SCAPE LANDSCAPE ARCHITECTURE DPC

HAYWARD REGIONAL SHORELINE MASTER PLAN
TASK 4 - ADAPTATION STRATEGIES

JANUARY 9, 2020

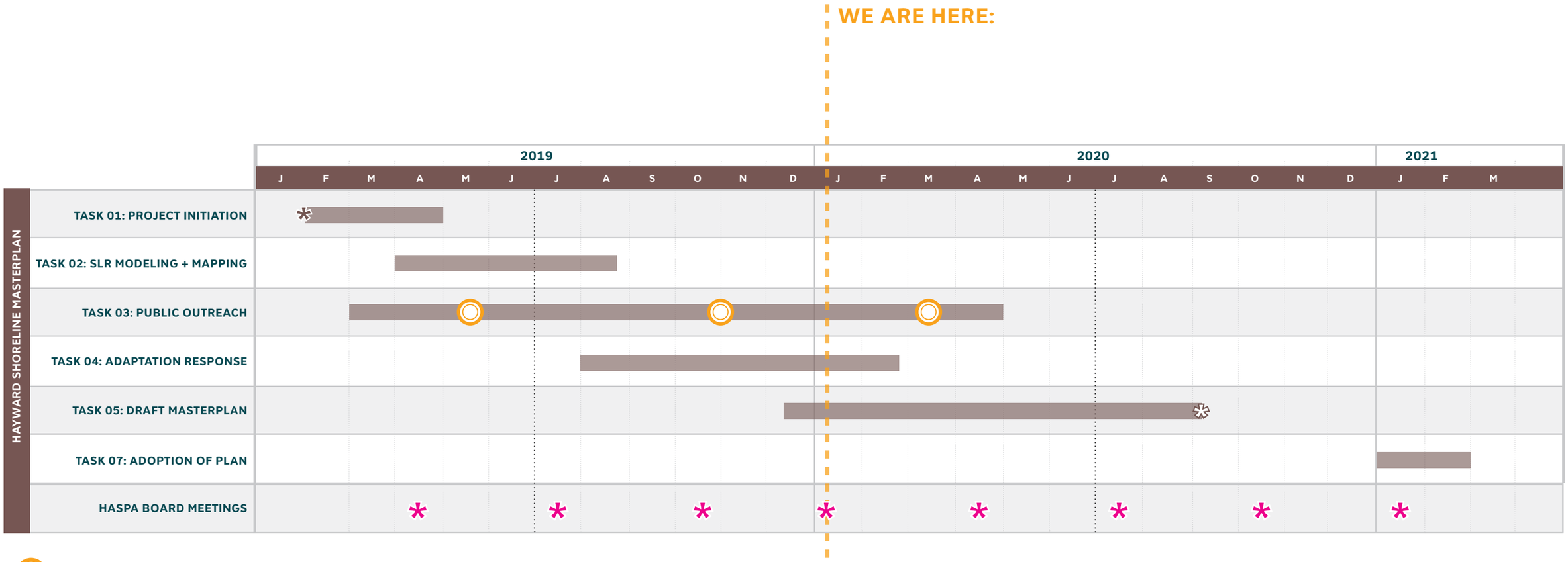
TASK 4- ADAPTATION STRATEGIES

Agenda

- Project Schedule
- Project Goals
- Since We Last Met
- Adaptation Strategies
- Master Plan Assumptions
- Next Steps

PROJECT SCHEDULE

PROJECT SCHEDULE



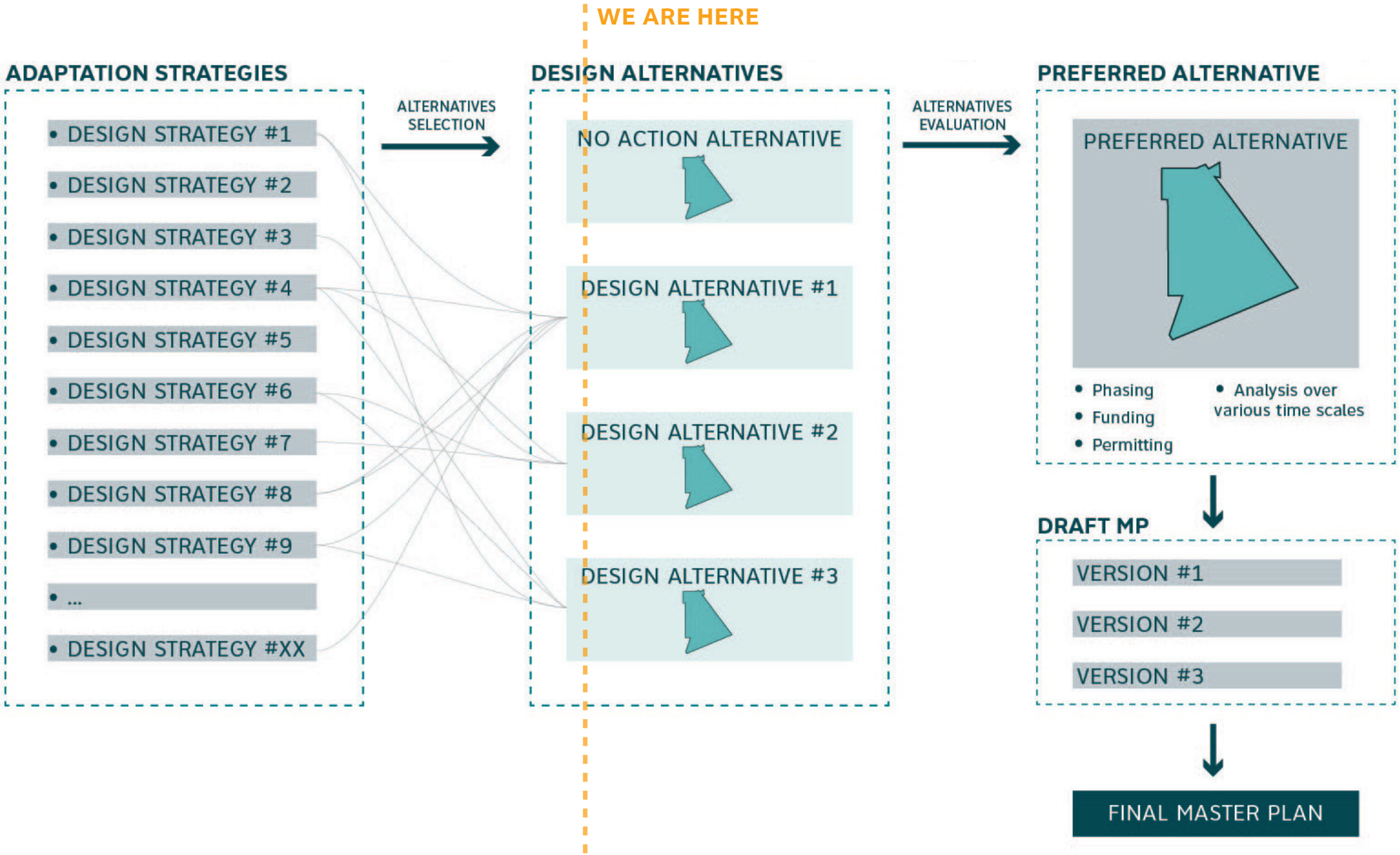
Community or Stakeholder Workshop

Task Duration

HASPA Board Meetings

Final Masterplan Report Submission

PROJECT SCHEDULE



PROJECT GOALS

CREATE A RESILIENT SHORELINE FOR PEOPLE AND ECOLOGY

- ENHANCE THE SHORELINE'S ECOLOGICAL VALUE AND ADAPT TO SEA LEVEL RISE
- ENHANCE RECREATIONAL OPPORTUNITIES AND ADAPT TO CLIMATE CHANGE
- CREATE A MANAGEMENT FRAMEWORK FOR ADAPTING TO SEA LEVEL RISE OVER TIME
- PROVIDE REFUGE TO HELP ENDANGERED SHORELINE SPECIES ADAPT TO CLIMATE CHANGE

ENHANCE THE SHORELINE ENVIRONMENT TO REDUCE RISK TO CRITICAL INFRASTRUCTURE AND BUILT ASSETS

- ALIGN WITH AND ENHANCE EXISTING MANAGEMENT AND CAPITAL IMPROVEMENT PLANS

- REDUCE RISK TO REGIONAL CRITICAL UTILITIES FROM SEA LEVEL RISE, GROUNDWATER INTRUSION, AND FLOOD EVENTS

- REDUCE RISK TO TRANSPORTATION INFRASTRUCTURE FROM SEA LEVEL RISE, GROUNDWATER INTRUSION, AND FLOOD EVENTS

- REDUCE RISK TO AGENCY ASSETS (SAN FRANCISCO BAY TRAIL AND MARSH RESTORATION PROJECTS)

BUILD SOCIAL RESILIENCE IN THE COMMUNITY

- **PROMOTE SOCIAL EQUITY, ENVIRONMENTAL JUSTICE, AND PUBLIC HEALTH**

- **PRESERVE THE LOCAL ECONOMY AND INCREASE RESILIENCE TO CLIMATE CHANGE**

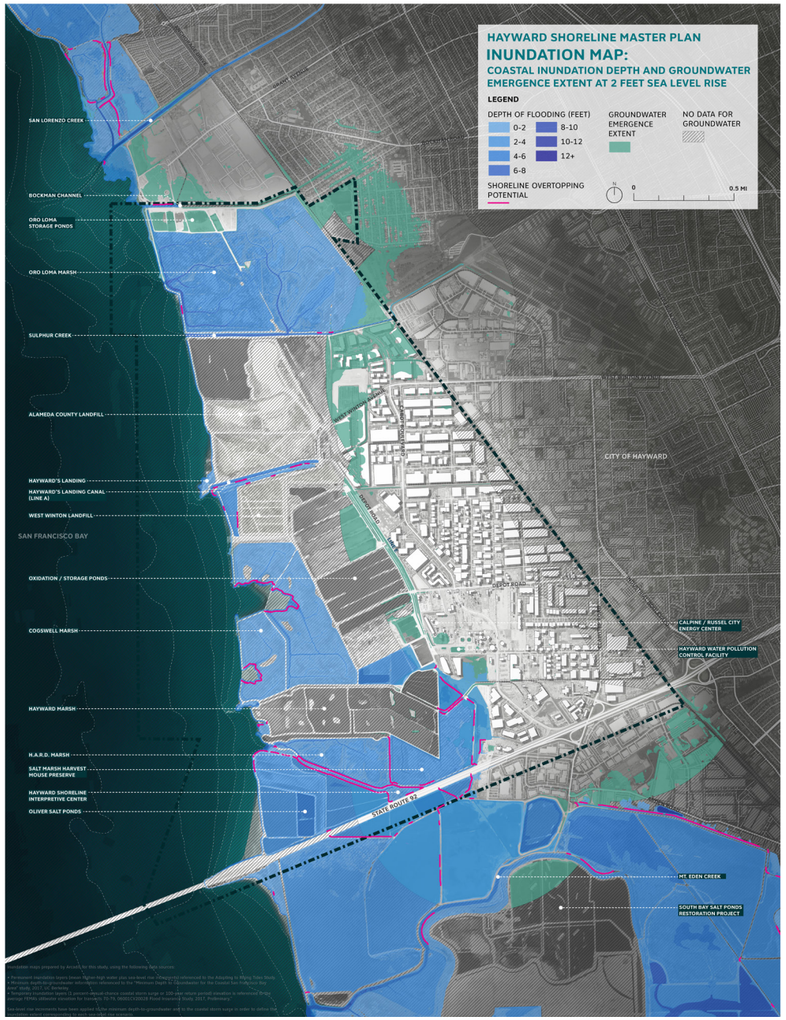
- **PREVENT THE DISRUPTION OF KEY COMMUNITY SERVICES**

BUILD CAPACITY FOR FUTURE GENERATIONS TO ADAPT TO CLIMATE CHANGE

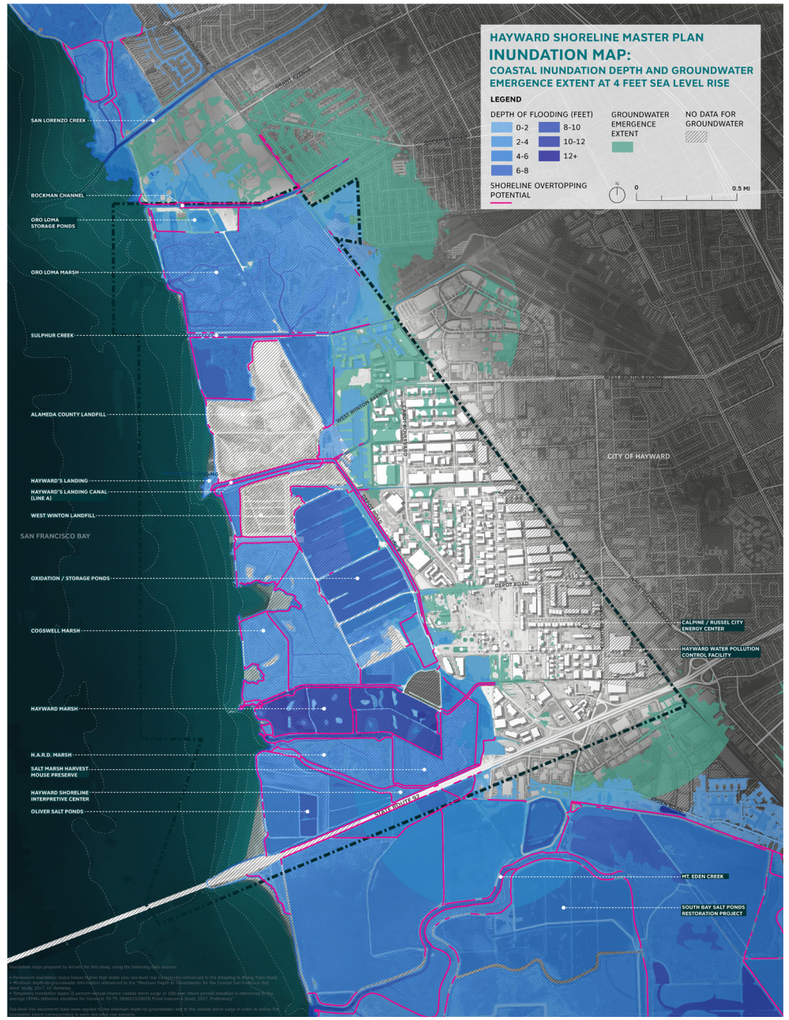
- **BUILD ORGANIZATIONAL AND COMMUNITY CAPACITY**
- **PROVIDE A PLACE FOR EDUCATION, INTERPRETATION, AND UNDERSTANDING OF THE SHORELINE AND CLIMATE CHANGE**
- **FOSTER STEWARDSHIP OF THE SHORELINE'S CULTURAL AND ECOLOGICAL RESOURCES**

SINCE WE LAST MET

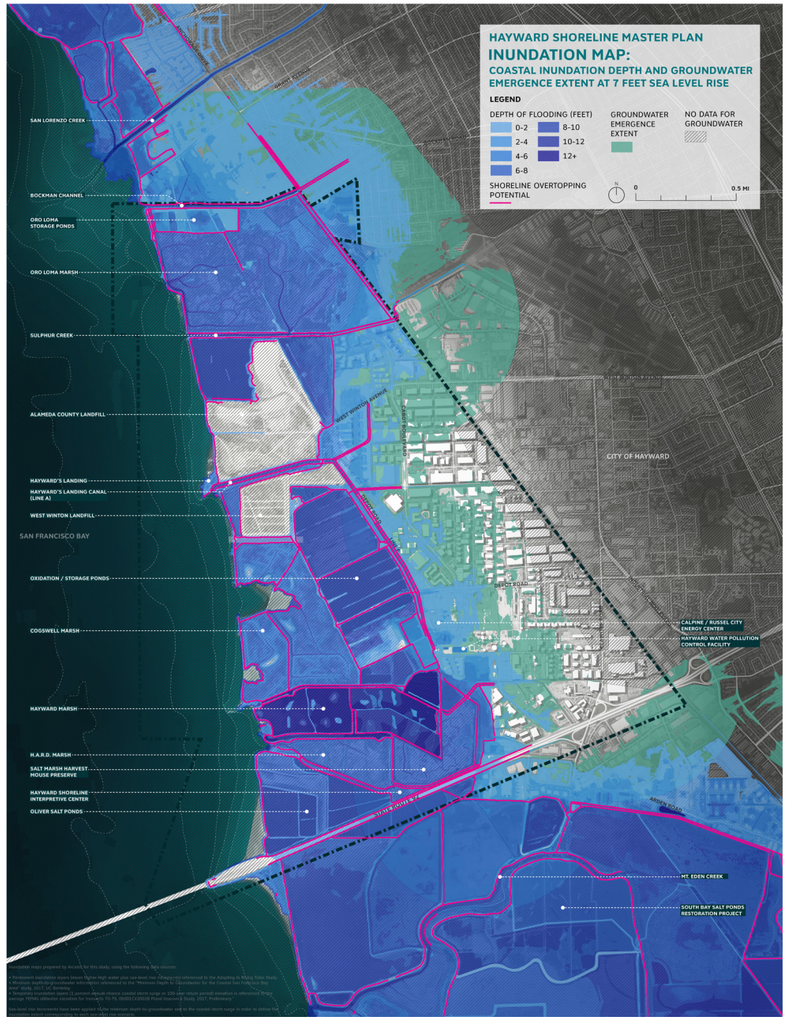
TASK 2- SEA LEVEL RISE MAPS



2′ SLR + GROUNDWATER EMERGENCE



4′ SLR + GROUNDWATER EMERGENCE



7′ SLR + GROUNDWATER EMERGENCE

TASK 2- FINAL REPORT SUBMITTED

SCAPE
ARCADIS
CONVEY
RE:FOCUS
SFEI

HAYWARD REGIONAL SHORELINE MASTER PLAN

FOR THE HAYWARD AREA SHORELINE PLANNING AGENCY (HASPA)
PART OF A JOINT POWERS AGREEMENT OF COH, HARD, AND EBRPD

TASK 2 DATA COLLECTION AND SEA LEVEL RISE MAPPING REPORT

SUBMITTED 11/26/2019

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SHORE TOUR

#HAY
SHORE
LINED SHORE CRAB
Pachygrapsus crassipes

STAKEHOLDER MEETING

TASK 4- DRAFT ADAPTATION REPORT

SCAPE
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CONVEY
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SFEI

HAYWARD REGIONAL SHORELINE MASTER PLAN

FOR THE HAYWARD AREA SHORELINE PLANNING AGENCY (HASPA) PART OF A JOINT POWERS AGREEMENT OF COH, HARD AND EBRPD

TASK 4
GOALS AND POLICIES MEMO
ADAPTATION STRATEGIES REPORT

DRAFT SUBMITTED 12/23/2019

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ADAPTATION STRATEGIES

ADAPTATION STRATEGIES

NATURE-BASED STRATEGIES

- Fine and Coarse Grain Beaches
- Tidal Marsh Restoration
- Diked Pond Management
- Fine Sediment Augmentation
- Tributary Connection to Baylands
- Reefs and Living Breakwaters
- Eelgrass Restoration

ENGINEERED STRATEGIES

- Levee improvements
- Ecotone Levee
- Tide Gates & Water Control Structures
- Wastewater Treatment Adaptation
- Land Elevation
- San Mateo Bridge Landing
- Revetments
- Subsurface Drainage

NON-STRUCTURAL STRATEGIES

- Public Access
- Marsh and Mudflat Migration Planning
- Managed Retreat
- Relocation of Hayward Shoreline Interpretive Center
- Building Scale Strategies

NATURE-BASED STRATEGIES

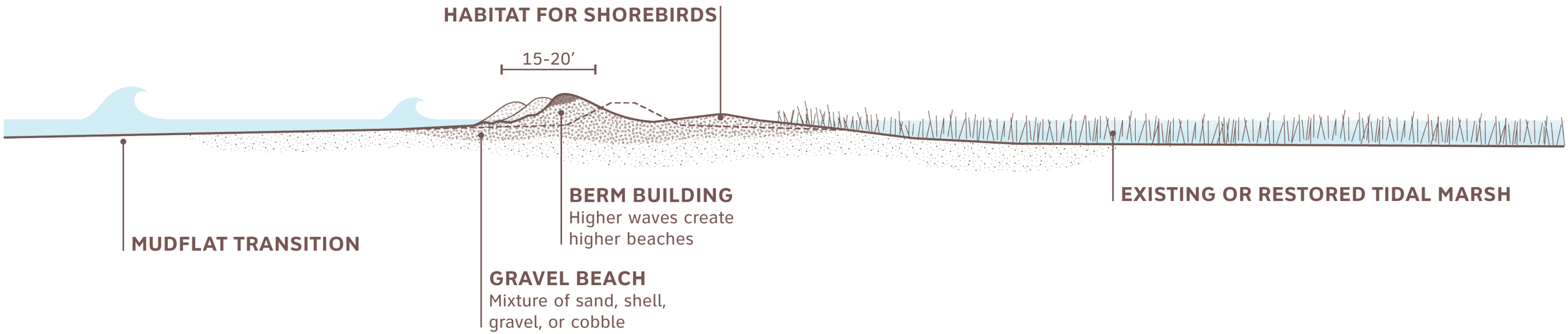
FINE AND COARSE GRAIN BEACHES

FINE AND COARSE GRAIN BEACHES

Definition

GOAL / OBJECTIVE

- Reduce erosion to levees
- Ecological enhancement (provides nesting habitat)



FINE AND COARSE GRAIN BEACHES

Option 1: Beaches in front of Landfills

GOAL / OBJECTIVE

Reduce the risk of erosion to the two landfills and enhance shoreline ecology with gravel nesting habitat.

DESCRIPTION

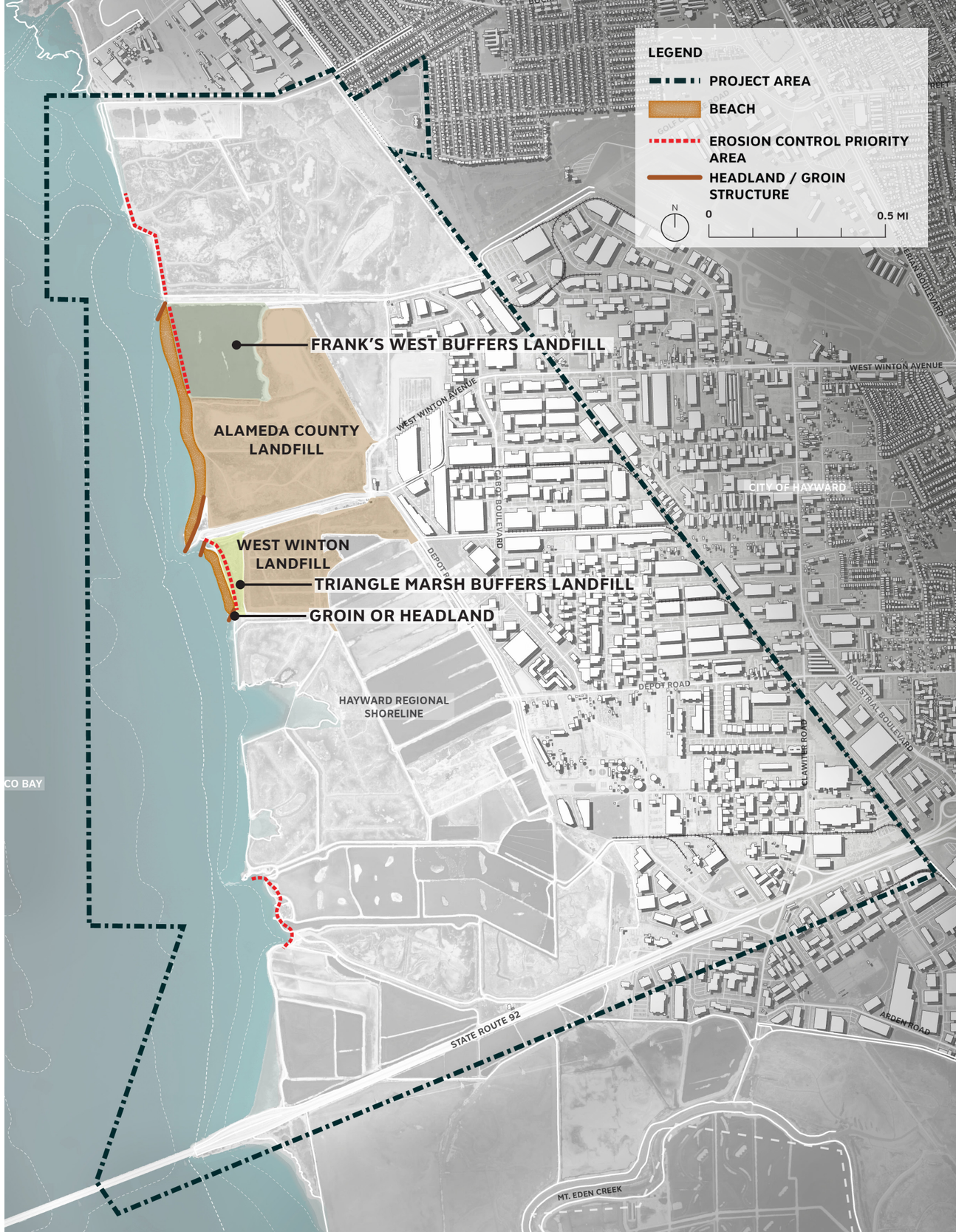
- Gravel beaches in front of Bay shoreline structures in front of Alameda County and West Winton Landfills

PROS

- Reduce erosion to landfill edges
- Reduce levee/berm maintenance adjacent to landfills
- Could enhance shorebird and beach habitat

CONS

- May require artificial replenishment
- May require the installation of lateral containment structures
- Considered as fill under current regulations, which might present permitting challenges



FINE AND COARSE GRAIN BEACHES

Option 2: Beaches in front of Existing Marsh Berms

GOAL / OBJECTIVE

Reduce the risk of erosion to outboard berms and levees in front of existing marshes and enhance shoreline ecology with gravel nesting habitat.

DESCRIPTION

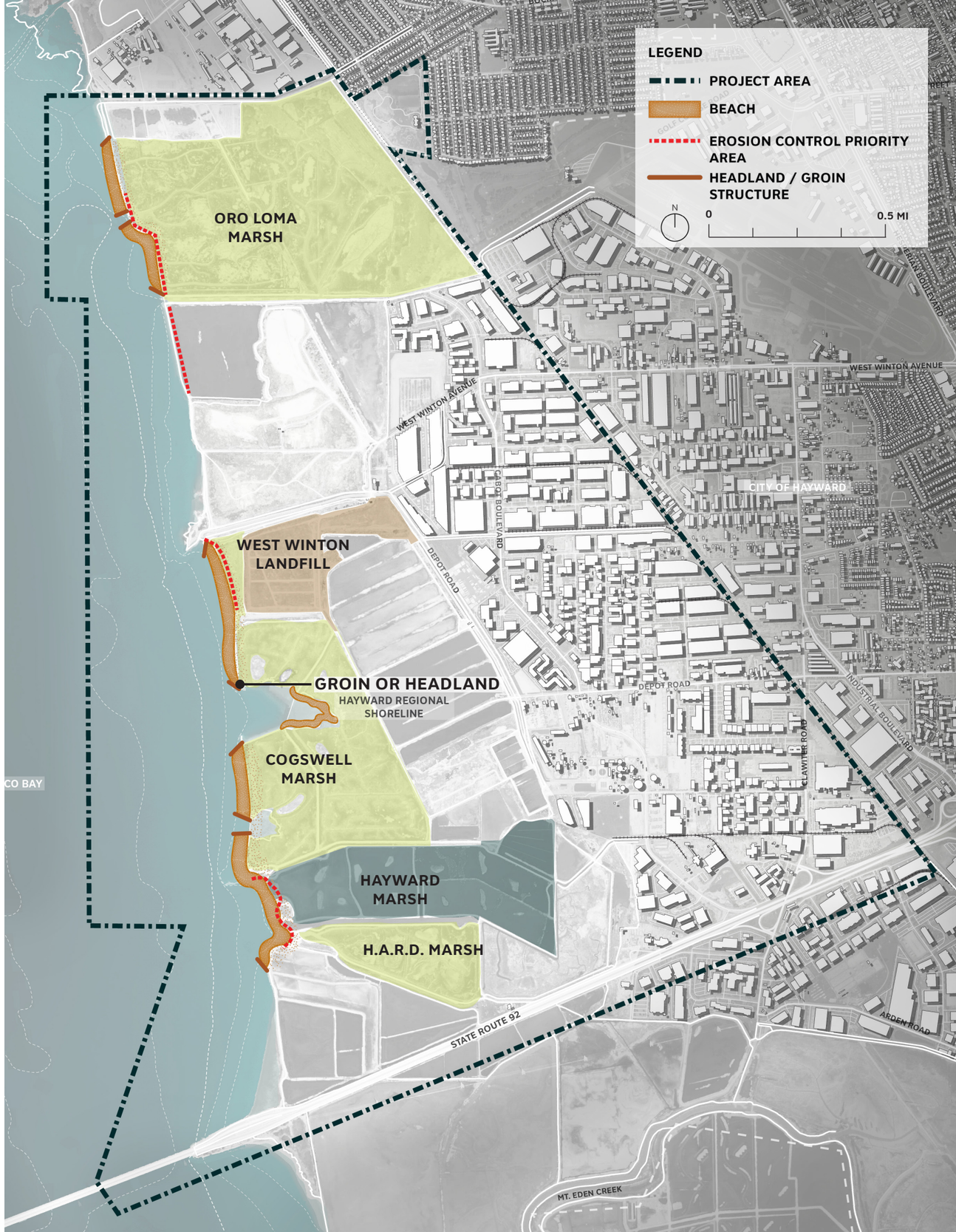
- Gravel beaches in front of the Bay shoreline structures in front of existing marshes

PROS

- Reduce erosion of outboard marsh edges
- Potential to lower maintenance of bayside levee/berms
- Reduced maintenance costs of outboard berms

CONS

- May require artificial replenishment
- May require the installation of lateral containment structures
- Considered as fill under current regulations, which might present permitting challenges



FINE AND COARSE GRAIN BEACHES

Option 3: Beaches along Entire Shoreline

GOAL / OBJECTIVE

Reduce the risk of erosion along the entire shoreline and enhance shoreline ecology with gravel nesting habitat.

DESCRIPTION

- Gravel beaches in front of all outboard Bay shoreline structures

PROS

- Reduce erosion to all outboard shoreline structures
- Reduce erosion and maintenance costs of shoreline berms and levees

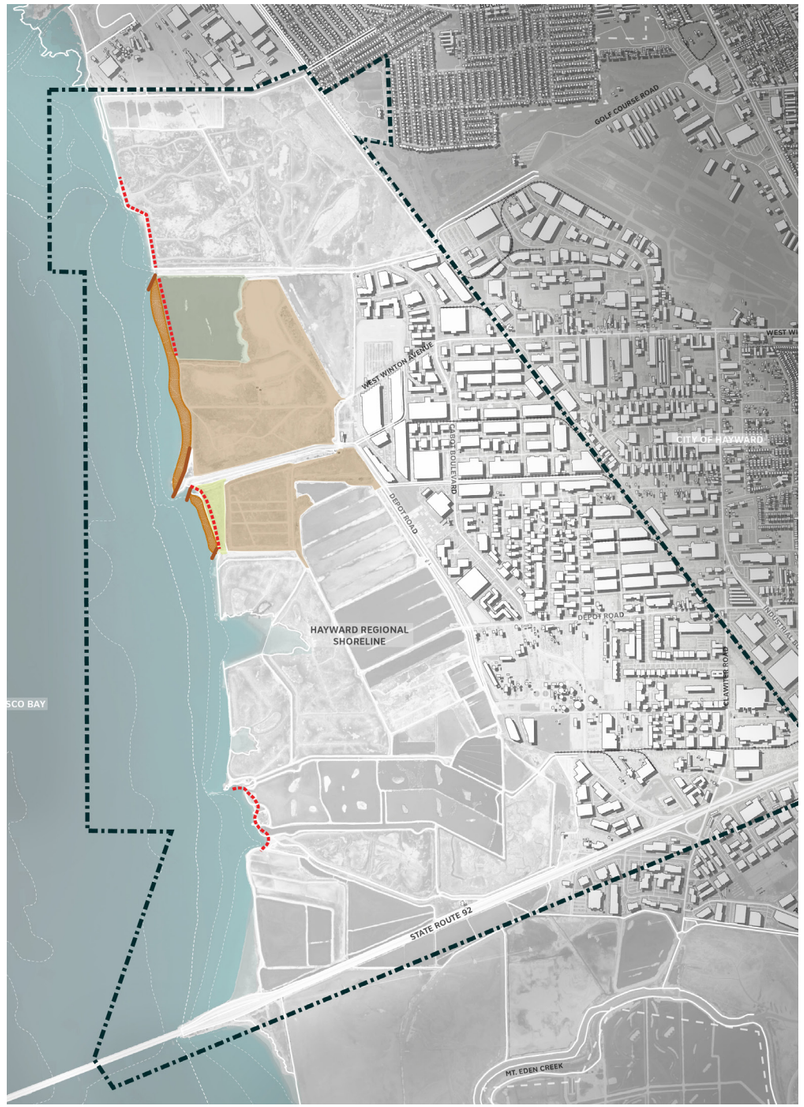
CONS

- May require artificial replenishment / Long-term cost
- May require the installation of lateral containment structures
- Would require a lot of material / High initial cost
- Could require the implementation of multiple groins to hold beaches between channels
- Considered as fill under current regulations, which might present permitting challenges

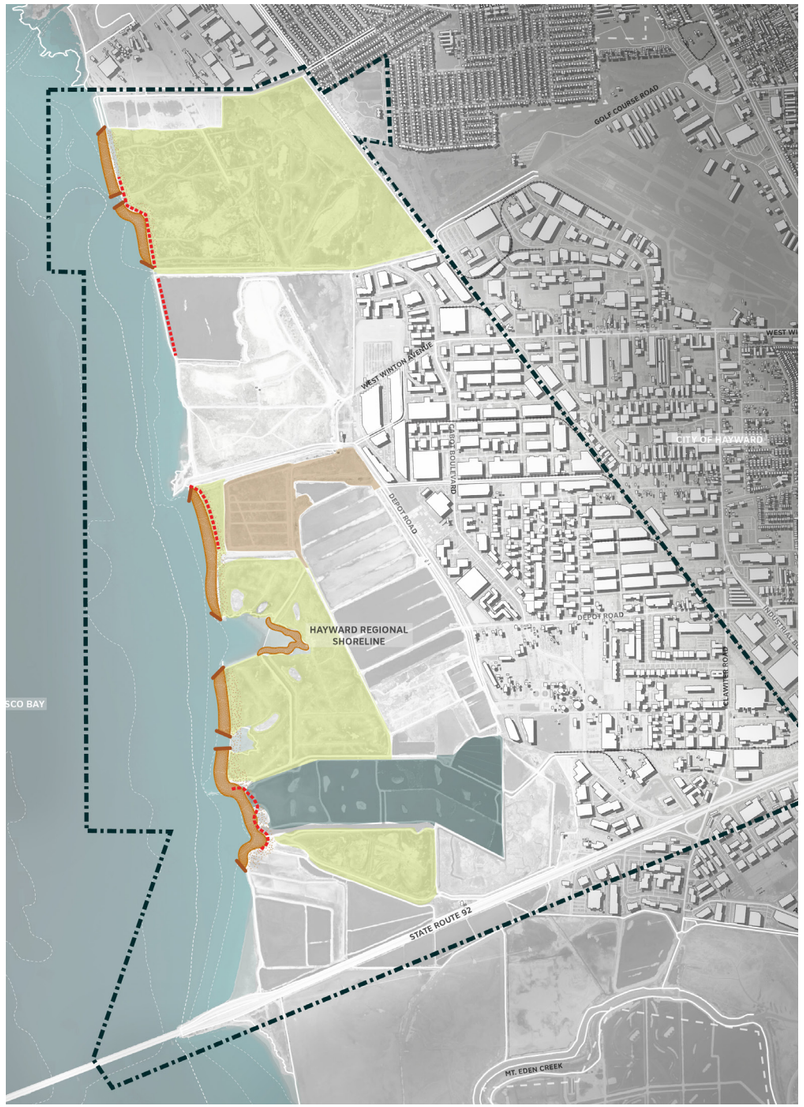
FINE AND COARSE GRAIN BEACHES

Compiled Options

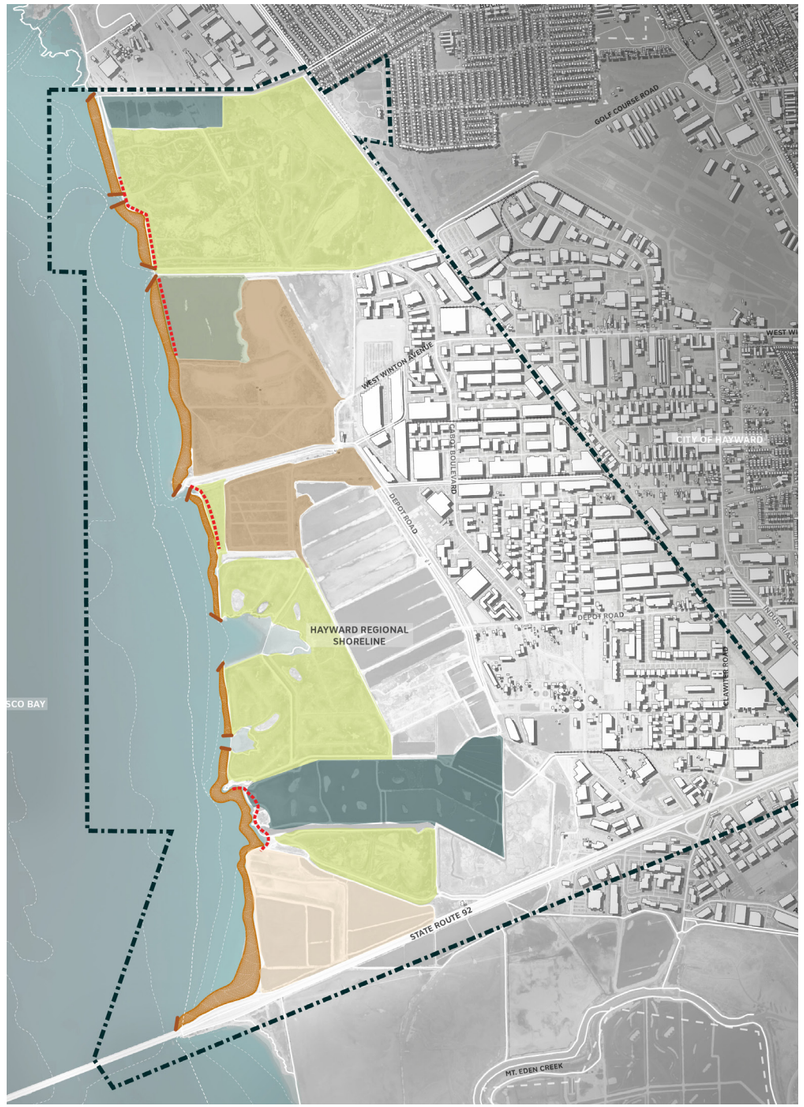
1: Beaches in front of Landfills



2: Beaches in front of Existing Marshes



3: Beaches along Entire Shoreline



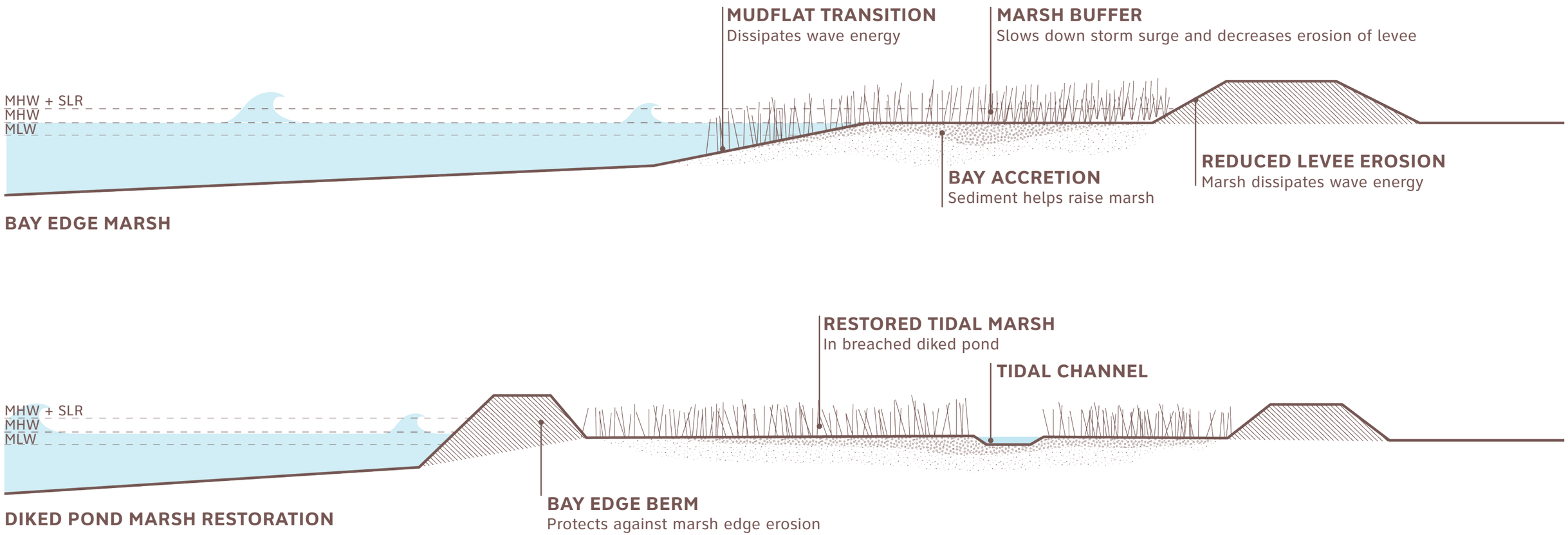
TIDAL MARSH RESTORATION

TIDAL MARSH RESTORATION

Definition

GOAL / OBJECTIVE

- Ecological enhancement (provides critical habitat)
- Reduce risk along the shoreline and attenuate waves



TIDAL MARSH RESTORATION

Option 1: Hayward Marsh Restoration

GOAL / OBJECTIVE

Restore Hayward Marsh to a tidal marsh that can accrete sediment, adapt with SLR, and create habitat.

DESCRIPTION

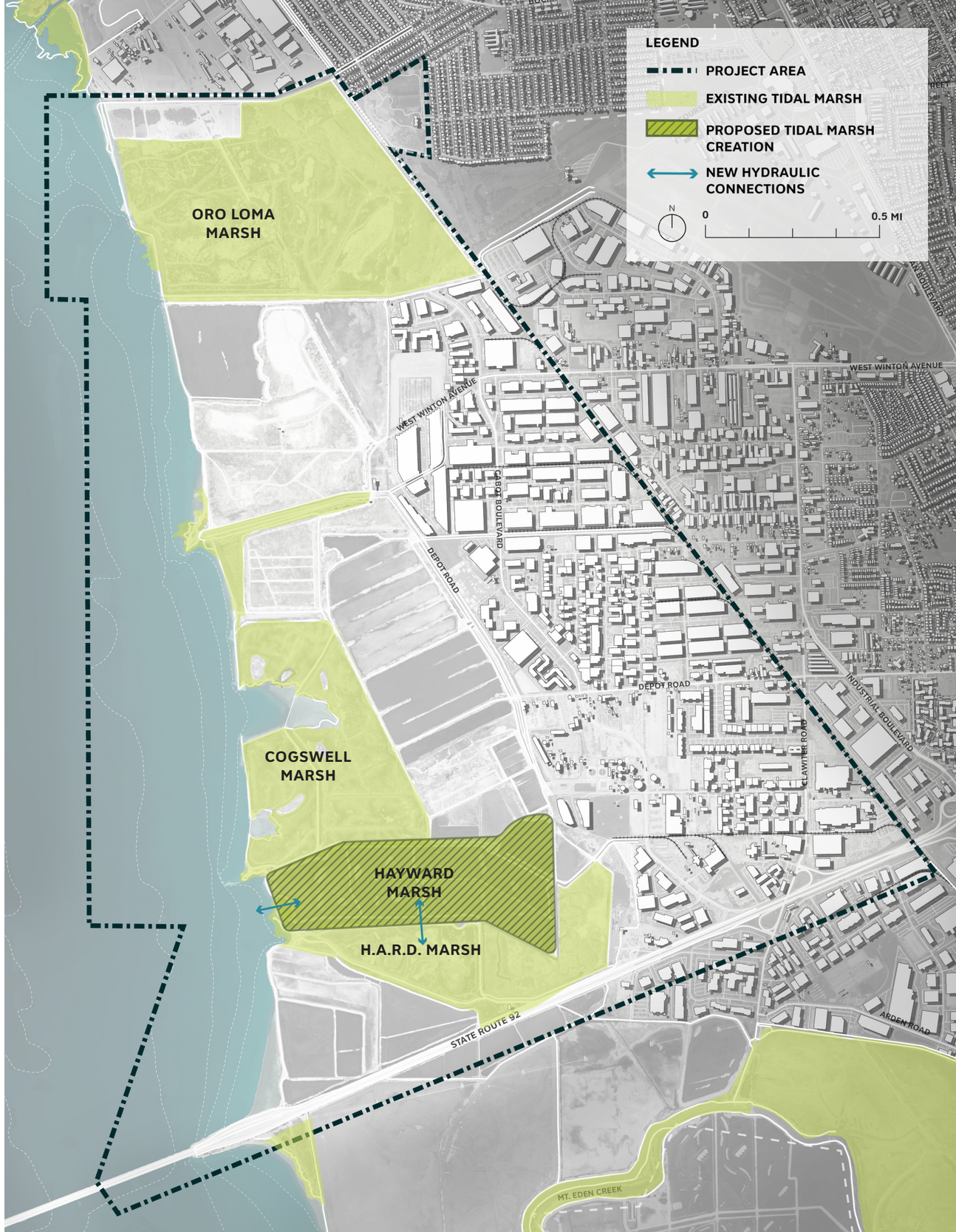
- Restore Hayward Marsh to a tidal marsh

PROS

- Hayward Marsh restoration is already being planned

CONS

- If Hayward Marsh is restored as a muted marsh, it will need improved levees for water control and may not accrete as much sediment as a fully tidal system
- Once you restore a diked Bayland to a tidal marsh, you can't use the area again for stormwater storage because it becomes regulated and protected



TIDAL MARSH RESTORATION

Option 2: Restore Bay-Side Ponds to Tidal Marsh

GOAL / OBJECTIVE

Restore diked ponds along the shoreline to tidal marshes that can accrete sediment, adapt with SLR, and create habitat.

DESCRIPTION

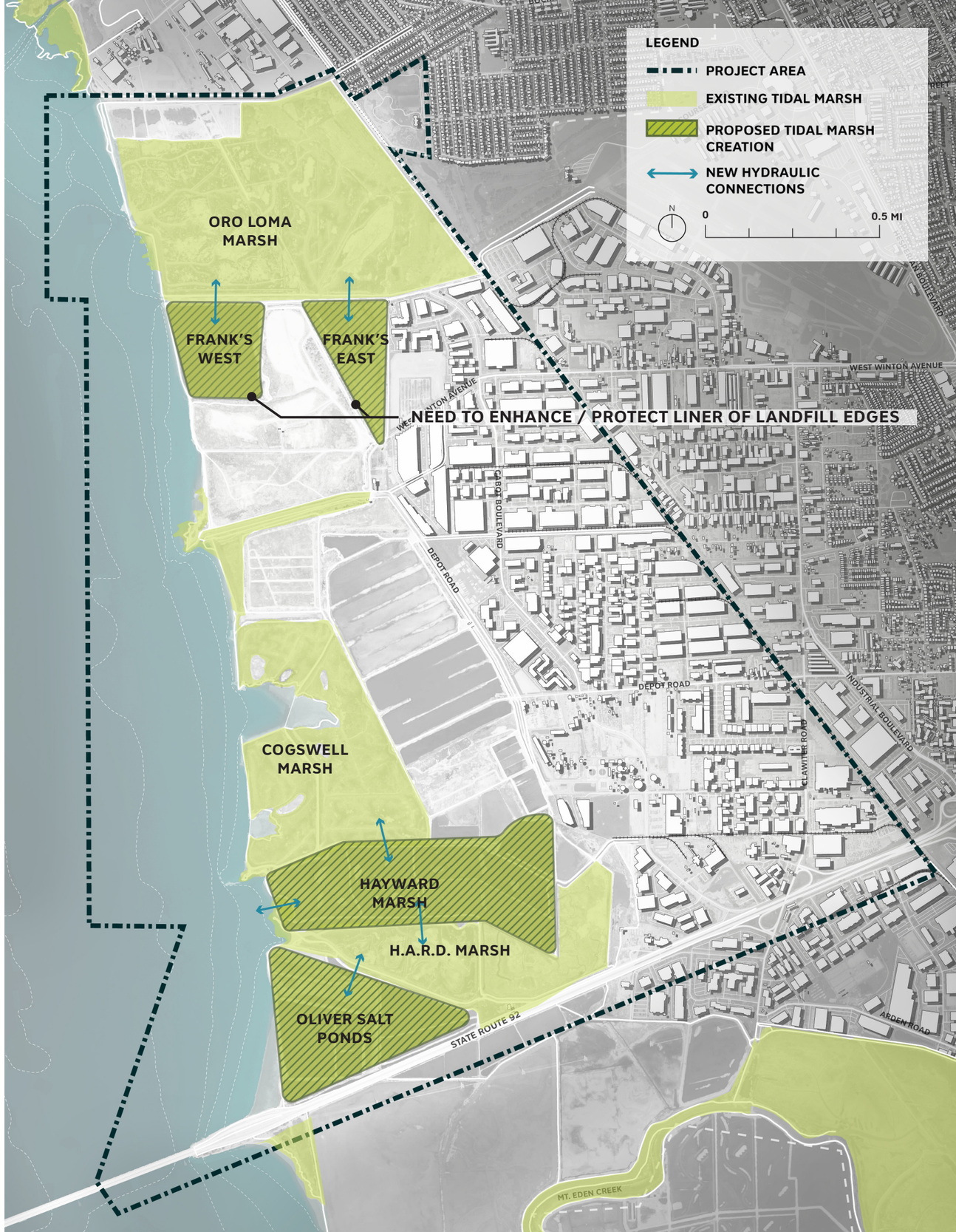
- Restore Frank's West, Frank's East, Hayward Marsh, and Oliver Salt Ponds to tidal marshes

PROS

- Marshes at Bay edge may be able to accrete more sediment (from Bay and fluvial sources)
- If paired with fine sediment augmentation, it will the marshes keep pace with SLR
- Frank's East and West could help buffer the landfill against erosion

CONS

- Lose existing salt pond shorebird habitat- impacts to endangered species habitat
- Once you restore a diked Bayland to a tidal marsh, you can't use the area again for stormwater storage because it becomes regulated and protected
- Lose shorebird refuge at Frank's West during high tide.



TIDAL MARSH RESTORATION

Option 3: Restore all Diked Ponds and Golf Course

GOAL / OBJECTIVE

Maximize tidal marsh restoration to buffer the shoreline and enhance its ecological value.

DESCRIPTION

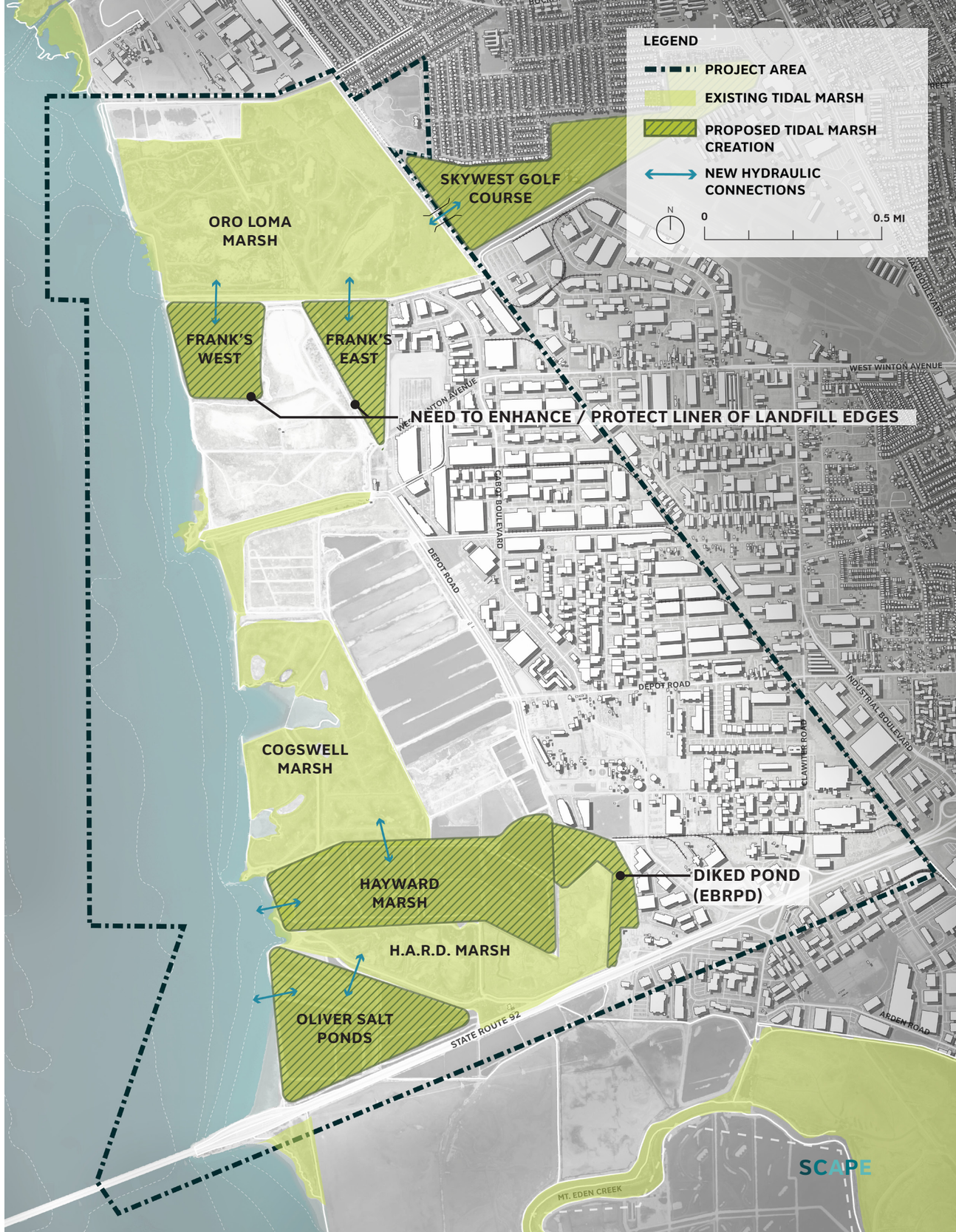
- Restore Skywest Golf Course, Frank's West, Frank's East, Hayward Marsh, and Oliver Salt Ponds to tidal marshes

PROS

- Increased marsh may buffer the shoreline from storm surge and reduce erosion
- Increased habitat benefits
- Larger tracts of connected marshes

CONS

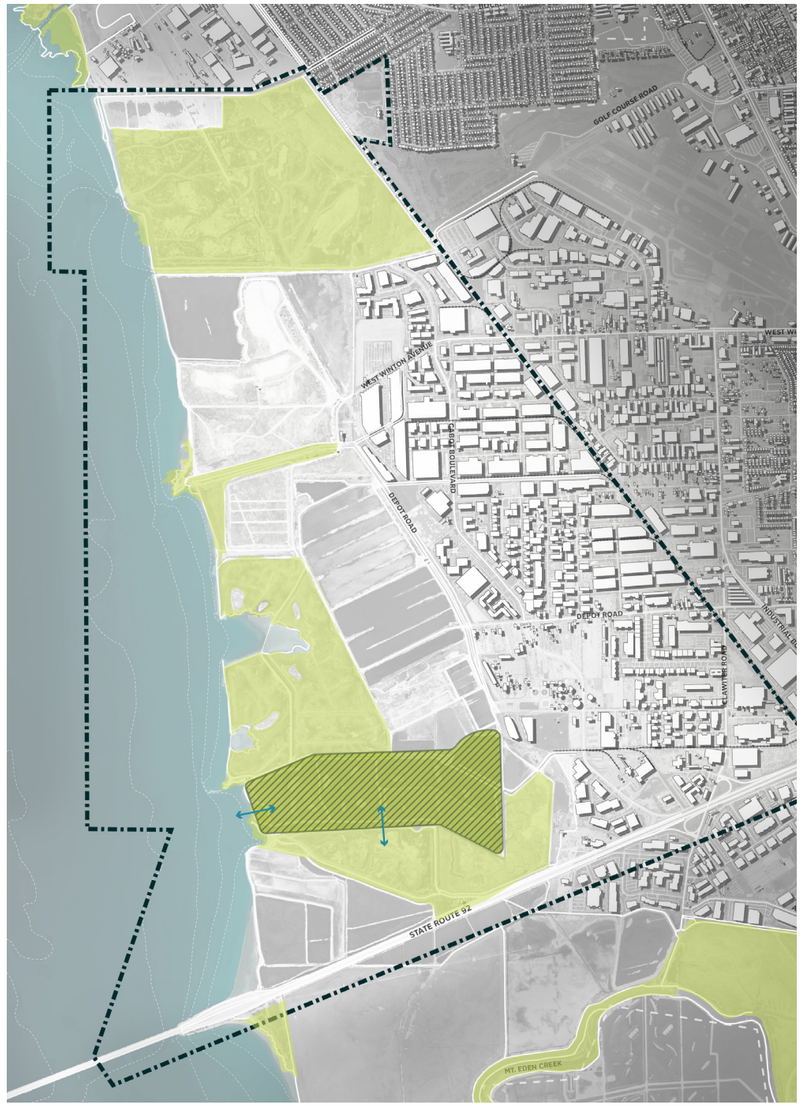
- Loss of stormwater detention storage space
- Loss of existing shorebird habitat at Oliver Salt Ponds- impacts endangered species habitat
- Once you restore a diked Bayland to a tidal marsh, you can't use the area again for stormwater storage because it becomes regulated and protected



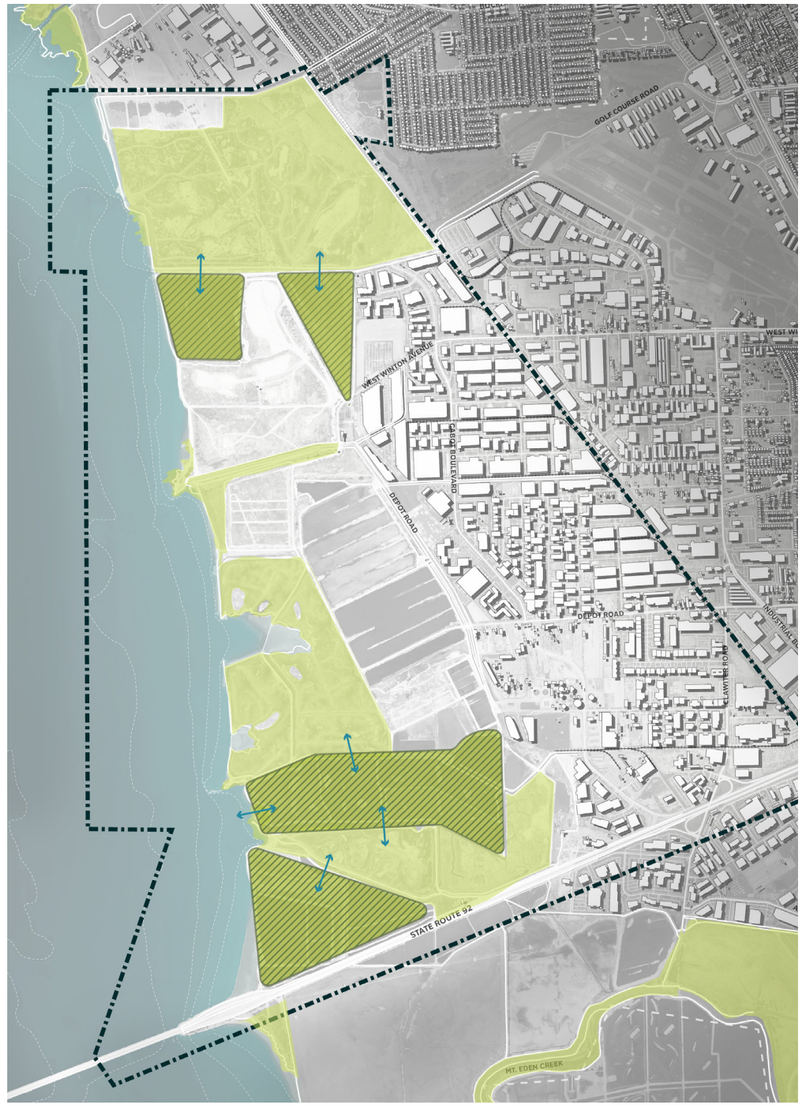
TIDAL MARSH RESTORATION

Compiled Options

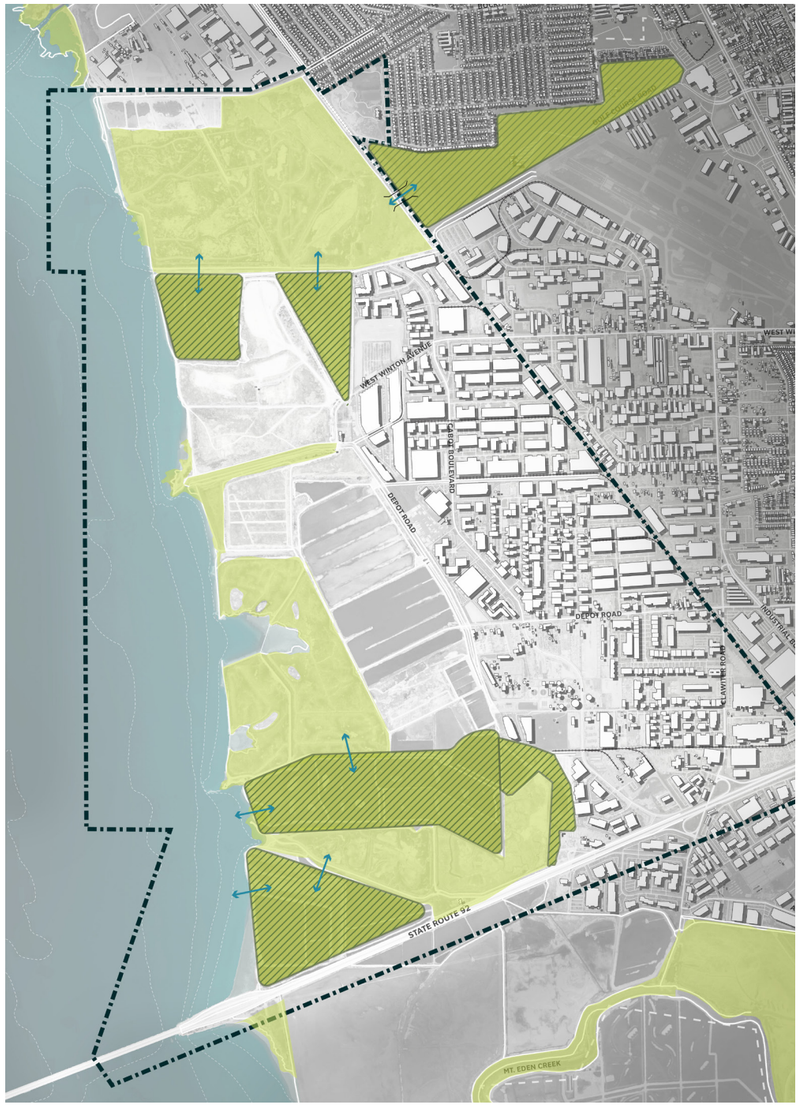
1: Hayward Marsh Restoration



2: Restore Bay-Side Ponds to Tidal Marsh



3: Restore all Diked Ponds and Golf Course



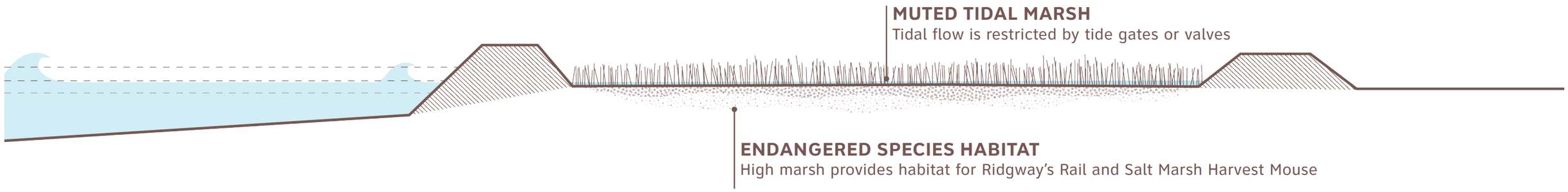
DIKED POND MANAGEMENT

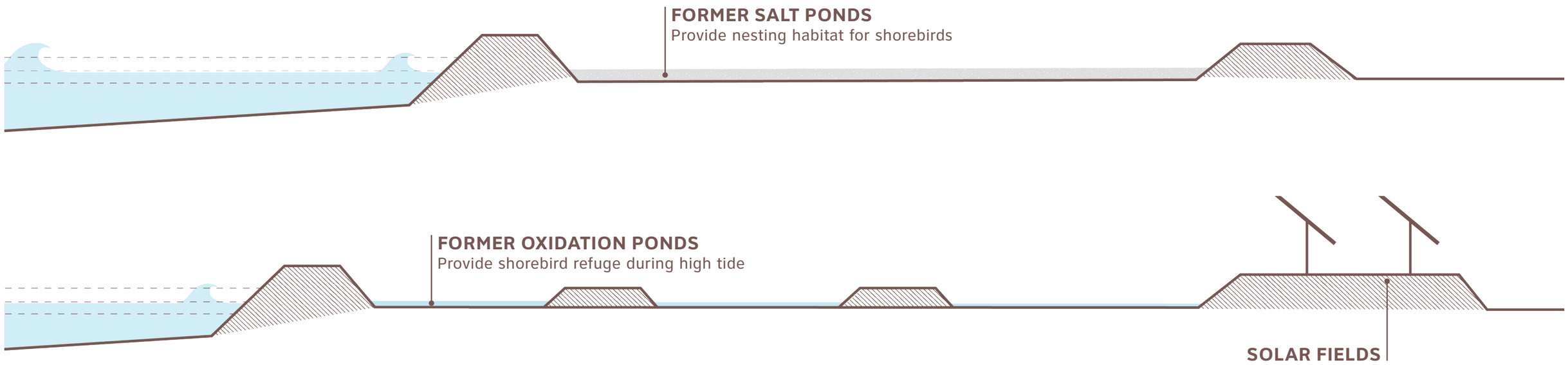
DIKED POND MANAGEMENT

Definition

GOAL / OBJECTIVE

- Flood control (provide stormwater storage space)
- Ecological enhancement (provide shorebird habitat)





DIKED POND MANAGEMENT

Option 1: No Action

GOAL / OBJECTIVE

Maintain all diked pond uses with sea level rise, storm surge, and groundwater emergence.

DESCRIPTION

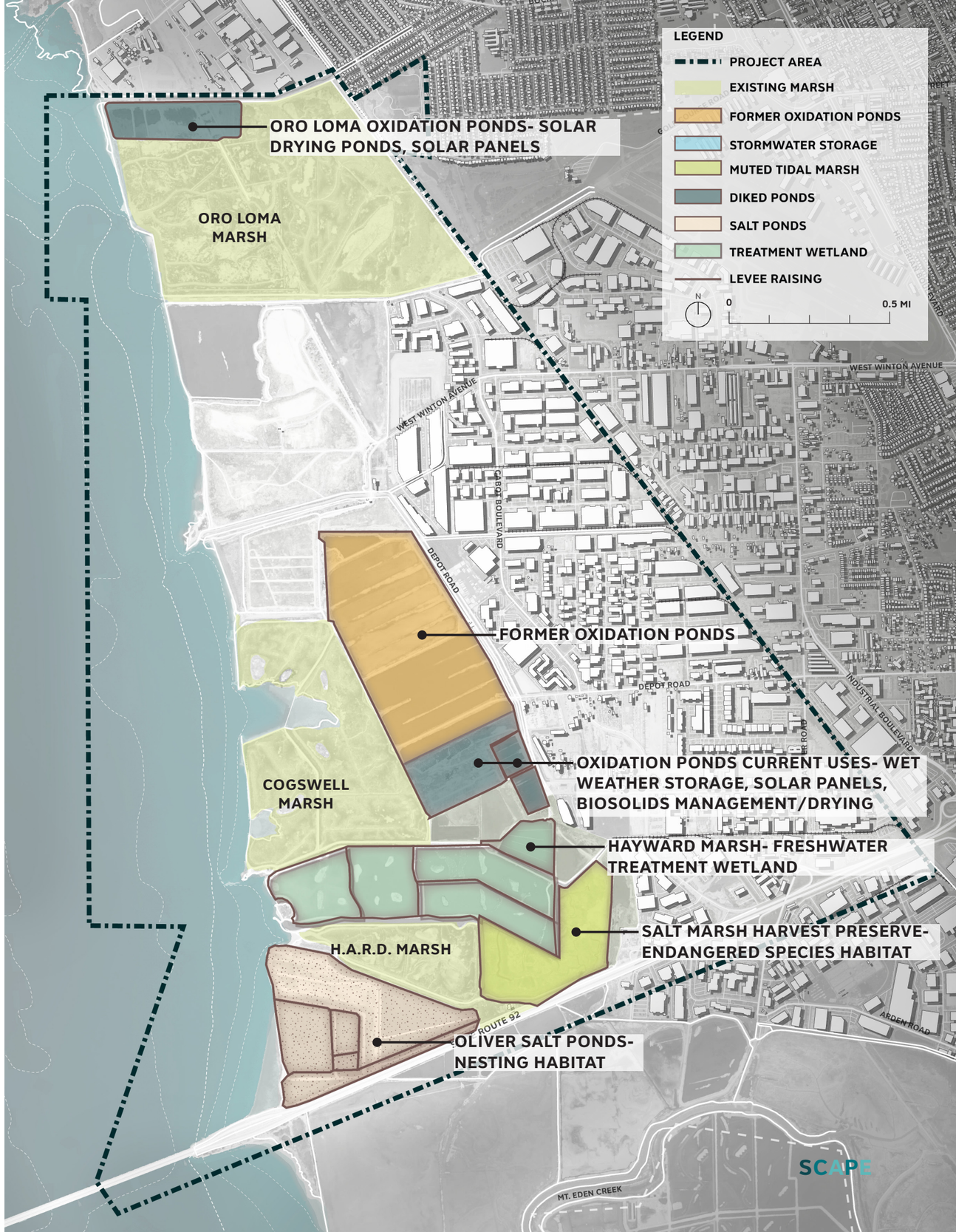
- Raise levees and provide erosion protection to maintain all diked pond uses as they exist today

PROS

- Maintain current uses and stormwater storage capacity

CONS

- Long-term and costly strategy to maintain uses with sea level rise- will require more pumping and raising / repair of berms and levees
- This is not a viable option for EBRPD



DIKED POND MANAGEMENT

Option 2: Tidal Restoration + Stormwater Management

GOAL / OBJECTIVE

Restore ecological services at the Bay's edge and manage stormwater inland.

DESCRIPTION

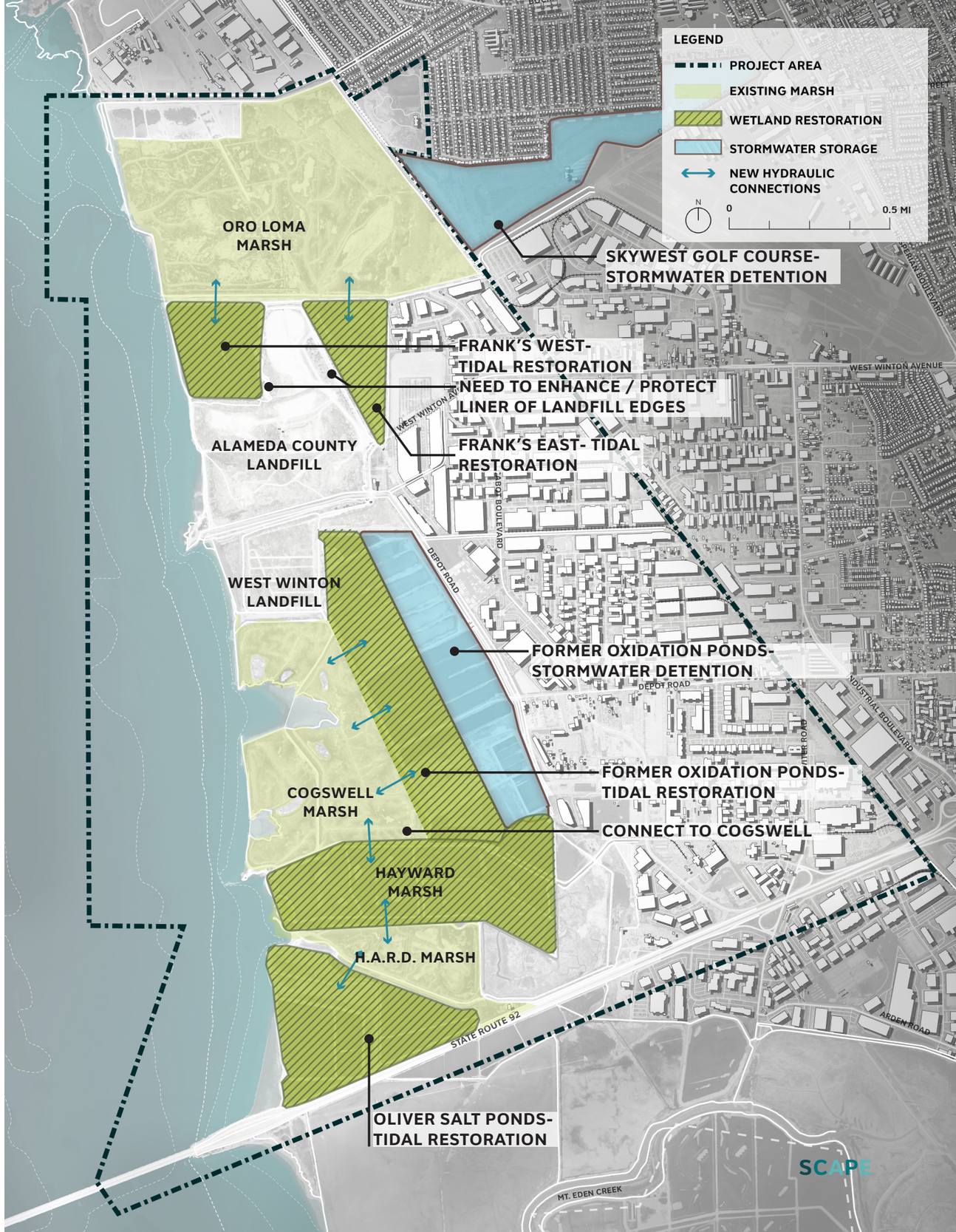
- Restore Frank's East and West, half of the Oxidation Ponds, Hayward Marsh, and Oliver Salt Ponds to tidal marshes
- Utilize Skywest Golf Course and half of the Oxidation Ponds for wet weather storage

PROS

- Increase stormwater detention capacity
- Large areas of new marsh restoration
- New marshes at bay edge that may accrete and sustain with SLR

CONS

- Disrupts shorebird habitat at Oliver Salt Ponds
- Loss of the oxidation ponds and the critical uses they provide, including wastewater wet weather storage, biosolids management/drying, and solar fields
- Will require more pumping as sea levels rise



HAYWARD SHORELINE MASTER PLAN
January 9, 2020

DIKED POND MANAGEMENT

Option 3: Restore Salt Ponds Inland, Double as Stormwater Detention

GOAL / OBJECTIVE

Maintain and restore habitat and ecological services, while managing stormwater inland.

DESCRIPTION

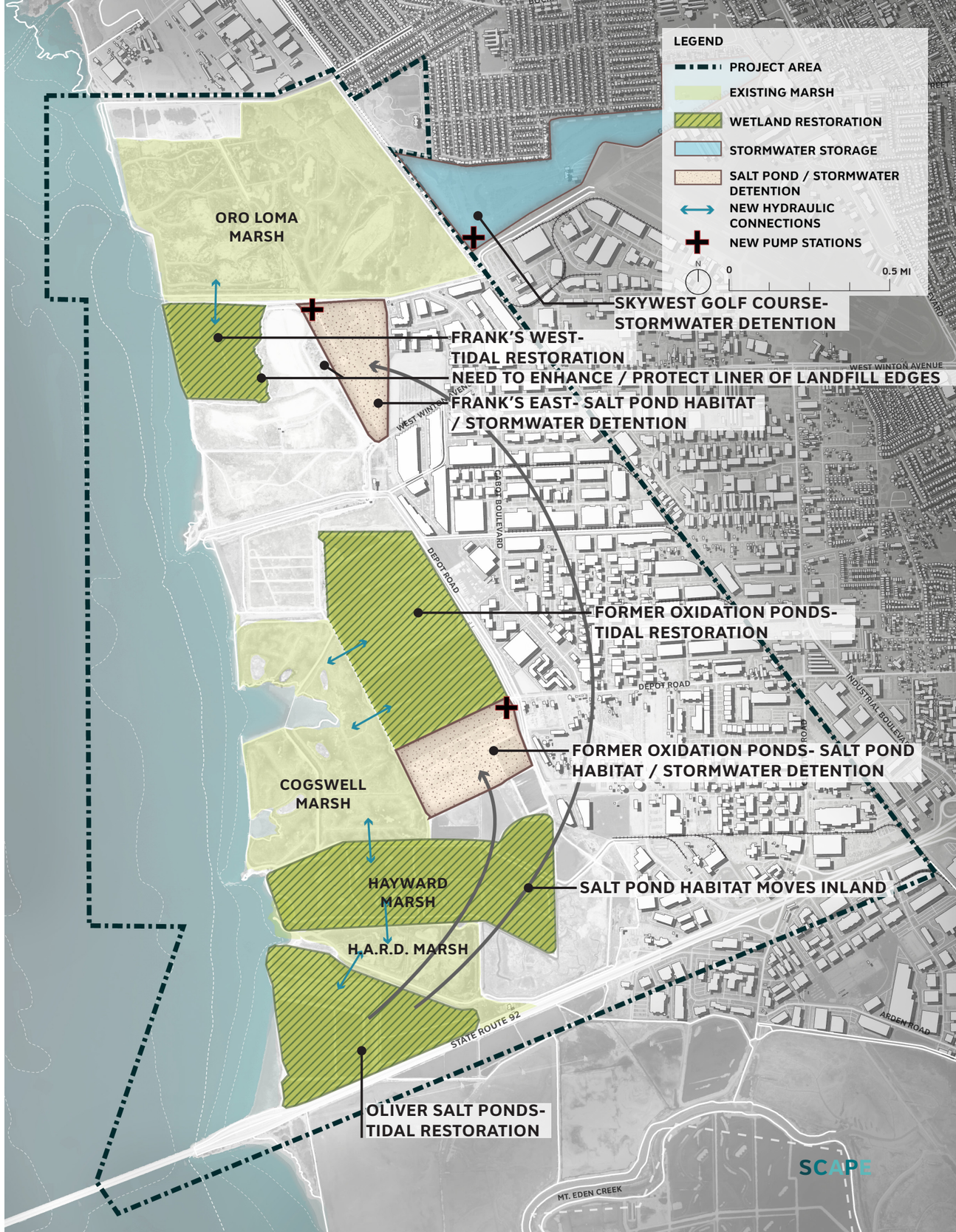
- Restore Frank's West, 2/3 of the Oxidation Ponds, Hayward Marsh, and Oliver Salt Ponds to tidal marshes
- Move salt pond habitat inland to Frank's East and part of the Oxidation Ponds. Salt ponds can be utilized for stormwater detention during storm events.
- Use Skywest Golf Course for wet weather storage

PROS

- Maintain salt pond habitat, while moving it inland so it's less vulnerable to SLR

CONS

- Loss of the oxidation ponds and the critical uses they provide, including wastewater wet weather storage, biosolids management/drying, and solar fields
- Area show as salt ponds at the oxidation ponds is not pond land and has been raised approximately 10' above grade

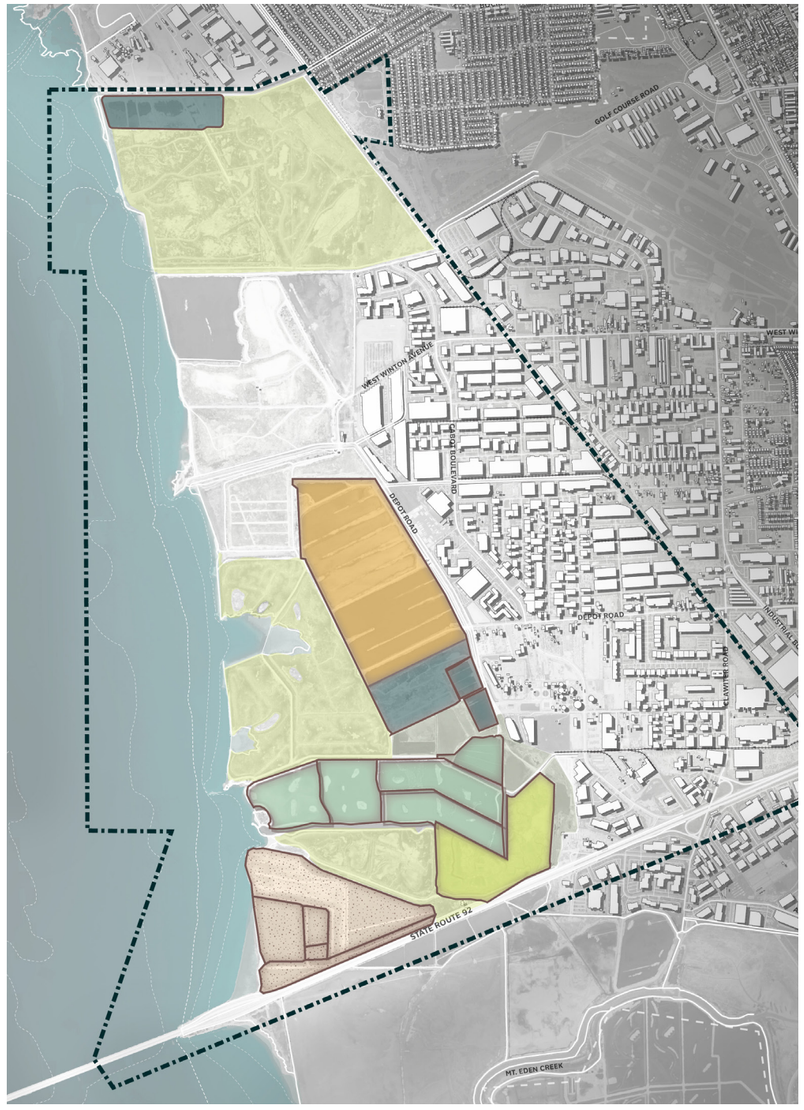


HAYWARD SHORELINE MASTER PLAN
January 9, 2020

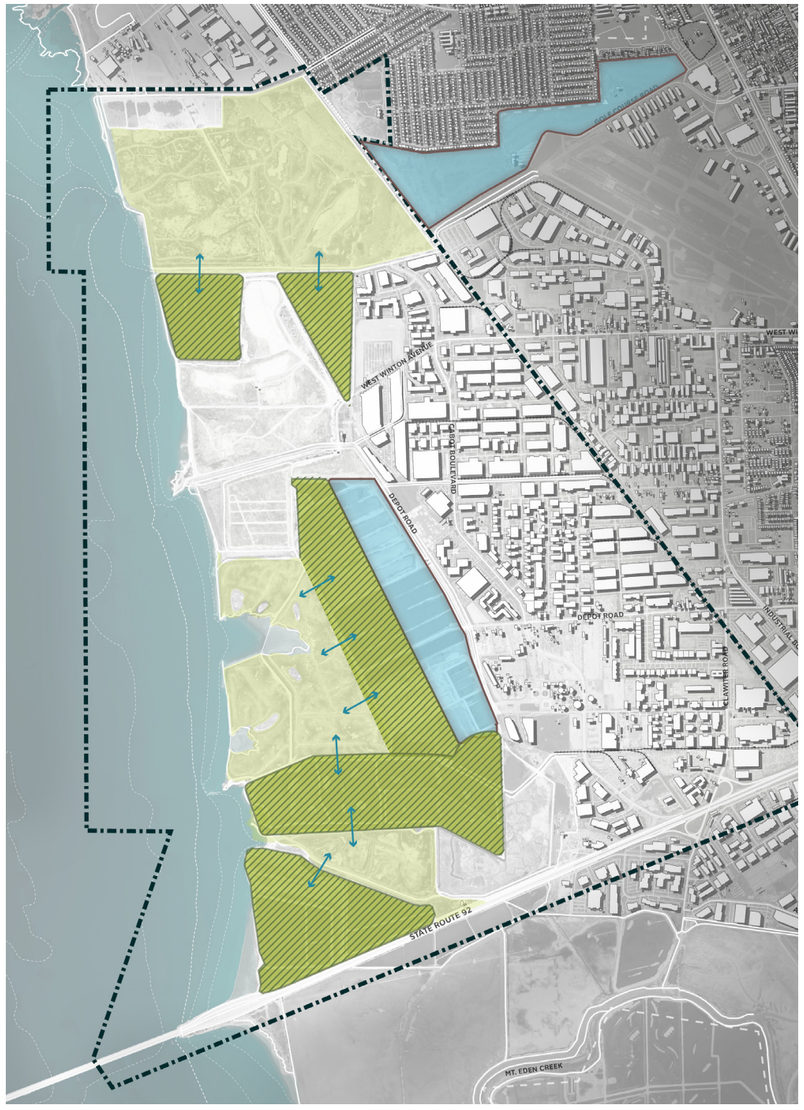
DIKED POND MANAGEMENT

Compiled Options

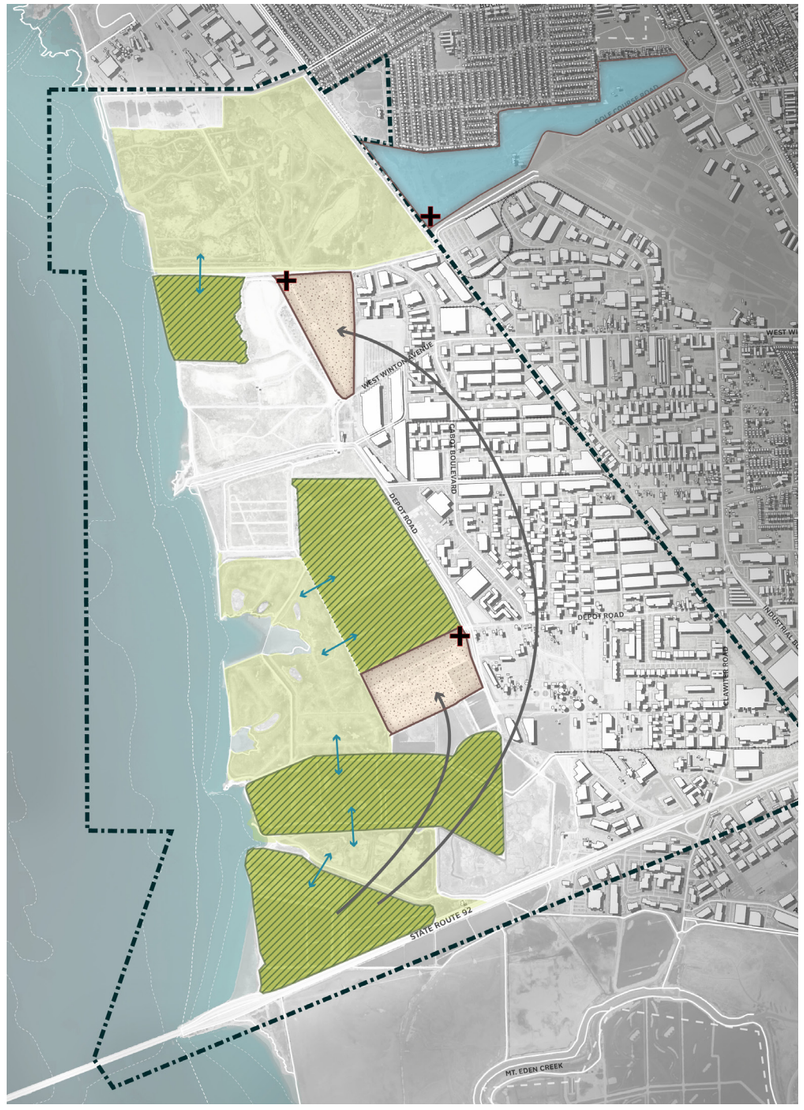
1: No Action



2: Tidal Restoration + Stormwater Management



3: Restore Salinas Inland, Double as Stormwater Detention



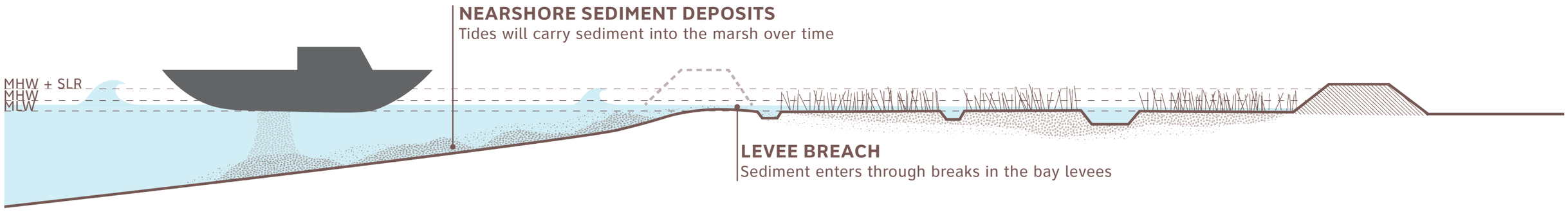
FINE SEDIMENT AUGMENTATION

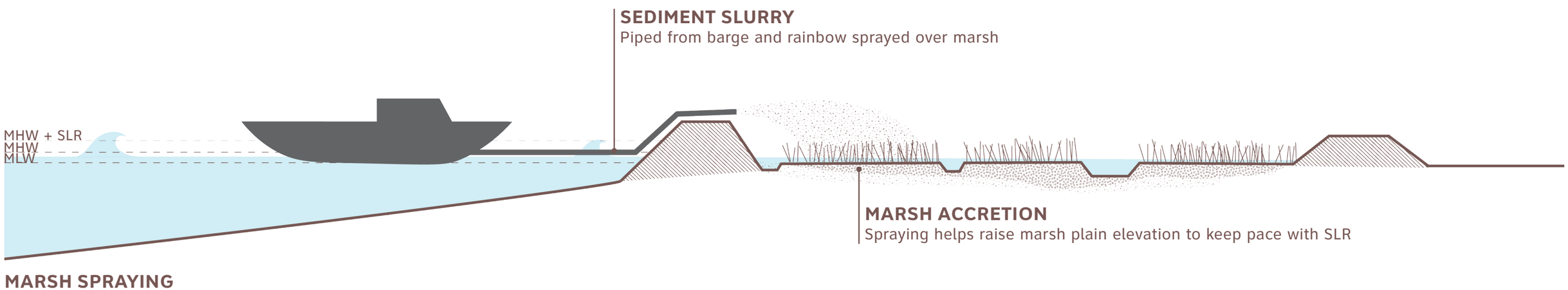
FINE SEDIMENT AUGMENTATION

Definition

GOAL / OBJECTIVE

- Maximize the potential of marshes to maintain themselves in the future with sea level rise





FINE SEDIMENT AUGMENTATION

Option 1: Feed from the Bay

GOAL / OBJECTIVE

Enhance Bay ecology and adapt with SLR through natural processes.

DESCRIPTION

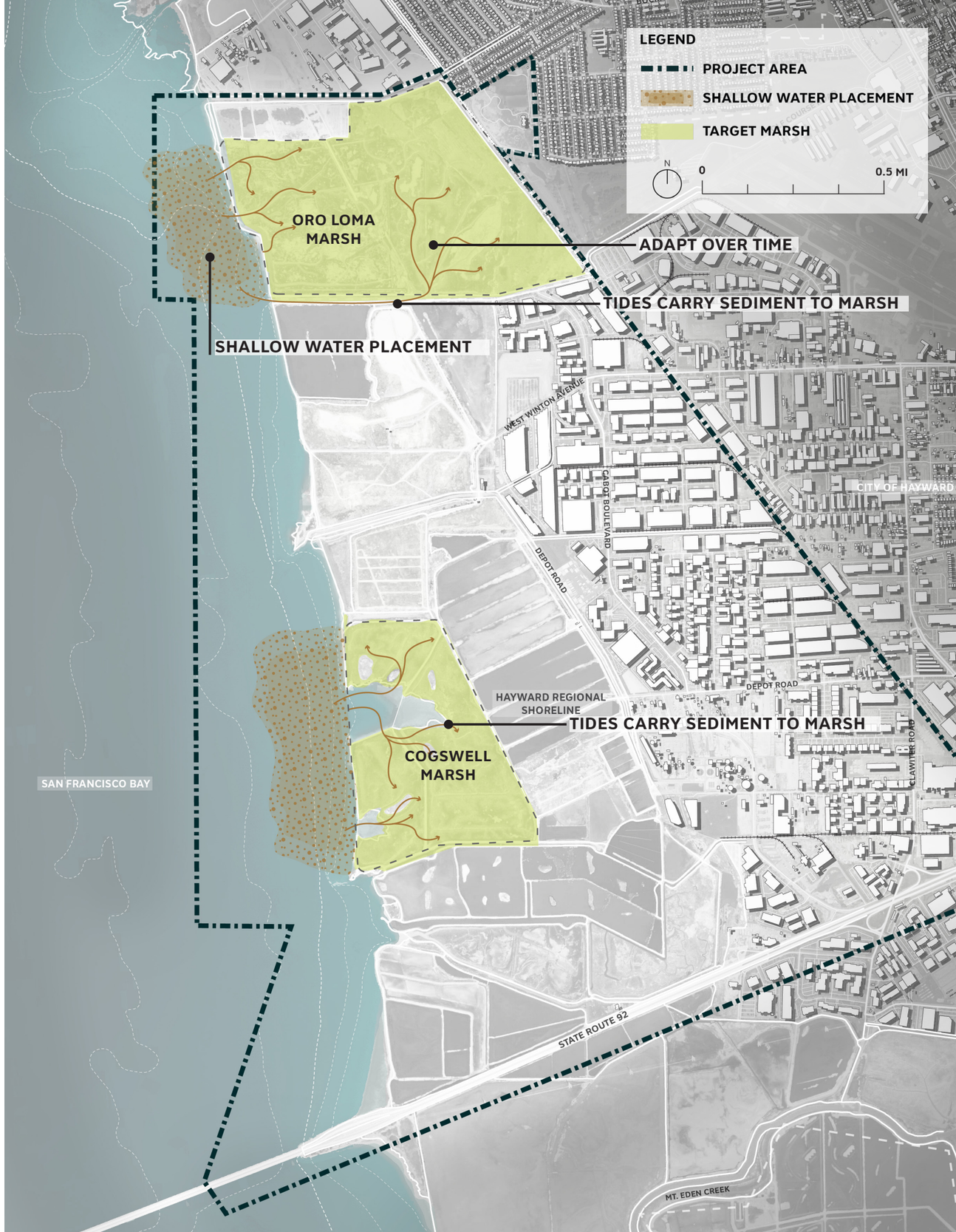
- Shallow water sediment placement on the mudflats in front of Oro Loma and Cogswell Marsh

PROS

- Allow natural processes to facilitate accretion
- Prioritize large marsh adaptation to keep pace with SLR

CONS

- Might be considered as fill. Filling the Bay is a regulatory challenge.
- Hard to get material to the mudflat because it is shallow
- Many unknowns about sediment transport and retention. Highly dependent on local hydrology
- Potential negative impacts to existing habitat



FINE SEDIMENT AUGMENTATION

Option 2: Nourish from an Upland Pipeline

GOAL / OBJECTIVE

Enhance Bay ecology and adapt to SLR.

DESCRIPTION

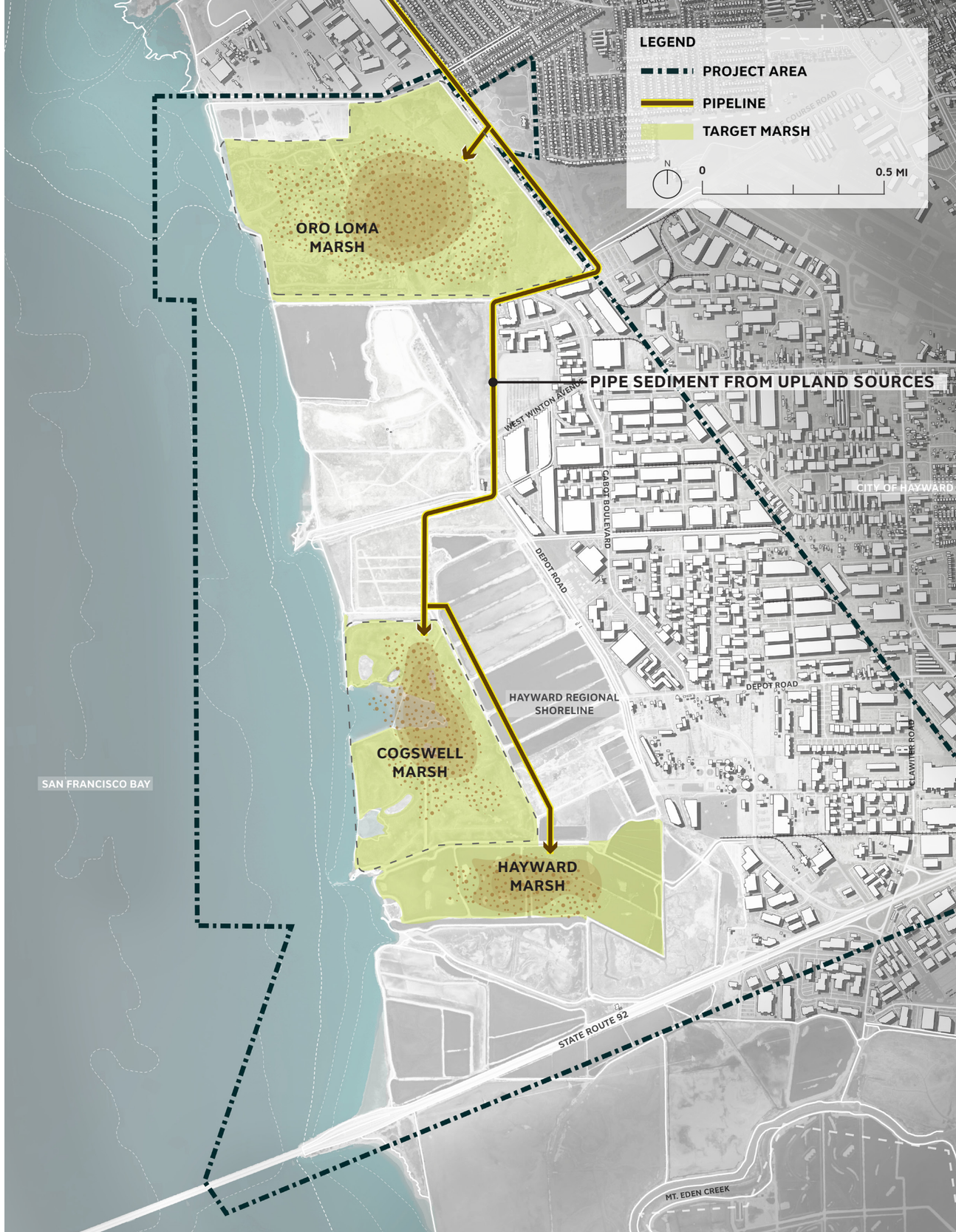
- Pipe sediment for deposition in existing marshes from Don Castro reservoir or other upland sources
- Deposit sediment at Oro Loma Marsh, Cogswell Marsh, and Hayward Marsh

PROS

- Pipe infrastructure could be used for sediment delivery over time
- Utilize upland sediment sources

CONS

- Might be considered as fill. Filling the Bay is a regulatory challenge.
- Pipeline infrastructure could be costly
- Many unknowns about sediment transport and retention
- Potential negative impacts to existing habitat



FINE SEDIMENT AUGMENTATION

Option 3: Prep Sites for Future Inundation

GOAL / OBJECTIVE

Prepare sites for future tidal marsh restoration.

DESCRIPTION

- Deposit sediment via floating pipes from a barge onto Frank's West, Frank's East, Hayward Marsh, part of the Oxidation Ponds, and Oliver Salt Ponds to lift them to marsh plain elevation

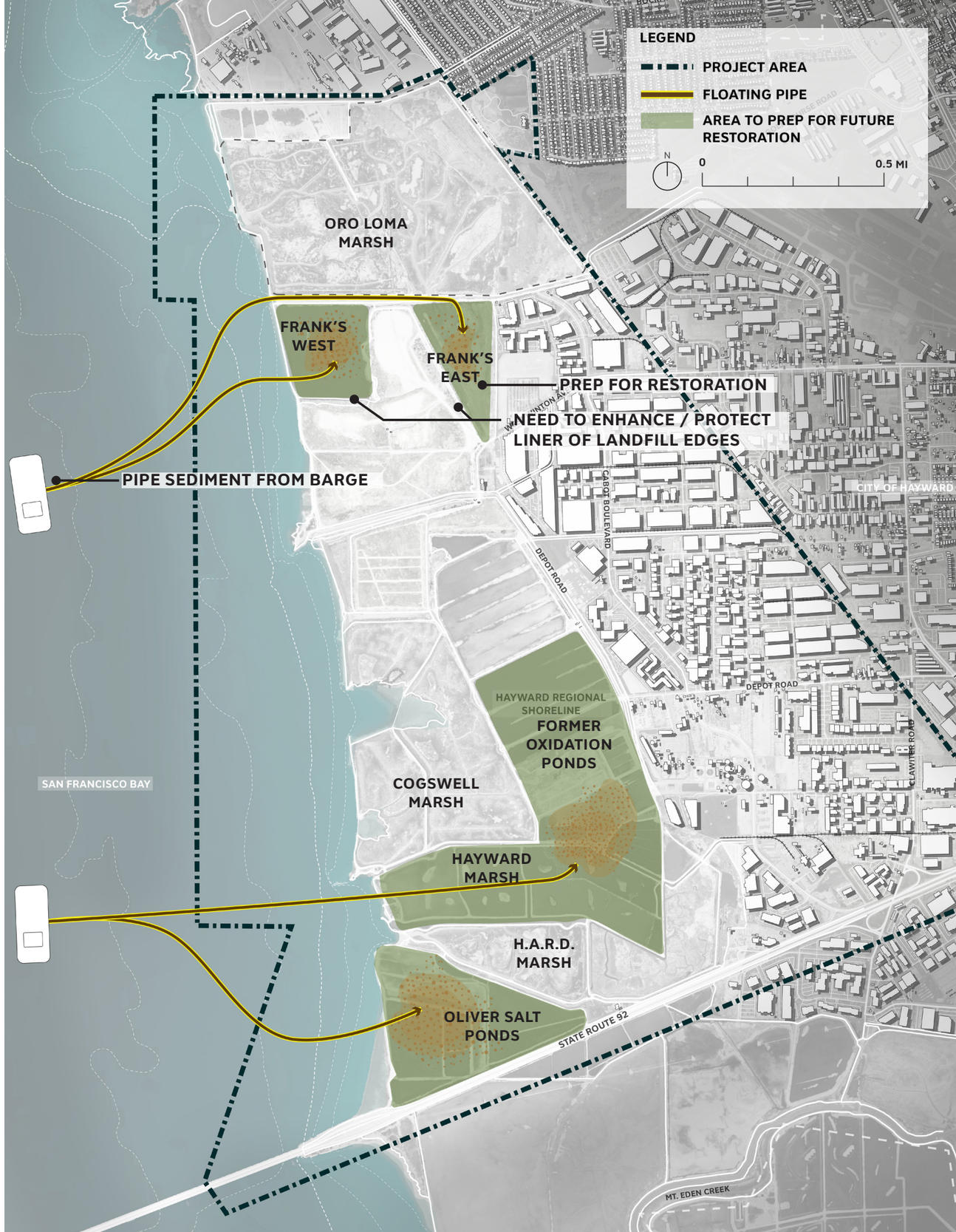
PROS

- Proactive approach to prep diked baylands for marsh restoration

CONS

- Potential negative impacts to existing habitat
- Power for pumping the sediment is very expensive
- An offloader and booster pumps will likely be required, which are very expensive

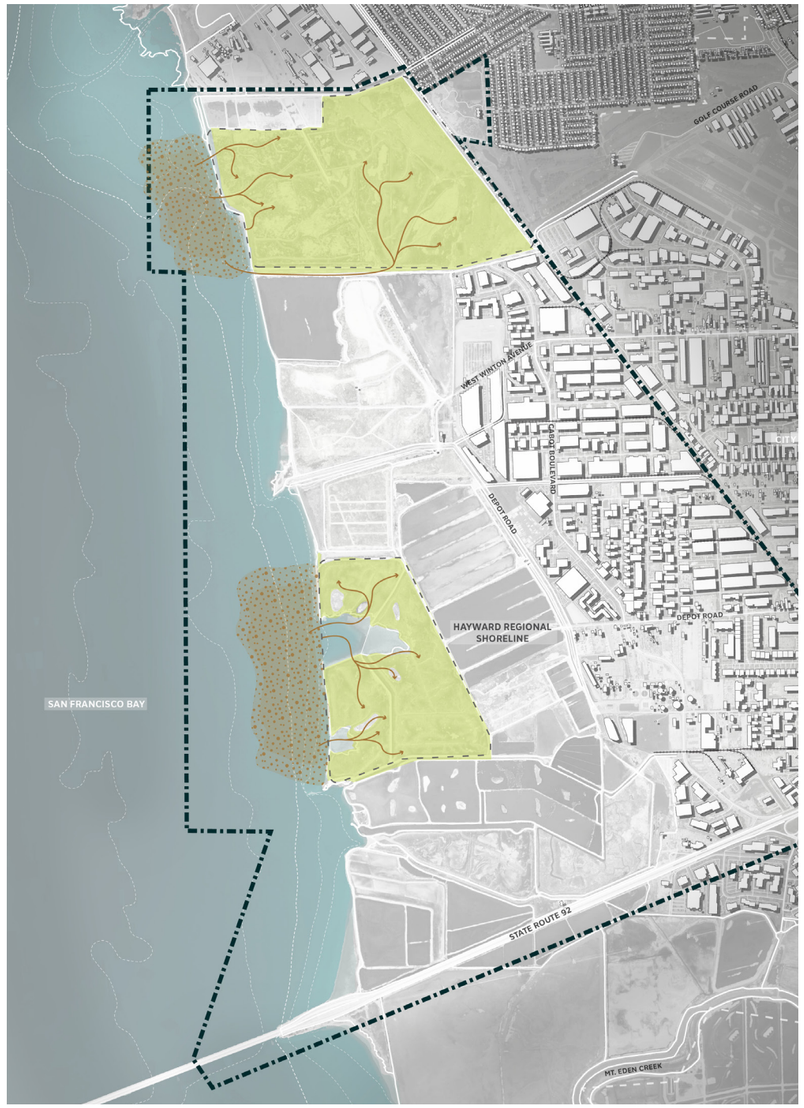
(Hamilton Wetlands Sediment Disposal costs: $35.46/CY)



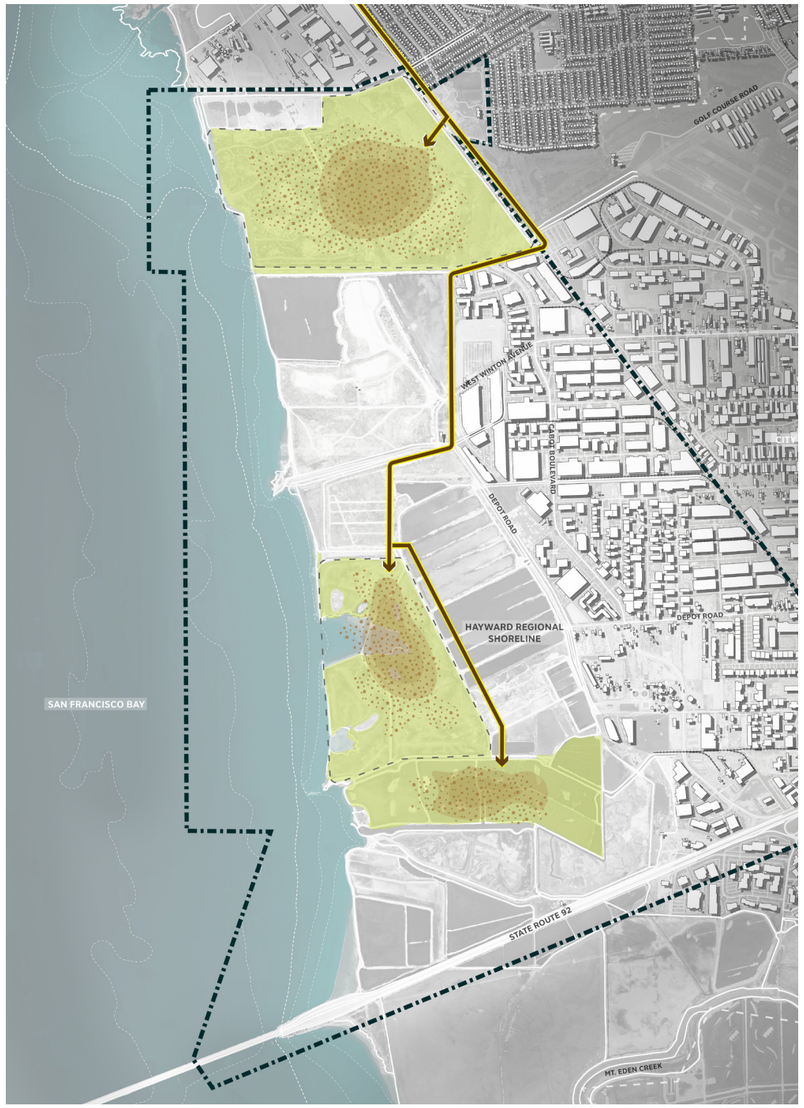
FINE SEDIMENT AUGMENTATION

Compiled Options

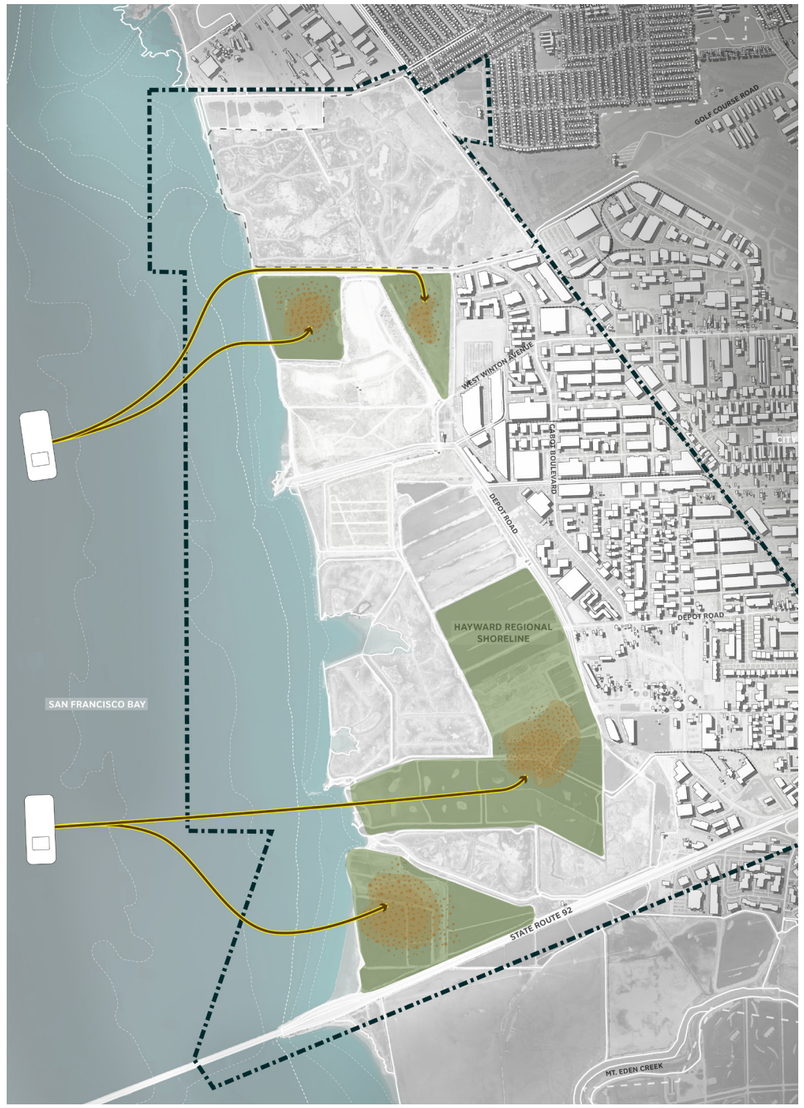
1: Feed from the Bay



2: Nourish from an Upland Pipeline



3: Prep Sites for Future Inundation



TRIBUTARY CONNECTION TO BAYLANDS

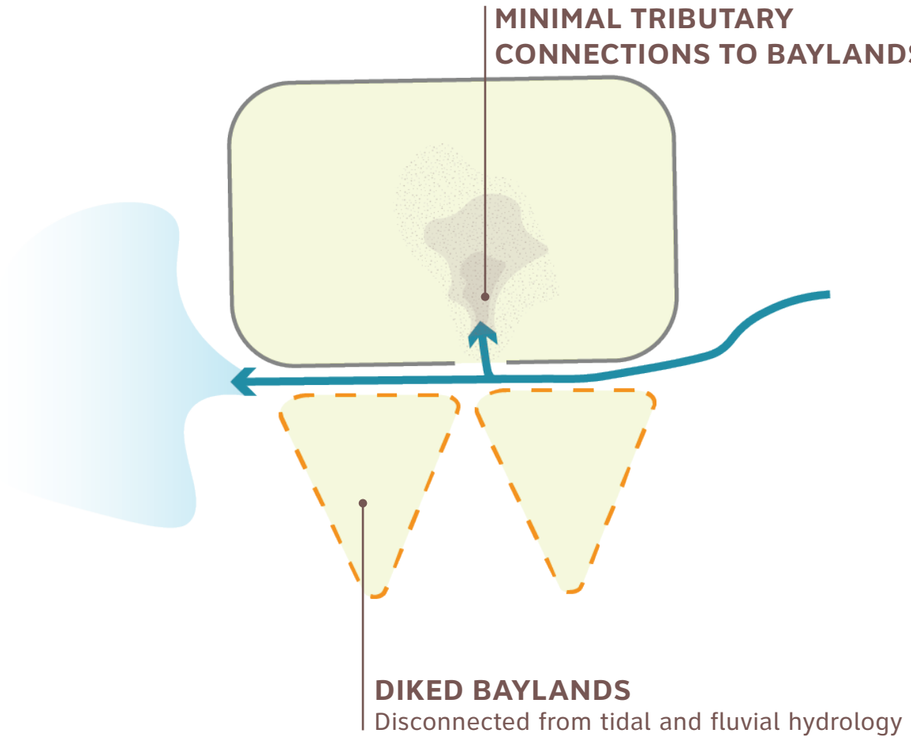
TRIBUTARY CONNECTION TO BAYLANDS

Definition

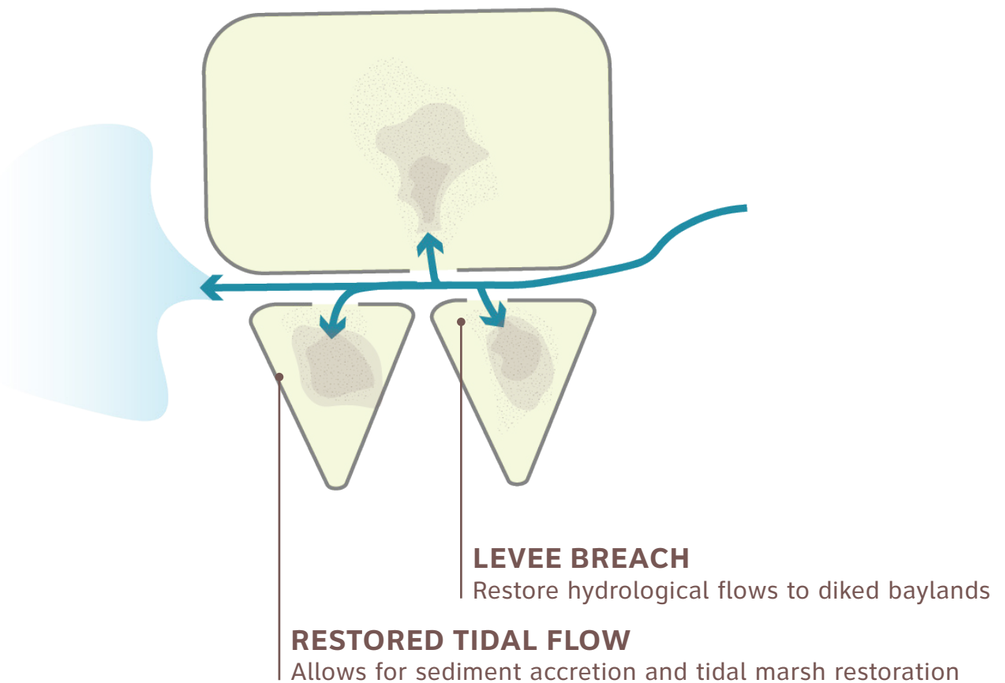
GOAL / OBJECTIVE

- Ecological enhancement (restore sediment and tidal flows for marsh restoration / health)

BEFORE



AFTER



TRIBUTARY CONNECTION TO BAYLANDS

Option 1: Sulphur Creek

GOAL / OBJECTIVE

Enhance marsh ecology and facilitate adaptation to SLR.

DESCRIPTION

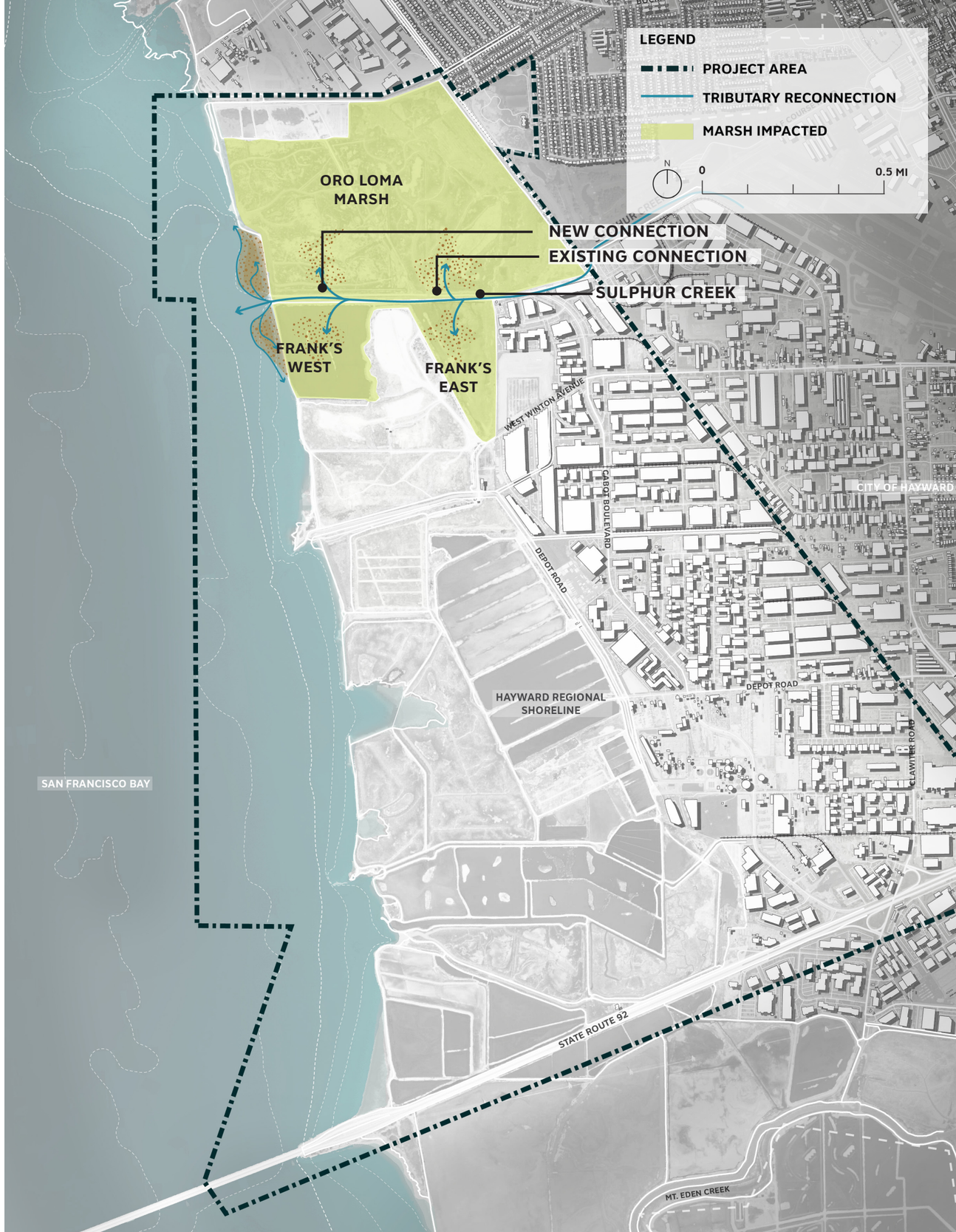
- Breach berms between Sulphur Creek and Oro Loma Marsh, Frank's East, and Frank's West

PROS

- Connect marshes to a large upland watershed
- Can help restore tidal marshes

CONS

- May impact flood control upstream- need to relocate tide gate
- May not do much for flood protection or SLR adaptation



TRIBUTARY CONNECTION TO BAYLANDS

Option 2: All Channels

GOAL / OBJECTIVE

Enhance marsh ecology and facilitate adaptation to SLR.

DESCRIPTION

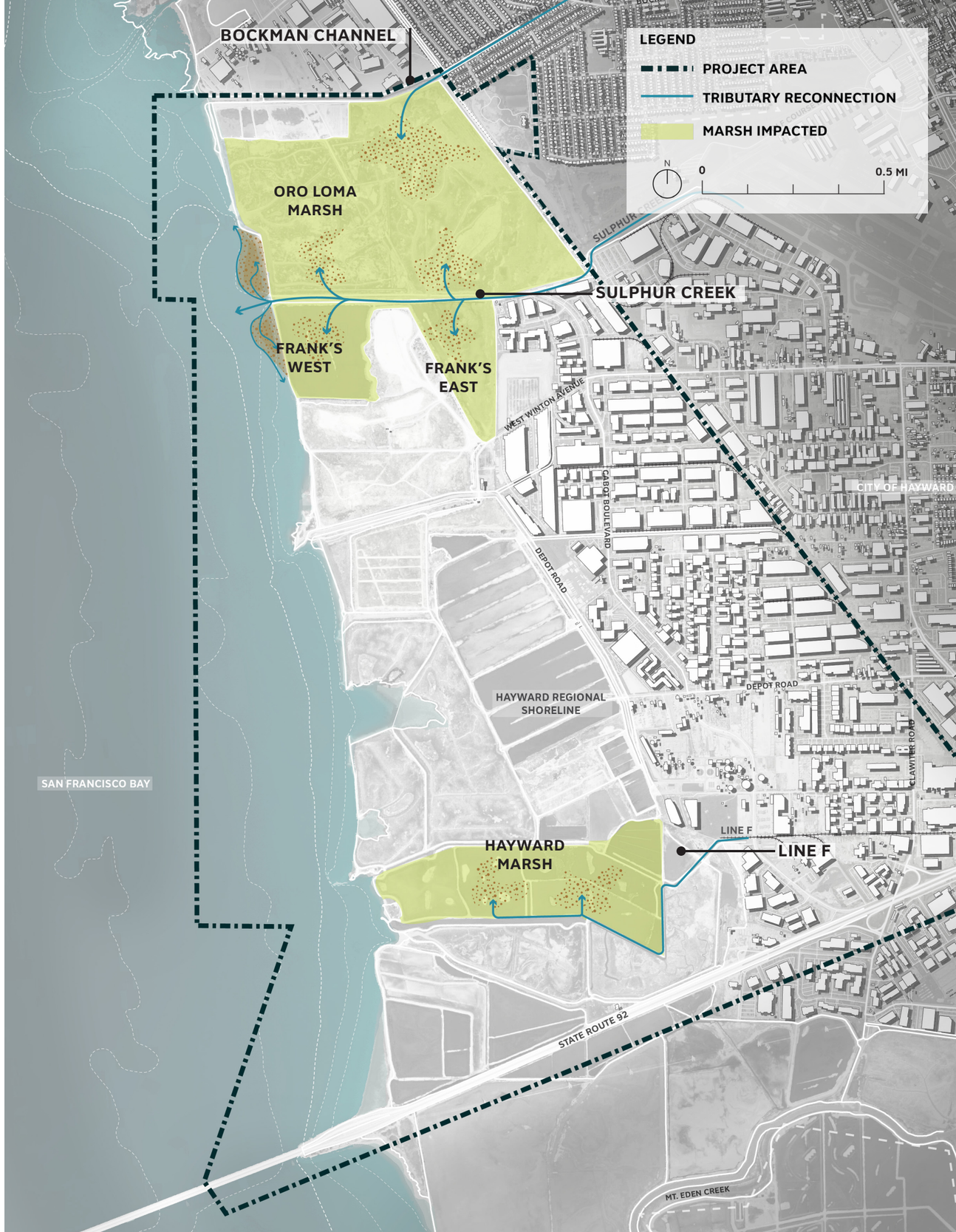
- Breach berms between Sulphur Creek and Oro Loma Marsh, Frank's East, and Frank's West
- Breach berms between Like F and Hayward Marsh

PROS

- Connect marshes to most viable upland watersheds
- Potential to nourish a large extent of marsh with sediment

CONS

- May impact flood control upstream- need to relocate tide gate
- Bockman Channel has low water quality today which may negatively impact Oro Loma marsh
- May not do much for flood protection or SLR adaptation

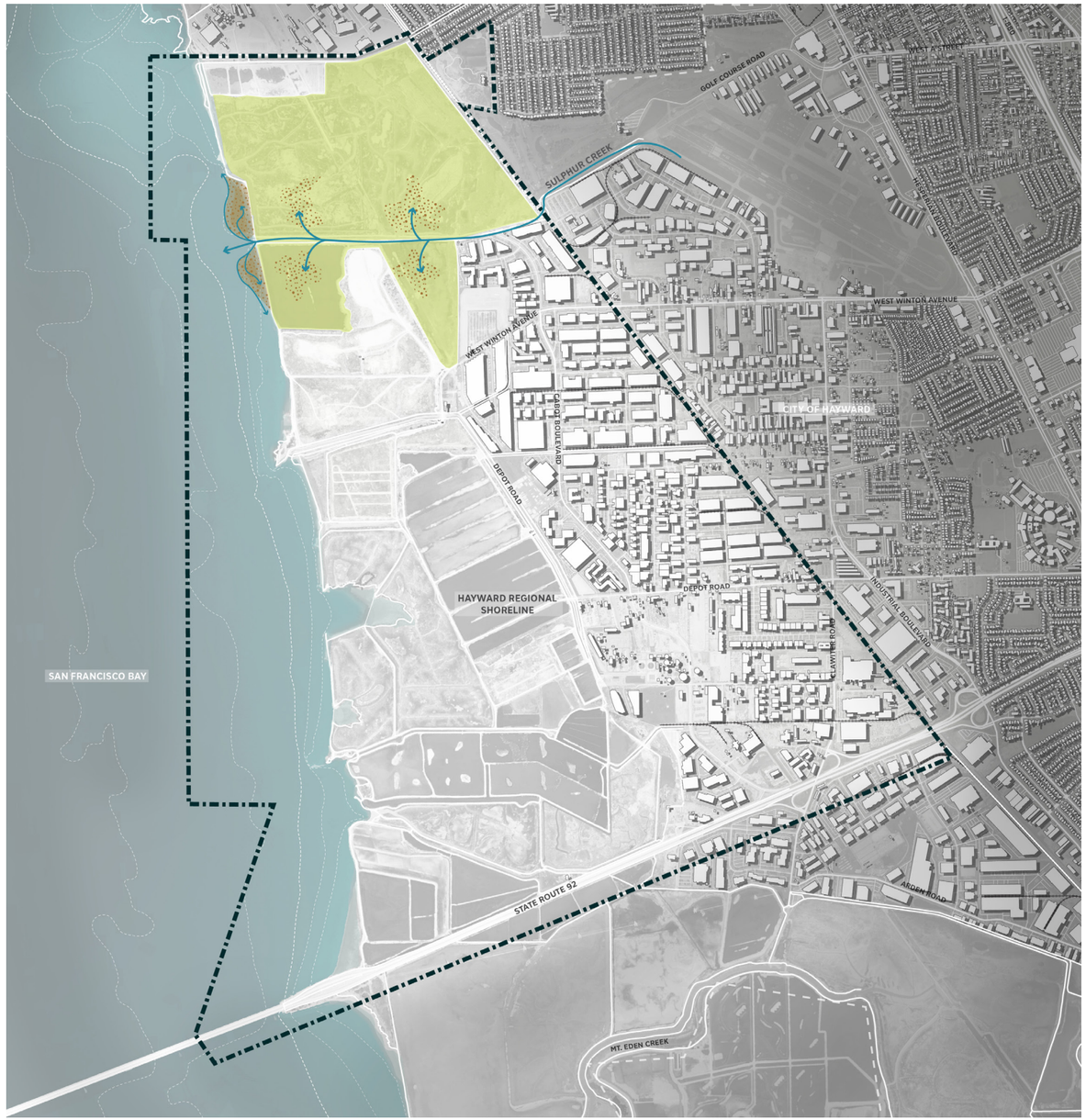


HAYWARD SHORELINE MASTER PLAN
January 9, 2020

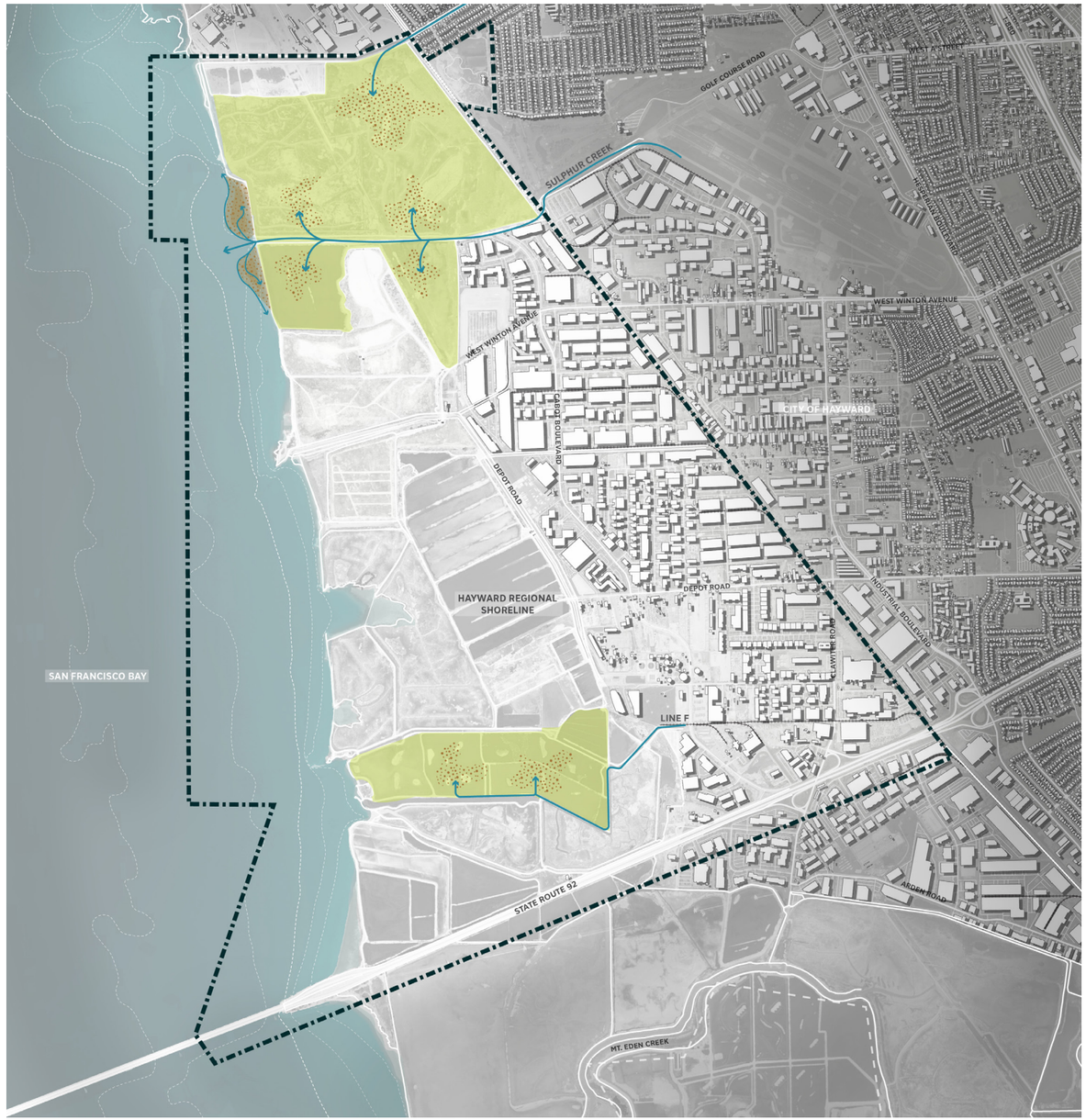
TRIBUTARY CONNECTION TO BAYLANDS

Compiled Options

1: Sulphur Creek



2: All Channels



ENGINEERED STRATEGIES

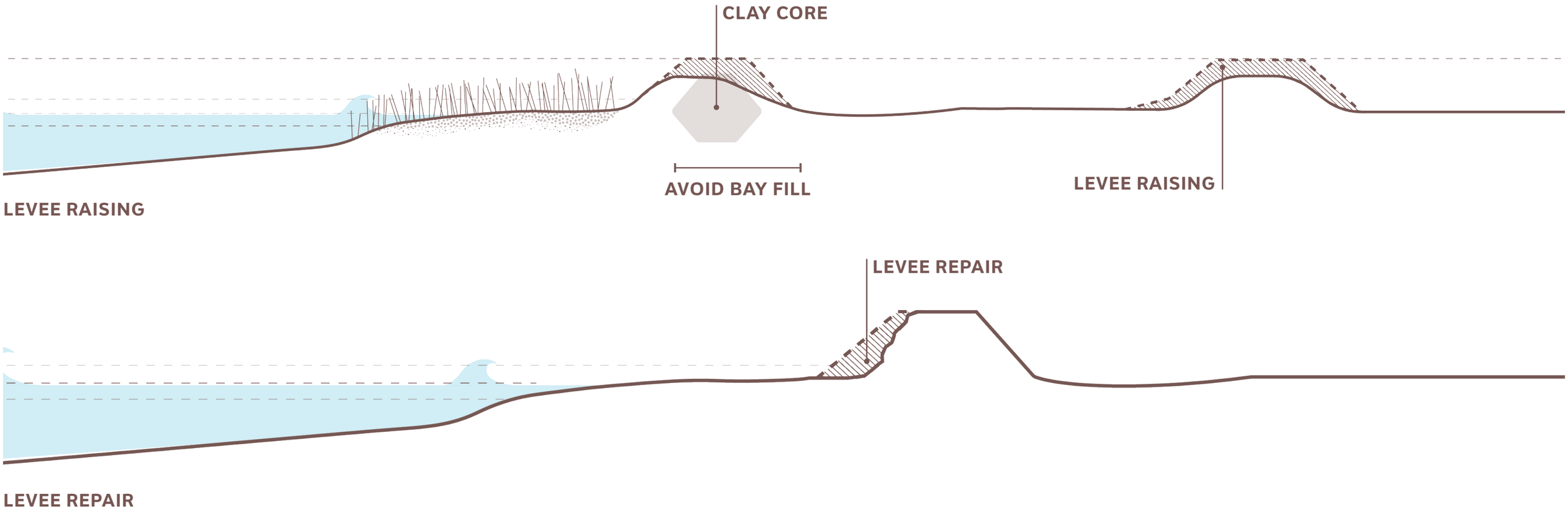
LEVEE IMPROVEMENTS

LEVEE IMPROVEMENTS

Definition

GOAL / OBJECTIVE

- Provide further flood protection
- Reduce erosion to marshes / infrastructure in their lee
- Enhance recreational opportunities



LEVEE IMPROVEMENTS

Option 1: Targeted Raising

GOAL / OBJECTIVE

Reduce risk of levee overtopping and provide flood protection.

DESCRIPTION

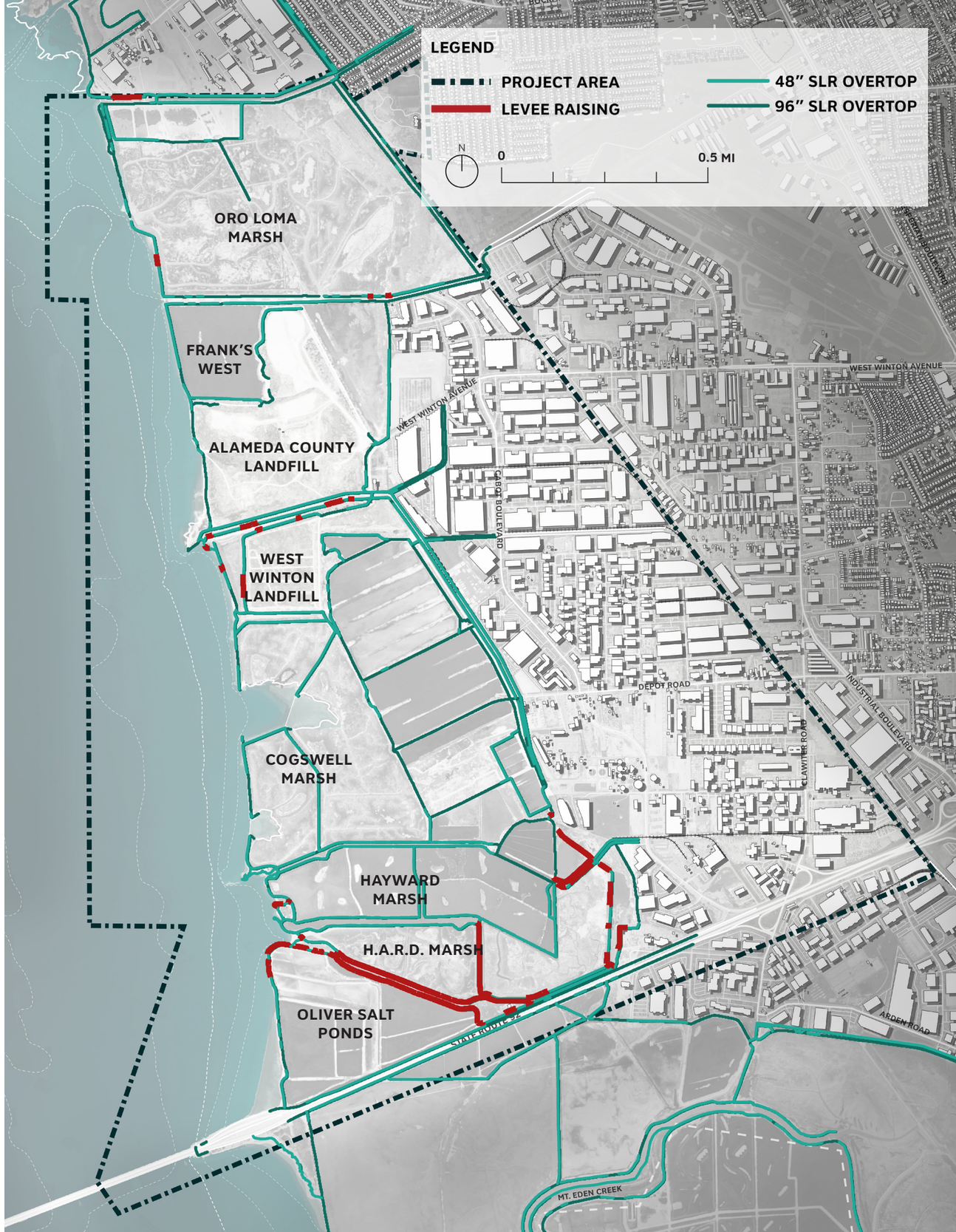
- Raise all levees that are projected to overtop with 2’ of SLR

PROS

- May help prevent localized flooding and erosion

CONS

- Does not address future storm surge or sea level rise
- Short-term strategy that only addresses a 2’ SLR scenario
- Does not account for freeboard- levees may still overtop with storm surge or wave action



LEVEE IMPROVEMENTS
Option 2: Address 4’ of SLR

GOAL / OBJECTIVE

Reduce risk to critical infrastructure and provide flood protection to inland communities.

DESCRIPTION

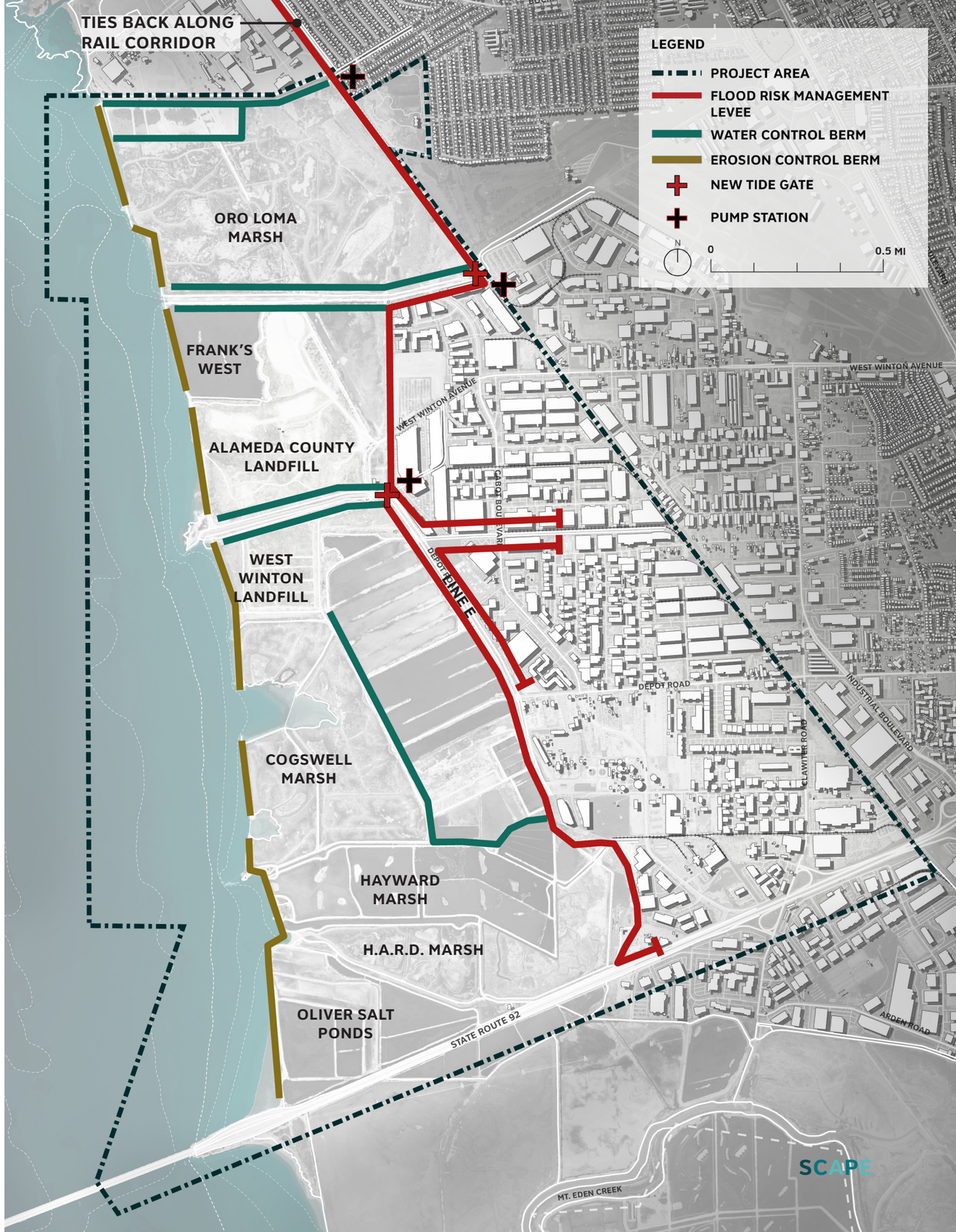
- Raise and repair inland levees for flood risk management
- Raise and repair levees along flood control channels
- Maintain Bay levees to reduce erosion

PROS

- Provides full protection to upland communities
- Prevents flooding from sea level rise in most areas
- Permits may be easier to attain if there is precedent in the area
- Preserves existing infrastructure, less disruptive than demolishing or replacing with a new construction

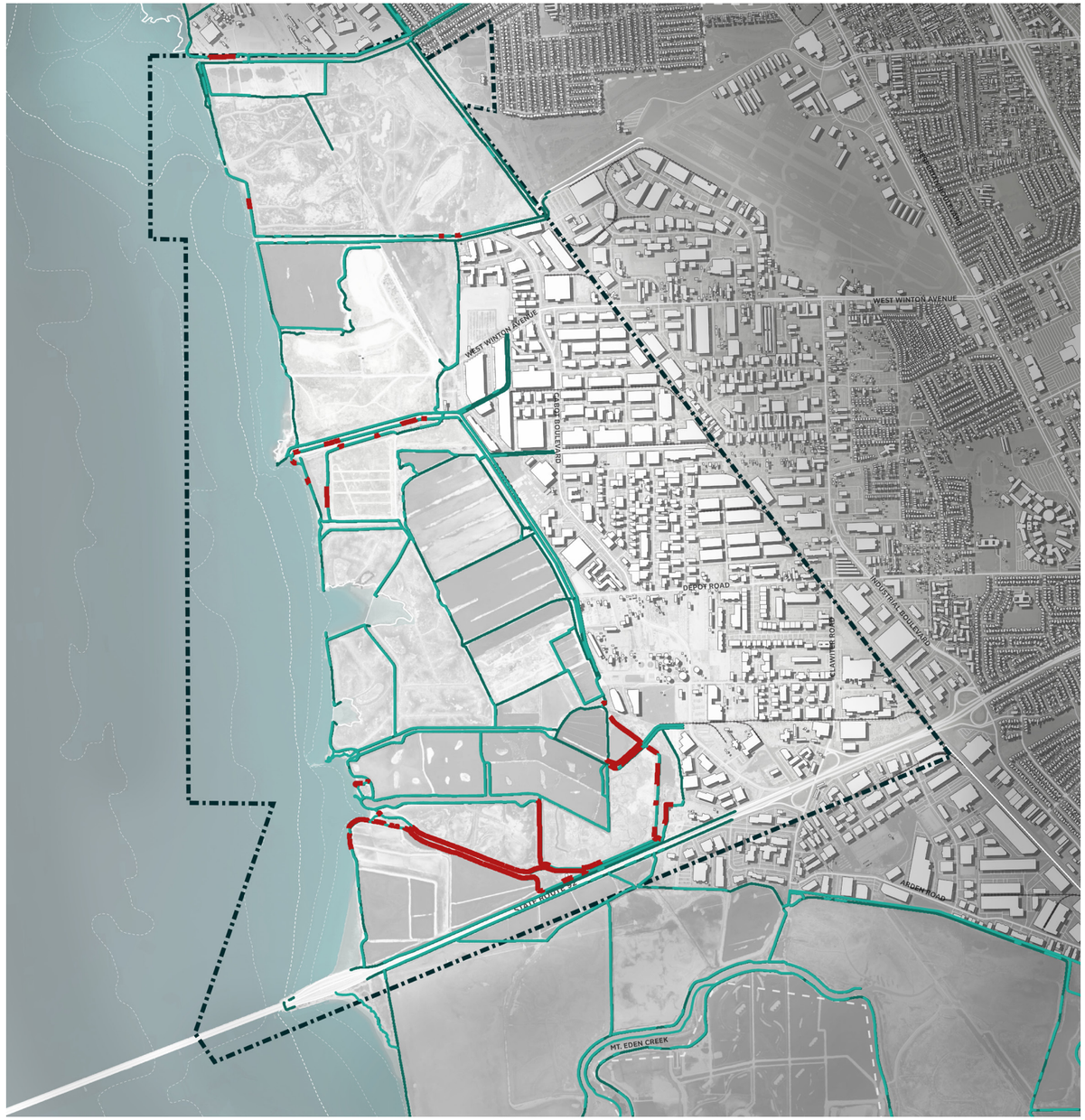
CONS

- Requires pump stations on all flood control channels or increased inland stormwater storage space
- Removes tidal connection for all marshes
- Levees could be extremely tall and wide
- May cause displacement of people, infrastructure and wildlife
- May require the demolition of pre-existing structures to raise ground
- Mid-term strategy that only addresses a 4’ SLR scenario

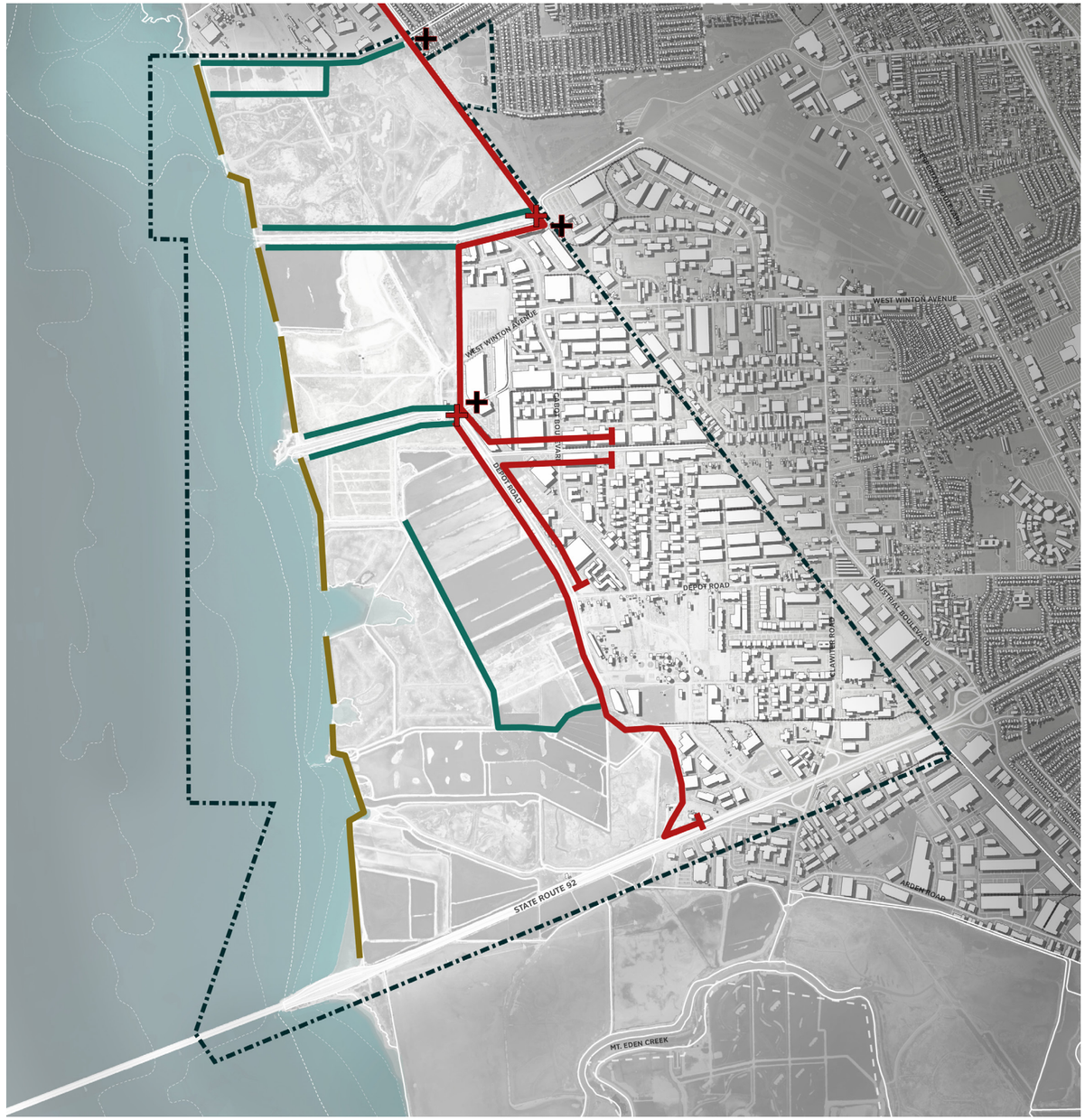


LEVEE IMPROVEMENTS
Compiled Options

1: Targeted Repairs



2: Address 4’ of SLR

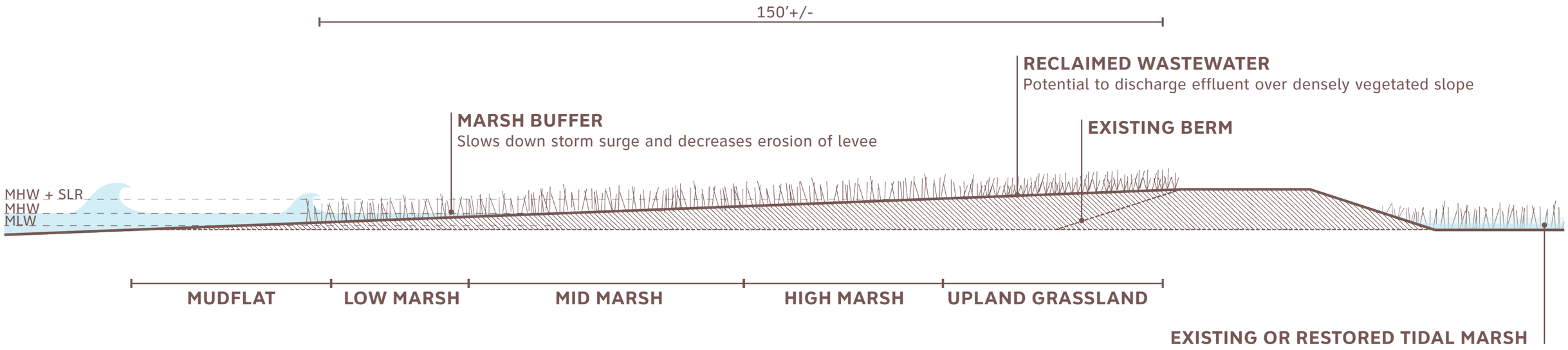


ECOTONE LEVEE

ECOTONE LEVEE
Definition

GOAL / OBJECTIVE

- Provide flood protection
- Enhance ecological function (provide transition zone, marsh migration space)



ECOTONE LEVEE

Option 1: Protect Critical Infrastructure

GOAL / OBJECTIVE

Reduce risk to critical infrastructure (Hayward WWTP and CalPine / Russell Energy Center). Enhance marsh migration space and transition zone.

DESCRIPTION

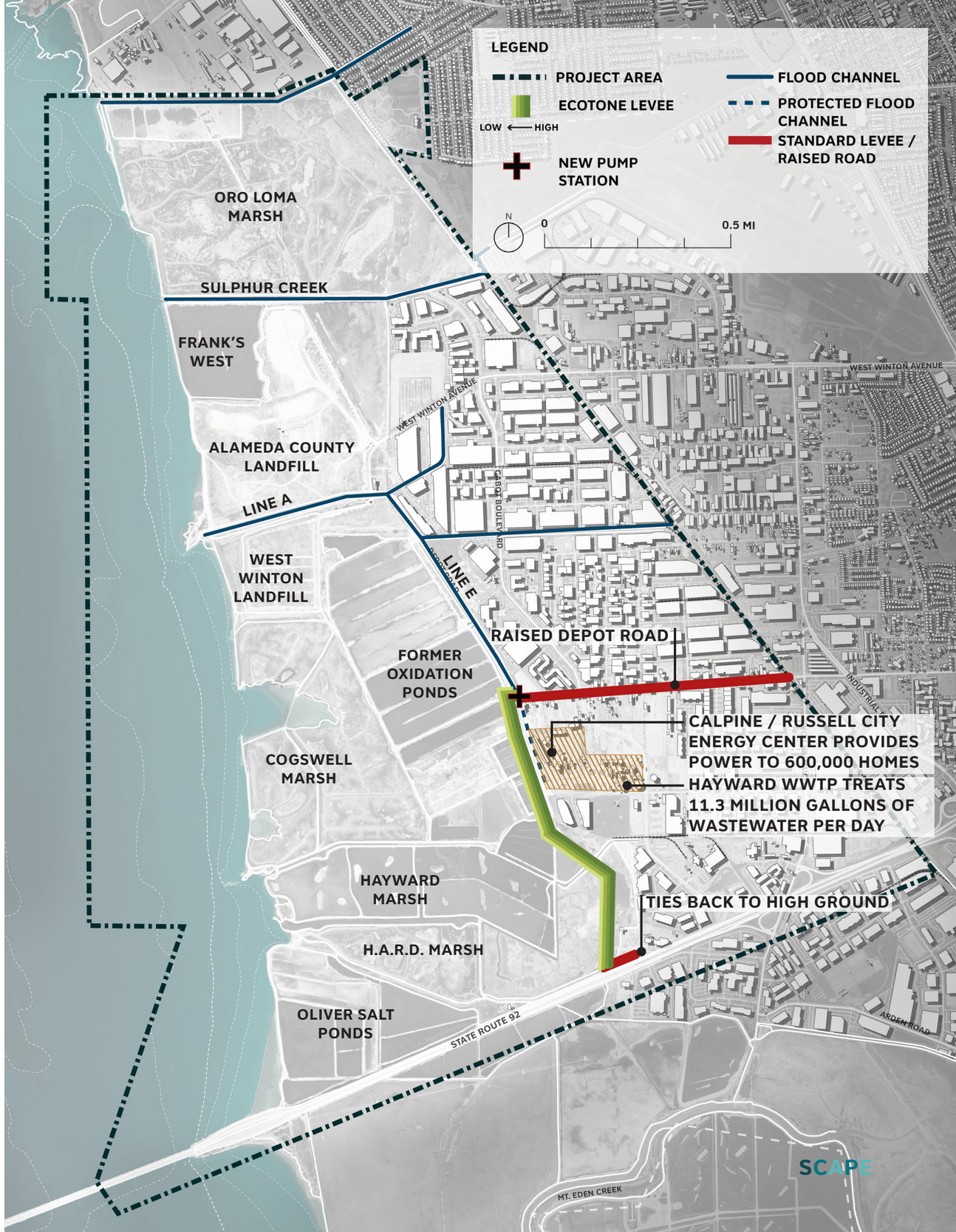
- Ecotone levee from SR-92 to Depot Road
- Road raising along Depot Road that ties back to high ground
- Standard levee along SR-92 that ties back to high ground
- **Rough unit costs: &10k per acre of marsh, $6k per LF of levee (SBSP Alviso)**

PROS

- Existing tidal connections remain
- Some water control structures will be preserved (Line A)
- Increases level of flood protection from a potential increased in frequency of storm events

CONS

- May require a portion of Line E to be relocated
- Oxidation ponds are unprotected
- A large amount of power would be required to operate pump stations behind the levee
- Predators may roost on the ecotone levee



HAYWARD SHORELINE MASTER PLAN
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ECOTONE LEVEE

Option 2: Maintain Oxidation Ponds

GOAL / OBJECTIVE

Provide flood protection for a majority of the southern portion of the Industrial Business district. Enhance marsh migration space and transition zone.

DESCRIPTION

- Ecotone Levee that extends from SR-92, on the Bayward side of the Oxidation Ponds, and ties back to the West Winton Landfill
- Levee raising along Line E to prevent inundation with 4’ of SLR
- Utilize the Oxidation Ponds for multi-purpose wet weather storage (groundwater, stormwater, wet weather equalization)

PROS

- Increases level of flood protection from a potential increase in the frequency of storm events

CONS

- Requires the management of a larger amount of stormwater on the inland side of the levee with increased storage space or pump stations
- A large amount of power would be required to operate pump stations behind the levee
- Predators may roost on the ecotone levee
- Negatively impacts Cogswell Marsh

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ECOTONE LEVEE

Option 3: Upland Levee

GOAL / OBJECTIVE

Reduce risk to critical infrastructure and provide flood protection for inland neighborhoods. Enhance marsh migration space and transition zone.

DESCRIPTION

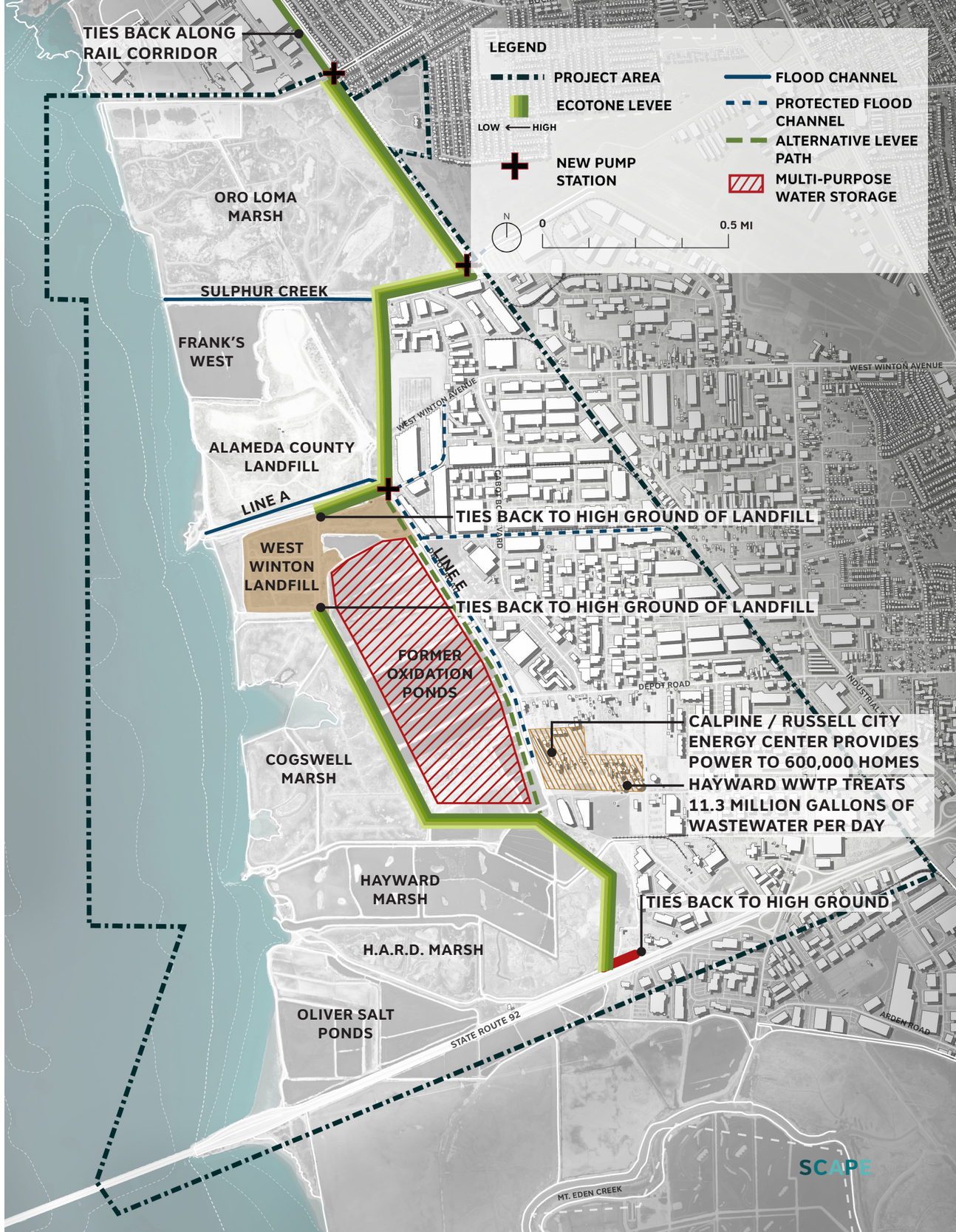
- Ecotone Levee
- Pump stations along Line A, Sulphur Creek, and Bockman Channel
- Multi-purpose water storage at Oxidation Ponds
- Standard levee tie back along SR-92 to high ground

PROS

- Provides potential groundwater (pumped from underground), stormwater, and WWTP wet weather equalization storage areas in oxidation ponds
- Allows for upland marsh migration
- Increases level of flood protection from a potential increase in the frequency of storm events
- Low-gradient slope does not need to be constructed from highly engineered levee core

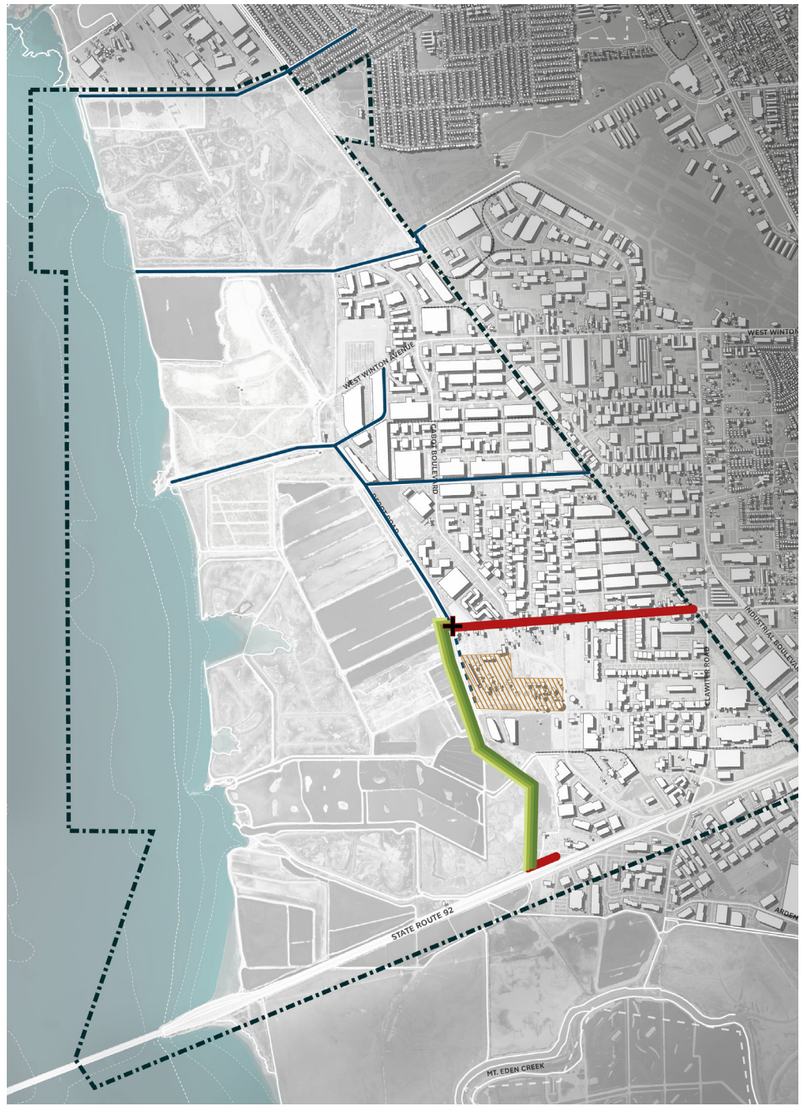
CONS

- Requires the management of a larger amount of stormwater on the inland side of the levee with increased storage space or pump stations
- A large amount of power would be required to operate pump stations behind the levee
- Dependant on levee raising along the rail corridor outside of the project boundary to the north
- Line A unprotected, Line E to be relocated
- Sulphur Creek to be re-routed
- FEMA does not certify transition slope levees and would not recognize the flood protection benefits of this levee in their flood maps
- Construction would require filling the bay and modifying shoreline topography - requires multiple permits
- Predators may roost on the ecotone levee
- Negatively impacts Cogswell Marsh

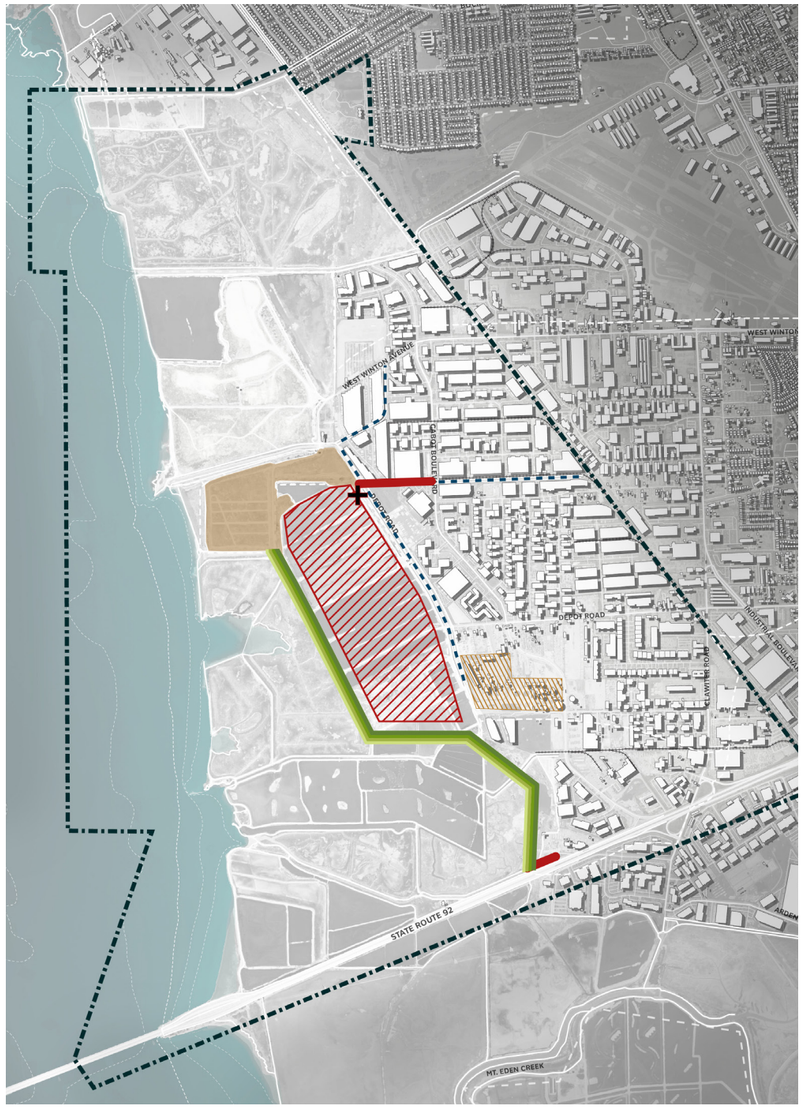


ECOTONE LEVEE
Compiled Options

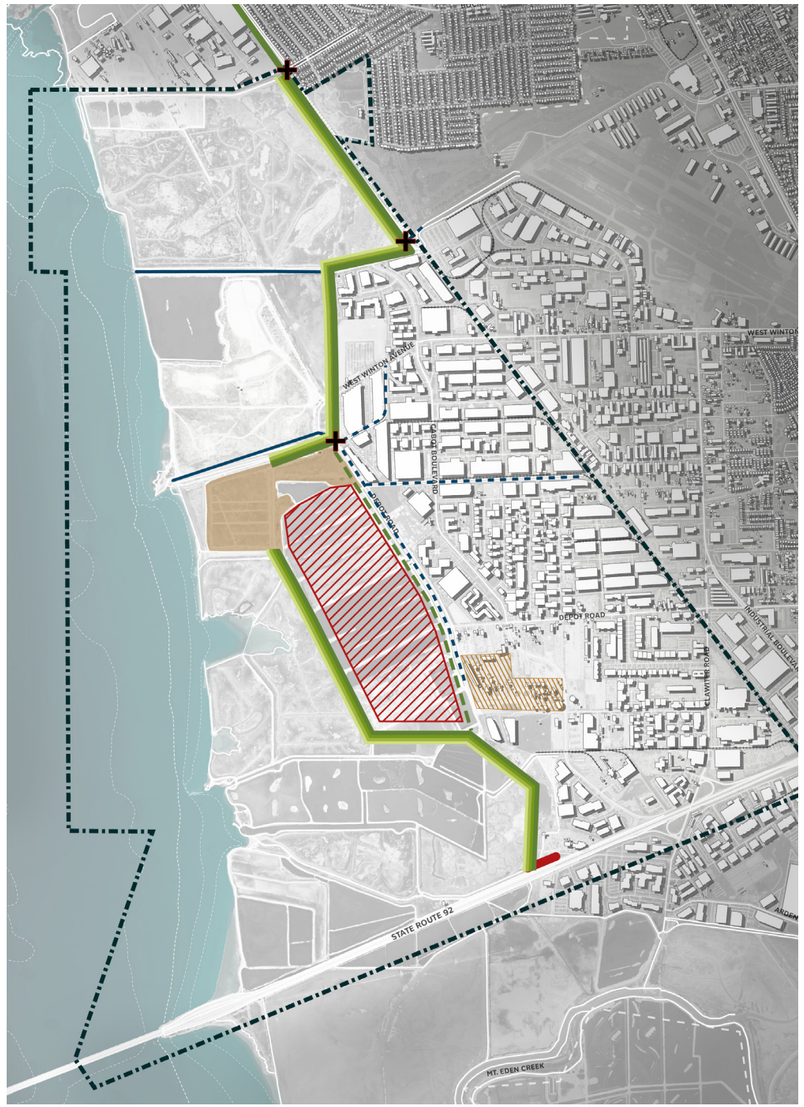
1: Protect Critical Infrastructure



2: Maintain Oxidation Ponds



3: Upland Levee



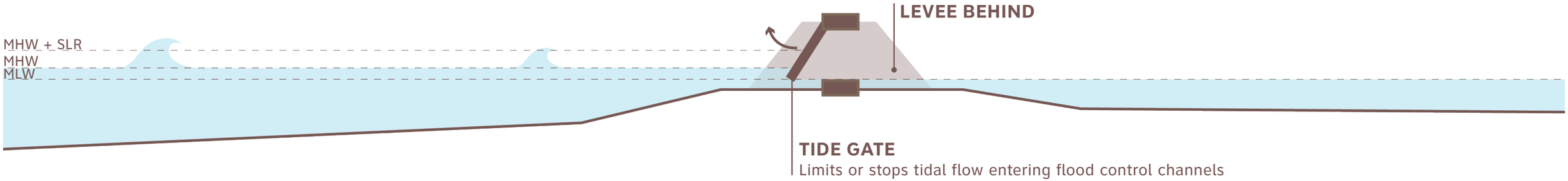
TIDE GATES & WATER CONTROL STRUCTURES

TIDE GATES & WATER CONTROL STRUCTURES

Definition

GOAL / OBJECTIVE

- Flood protection (stop tidal water from entering channel, allow stormwater out)
- Limit maximum elevation of water (“muted tidal”- tide gates close at a certain elevation, open at same elevation on ebb tide)



TIDE GATE
Limits or stops tidal flow entering flood control channels

Bockman Channel Tide Gate

Marathon Pump Station at Sulphur Creek

Line E Tide Gate at Depot Road

Tide gate at southern end of Hayward Marsh

TIDE GATES & WATER CONTROL STRUCTURES

Option 1: Upland Tide Gate Relocation

GOAL / OBJECTIVE

Flood risk reduction.

DESCRIPTION

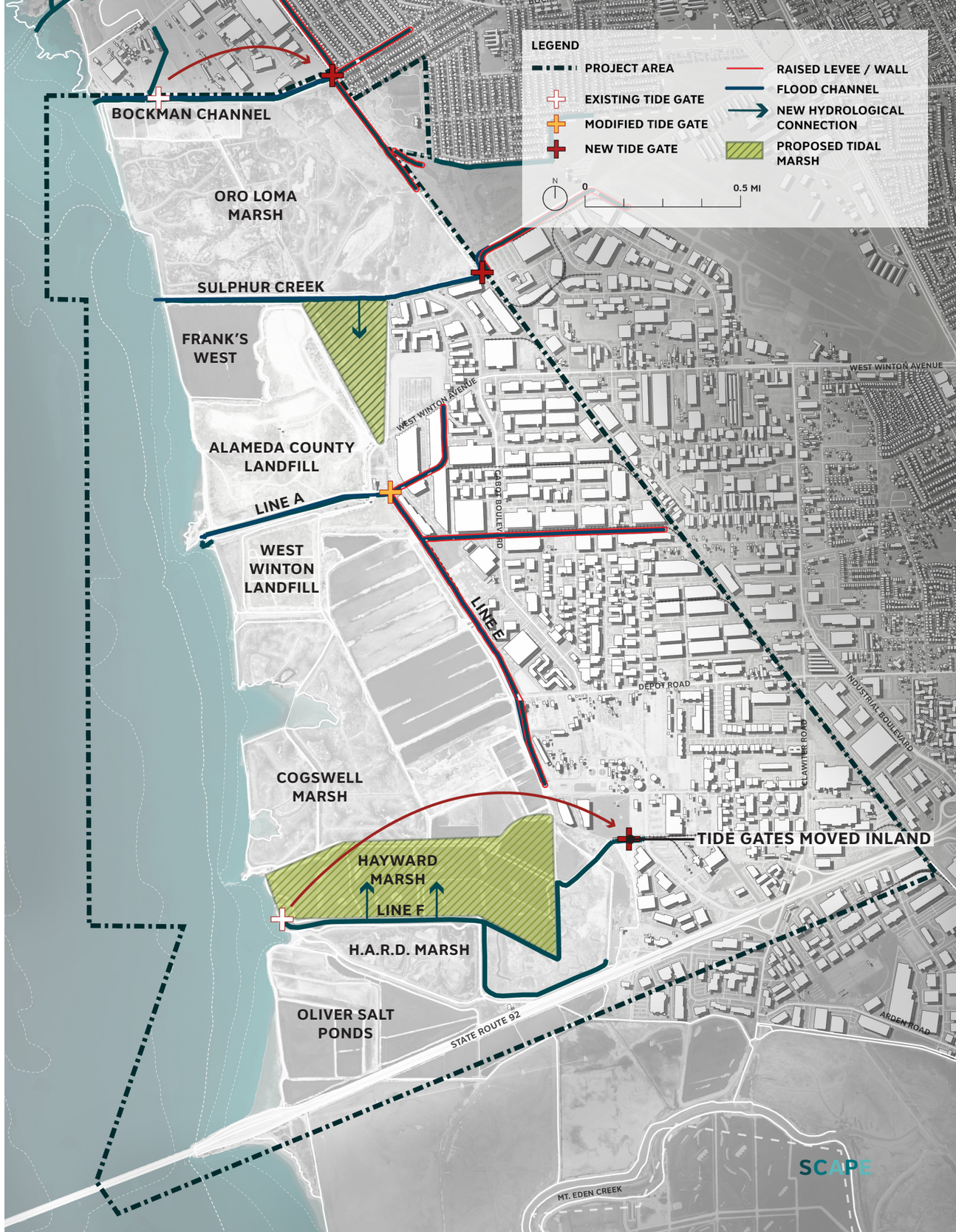
- Tide gate at Sulphur Creek is moved inland to the rail corridor
- Levees are raised along flood control channels inland of tide gates at Bockman Channel, Sulphur Creek, and Line F. Outboard levees could be lowered or removed.

PROS

- Opens up the potential to breach tributaries into the Baylands to restore tidal marsh
- Cheaper to locate control structures as close to the line of protection as possible
- Cheaper to raise and maintain shorter lengths of levees along the channels

CONS

- Need for automated tide gate in a more complex hydraulic system



TIDE GATES & WATER CONTROL STRUCTURES

Option 2: Storage In Flood Channels / Downstream Tide Gate Relocation

GOAL / OBJECTIVE

Increase stormwater storage capacity in the channels only.

DESCRIPTION

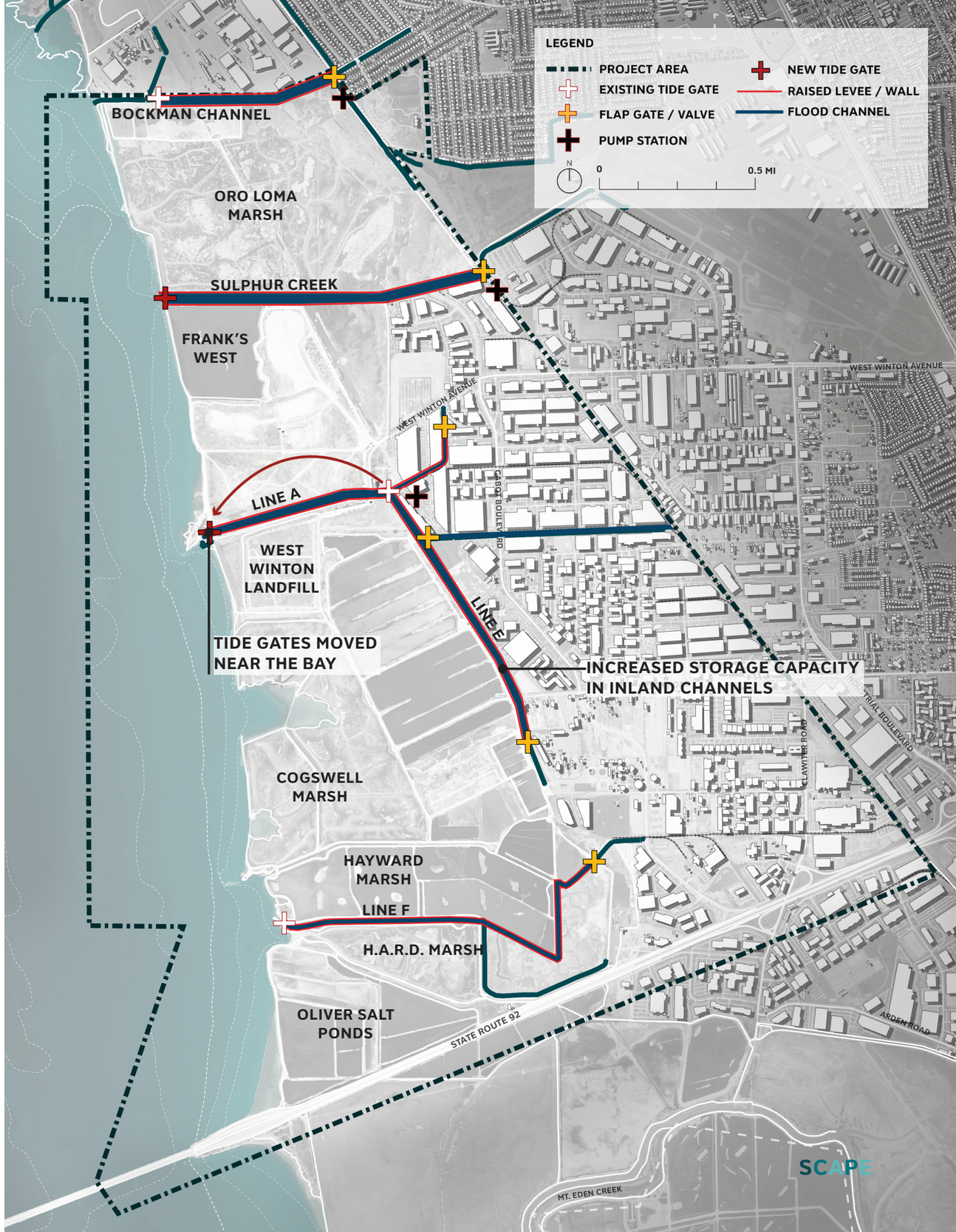
- New tide gates at the Bay's edge along Bockman Channel, Sulphur Creek, and Line A
- New flap gates inland along Sulphur Creek and Line E
- Levees are raised along Bockman Channel, Sulphur Creek, Line A, and Line F, inland of the new tide gate locations
- New pump stations at Bockman Channel, Sulphur Creek, and Line A

PROS

- Improved storage capacity

CONS

- Would require pump stations
- Would require increasing the length of levee and raising
- Few viable locations for significant storage volumes
- Limits or eliminates tidal flow in channels which could provide habitat
- May trap sediment before it reaches the Bay, which would require maintenance dredging
- Storage volume assessment required



HAYWARD SHORELINE MASTER PLAN
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TIDE GATES & WATER CONTROL STRUCTURES

Option 3: Detention Pond Storage / Improving Flood Channels

GOAL / OBJECTIVE

Increase stormwater storage capacity.

DESCRIPTION

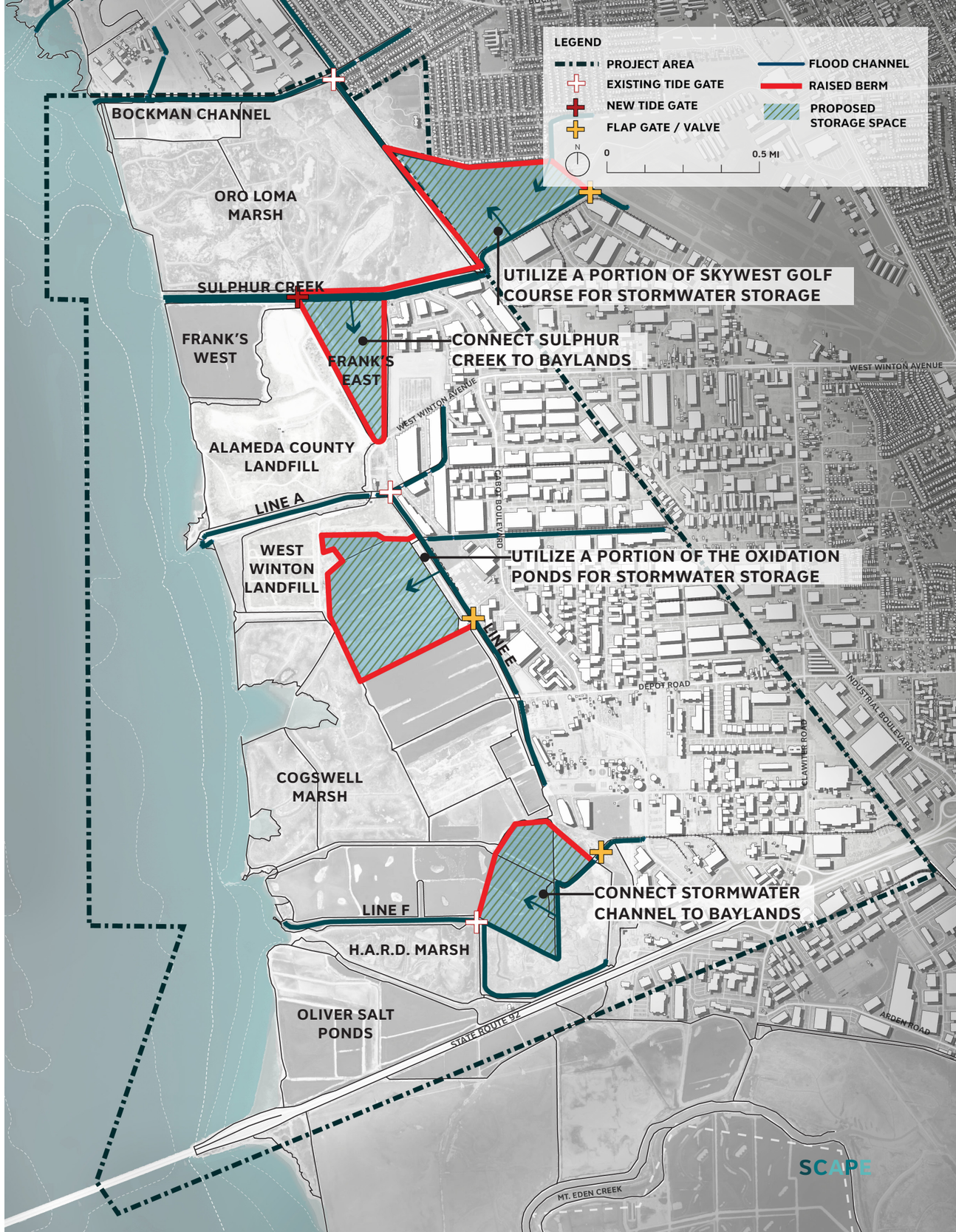
- New flap gates at Sulphur Creek, Line E, and Line F
- New berms around portions of Skywest Golf Course, Frank's East, Oxidation Ponds, and Hayward Marsh

PROS

- Improved storage is beneficial
- Provides further protection from sea level rise

CONS

- May contribute to groundwater ponding
- May exacerbate flooding if you don't have sufficient pumping capacity
- Public Works is concerned about the partial loss of oxidation ponds
- Would require pump stations long-term
- May have negative ecological impacts in the water storage areas- salinity shocking
- Storage volume assessment required



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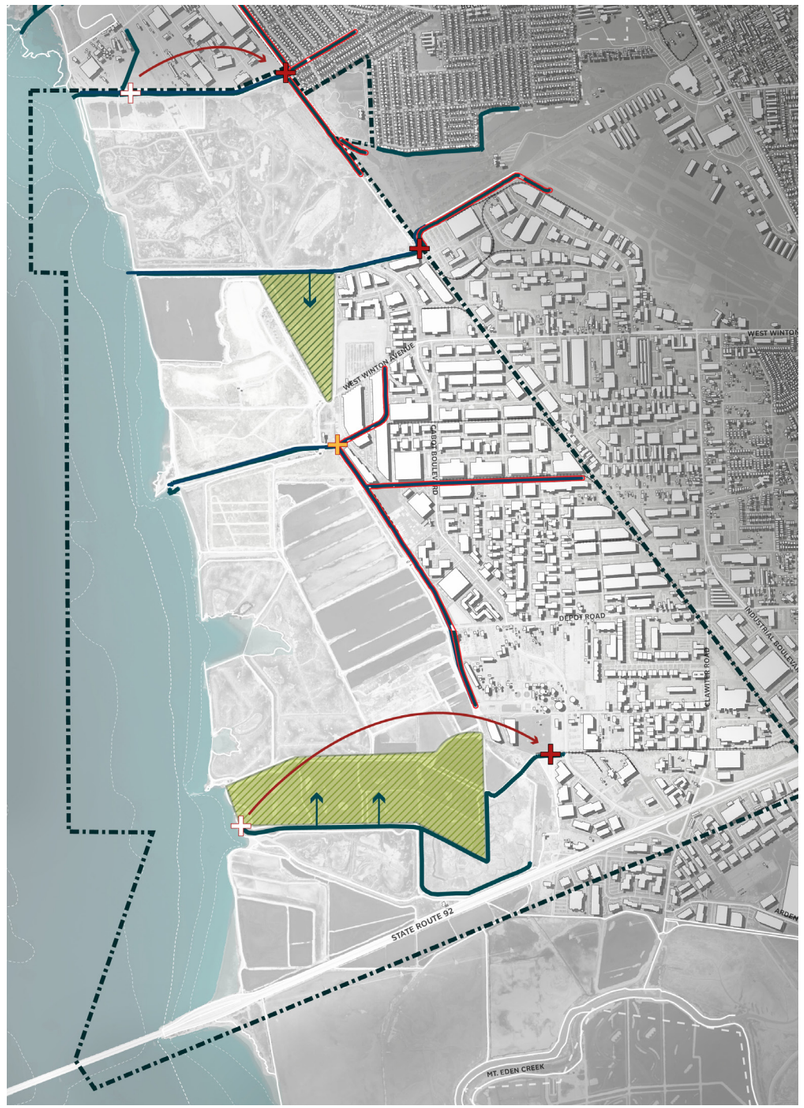
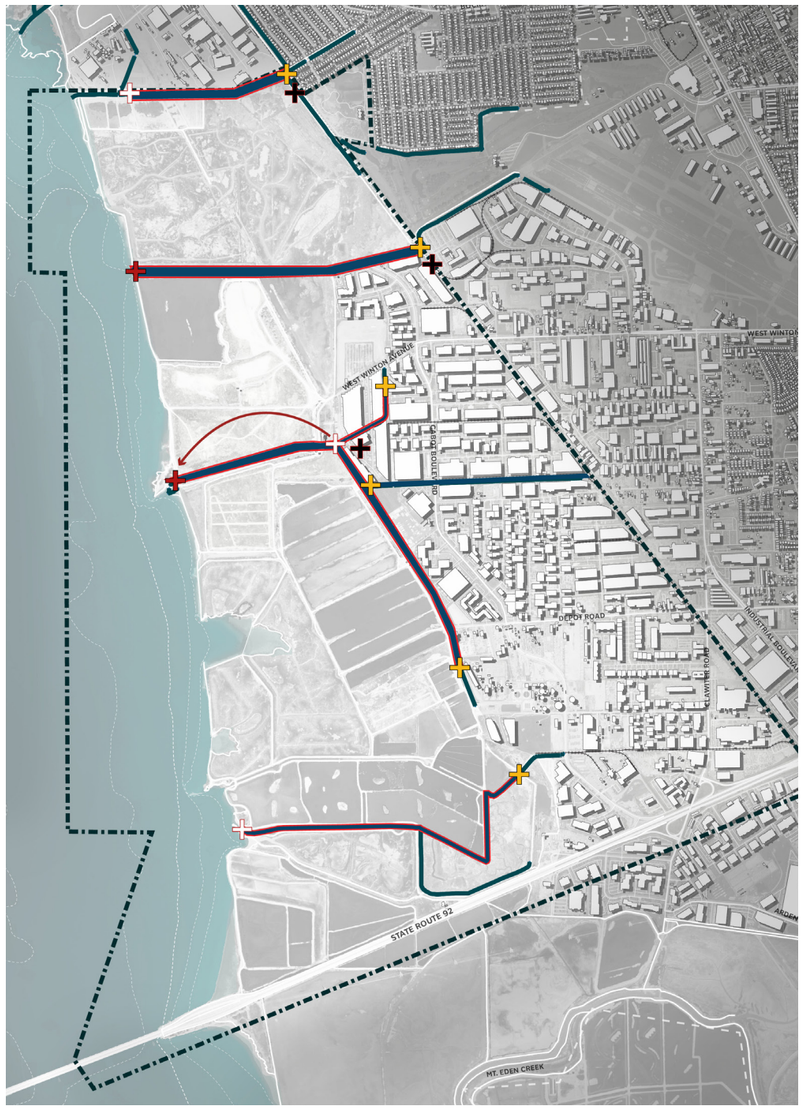
TIDE GATES & WATER CONTROL STRUCTURES

Compiled Options

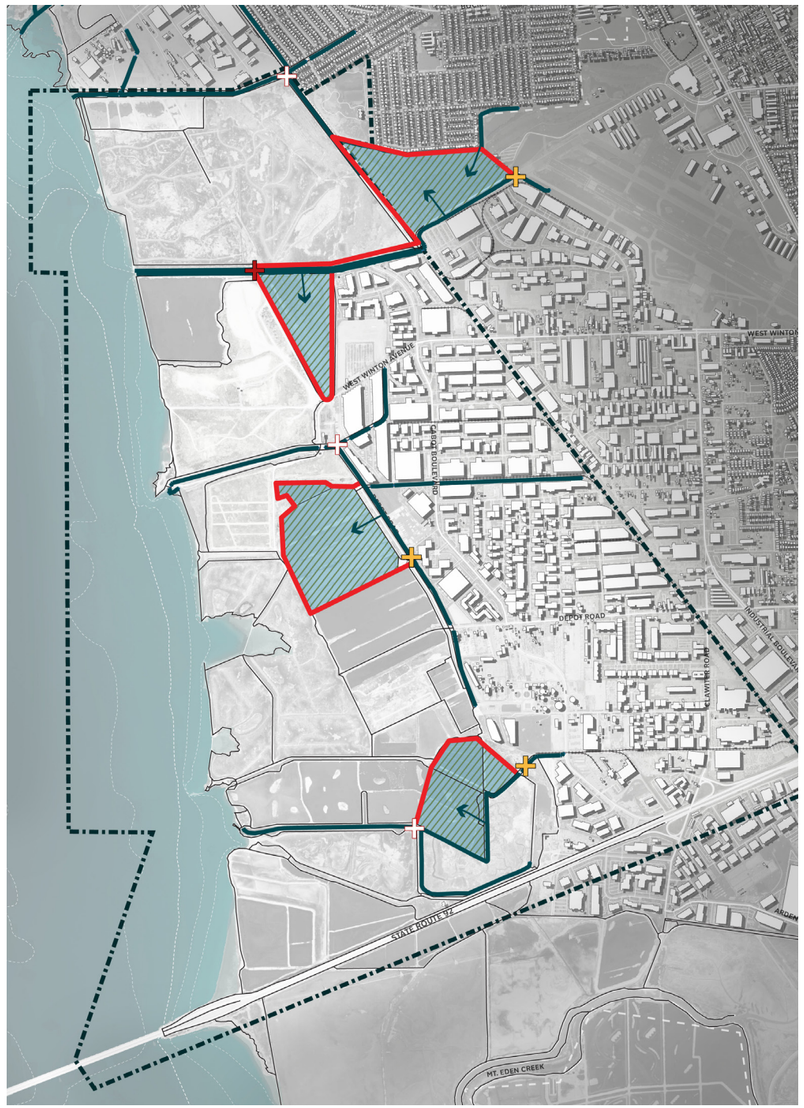
1: Upland Tide Gate Relocation



2: Storage In Flood Channels / Downstream Tide Gate Relocation



3: Diked Pond Storage / Improving Flood Channels



WASTEWATER TREATMENT ADAPTATION

WASTEWATER TREATMENT ADAPTATION

Definition

GOAL / OBJECTIVE

- Reduce risk to regional critical utilities

MAP OF EBDA PIPELINE

WASTEWATER TREATMENT ADAPTATION

Option 1: Oro Loma Local Discharge

GOAL / OBJECTIVE

Adapt critical infrastructure and enhance marsh migration space.

DESCRIPTION

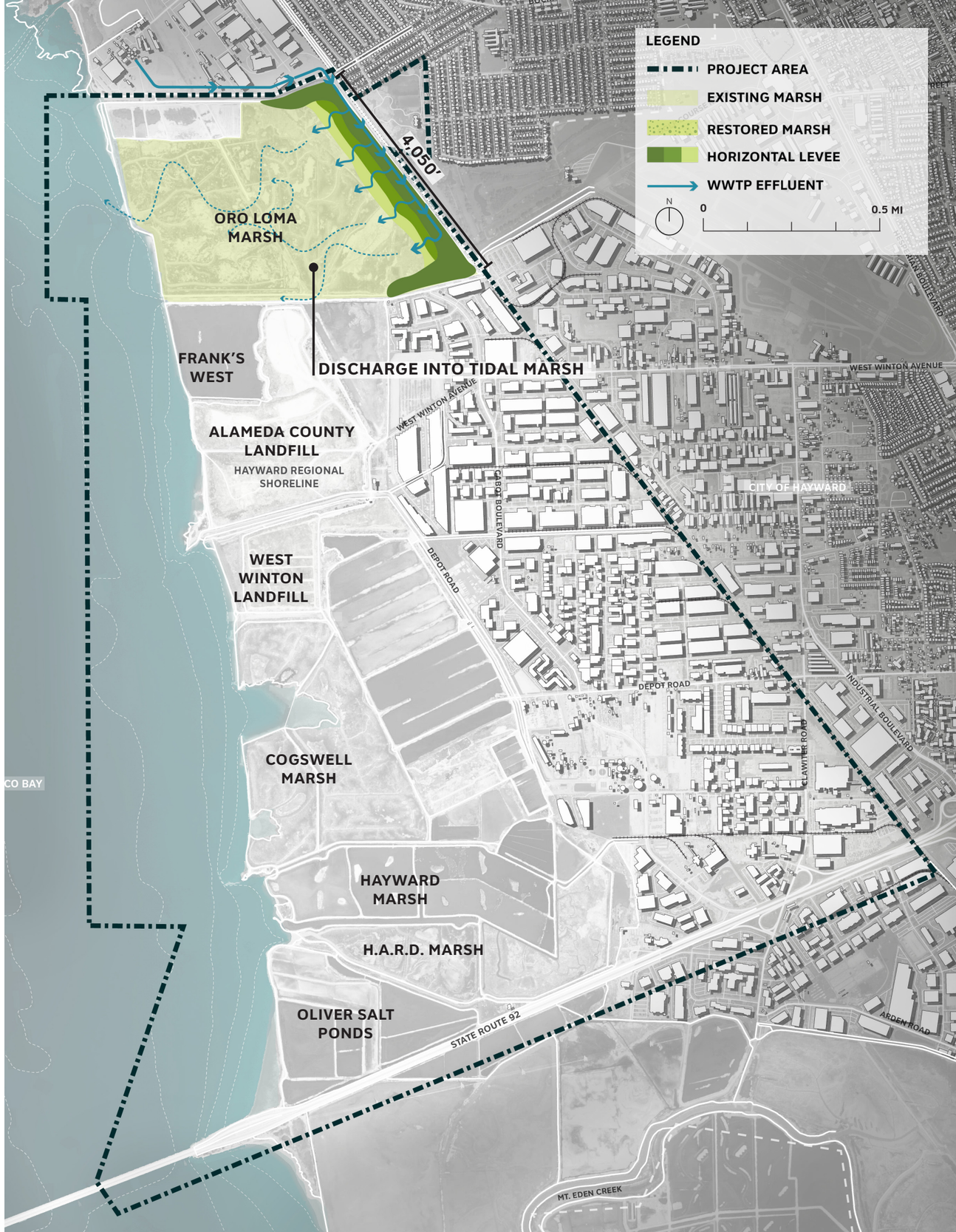
- Horizontal levee along the back of Oro Loma Marsh

PROS

- Restore salinity gradient to tidal marsh
- Local discharge with EBDA retirement

CONS

- Need to maintain and raise levee with sea level rise
- May have negative impacts to Oro Loma marsh- increased freshwater would change salinity gradient
- Endangered species habitat loss
- Water board permit is difficult to obtain



WASTEWATER TREATMENT ADAPTATION

Option 2: Hayward Treatment + Storage

GOAL / OBJECTIVE

Adapt critical infrastructure, provide stormwater storage, and enhance freshwater marsh habitat.

DESCRIPTION

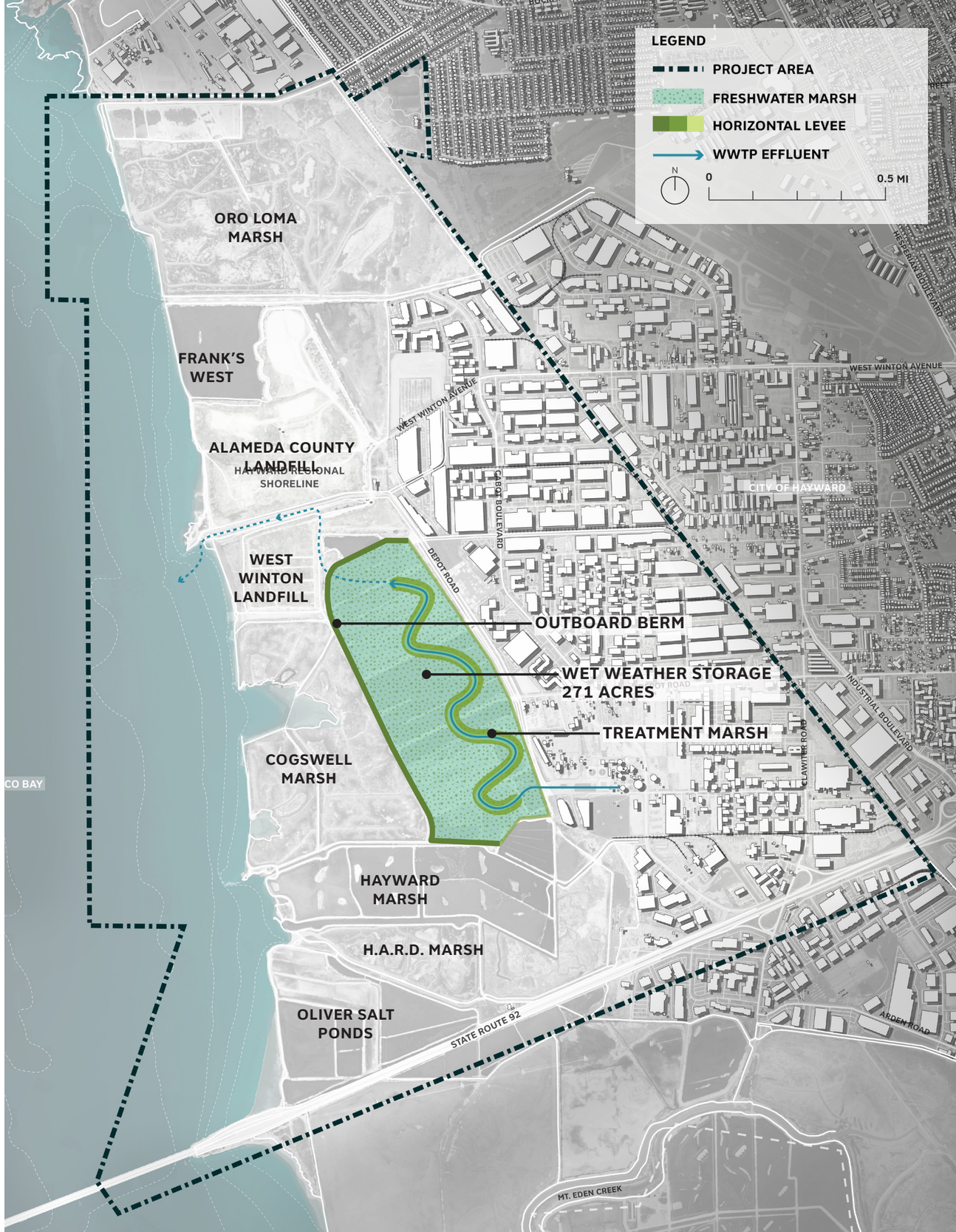
- Freshwater treatment marsh in the Oxidation Ponds
- Raised outboard berm

PROS

- Increase storage capacity during wet weather events
- Hayward is one of the only WWTPs that can do wet weather equalization

CONS

- Not directly connected to the bay
- Need to maintain and raise levee with sea level rise
- Water board permit is difficult to obtain
- Loss of solar fields and biosolids management/ drying area near the oxidation ponds



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WASTEWATER TREATMENT ADAPTATION

Option 3: Hayward Local Discharge

GOAL / OBJECTIVE

Adapt critical infrastructure, enhance marsh migration space, provide stormwater storage space.

DESCRIPTION

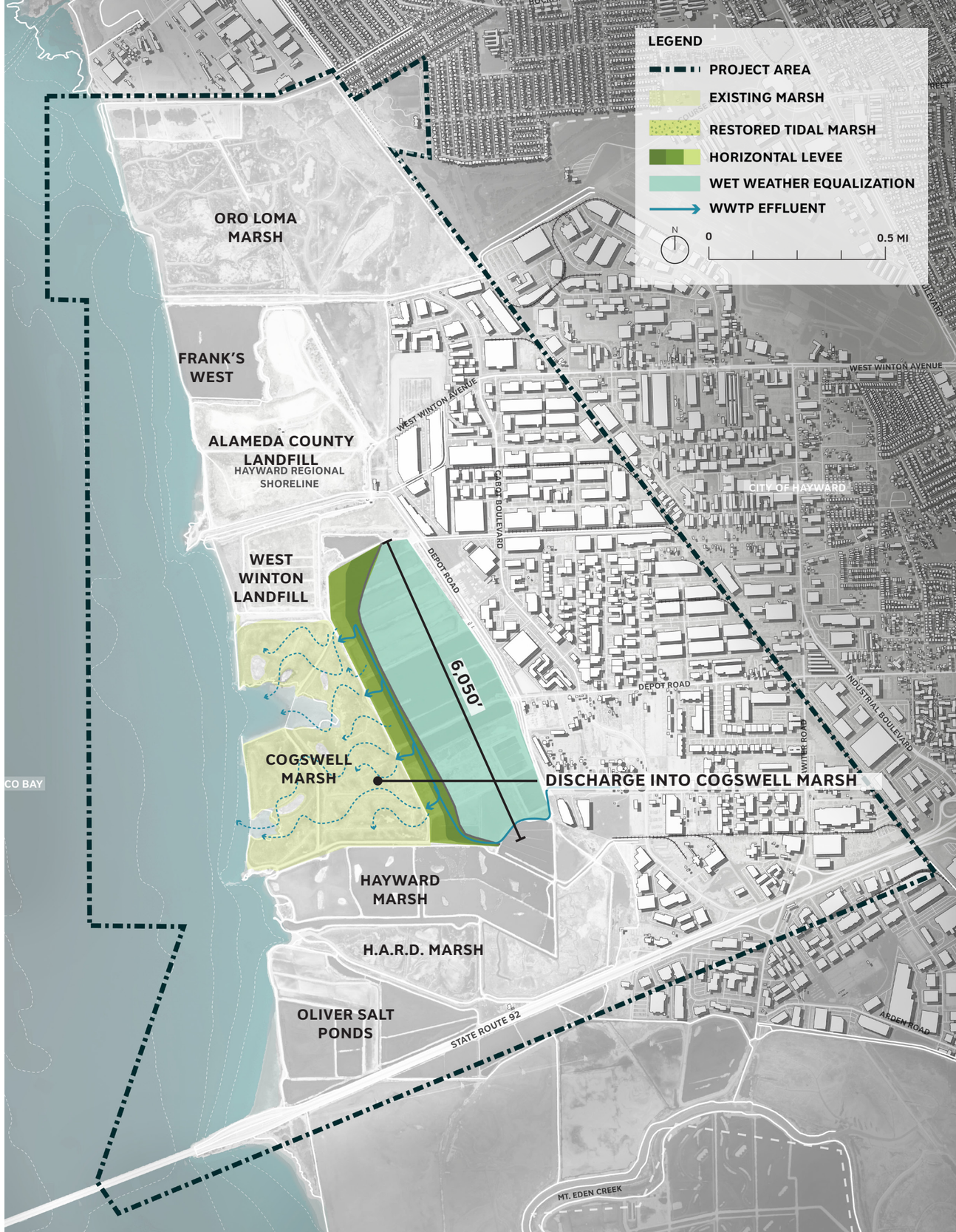
- Horizontal levee along the western extent of the Oxidation Ponds
- Stormwater storage improvements in the rest of the Oxidation Ponds

PROS

- Locally discharge effluent
- Protects oxidation ponds
- Can tie into a larger ecotone levee

CONS

- May have negative impacts to Cogswell marsh- increased freshwater would change salinity gradient
- Partial loss of oxidation ponds
- Water board permit is difficult to obtain



HAYWARD SHORELINE MASTER PLAN
January 9, 2020

WASTEWATER TREATMENT ADAPTATION

Option 4: Fully Tidal Discharge

GOAL / OBJECTIVE

Adapt critical infrastructure, enhance marsh migration space, provide stormwater storage space.

DESCRIPTION

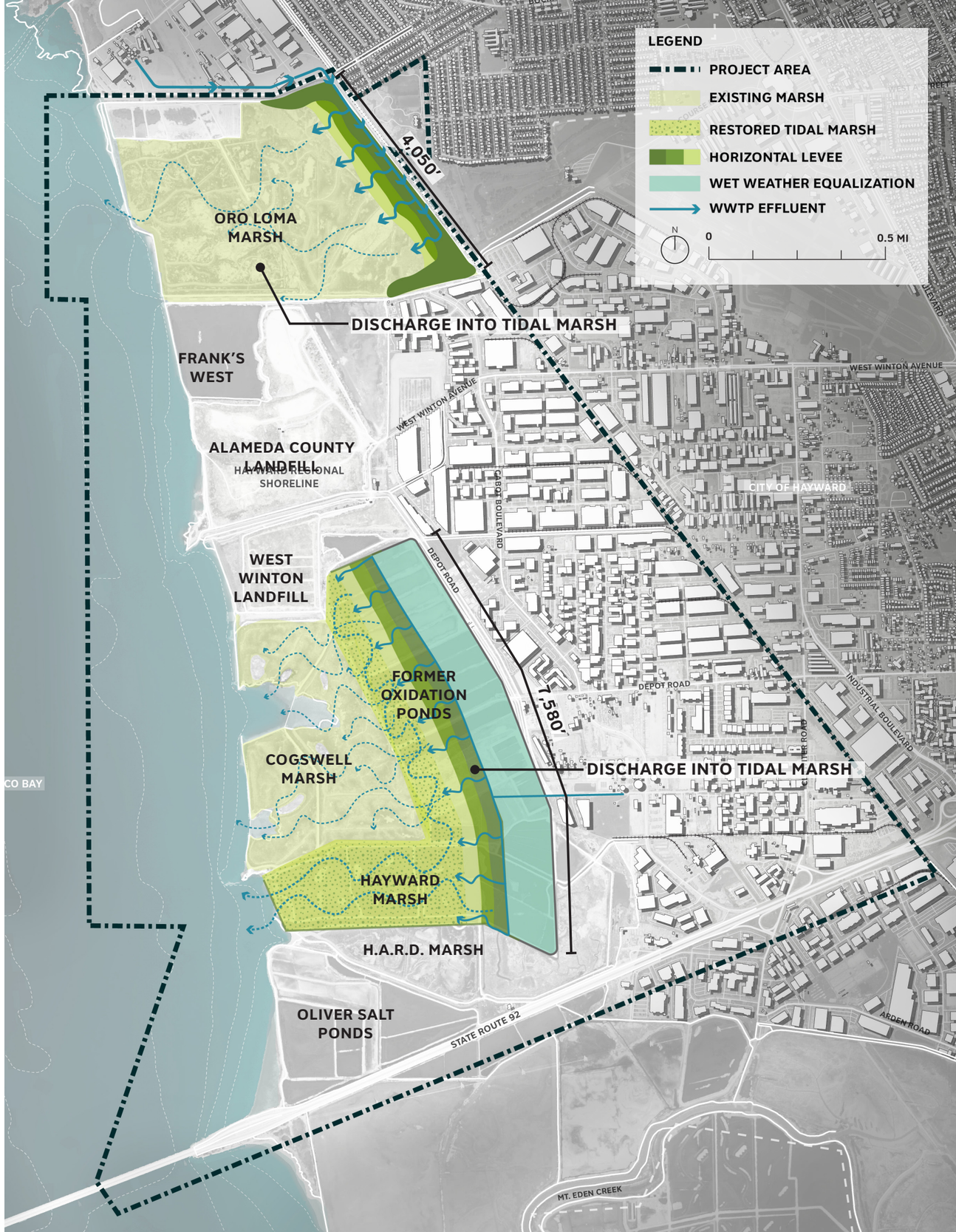
- Horizontal levee in the back of Oro Loma Marsh and through the middle of the Oxidation ponds
- Water storage improvements on the inland side of the Oxidation Ponds

PROS

- May be able to discharge from other WWTPs
- Fully tidal system, able to accrete and connect to Cogswell Marsh
- Pair with horizontal levee
- Restore salinity gradient to tidal marsh
- Local discharge with EBDA retirement

CONS

- Restrictions on discharge into fully tidal system- not permitted yet
- Nearshore discharge would be less likely than maintaining the EBDA pipeline
- May negatively impact existing marsh systems- increased freshwater would change salinity gradient and may lead to loss of habitat over time if the area is fully tidal
- Partial loss of oxidation ponds
- Water board permit is difficult to obtain
- Not a viable option for the City of Hayward

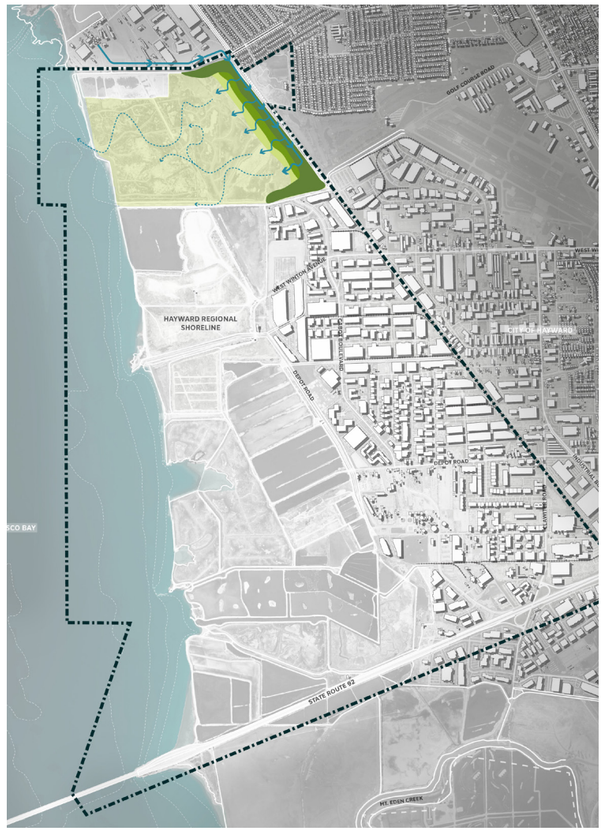


HAYWARD SHORELINE MASTER PLAN
January 9, 2020

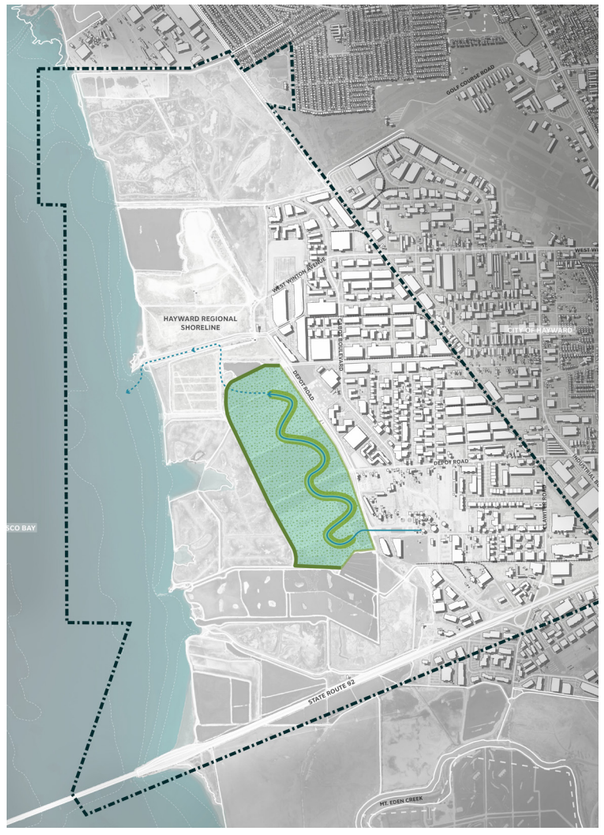
WASTEWATER TREATMENT ADAPTATION

Compiled Options

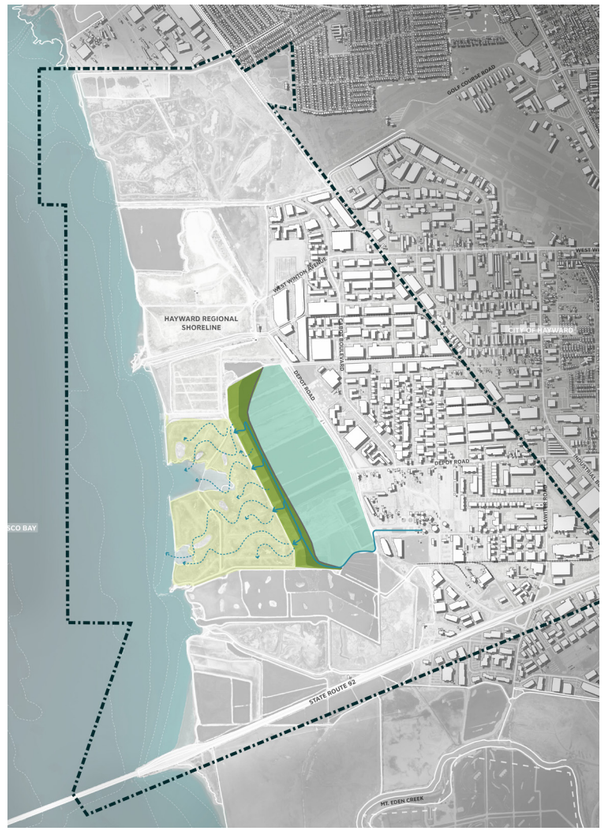
1: Oro Loma Local Discharge



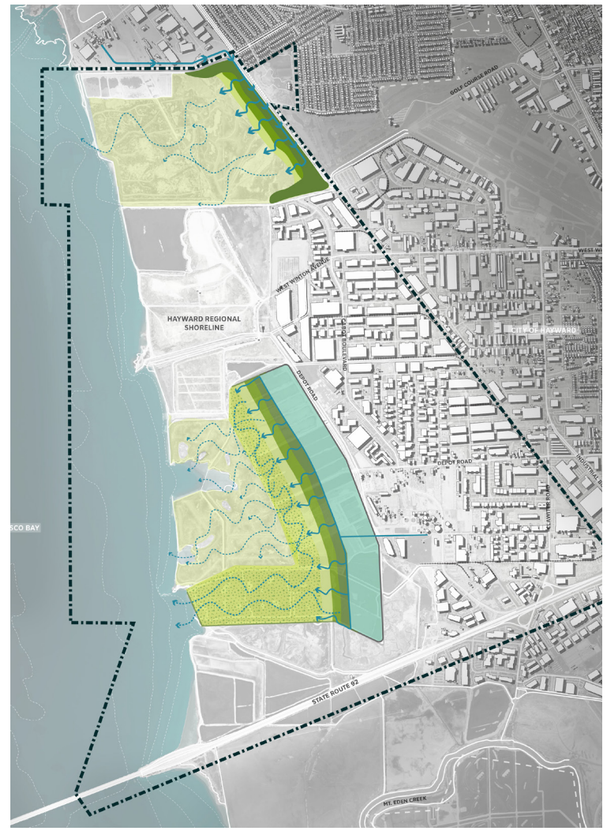
2: Hayward Treatment + Storage



3: Hayward Local Discharge



4: Fully Tidal Discharge

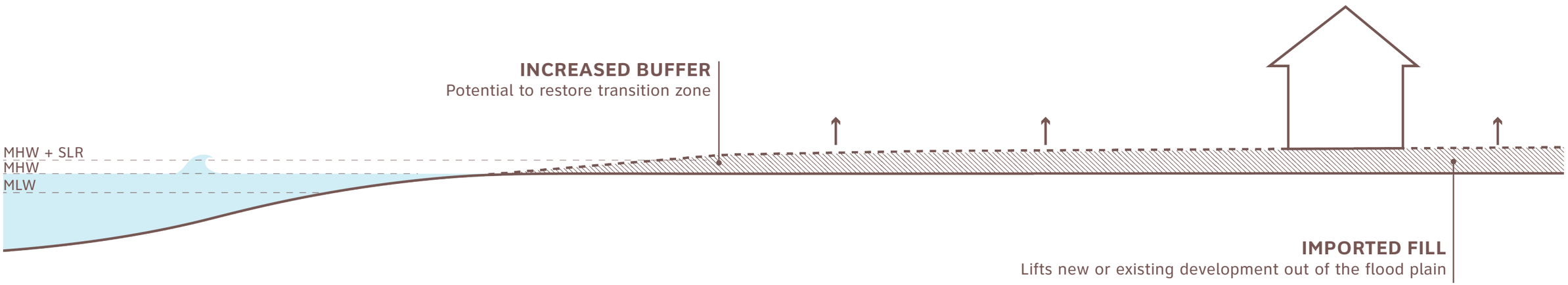


LAND ELEVATION

LAND ELEVATION
Definition

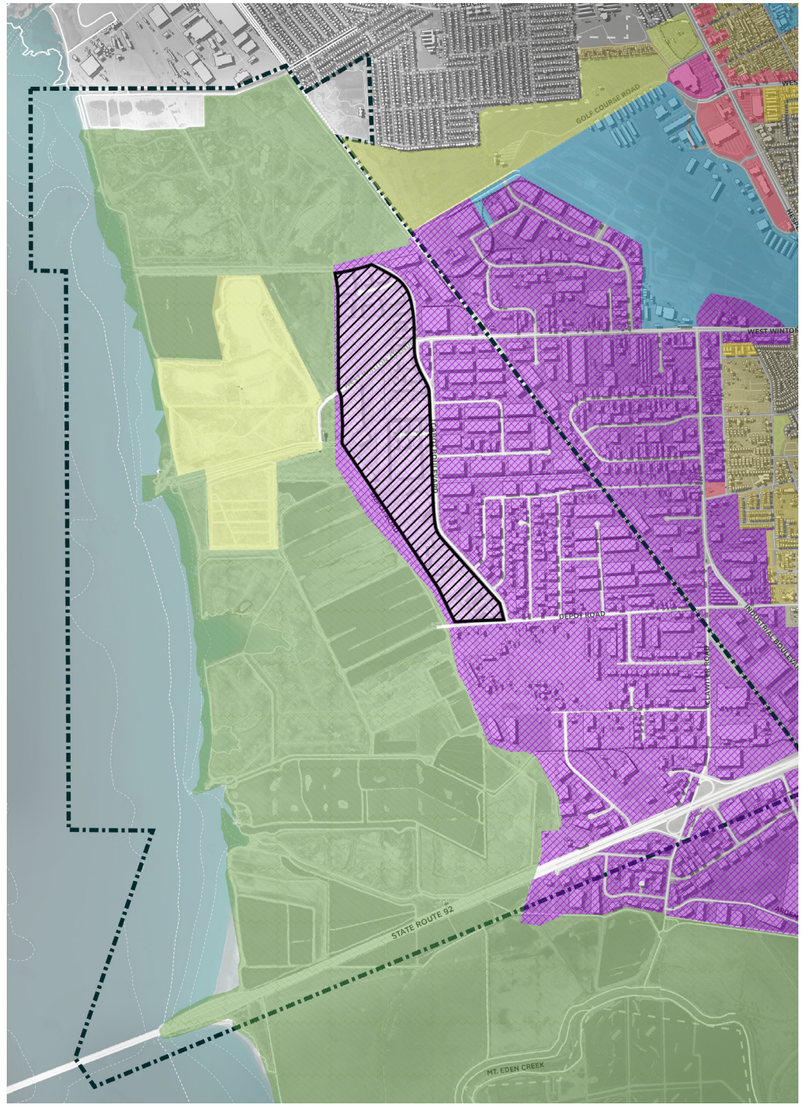
GOAL / OBJECTIVE

- Reduce risk to SLR, flood events, and groundwater emergence

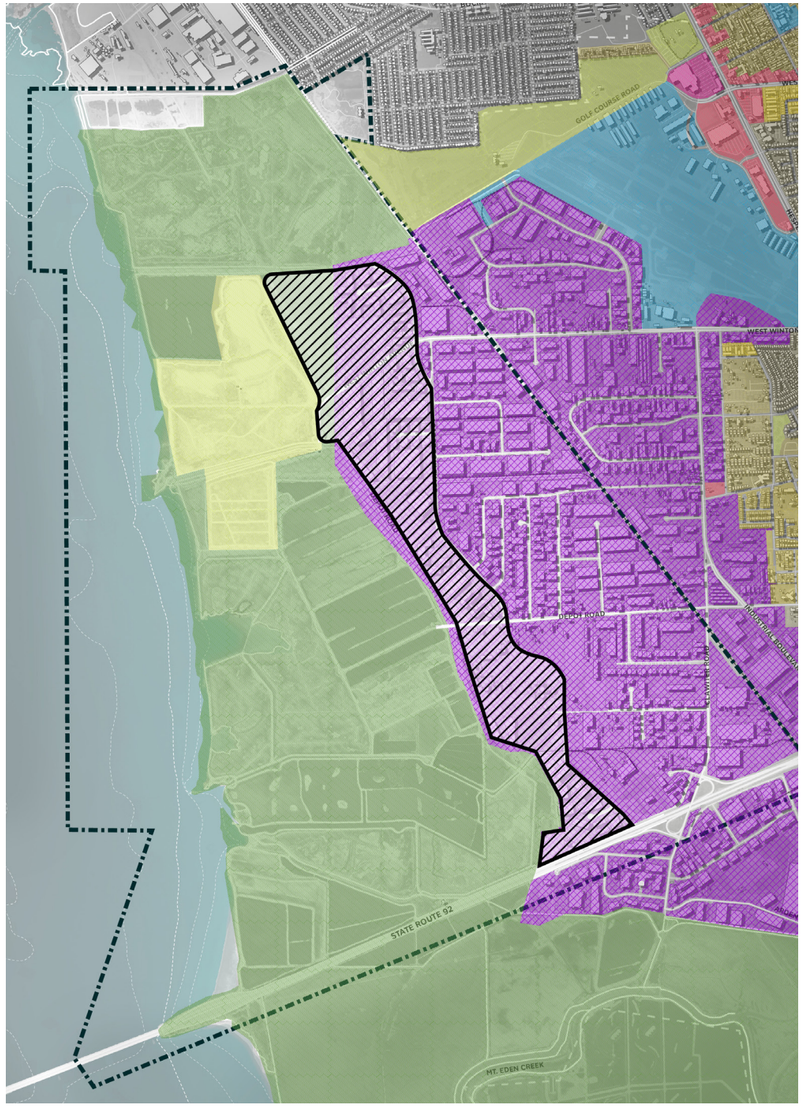


LAND ELEVATION
Compiled Options

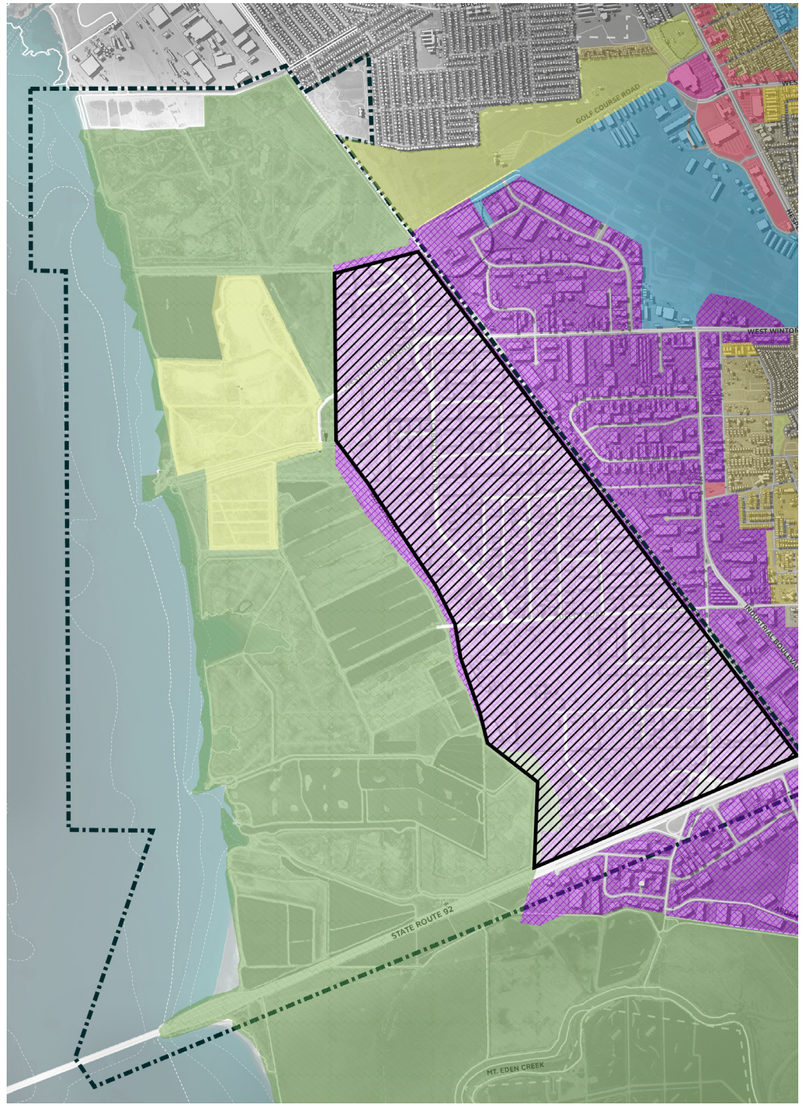
1: West of Cabot Boulevard



2: Bay Buffer



3: Industrial Neighborhood

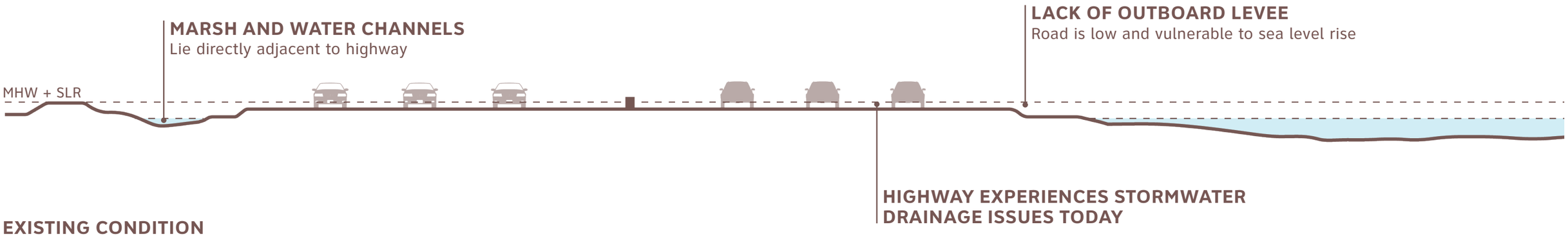


SAN MATEO BRIDGE LANDING

SAN MATEO BRIDGE LANDING
Definition

GOAL / OBJECTIVE

- Reduce risk to transportation infrastructure from SLR, groundwater intrusion, and flood events



EXISTING CONDITION

SAN MATEO BRIDGE LANDING

Option 1: Flood Walls

GOAL / OBJECTIVE

Reduce risk to critical transportation infrastructure with future SLR, storm surge, and groundwater emergence.

DESCRIPTION

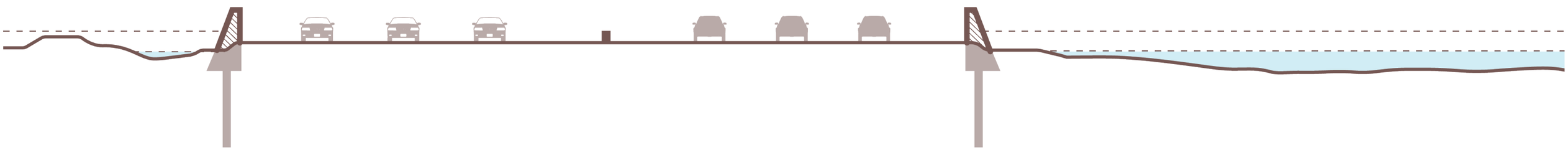
- Build two flood walls along the SR-92 bridge landing

PROS

- May not disrupt traffic flow during construction
- Does not need a new R.O.W. to the north or south of the existing R.O.W.
- Reduces risk of still water flooding and SLR inundation
- Flood walls occupy a relatively small footprint

CONS

- Would create a bathtub effect- need to drain and pump water off the bridge itself
- Maintenance costs
- May have issues with exits that would require temporary gates / barriers



SAN MATEO BRIDGE LANDING

Option 2: Flood Protection Levees

GOAL / OBJECTIVE

Reduce risk to critical transportation infrastructure with future SLR, storm surge, and groundwater emergence.

DESCRIPTION

- Build two levees on either side of the SR-92 bridge landing

PROS

- May not disrupt traffic flow during construction
- Reduces risk of still water flooding and SLR inundation
- Does not need a new R.O.W. to the north or south of the existing R.O.W.

CONS

- Levees would be vulnerable to erosion
- Would create a bathtub effect- need to drain and pump water off the bridge itself
- Maintenance costs

SAN MATEO BRIDGE LANDING

Option 3: Elevate Land

GOAL / OBJECTIVE

Reduce risk to critical transportation infrastructure with future SLR, storm surge, and groundwater emergence.

DESCRIPTION

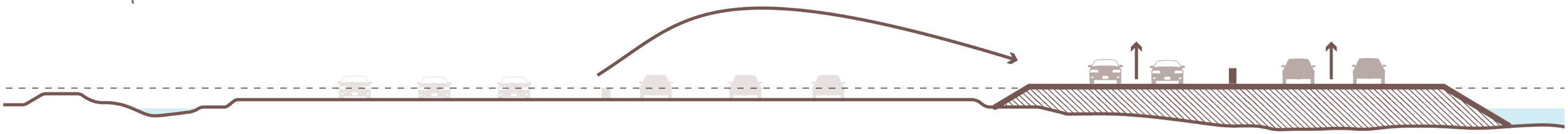
- Rebuild SR-92 on elevated land above the flood plain and SLR inundation zones

PROS

- Potential to lift the whole road out of flood and SLR inundation zones

CONS

- Would require a new R.O.W. to the south of the existing R.O.W.
- Levee edges would be vulnerable to erosion
- In order to avoid traffic disruption, would require fill in existing marsh, which is a permitting challenge
- May experience a significant amount of settlement and subsidence
- Would require modifications to road connections



SAN MATEO BRIDGE LANDING

Option 4: Raise on Piles

GOAL / OBJECTIVE

Reduce risk to critical transportation infrastructure with future SLR, storm surge, and groundwater emergence, and restore tidal connectivity between marshes.

DESCRIPTION

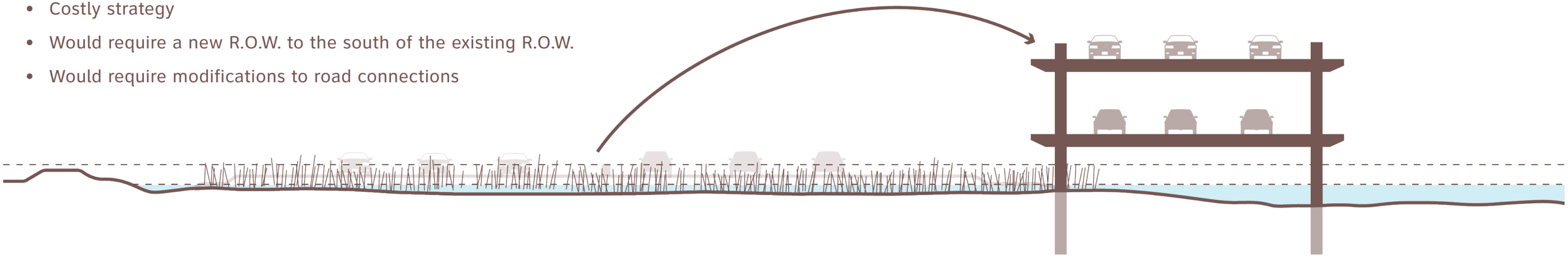
- Rebuild SR-92 on piles
- Restore tidal marsh in its current location

PROS

- Increase ecological connectivity of the marshes below
- Potential to raise out of the floodplain and all SLR inundation zones

CONS

- Costly strategy
- Would require a new R.O.W. to the south of the existing R.O.W.
- Would require modifications to road connections



SAN MATEO BRIDGE LANDING

Option 5: Floating Bridge

GOAL / OBJECTIVE

Reduce risk to critical transportation infrastructure with future SLR, storm surge, and groundwater emergence.

DESCRIPTION

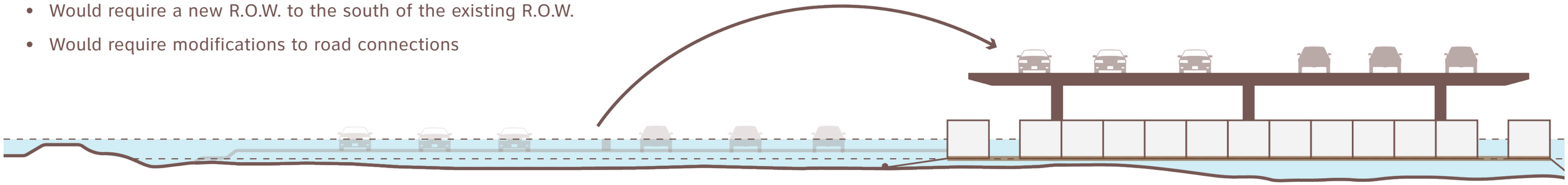
- Rebuild SR-92 as a floating bridge adjacent to the existing highway
- The existing approach may be retreated further inland if the existing approach is converted to floating

PROS

- Potential to lift the whole road out of flood and SLR inundation zones
- Adaptable to varying water levels

CONS

- Costly strategy
- Would require a new R.O.W. to the south of the existing R.O.W.
- Would require modifications to road connections

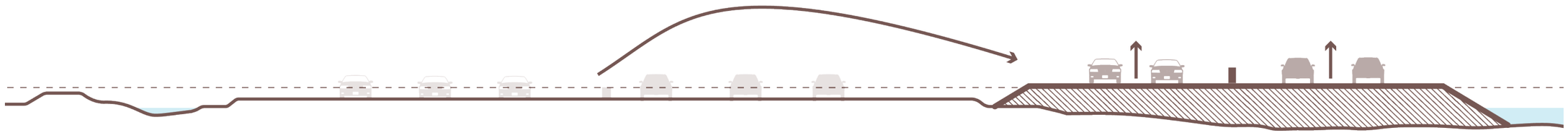


SAN MATEO BRIDGE LANDING

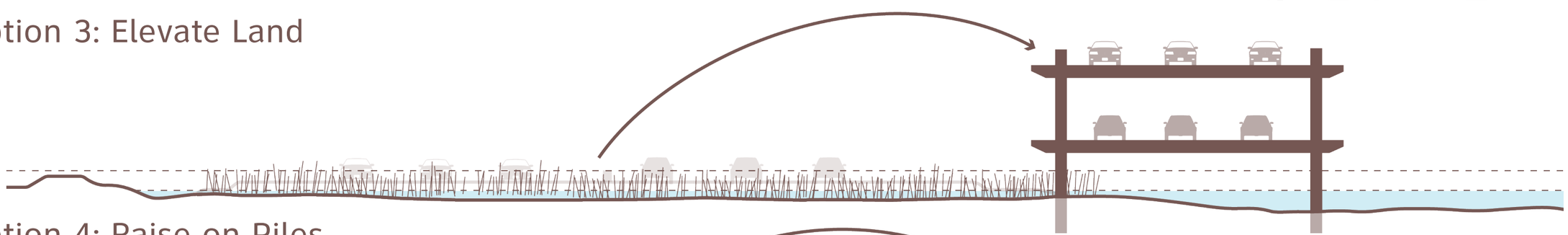
Compiled Options

Option 1: Flood Walls

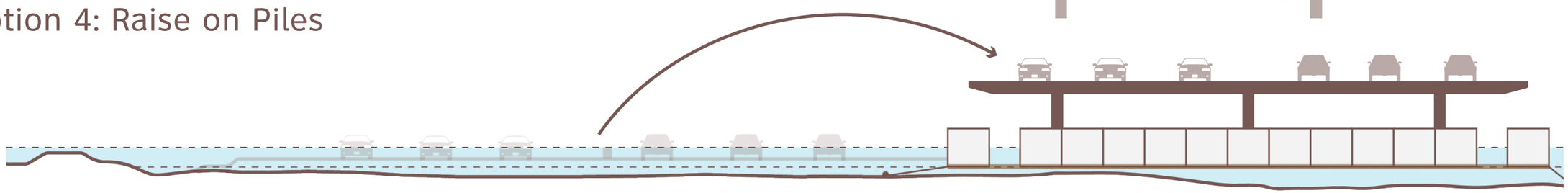
Option 2: Flood Protection Levees



Option 3: Elevate Land



Option 4: Raise on Piles



Option 5: Floating Bridge

NON-STRUCTURAL STRATEGIES

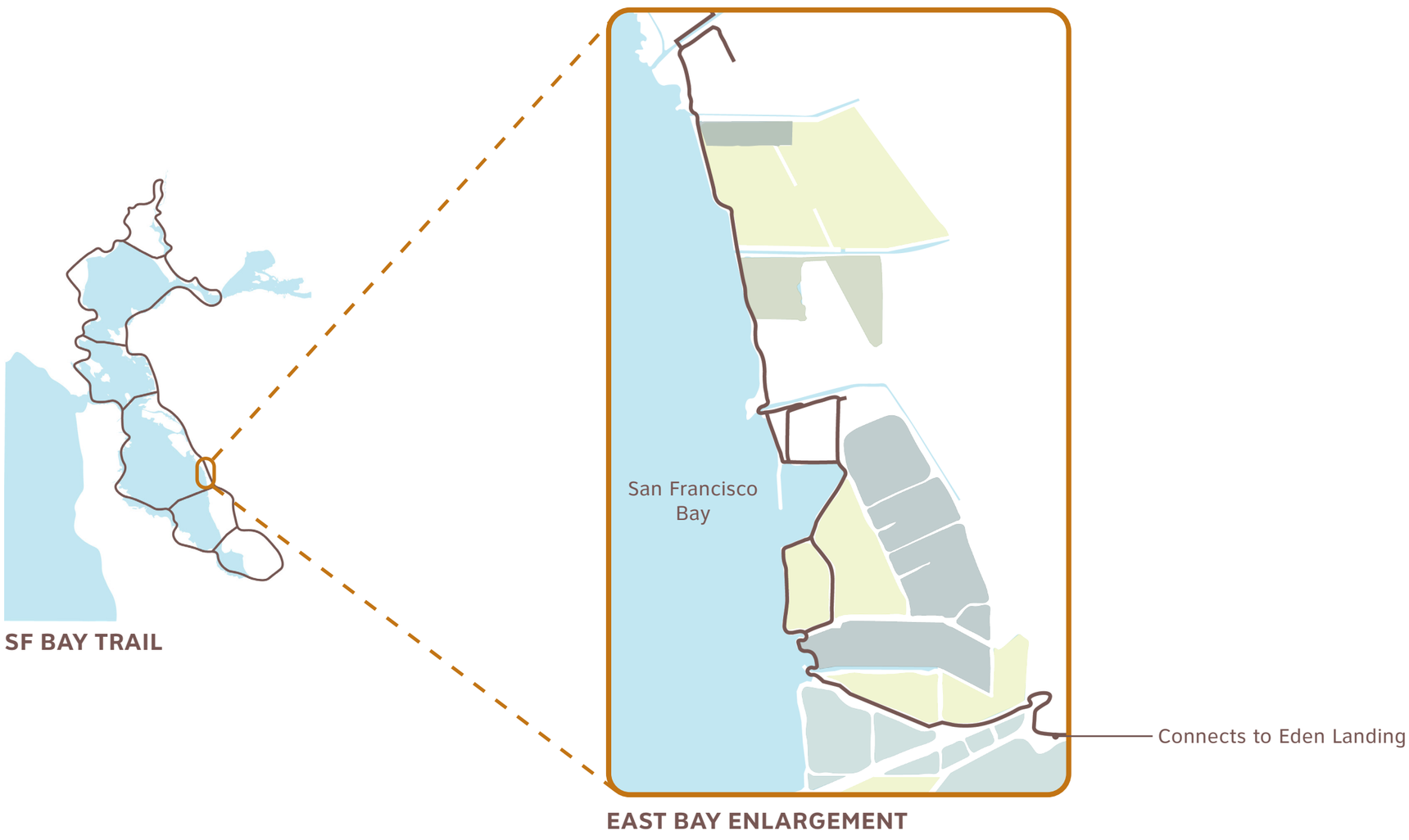
PUBLIC ACCESS & THE BAY TRAIL

PUBLIC ACCESS & THE BAY TRAIL

Definition

GOAL / OBJECTIVE

- Enhance recreational opportunities and adapt to SLR
- Create a management framework for adapting to SLR over time



SF BAY TRAIL

EAST BAY ENLARGEMENT

PUBLIC ACCESS & THE BAY TRAIL

Option 1: Maintain Current Alignment of the Bay Trail

GOAL / OBJECTIVE

Maintain recreational opportunities.

DESCRIPTION

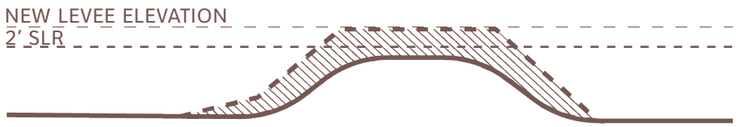
- Raise and repair all levees projected to overtop with 2’ SLR (accounting for 2’ freeboard)

PROS

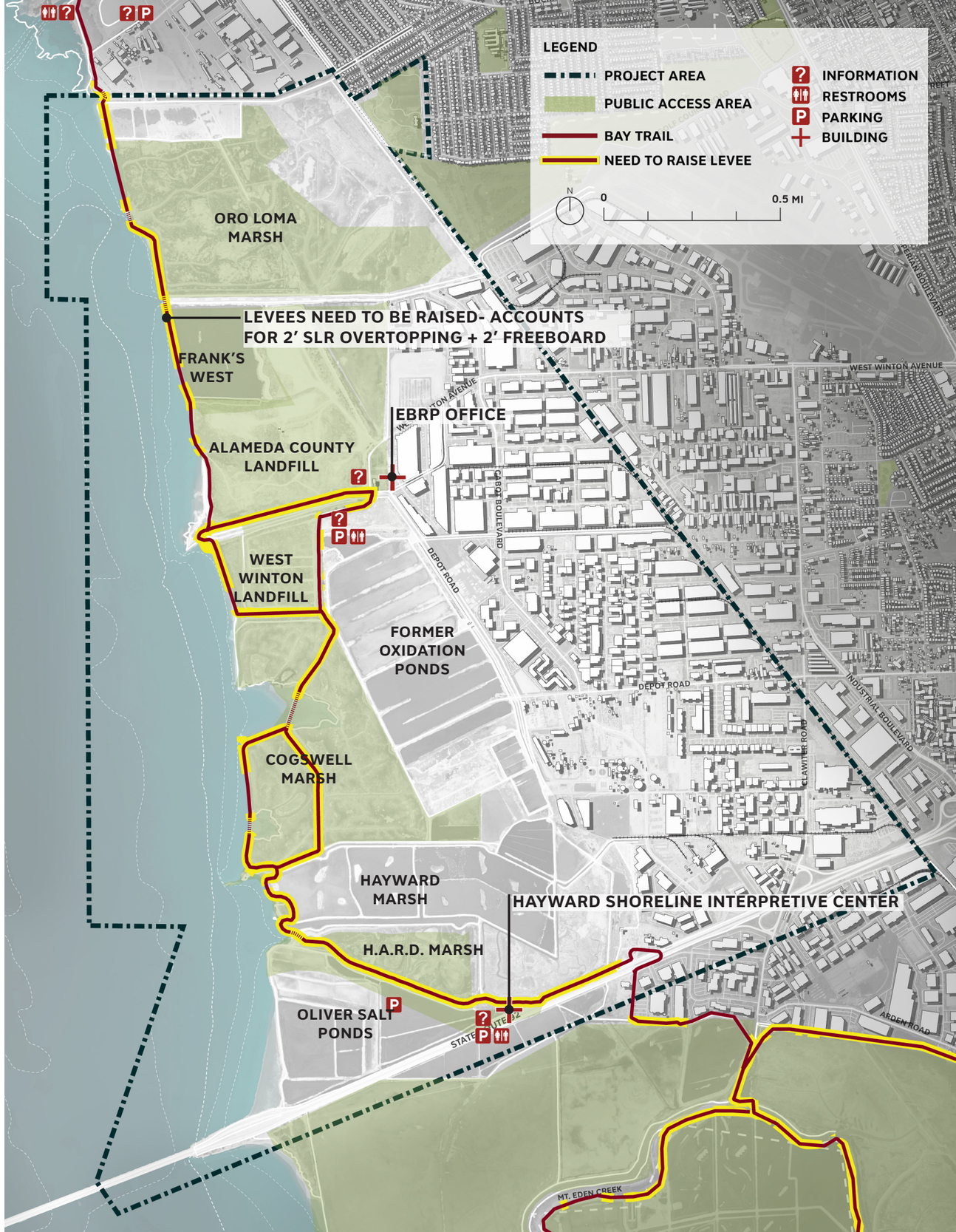
- Diverse bay experience adjacent to blue water
- Maintains current alignment which is existing and permitted
- Maintains existing habitats

CONS

- Short-term solution
- Bay trail remains in exposed position near bay edge
- May have to elevate, repair levees that are not associated with other restoration / flood protection projects
- Costly to elevate and repair levees



LEVEE RAISING
HAYWARD SHORELINE MASTER PLAN
January 9, 2020



PUBLIC ACCESS & THE BAY TRAIL

Option 2: Adapt the Bay Trail over Time

GOAL / OBJECTIVE

Develop a management framework to adapt recreational resources over time with SLR.

DESCRIPTION

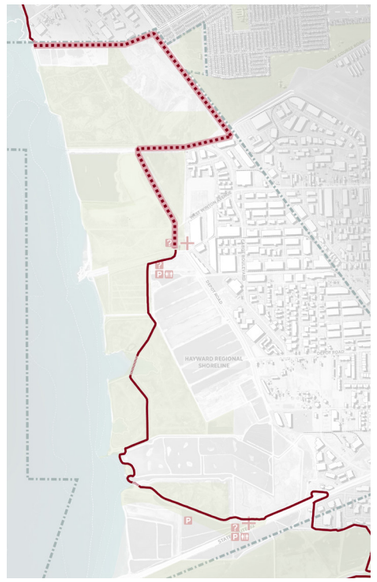
- Relocate the Bay Trail in 3 phases over time with SLR

PROS

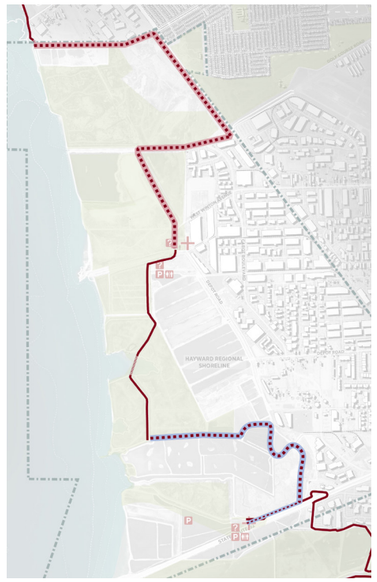
- Phased approach may be easier to implement and fund

CONS

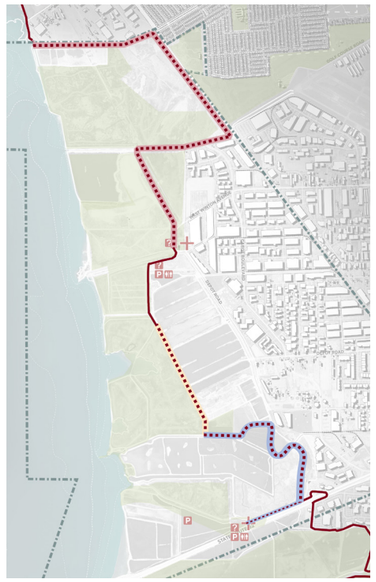
- Trail connections at the bay will be vulnerable with SLR
- Proximity to WWTP uses could pose an issue



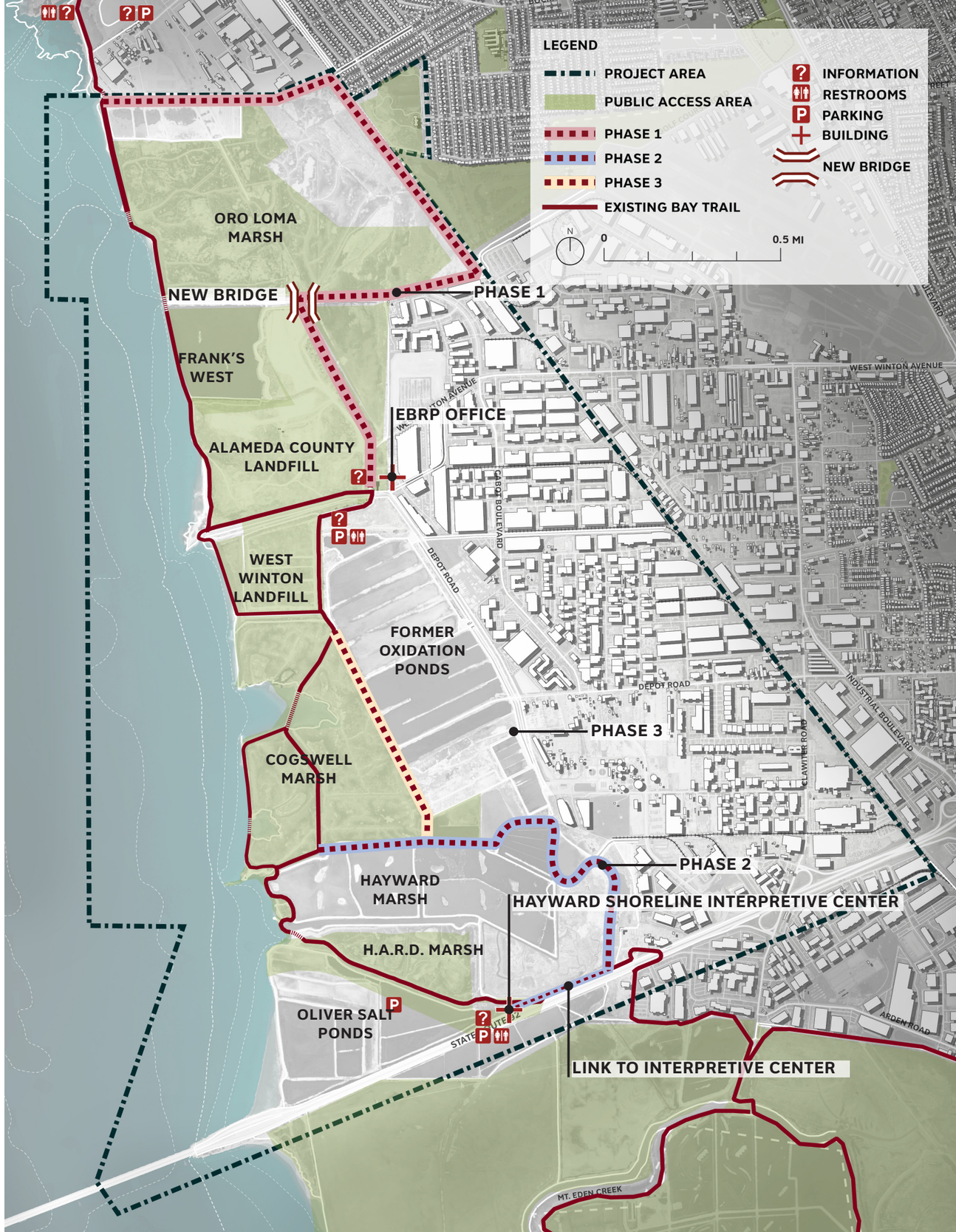
Phase 1



Phase 2



Phase 3



PUBLIC ACCESS & THE BAY TRAIL

Option 3: Realign with New Infrastructure Improvements

GOAL / OBJECTIVE

Create a management framework to adapt recreational resources with SLR.

DESCRIPTION

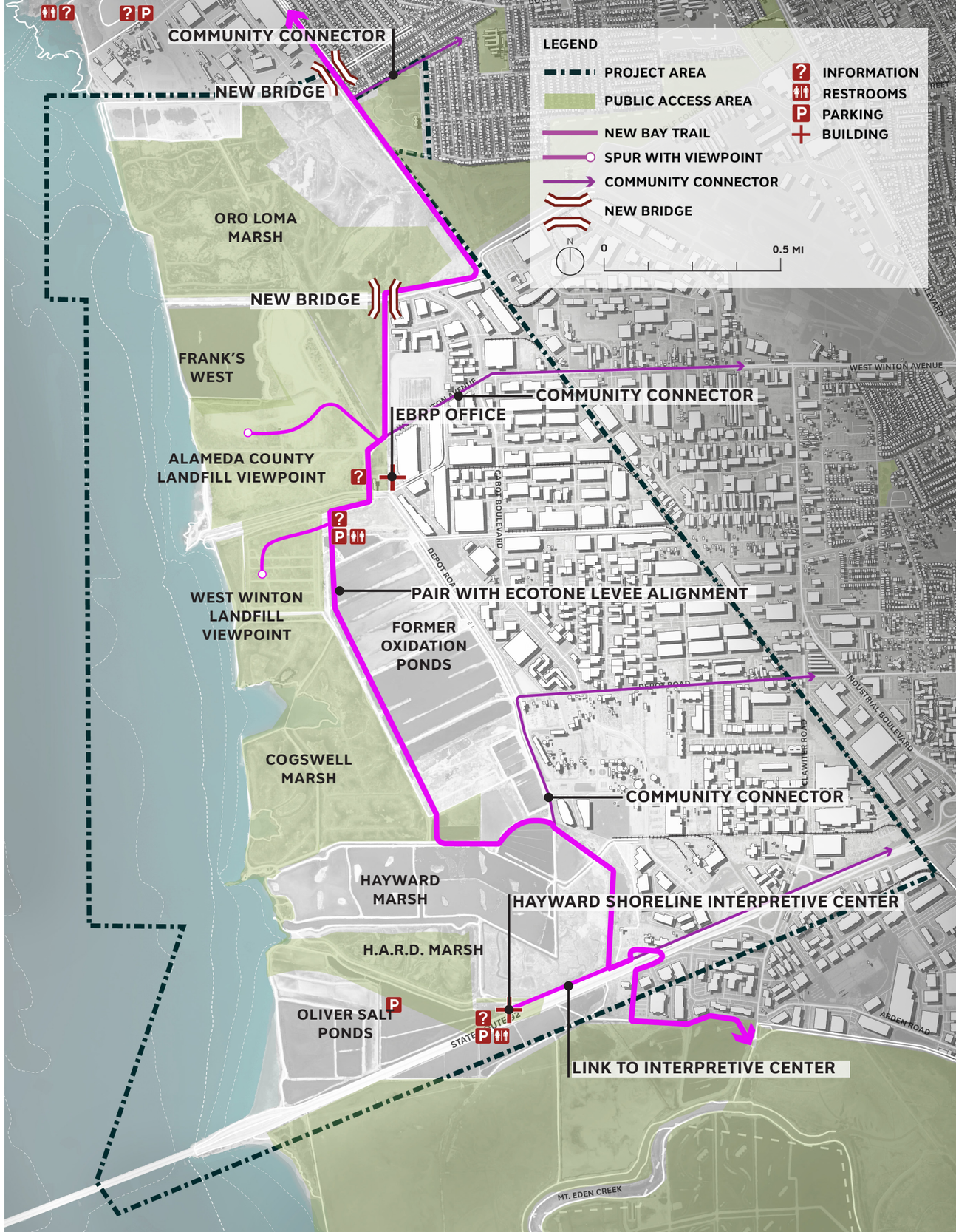
- Move the Bay Trail inland to higher ground with new infrastructure improvements

PROS

- Closer to adjacent community- enhance key connections inland
- Could be paired with horizontal levee / other infrastructure projects
- Landfill spurs provide unique views of the shoreline and bay
- Buffered from direct wave erosion from the bay
- Bypasses existing infrastructure (restrooms, parking, etc.)

CONS

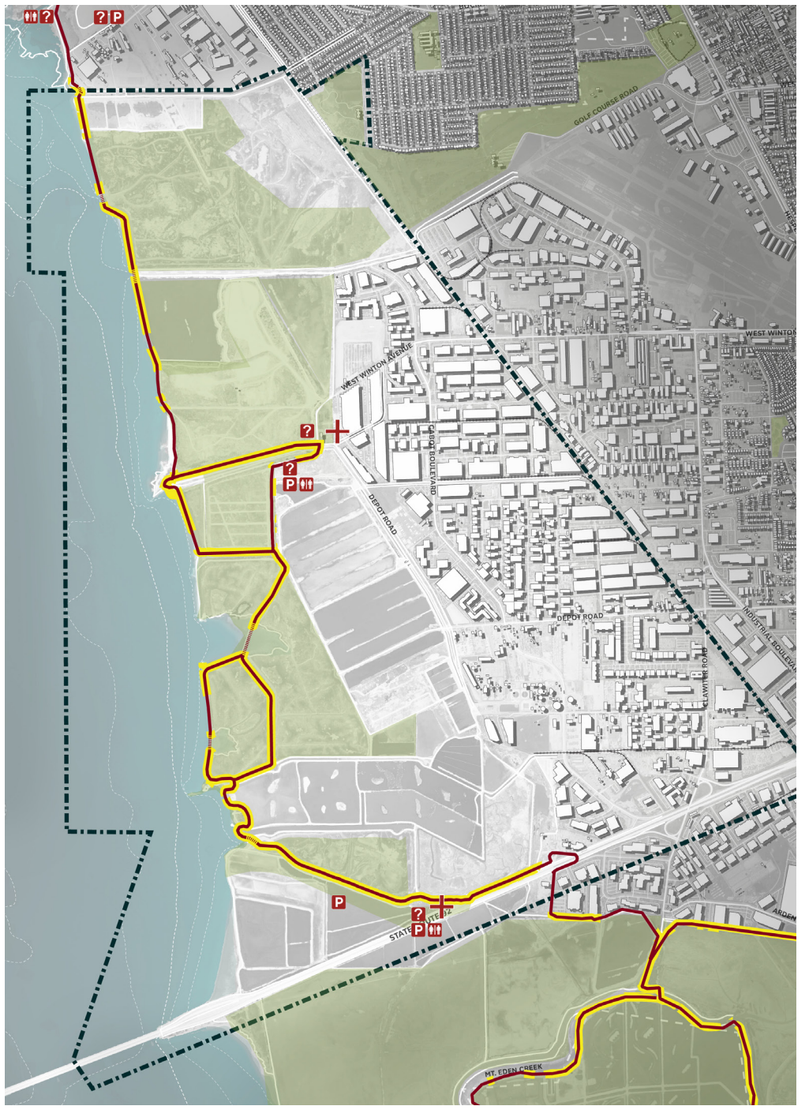
- Bay trail could be far from blue water experience if construction occurs before SLR inundates
- Proximity to WWTP or industrial uses could be an issue



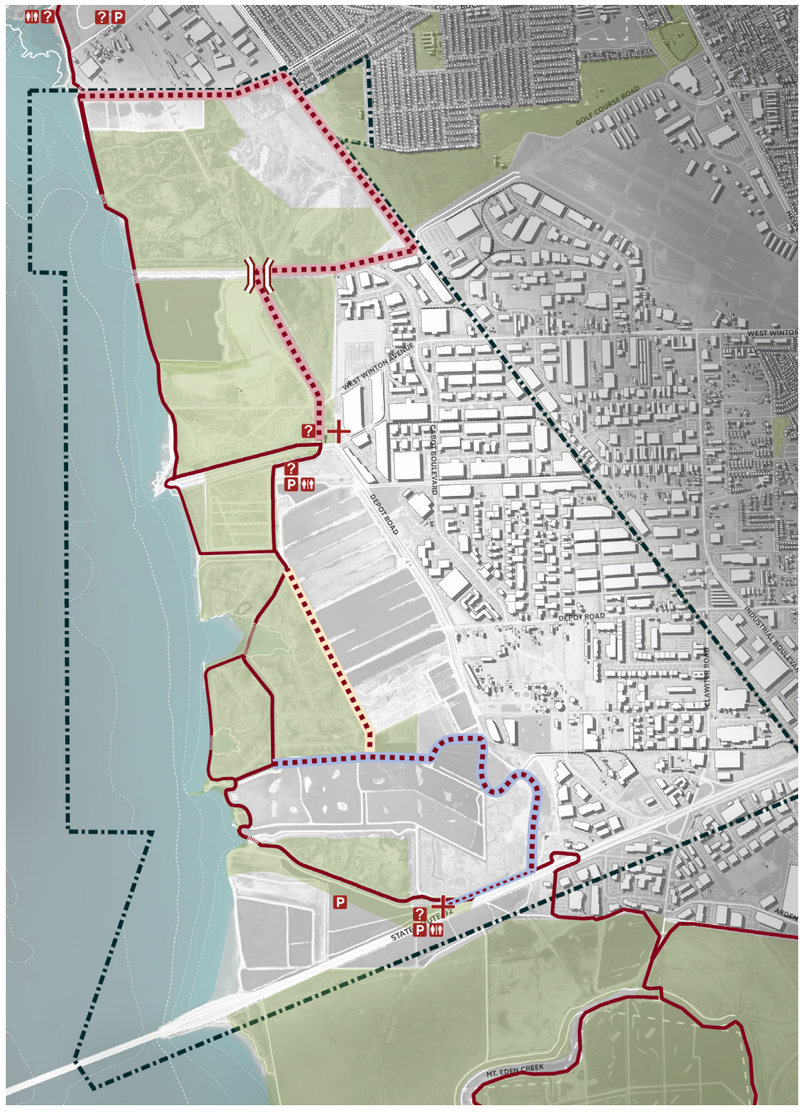
PUBLIC ACCESS & THE BAY TRAIL

Compiled Options

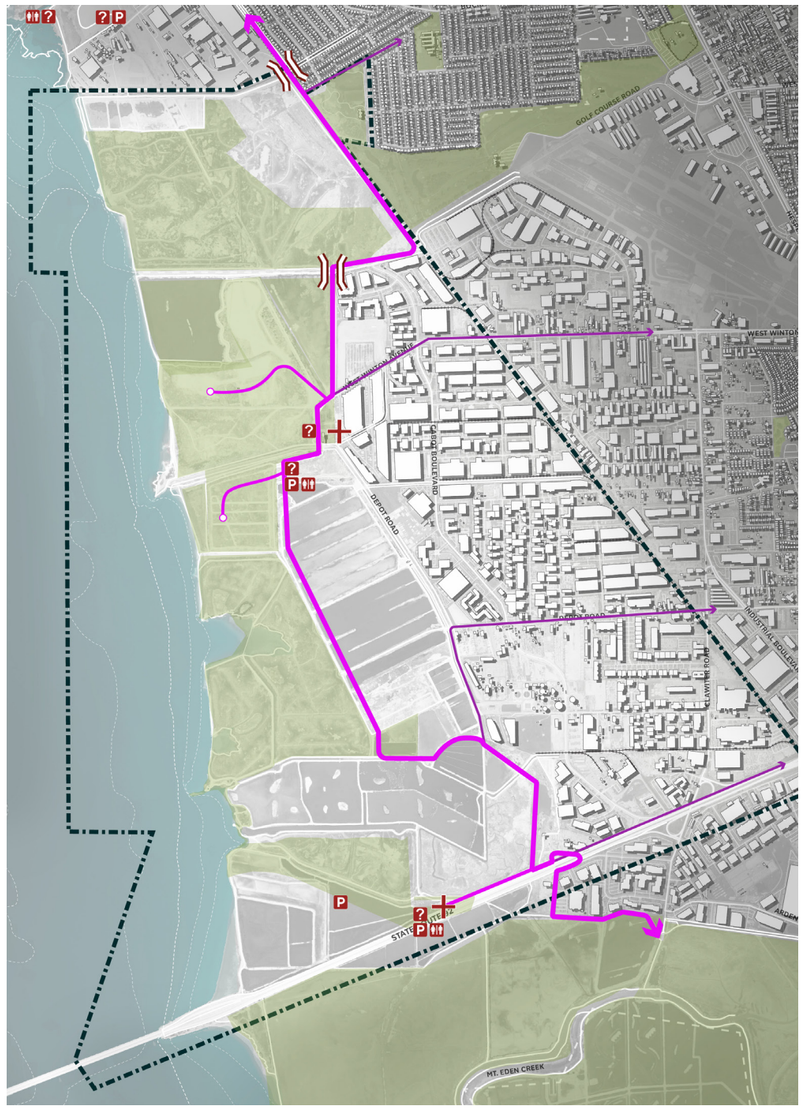
1: Maintain Current Alignment of the Bay Trail



2: Adapt the Bay Trail over Time



3: Realign with New Infrastructure Improvements



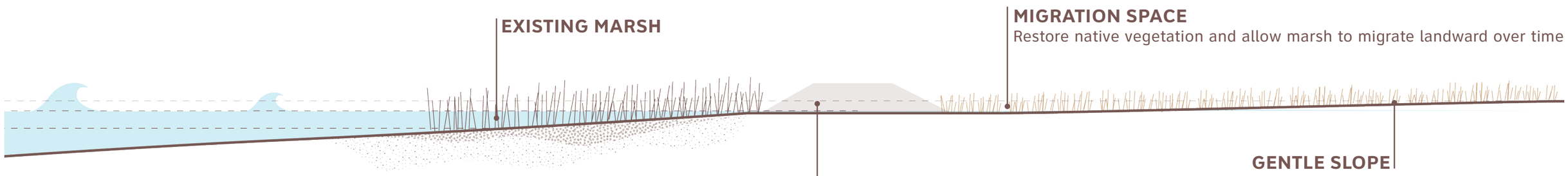
MARSH AND MUDFLAT MIGRATION PLANNING

MARSH AND MUDFLAT MIGRATION PLANNING

Definition

GOAL / OBJECTIVE

- Create a management framework for adapting to SLR over time



MARSH AND MUDFLAT MIGRATION PLANNING

Option 1: Oro Loma Marsh Migration

GOAL / OBJECTIVE

Maintain Oro Loma Marsh ecosystem with sea level rise.

DESCRIPTION

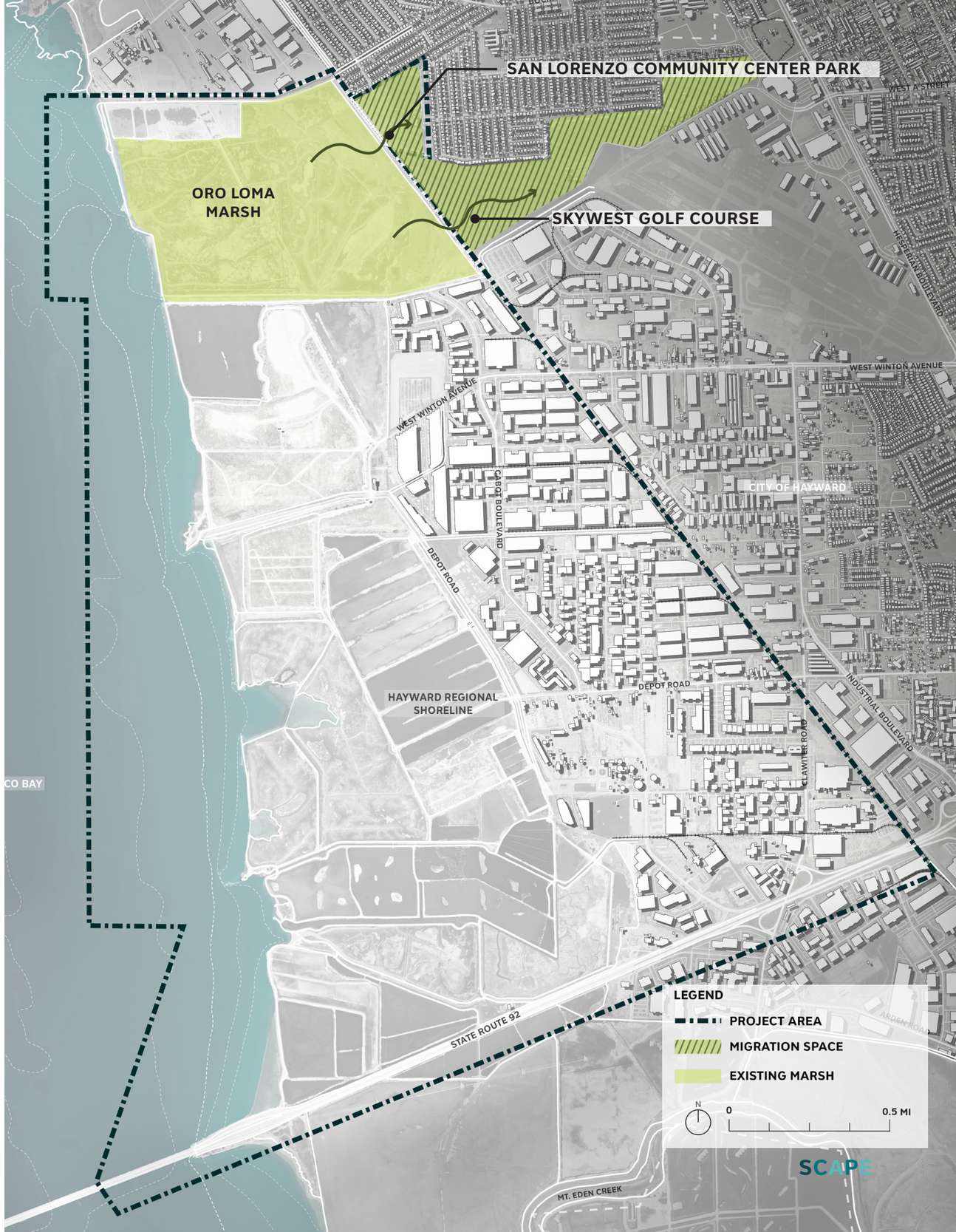
- Prep San Lorenzo Community Center Park, Skywest Golf Course as future migration space (upland grassland with shallow slope)

PROS

- Large space for migration
- Connect new recreation space to adjacent community

CONS

- Need to cross railroad through culverts, which is a tough right of way
- Need to cross existing utility corridor in Oro Loma Marsh
- Land could require significant prep to facilitate migration and disrupt the current uses



MARSH AND MUDFLAT MIGRATION PLANNING

Option 2: Larger Migration Potential

GOAL / OBJECTIVE

Maintain marsh ecosystems with sea level rise.

DESCRIPTION

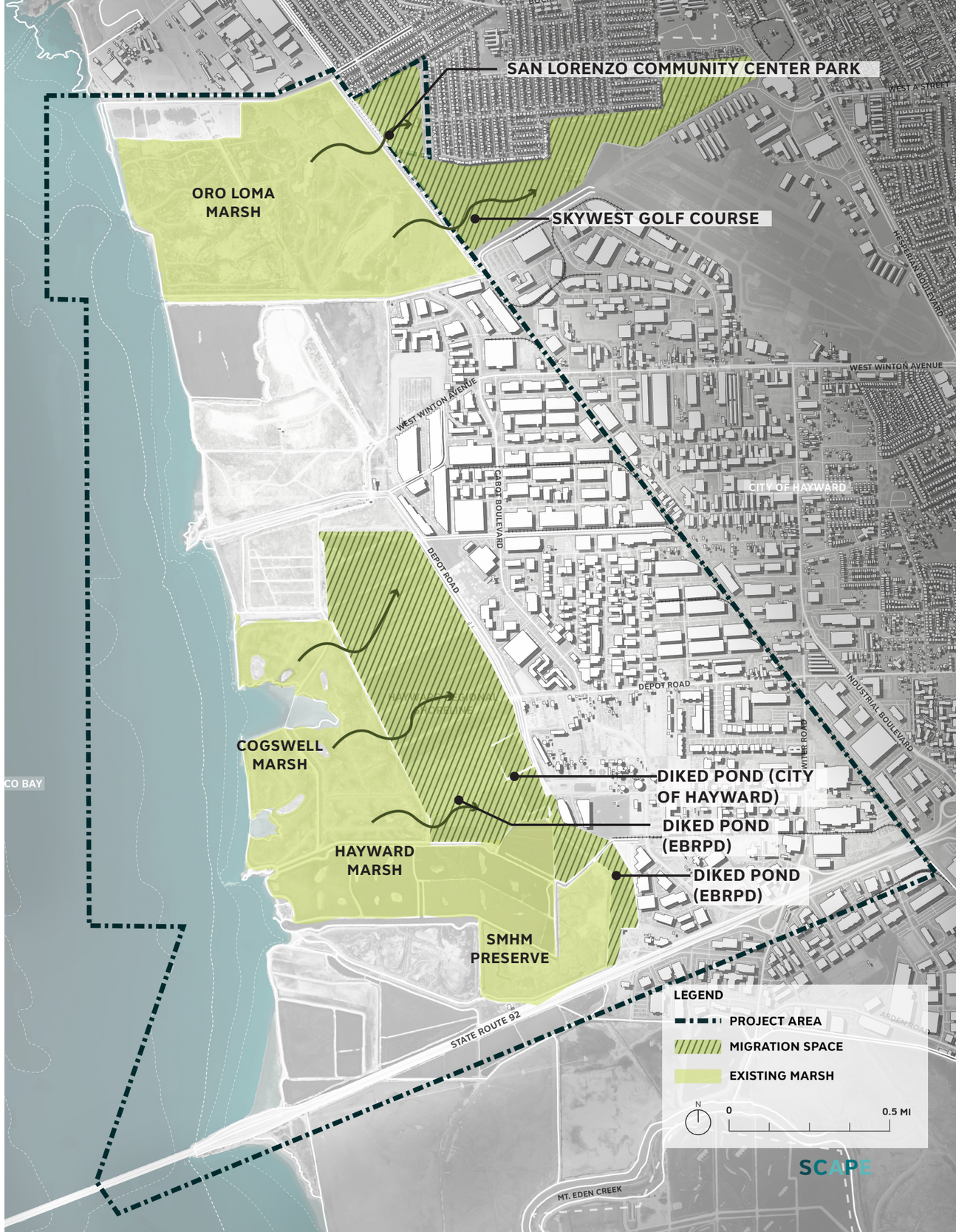
- Prep San Lorenzo Community Center Park, Skywest Golf Course, and the Oxidation Ponds as future migration space (upland grassland with shallow slope)

PROS

- Two large migration spaces

CONS

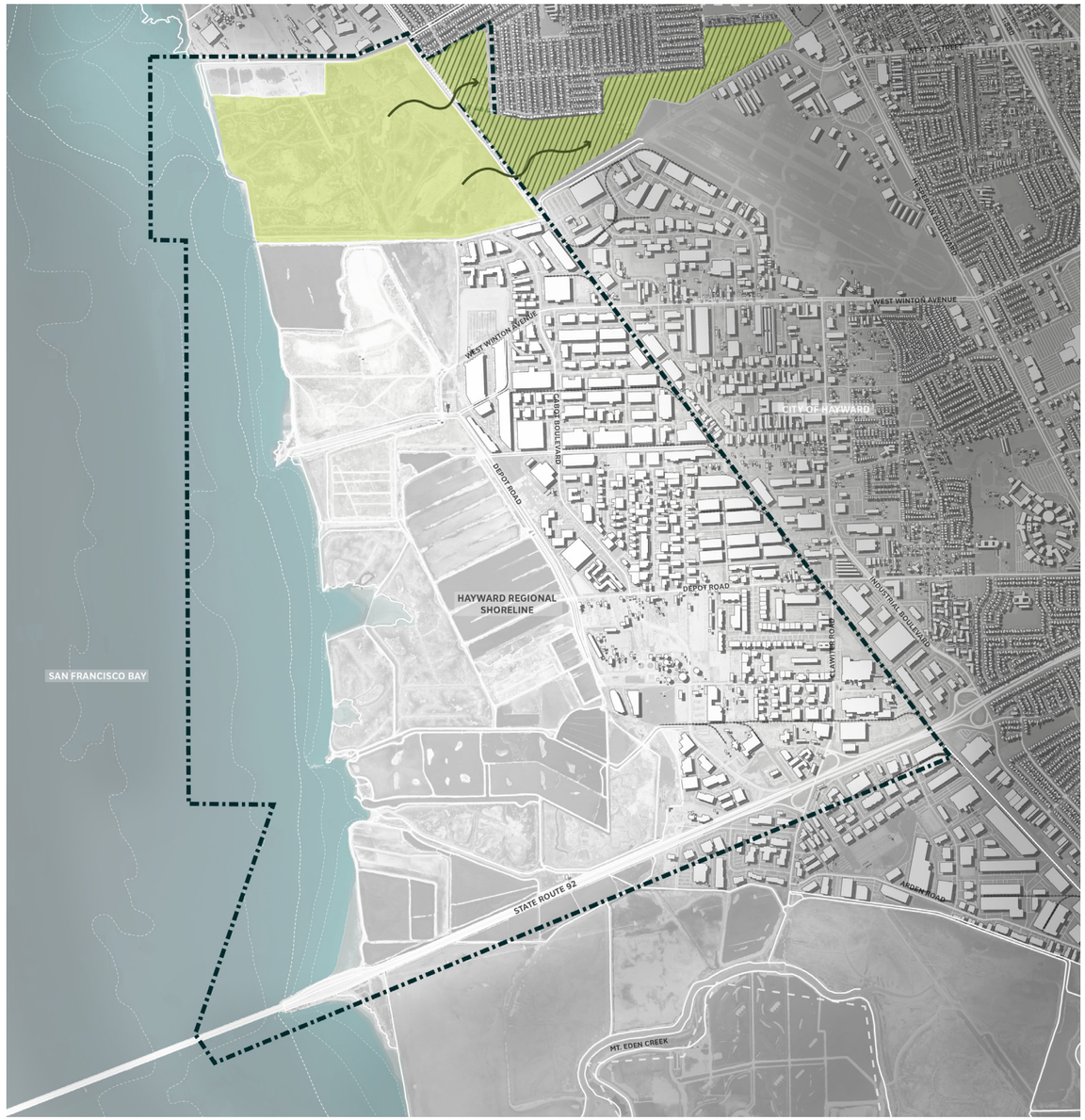
- Loss of stormwater detention capacity at oxidation ponds
- Need to cross existing utility corridor in Oro Loma Marsh
- Land could require significant prep to facilitate migration and disrupt the current uses



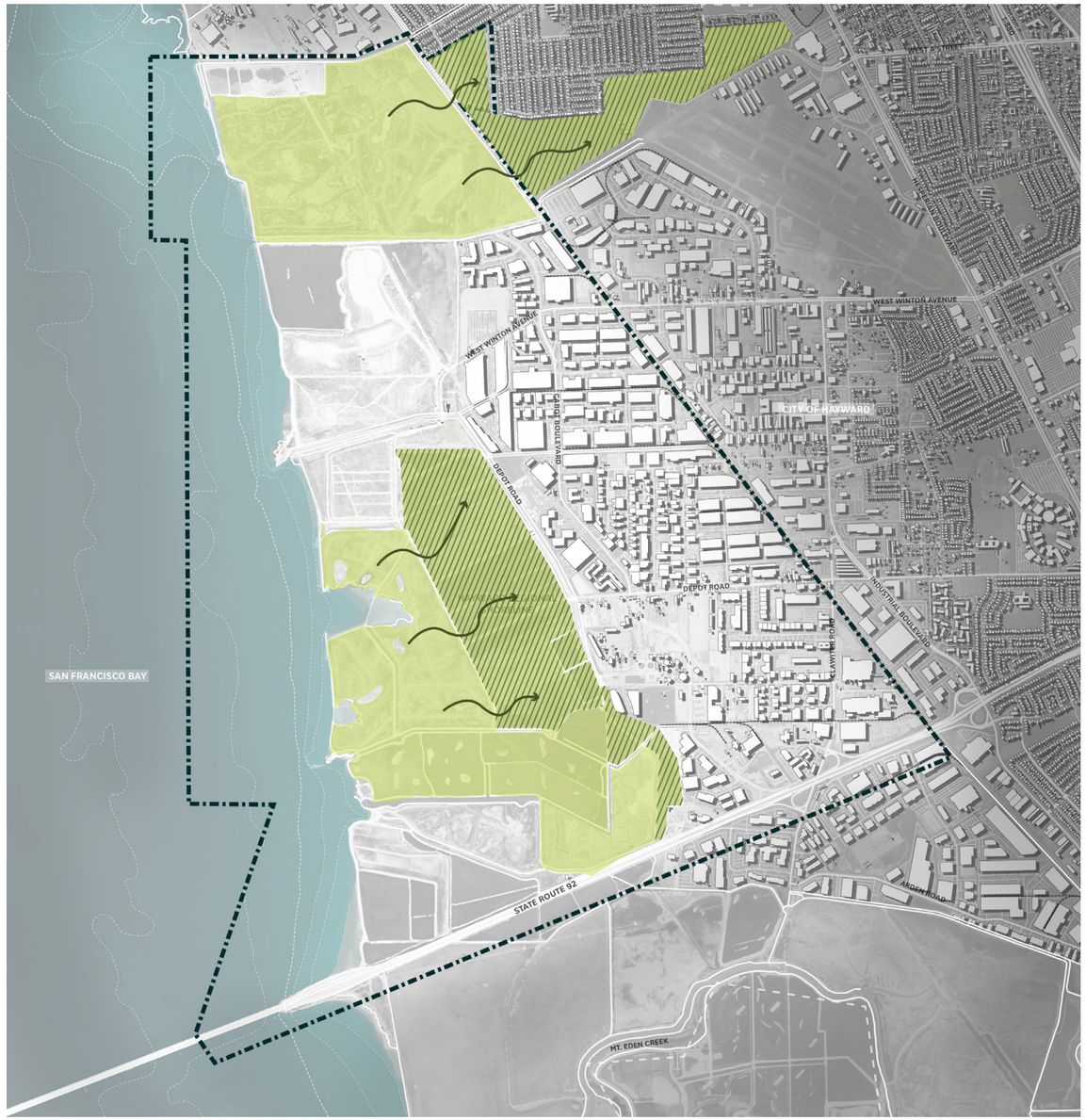
MARSH AND MUDFLAT MIGRATION PLANNING

Compiled Options

1: Oro Loma Marsh Migration



2: Larger Migration Potential

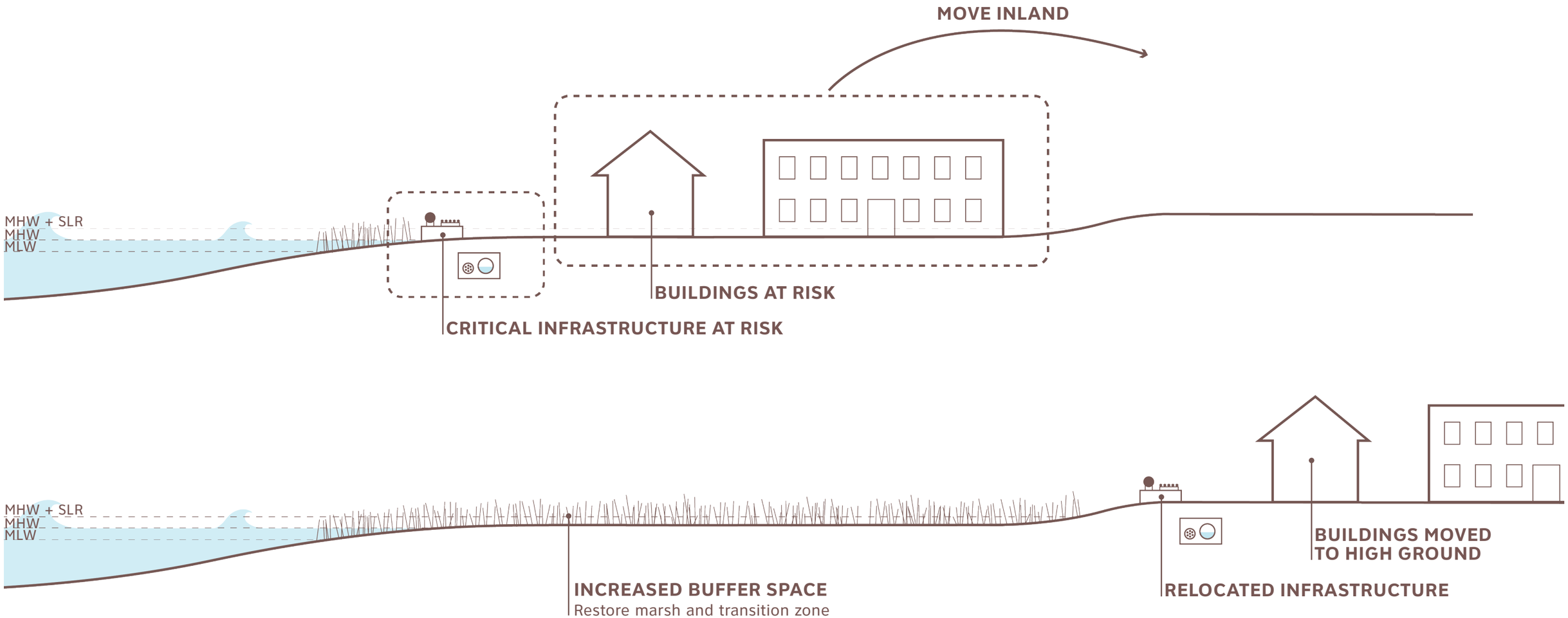


MANAGED RETREAT

MANAGED RETREAT
Definition

GOAL / OBJECTIVE

- Create a management framework for adapting to SLR over time



MANAGED RETREAT

Option 1: Relocation of Key Assets

GOAL / OBJECTIVE

Relocate key assets out of future tidal inundation zones.

DESCRIPTION

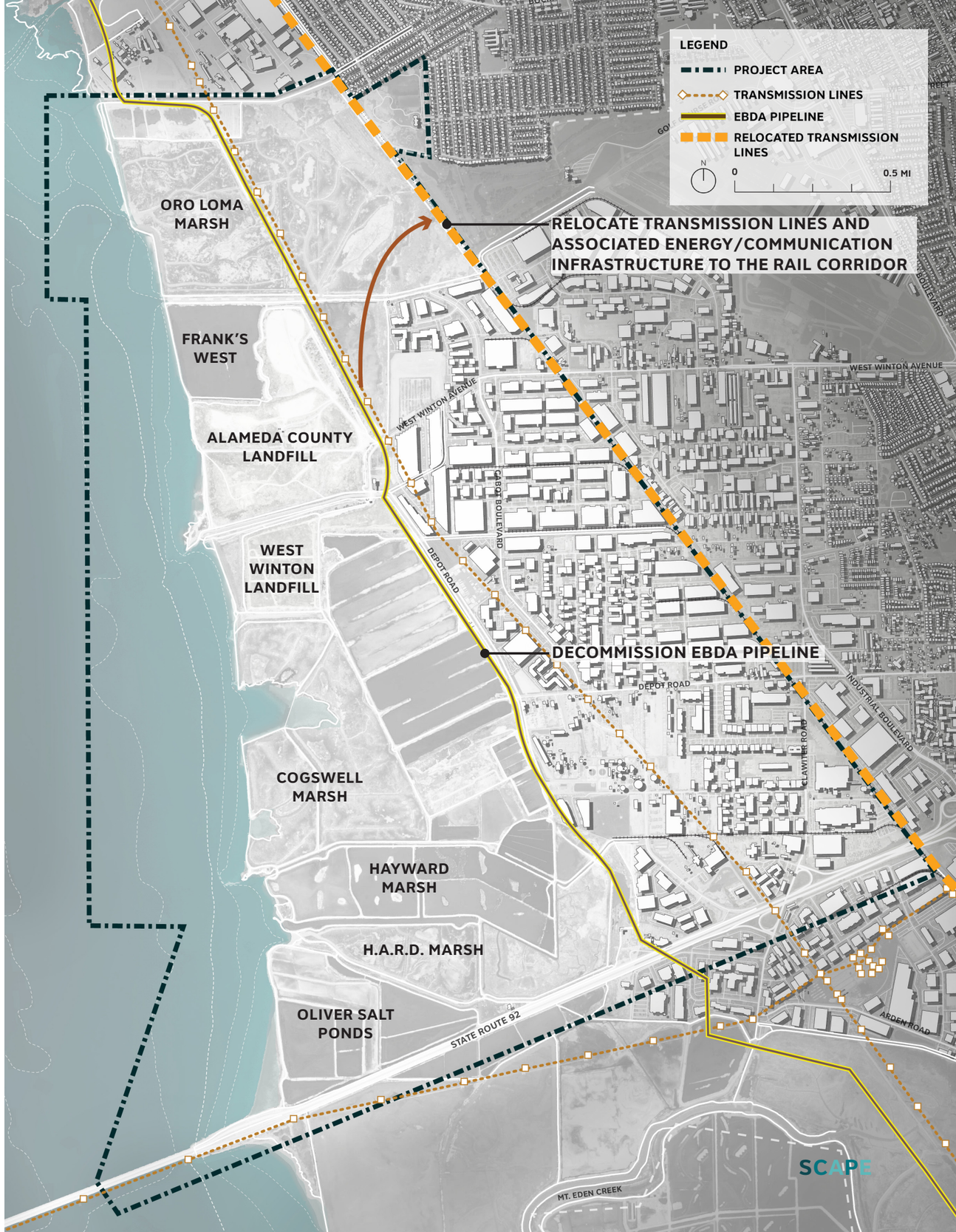
- Decommission EBDA pipeline and retrofit WWTP's for local discharge
- Relocate transmission lines and associated energy/ communication infrastructure to the rail corridor

PROS

- Reduce risk of damage from future SLR and flooding

CONS

- Requires multiple-agency coordination and long-term planning
- Short-term solution



MANAGED RETREAT

Option 2: Relocation of All Critical Infrastructure

GOAL / OBJECTIVE

Relocation of critical infrastructure assets out of the tidal inundation zone.

DESCRIPTION

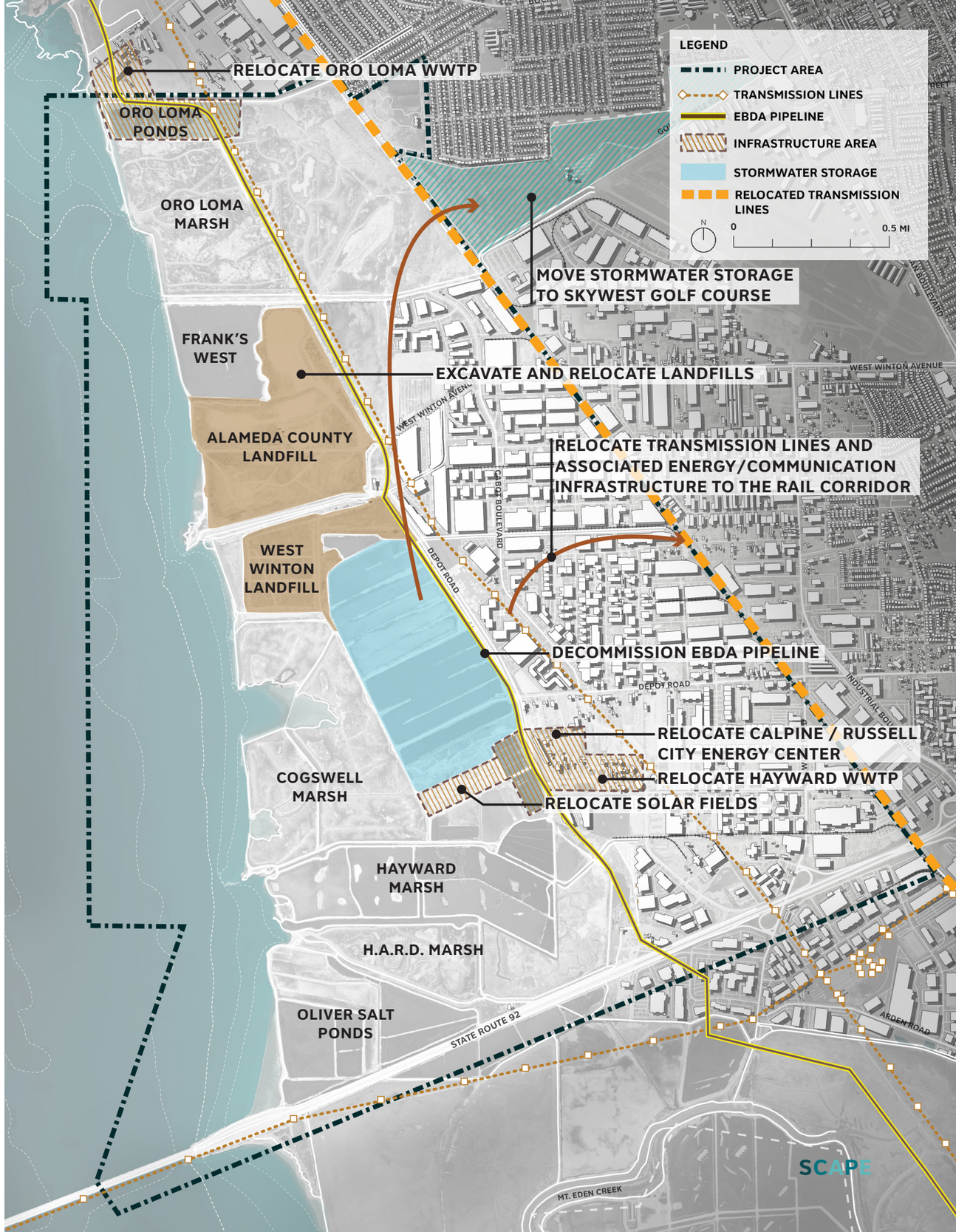
- Excavate landfills and remove materials
- Relocate Oro Loma and Hayward WWTP's upland
- Relocate CalPine / Russell city energy center upland
- Decommission EBDA pipeline and retrofit WWTP's for local discharge
- Relocate transmission lines to the rail corridor

PROS

- Reduce risk of damage from future SLR and flooding
- Maintain access to coastal areas while enhancing protection
- Enhance ecosystem function with natural infrastructure by returning land to natural habitat

CONS

- Very costly
- In order to substantially reduce vulnerability, would require raising land at rail corridor to lift out of SLR inundation and storm surge zones
- Lack of available land to move these assets, which may require eminent domain
- Requires multiple-agency coordination and long-term planning
- "Takings" Law



HAYWARD SHORELINE MASTER PLAN
January 9, 2020

MANAGED RETREAT

Option 3: Managed Retreat of Vulnerable Neighborhoods/ Industrial Areas

GOAL / OBJECTIVE

Relocate vulnerable neighborhoods out of the tidal inundation zone.

DESCRIPTION

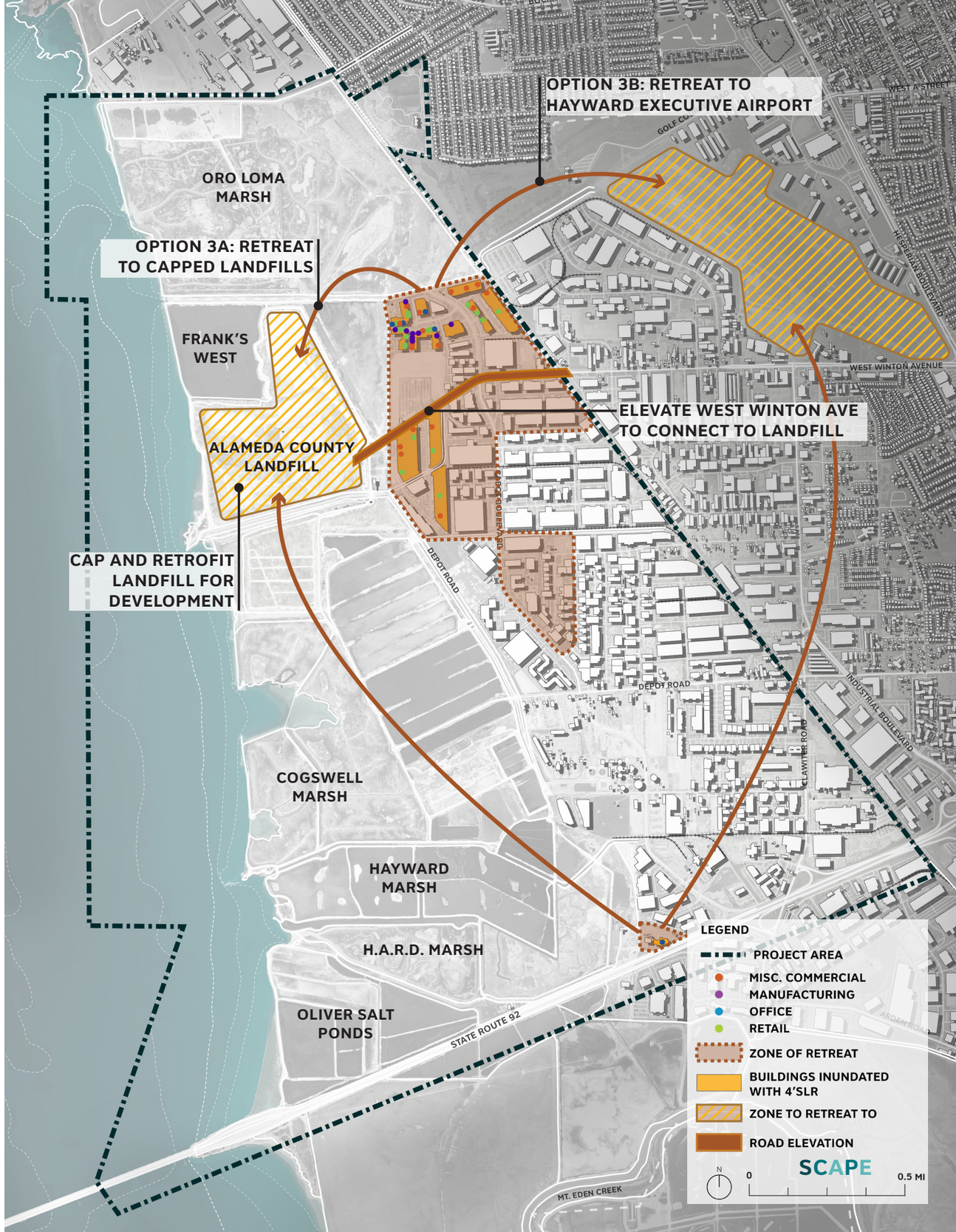
- Retreat businesses impacted by 4’ of SLR or groundwater emergence to
- 3a: Retreat to the landfills
- 3b: Retreat to Hayward Executive Airport

PROS

- Reduce risk of damage from future SLR and flooding
- Reduce cost associated with recovery if not relocated
- Maintain access to coastal areas while enhancing protection
- Enhance ecosystem function with natural infrastructure by returning land to natural habitat

CONS

- Requires available land to move neighborhoods and industrial areas to
- Industrial land use encroaching on other land use further inland
- Potential remediation concerns
- Very costly
- No precedent for buyout program of industrial area
- Counter to City’s goals for economic development
- Requires property-owner buy-in
- Reduces tax base



MANAGED RETREAT

Option 4: Discourage rebuilding in vulnerable locations while increasing growth in other areas

GOAL / OBJECTIVE

Discourage rebuilding in vulnerable locations while increasing growth in other areas.

DESCRIPTION

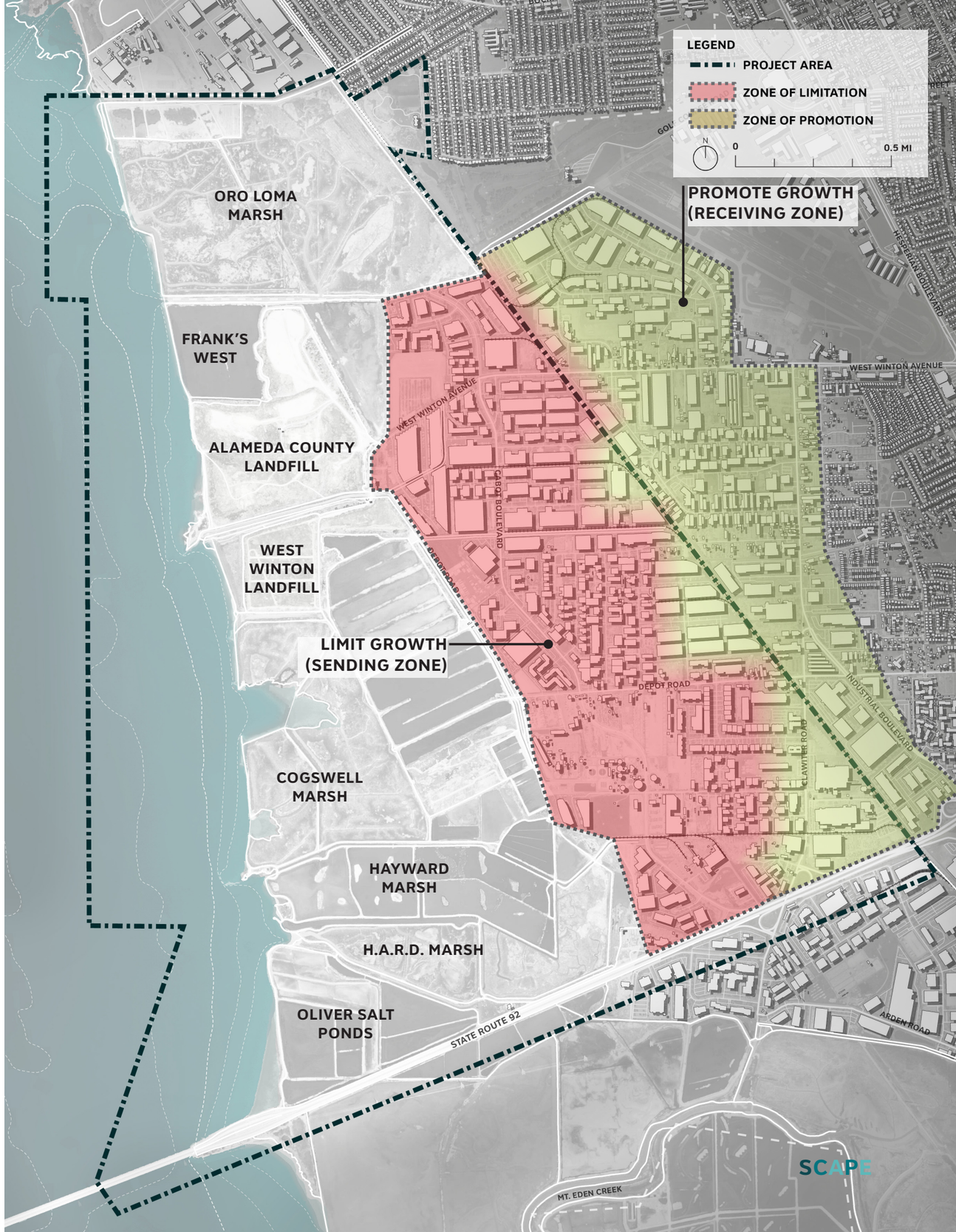
- Enact policies to limit investments and development potential of high-risk areas and encourage growth and investment in less risky areas

PROS

- Reduce risk of damage from future SLR and flooding
- Maintain access to coastal areas while enhancing protection
- Enhance ecosystem function with natural infrastructure by returning land to natural habitat
- Can be implemented through zoning changes, or creating a transfer of development rights (TDR) program
- Can complement economic development strategy of increasing intensity of industrial uses towards tech/innovation sector

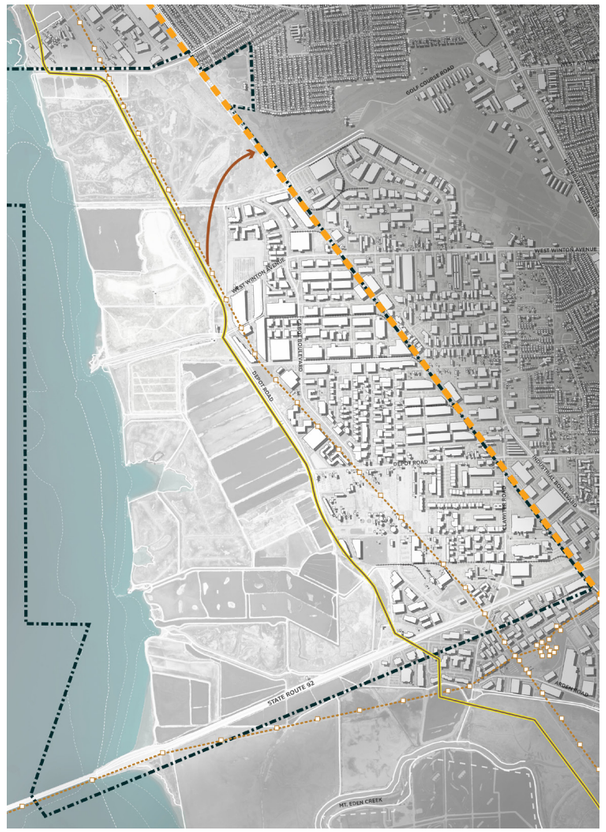
CONS

- Could be placing those who are unable to retreat at a disadvantage
- May lead to a patchwork of remaining properties
- Displacement
- Legal aspects of restricted development
- Could reduce tax base
- Areas for growth already built out

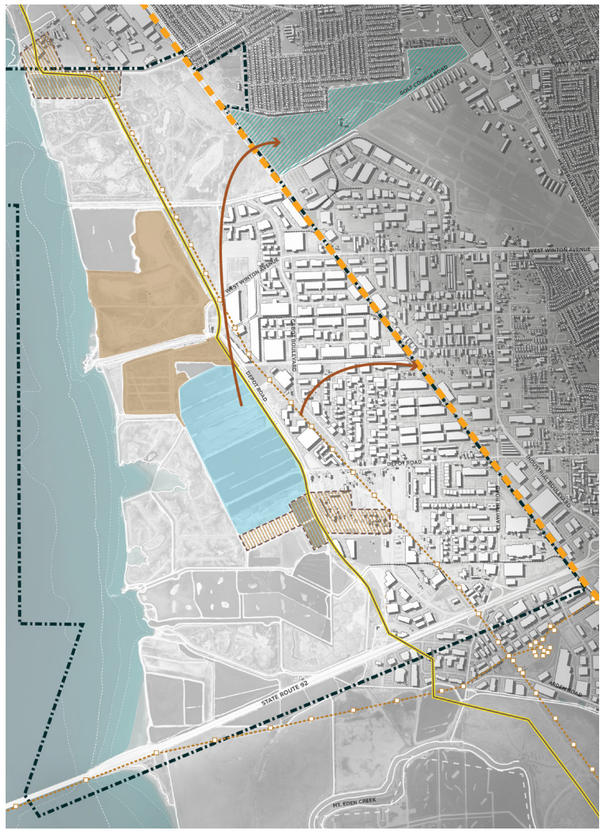


MANAGED RETREAT
Compiled Options

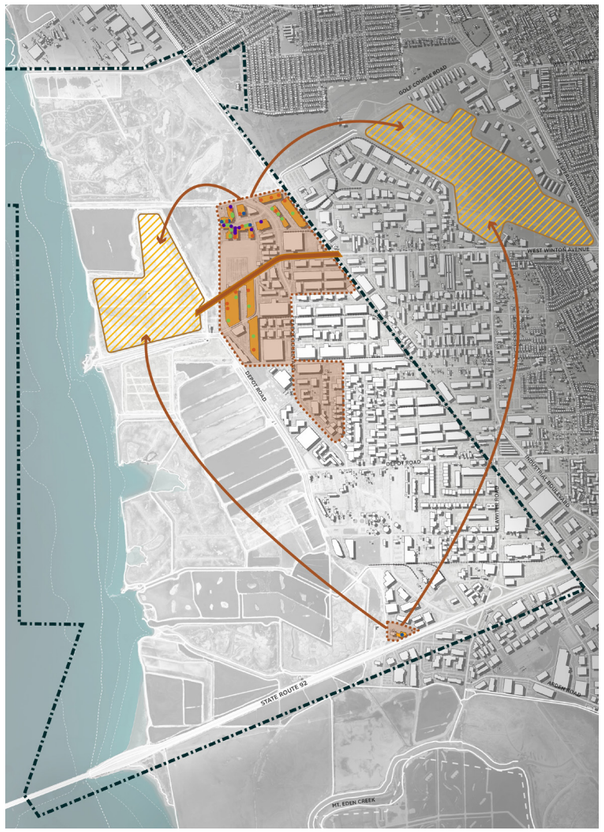
1: Relocation of Key Assets



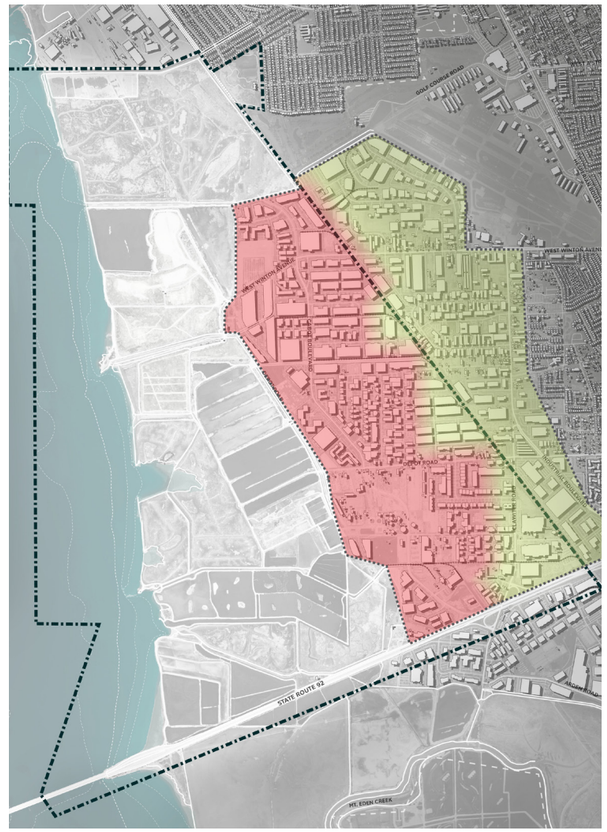
2: Relocation of All Critical Infrastructure



3: Managed Retreat of Vulnerable Neighborhoods/ Industrial Areas



4: Discourage rebuilding in vulnerable locations while increasing growth in other areas



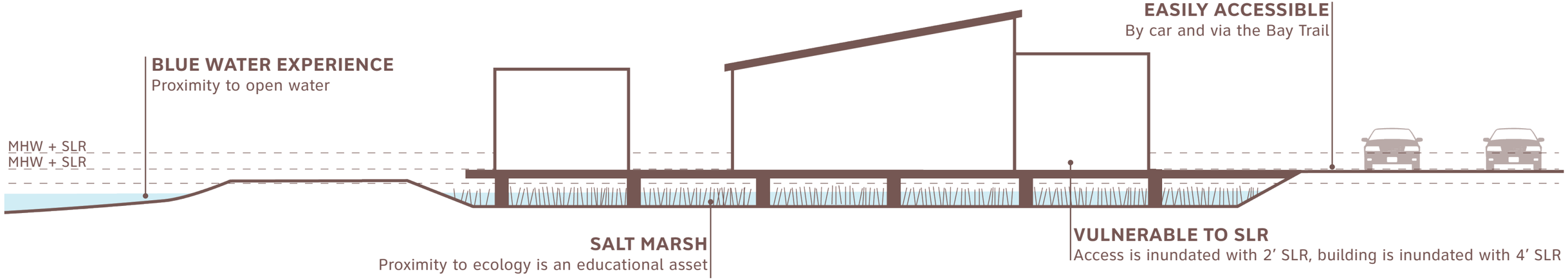
HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Description

GOAL / OBJECTIVE

- Enhance educational opportunities and adapt to SLR
- Create a management framework for adapting to SLR over time



HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 1: Remain in Place / Elevation

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Maintain current location of the Interpretive Center and elevate with SLR

PROS

- Maintain current location
- Blue water experience - proximity to shoreline marshes
- Building is highly visible in its current location

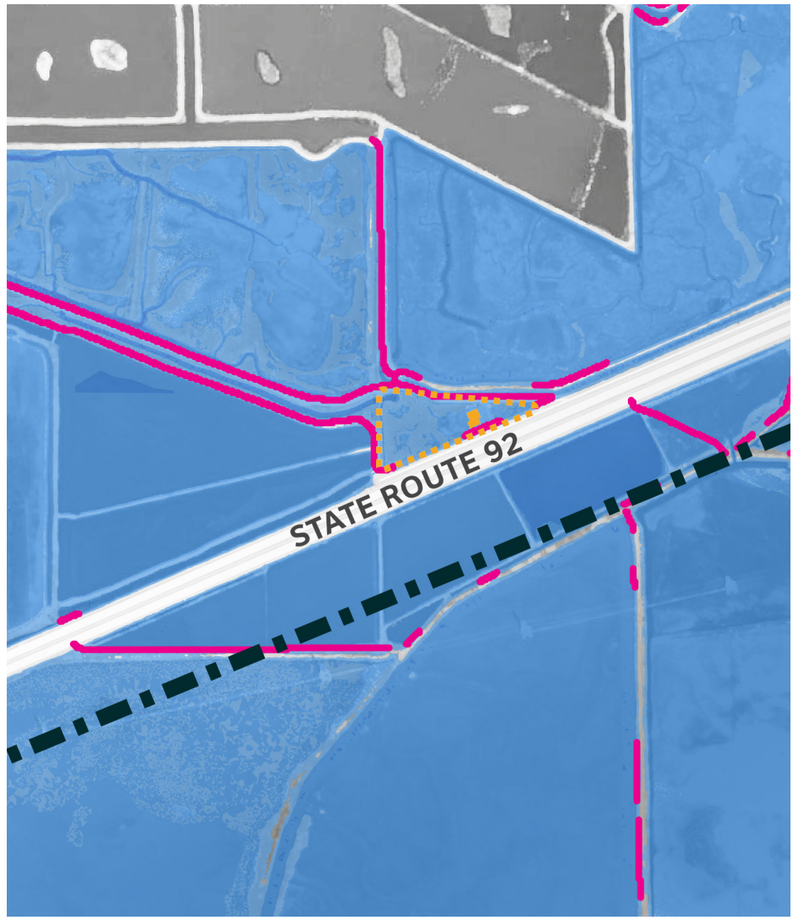
CONS

- Access paths to the shoreline and bay are inundated with SLR
- Raising the building may be costly, only to be inundated with 7’ SLR
- ADA accessibility might be a challenge

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

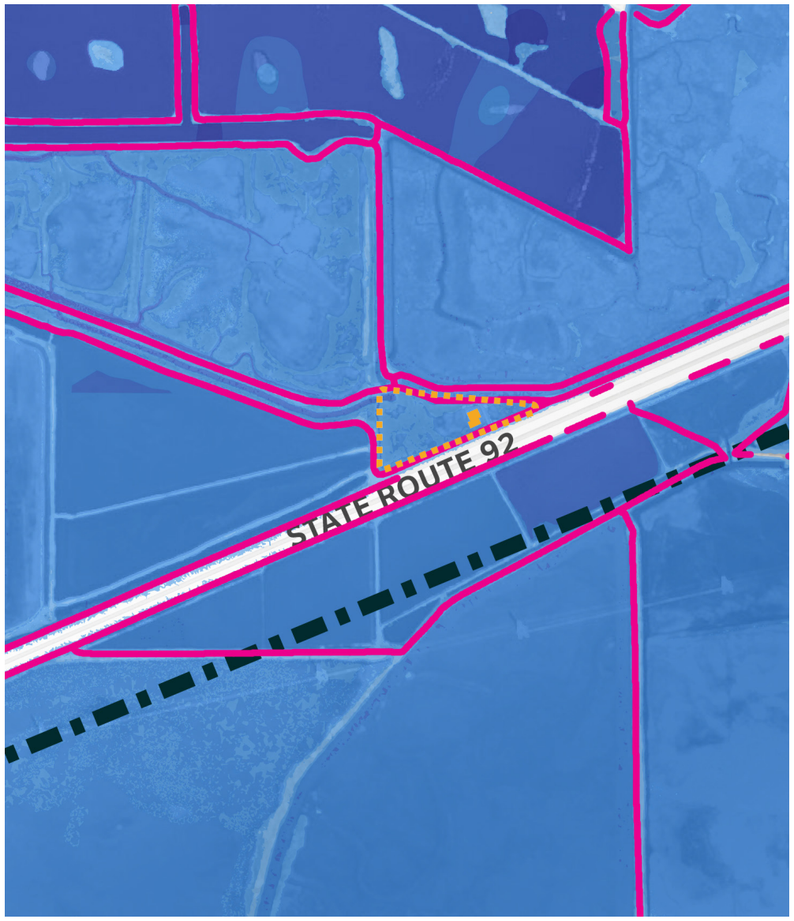
Option 1: Remain in Place / Elevation

2′ SLR



- Bay Trail access is inundated

4′ SLR



- Need to raise building, which becomes inundated

7′ SLR

- Site is severely compromised
- Need to relocate building- all access, including roads, is inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 2: West Winton Landfill

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Relocate the Interpretive Center to the West Winton Landfill

PROS

- Blue water experience - proximity to marshes
- Expansive views of the shoreline

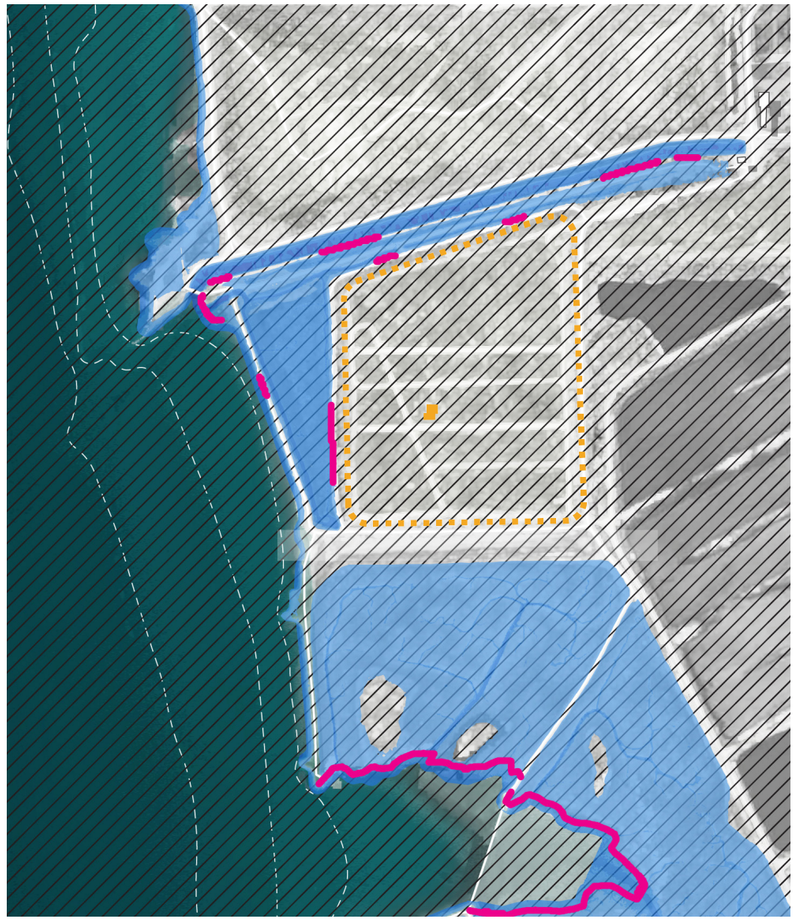
CONS

- Landfill poses maintenance concerns- may be unstable. Building would likely require deep piles that go through the landfill
- May be costly to puncture foundations through landfill
- Car access inundated with 4’ SLR- would require raising the road

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

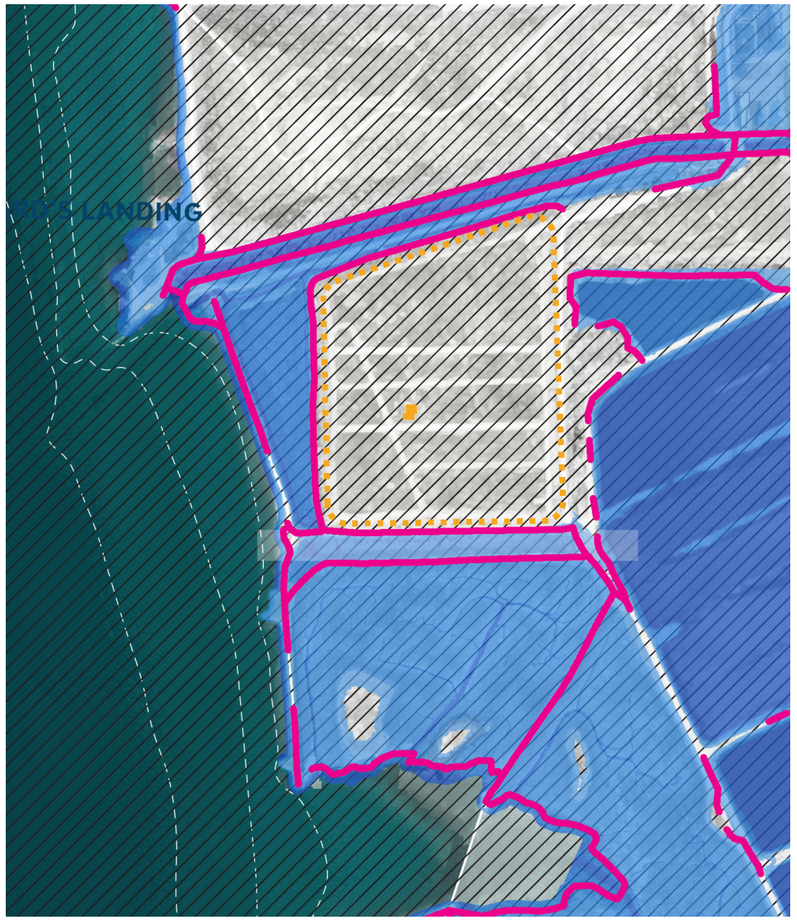
Option 2: West Winton Landfill

2′ SLR



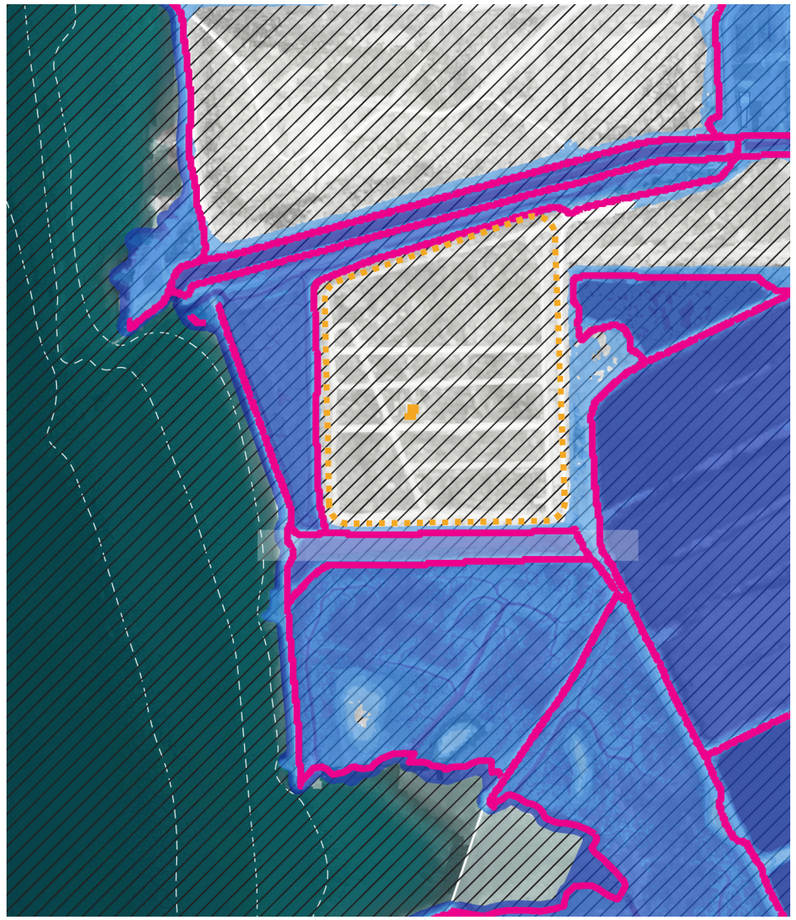
- Minimal impacts

4′ SLR



- W. Winton Ave is inundated

7′ SLR



- Site is severely compromised
- W. Winton Ave is severely inundated
- Access by car and trails is lost

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 3: Regional Park Office

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Relocate the Interpretive Center to the Regional Park Office site

PROS

- Proximity to marshes
- Could be paired with horizontal levee on landfill edge
- Easily accessible from West Winton Ave

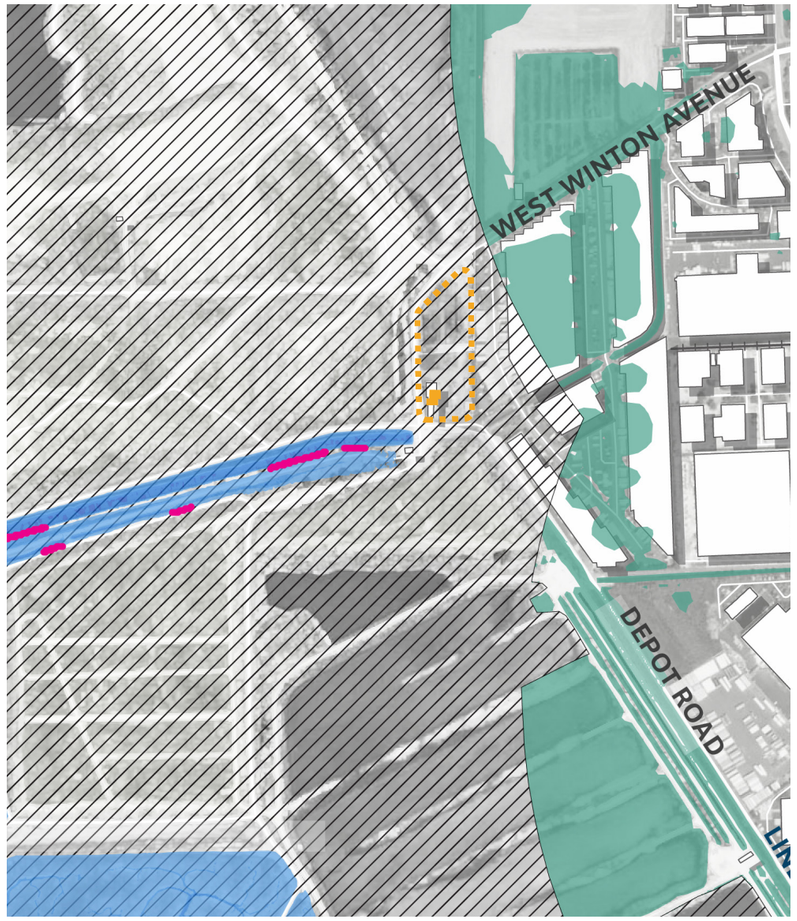
CONS

- No true blue experience
- Access and building are inundated with 4’ SLR
- Transmission lines go through this site, which may present an issue

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

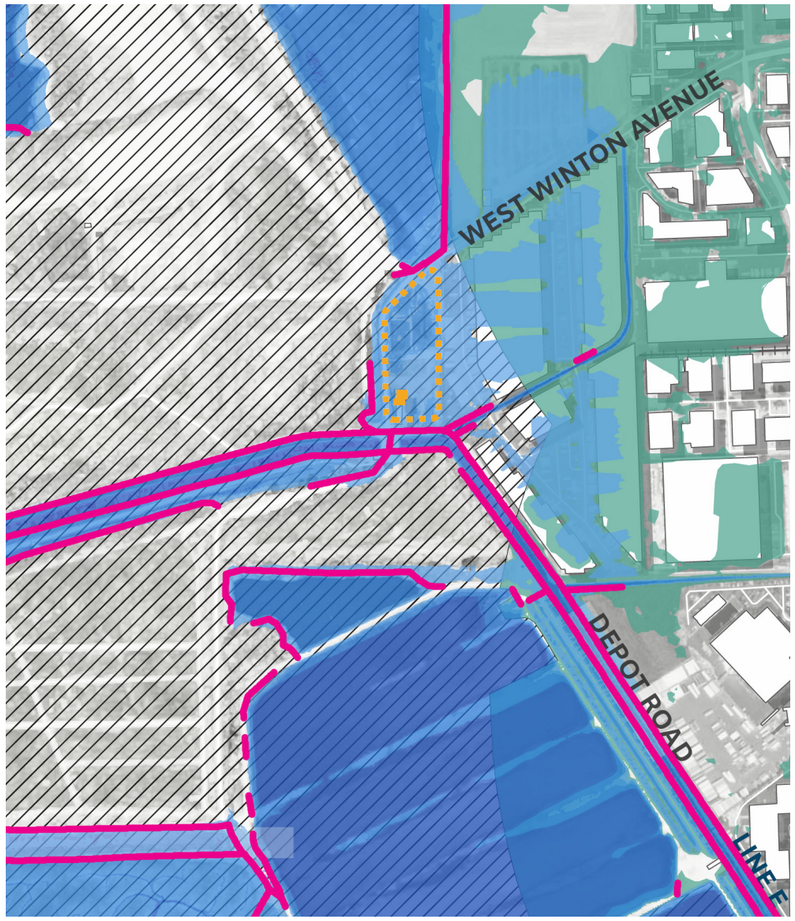
Option 3: Regional Park Office

2′ SLR



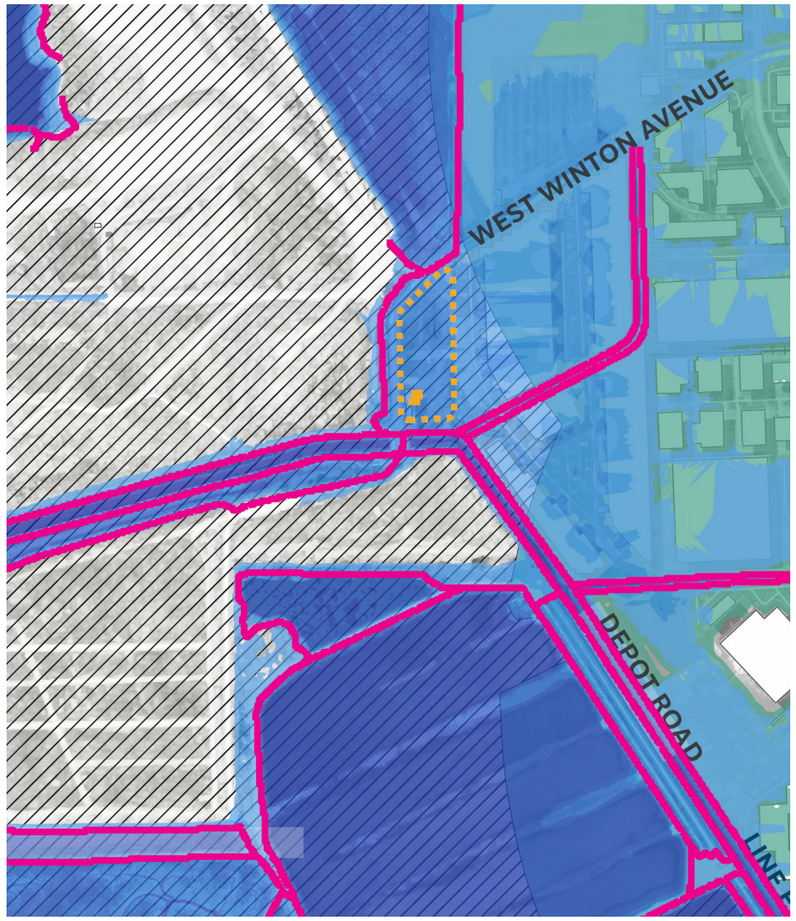
- Minimal impacts
- Potential groundwater emergence (no data)

4′ SLR



- Building and access road are inundated

7′ SLR



- Site is severely compromised
- Building is severely inundated
- Access is severely inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 4: San Lorenzo Community Center Park

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Relocate the Interpretive Center to San Lorenzo Community Center Park

PROS

- Potential to paired with marsh migration space pilot project
- Proximity to residential community
- Proximity to Oro Loma Marsh
- Blue water experience with SLR inundation

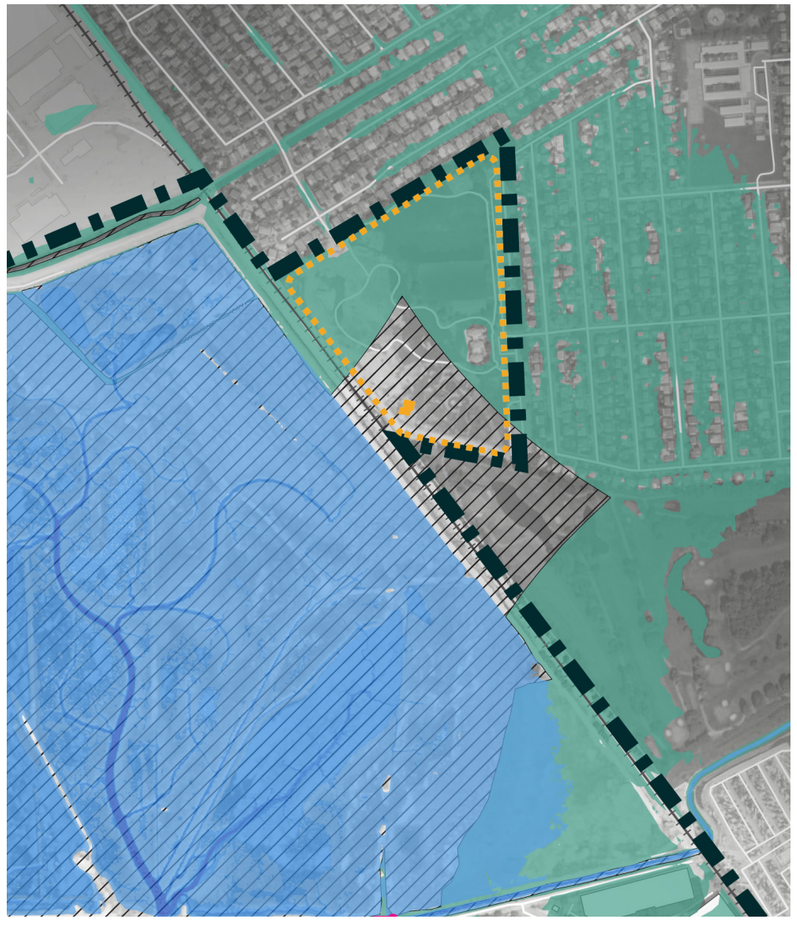
CONS

- Inundated with 4’ SLR
- Potential groundwater impacts

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

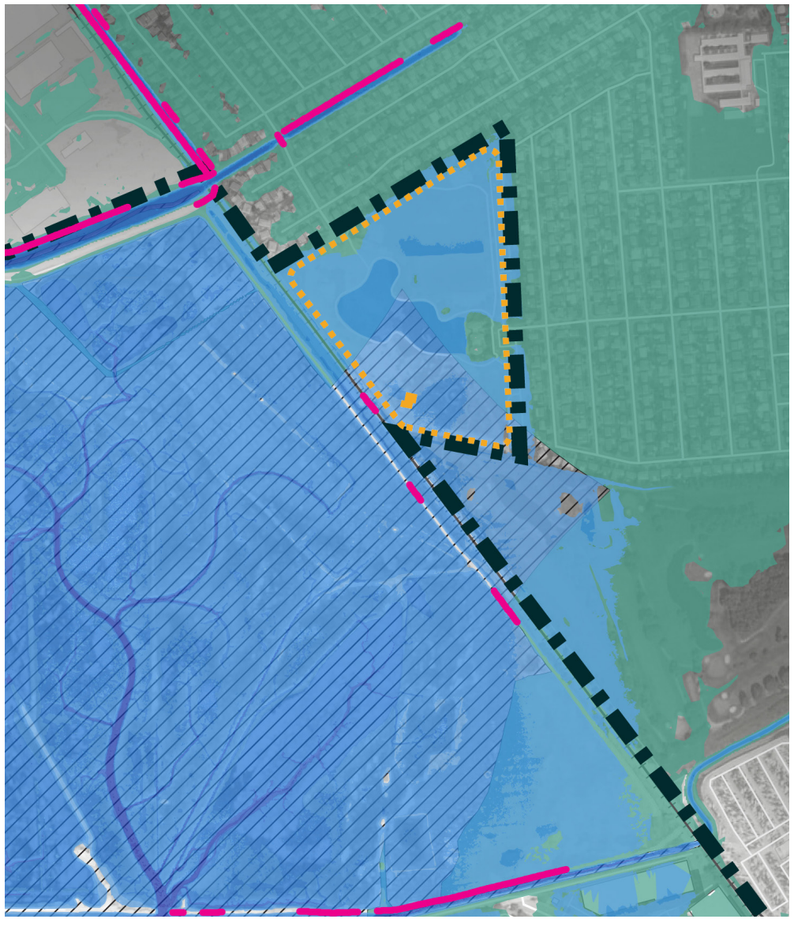
Option 4: San Lorenzo Community Center Park

2′ SLR



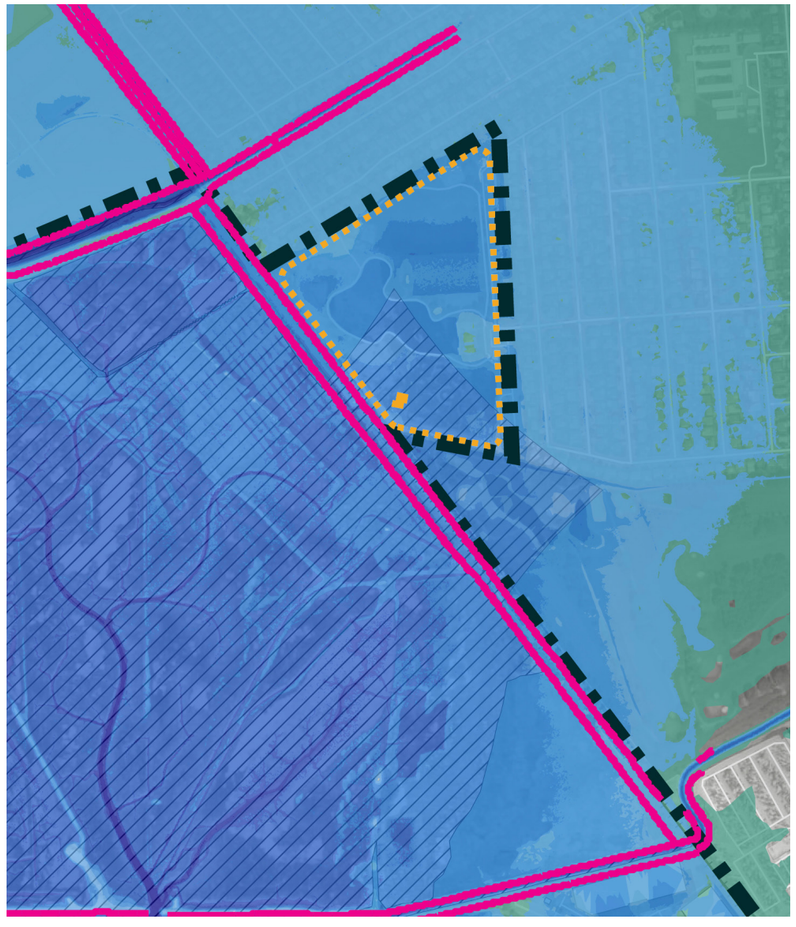
- Potential groundwater impacts (no data)

4′ SLR



- Building is inundated

7′ SLR



- Site is severely compromised
- Building is severely inundated
- All adjacent access is inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 5: Frank's East

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Elevate a portion of Frank's East
- Relocate the Interpretive Center to Frank's East

PROS

- Potential to paired with a horizontal levee on the landfill edge + tidal marsh restoration + Bay Trail realignment
- Easy vehicular access and parking along West Winton Ave

CONS

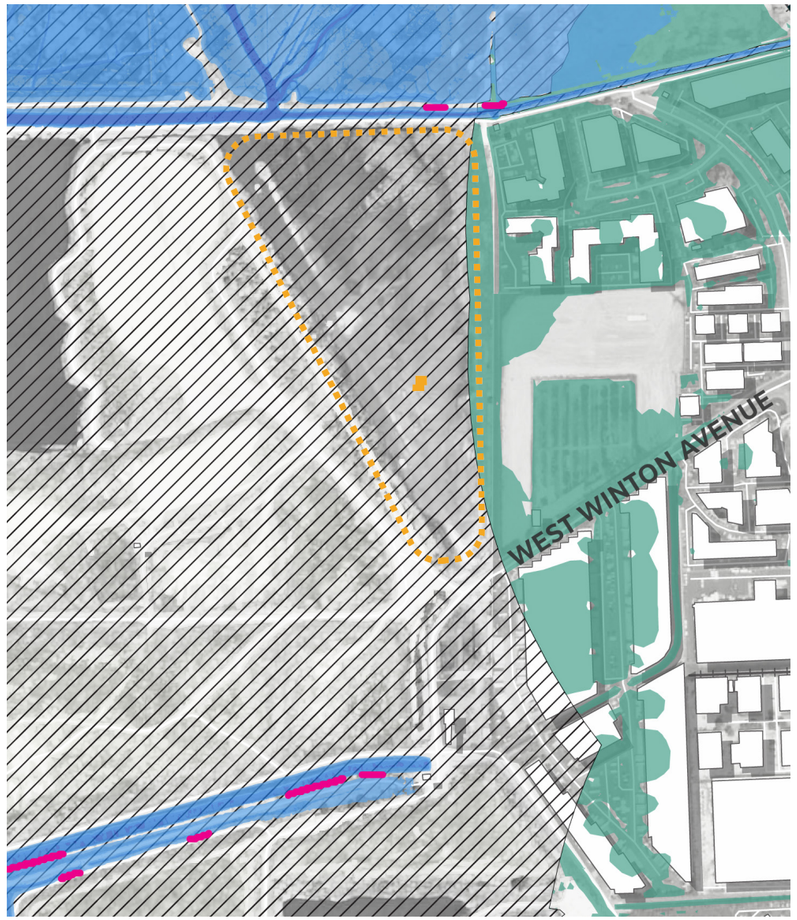
- No parking infrastructure in proximity
- No blue water experience
- Transmission lines go through this site, which may present an issue

HAYWARD SHORELINE MASTER PLAN
January 9, 2020

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

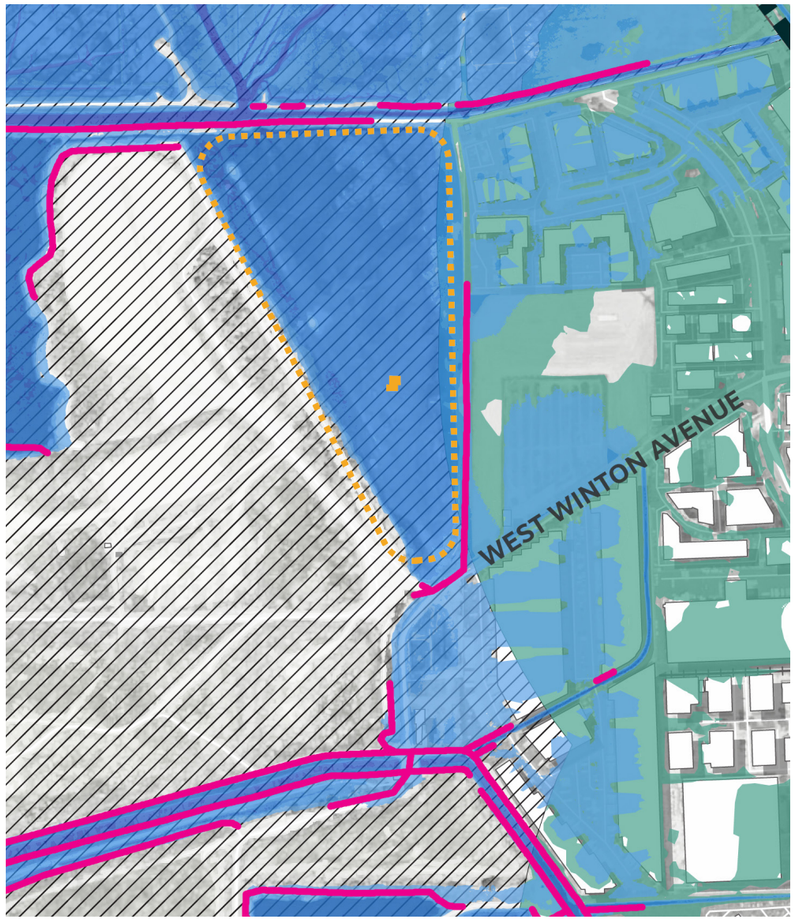
Option 5: Frank's East

2' SLR



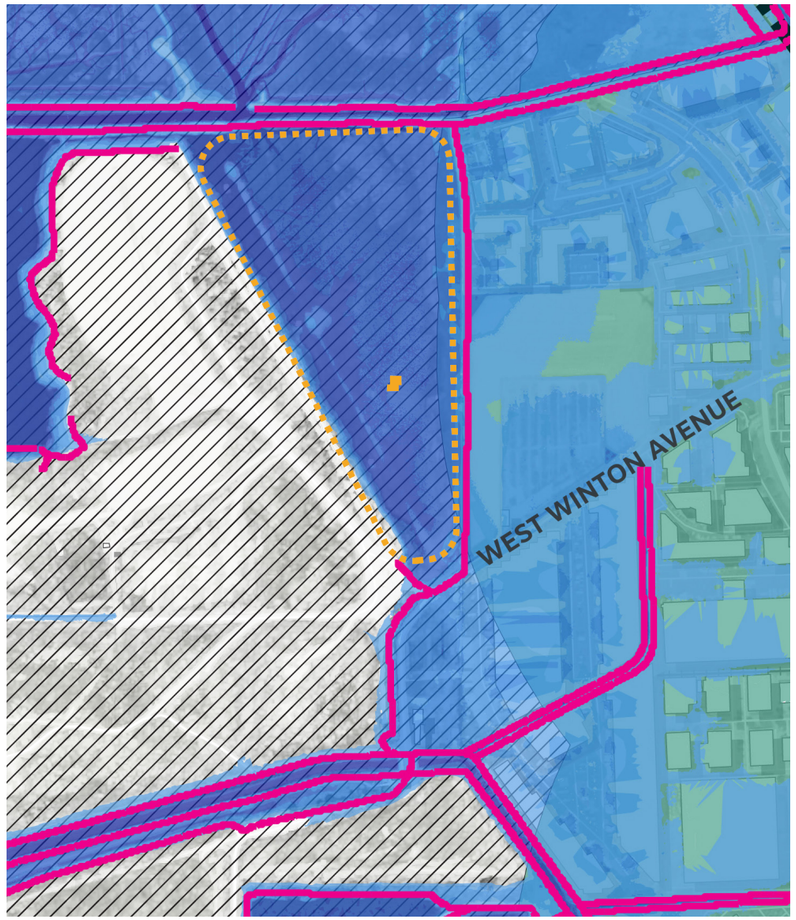
- No impacts

4' SLR



- Building is inundated
- Access is inundated

7' SLR



- Site is severely compromised
- Building is severely inundated
- Access is inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 6: Eden Landing

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

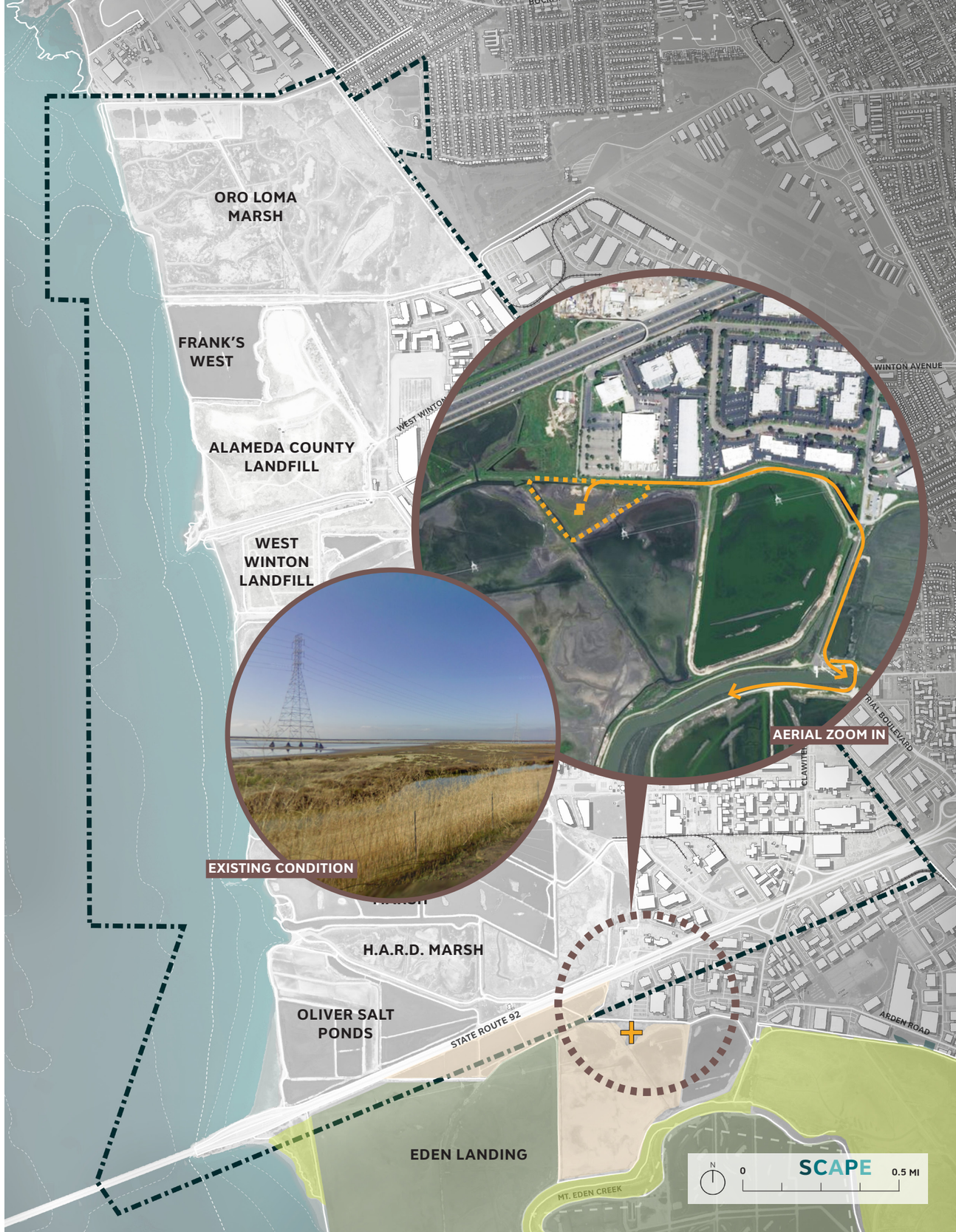
- Relocate the Interpretive Center to Eden Landing

PROS

- Blue water experience
- Adjacent to kayak launch and Eden Landing public access

CONS

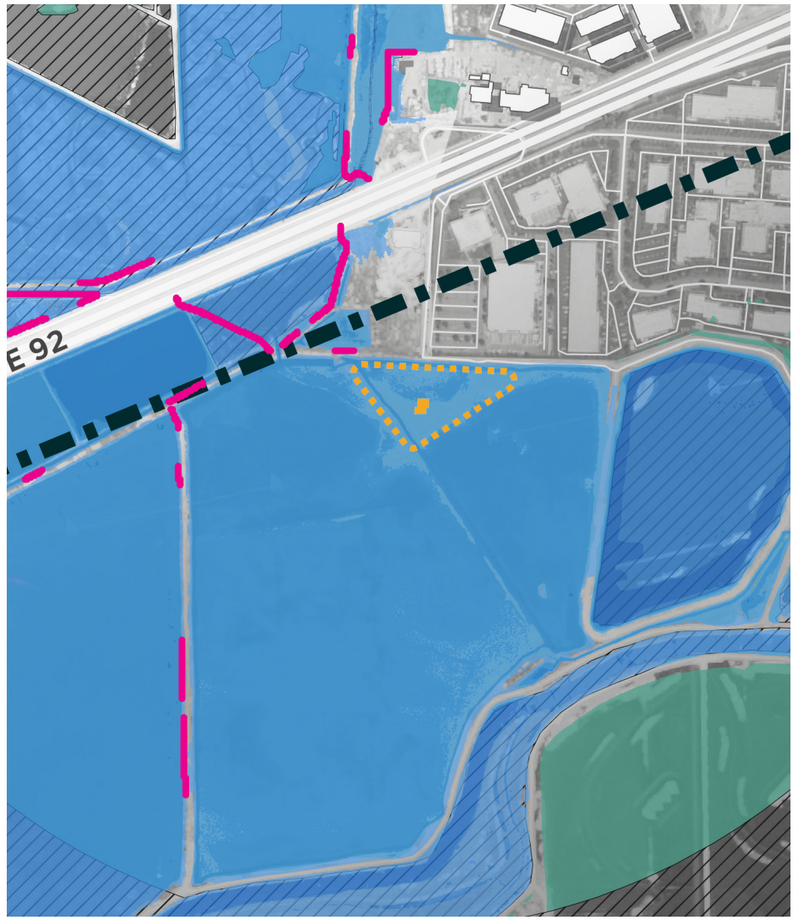
- Inundated with 2’ SLR
- No immediate public parking



HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

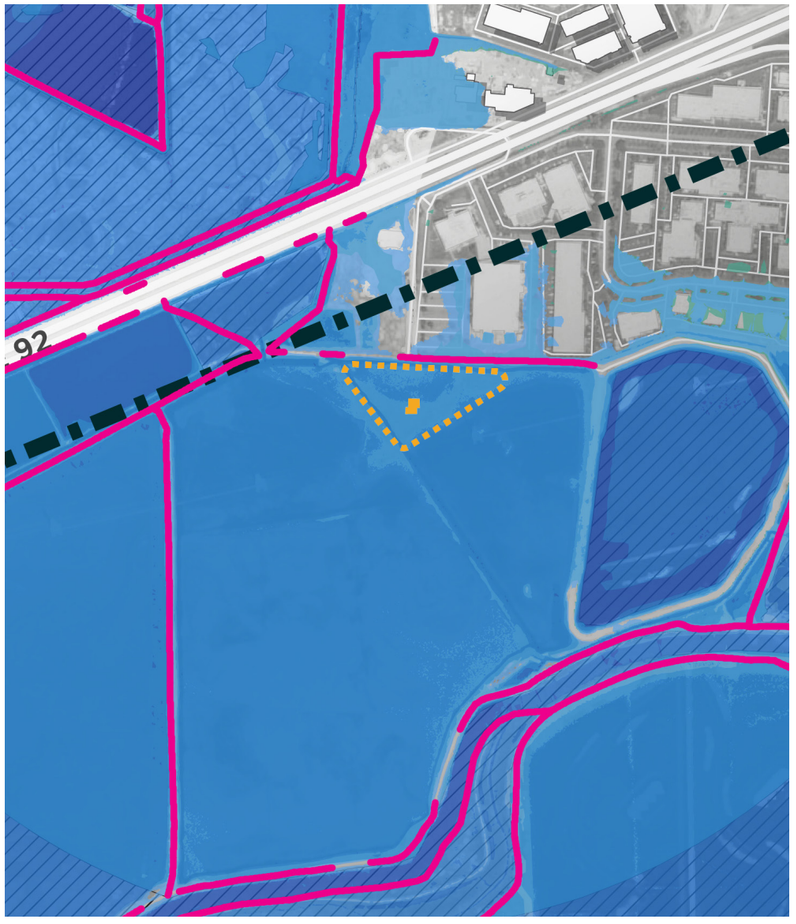
Option 6: Eden Landing

2′ SLR



- Building is inundated

4′ SLR



- Building is inundated
- Bay Trail is inundated

7′ SLR

- Site is severely compromised
- Building is severely inundated
- All access is inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 7: Floating Building / Barge

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Retrofit the Interpretive Center as a floating building or barge

PROS

- Adapts to flooding and SLR
- Blue water experience
- Ability to move to different locations
- Maintain current location and visibility

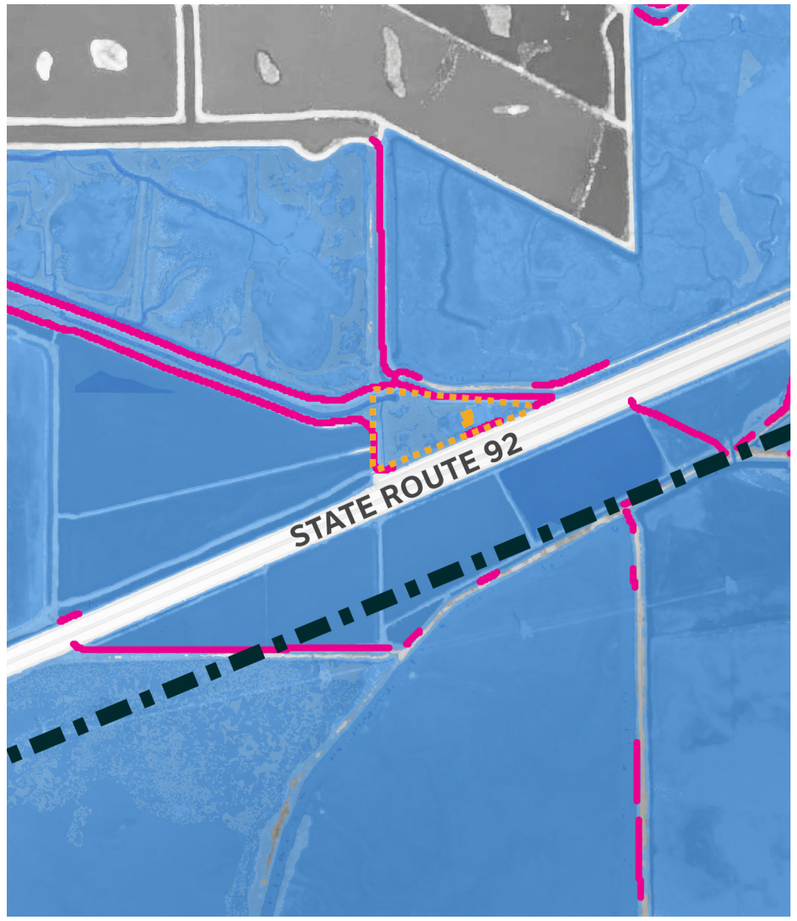
CONS

- May be hard to move a barge in shallow water and narrow channel
- All access is inundated with 7’ SLR
- Strong tidal run and wind would prohibit barge movement
- Parking and trail access becomes an issue with SLR

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

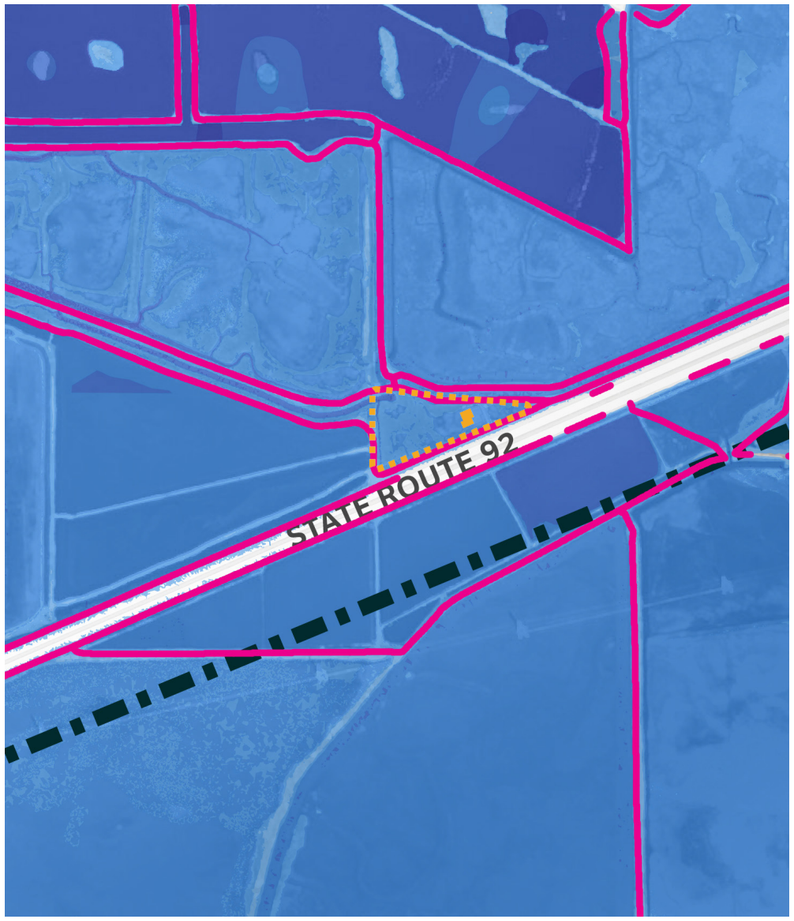
Option 7: Floating Building / Barge

2′ SLR



- Bay Trail access is inundated

4′ SLR



- All trail access is inundated

7′ SLR

- All access, including roads, is severely inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Option 8: SMHM Preserve

GOAL / OBJECTIVE

Enhance educational opportunities and adapt with SLR.

DESCRIPTION

- Relocate the Interpretive Center to the diked pond adjacent to the SMHM Preserve

PROS

- Potential to pair with wastewater treatment pilot project / horizontal levee
- Potential to pair with trail realignment
- Owned by EBRPD

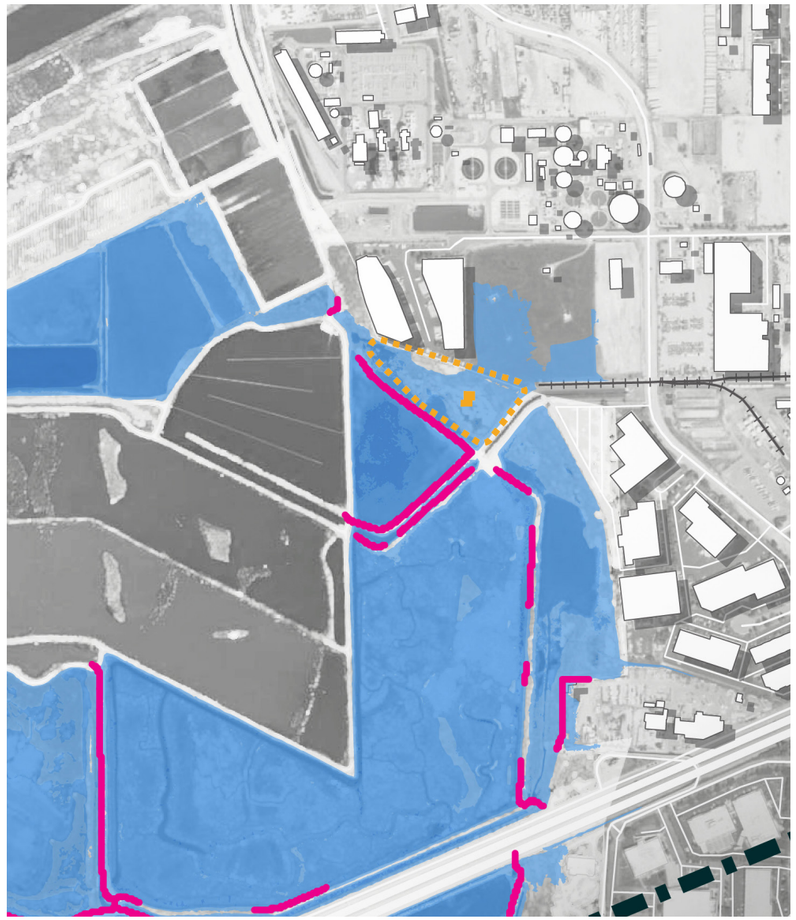
CONS

- Site is inundated in all SLR scenarios
- Not easily accessible by car
- No direct blue water experience
- Public access adjacent to wastewater uses is problematic

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

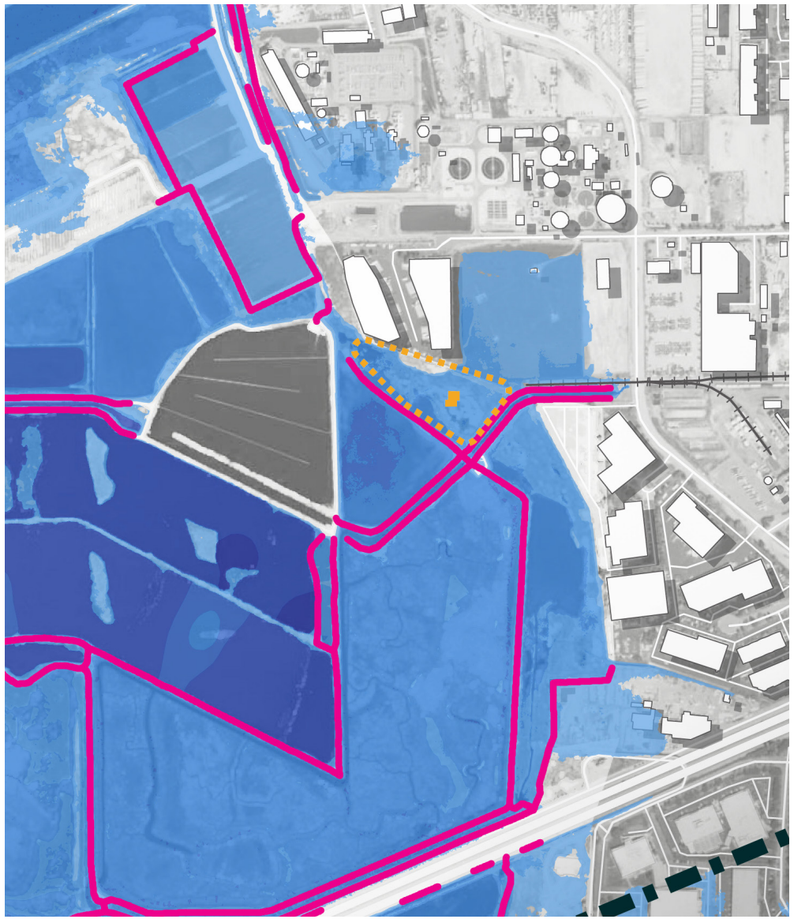
Option 8: SMHM Preserve

2′ SLR



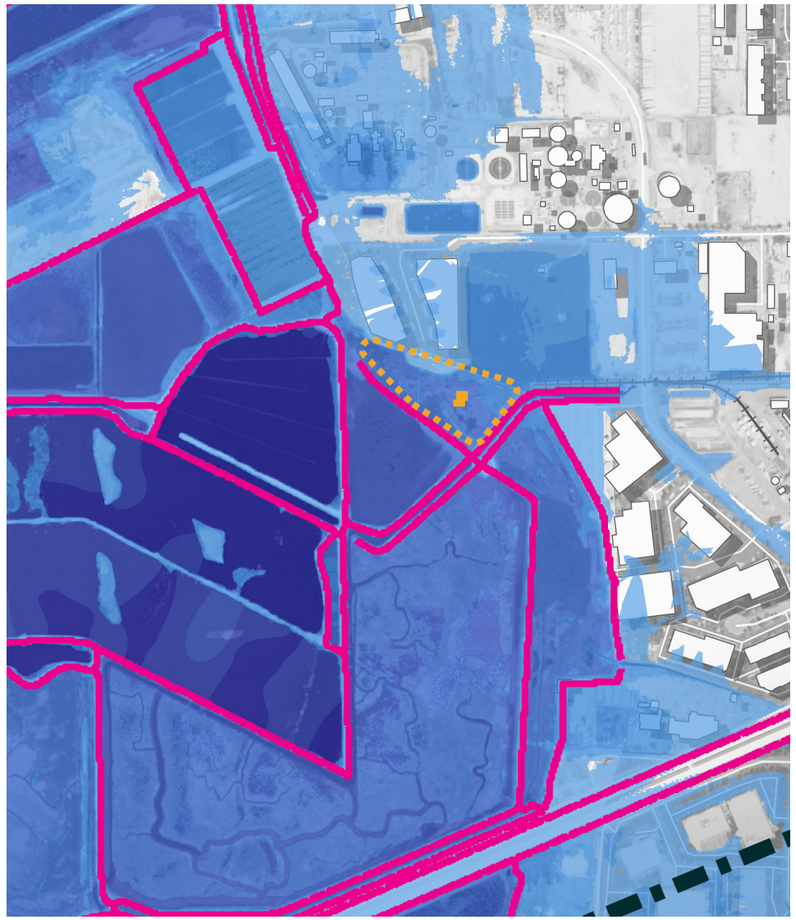
- Site is inundated
- Some access is inundated

4′ SLR



- Site is inundated
- Most access is inundated

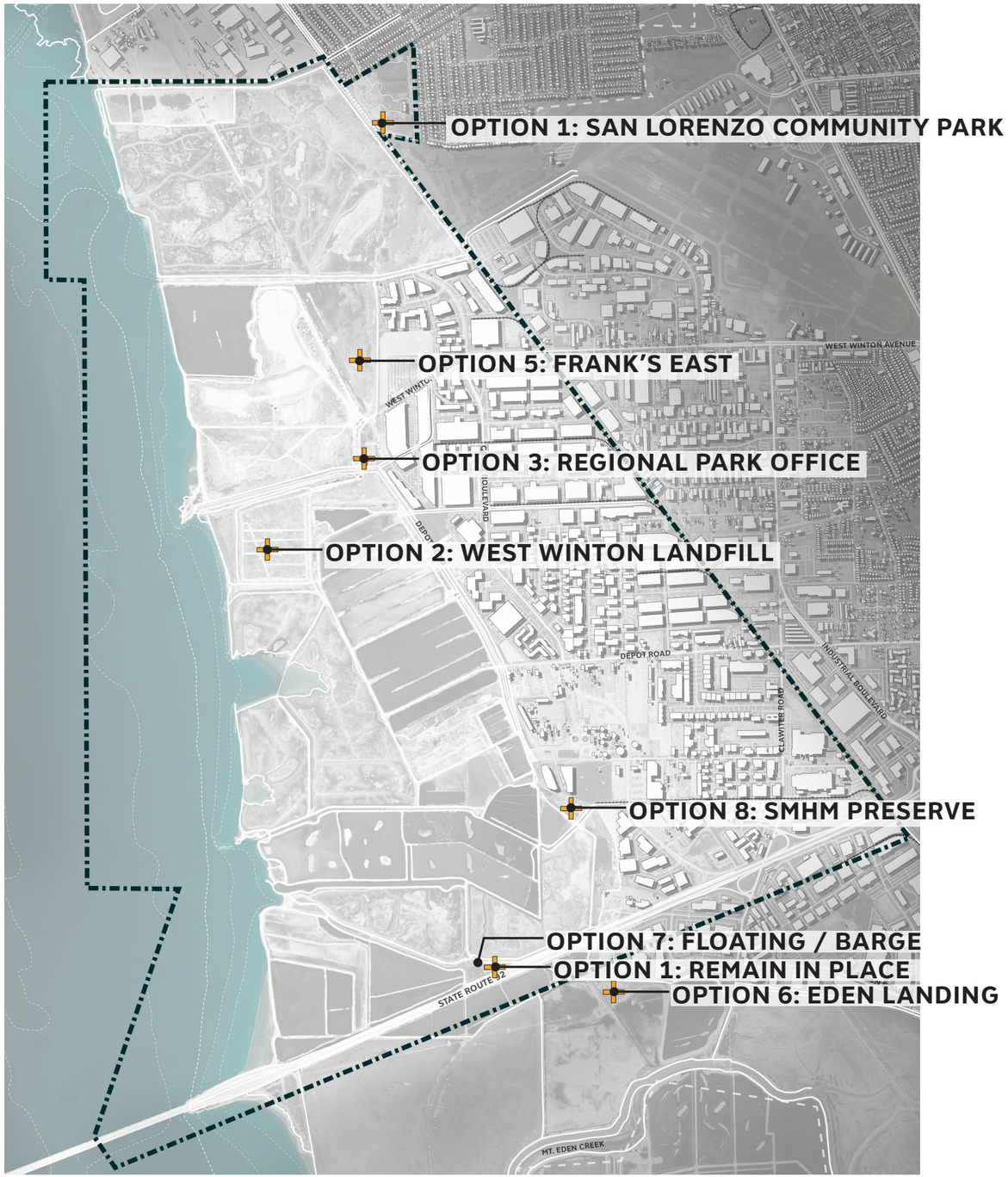
7′ SLR



- Site is severely compromised
- All access is severely inundated

HAYWARD SHORELINE INTERPRETIVE CENTER RELOCATION

Compiled Options



BUILDING SCALE STRATEGIES

BUILDING SCALE STRATEGIES
Definition

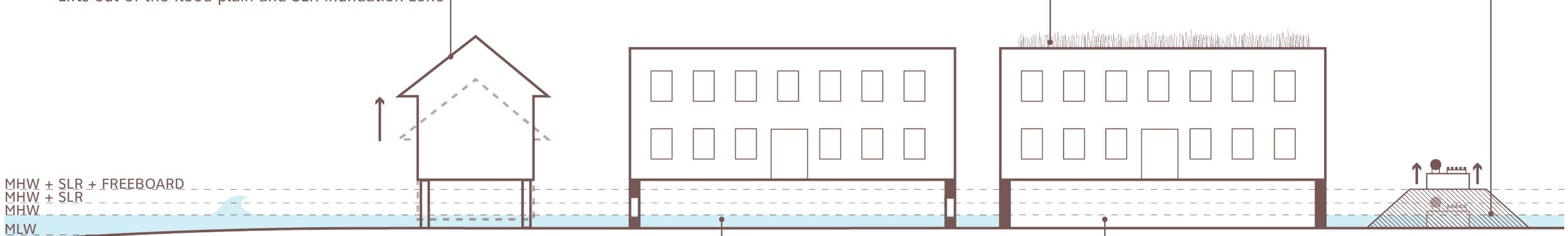
GOAL / OBJECTIVE

- Improve design of buildings to increase resiliency to SLR and climate change

BUILDING ELEVATION
Lifts out of the flood plain and SLR inundation zone

GREEN INFRASTRUCTURE
Absorptive green roofs reduce the need for stormwater storage

ELEVATION OF CRITICAL SYSTEMS
Lift out of flood plain and SLR inundation zones

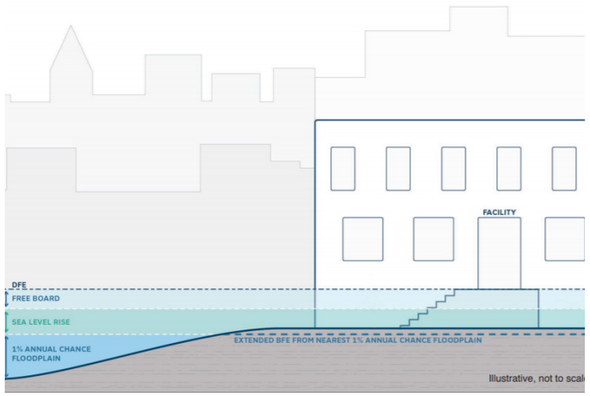


DRY FLOODPROOFING
Keeps flood waters out of structure. Potential to pair with local, building, or lot scale perimeter protection

WET FLOODPROOFING
Allows flood water to move into unoccupied areas below the building. Would need to be 'mudproof' as well. Also need to raise critical systems (electrical / mechanical)

BUILDING SCALE STRATEGIES
Compiled Options

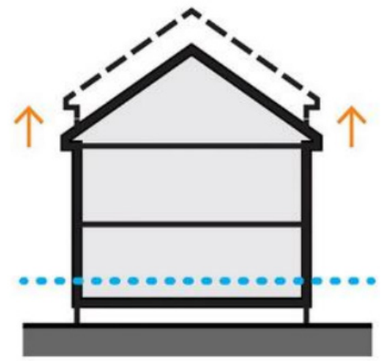
1: Increasing Standards for New Construction



2: Providing Loans / Grants / Tax Incentives for Implementation

3: Technical Support & Education

4: Removing Regulatory Impediments



GOAL / OBJECTIVE

Improve design of buildings to increase resiliency to SLR and climate change.

Provide support to help businesses and homeowners adapt to climate change.

Improve design of buildings to increase resiliency to SLR and climate change.

Improve design of buildings to increase resiliency to SLR and climate change.

MASTER PLAN ASSUMPTIONS

MASTER PLAN ASSUMPTIONS

Overarching

- The plan is based on adapting the project area over a **mid-range timeframe.**

- The plan assumes **little change to the urban fabric** (streets, buildings), economy, land use, and critical built infrastructure on the site over the planning horizon.

- The intent is to **reduce risk to critical assets** from daily tidal inundation up to 4’ of SLR on top of the current mean higher high tide.

- The plan is considering a **perimiter protection aproach to critical assets** and an **adaptation approach to shoreline ecosystems.**

- **Non-structural strategies,** such as retreat and land elevation, are not articulated in this plan, although they will be layered on to further reduce risk, and would likely be required to **adapt to a higher SLR scenario** long-term.

MASTER PLAN ASSUMPTIONS

Overarching

Table 8: Sea level rise increments by time horizon and level or risk aversion, based on the California Coastal Commission recommendations.

# Years from now	Year	Identifies areas that…	17% Prob. SLR meets or exceeds *Low Risk Aversion*	5% Prob. SLR meets or exceeds *Medium Risk Aversion*	0.5% Prob. SLR meets or exceeds *Medium-High Risk Aversion*	
10	2030	are at **immediate** flood risk	0.5	0.6	**0.8**	
20	2040		0.8	1.0	**1.3**	
30	2050		1.1	1.4	**1.9**	Up to 2 ft
40	2060	are at **intermediate** flood risk	1.5	1.8	**2.6**	
50	2070		1.9	2.4	**3.5**	
60	2080		2.4	3.0	**4.5**	Up to 4.5 ft
70	2090	Will be **potentially** flooded	2.9	3.6	**5.6**	
80	2100		3.4	4.4	**6.9**	Up to 7 ft
90	2110		3.5	4.5	7.3	
100	2120		4.1		8.6	

MASTER PLAN ASSUMPTIONS

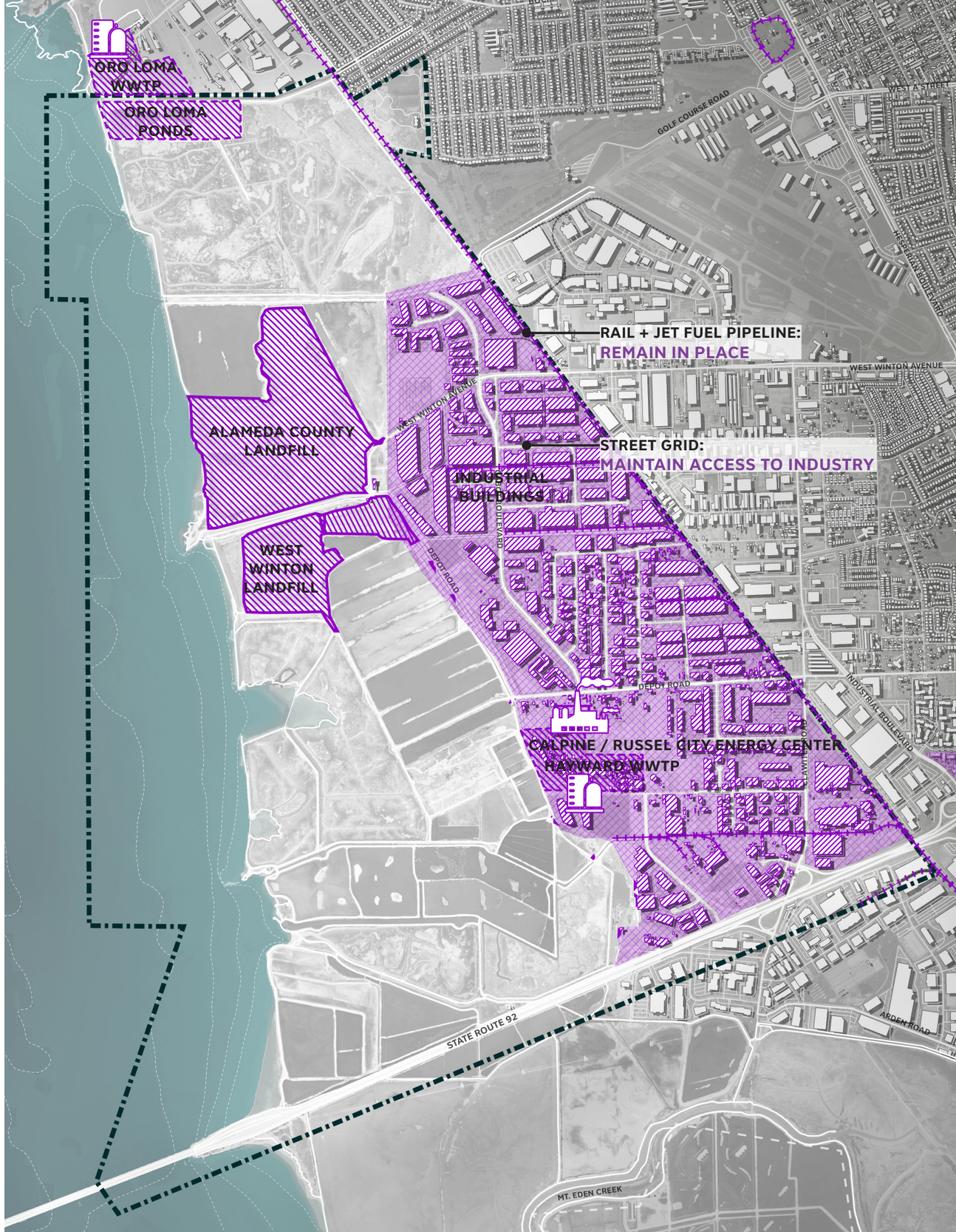
Overarching

SLR	MHHW + SLR	MHHW + SLR + 100 YEAR STORM	MHHW + SLR + 500 YEAR STORM
0′	7′	10.3′	11.3′
2′	9′	12.3′	13.3′
4′	11′	14.3′	15.3′
7′	14′	17.3′	18.3′

STAKEHOLDER FEEDBACK

Remain in Place

- Oro Loma WWTP
- Oro Loma ponds
- Landfills
- Industrial neighborhood (buildings + access)
- Hayward WWTP
- Calpine / Russel City Energy Center
- Railroad & jet fuel pipeline



REMAIN IN PLACE

HAYWARD SHORELINE MASTER PLAN
January 9, 2020

STAKEHOLDER FEEDBACK

Maintain Critical Uses

- **Wastewater wet weather storage**
- **Biosolids management / drying**
- **Solar field**

MAINTAIN CRITICAL USES

HAYWARD SHORELINE MASTER PLAN
January 9, 2020

STAKEHOLDER FEEDBACK

Adapt in Place

- Oro Loma marsh
- Triangle marsh
- Cogswell marsh
- Hayward marsh
- H.A.R.D. marsh
- EBDA pipeline - decommission
- SR-92 Bridge Landing- remain / adapt in place

ADAPT IN PLACE (NATURAL ASSET)

ADAPT IN PLACE (BUILT ASSET)

HAYWARD SHORELINE MASTER PLAN
January 9, 2020

STAKEHOLDER FEEDBACK

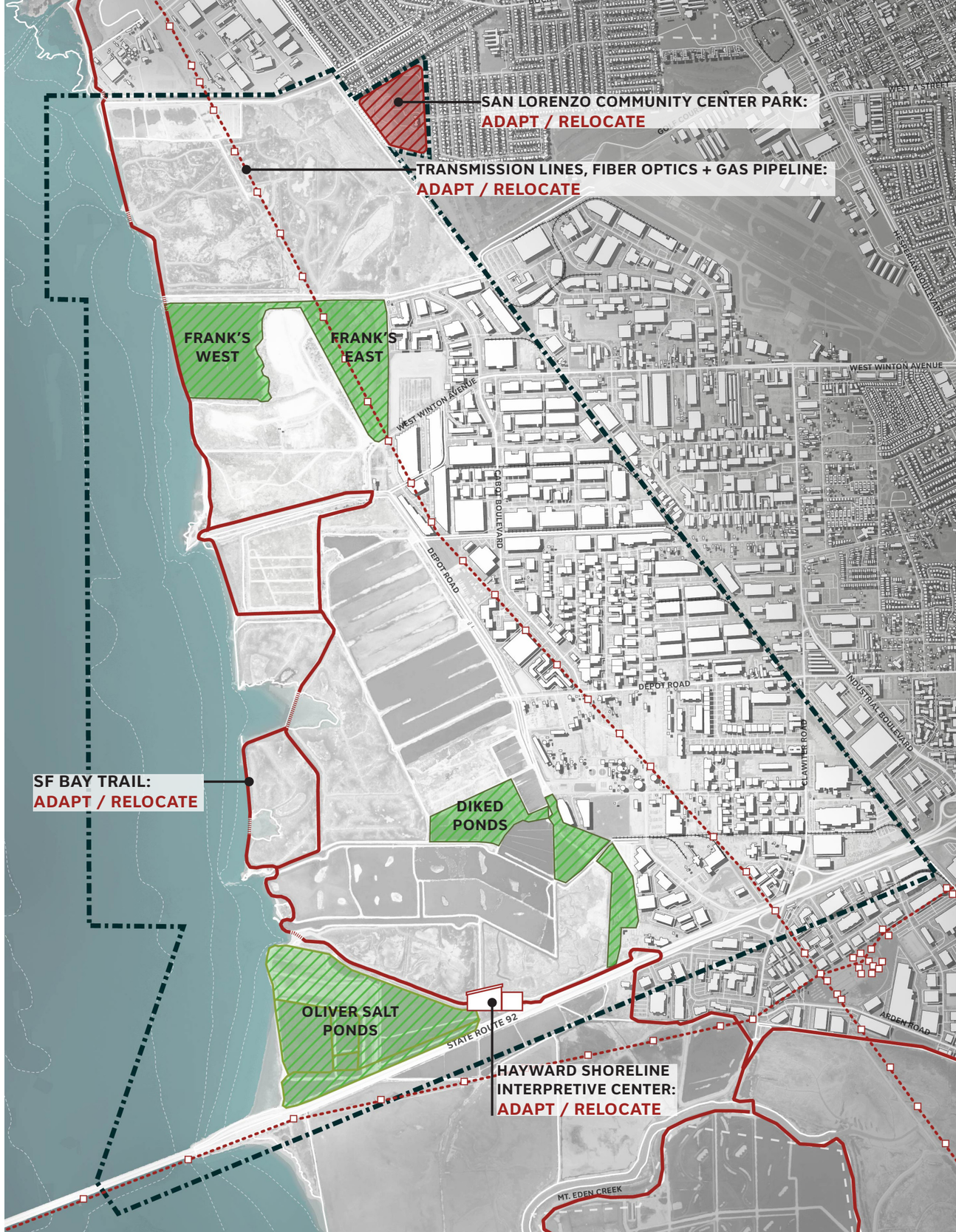
Adapt / Relocate

- Bay Trail
- Hayward Shoreline Interpretive Center
- San Lorenzo Community Center Park
- Frank’s west & east
- Transmission lines
- Oliver salt ponds and historical assets
- SMHM preserve
- Diked ponds

ADAPT / RELOCATE (NATURAL ASSET)

ADAPT / RELOCATE (BUILT ASSET)

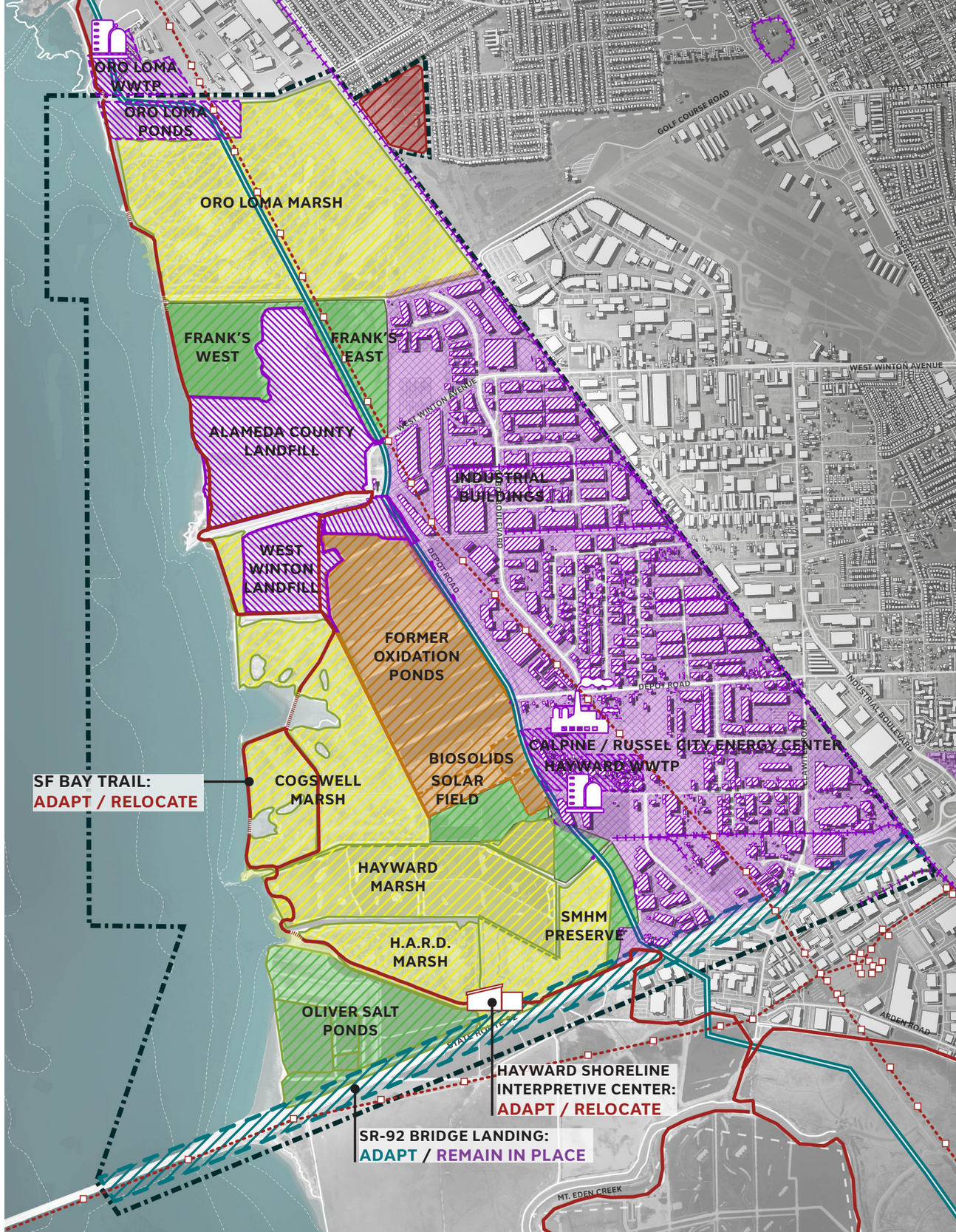
HAYWARD SHORELINE MASTER PLAN
January 9, 2020



STAKEHOLDER FEEDBACK

Compiled Assumptions

- REMAIN IN PLACE
- MAINTAIN CRITICAL USES
- ADAPT IN PLACE (NATURAL ASSET)
- ADAPT IN PLACE (BUILT ASSET)
- ADAPT / RELOCATE (NATURAL ASSET)
- ADAPT / RELOCATE (BUILT ASSET)



HAYWARD SHORELINE MASTER PLAN
January 9, 2020

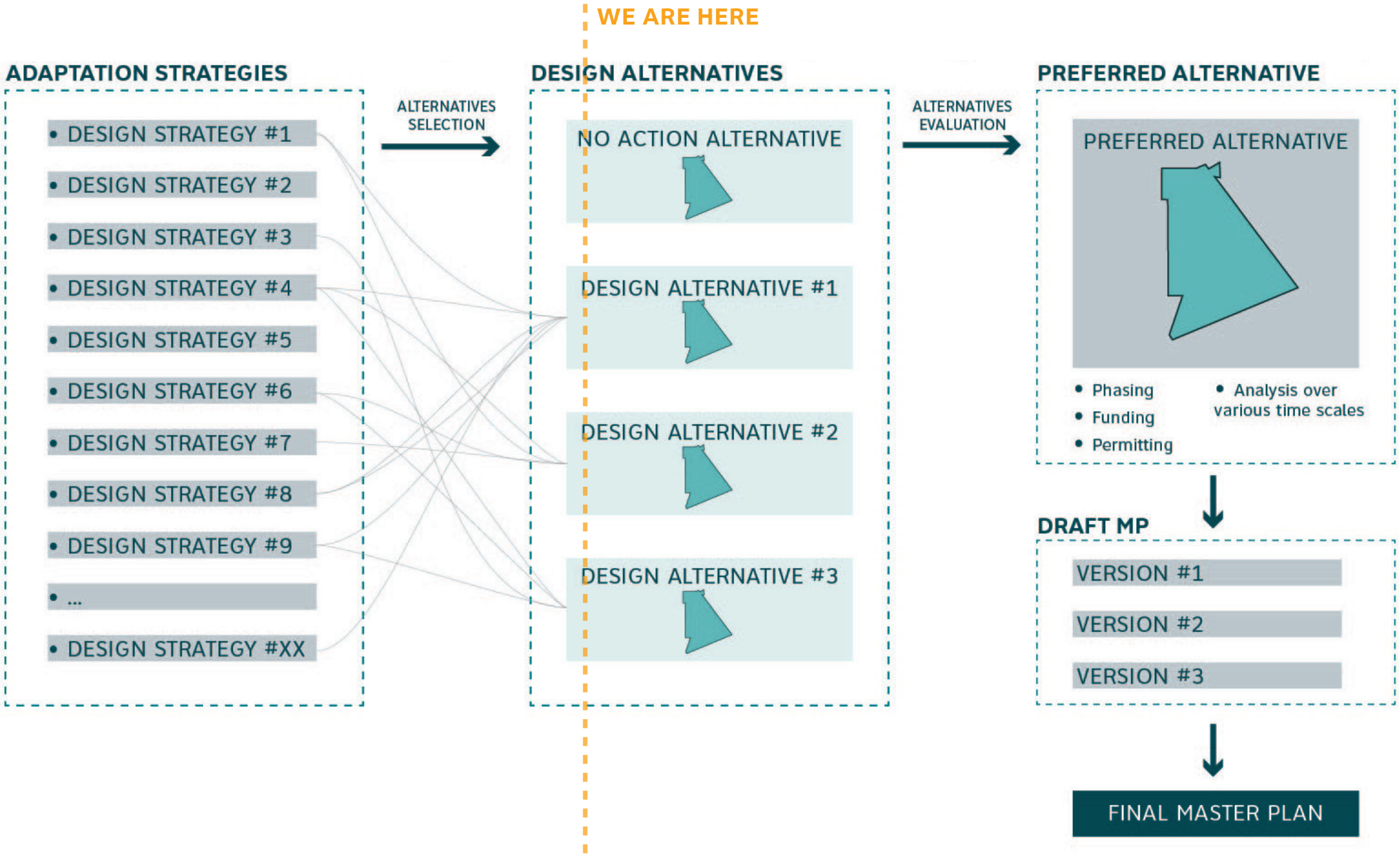
MASTER PLAN ASSUMPTIONS & STAKEHOLDER FEEDBACK

	ASSET	PLANNING ASSUMPTION
WASTEWATER INFRASTRUCTURE	Oro Loma WWTP	• Remain in place
	Hayward WWTP	• Remain in place
	Oxidation Ponds	• Maintain critical uses: wastewater wet weather storage, solar fields, biosolids management / drying
	EBDA Pipeline	• Adapt - decommission over time
TRANSPORTATION INFRASTRUCTURE	SR-92 Bridge Landing	• Remain in place / adapt
	Rail Corridor	• Remain in place
	Street Grid	• Maintain access to industrial zone from inland roads • Maintain ingress and egress to surrounding residential neighborhoods
ENERGY INFRASTRUCTURE	Transmission Lines	• Adapt / Relocate
	Jet Fuel Pipeline	• Remain in place - avoid disturbing function and use
	Gas Pipeline	• Remain in place - maintain access
COMMUNICATION INFRASTRUCTURE	Fiber Optics	• Remain in place - avoid disturbing function and use
BUILDINGS & LAND USE	Industrial Land Use	• Remain in place without need for building-level adaptation with 4' SLR
RECREATIONAL INFRASTRUCTURE	Bay Trail	• Adapt / relocate • Connect through the site north-south • Access the Interpretive Center • Connect to trailheads and parking areas • Maximize blue water experience
	Hayward Shoreline Interpretive Center	• Adapt and decommission over time • Relocate • Ensure vehicular and pedestrian access and parking • Locate along the Bay Trail • Locate in proximity to educational opportunities that won't be inundated
	San Lorenzo Community Center Park	• Adapt and decommission over time • Relocate • Ensure vehicular and pedestrian access and parking
HABITATS & ECOSYSTEMS	Existing Tidal Marsh + Hayward Marsh Restoration	• Adapt to 4' SLR
	Muted & Managed Marsh	• Adapt or preserve SMHM preserve • Adapt or preserve endangered species habitat
	Salt Ponds	• Adapt / relocate
	Seasonal Wetlands	• Adapt / relocate
	Mudflats	• Enhance
LANDFILLS	Alameda County & West Winton Landfills	• Remain in place • Prevent erosion and seepage

NEXT STEPS

NEXT STEPS

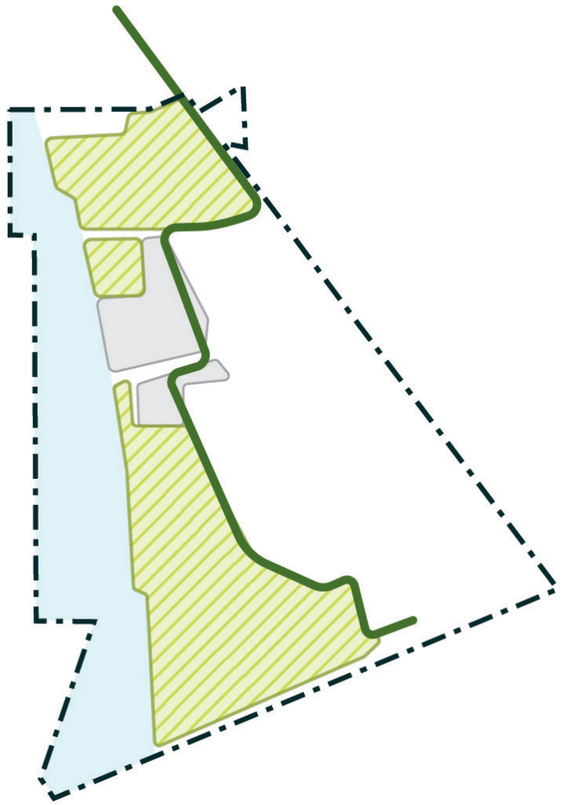
Task 5



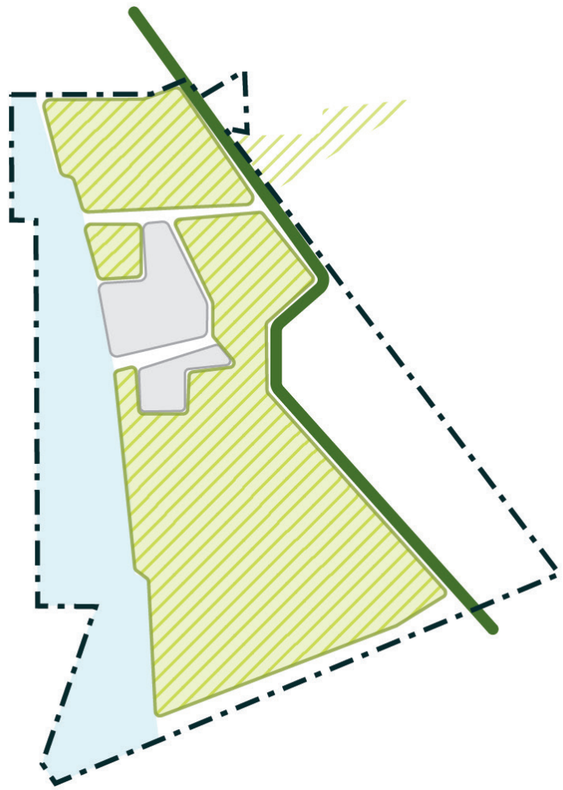
NEXT STEPS

Range of Options

A. Full Edge Protection



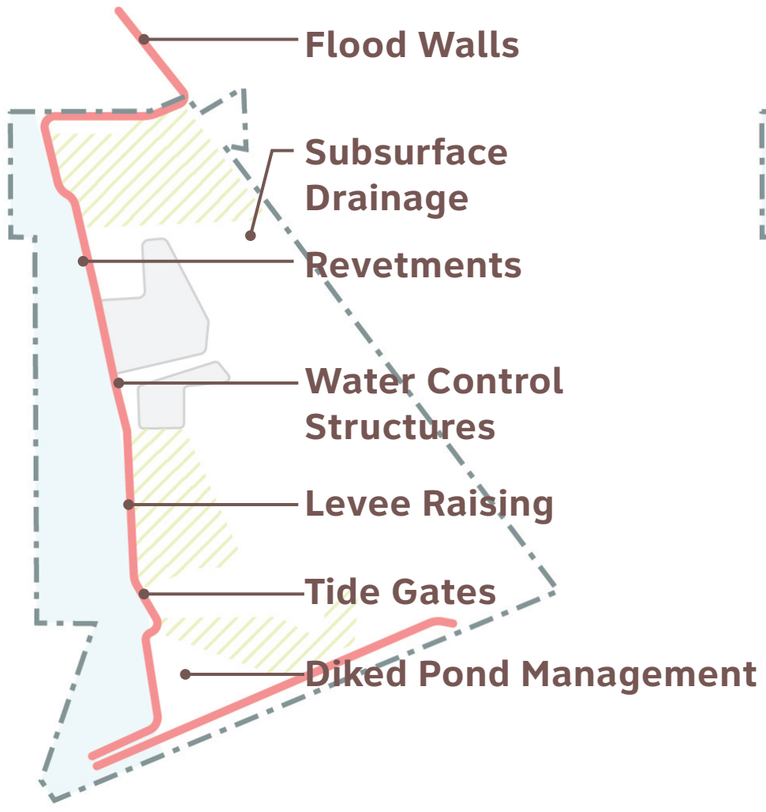
B. Hybrid

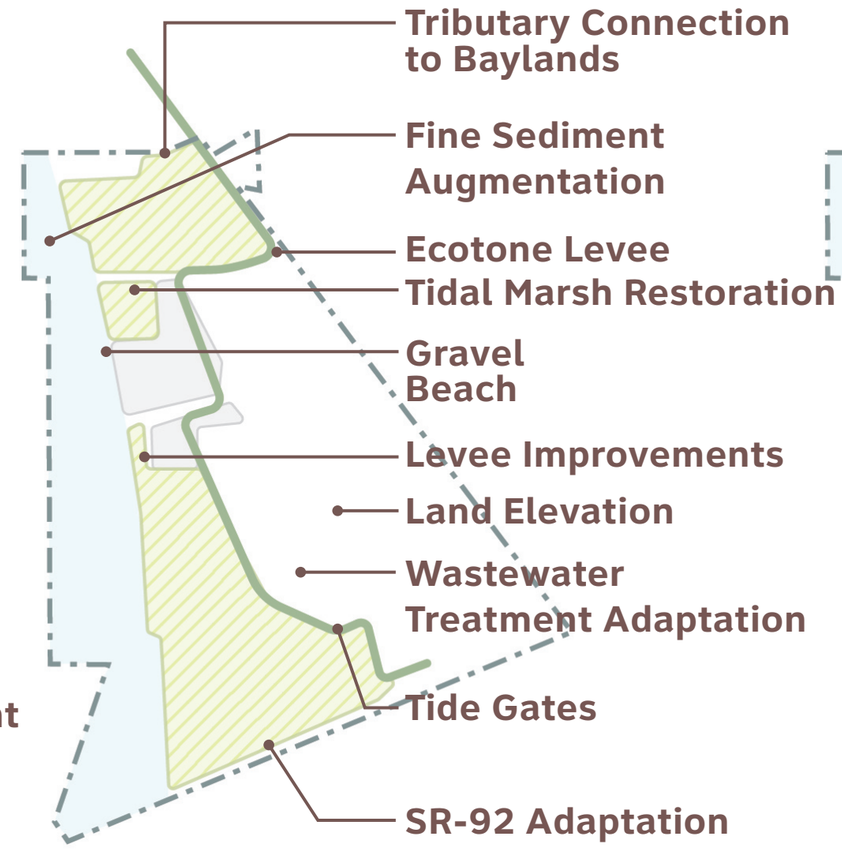


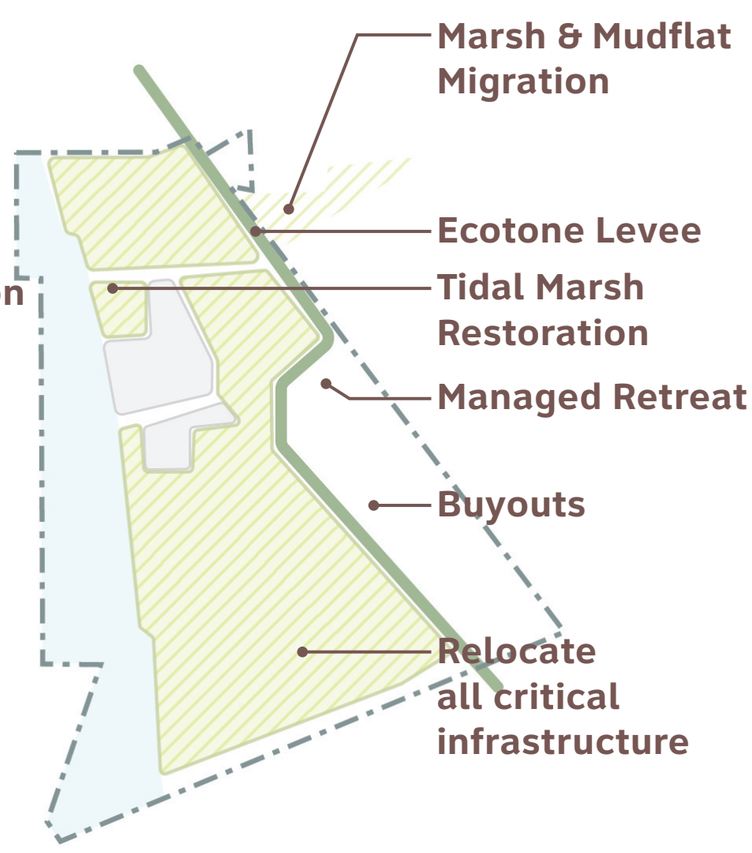
C. Retreat

NEXT STEPS

Related Strategies







A. Full Edge Protection

- Very costly
- Hard to permit/repair Bay levees
- Line of protection at the Bay not supported

B. Hybrid

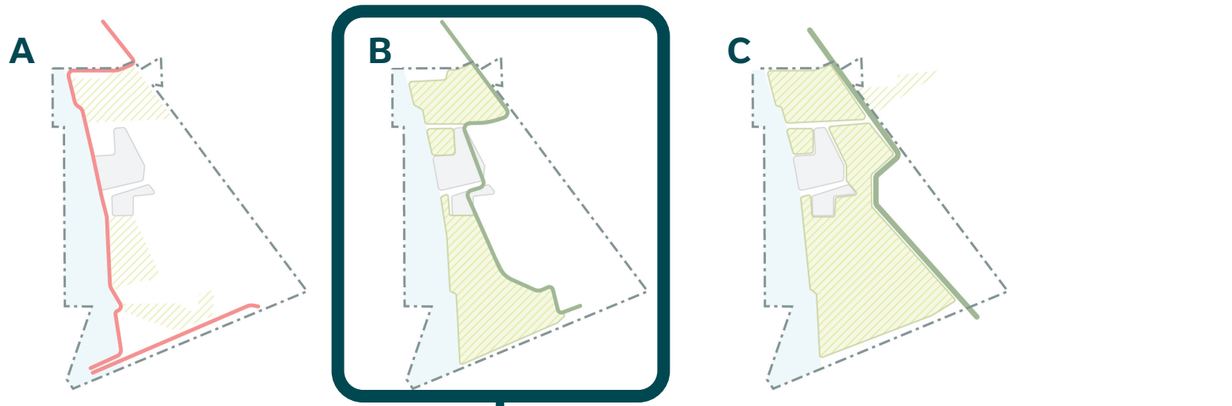
- Broad support for an ecotone levee
- Support for upland sediment pipeline from Don Castro to help marshes adapt
- Support for layered risk reduction

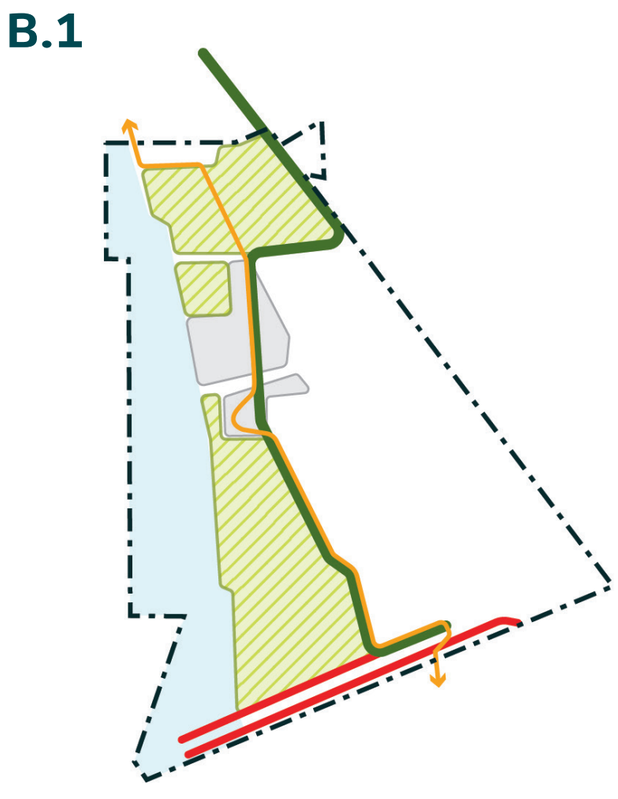
C. Full Retreat

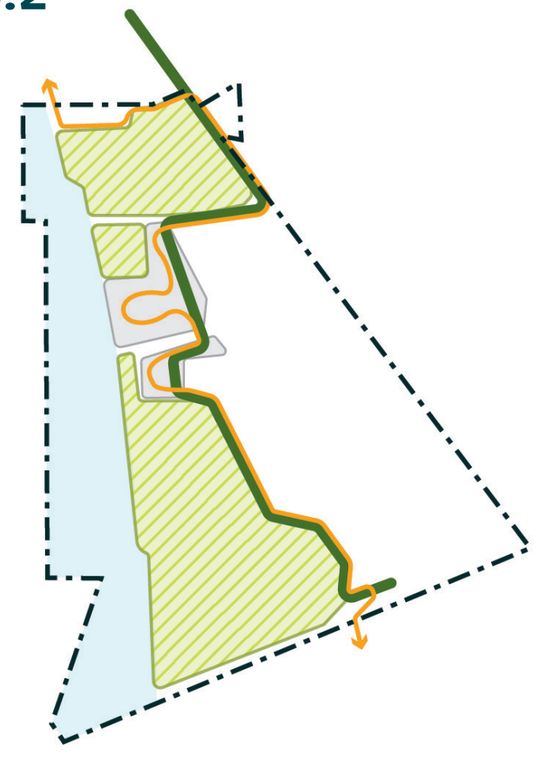
- COH does not support managed retreat
- COH wants to maintain industrial land use
- EBRPD concerned about marshes against residential

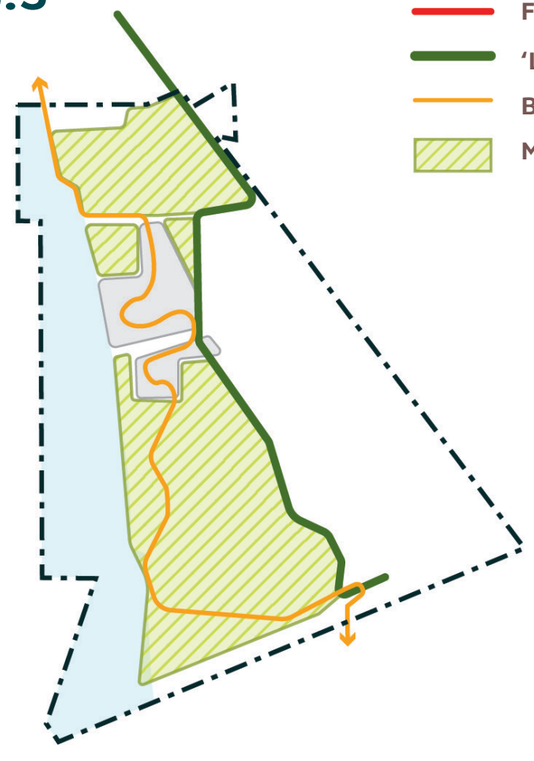
NEXT STEPS

Initial Scenario Ideas









FLOOD WALL

'LINE OF PROTECTION'

BAY TRAIL

MARSH

NEXT STEPS

- BACKGROUND REPORT ON EXISTING CONDITIONS
- STAKEHOLDER OUTREACH PLAN

- SEA LEVEL RISE AND GROUDWATER MAPPING ANALYSIS
- ONLINE DISPLAY OF SLR MAPS AND ASSOCIATED RISKS

- **GOALS AND POLICIES**
- **ADAPTATION STRATEGIES AND IMPLEMENTATION ACTIONS**

- SHORELINE MASTER PLAN CONCEPT
- DESIGN ALTERNATIVES
- IDENTIFY FUNDING SOURCES
- MASTER PLAN (DRAFT AND FINAL)

THANK YOU!