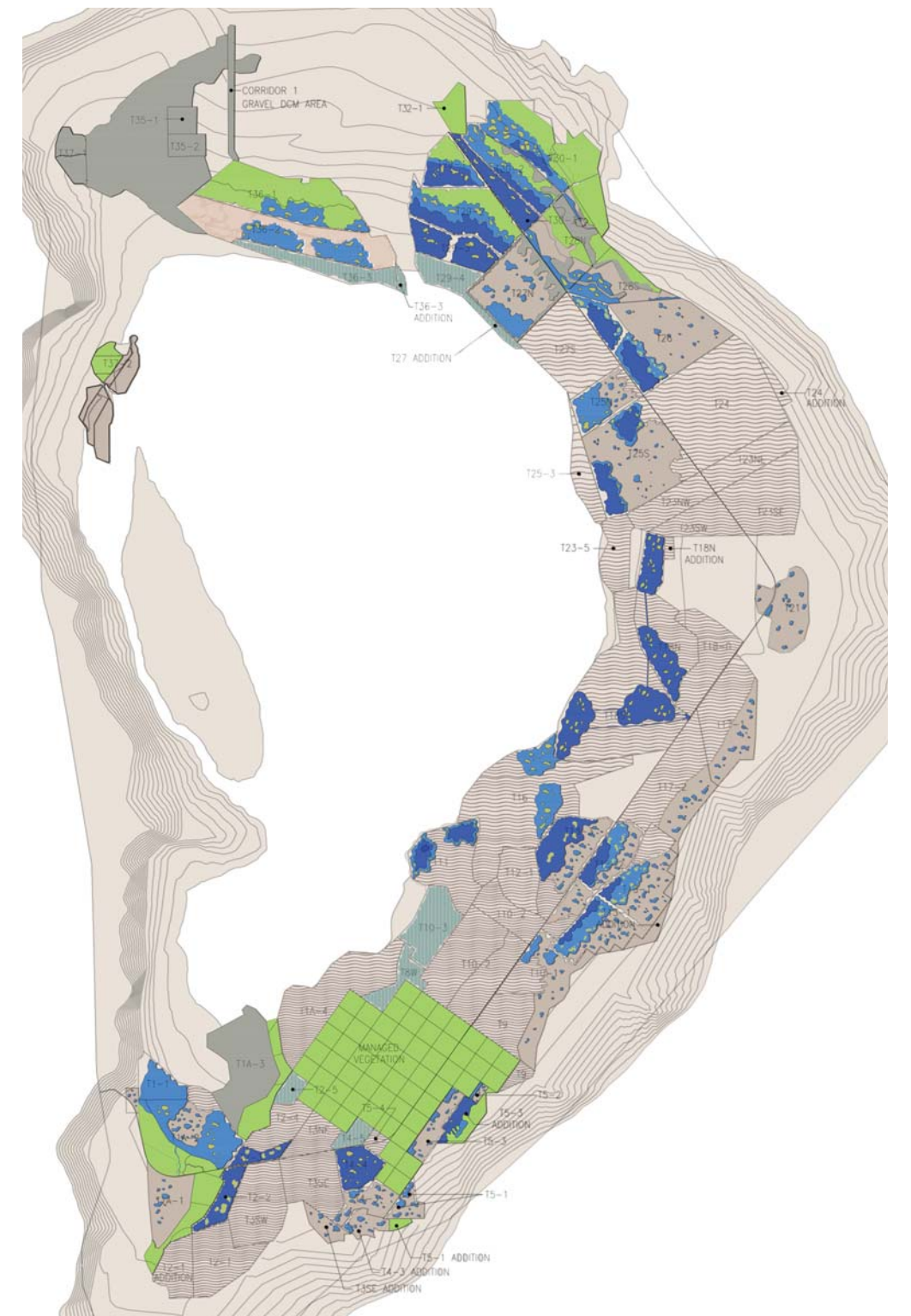
PHASE 4

WATER USE AT
48% OF CURRENT LEVELS
(APPROX. 7.3 SQUARE MILES)



PHASE 5

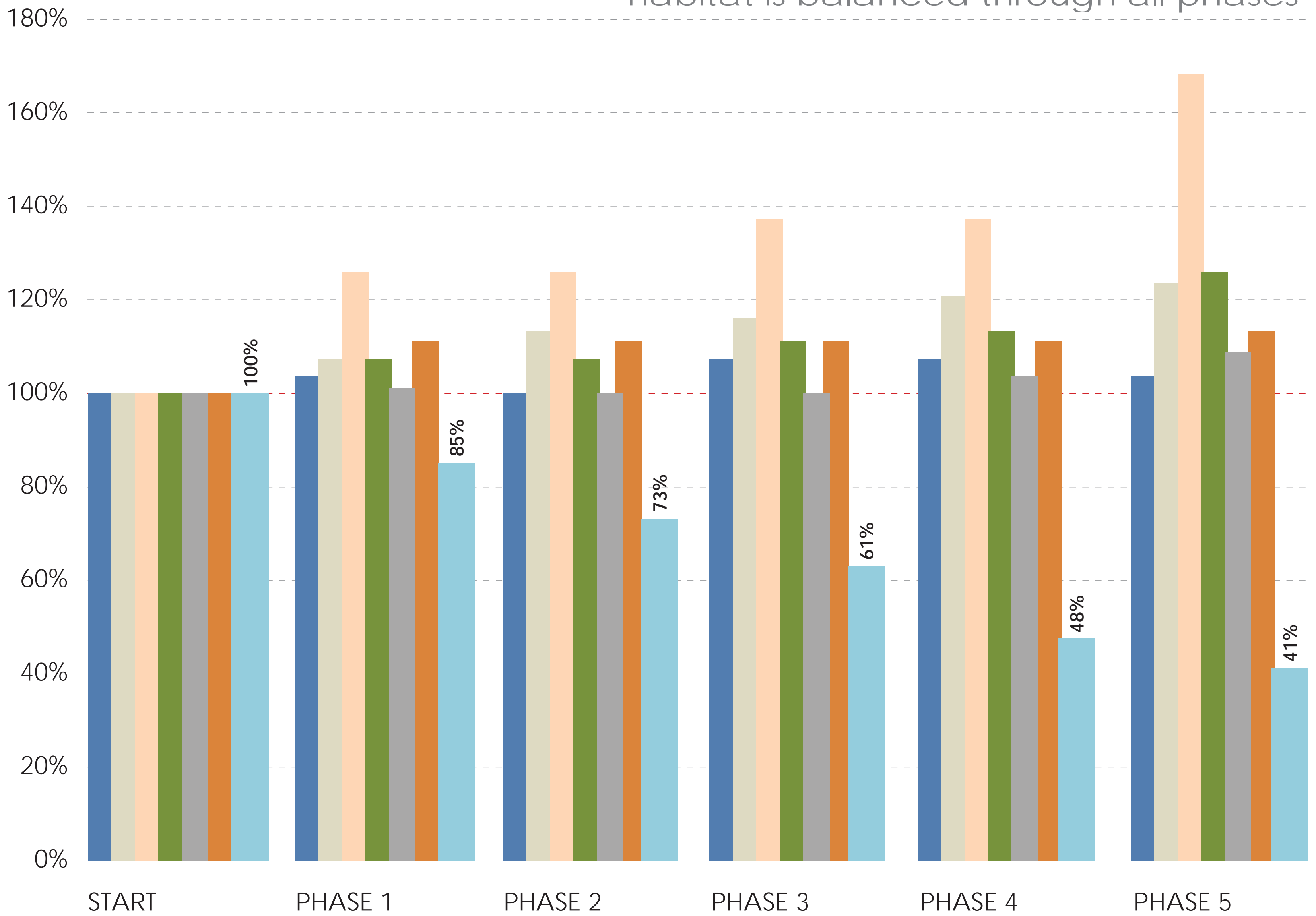
WATER USE AT
41% OF CURRENT LEVELS
(APPROX. 6.2 SQUARE MILES)



MASTER PROJECT

REDUCTION IN WATER USE TO
41% OF CURRENT LEVELS
(TOTAL DUST CONTROL AREA IS 45 SQUARE
MILES & INCLUDES EXISTING AREAS NOT
PLANNED FOR CHANGES)

habitat is balanced through all phases



SUMMARY

Each phase of the Master Project will create additional habitat for important species guilds on Owens Lake. Described in the following section, each guild has preferred habitat conditions which do not require as much water as is currently being applied.

As shown in the graph, at the completion of Phase 5, habitat area for all guilds is increased while water use is reduced to 41% of current levels.

LEGEND

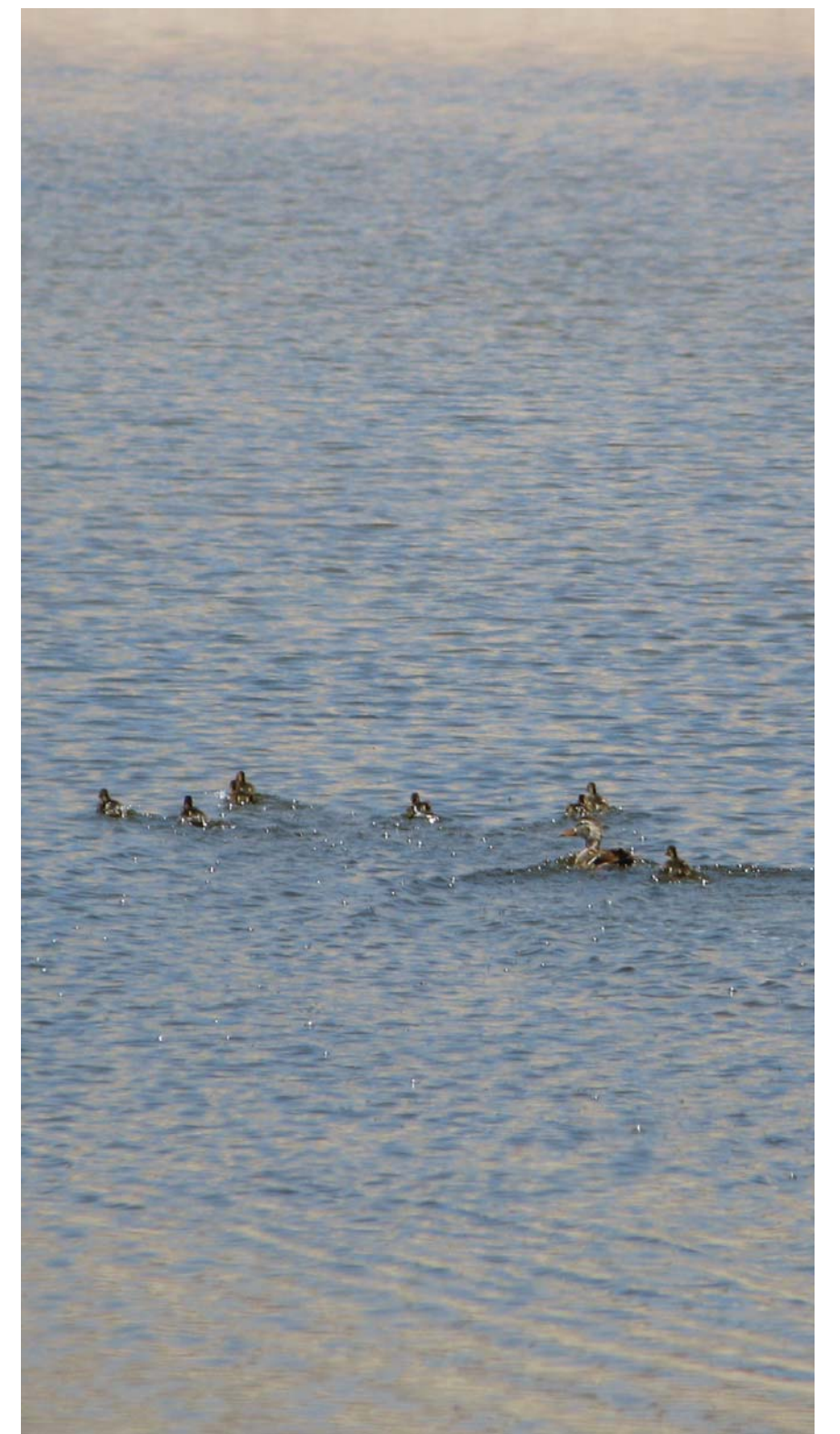
- Diving Waterbirds
- Breeding Shorebirds
- Breeding Waterfowl
- Alkali Meadow
- Migrating Shorebirds
- Migrating Waterfowl
- Water Use

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lake
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Species
Guilds





PREFERRED HABITAT CONDITIONS

1

Water Depth: Deeper water (30 cm - 40 cm deep and greater) to dive in 40-100 acre ponds

2

Salinity: Productive Saline Conditions

3

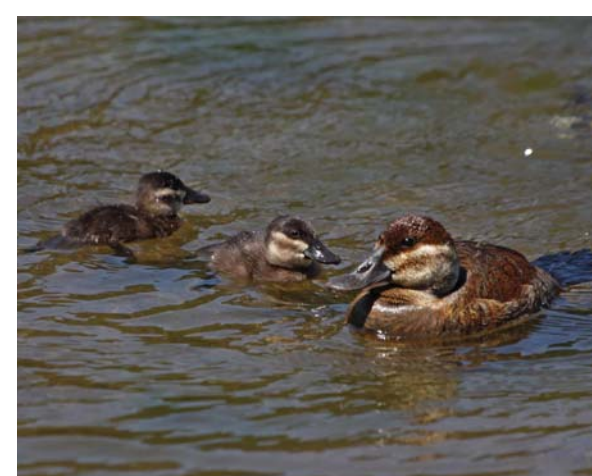
Ponded water available during migration in spring and fall



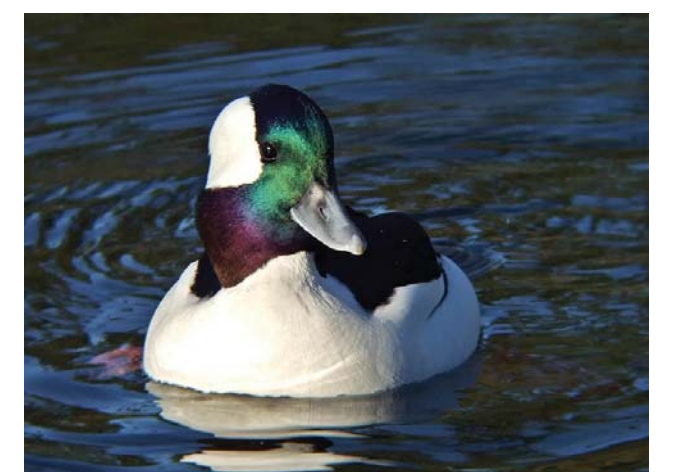
REPRESENTATIVE GUILD MEMBERS



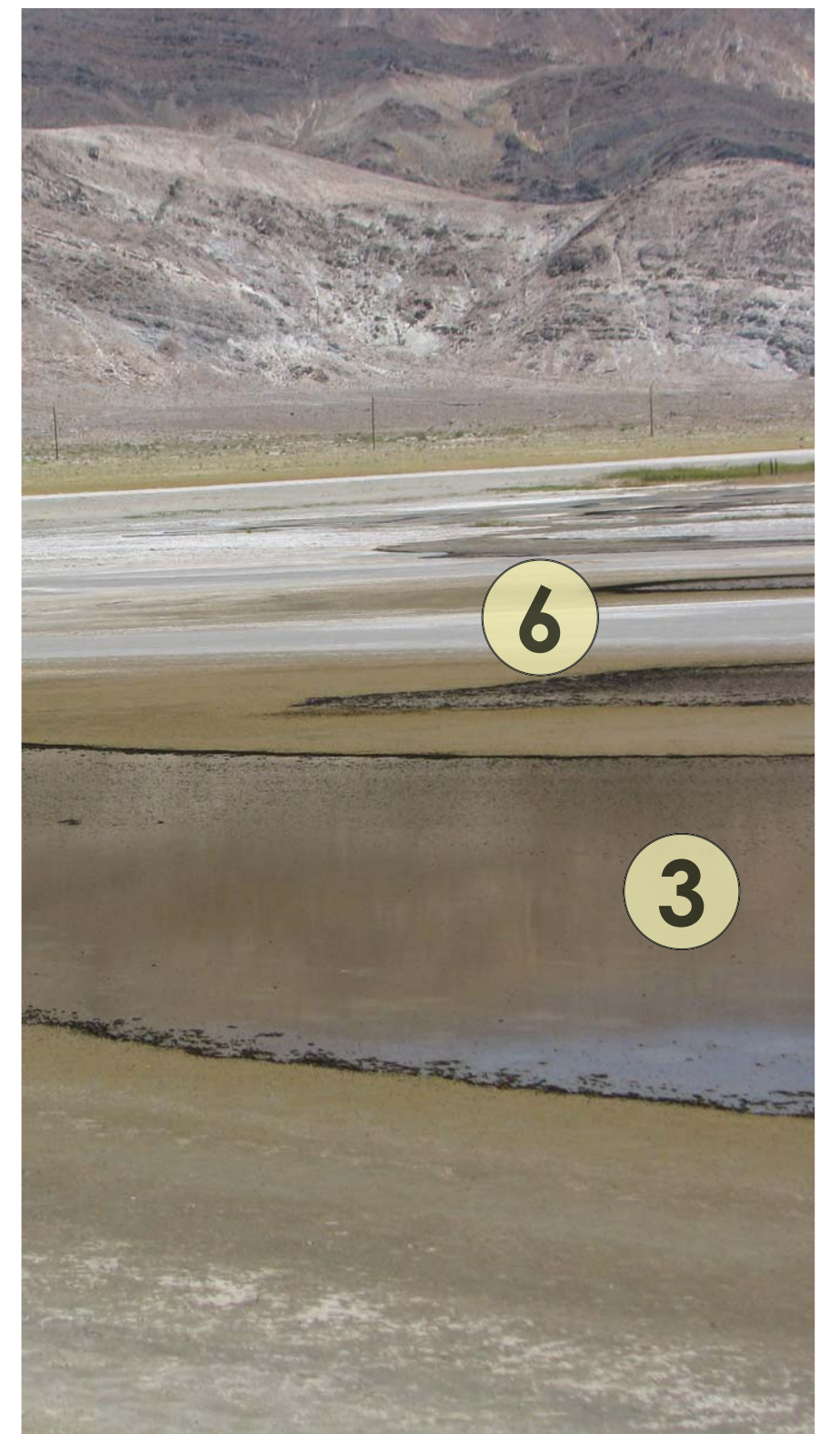
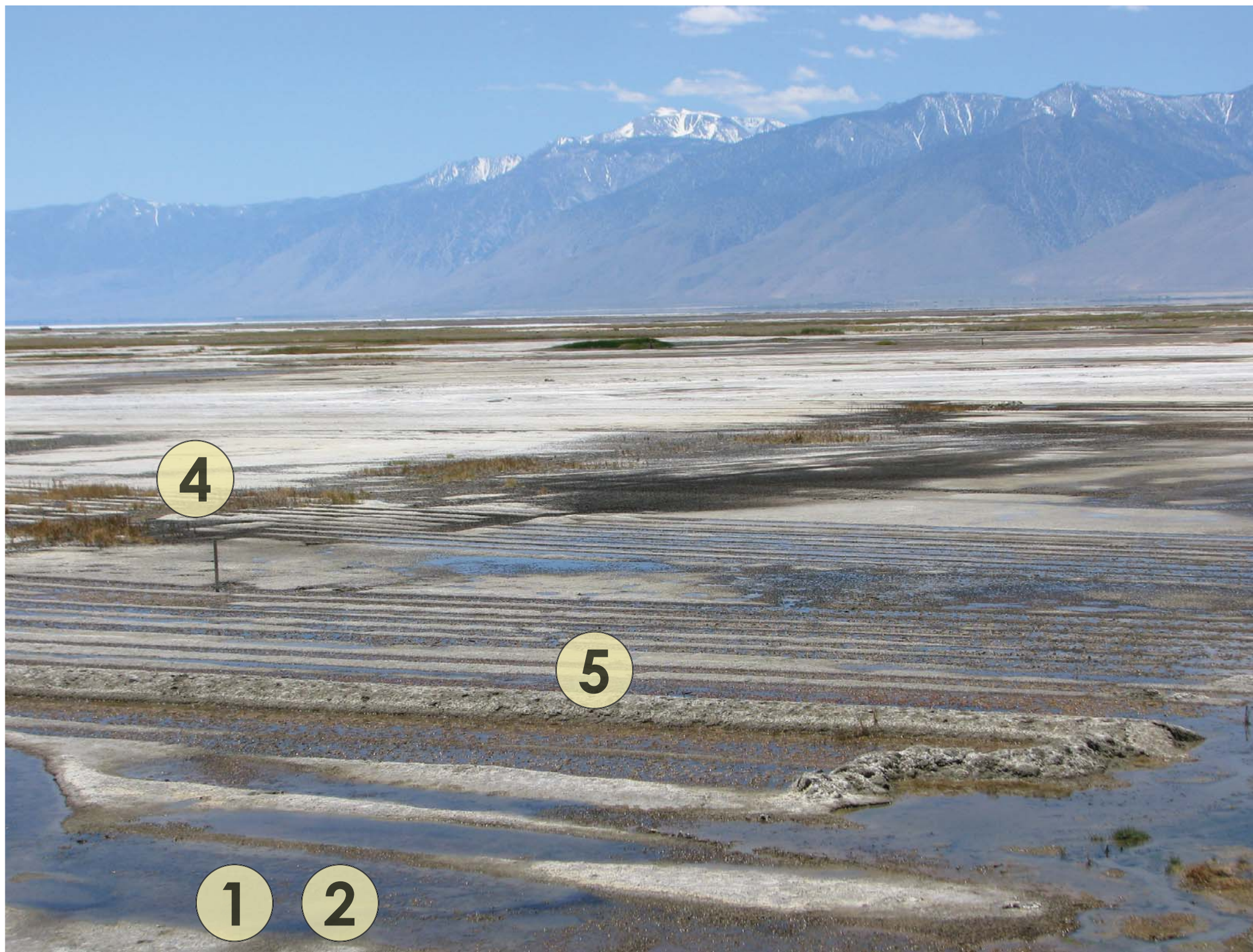
EARED GREBE
(*Podiceps nigricollis*)



RUDDY DUCK
(*Oxyura jamaicensis*)



BUFFLEHEAD
(*Bucephala albeola*)



PREFERRED HABITAT CONDITIONS

- 1 Water Depth: Shallow water (0 cm - 10 cm deep)
- 2 Salinity: Productive saline water
- 3 Water available when nesting & breeding in spring & summer
- 4 Habitat islands and dry areas for nesting
- 5 Topographic relief to conceal nests from predators
- 6 Little to no vegetation

REPRESENTATIVE GUILD MEMBERS



SNOWY PLOVER
(Charadrius nivosus)



BLACK-NECKED STILT
(Himantopus mexicanus)



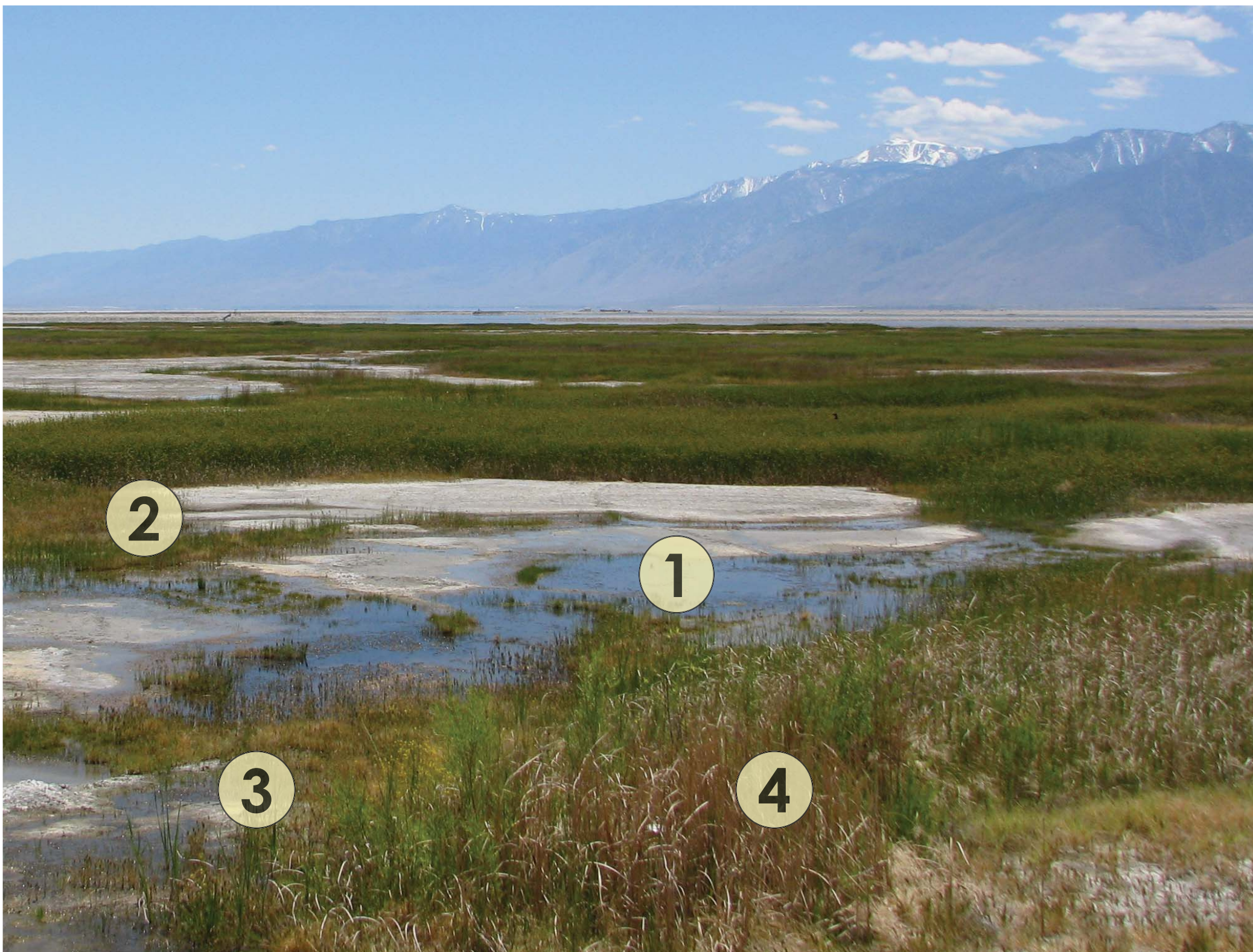
KILLDEER
(Charadrius vociferus)



AMERICAN AVOCET
(Recurvirostra americana)



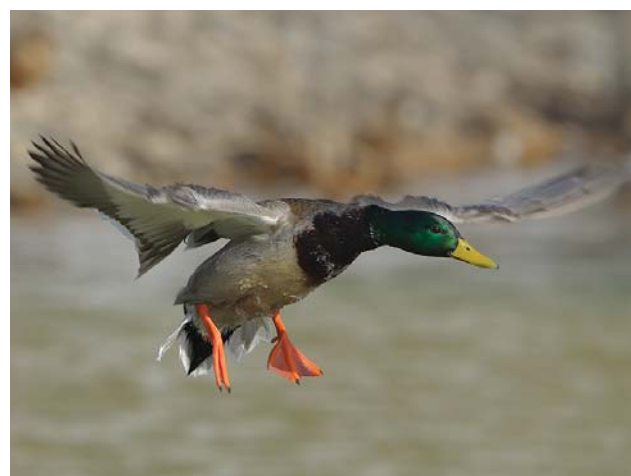
LONG-BILLED CURLEW
(Numenius americanus)



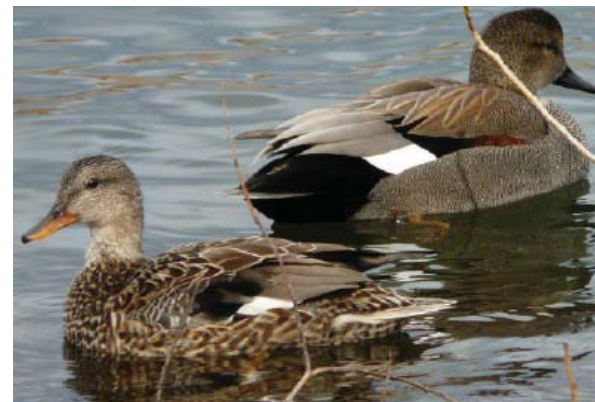
PREFERRED HABITAT CONDITIONS

- 1 Water Depth: Shallow water (13 cm - 30 cm deep)
- Salinity: Fresh to Brackish Water
- 2 Habitat islands for nesting and roosting
- Ponded water available during breeding season in spring & summer
- 3 Vegetation Extent: A 50:50 ratio of vegetation to open water is optimum
- Vegetation Structure: Tall and diverse alkali meadow communities nest adjacent to water
- 4

REPRESENTATIVE GUILD MEMBERS



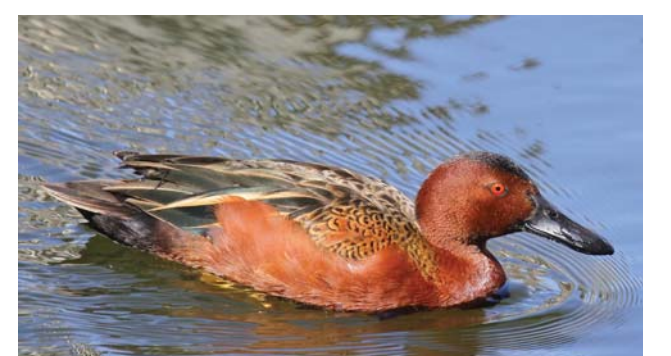
MALLARD
(*Anas platyrhynchos*)



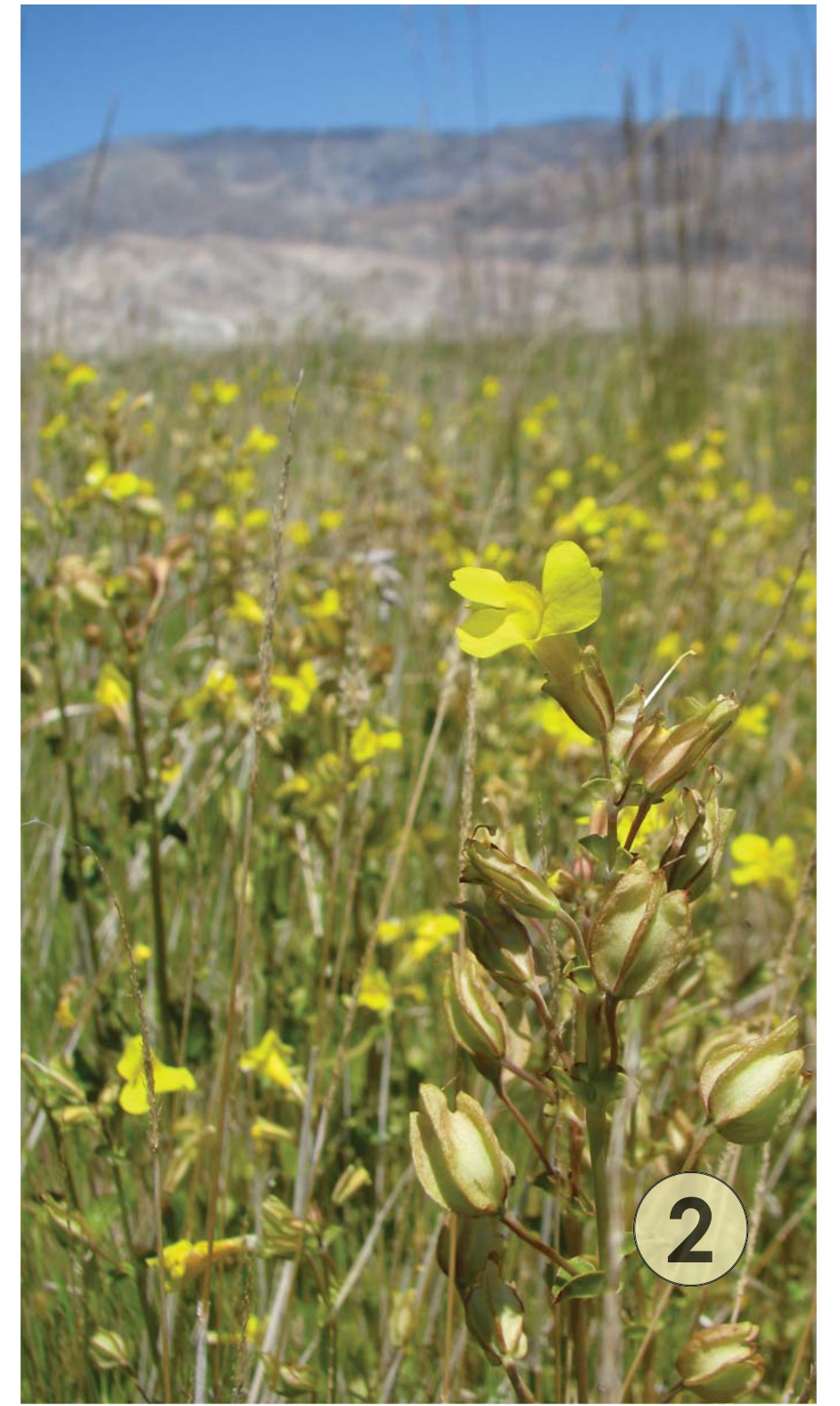
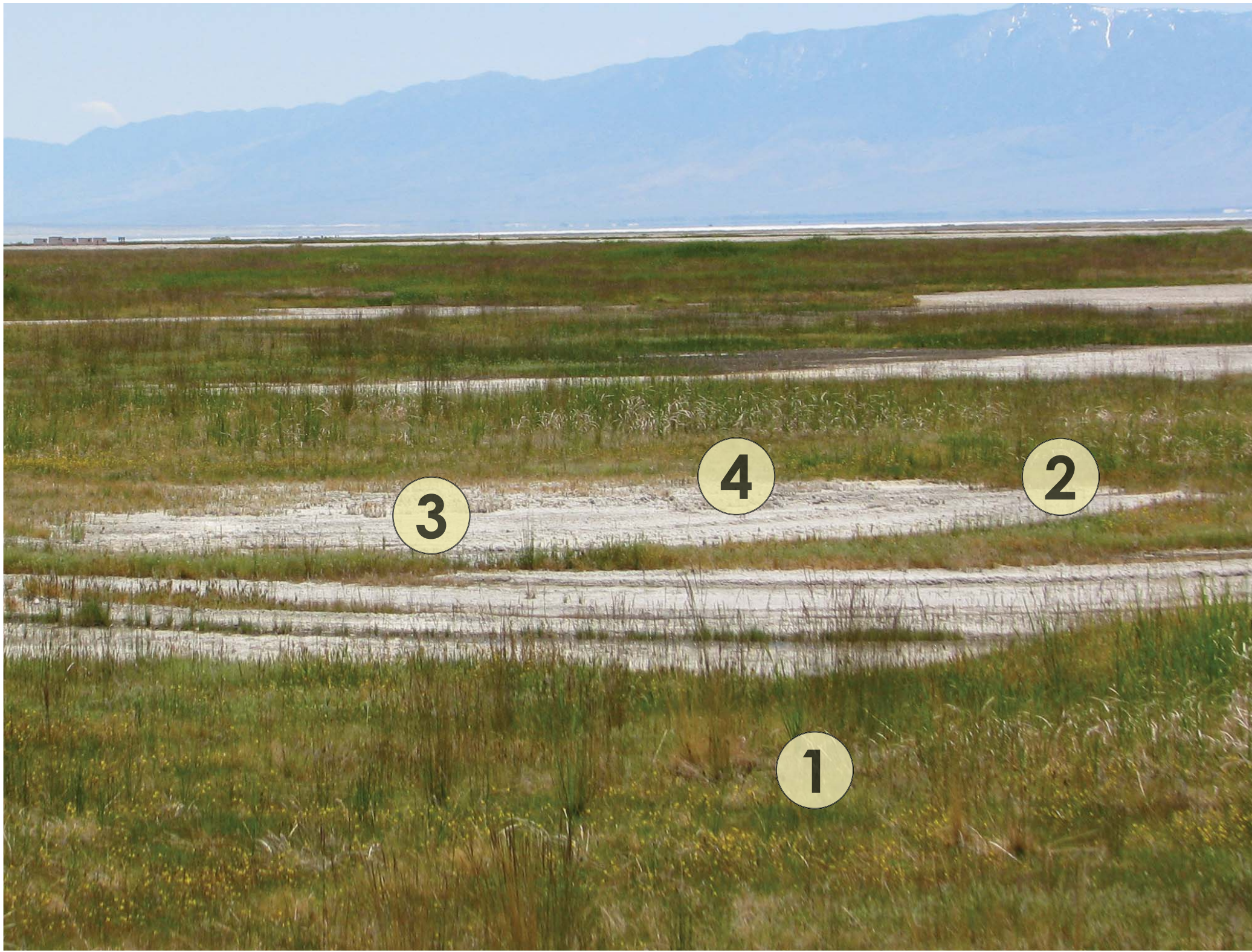
GADWALL
(*Anas strepera*)



GREEN-WINGED TEAL
(*Anas carolinensis*)



CINNAMON TEAL
(*Anas cyanoptera*)



PREFERRED HABITAT CONDITIONS

- 1 Diverse plant species and heights
- 2 High vegetative cover
- 3 High topographic diversity
- 4 Soil with low salinity

REPRESENTATIVE GUILD MEMBERS



SIDE-BLOTCHED LIZARD
(*Uta stansburiana*)



GOPHER SNAKE
(*Pituophis catenifer*)



OWENS VALLEY VOLE
(*Microtus californicus*)



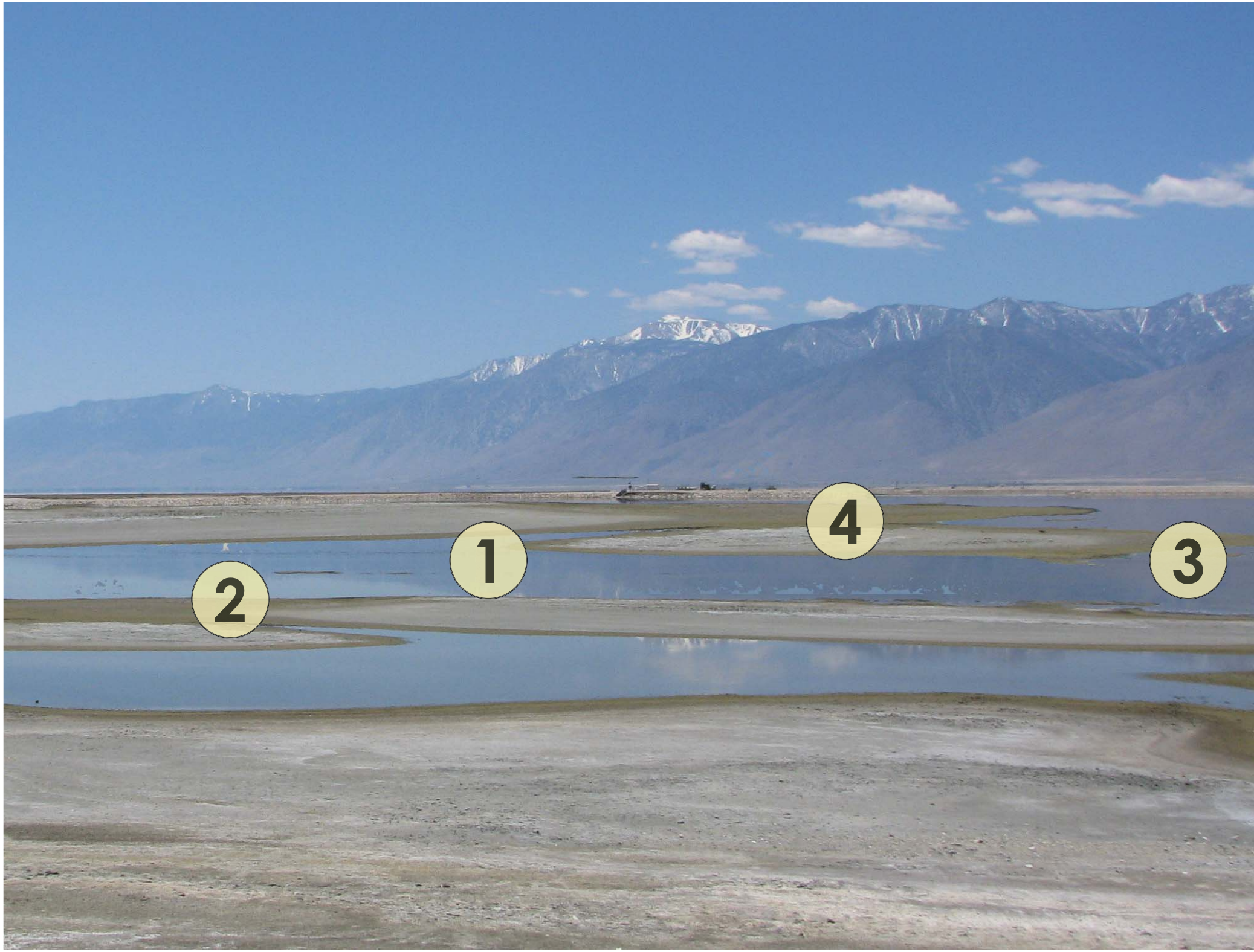
WESTERN MEADOWLARK
(*Sturnella neglecta*)



NORTHERN HARRIER
(*Circus cyaneus*)



SAVANNAH SPARROW
(*Passerculus sandwichensis*)



PREFERRED HABITAT CONDITIONS

- 1 Water Depth: Shallow water (0 cm - 10 cm deep)
- 2 Salinity: Productive saline water
- 3 Water available during migration in spring and fall
- 4 Dry habitat islands for resting and shoreline foraging
- 5 Small amounts of vegetation

REPRESENTATIVE GUILD MEMBERS



WESTERN SANDPIPER
(Calidris mauri)



WILSON'S PHALAROPE
(Phalaropus tricolor)



RED-NECKED PHALAROPE
(Phalaropus lobatus)



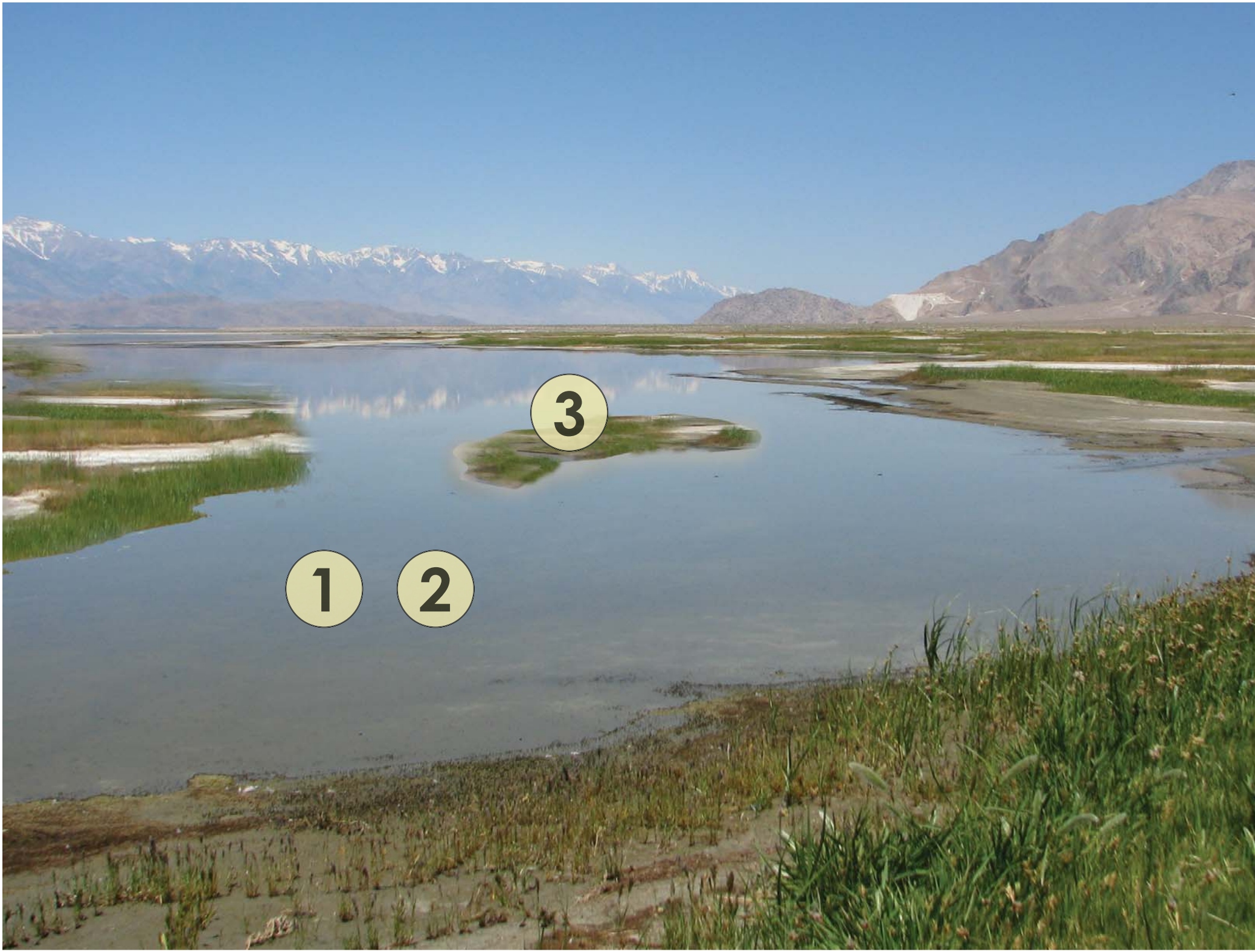
DUNLIN
(Calidris alpina)



WILLET
(Tringa semipalmata)



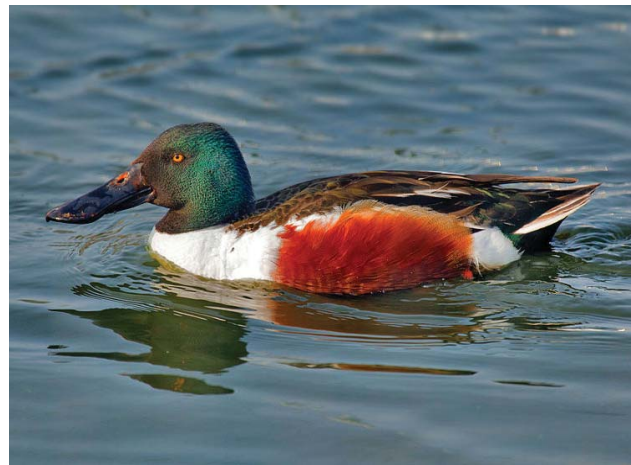
LESSER YELLOWLEGS
(Tringa flavipes)



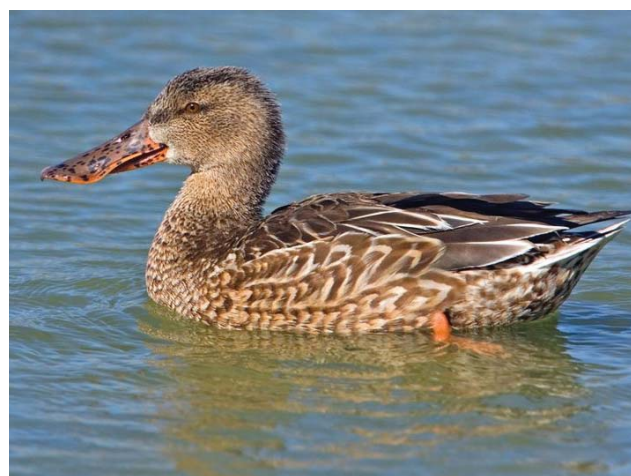
PREFERRED HABITAT CONDITIONS

- 1 Water Depth: Shallow water (13 cm - 30 cm deep)
- 2 Salinity: Brackish to Saline Water
- 3 Habitat islands for roosting and foraging
- 4 Water available during migration in spring and fall

REPRESENTATIVE GUILD MEMBERS



AMERICAN WIDGEON
(Anas americana)



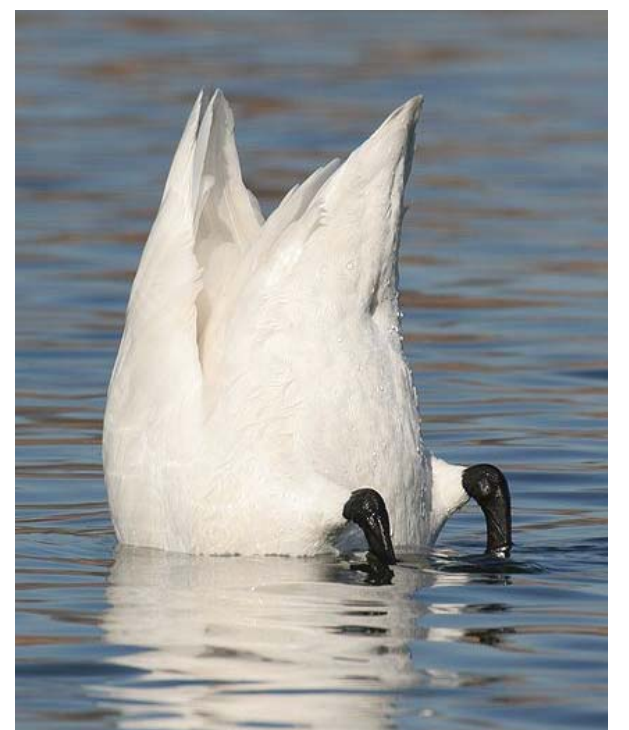
CANADA GOOSE
(Branta canadensis)



NORTHERN SHOVELER
(Anas clypeata)



NORTHERN PINTAIL
(Anas acuta)



TUNDRA SWAN
(Cygnus columbianus)

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Waterless
Dust Control





BRINE

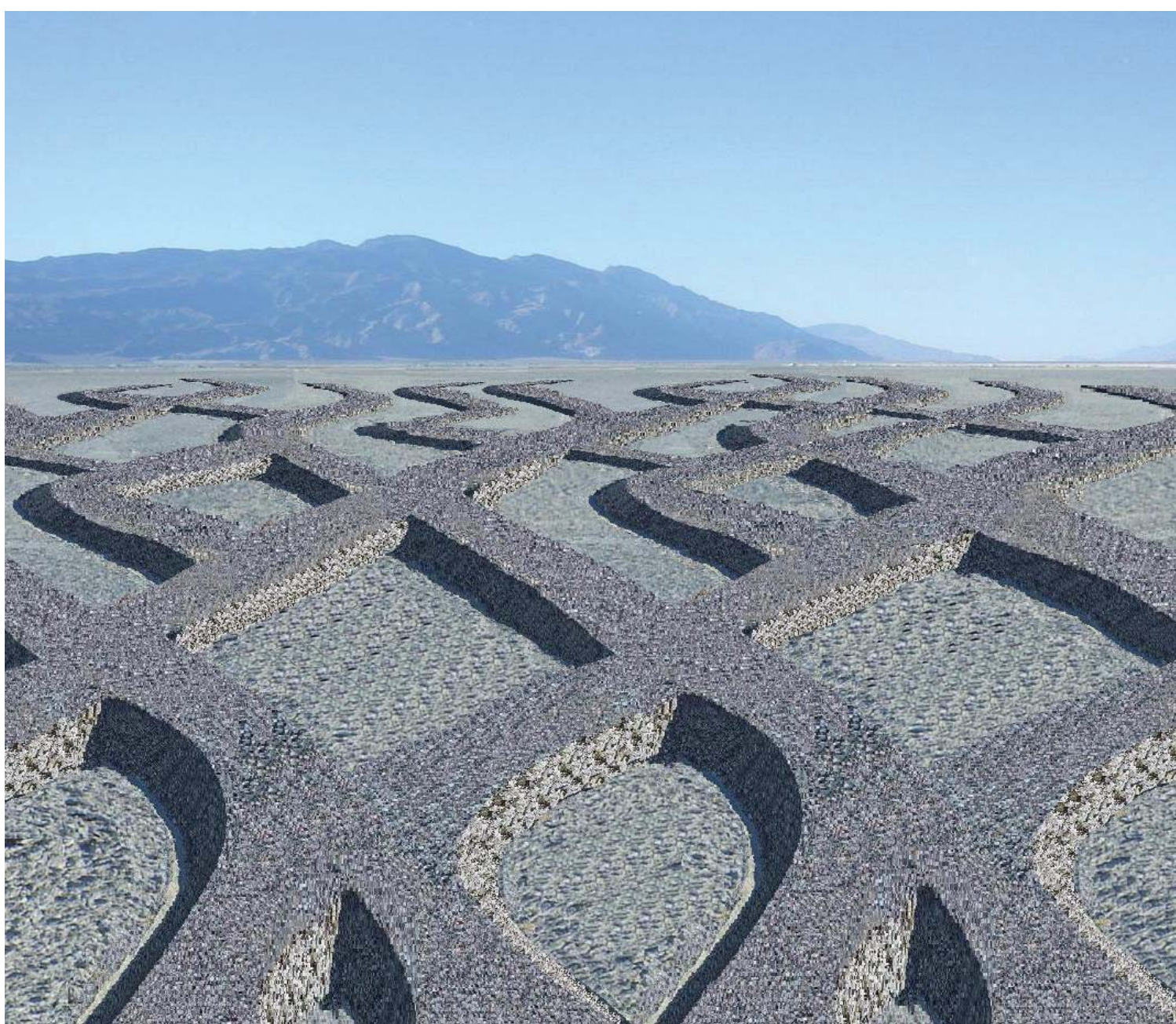
Water with very high salinity (similar to that of the brine pool at Owens Lake) which experiences little to no evaporation resulting in significant water savings



GRAVEL COVER

Shallow covering using locally sourced rock.

graphics prepared by: LADWP



NON-UNIFORM MEANDERING RIDGES

Based on the concept of a braided stream inverted in relief. Random, curving ridges of lakebed soil providing alcoves of protected playa.



TILLAGE

Low ridges of native soil oriented to allow for positive drainage and provide topographic relief.

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lake
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Enabling the
Project



THE PROJECT

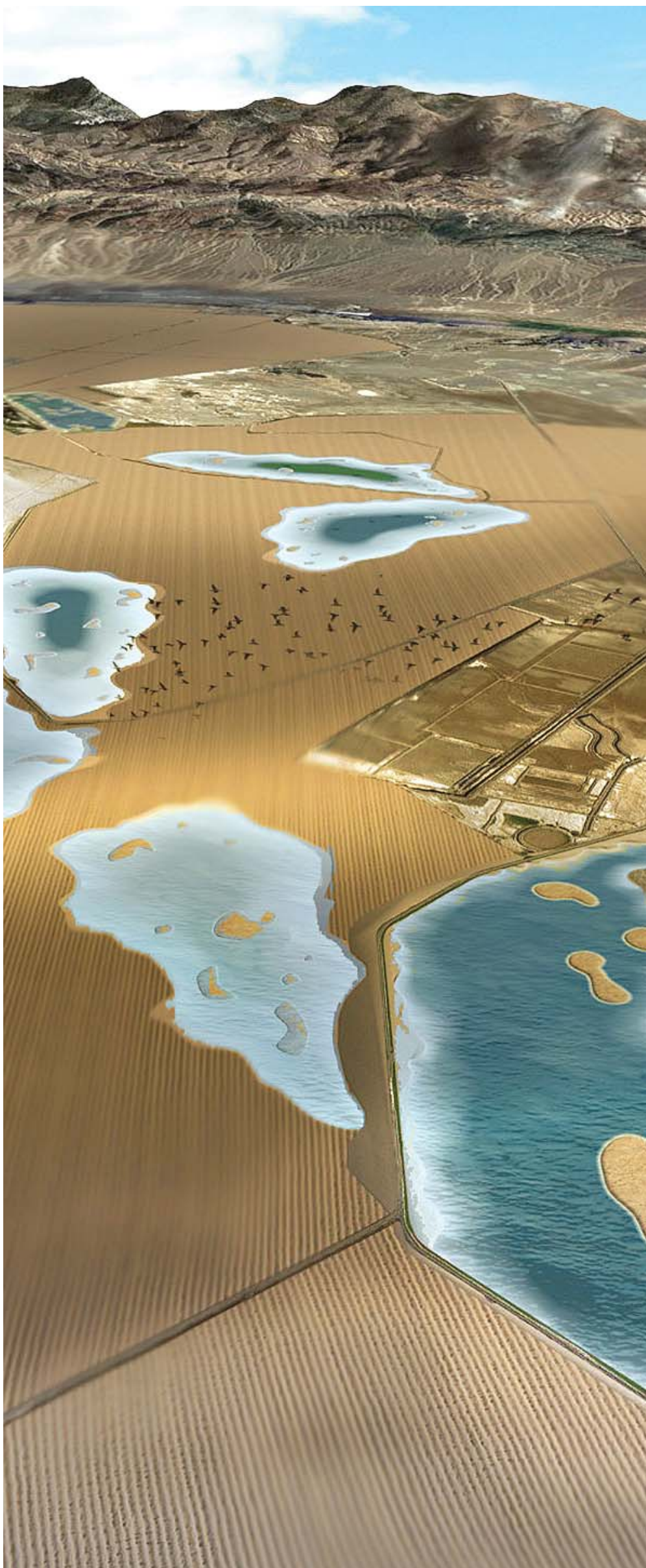
The Master Project will create a more sustainable and balanced solution at Owens Lake. Master Project implementation will also require a significant investment by Los Angeles and its ratepayers. In order to justify this increased expenditure, LADWP requests the following assurances:



RECOGNIZE COMPLIANCE

The success of Owens Lake dust control has come at a steep price. Fifteen percent of every LADWP ratepayer's water bill is spent on controlling dust at Owens Lake. More than 800,000 of these LADWP ratepayers live below the national poverty level. We cannot ask LADWP ratepayers to sign a blank check.

Execution of the Master Project must recognize that the control of dust on 45 square miles of lakebed satisfies the City's obligations under Health and Safety Code section 42316.



ACCEPT ADDITIONAL DUST CONTROL METHODS

Existing dust controls utilize three methods approved by Great Basin Unified Air Pollution Control District in the 1990s: shallow flooding, managed vegetation, and gravel cover. The most widely used control, shallow flooding (79%) and vegetation (8%) risk conflict with State law because they directly impact the City's right and ability to divert water for municipal use. Moreover, water diverted from the Los Angeles Aqueduct for dust control on Owens Lake must be directly replaced by water from the California Delta.

Gravel cover is cost prohibitive for widespread use at \$30 million per square mile and is unsuitable for many areas of the lakebed where poor soil conditions exist. The testing and approval of additional control methods is lengthy and uncertain and is not required by State law, which simply mandates mitigation without citing limits or constraints.

There is an immediate and critical need to allow new methods for dust control on Owens Lake, many of which are known and already in wide use elsewhere. A commitment by LADWP to re-invest in new, more environmentally suitable dust controls must be tied to an absolute guarantee that more dust control methods will be allowed.

In addition, the application of waterless dust controls, consistent with the habitat and other goals of the Master Plan, must be allowed, and wherever applicable, in whatever form makes technical, environmental and economic sense.

Los Angeles must be allowed to use a variety of waterless and water-efficient dust control measures as needed on the lakebed in order to achieve the water savings and cost containment needed to implement the Project.



ALLOW FOR TRANSITION

There are constraints within the State Implementation Plan¹ that render it virtually impossible to make the Project a reality because the existing dust controls must remain in compliance all of the time, including during the transition process. The act of implementing the Project would currently expose the City to fines of up to \$10,000 per day to achieve the proposed environmental benefits.

Temporary dust controls and sound work practices in the transition areas would be utilized to minimize the potential occurrence of dust emissions and protect local residents during all construction phases, but are not recognized under the current regulatory scheme.

Los Angeles must be allowed to transition sufficient areas of the lakebed (up to 3 square miles at a time) without incurring violations and exposure to fines and penalties from arbitrary constraints in the State Implementation Plan.



PERMISSION TO WORK

The California State Lands Commission is responsible for granting leases on the Owens Lakebed and setting terms and conditions. Lease terms have included payments of additional mitigation fees, transfer of State liability to the leaseholder, and requirements for unrelated industrial cleanup.

An agreement to implement a Master Project must go hand-in-hand with the ability to execute all elements of the project without delay, risk of loss of capital investment, or potential for additional mitigation measures.

In order to control dust on State property, Los Angeles must have a permanent right to implement the Project and maintain it according to the Maintenance Plan and Adaptive Management Plan provisions.

¹ Great Basin Unified Air Pollution Control District was required to prepare a State Implementation Plan (SIP) to demonstrate how the Owens Valley Planning Area would be brought into attainment with federal air quality standards.

owens lake Master Project:
transitioning from 'water waste' to 'water wise'








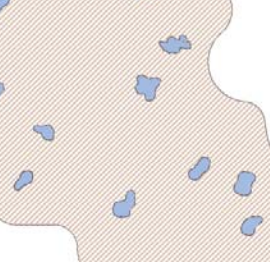
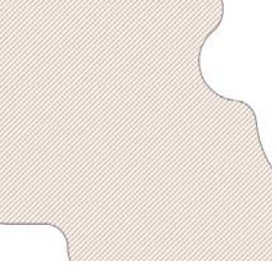
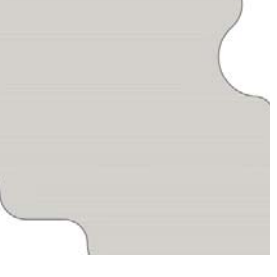



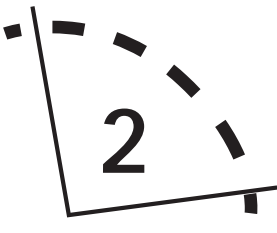
owens
lake
MASTER
PROJECT

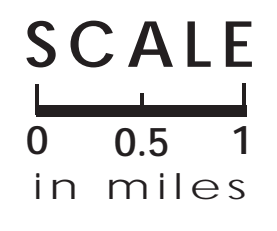
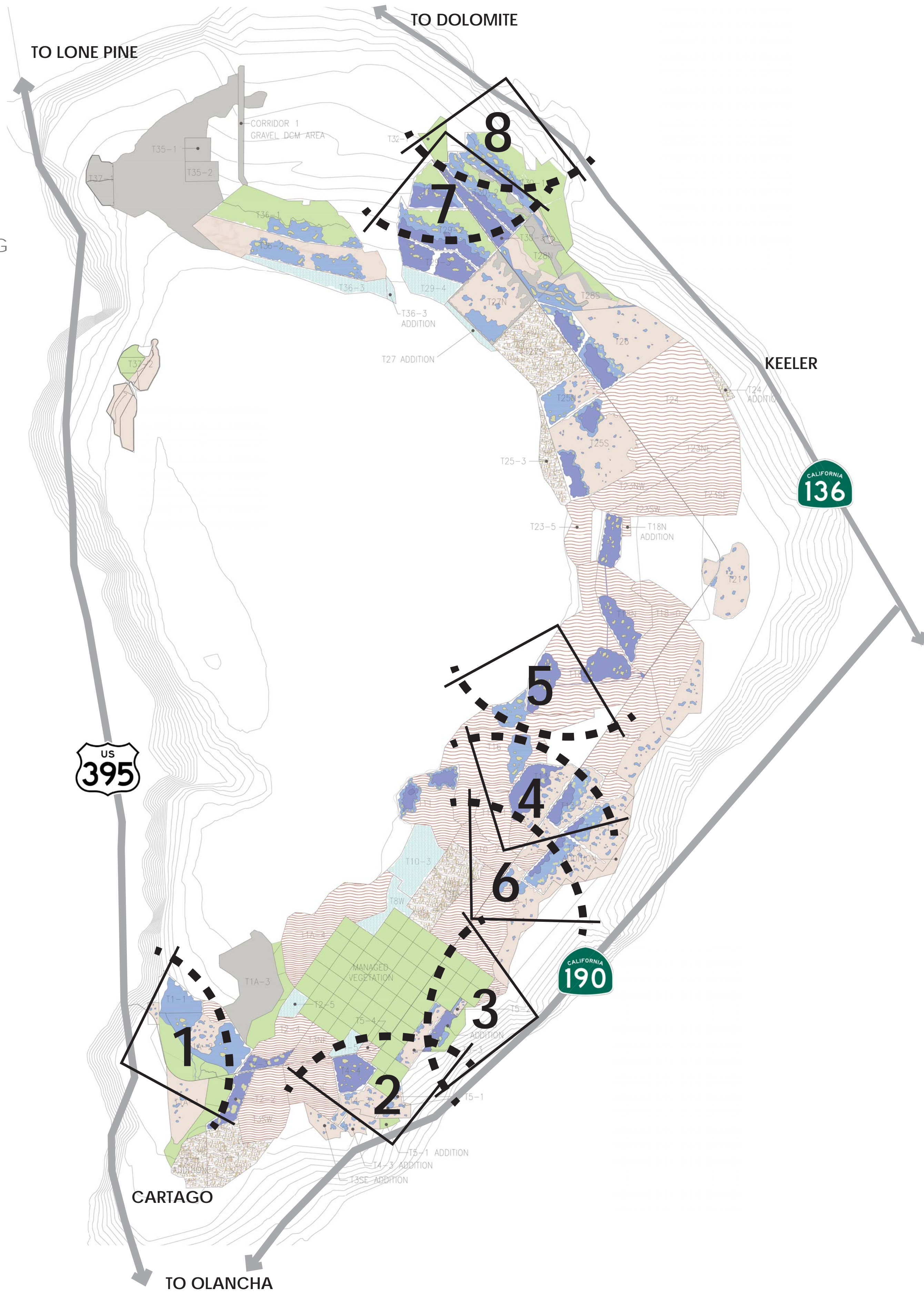


Birds Eye
Views



LEGEND

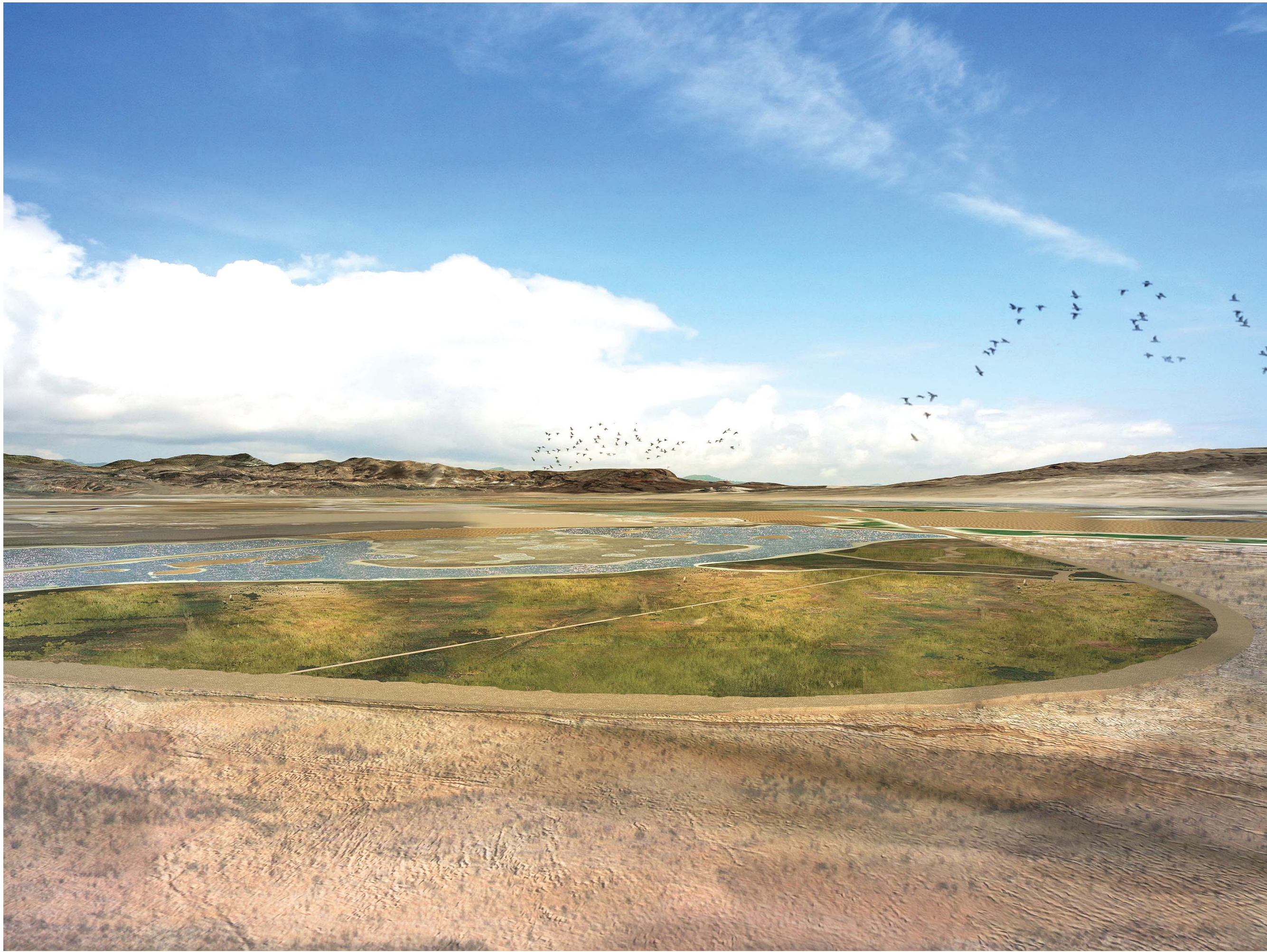
-  CURVING TILLAGE
-  NON-UNIFORM MEANDERING RIDGES
-  MANAGED VEGETATION
-  SHALLOW POND
-  ISLAND
-  DEEP POND
-  DEEPER POND
-  SPRINKLER IRRIGATION (WITH INTERMITTENT PONDS)
-  SPRINKLER IRRIGATION (WITHOUT INTERMITTENT PONDS)
-  GRAVEL
-  BERM ROAD
-  TOE OF BERM ROAD SLOPE
-  BRINE
-  REFER TO PERSPECTIVE VIEWS FOR ENLARGEMENTS



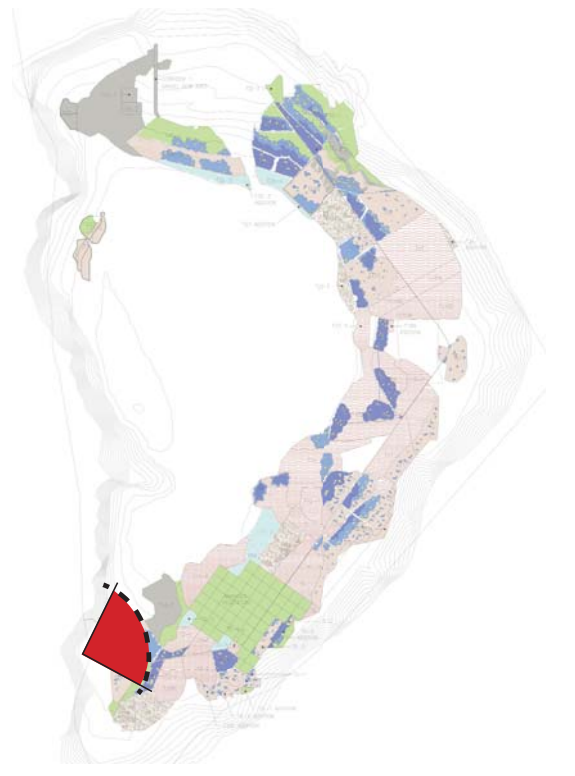
PERSPECTIVE VIEW LOCATIONS

owens lake | MASTER PROJECT





VIEW 1

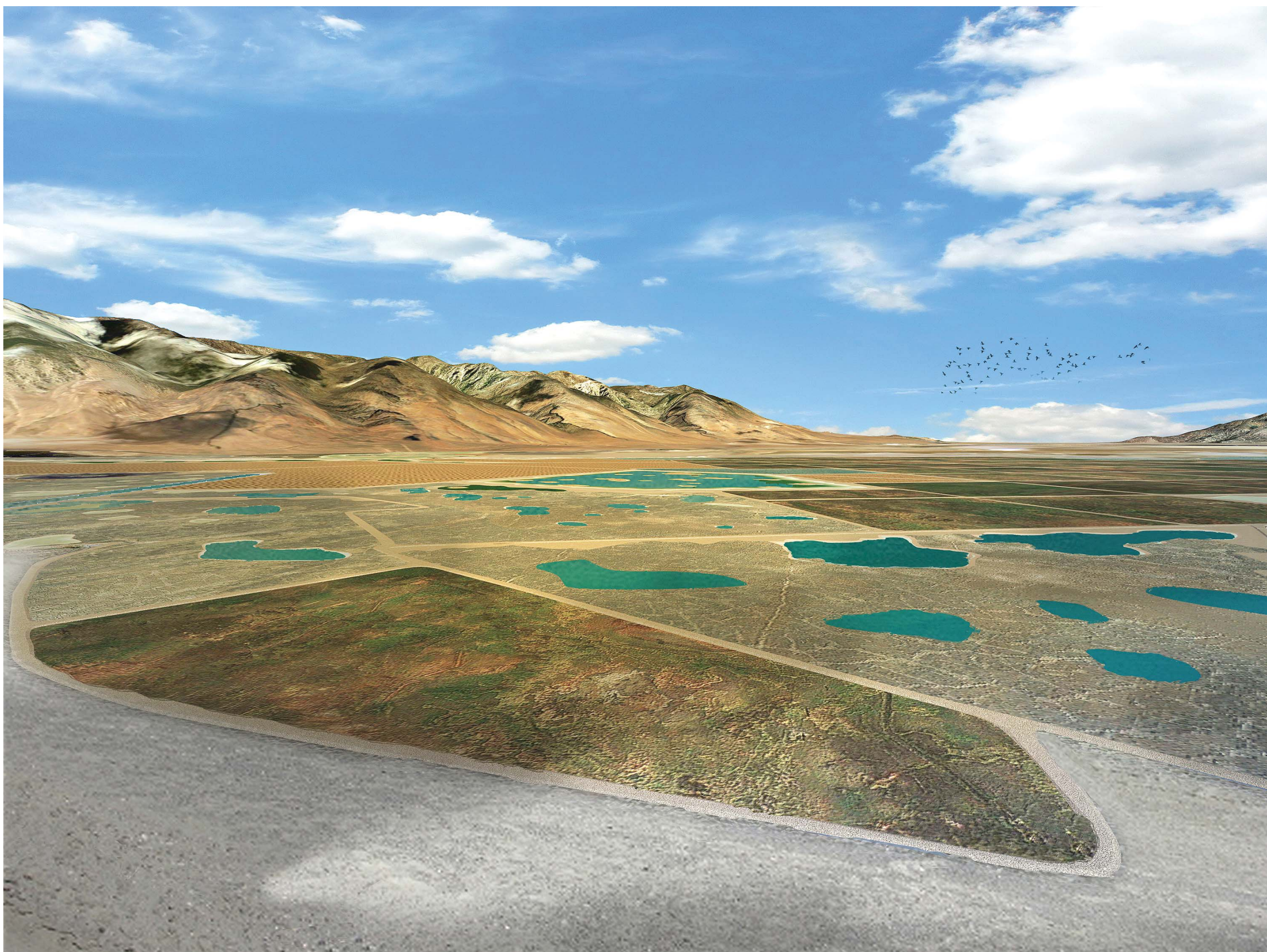


VIEW FROM
HIGHWAY 395
LOOKING EAST

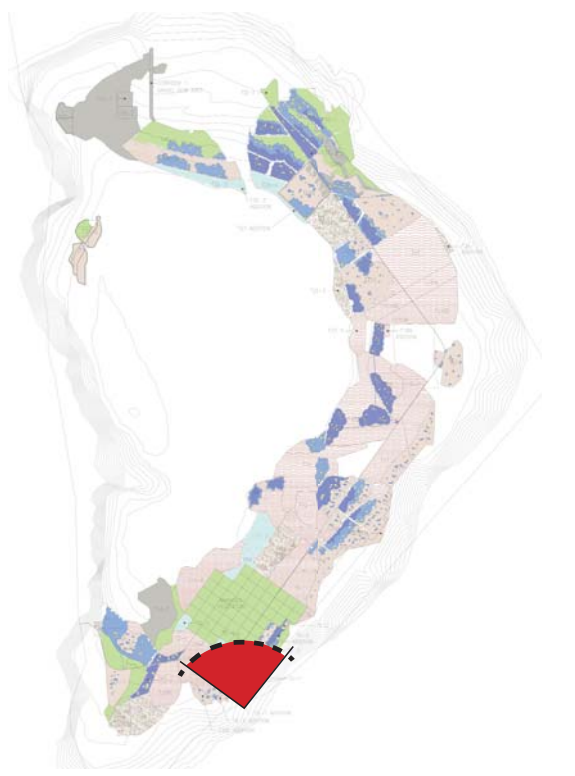
FOREGROUND:
UNDISTURBED
NATIVE TERRAIN

MIDDLE GROUND:
MANAGED
VEGETATION

BACKGROUND:
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS



VIEW 2

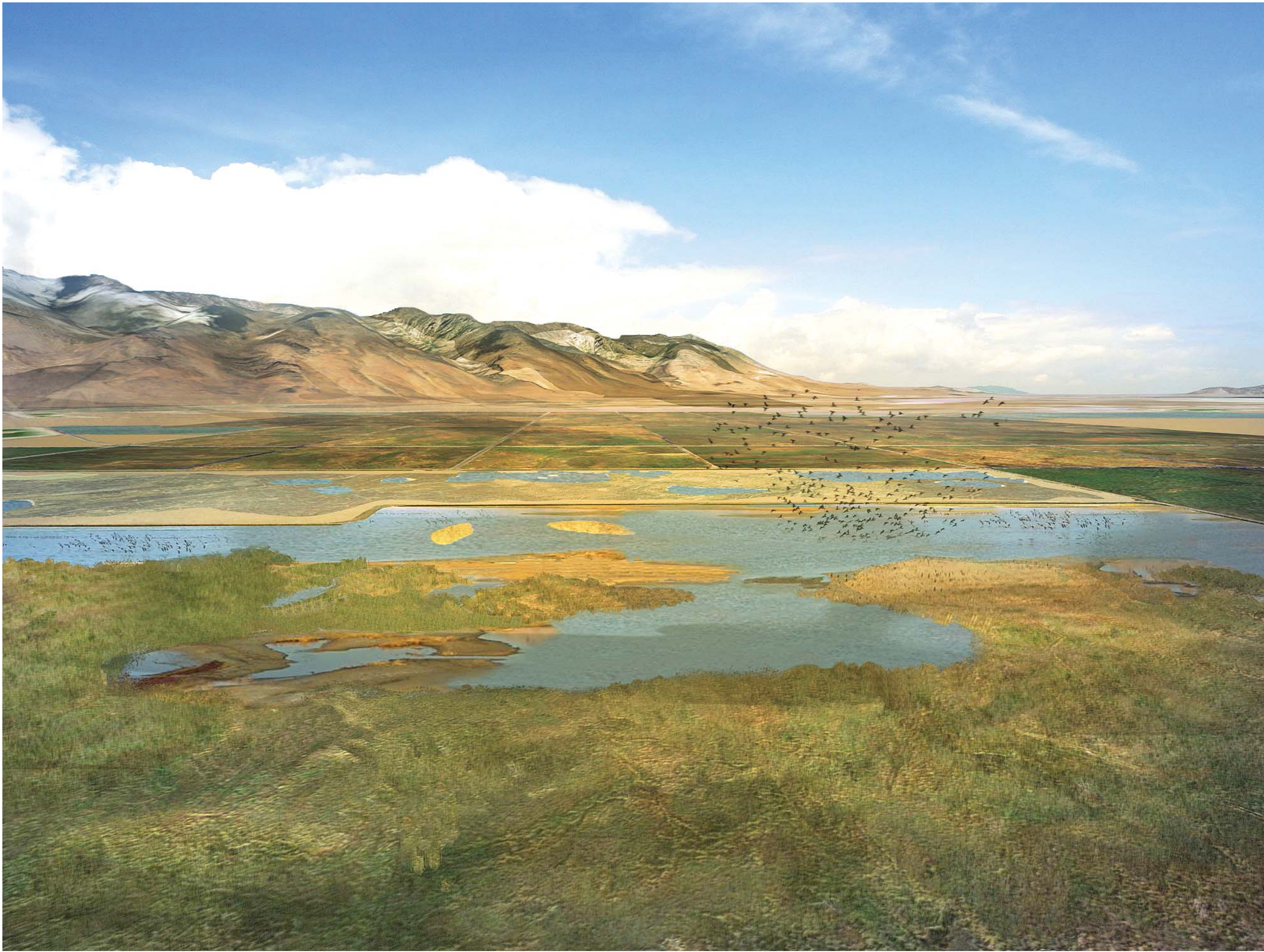


VIEW FROM
HIGHWAY 190
LOOKING NORTH

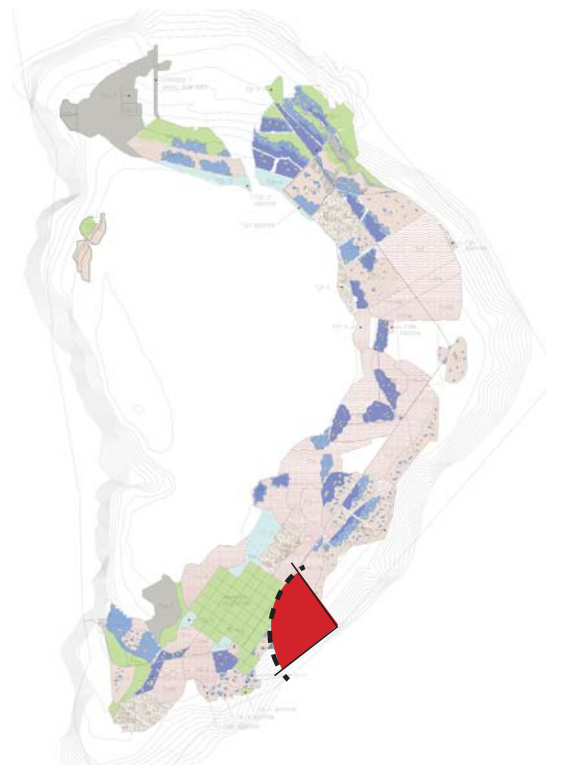
FOREGROUND:
UNDISTURBED
NATIVE TERRAIN

MIDDLE GROUND:
MANAGED
VEGETATION

BACKGROUND:
SPRINKLER
IRRIGATION WITH
INTERMITTENT PONDS



VIEW 3

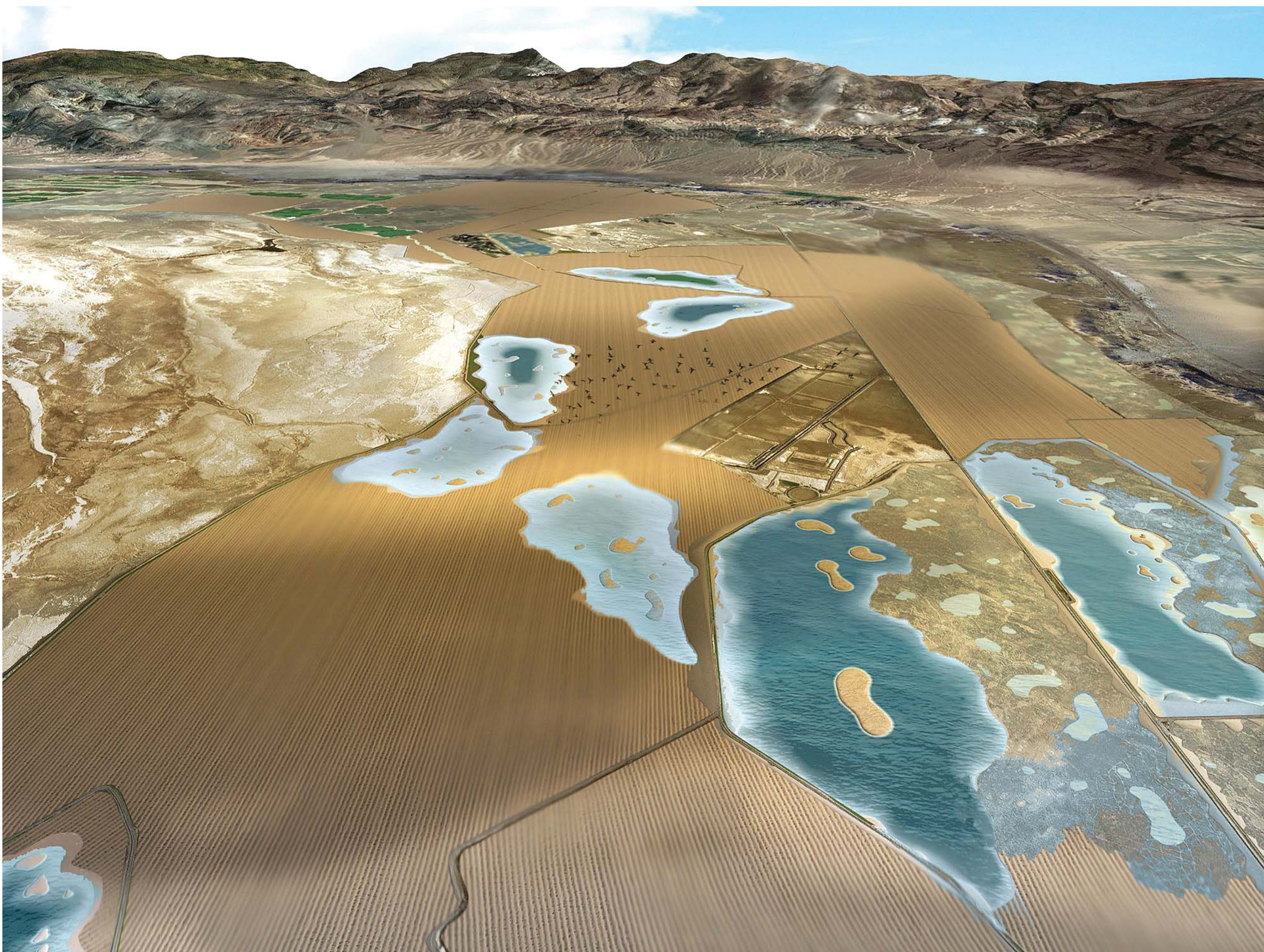


VIEW FROM
HIGHWAY 190
LOOKING WEST

FOREGROUND:
MANAGED
VEGETATION

MIDDLE GROUND:
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS

BACKGROUND:
MANAGED
VEGETATION



VIEW 4



AERIAL VIEW
LOOKING
NORTHEAST

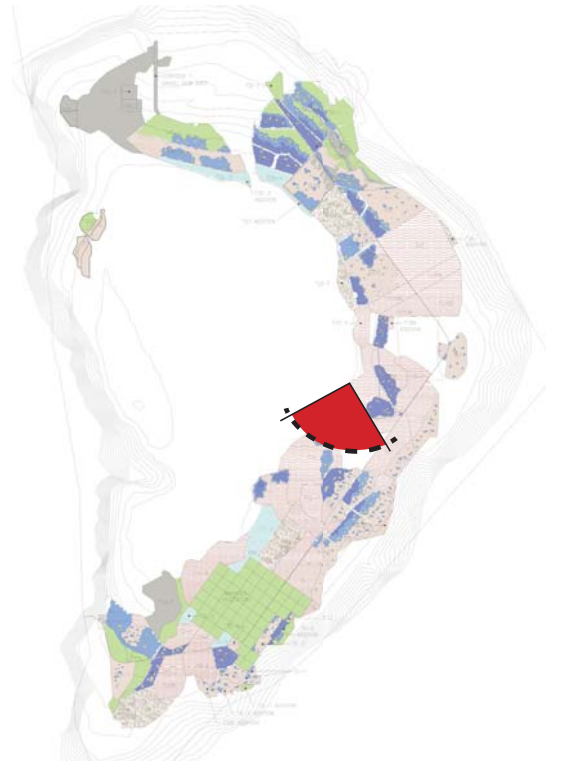
FOREGROUND:
CURVING TILLAGE

MIDDLE GROUND:
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS

BACKGROUND:
SPRINKLER
IRRIGATION WITH
INTERMITTENT PONDS



VIEW 5

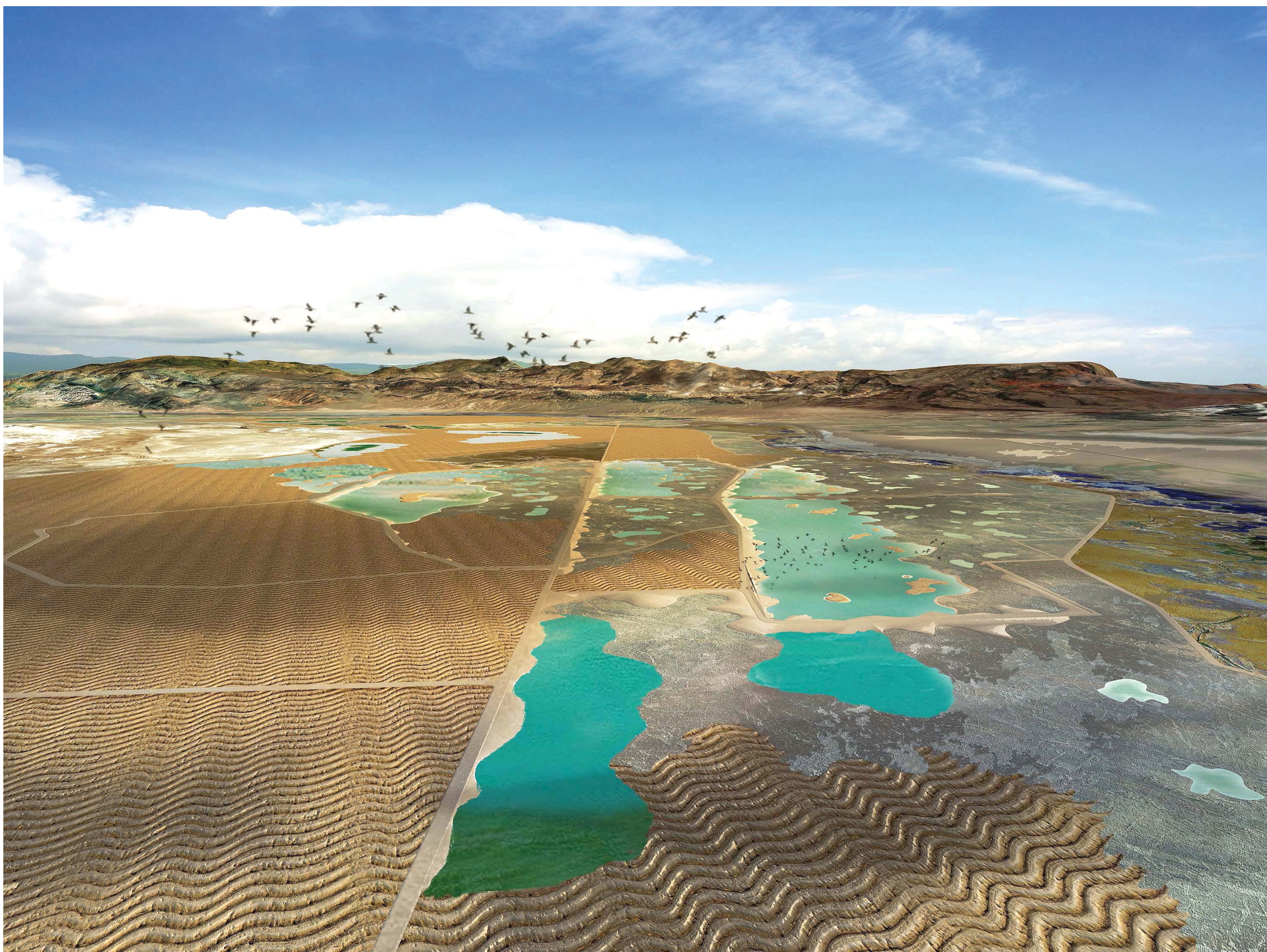


VIEW LOOKING SOUTH

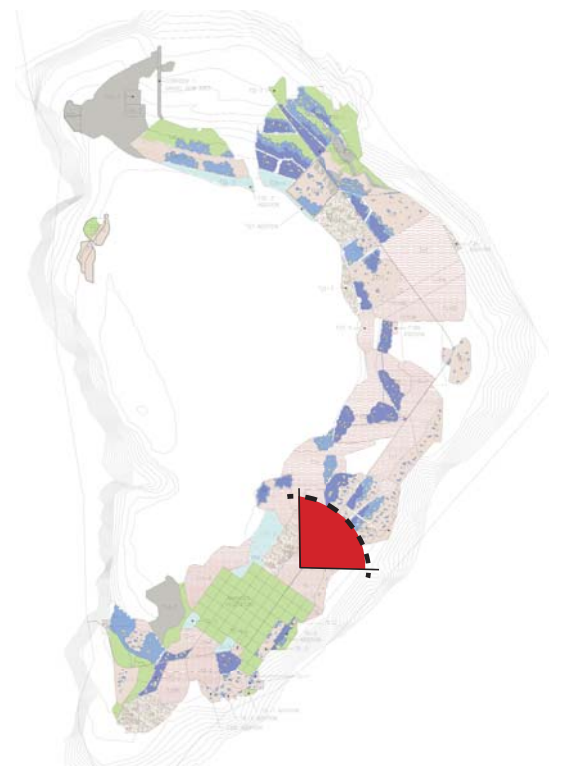
FOREGROUND:
UNDISTURBED
NATIVE TERRAIN
WITH BERM ROADS

MIDDLE GROUND:
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS AND
EDGES OF CURVING
TILLAGE

BACKGROUND:
CURVING TILLAGE
WITH SHALLOW
PONDING



VIEW 6

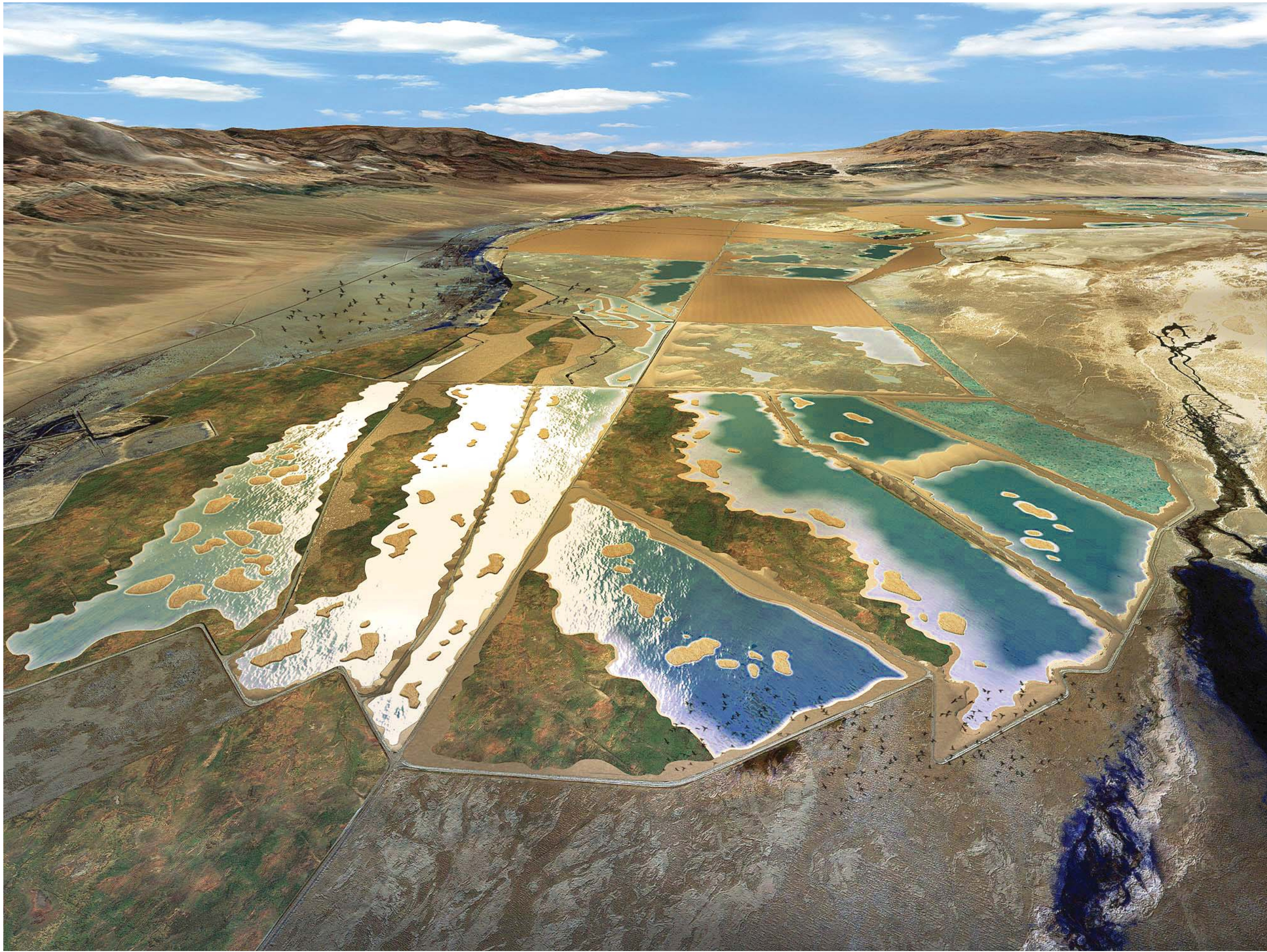


AERIAL VIEW
LOOKING
NORTHEAST

FOREGROUND:
CURVING TILLAGE

MIDDLE GROUND:
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS

BACKGROUND:
SPRINKLER
IRRIGATION WITH
INTERMITTENT PONDS



VIEW 7

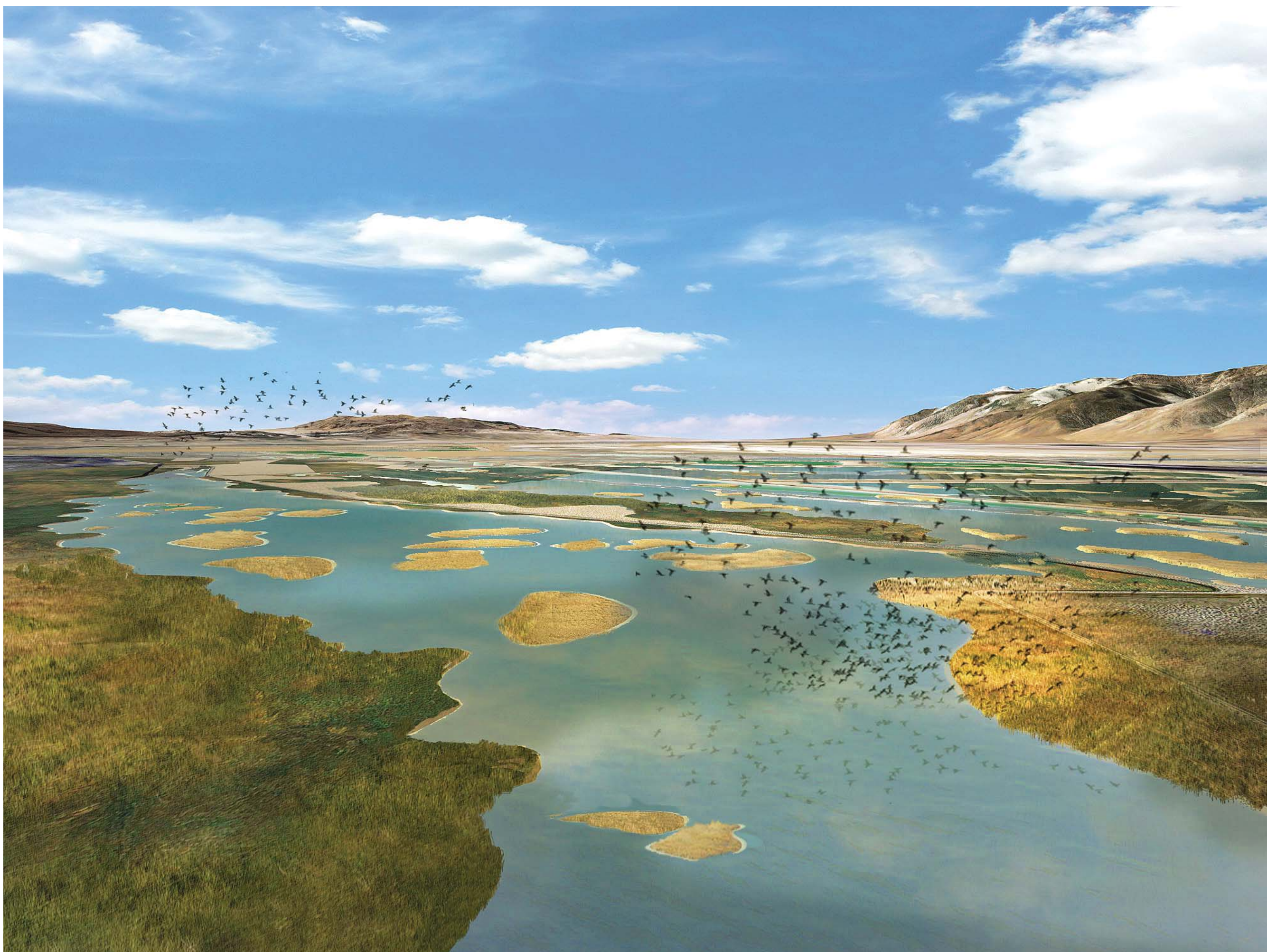


AERIAL VIEW
LOOKING SOUTH

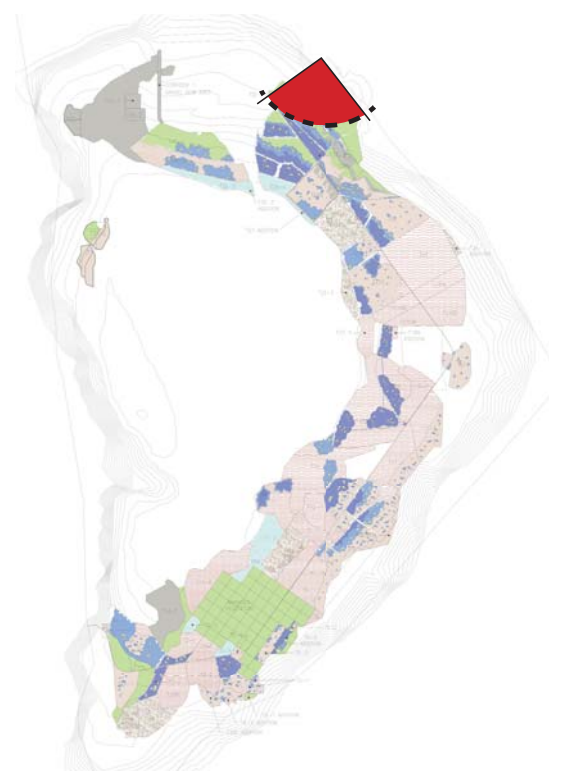
FOREGROUND:
MANAGED
VEGETATION AND
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS

MIDDLE GROUND:
SPRINKLER
IRRIGATION WITH
INTERMITTENT PONDS

BACKGROUND:
CURVING TILLAGE



VIEW 8



VIEW LOOKING
SOUTH

FOREGROUND:
MANAGED
VEGETATION AND
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS

MIDDLE GROUND:
MANAGED
VEGETATION AND
SHALLOW PONDING
WITH INTERMITTENT
ISLANDS

BACKGROUND:
CURVING TILLAGE