NORTH RICHMOND COLLABORATIVE SHORELINE ADAPTATION PLAN

NOVEMBER 2023

WEST COUNTY WASTEWATER

MITHŪN

ESA

the watershed project

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FUNDED BY: THE SAN FRANCISCO BAY RESTORATION AUTHORITY

SAN FRANCISCO BAY RESTORATION AUTHORITY

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IN MEMORIAM

Dr. Henry Clark
1945-2022

Dr. Henry Clark was a tireless advocate for environmental justice in Richmond and North Richmond: he grew up here, in the shadow of the Chevron Refinery, which helped shaped his life's work and commitment to racial and environmental justice. He was founder and executive director of the West County Toxics Coalition, and an original member of the North Richmond Municipal Advisory Council. He also served as Community Advisory Board member for Mithun's Resilient by Design effort, which helped advance early visions for multi-benefit approaches to sea level rise resilience in the community.

Sherry Stanley
1947-2022

Sherry Stanley was a highly engaged and supportive member of the Community Advisory Board for Resilient by Design. In addition, through her role as a director on the West County Wastewater board, she helped position West County Wastewater as a leader and partner in advancing a multi-benefit approach to sea level rise in North Richmond and west Contra Costa County, with a focus on balancing community needs, habitat restoration and crucial wastewater infrastructure in the face of climate change.

TABLE OF CONTENTS

This report is laid out as 11"x17" 2-page spread digital PDF, intended to be viewed in continous side-by-side format with cover page.

GLOSSARY OF TERMS

Adaptation • Human modifications to behavior and physical environments in response to climate change; in this report focusing on protection from or accomodation to sea level rise

BRRIT • San Francisco Bay Restoration Regulatory Integration Team, a multi-jurisdictional review body for permitting

CSAP • Collaborative Shoreline Adaptation Plan (this report)

Levee • An engineered earthen berm designed for flood protection.

NAVD88 • North American Vertical Datum of 1988, the base elevation used in this report

SLR • Sea level rise

LAND ACKNOWLEDGEMENT

The North Richmond Shoreline Adaptation project partners acknowledge that all restoration efforts on the North Richmond Shoreline take place on the unceded territory of xučyun (Huchiun), homeland of the Chochenyo-speaking Ohlone peoples, which includes the Lisjan nation, a confederation of the Karkin (Ohlone), Bay Miwok, Plains Miwok, Delta Yokut and Napian (Patwin) nations. 'Huchiun' land, also known as the East Bay of the San Francisco Bay Area, means "The land of the people" or "The people's land" in the Chochenyo language. The Lisjan people have lived on this land and cared for it since time immemorial and continue to remain in relationship to these lands through culture, ceremony and stewardship. They are important parts of not only the history of this area, but also in the continuing knowledge of this place.

Today, the Lisjan communities are working not only to revitalize their culture, knowledge, and native languages, but to rematriate their ancestral homeland. Tribal members living in the Bay Area recount how their ancestors relied on fish and seafood from the Bay for their livelihood and sustenance, as well as on seeds, roots, and berries from the surrounding hills and valleys. Boats made from Tule reed were used to travel along the Bay's waterways. The Lisjan people have always had a deep spiritual connection to the land and stewarded the natural environment. Colonization disrupted these living ecosystems and ways of life and in the 20th and 21st centuries, heavy industrialization brought oil refining and chemical manufacturing to The North Richmond Shoreline, intensifying environmental degradation. Today, the shoreline faces an additional threat: sea level rise as a result of climate change.

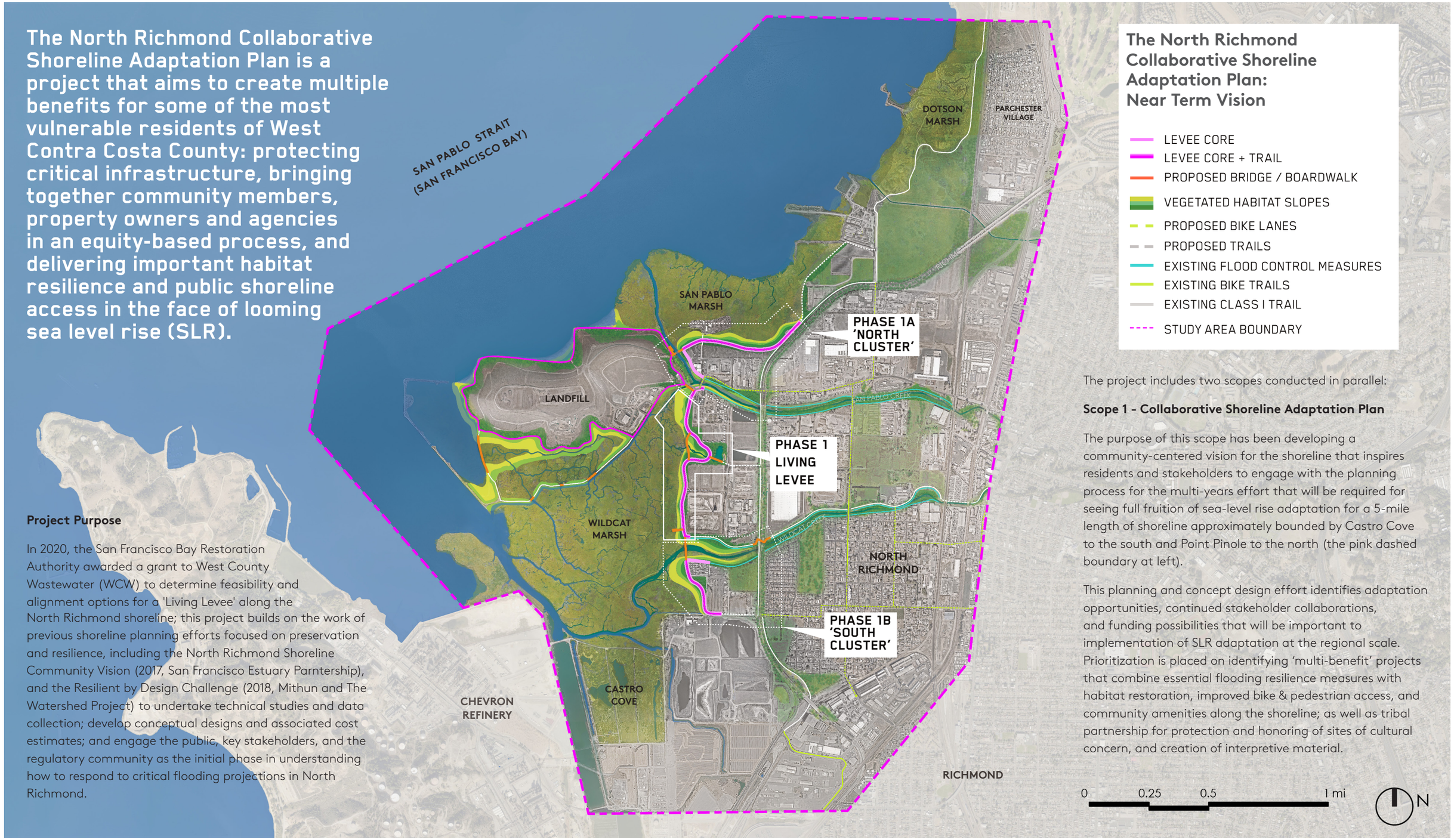
The restoration of the North Richmond Shoreline is designed to mimic the natural processes of coastal protection from sea level rise, creating a 'Nature-based Solution' that uses the benefits and services provided by ecosystems and natural processes. Restoring the shoreline also means restoring people's relationship with the shoreline, and following the lead of our Lisjan neighbors, the original protectors and stewards of this land whose connection to the shoreline has spanned hundreds of generations. Beyond this territory acknowledgment, we are committed to work toward dismantling colonialism through highlighting the presence and perspective of present-day Lisjan community members in our outreach and education, honoring Indigenous wisdom in our restoration strategy, and speaking the original name of this place in the Chochenyo language: Huchiun.

The project team collaborated with tribal leaders from the Confederated Villages of Lisjan and local artist Obi Kaufman to develop interpretive panels on the Past, Present and Future vision for the shoreline to be placed along the Wildcat Creek and Bay trail segments. Image provided by The Watershed Project.

OVERVIEW

PROJECT OVERVIEW

The North Richmond Collaborative Shoreline Adaptation Plan is a project that aims to create multiple benefits for some of the most vulnerable residents of West Contra Costa County: protecting critical infrastructure, bringing together community members, property owners and agencies in an equity-based process, and delivering important habitat resilience and public shoreline access in the face of looming sea level rise (SLR).



Project Purpose

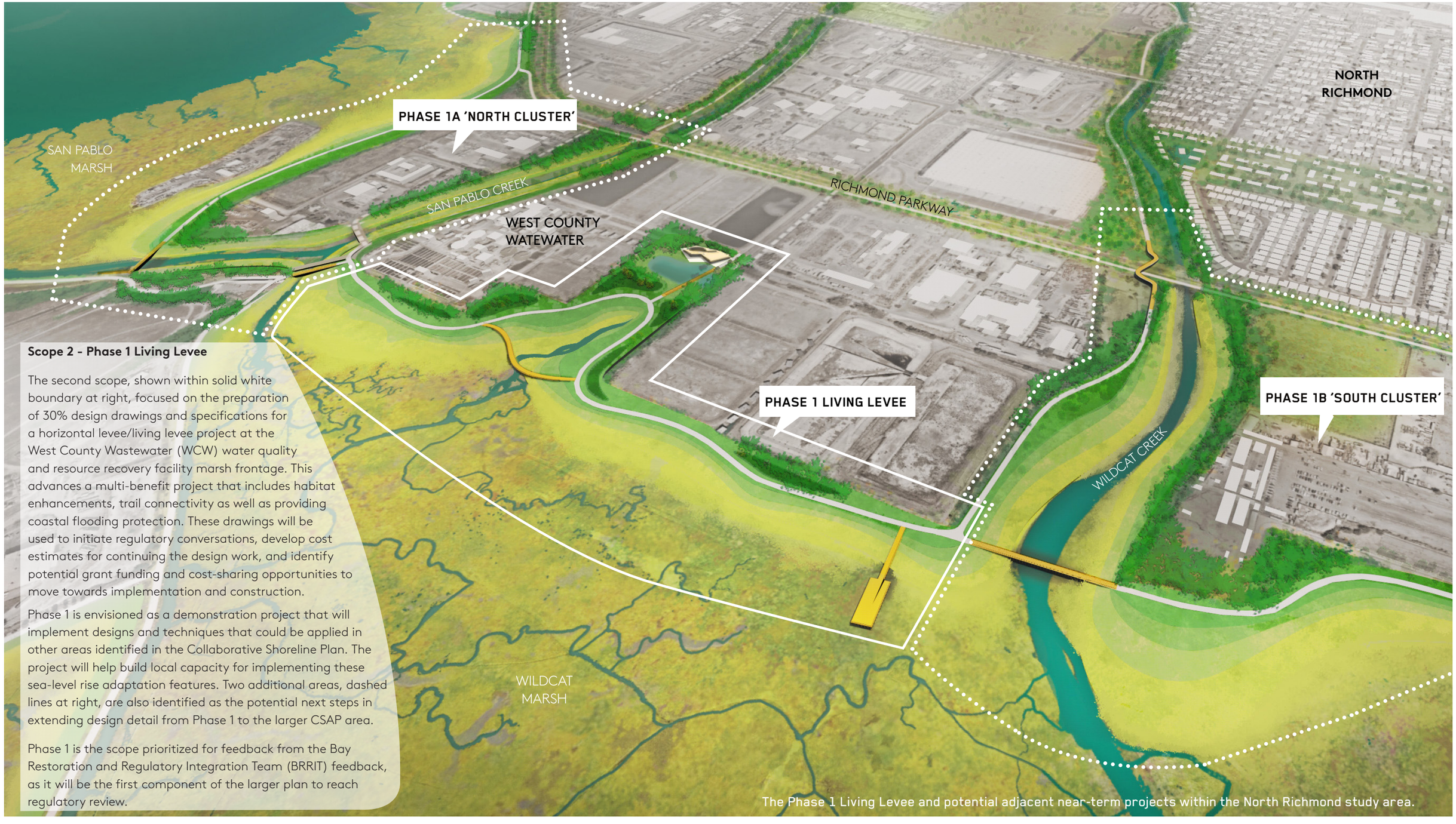
In 2020, the San Francisco Bay Restoration Authority awarded a grant to West County Wastewater (WCW) to determine feasibility and alignment options for a 'Living Levee' along the North Richmond shoreline; this project builds on the work of previous shoreline planning efforts focused on preservation and resilience, including the North Richmond Shoreline Community Vision (2017, San Francisco Estuary Parntership), and the Resilient by Design Challenge (2018, Mithun and The Watershed Project) to undertake technical studies and data collection; develop conceptual designs and associated cost estimates; and engage the public, key stakeholders, and the regulatory community as the initial phase in understanding how to respond to critical flooding projections in North Richmond.

The project includes two scopes conducted in parallel:

Scope 1 - Collaborative Shoreline Adaptation Plan

The purpose of this scope has been developing a community-centered vision for the shoreline that inspires residents and stakeholders to engage with the planning process for the multi-years effort that will be required for seeing full fruition of sea-level rise adaptation for a 5-mile length of shoreline approximately bounded by Castro Cove to the south and Point Pinole to the north (the pink dashed boundary at left).

This planning and concept design effort identifies adaptation opportunities, continued stakeholder collaborations, and funding possibilities that will be important to implementation of SLR adaptation at the regional scale. Prioritization is placed on identifying 'multi-benefit' projects that combine essential flooding resilience measures with habitat restoration, improved bike & pedestrian access, and community amenities along the shoreline; as well as tribal partnership for protection and honoring of sites of cultural concern, and creation of interpretive material.



Scope 2 - Phase 1 Living Levee

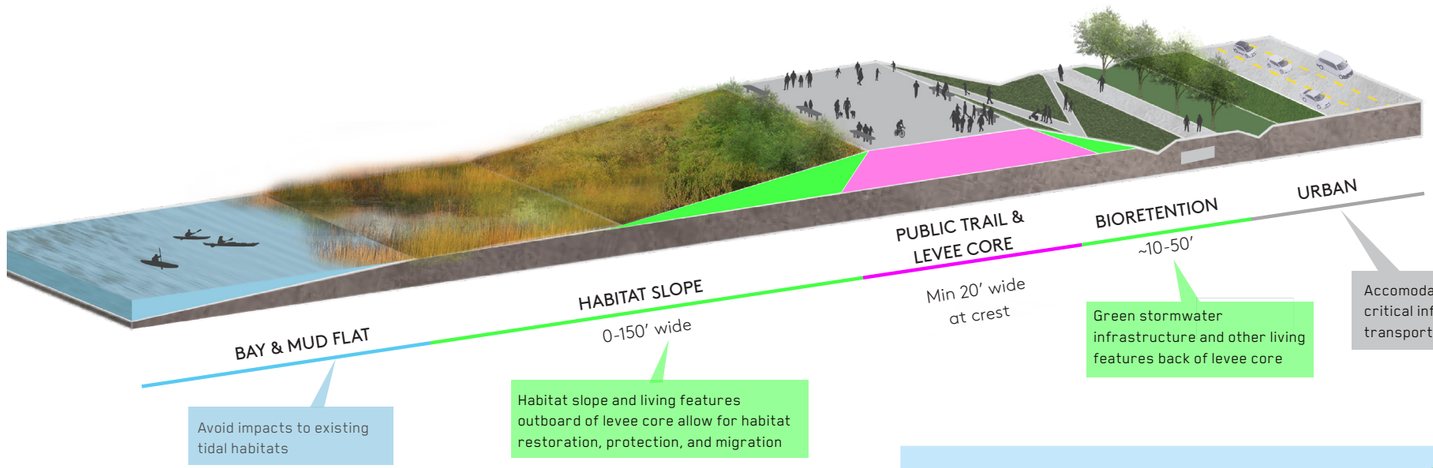
The second scope, shown within solid white boundary at right, focused on the preparation of 30% design drawings and specifications for a horizontal levee/living levee project at the West County Wastewater (WCW) water quality and resource recovery facility marsh frontage. This advances a multi-benefit project that includes habitat enhancements, trail connectivity as well as providing coastal flooding protection. These drawings will be used to initiate regulatory conversations, develop cost estimates for continuing the design work, and identify potential grant funding and cost-sharing opportunities to move towards implementation and construction.

Phase 1 is envisioned as a demonstration project that will implement designs and techniques that could be applied in other areas identified in the Collaborative Shoreline Plan. The project will help build local capacity for implementing these sea-level rise adaptation features. Two additional areas, dashed lines at right, are also identified as the potential next steps in extending design detail from Phase 1 to the larger CSAP area.

Phase 1 is the scope prioritized for feedback from the Bay Restoration and Regulatory Integration Team (BRRIT) feedback, as it will be the first component of the larger plan to reach regulatory review.

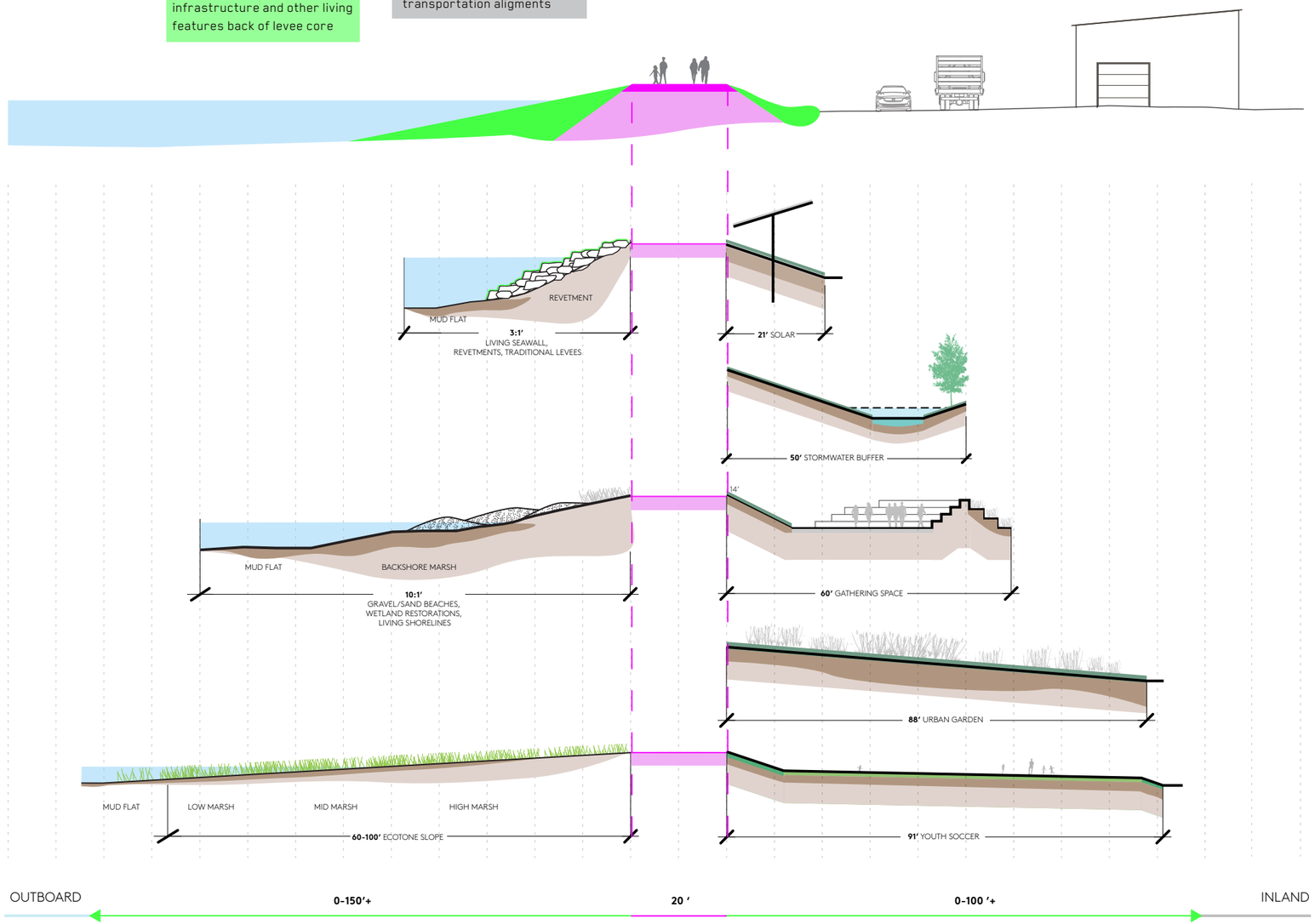
The Phase 1 Living Levee and potential adjacent near-term projects within the North Richmond study area.

A FLEXIBLE BAND: MULTI-BENEFIT ADAPTATIONS



The 'Living Levee' approach suggests not just a singular, but a suite of potential nature-based adaptation measures that can be configured in various ways, along with programmatic options for green infrastructure on the inland side of the levee core as well.

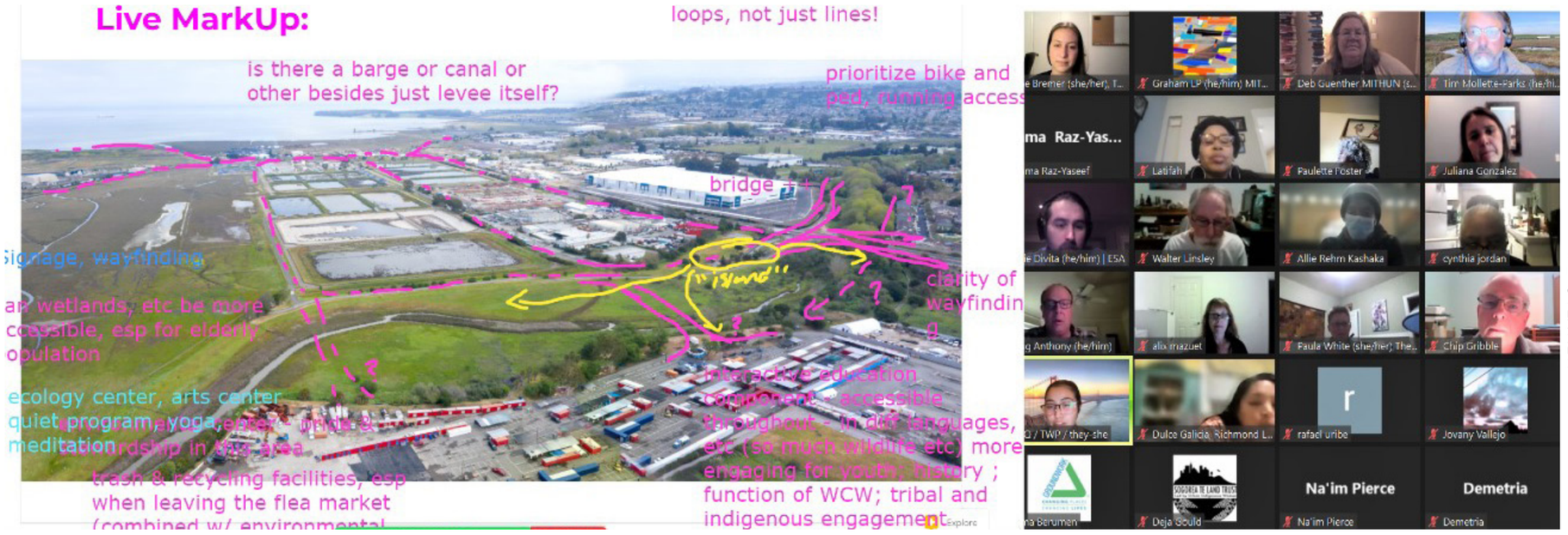
Under consideration in the broader North Richmond Collaborative Shoreline Adaptation Plan, are approaches such as shoreline vegetation management, beaches, oyster reefs, eelgrass, and more.



Project Goals

The project goals, refined over the course of this preliminary design phase, emphasize WCW's commitment to developing a multi-benefit project, with the project team focusing on designing approaches that can achieve the following:

- Flood protection and sea-level rise resilience
- Compatibility with essential WCW plant functions
- Continued and improved public access and recreational opportunities
- Ecological enhancement
- Integration and compatibility with regional planning efforts around related SLR adaptation, habitat creation and remediation, public access, recreation, education, and community engagement, participation & co-design.



SNAPSHOT FROM A CO-DESIGN PROCESS: Community engagement included hybrid models and drawing together over zoom during the period when the pandemic prevented in-person meetings.

West County Wastewater, with support from the Mithun-ESA-Watershed Project team, prioritized innovative design and engineering solutions, creative approaches to implementation and funding, and enhancing the relationships among North Richmond community members, public agency staff and elected officials and leaders that will be needed for achieving SLR adaptation.

These relationships and ongoing collaborations will be critical to achieving lasting well-being for one of the most disadvantaged communities in the Bay Area. As sea level rise prediction models and engineering approaches continue to evolve in the coming years, it is these relationships and collaborations that emerged from this process that may prove most crucial, as our communities learn to co-exist with shoreline adaptation into the foreseeable future.

The North Richmond Collaborative Shoreline Adaptation Plan (and the Phase 1 Living Levee Phase 1 project nested within it) focuses on creating transitional upland habitat, providing flood protection to critical infrastructure and neighboring disadvantaged communities, and improving public access to the North Richmond Shoreline.

Through the community co-design and engagement processes, this Collaborative Plan focuses on beginning the knowledge sharing and coalition building required for the implementation and long-term adaptive management of living infrastructure.

Community Working Group participants visiting the Phase 1 Living Levee site at West County Wastewater / Wildcat Marsh frontage.

SUMMARY OF RECOMMENDATIONS

Collaborative Shoreline Adaptation

The North Richmond Collaborative Shoreline Adaptation Plan (NR-CSAP) combines community vision for trails, access and amenities, and nature-based adaptation features into a suite of multi-benefit SLR concepts along the 5-mile shoreline from Castro Cove to Dotson Marsh. Spanning many different habitats, land uses, topographical and hydrological conditions, the NR-CSAP reflects a variety of community co-designed benefits. Some portions of the CSAP area are well-suited to a living levee approach, while other areas will require alternate strategies to balance flooding protection, access and habitat enhancement.

The team reached out to property owners and other stakeholders to discuss shared vulnerabilities and potential adaptation measures throughout the shoreline. From those conversations, the plan identified two "Collaboration Clusters" north and south of the Phase 1 project where near-term SLR vulnerability overlapped with cooperative land-holding partners and most crucially, priorities identified during the community co-design process.

For the Phase 1A North Cluster, where Republic Services, WCW and Contra Costa Flood Control District are primary landowners, the NR-CSAP developed conceptual designs for hydrologic reconnection of San Pablo Creek to Wildcat Marsh (to restore a historic landscape connectivity pattern), tidal reconnection of diked stormwater ponds, and SLR adaptation concepts to help protect the capped landfill edge as rising seas and wave action increases. Enhanced access points for pedestrians from the Richmond Parkway were also provided in the concepts. In addition, input from members of the Confederated Villages of Lisjan identified the need for a small boat launch to support their traditional programming on San Pablo Bay, and the opportunity exists near the outfall of San Pablo Creek to provide this amenity.

In the Phase 1B South Cluster, where stakeholders include the Flood Control District and East Bay Parks, the plan identified opportunities for living levee and trail connections to help bolster SLR resilience on a future flooding path that would affect the Parkway and homes in North Richmond.

Phase 1 Living Levee Design

The current design for the "Phase 1 Living Levee" project, advanced through the scope of this grant to 30% drawings (see appendix for detailed exhibits), is an ecotone-slope levee that will allow for habitat transition, public trail improvements and coastal flooding protection for critical infrastructure at the West County Wastewater treatment facility. The top of the living levee core as currently designed is approximately 2.5 feet higher than the adjacent existing trails and levees at Wildcat Creek and the surface elevation of the nearby Richmond Parkway. In addition to providing for flood protection, enhanced trail access, and community amenities, the Phase 1 project at WCW also creates seven acres of tidal marsh restoration.

Future phases of site investigation and design development will include investigating issues of groundwater rise, potential soil contamination, and geotechnical issues, among other considerations, though this report conveys what is known currently based on review of existing documents. Further study and design effort will be crucial, and funding requests for continuing this work are on-going to deliver this essential project to people of North Richmond.

PROPOSED VIEW (CUTAWAY): A 'Living Levee' at West County Wastewater frontage on Wildcat Marsh in North Richmond, combining flood protection, new trails and amenities, habitat restoration and stormwater management.

1. CONDITIONS AT THE SHORELINE

ON THE GROUND IN NORTH RICHMOND

The North Richmond Shoreline Baylands have undergone considerable fragmentation, though some components of its historical ecological landscape persist. The area comprises both unincorporated west Contra Costa County and City of Richmond, and is known as North Richmond. Historically, this was a place of tremendous ecological diversity; the Bay coastline and marshlands of the Wildcat and San Pablo creek deltas provided an abundance of natural resources that were stewarded for thousands of years by Ohlone tribes indigenous to Huchiun.

Many areas within the proposed project were originally wetlands that have been filled or altered. The location of the historic shoreline prior to European colonization and mass habitat alteration is roughly approximated by the current alignment of Richmond Parkway. The low-lying area with fertile soils provided good agricultural opportunities as human settlement increased.

The project area contains five upland habitat types and seven habitat types associated with aquatic features. The following upland habitat types occur in the Area: coastal scrub, grassland, mixed woodland, riparian, and developed/ruderal. Aquatic habitat types include shallow bay, tidal flat, tidal marsh, tidal panne, diked wetland, seasonal wetland, and pond. Much of the area is developed, with tidal marsh, tidal flat, and shallow bay the next largest habitat types. Other habitat types occur in much smaller quantities.

In the years following the establishment of the adjacent Chevron Richmond Refinery in 1901 and the World War II ship-building effort, North Richmond became a place of racial inequity. African Americans arrived in the Bay Area from across the country during the WWII labor surge and were forced to settle in the low-lying and flood-prone topographic bowl through de facto segregation. Cut off physically from adjacent resources by railroads and other infrastructure, community members have also endured a lack of public services and long distance travel to their seat of governmental representation, more than 20 miles away by car in Martinez. Today, North Richmond continues to endure ongoing environmental and racial injustice.

- In the CalEnviroScreen 4.0 report (2021), North Richmond was ranked as the second most environmentally disadvantaged census tract in the state, with a score of 91.84 out of 100. This means that North Richmond residents face high levels of exposure to environmental hazards, which can lead to a range of health problems.
- The Climate Change & Health Vulnerability Indicators for California (CCHVI) identifies that 26% of the North Richmond area is in a SLR risk zone. That is about 20 times the statewide average (1.6%). That risk is shouldered overwhelmingly by African American and Latino residents according to the CCHVI data.
- The North Richmond census tract is rated 'Very High' on the FEMA Risk Index, landing in the 96th percentile nationwide for risk overall. This rating is driven by risks of social vulnerability, flooding (riverine and coastal) and heat wave.

"...we get to be a group of people that come together and strategically plan things so that we won't get hit hard in the end. And that we will have a future to look forward to....."

—Princess Robinson,

North Richmond Municipal Advisory Council Member and Community Working Group Participant

In response to these challenges, North Richmond community leaders respond with multiple generations of advocacy and environmental leadership. For shoreline adaptation work, community members have been highly engaged in planning efforts to date. In 2021, West County Wastewater (WCW), Mithun and The Watershed Project (TWP) began a Community Co-Design process that led to preparing the this collaborative adaptation plan. The details of that effort are in Chapter 2. This most recent engagement builds upon years of community visioning in the area, including North Richmond Shoreline Visioning Project in 2017 (by SFEP and TWP), and in 2018 the Community Advisory Board for North Richmond's Resilient by Design process (also led by TWP and Mithun). These efforts originally identified the priority for nature-based sea-level rise adaptation along the shoreline that would also provide education and recreation. And in 2019, TWP conducted a needs assessment as part of the Integrated Regional Water Management and Tribal Involvement Program. The community deemed exploring the feasibility of multi-benefit, nature-based SLR resilience solutions along the NR shoreline as priority projects.

This Collaborative Shoreline Adaptation Plan is the next response to these calls for action, continuing the legacy of community-led enivronmental stewardship and advocacy in North Richmond.

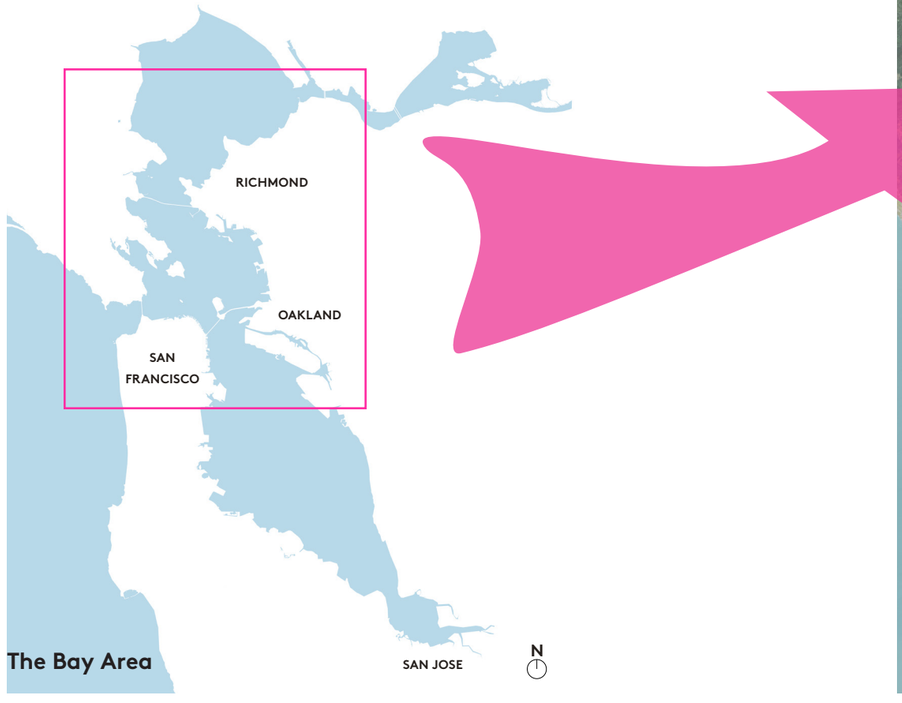
INTERPRETATION: The project team collaborated with tribal leaders from the Confederated Villages of Lisjan and local artist Obi Kaufman to develop interpretive panels on the Past, Present and Future vision for the shoreline to be placed along the Wildcat Creek and Bay trail segments. Image provided by The Watershed Project.

SITE CONTEXT: KEY PLAN

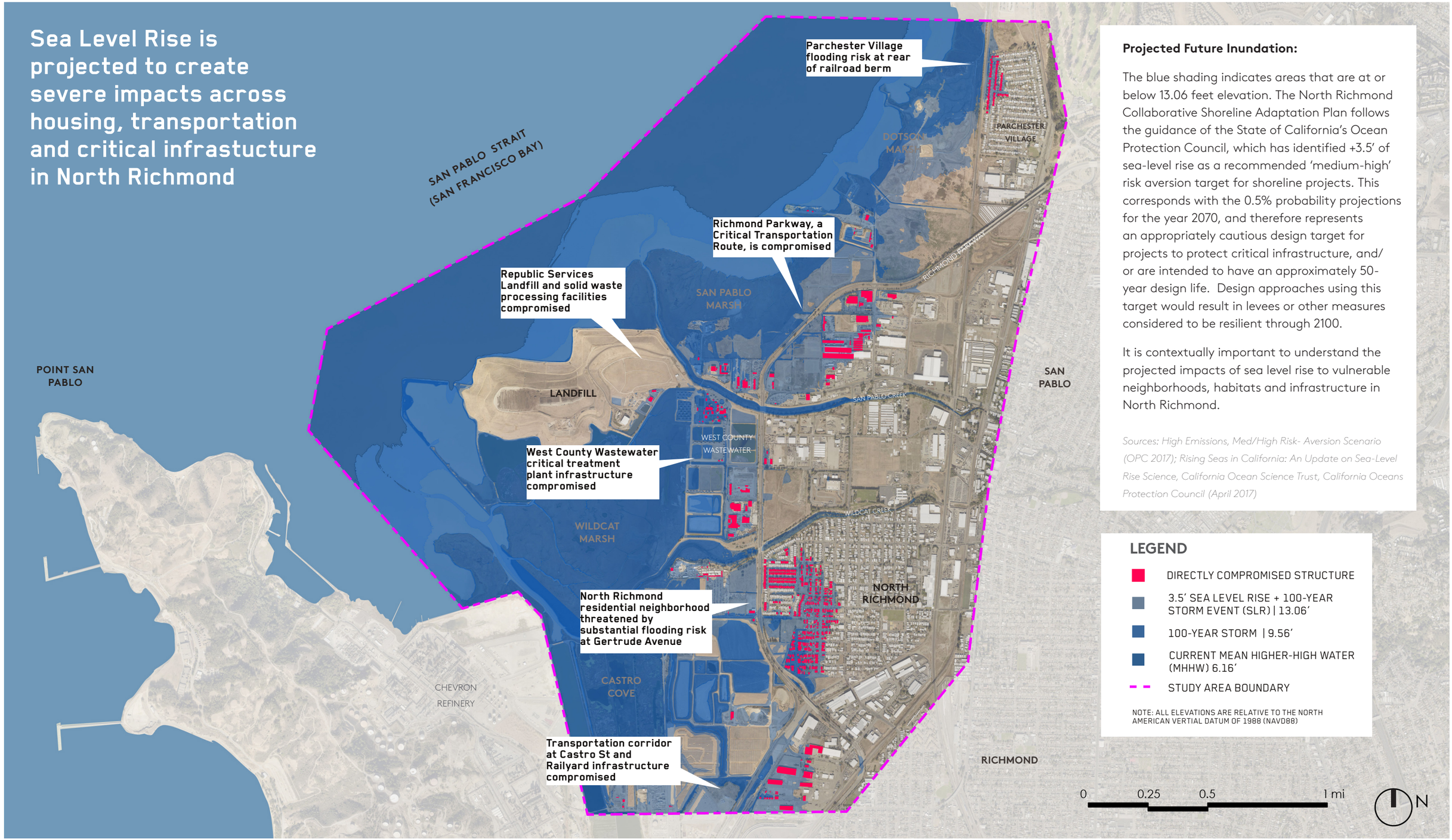
North Richmond, California

The North Richmond Collaborative Shoreline Adaptation Plan examines a study area comprising approximately five miles of shoreline located in West Contra Costa County on San Francisco Bay.

Fronting on the San Pablo Strait, where the waters of the Pacific Ocean ebb and flow with massive inland freshwater inputs from the San Joaquin delta, the Bay here is home to a diversity of marine and transitional habitats, as well as intensive industrial development and residential neighborhoods.



SEA LEVEL RISE VULNERABILITIES IN NORTH RICHMOND



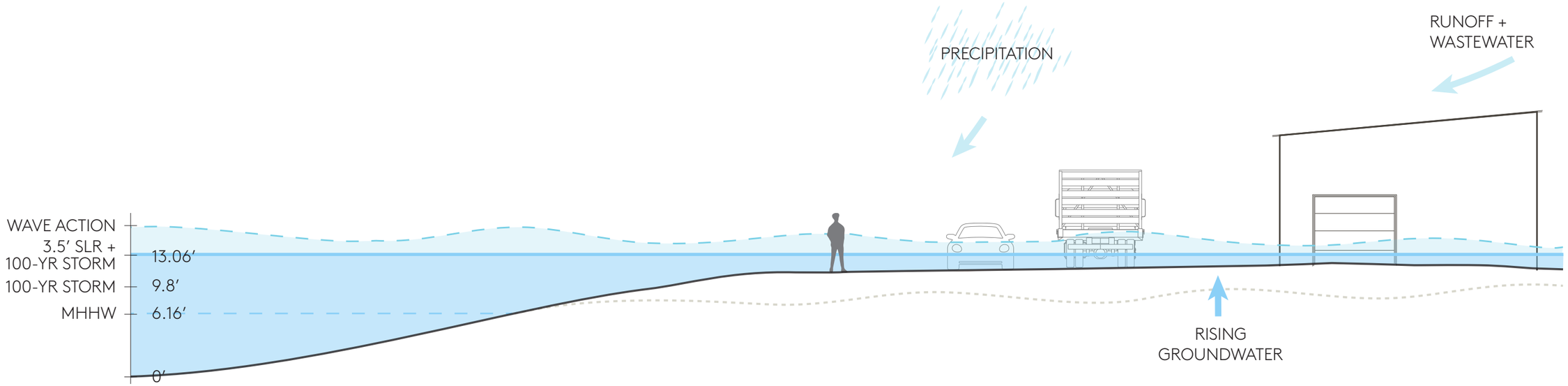
Projected Future Inundation:

The blue shading indicates areas that are at or below 13.06 feet elevation. The North Richmond Collaborative Shoreline Adaptation Plan follows the guidance of the State of California's Ocean Protection Council, which has identified +3.5' of sea-level rise as a recommended 'medium-high' risk aversion target for shoreline projects. This corresponds with the 0.5% probability projections for the year 2070, and therefore represents an appropriately cautious design target for projects to protect critical infrastructure, and/or are intended to have an approximately 50-year design life. Design approaches using this target would result in levees or other measures considered to be resilient through 2100.

It is contextually important to understand the projected impacts of sea level rise to vulnerable neighborhoods, habitats and infrastructure in North Richmond.

Sources: High Emissions, Med/High Risk- Aversion Scenario (OPC 2017); Rising Seas in California: An Update on Sea-Level Rise Science, California Ocean Science Trust, California Oceans Protection Council (April 2017)

UNDERSTANDING SEA LEVEL RISE



SEA LEVEL RISE DIAGRAM: In the San Francisco Bay, the high tide water levels (Mean High Higher Water, or MHHW) rise to a little over six feet in elevation. During storm events such as a 100-year storm, the waters rise to about nine feet. By 2100, the water levels (Sea Level Rise, or SLR) during a 100-year storm event are projected to increase by more than 3 feet, impacted further by waves from storms and wind, precipitation, stormwater runoff and groundwater levels. All elevations in this report utilize the North American Vertical Datum of 1988 (NAVD88).

Sea Level Rise in California

Sea-level rise (SLR) will dramatically change conditions along shorelines around the world. The State of California's Ocean Protection Council has published guidance for planning for future sea-level rise along California's shorelines. While we cannot predict the rate of future sea-level rise with certainty, projections published in the State guidance document indicate that San Francisco Bay is likely to experience between +1.6 and + 3.4 feet of sea-level rise by the year 2100 (OPC 2018).

Coastal flood protection projects should apply a risk-based approach to identify appropriate flood protection design targets. This analysis should consider the types of infrastructure and land uses that are at risk of flooding, the level of vulnerability and sensitivity to flood impacts. This analysis should also include consideration of the design life of the proposed project, and evaluation of future adaptation pathways for managing the landscape beyond the design life of the current project. Projects intended to protect critical infrastructure should plan to accommodate higher amounts of sea-level rise in the near-term, while projects that protect flood-tolerant land uses might aim to accommodate a lower amount of sea-level rise in the near-term. Regardless of the near-term sea-level rise design target, all projects should also begin identifying longer-term adaptation pathways to accommodate continuing sea-level rise over longer time periods.

As such, the North Richmond Collaborative Shoreline Adaptation Plan has identified +3.5 feet of sea-level rise as a recommended design target for shoreline projects protecting critical infrastructure in the project's planning area. This target corresponds with the 0.5% probability projections for the year 2070 (High Emissions, Med/High Risk-Aversion Scenario for 2070, OPC 2017), and therefore represents an appropriately cautious design target for projects to protect critical infrastructure, and/or are intended to have an approximately 50-year design life. This design target also corresponds to the upper end of the likely range of predicted sea-level rise for the year 2100 (High Emissions, Low Risk-Aversion Scenario for 2100, OPC 2017).

Based on these projections, a project that is designed to accommodate +3.5ft of sea-level rise is very likely to be resilient to sea-level rise through 2070, and has a good chance to be resilient through 2100. Additional adaptation future measures would be needed to accommodate sea-level rise beyond these time-horizons.

It is contextually important to understand the projected impacts of sea level rise to vulnerable neighborhoods, habitats and infrastructure in North Richmond. Please see the Adapting to Rising Tides online interactive map to explore these projections further.

Some examples of other impacts include: local geology and soil conditions and accounting for potential settlement and consolidation; exposure to waves, wind set-up, and storm surges that might increase flood elevations at the project location; and effects of local watersheds, including creek flows, stormwater runoff, and groundwater, that might cause flooding separate from and/or in combination with elevated coastal water levels.

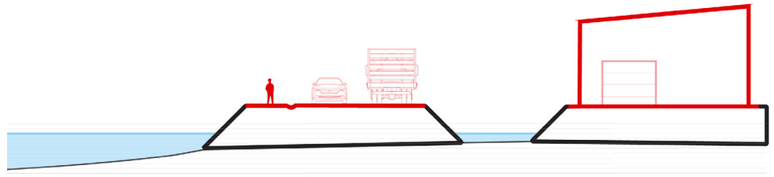
Sea Level Rise Adaptation Options

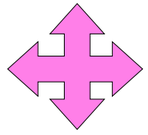
The total project study area covers approximately 5 miles of shoreline in North Richmond, from Castro Cove in the south to Parchester Village in the north. Though one of the primary goals is to provide effective flood protection from sea level rise to vulnerable areas within this zone, this should not be confused with a continuous levee along this length of shoreline. Any proposed design under consideration from this project will be calibrated to the many complexities of hydrology, habitat, infrastructure, etc within this study area, and will be engineered to work with existing creeks, flood plains and stormwater flows. Effective flood protection in North Richmond will likely require a number of multi-benefit infrastructure projects that are strategically linked to address multiple vulnerable locations.

ADAPTATION OPTIONS (at right):
Concept diagram for addressing the impacts of rising sea levels.

RAISE

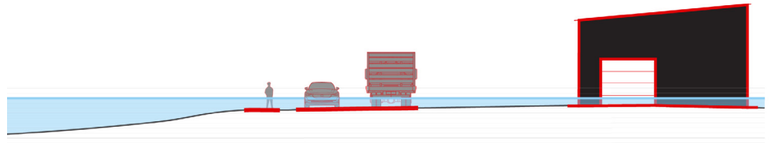
To adjust to 3.5' of SLR by 2100, structures can be elevated by raising foundations or elevating the structures themselves.

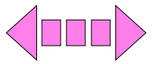




RECONFIGURE

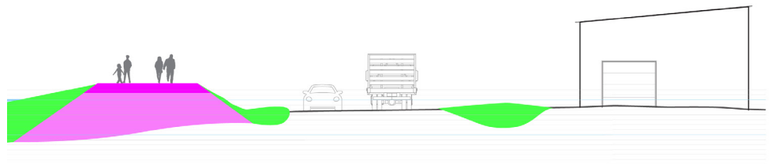
In the face of rising waters, some land uses are reconfigured, shuffling functions and features, such as relocating infrastructure systems to higher ground, or transferring water resistant spaces closer to coastal locations.



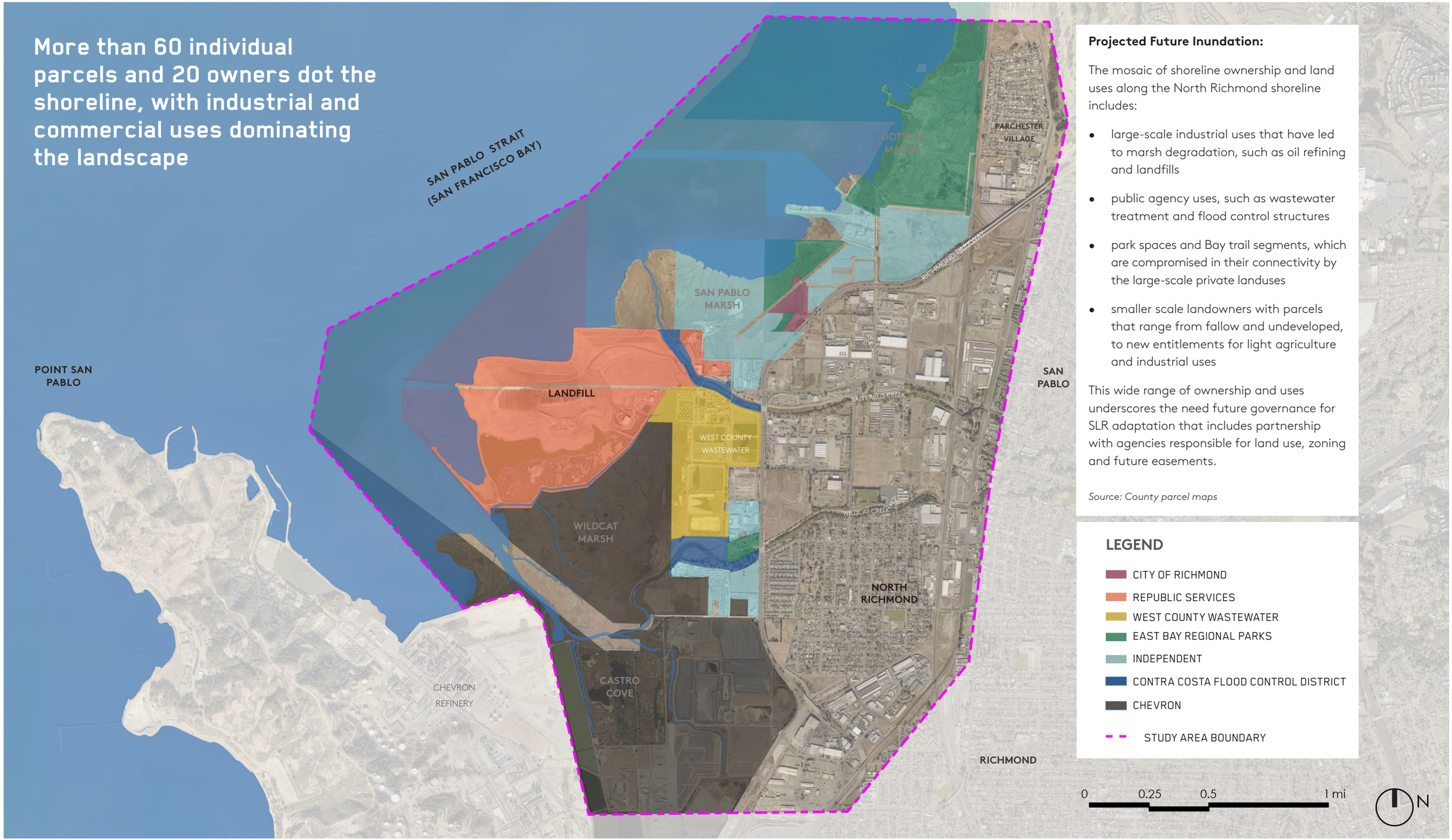


ADAPT

Often a more 'nature-based' design option, this method softens hardscape to include more vegetation space such as marshes and lagoons at the water's edge, plus basins to hold and slow water during storm events.



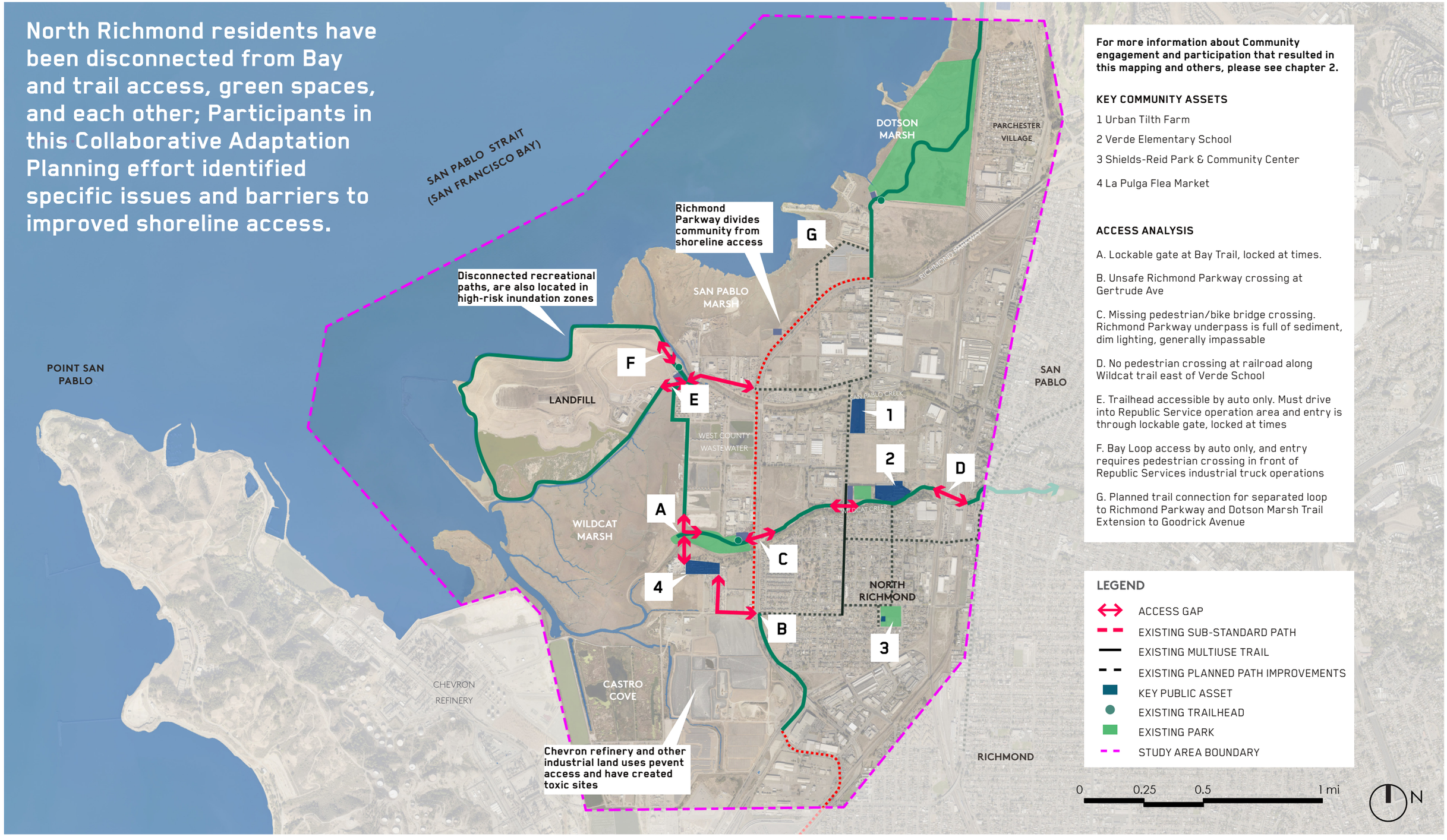
LAND OWNERSHIP COMPLEXITY



NORTH RICHMOND COLLABORATIVE SHORELINE ADAPTATION PLAN / 2023

CONNECTIVITY CHALLENGES

North Richmond residents have been disconnected from Bay and trail access, green spaces, and each other; Participants in this Collaborative Adaptation Planning effort identified specific issues and barriers to improved shoreline access.



For more information about Community engagement and participation that resulted in this mapping and others, please see chapter 2.

KEY COMMUNITY ASSETS

1 Urban Tilth Farm

2 Verde Elementary School

3 Shields-Reid Park & Community Center

4 La Pulga Flea Market

ACCESS ANALYSIS

A. Lockable gate at Bay Trail, locked at times.

B. Unsafe Richmond Parkway crossing at Gertrude Ave

C. Missing pedestrian/bike bridge crossing. Richmond Parkway underpass is full of sediment, dim lighting, generally impassable

D. No pedestrian crossing at railroad along Wildcat trail east of Verde School

E. Trailhead accessible by auto only. Must drive into Republic Service operation area and entry is through lockable gate, locked at times

F. Bay Loop access by auto only, and entry requires pedestrian crossing in front of Republic Services industrial truck operations

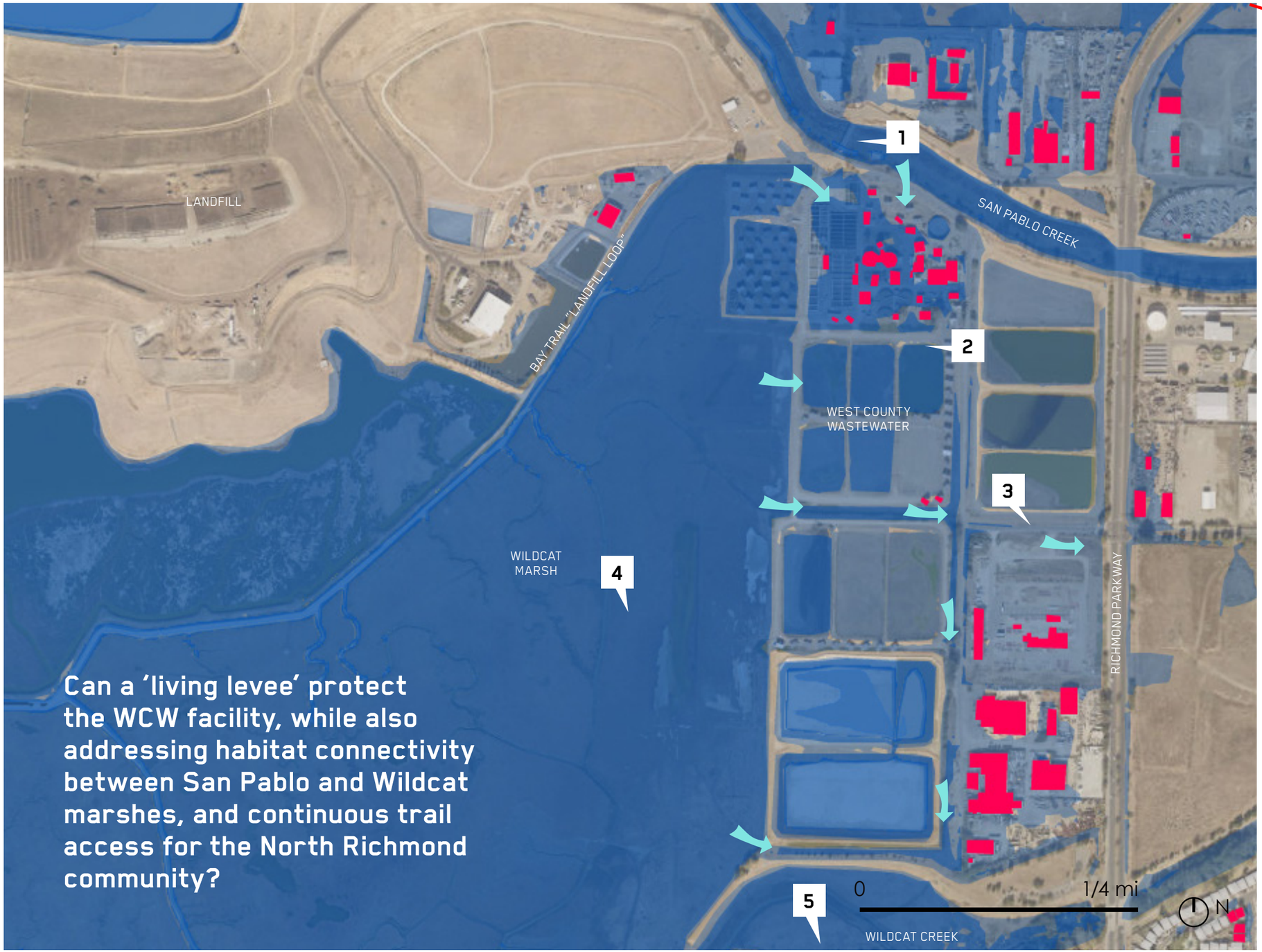
G. Planned trail connection for separated loop to Richmond Parkway and Dotson Marsh Trail Extension to Goodrick Avenue

LEGEND

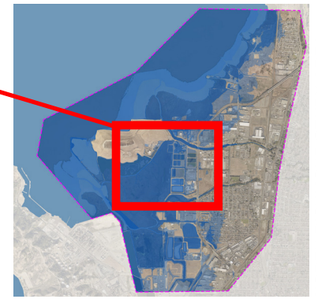
- ACCESS GAP
- EXISTING SUB-STANDARD PATH
- EXISTING MULTIUSE TRAIL
- EXISTING PLANNED PATH IMPROVEMENTS
- KEY PUBLIC ASSET
- EXISTING TRAILHEAD
- EXISTING PARK
- STUDY AREA BOUNDARY

AERIAL VIEW: Looking north over West County Wastewater facilities, Wildcat Marsh and Wildcat Creek

ENLARGED VIEW: PROJECTED INUNDATION AT WEST COUNTY WASTEWATER VICINITY



Can a 'living levee' protect the WCW facility, while also addressing habitat connectivity between San Pablo and Wildcat marshes, and continuous trail access for the North Richmond community?



NORTH RICHMOND STUDY AREA

FLOODING EXPOSURES

1. Vehicular access to Republic Services and the Bay Trail Landfill Loop compromised
2. West County Wastewater treatment facilities completely inundated
3. Vehicular access to West County Wastewater facilities and adjacent businesses compromised

ECOLOGICAL EXPOSURES

4. Wildcat marsh ecoysystem will disrupted with deeper and more frequent inundation
5. Wildcat Creek and San Pablo Creek Riparian transition zones impacted by salt water intrusion.

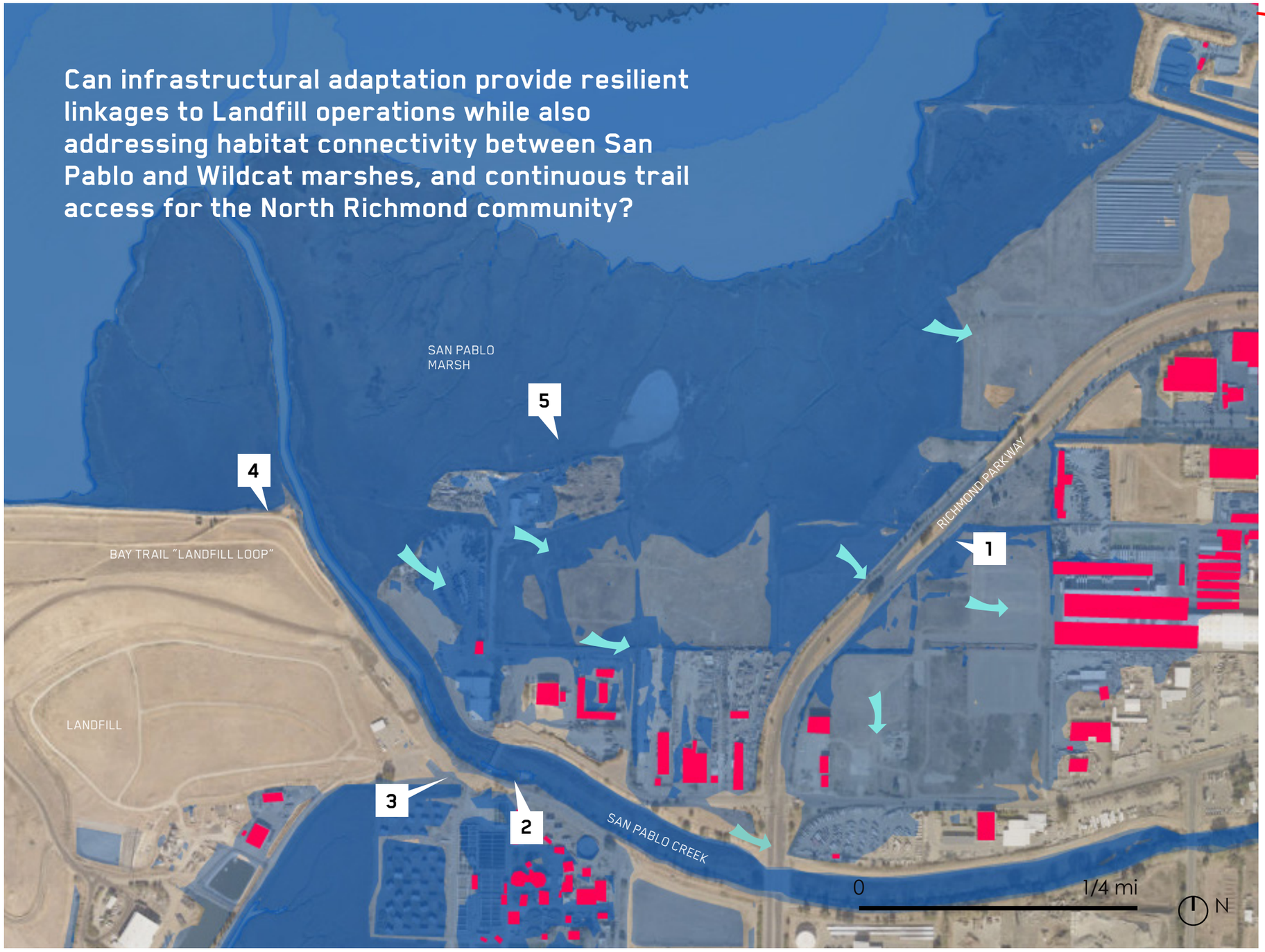
LEGEND

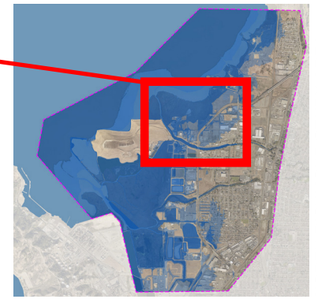
- APPARENT FLOODING PATHWAY
- COMPROMISED STRUCTURE
- 100 YEAR COASTAL FLOOD + 3.5' SEA LEVEL RISE | **13.06'**
- 100 YR COASTAL FLOOD | **9.56'**
- MEAN HIGH WATER | **6.16'**
- STUDY AREA BOUNDARY

NOTE: ALL ELEVATIONS ARE RELATIVE TO THE NORTH AMERICAN VERTIAL DATUM OF 1988 (NAVD88)

AERIAL VIEW: Looking south at San Pablo Marsh, San Pablo Creek, Republic Services Landfill, and West County Wastewater

ENLARGED VIEW: PROJECTED INUNDATION AT SAN PABLO MARSH & RICHMOND PARKWAY





NORTH RICHMOND STUDY AREA

FLOODING EXPOSURES

1. Richmond Parkway, a critical throughway and emergency route, will experience frequent innundation expanding inland to businesses east of the parkway
2. Vehicular access to Republic Services waste processing facilities will be inundated
3. Pedestrian access to Bay Trail and Landfill Loop will be further cut off from community

ECOLOGICAL EXPOSURES

4. Rising waters will increase erosion around landfill and Republic Services infrastructure
5. Existing marsh ecosystems will be disrupted with deeper and more frequent inundation

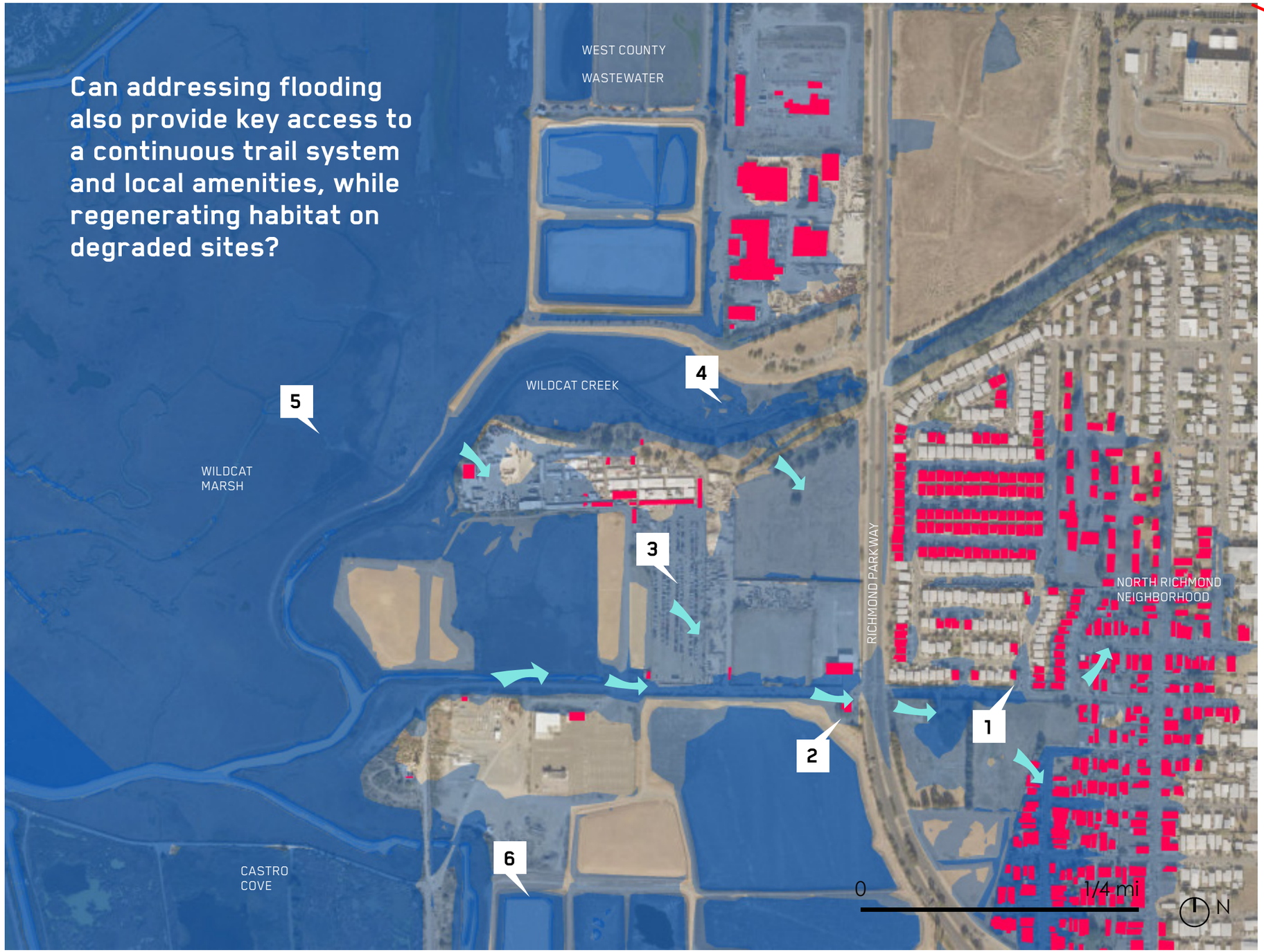
LEGEND

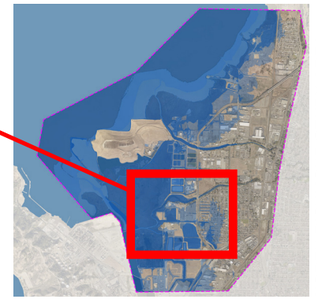
- APPARENT FLOODING PATHWAY
- COMPROMISED STRUCTURE
- 100 YEAR COASTAL FLOOD + 3.5' SEA LEVEL RISE | **13.06'**
- 100 YR COASTAL FLOOD | **9.56'**
- MEAN HIGH WATER | **6.16'**
- STUDY AREA BOUNDARY

NOTE: ALL ELEVATIONS ARE RELATIVE TO THE NORTH AMERICAN VERTIAL DATUM OF 1988 (NAVD88)

AERIAL VIEW: Looking West over North Richmond neighborhoods, La Pulga Flea Market and out to Castro Cove, Wildcat Marsh and the Chevron Refinery

ENLARGED VIEW: PROJECTED INUNDATION AT NORTH RICHMOND NEIGHBORHOOD





FLOODING EXPOSURES

1. North Richmond neighborhoods will be inundated and disrupt access to/from residences
2. Flooding will limit critical access and services to Gertrude Pump Station and related stormwater infrastructure
3. Community flea market will be inundated

ECOLOGICAL EXPOSURES

4. Flooding intrusion into Wildcat Creek
5. Existing marsh ecosystems will be disrupted by deeper and more frequent inundation
6. Chevron ponds and facilities southwest of this site will experience inundation and erosion issues

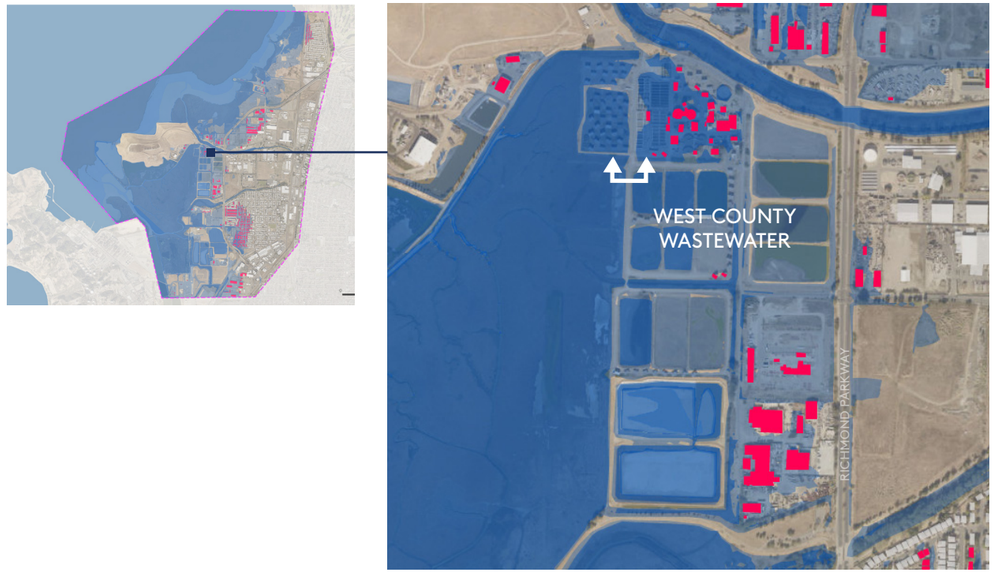
LEGEND

- APPARENT FLOODING PATHWAY
- COMPROMISED STRUCTURE
- 100 YEAR COASTAL FLOOD + 3.5′ SEA LEVEL RISE | **13.06′**
- 100 YR COASTAL FLOOD | **9.56′**
- MEAN HIGH WATER | **6.16′**
- STUDY AREA BOUNDARY

NOTE: ALL ELEVATIONS ARE RELATIVE TO THE NORTH AMERICAN VERTIAL DATUM OF 1988 (NAVD88)

West County Wastewater Facility

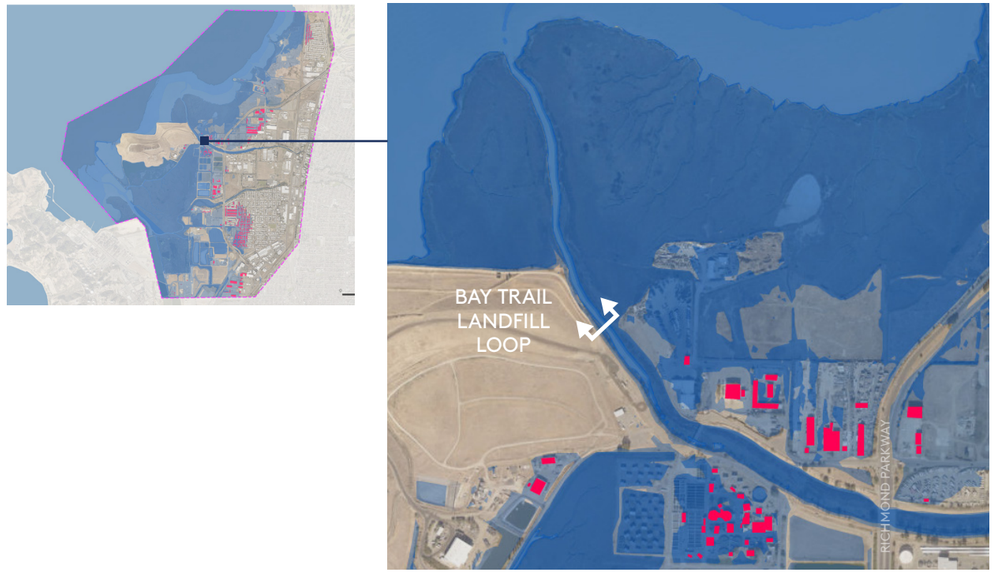
Inundation at the West County Wastewater water quality and resource recovery plant will compromise this critical public health infrastructure as well as existing marsh ecosystems, and pedestrian trail access.

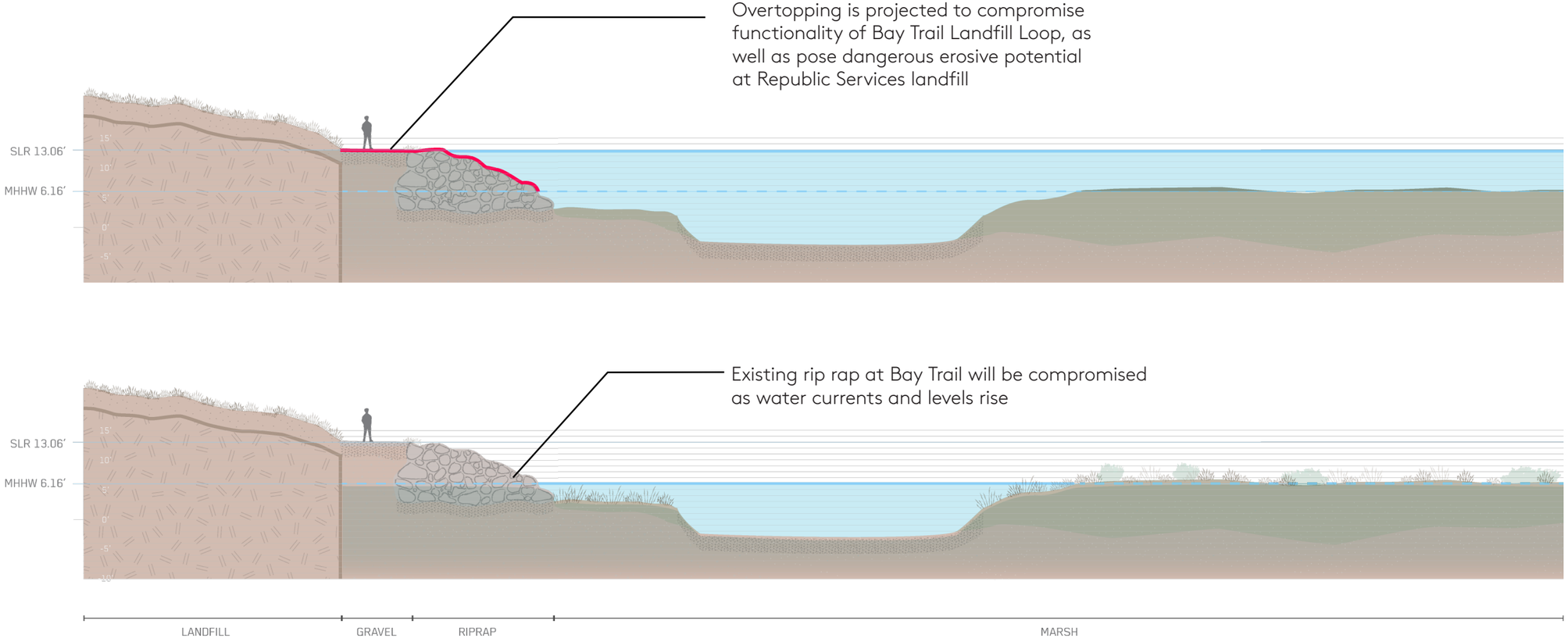


SCALE 1"=20'
(section is 250' wide)

Bay Trail Landfill Loop

Inundation at the Bay Trail Landfill Loop will compromise existing marsh ecosystems, pedestrian trail access, and critical waste processing infrastructure

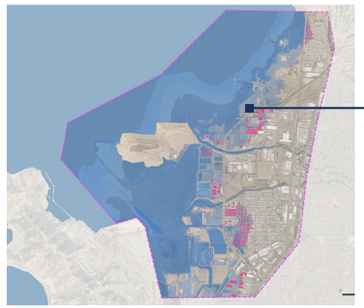


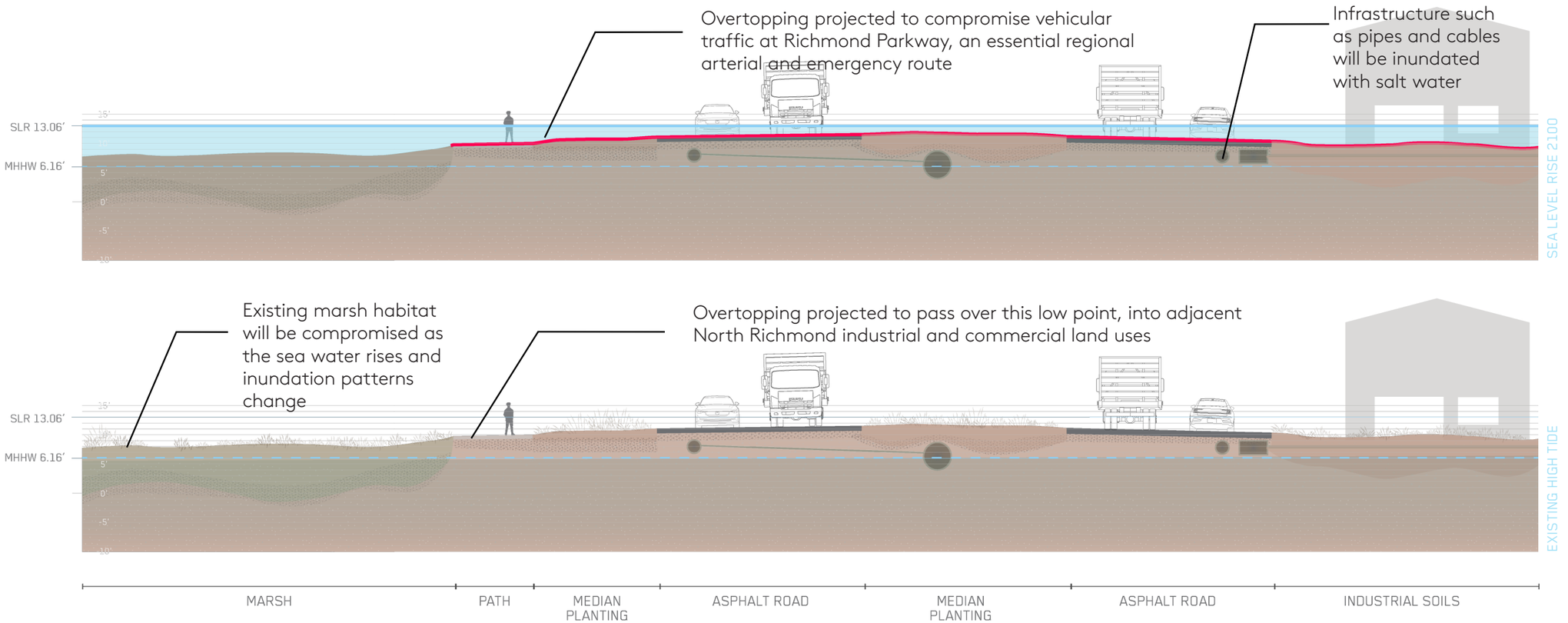


SCALE 1"=20'
(section is 250' wide)

Richmond Parkway

In the northern portion of the study area, inundation threatens transit and emergency routes, as well as critical transitional habitat zones.



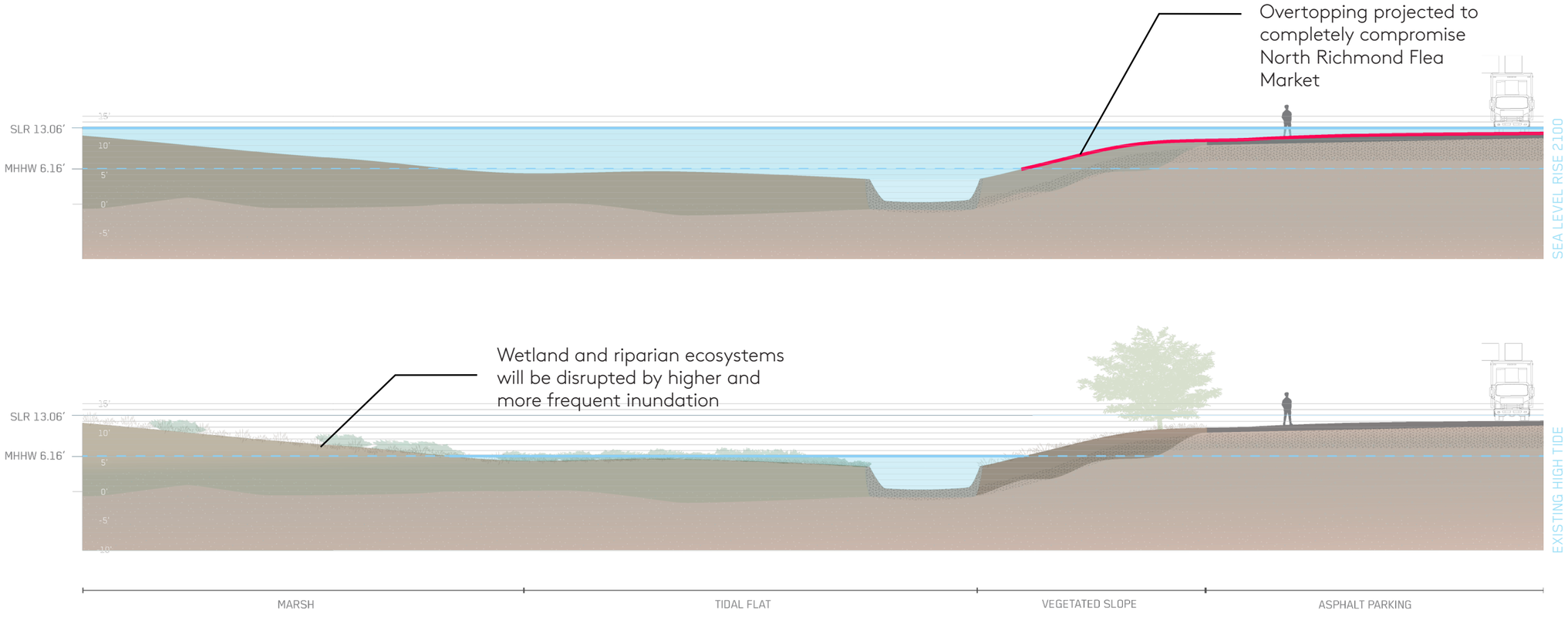


- OVERTOPPING
- UNDERGROUND PIPE CABLE INFRASTRUCTURE
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED, SHOWN DIAGRAMATICALLY)

SCALE 1"=20'
(section is 250' wide)

Flea Market

At the southern end of the study area, inundation of the North Richmond flea market will compromise this community asset as well as riparian ecosystems at Wildcat Creek



OVERTOPPING

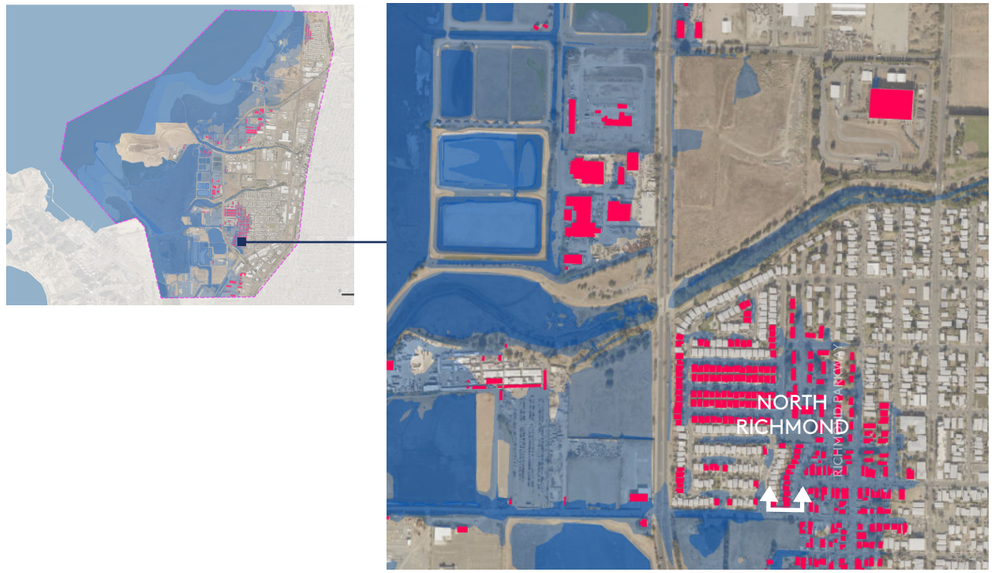
GROUND

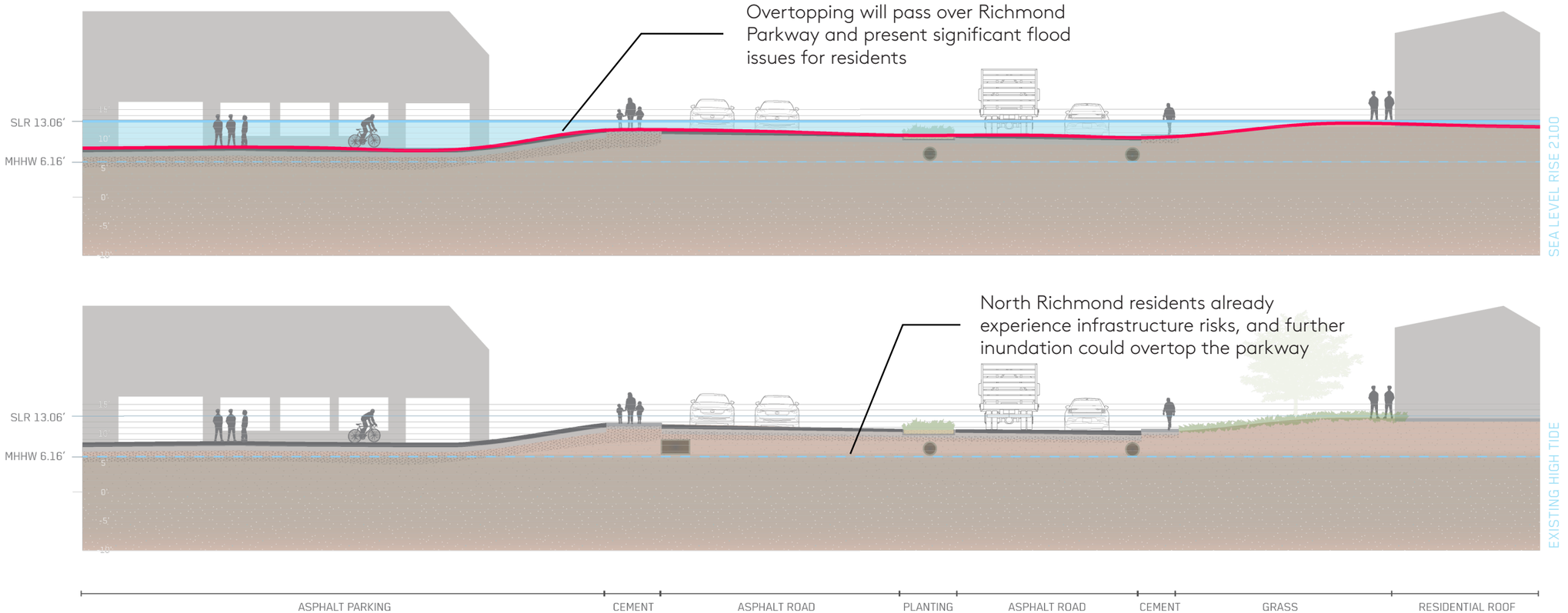
SUB-SURFACE GROUNDWATER (ESTIMATED, SHOWN DIAGRAMATICALLY)

SCALE 1"=20'
(section is 250' wide)

North Richmond Neighborhood

The North Richmond residential neighborhood is projected to experience severe inundation with disrupted access to/from residences; Flooding will limit critical access and services to Gertrude Pump Station and related stormwater infrastructures.





OVERTOPPING

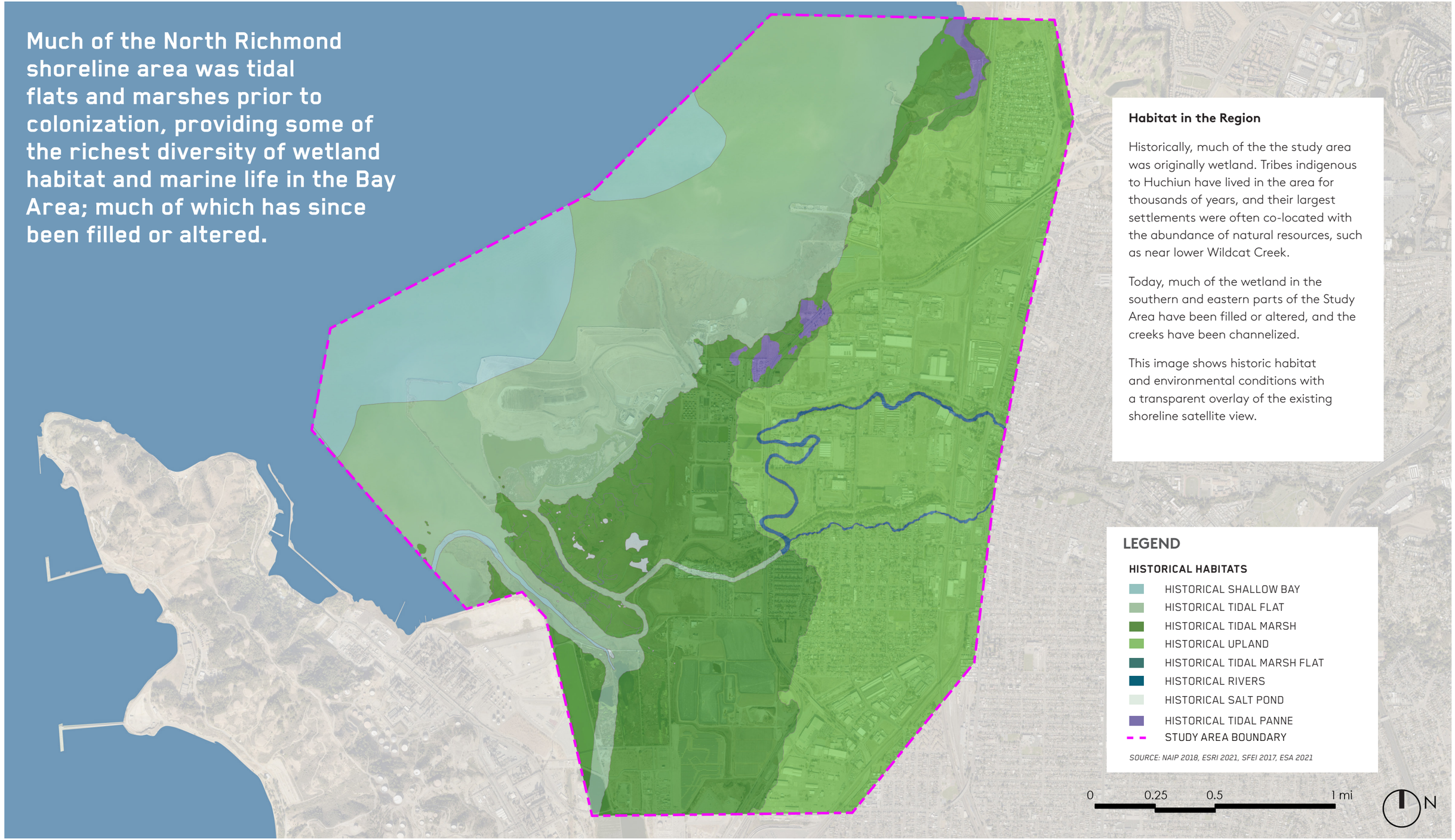
GROUND

SUB-SURFACE GROUNDWATER (ESTIMATED, SHOWN DIAGRAMATICALLY)

SCALE 1"=20'
(section is 250' wide)

HISTORIC HABITAT

Much of the North Richmond shoreline area was tidal flats and marshes prior to colonization, providing some of the richest diversity of wetland habitat and marine life in the Bay Area; much of which has since been filled or altered.



Habitat in the Region

Historically, much of the the study area was originally wetland. Tribes indigenous to Huchiun have lived in the area for thousands of years, and their largest settlements were often co-located with the abundance of natural resources, such as near lower Wildcat Creek.

Today, much of the wetland in the southern and eastern parts of the Study Area have been filled or altered, and the creeks have been channelized.

This image shows historic habitat and environmental conditions with a transparent overlay of the existing shoreline satellite view.

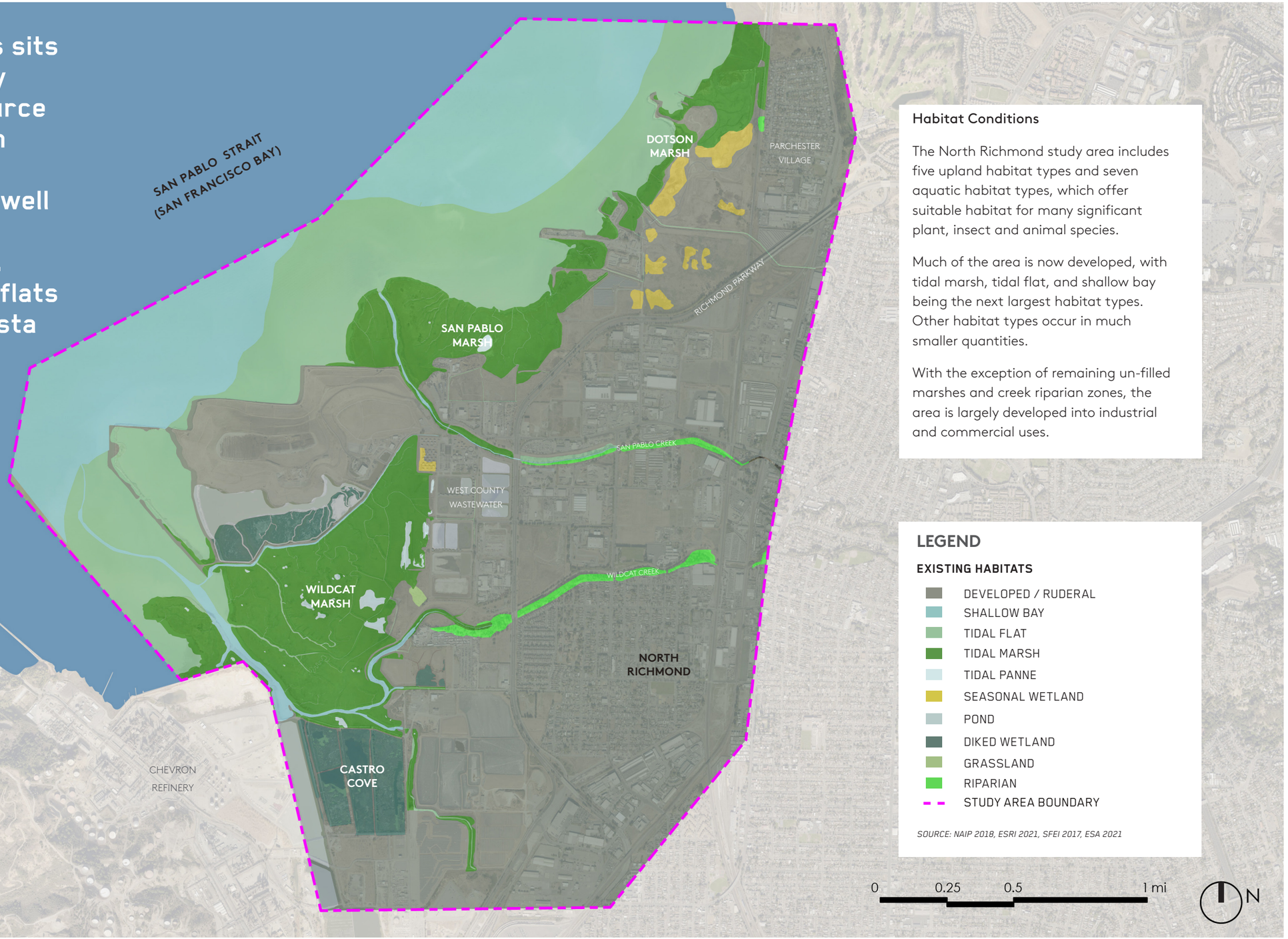
EXISTING HABITAT

On former tidal marshes sits most of the West County Water Quality and Resource Recovery Plant, Chevron refinery (filled Castro Cove), and railyards, as well as portions of the North Richmond neighborhood. Atop former tidal (mud) flats sits the West Contra Costa Landfill.

POINT SAN PABLO

UPLAND HABITAT	ACRES
Coastal scrub	17.1
Grassland	4.5
Mixed woodland	13.0
Riparian	28.0
Developed/ruderal	1289.2

AQUATIC HABITAT	ACRES
Shallow bay	326.7
Tidal flat	687.2
Tidal marsh	517.7
Tidal panne	12.0
Diked wetland	101.5
Seasonal wetland	33.9
Pond	122.7



Habitat Conditions

The North Richmond study area includes five upland habitat types and seven aquatic habitat types, which offer suitable habitat for many significant plant, insect and animal species.

Much of the area is now developed, with tidal marsh, tidal flat, and shallow bay being the next largest habitat types. Other habitat types occur in much smaller quantities.

With the exception of remaining un-filled marshes and creek riparian zones, the area is largely developed into industrial and commercial uses.

ECOLOGICAL CONDITIONS

ABOVE: Haibtat types within the study area vary from upland to aquatic, such as these areas along Wildcat, left, and San Pablo Creeks. (Habitat acrage source: ESA, SFEI ASC 2017)

Historically, much of the Study Area was originally tidal wetland. The pre-industrial shoreline aligns roughly with present-day Richmond Parkway; further inland, deep-rooted perennial grasses formed the basis of a coastal prairie ecosystem.

Ohlone tribes indigenous to Huchiun have lived in the area for thousands of years, and maintained its diverse ecosystems in harmonious relationship. In the 18th century, European colonization displaced most of the Huchiun, and converted much of the land to agriculture and cattle ranching.

Land use changes continued along the water's edge. At the end of the 19th century, the establishment of a deepwater port at Point Richmond, just south of the Study Area, led to rapid urbanization and industrialization (Collins et al., 2001).

Today, much of the tidal wetland in the southern and eastern parts of the Study Area have been filled or altered, and the creeks have been channelized.

The study area contains five upland habitat types and seven aquatic habitat types, which offer suitable habitat for many significant plant, insect and animal species. (See appendix "Species of Special Interest" for list and traits.)

Below is an overview of Study Area conditions researched for this project; see appendix for specifics and related reports.

GEOLOGY

Geologic conditions within the study area generally consist of artificial fill over marine and marsh deposits, commonly referred to as "Bay Mud". Bay mud is highly deformable, which introduces challenges when designing earthwork projects near existing infrastructure.

Project designs will need to anticipate the short and long-term consolidation of these soft bay mud subsoils. This includes designing to earthwork to accommodate moderate subsoil deformations, while also planning and budgeting for monitoring and periodic maintenance to regrade shoreline features when deformations exceed allowable limits.

WATERSHEDS

The study area consists of three watersheds, with two significant creeks flowing through into the bay: San Pablo Creek to the north, and Wildcat Creek to the south. The smaller Castro Cove watershed flows into Wildcat Marsh near the Chevron refinery.

These creeks are a significant source of sediment supporting the tidal marshes of the area. They are also important wildlife corridors that connect the bay eastward to Wildcat Canyon Regional Park and other inland open spaces, including critical historical steelhead runs.

COASTAL CONDITIONS

San Pablo Bay is a sub-embayment of the San Francisco Estuary. The typical daily tide ranges from 0' to 6.1' (MHHW), and annual king tides can approach 7.5' NAVD88 (NOAA Richmond Tide Gauge Station 9414863).

San Pablo Bay is sheltered from ocean swells, and typical waves rarely exceed 1' high; however storm winds from the northwest can create waves approaching 3' in height along the North Richmond shore. Ship wakes from large cargo and ferries can also generate waves higher than 1 foot.

HABITAT

Habitat conditions are projected to change over time as a result of rising sea levels, with changes driven by by rising tide elevations. These habitat changes are also influenced by the natural accretion of organic and mineral sediment in the tidal marshes and other shoreline habitats, and by shoreline construction. Future changes in shoreline habitat composition will depend strongly on the rate of sea-level rise, but conservation and habitat enhancement efforts can also improve the quality and resilience of these habitats.

NORTH RICHMOND SHORELINE

SPECIES OF THE BAY

Black Oystercatcher
Bombus occidentalis

California Ridgeway's Rail
Rallus obsoletus obsoletus

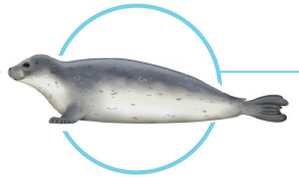
California Black Rail
Laterallus jamaicensis conturniculus

Saltmarsh Common Yellowthroat
Geothlypis trichas sinuosa

Bryant's Savannah Sparrow
Passerculus sandwichensis alaudinus

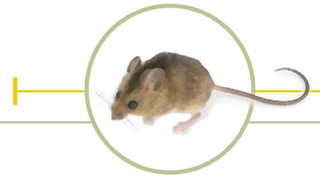
Steelhead possess the ability to spawn repeatedly, maintaining the mechanisms to return to the Pacific Ocean after spawning in freshwater. Juvenile steelhead may spend up to four years residing in freshwater prior to migrating to the ocean as smolts. Central California Coast steelhead migrate through San Pablo Bay waters in transit between freshwater spawning areas and the Pacific Ocean.

California Sea Lion
Zalophus californianus



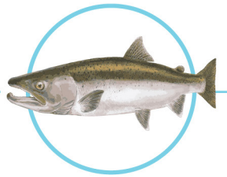
Pacific Habor Seal
Phoca vitulina richardsii

The Pacific harbor seal is found in coastal waters throughout the San Francisco Estuary, and when not swimming or foraging underwater for fish, shellfish, and crustaceans, harbor seals will haul out on rocks or land next to water to rest. This species frequents relatively shallow water, staying close to shorelines.



Salt Marsh Harvest Mouse
Reithrodontomy's reviventris

The salt marsh harvest mouse is endemic to the marshes which border San Francisco, San Pablo, and Suisun Bays. The primary habitat is the middle to upper zone of salt and brackish marshes. However, they frequently use terrestrial grassland habitats adjacent to tidal marsh and grass-pickleweed ecotones, dependent on the dense vegetation cover. Flooding is an important factor in their habitat. While good swimmers, they are highly vulnerable to avian predators when the marshes are submerged. During king tides and coastal floods, vegetation like marsh gumplant (Grindelia stricta) and upland ecotones provide important refuge.



Central California Coast Steelhead
Oncorhynchus mykiss

Longfin Smelt
Sprinchus thaleichthys

Pacific Herring
Clupea pallasii

Eelgrass
Zostera marina

Suisun Marsh Aster
Symphyotrichum lentum

HIGH MARSH

SEA LEVEL RISE

PRESENT DAY TIDES

SHALLOW BAY

Intertidal mudflats and shallow open water areas support important flora, including diatoms and other microalgae, macroalgae, and eelgrass. Microalgae are foundational to the San Francisco Estuary food web, supplying food for invertebrates that are then consumed by shorebirds and waterfowl. Macroalgae and eelgrass support invertebrates and fish by providing shelter, food, and spawning areas. Pacific harbor seal and California sea lion forage in the shallow bay habitat for fish, shellfish and crustaceans. Tidal flats and channels provide foraging and roosting habitat for shorebirds at low tide which hunt for worms, shellfish, and other invertebrates that inhabit the bay mud. The tidal channel also provides habitat for ducks.

MARSH

Northern coastal salt marsh, also called saline emergent wetland or tidal marsh, is a highly productive, herbaceous community of salt-tolerant species forming a moderate to dense cover up to 3 feet tall. This community is usually found along sheltered inland margins of bays, lagoons, and estuaries where the hydric soils are subject to regular tidal inundation for at least part of the year. Most species grow actively in the summer and are dormant in winter. San Francisco Estuary salt marshes provide food and nesting habitat for a wide variety of bird species. Tidal pannes are natural depressional areas that develop in higher elevation marsh areas. They typically are unvegetated and are inundated only during highest tides. Their salinity rises when the water evaporates. Though they are typically not highly utilized by wildlife, except for shorebirds when flooded, the edges of tidal pannes are associated with rare plants.

White-Tailed Kite
Elanus leucurus

San Pablo Song Sparrow
Melospiza melodia samuelis

Northern Harrier
Circus hedsonius

Northern harrier nest and forage along in open areas including wet meadows, slough, savanna, prairie, and marshes, feeding on small wildlife, including small mammals, reptiles, and birds. Destruction of marsh habitat is the primary reason for the decline of this species. Northern harriers nest on the ground in clumps of dense vegetation, often in moist habitat.

San Pablo Vole
Microtus californicus sanpabloensis

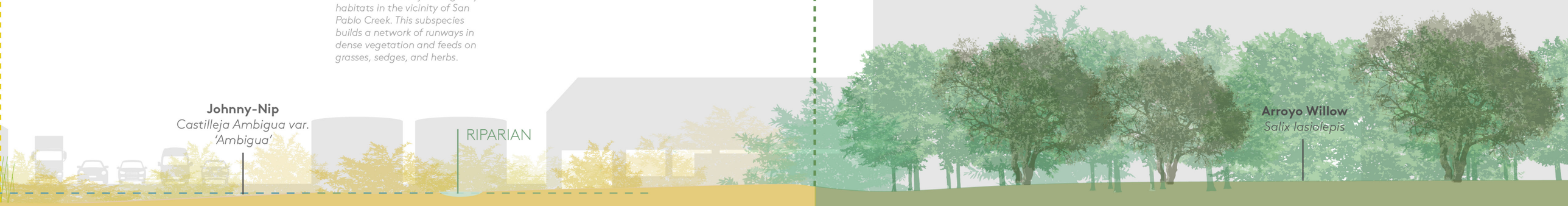
The San Pablo vole is found in salt marsh and adjacent grassy habitats in the vicinity of San Pablo Creek. This subspecies builds a network of runways in dense vegetation and feeds on grasses, sedges, and herbs.

Obscure Bumble Bee
Bombus caliginosus

This bumble bee inhabits open grassy coastal prairies and Coast Range meadows on the Pacific coast of North America from southern British Columbia to southern California. The obscure bumble bee nests underground in old rodent nests, as well as above ground in abandoned bird nests, clumps of grass, and natural cavities (Hatfield et al., 2014).

Western Bumble Bee
Bombus occidentalis

This species historically was widely distributed in western North America, inhabiting open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. The western bumble bee typically nests underground in old animal nests, and occasionally above ground in cavities.



WETLAND

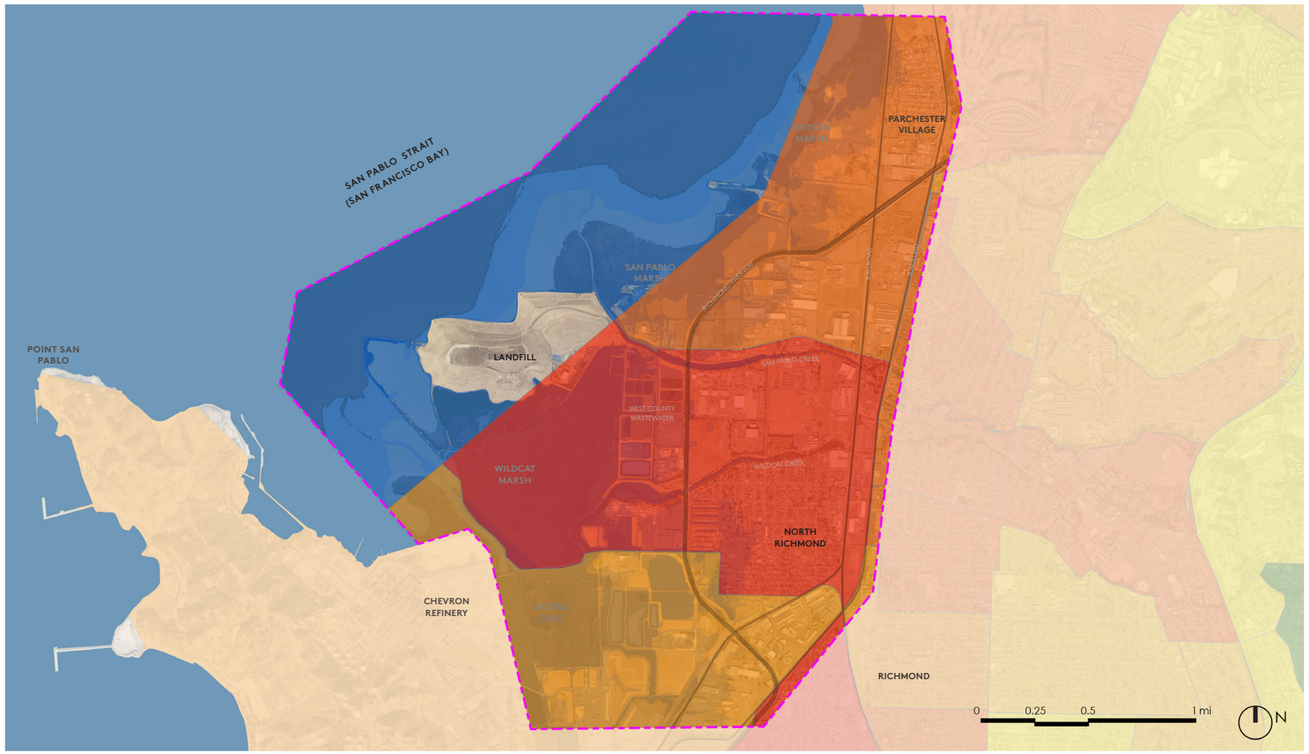
Diked wetlands are areas of historic marsh that have been isolated from tidal influence by levees or berms. They generally retain salt marsh vegetation, typically pickleweed, due to the high salt content of the soil. They can subside over time as organic material decomposes and the soil dewaters from evaporation. Low areas can accumulate rainwater and vegetation more typically associated with seasonal wetlands can become dominant. Seasonal wetlands are generally saturated and/or inundated annually during winter and early spring when water drains into and through the Study Area.Birds and bats may forage over or in the seasonal wetlands especially when the area is inundated in the winter and spring. Large and small mammals may also utilize the seasonal wetlands in the summer and fall months when the seasonal wetlands are not inundated

UPLAND

Upland habitat includes pond, riparian and grassland areas. There are additional uplands habitats at the site including coastal scrub and mixed woodlands. Coastal scrub habitats are found in a band between tens to hundreds of meters wide along the west coast, stretching from Monterey, California north into Oregon.

ENVIRONMENTAL JUSTICE

Environmental indicators from the State of California reveal that residents in North Richmond are exposed to the most severe burden category of pollution on their lives and health.



Indicators are a measure studied by the California Environmental Protection Agency, of pollution burden for populations, based on exposure to pollution, the environmental effects of that pollution, the number of people impacted by the pollution and socioeconomic factors that make pollution more harmful.

LEGEND

- 90-100% POLLUTION BURDEN
- 80-90% POLLUTION BURDEN
- 70-80% POLLUTION BURDEN
- 60-70% POLLUTION BURDEN
- 50-60% POLLUTION BURDEN
- 40-50% POLLUTION BURDEN
- 30-40% POLLUTION BURDEN
- 20-30% POLLUTION BURDEN
- 10-20% POLLUTION BURDEN
- 0-10% POLLUTION BURDEN
- 3.5' SEA LEVEL RISE + 100-YR COASTAL FLOOD | **13.06'**
- 100 YR COASTAL FLOOD | **9.56'**
- MEAN HIGH WATER | **6.16'**

SOURCE: Cal Enviroscreen

NOTE: ALL ELEVATIONS ARE RELATIVE TO THE NORTH AMERICAN VERTIAL DATUM OF 1988 (NAVD88)

One of the more recent 'flare up' incidents at the Chevron Richmond refinery in May of 2021. The North Richmond residential neighborhood can be seen immediately adjacent (Image: ABC News).

NORTH RICHMOND LEGACY ORGANIZING & STEWARDSHIP

Community leadership in North Richmond and the collaborative work being done there is strong and well-established. North Richmond organizers' work in watershed restoration, fresh food access and movements for social and racial justice and towards a Just Transition from fossil fuels, are known and shared nationally as excellent models.

Despite the many ways that community here has been dis-advantaged, this is a place that is well positioned to implement equitable resilient infrastructure, and share stories. We have been privileged to work alongside an inter-generational group of community leaders and legacy residents in co-creating this Adaptation plan.

We are also keen to recognize that the success of this effort is due in part to the incredible history of community organizing and watershed protection that North Richmond residents and activists have been working on for many years;

We recognize Whitney Dotson, Dr. Henry Clark, Anne Riley and the many others who have fought for public health and open space protections in North Richmond, from Dotson Marsh, to Wildcat Creek and to the front gates of the Chevron refinery. We are standing on their shoulders to be sure.

The fragmented and mostly industrialized conditions in the former tidal marshes have limited shoreline access for nearby neighborhoods over the years, especially for the North Richmond residential neighborhood and other adjacent communities of color. Some of those industrial uses, such as the Chevron refinery as well as diesel traffic along the Richmond Parkway, have created air quality issues and related health disparities for the residential areas. The project team recognizes that many of these conditions are inter-related, and that rising sea levels will exacerbate the challenges already being faced by North Richmond residents.

Towards A "Living Levee"

Ideas for nature-based adaptation to sea level rise have been part of North Richmond community conversations since at least 2016. The 2017 North Richmond Shoreline Vision Plan, the 2018 Resilient by Design Our Home report and the 2020 North Richmond Water Needs Assessment were all community-centered processes that identified support among North Richmond residents.

The community engagement processes for this project are described in Chapter 2, and build on these previous documents and participatory studies.

ABOVE: Dr. Henry Clark leading a rally (image credit: Richmond Confidential, "Henry Clark and Three Decades of Environmental Justice" 2012.

BOTTOM LEFT: Project team members at left walking the watershed with Tribal partners from the Confederated Villages of Lisjan.

BOTTOM RIGHT: Project team members sharing out Wildcat Creek design ideas with community members at a public workshop.

2. COMMUNITY PROCESSES

FRAMEWORKS FOR COMMUNITY PARTICIPATION & CO-DESIGN

The Collaborative Shoreline Plan has been a continuation of years-long community engagement around sea level rise resilience.

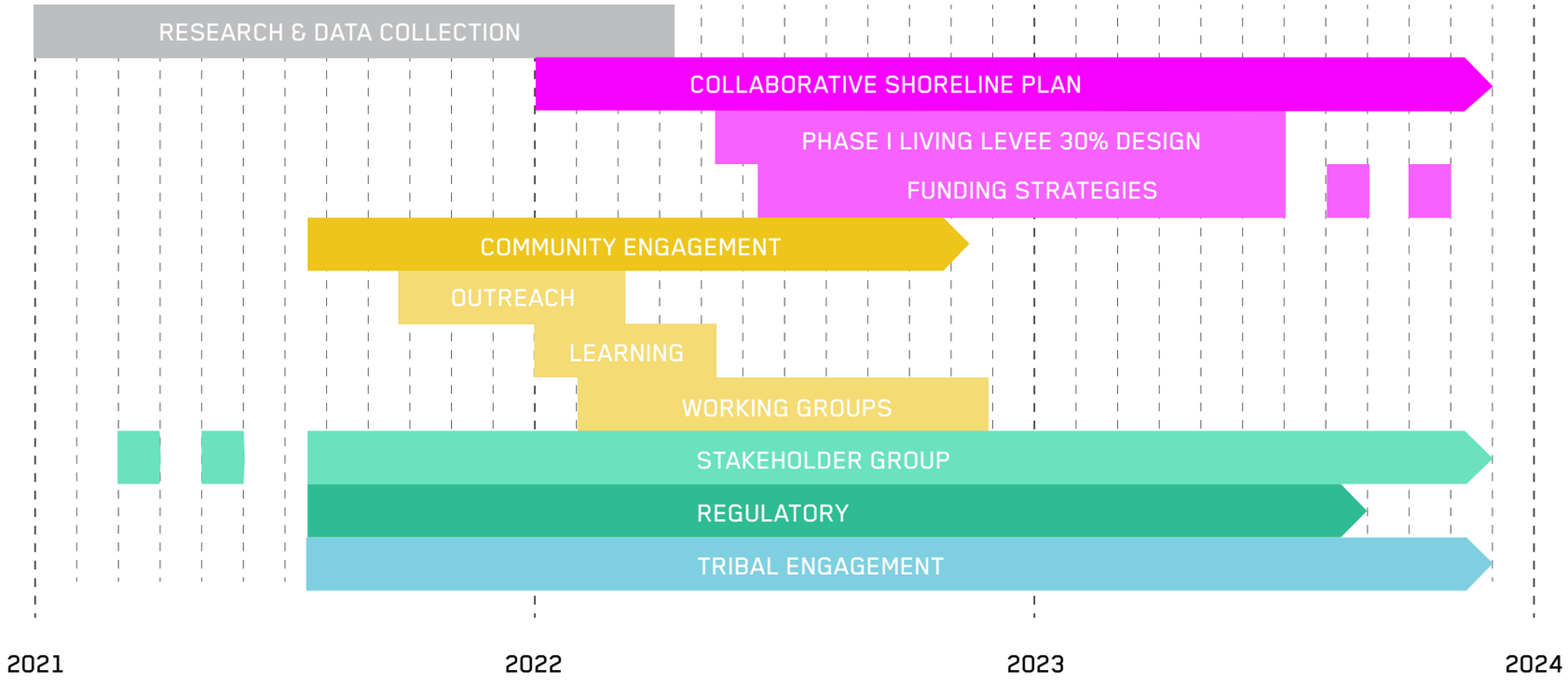
In 2017, The Watershed Project conducted a community visioning exercise, working with community members to develop high-level vision for the North Richmond Shoreline's future. In 2018, The Watershed Project and Mithun worked together during Resilient by Design (a regional design initiative funded by the Rockefeller Foundation) to imagine the impact of sea level rise on the North Richmond shoreline, and develop ideas for key projects to increase community resilience. And in 2019, Contra Costa County Supervisor John Gioia's office initiated stakeholder meetings to engage landowners, government, organizations, and community members toward seeking a solution collaboratively. West County Wastewater, as a key property owner and manager of affected critical infrastructure, took the lead in applying for grants to develop this work. These pre-project efforts were foundational to the 2021 SFBRA Grant that funded this Collaborative Plan.

Using an Education and Participatory Engagement Model for Co-Designing Shoreline Adaptation

On the North Richmond shoreline, the participatory engagement process has helped planning move beyond merely gathering community voices to inform decision-makers, to proactively bringing community leaders to the decision-making table, to work alongside the team.

Through this model, designers and engineers have been better able to understand community needs and preferences, and community leaders have been better equipped to understand and prioritize the limitations and strengths of various project and community ideas. Community leaders could also better oversee that their preferences and needs are equitably included in the designs.

Three guiding principles led the framework for community engagement on the plan: **(1) a broad stakeholder involvement**, including landowners, businesses, agencies, and the public. This ensured the solution will be more efficient and cost-effective. **(2) a multi-benefit approach**. This works to add amenities and improvements for the community, such as trails, parks, and community centers, and also thinking about employment opportunities, housing development, and project maintenance, and **(3) prioritizing nature-based solutions**.



PROJECT TIMELINE: From 2021 to 2023, the project team engaged private, public, tribal and regulatory community members and neighbors to collaboratively design for shoreline adaptation, implementation and funding.

COMMUNITY MEMBERS AT THE DECISION-MAKING TABLE

From the first guiding principle, that community members living near the shoreline needed to be purposefully and actively involved in shaping the design outcomes, a three-step approach was laid out with community residents and leaders:

1. Outreach Meetings: Building teams

In 2021, The Watershed Project started a series of informative webinars and meetings with various community organizations and groups in North Richmond. The purpose of these sessions was two-fold: educate residents on the impact of sea level rise on their neighborhoods and related potential adaptation design options, and to recruit community members to join the working group as paid participants.

The project team made presentations to 10+ existing community organizations, for project introductions and updates, including the North Richmond Municipal Advisory Council, Supervisor Gioia (District 1), West Contra Costa Transportation Advisory Committee (WCCTAC), Citizens for East Shore Parks, San Pablo Watershed Council, and the Stakeholder Working Group.

Following this effort, the team recruited more than twenty community leaders, to work alongside designers, engineers, and community engagement managers.

These community leaders met with the team nearly every week from February through October 2022, and were paid for their work.

2. Learning Sessions: Sharing Knowledge

The teams created a series of learning seminars, to bring community leaders up to speed and to a uniform level. These sessions covered topics such as the San Francisco Bay Estuary, Ecosystem Services, Environmental Justice and Activism in North Richmond, the Whitney Dotson Family Marsh, Leadership, Surveying tools.

The teams also did field tours, to get to know the area. These visits culminated with a few sessions diving deep with the groups into project design, to get even more familiar with the area and the technical information.

The field notes questionnaire is included in the appendix.

3. Working Groups: Co-Design

From this foundational knowledge, the teams divided into three smaller workgroups:

Envisioning Design Approaches Workgroup explored, evaluated, and designed technical solutions for sea level rise.

Sustainability and Growth Workgroup identified mutual benefits and development opportunities for employment, housing, and education.

Community Survey Workgroup designed a participatory survey to gather community input on needs and preferences, including critical issues outreach was made to community members to be contacted for the survey, internal meetings coordinated, and co-facilitated focus group discussions to administer the survey. The survey was also made available as an online form. (See appendix for survey results.)

COMMUNITY OUTREACH:
At right, a sampling of the outreach materials in moving from community outreach to co-design. See appendix for survey examples.

Adaptación de la costa de North Richmond:

Los miembros de la comunidad:
-Trabajarán aproximadamente de 1 a 2 horas a la semana entre febrero y septiembre de 2022, con un receso de verano durante julio y agosto.
-Completarán tareas incluyendo: coaprendizaje, recopilación y análisis de datos, participación de la comunidad, preparación de materiales y participación y dirección de reuniones.
-Participarán en uno de los grupos de trabajo comunitarios siguientes: Imaginando soluciones, Encuesta comunitaria, o Sostenibilidad y crecimiento.

Los miembros de la comunidad recibirán un pago máximo de $1,000 por el proyecto ($50 por reunión)
La fecha límite de solicitud es el 31 de enero de 2022!!!

Realizaremos un webinar para proporcionar más información y responder cualquier pregunta el **lunes 24 de enero de 6 a 7 pm.**
Un enlace al webinar está disponible en **TheWatershedProject.org/Shoreline.**

Para más información y para aplicar, visite **TheWatershedProject.org/Shoreline** o contacte a Eunice Quintanilla a **eunice@thewatershedproject.org** o **707-726-2829** (mensaje de texto o llamada).

the watershed project

North Richmond Shoreline Adaptation Project:

Community Members can participate by:
-Work approximately 1-2 hours a week between February and September 2022, with a summer break during July and August.
-Complete tasks such as co-learning, gathering and analyzing data, conducting community engagement, preparing materials, and participating in and leading meetings.
-Participate in one of the following community workgroups: Envisioning Solutions, Community Survey, or Sustainability and Growth.

Community members will receive a maximum payment of $1,000 for the project ($50 per meeting).
The application deadline is January 31st, 2022!!!

We will hold a webinar to provide more information and answer any questions on **Monday, January 24th, 6-7 pm.**
A link to the webinar is available at **TheWatershedProject.org/Shoreline**

For more information and to apply, visit TheWatershedProject.org/Shoreline or contact Eunice Quintanilla at **eunice@thewatershedproject.org** or **707-726-2829** (text or call).

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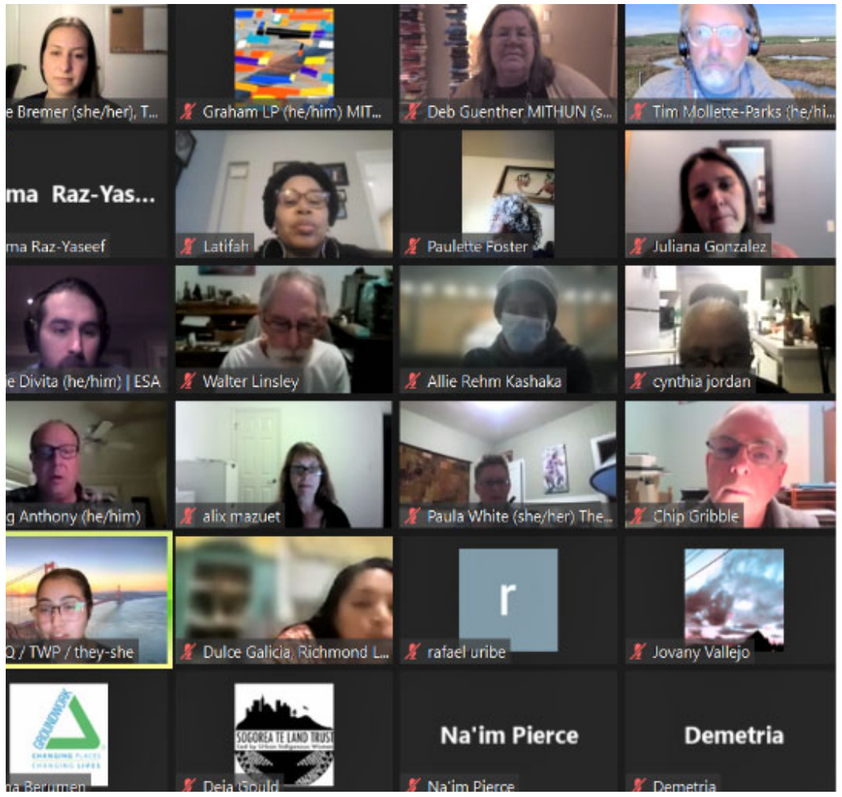
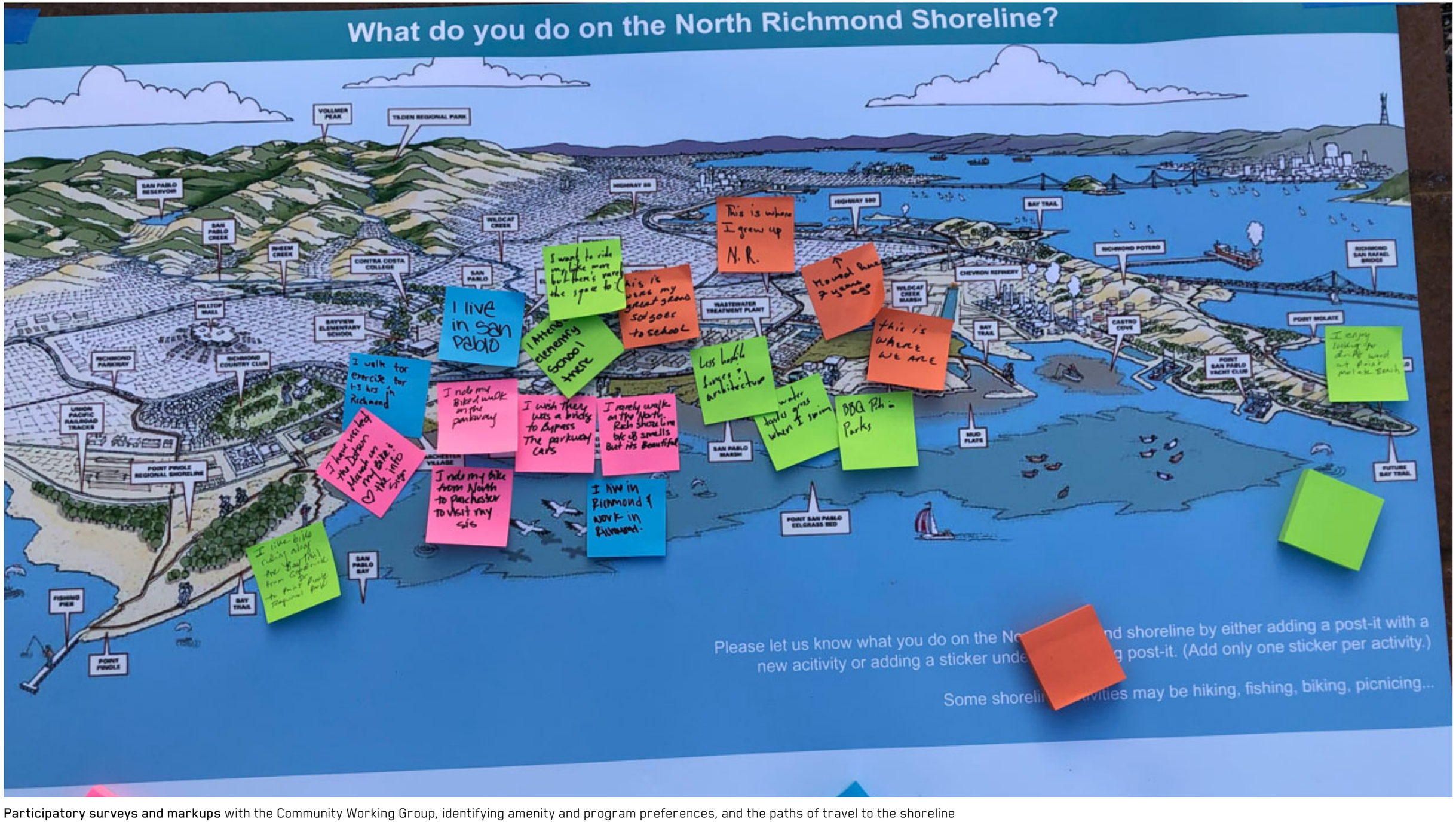
SITE VISITS with the Community Working Gtroup members. A tall ladder was employed to help envision various sea level rise heights and design strategies in the field



SNAPSHOT FROM A CO-DESIGN PROCESS:
Community engagement included hybrid models and drawing together over web-based interactive meetings during the period when the pandemic prevented in-person meetings.



Participatory surveys and markups with the Community Working Group, identifying amenity and program preferences, and the paths of travel to the shoreline

"Collaboration Cluster" South: concept sketch for project linkages, generated by the community co-design process

SITE VISITS with the Community Working Group members

Moving Forward

The project team received crucial feedback in working side by side with community leaders and analyzing the information received for the community survey. The input from the Workgroups and Community Survey was incorporated into the project, as the design team crafts project vision plans to align with issues that are important to the community.

For example, community members said that to make the shoreline and any development on it useful to them, they need better means of public transportation to this area. The design team also learned that community members are concerned about their safety and want designs to include means to make them feel more secure while enjoying the shoreline and parks. Lastly, community members said they would like to have a program based on local leaders that will provide educational, environmental, recreational, cultural, and employment opportunities at the shoreline. These are some of the topics the team intends to work on in the next phases of the project.

Part of the measure of success in this process has been the participation of legacy North Richmond residents and community leaders, including elders and youth across language and demographic lines. In addition, additive efforts were made to meet community members in their existing meeting and social networks. The team held workshops and presentations with existing community organizations, including the North Richmond Municipal Advisory Council, Supervisor Gioia's office, West Contra Costa Transportation Advisory Committee (WCCTAC), San Pablo Watershed Neighbors Education and Restoration Society (SPAWNERS), San Pablo Watershed Council, Citizens for East Shore Parks (CESP), and the Richmond City Council.

TRIBAL ENGAGEMENT

Tribal engagement included site visits (at right) and working (above) toward a shared understanding of cultural and site-specific priorities. Image by Obi Kaufman and provided by The Watershed Project.

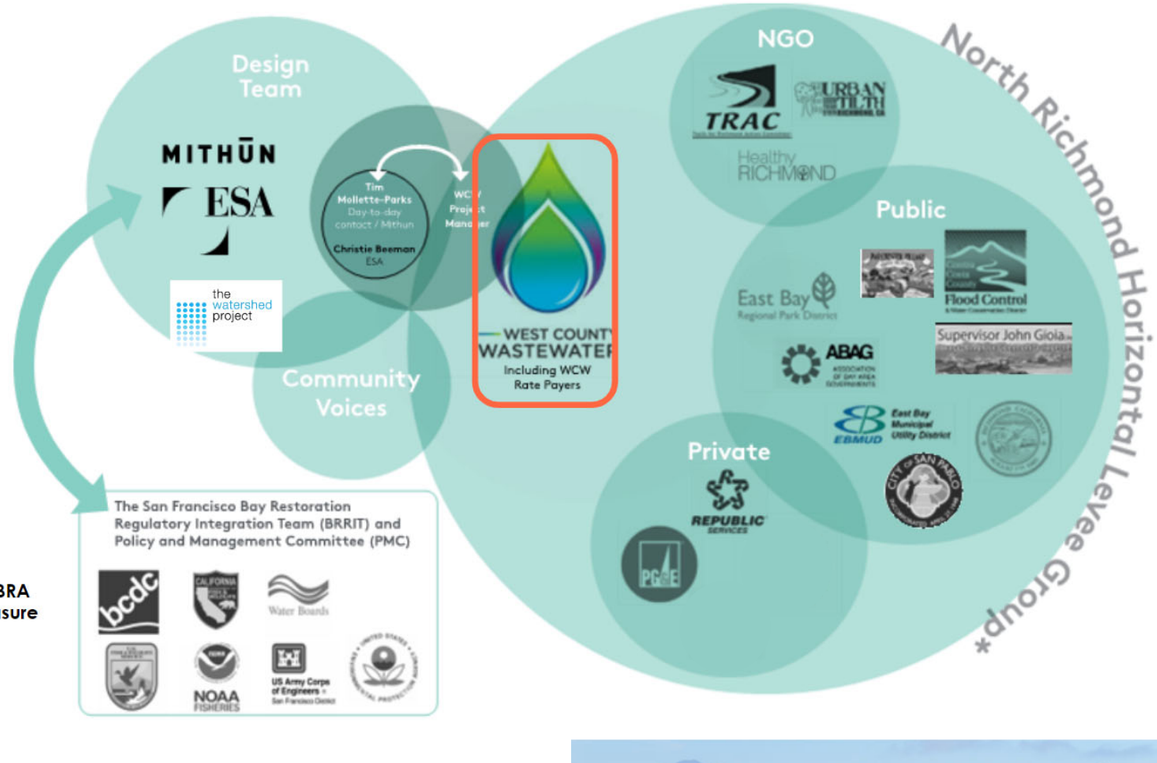
The project team has also been in a parallel process of tribal engagement with the leaders from the Confederated Villages of Lisjan, indigenous to Huchuin, what is now also called the 'East Bay', including Richmond and North Richmond. The team worked to arrive at shared understanding of a role as cultural advisors on the project, providing feedback and helping to develop interpretive material, including interviews with tribal members and to work with the design team to develop concept designs for one or more installation(s) to honor sites of cultural concern within the concept study area.

Engagement included:

- Two site visits with members of the Confederated Villages of Lisjan (Ohlone)
- Zoom meetings and discussions to arrive at shared understanding of role as cultural advisors on the project
- Agreement to provide feedback and help develop interpretive material, including interviews with tribal members
- Working with the team to develop concept designs for one or more site installation(s) to honor sites of cultural concern within the concept study area
- Building an indigenous storytelling website
- Creation of a land acknowledgement for this document

NORTH RICHMOND HORIZONTAL LEVEE WORKING GROUP

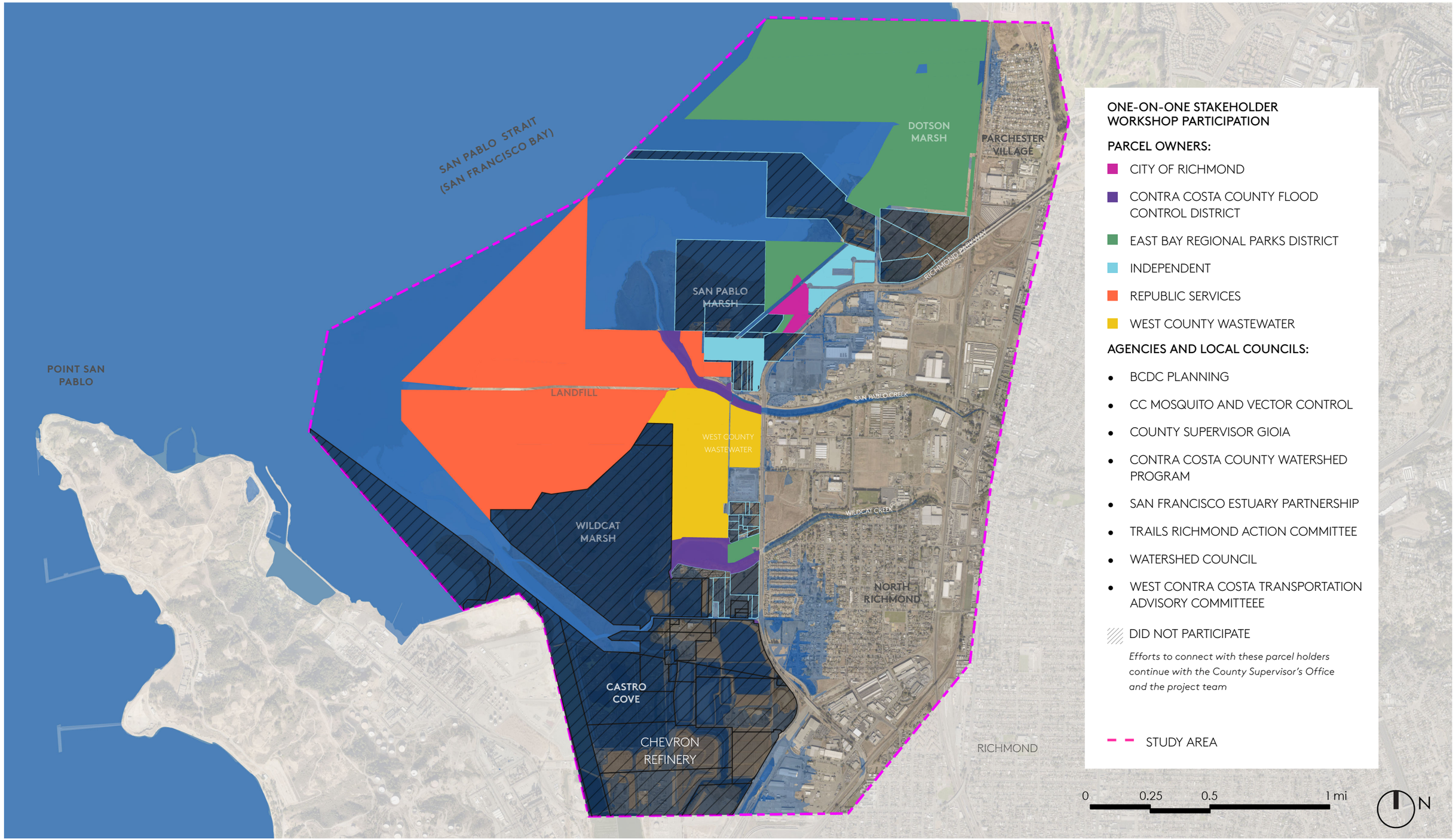
In tandem with the Community Working Group process, there have been parallel efforts for engagement with shoreline property owners, neighboring businesses, civil service organizations and public agencies through the North Richmond Horizontal Levee Working Group (NRHLWG). The project team, with West County Wastewater and the help of Supervisor Gioia's office, has been convening meetings approximately quarterly since 2019, in order to help bring key property owners along the shoreline to the table.
The project team transparently shared out updates from project research, the Community Working Group co-design effort, as well as the community priorities identified for restoration, access, and amenities that have emerged over this past year. These workshops also included small group conversations, where property holders were provided an opportunity to meet with one another and discuss potential adaptation options together with the project team.



*Funded by SFBRA grant with Measure AA $

PROPERTY PARTICIPATION:
Led by San Francisco Estuary Partnership and West County Wastewater, the Horizontal Levee Working Group (at right) have been holding regular group meetings since 2019

PARCEL OWNER ENGAGEMENT MAP



“COLLABORATION CLUSTERS” PROPERTY OWNER & AGENCY OUTREACH

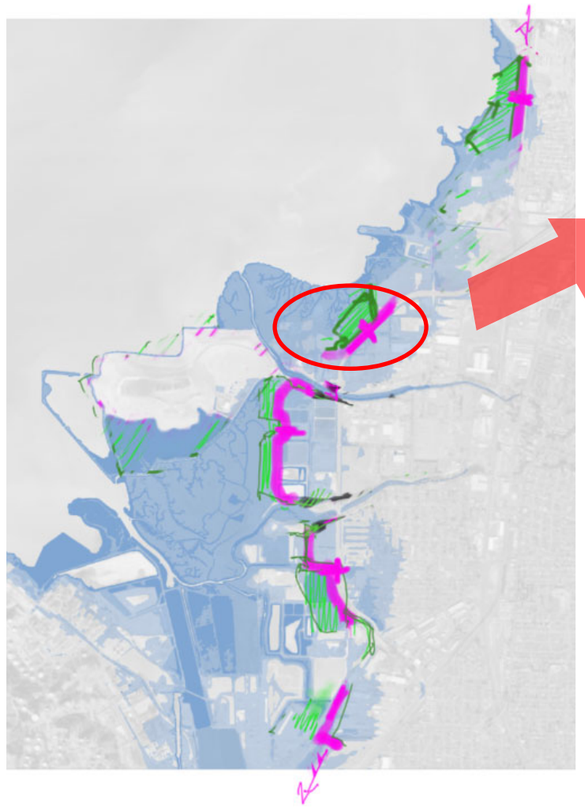
Upon completing preliminary vulnerability analysis of SLR compound flood risk within the North Richmond study area (see chapter 1), two locations were identified as particularly prone to near-term flooding that would compromise critical infrastructure (outside of the West County Wastewater Qaulity & Resource Recovery facility)and that also overlapped with opportunities for making trail linkages and closing gaps in shoreline access. These clusters of specific low-lying properties, infrastructure, and access routes were named “Collaboration Clusters” in order to accelerate design research and outreach to property owners and relevant city, county and regional agencies.

The project team, again in partnership with the West County Wastewater and the help of Supervisor Gioia’s office, set about convening meetings with as many of these cluster parcel holders as possible (in parallel with the overall NRHLWG itself.)

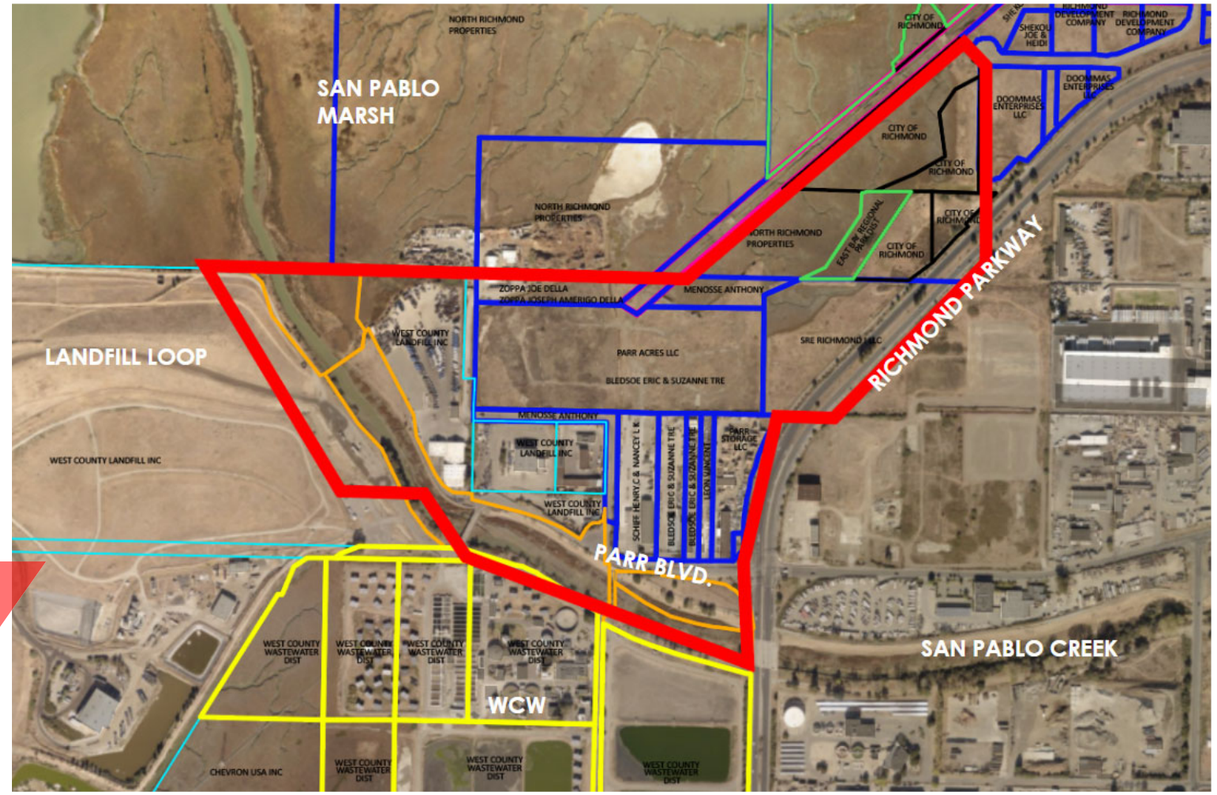
This substantial outreach effort resulted in a number of one-on-one and small group meetings and workshops to consider proposed strategies from the design team. These near-term vulnerabilities, understood through the lens of multi-benefit living infrastructure projects can be the lynchpin for long-term resilience in North Richmond. Proposals for these areas, in development, were also shared transparently as part of the design approaches conversation with the Community Working Group, and the sketch concepts found in this chapter have been elaborated and refined in chapter 3.

“Collaboration Clusters” focusing on near-term vulnerabilities north and south of the Phase 1 living levee project at West County Wastewater, led to the identification of projects termed Phase 1A (North) and 1B (South) further described in chapter 3.

These early “Collaboration Cluster” conversations helped the project team and local government representatives identify future challenges and prospects in terms of funding, logistics, and governance, which are identified in chapter 4.



Early Sketch looking at critical near-term flooding vulnerabilities in North Richmond



“Collaboration Cluster” North: parcel ownership is complex within this cluster area, but shared vulnerability presents the opportunity to bring many parties to the table.

"Collaboration Cluster" North: concept sketch for project linkages, trails, living levee habitat slopes, and amenitites

Site Walk and Presentation with EPA Region 9 at West County Wastewater and Wildcat Creek shoreline areas in North Richmond, September 2022

REGULATORY ENGAGEMENT & OUTCOMES

West County Wastewater and the project team met with the Bay Restoration Regulatory Integration Team (BRRIT) to discuss applicable environmental regulations and required permits for the proposed demonstration project at the West County Wastewater treatment plant. The BRRIT includes representatives from the California Department of Fish and Wildlife (CDFW), the San Francisco Bay Regional Water Quality Control Board (RWQCB), the Bay Conservation and Development Commission (BCDC), the US Army Corps of Engineers (USACE), US Fish and Wildlife Service (USFWS), and NOAA Marine and Fisheries Service (NMFS). The purpose of the BRRIT is to provide a single venue for habitat restoration projects to meet with these several regulatory agencies to share information on proposed projects, to request information and feedback from the agency staff, and to allow the agencies to coordinate their responses to the project proponents. In general, the BRRIT agencies request that projects coordinate "early and often" in order to identify and resolve permitting issues prior to submission of applications. Pre-application coordination with the agencies improves permit application timelines and outcomes.

The project team and BRRIT agency staff participated in an initial meeting in the spring of 2022, which included an introduction to the WCW demonstration project and the Collaborative Shoreline Plan. In the spring of 2023 the project team and BRRIT staff participated in a second meeting, which included discussions of the draft 30% design for the demonstration project, and a site walk along the Bay Trail at the WCW Water Quality & Resource Recovery facility.

The regulatory agencies were generally supportive of the proposed project, in particular acknowledging the project's goals of achieving multiple benefits (flood protection/SLR resilience, habitat enhancements, and improved recreational opportunities) and the strong level of community participation during the planning and conceptual design process. Staff provided valuable feedback to guide future project planning and to help the project team prepare for permit applications.

Agency staff requested the opportunity to review and provide comments on a draft version of the project's Monitoring and Adaptive Management Plan (MAMP) prior to permit application submission. The project team plans to prepare a draft MAMP for the demonstration project during the 60% design phase.

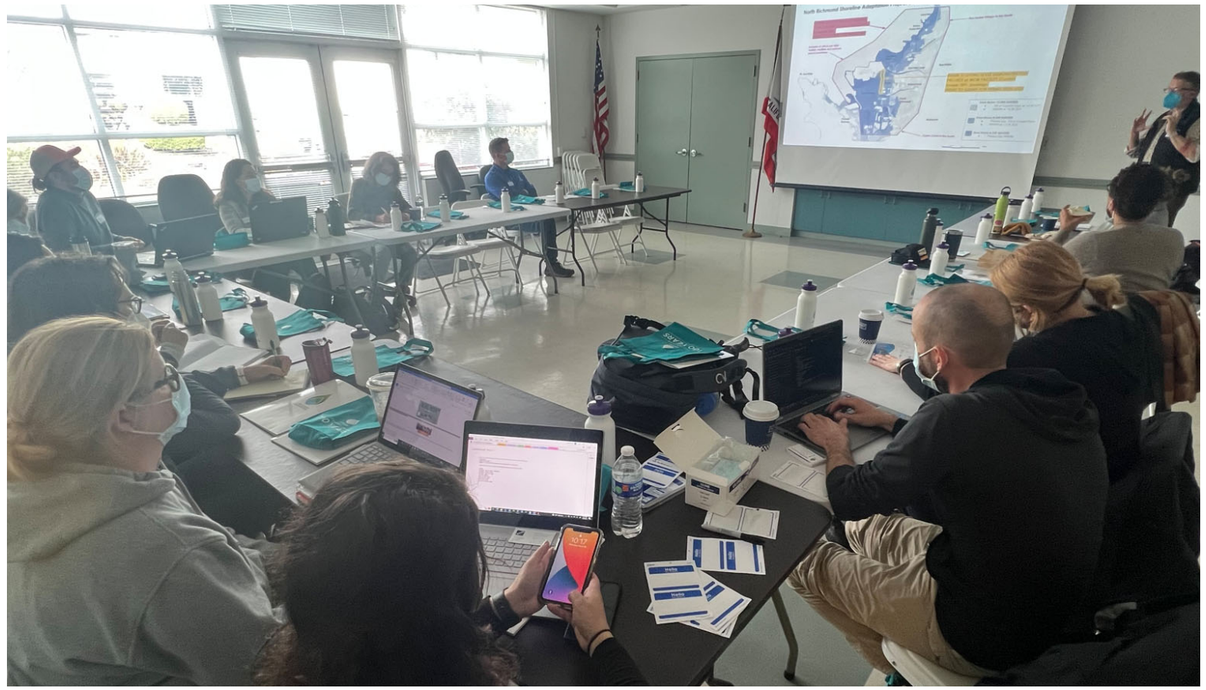
Agency staff recommended coordination with local Mosquito Abatement staff to review the proposed designs and incorporate feedback to reduce risk of creating new mosquito habitats.

The agencies encouraged the project to continue to engage with local tribal representatives.

CDFW staff invited the project team to consult with staff to discuss whether the project could qualify for the CEQA Statutory Exemption for Restoration Projects (SERP).

CDFW staff indicated that the project likely would require a Section 1600 Lake and Streambed Alteration Agreement based on the proposed impacts to existing drainage channels. Agency staff invited the project to follow up discussions on this topic.

Site Walk Itinerary and Presentations with the BRRIT (Bay Restoration Regulatory Integration Team) at West County Wastewater shoreline areas in North Richmond, March 2023



3. Sea Level Rise: Design Options

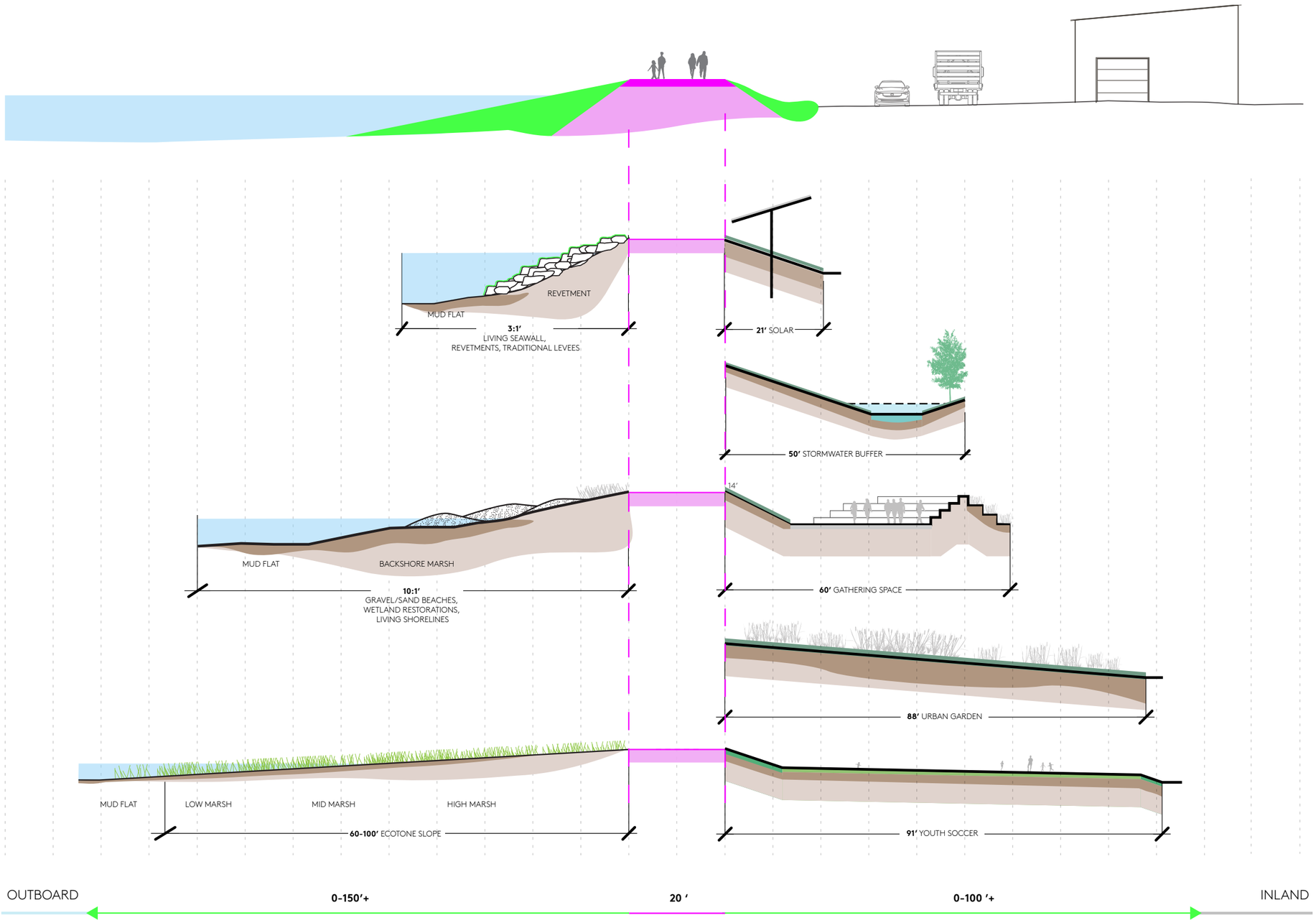
ADAPTATION OPTIONS: UNDERSTANDING A ‘MULTI-BENEFIT’ APPROACH

The ‘Living Levee’ approach suggests not just a singular, but a suite of potential nature-based adaptation measures that can be configured in various ways, along with programmatic options for green infrastructure on the inland side of the levee core as well.

Under consideration in the broader North Richmond Collaborative Shoreline Adaptation Plan, are approaches such as shoreline vegetation management, beaches, oyster reefs, eelgrass, and more.

This combination of habitat adaptation, designed around the core of levees for flood protection, and layering on public trails, access and amenities together comprise a ‘multi-benefit’ approach to designing for sea level rise, that can be configured in many different ways.

We discuss these typological approaches suited for North Richmond, as well as the site-specific recommended projects and phasing that have emerged through the co-design process.



Options for multi-benefit projects.

Note: Extents of habitat slope and fill to be determined, based on existing wetlands delineation, project offsets, parcel ownership and other factors

RESTORATION PRIORITIES

Living Levee / Habitat Slopes / Ecotone Slopes

A "living levee" is a design approach for flood protection levees that also includes the creation or enhancement of gently sloped ecologically functional transitions between the nearby tidal or riparian aquatic habitats and the uplands along the crest of the new levee. The resulting landscape provides flood protection and creates space for protection and preservation of native habitats. A living levee (also known as "ecotone levee") design is an emerging technology and both designers and local communities are still learning about the opportunities, benefits and limitations of these landscapes.

The conceptual design of the living levee Phase 1 is based on a careful review of regional planning guidance, scientific literature, and similar projects around the San Francisco Bay. In many locations along the SF Bay shoreline, a living levee is one of the best available options to adapt to rising sea levels, demonstrating the capacity for flood protection and public access while also enhancing the local habitats. This design approach is based on the best available peer-reviewed science and is a solution that is appropriate for the specific ecology and geomorphology of the San Francisco Bay and specifically the North Richmond Shoreline. The San Francisco Estuary Institute's Adaptation Atlas and the San Francisco Bay Habitat Goals Project's summary reports provide comprehensive summaries of the San Francisco Bay shoreline landscapes and the opportunities for living levees to provide flood protection and ecological benefits.

The living levee is just one of a suite of nature-based adaptation measures under consideration in the broader North Richmond Collaborative Shoreline Adaptation Plan, including approaches such as shoreline vegetation management, beaches, oyster reefs, eelgrass, and others. The living levee concept has previous and current support from multiple stakeholders and community members, and happens to be ideally suited to protect the marsh edge along the West County Wastewater (WCW) Treatment Plant. WCW has volunteered their property as an early demonstration site for nature-based SLR adaptation along the North Richmond Shoreline, and consequently this design approach has received a lot of attention during this planning process, however our team understands that living levees are not a one-size-fits-all solution, and some sections of shoreline in the larger 5-mile study area will require varying design approaches.

Living Shorelines

"Living shorelines" are constructed coastal landscapes that use nature-based features and designs in order to provide flood protection and erosion management, while also creating and enhancing native shoreline habitats. Living shorelines are an alternative to historic 'grey infrastructure' shoreline engineering designs, which very often focused solely on flood protection and erosion management, as cheaply as possible, without any consideration for the other environmental effects of these structures. The resulting 'Grey infrastructure' designs include features like sea-walls, rip-rap, and steep-sloped levees. These designs use unnatural materials, and are designed to take up as little space as possible to allow for construction of other infrastructure right up to the shoreline edge, often leaving no space for habitat and recreation along the shoreline. The construction of 'grey infrastructure' around the shoreline of San Francisco Bay in the 1800 and 1900's contributed to the loss of 90% of the tidal wetland habitats in the region, with devastating effects on native wildlife populations. Grey infrastructure also often creates barriers that have disconnected many Bay Area neighborhoods and communities from the bay itself, preventing residents from connecting with their natural environment.

Living shorelines offer an alternative to grey infrastructure, using designs that mimic natural landscapes to allow for the construction of flood protection and shoreline erosion projects that also can contribute to the restoration of some of these lost shoreline habitats. It is important to select a living shoreline design that is appropriate for the project's physical setting. This requires consideration of the local tides and wave conditions, geologic conditions, historic and present day ecological resources at and near the project site, and the required level of flood protection and erosion resilience.

Gravel/sandy beaches

Coarse shorelines, including gravel and sandy beaches, can help resist wave-driven erosion while also providing habitats for shorebirds, native plants, and benthic wildlife. In San Francisco Bay natural sand and gravel material is relatively rare along the shoreline, however coarse beach material can be found near the mouths of some creeks and geological outcrops, and ancient deposits of sand and gravel exist in layers intermixed with the Bay Mud. Sand and gravel beaches can provide valuable habitat for shorebirds, invertebrates, and shoreline plants.

Because of the very limited natural supply of coarse sediment, natural coarse beaches are uncommon, however they can provide an ecologically and geomorphically valuable tool for managing shoreline erosion in certain settings. The greatest challenge with coarse beaches is the need to import the beach material, both for initial construction and also to periodically replace beach material that washes away over time.

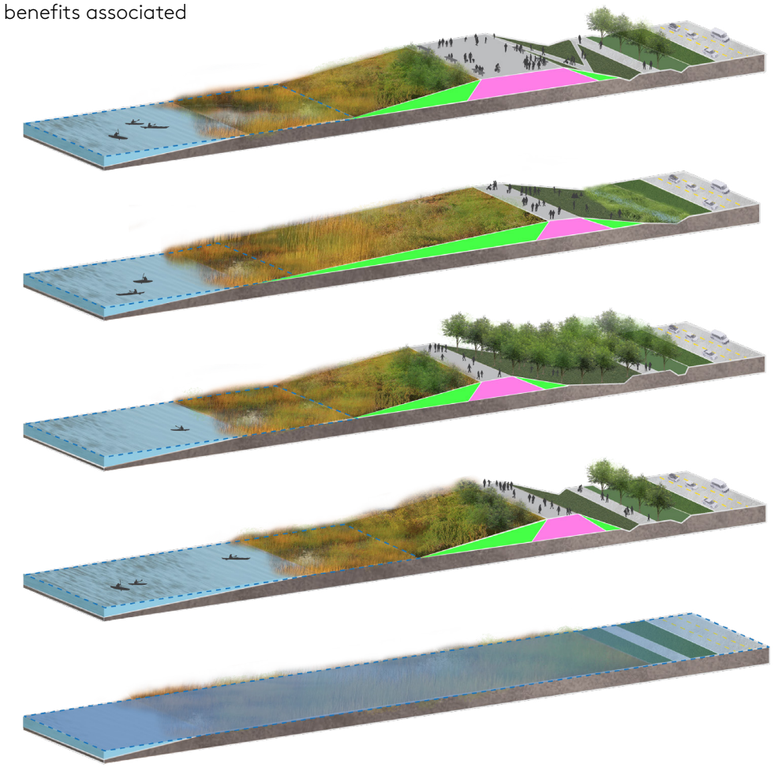
Tidal Marsh / Wetland restoration

Vegetated tidal marshes are highly productive landscapes, providing habitat for a wide variety of wildlife including many threatened or endangered species, providing benefits to water quality, and buffering shorelines from wave-driven erosion. Tidal marshes are also dynamic landscapes that can capture and accumulate mineral and organic sediments to raise their elevation over time. This allows tidal marshes to keep pace with slow to moderate rates of sea-level rise.

There are many ecological and resilience benefits associated with the restoration of tidal marsh habitats in existing non-tidal diked ponds and other degraded shoreline areas. Tidal marsh habitats require appropriate ground elevations and adequate tidal circulation to/from the open bay.

Seasonal Wetlands

There are a wide variety of types of seasonal wetland habitats that occur around San Francisco Bay, including salt pannes, vernal pools, wet meadows, and seasonal ponds. These habitats rely on seasonal rainfall and streamflows to support water-dependent plants and wildlife. These habitats can provide a wide range of habitat benefits and improvements to water quality, however because these habitats often rely on capturing limited amounts of rainfall



Typological approaches for 'multi-benefit' living levees.

LIVING LEVEES: A FLEXIBLE BAND

OUTBOARD

Complement existing habitat and tidal zones, in preparation for future sea level rise

Avoid impacts to existing tidal habitats at the water's edge

HABITAT SLOPE

Allow for habitat restoration, protection, and migration

Gentler, wider slope creates more opportunities for transition zone habitats, while narrower, steeper slope might be better in some areas to protect/preserve existing tidal habitats.

LEVEE CORE

Public trail on levee core

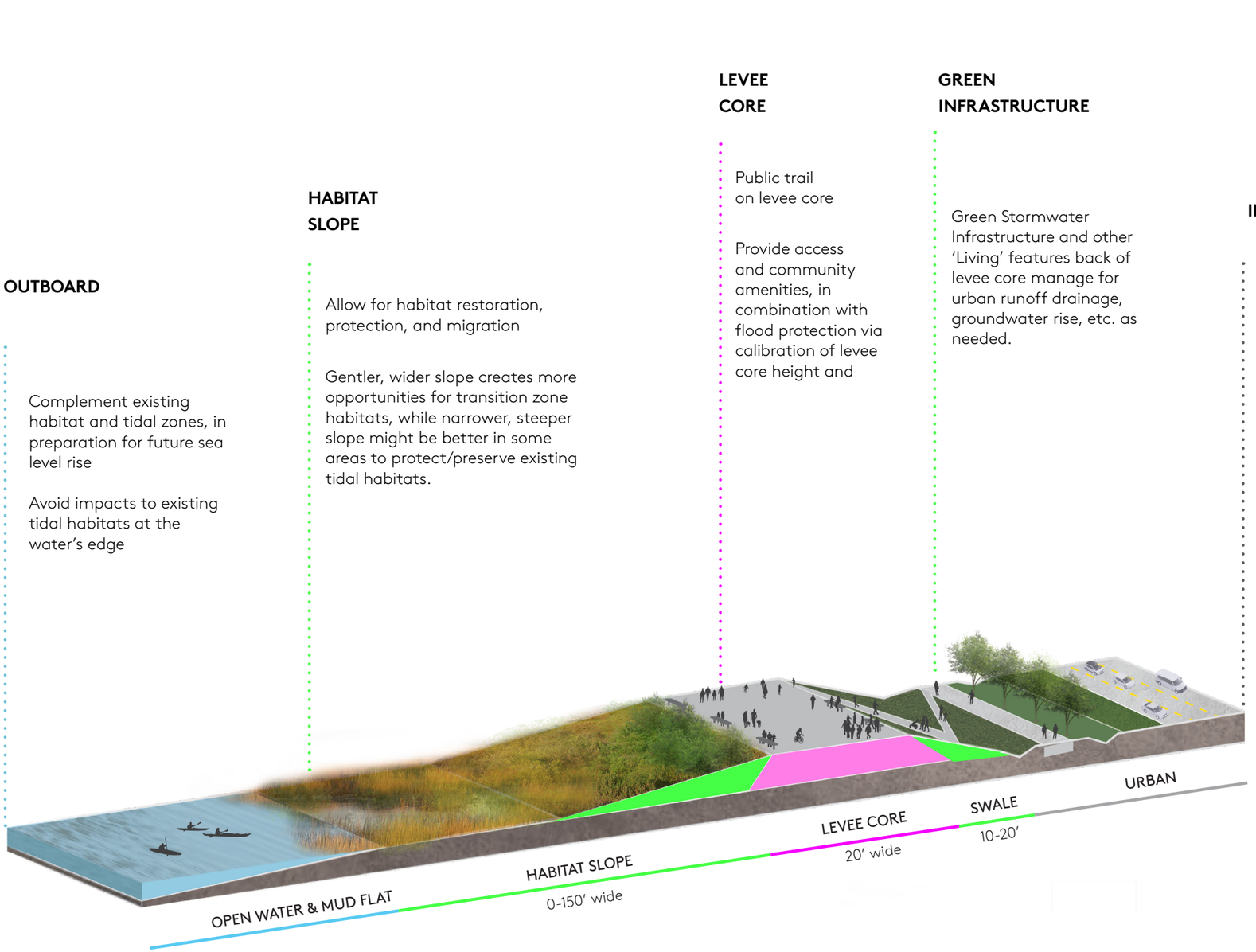
Provide access and community amenities, in combination with flood protection via calibration of levee core height and

GREEN INFRASTRUCTURE

Green Stormwater Infrastructure and other 'Living' features back of levee core manage for urban runoff drainage, groundwater rise, etc. as needed.

INLAND

Accommodate / Modify existing critical infrastructure and transportation alignments



during the winter months, these habitats can be highly sensitive to changes in the local watershed and geology.

The proposed living levee project may create opportunities for the creation of new seasonal wetlands, in particular in areas where stormwater accumulates on the landward side of the new levees.

Riparian / Floodplain Corridors

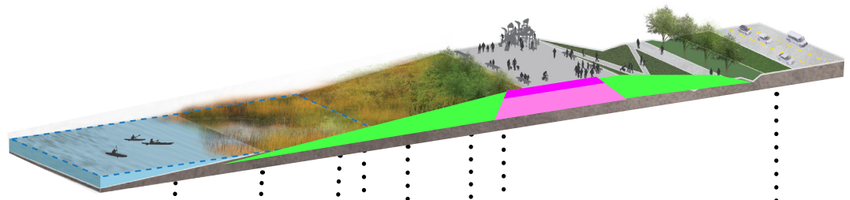
Creeks and streams provide valuable connections between San Francisco Bay and the nearby flatlands and upland watersheds. Not only do these channels play an important role in conveying rainfall runoff from our streets and neighborhoods, but they also provide important habitat for a wide variety of species.

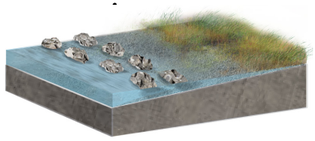
Many of the creeks and streams around the Bay Area have been heavily degraded by projects that aimed to maximize the area available for land development at the expense of habitats and the natural landscape. The resulting stormwater channel systems include culverts and concrete lined channels that provide very little ecological value. In addition, these rigid structures were often optimized to have just enough capacity to handle historic rainfall patterns, and have limited flexibility to accommodate the more extreme rainfall patterns expected due to climate change. The North Richmond community should take advantage of opportunities to improve existing creek corridors, including Wildcat, San Pablo and Rheem Creek, first by protecting and enhancing the existing natural creek channels and pursuing opportunities to widen the protected floodplain and habitat corridors along each channel and to reconnect additional floodplain areas to the existing channel corridors.

One major challenge as sea-levels rise will be managing flood elevations along the creek corridors. Rising sea-levels can contribute to higher flood elevations along the creeks flowing into the Bay. It is important that communities set aside space along these channels so that these landscapes can adapt to changing future conditions.

HABITATS

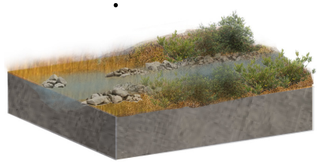
Habitat areas can be calibrated for extents and slope, providing for different needs based on projected sea levels, erosion, and adjacent conditions.





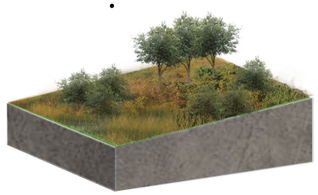
LIVING SHORELINE

Apply nature-based features to provide coastal protection and habitat



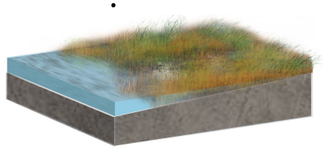
RIPARIAN

Preserve and expand natural corridors along creek channels



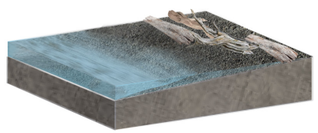
ECOTONE

Create or enhance gently sloped transitions between tidal and riparian habitats and adjacent uplands



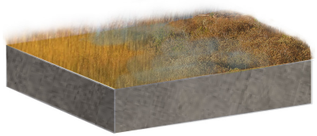
TIDAL WETLAND

Restore tides to diked ponds, remove unneeded historic shoreline fill



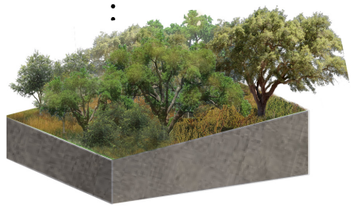
GRAVEL BEACH

For shorelines with larger wave exposure. To reduce erosion of marsh habitats and to protect critical infrastructure



SEASONAL WETLAND

Create wetland habitats in areas where stormwater runoff is concentrated for water quality and habitat benefits



UPLANDS

Protect open space and apply ecological enhancements to restore habitat

ECOLOGICAL ENHANCEMENTS

ESTABLISH NATIVE VEGETATION

Seeding and planting appropriate native plant species

INVASIVE PLANT MANAGEMENT

Managing and eradicating invasive plants

SMALL-SCALE HABITAT

NATURAL STRUCTURES
- wood habitat structures
- oyster reefs & refugia

MANUFACTURED
- Owl burrows
- bird/bat boxes

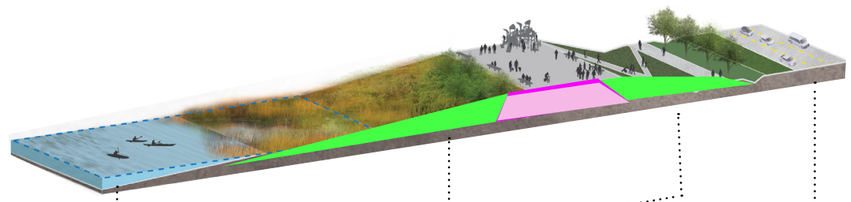
NATURE-BASED WATER TREATMENT

- Stormwater swales
- Wetland water treatment ponds
- Subsurface flow water treatment wetlands

Gentler, wider slope creates more opportunities for transition zone habitats, but narrower, steeper slope might be better in some areas to protect/ preserve existing tidal habitats and accomodate for existing infrastructure, etc.

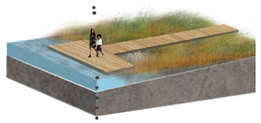
AMENITIES

This group of amenities were identified by the Community Working Group co-design process discussed in chapter 2; as well as priorities for ranked preference and location.

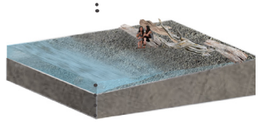


WATERFRONT

KAYAK BEACH

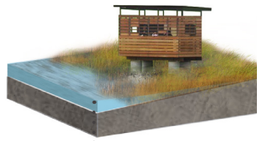


BOARDWALK

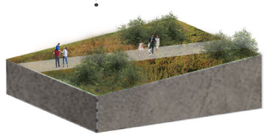


GRAVEL BEACH

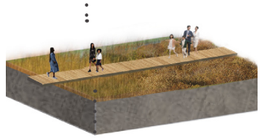
GREEN SPACES



BIRD BLIND

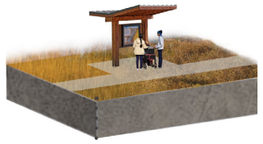


GARDEN

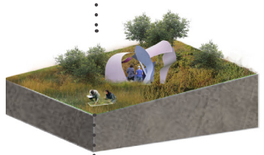


WALKWAY

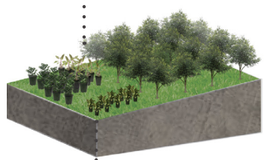
ENRICHMENT



INFO KIOSK

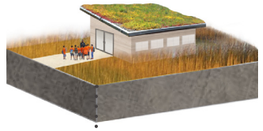


ART/RESEARCH AREA



NATIVE PLANT NURSERY

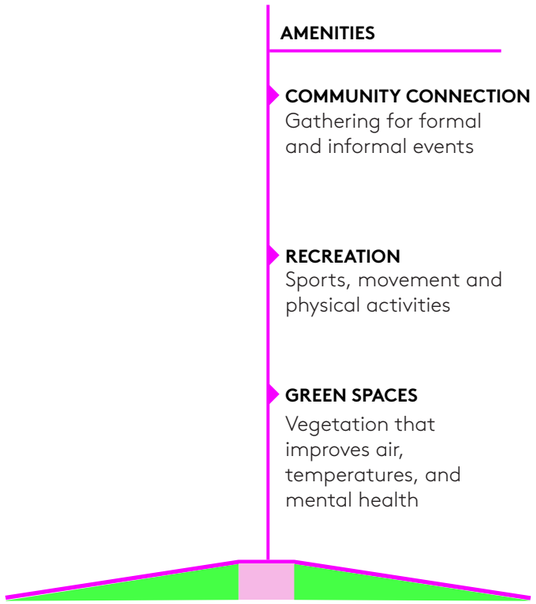
COMMUNITY



EVENT SPACE

PARK

GATHERING SPACE



Levee amenities provide for community and green infrastructure at the same time. Refer to chapter 2 for more details.

REGULATORY GUIDANCE FOR LEVEE HEIGHT

As noted in Chapter 1, the state of California has published guidance for planning for future sea-level rise. Coastal flood protection projects should apply a risk-based approach to identify appropriate flood protection design targets, including accommodation for an appropriate amount of future sea-level rise. This analysis should consider the types of infrastructure and land uses that are at risk of flooding, the level of vulnerability and sensitivity to flood impacts.

This analysis should also include consideration of the design life of the proposed project, and evaluation of future adaptation pathways for managing the landscape beyond the design life of the current project.

The proposed project is assumed to have an approximate 45-year design life (through approximately 2070). The project provides flood protection for critical infrastructure at the West County Wastewater treatment plant, consequently it is appropriate to use the "medium-high risk aversion" projections for planning and design. Current State of California sea-level rise guidance indicates +3.5ft of sea-level rise by 2070 under the "medium-high risk aversion" projections (OPC 2018).

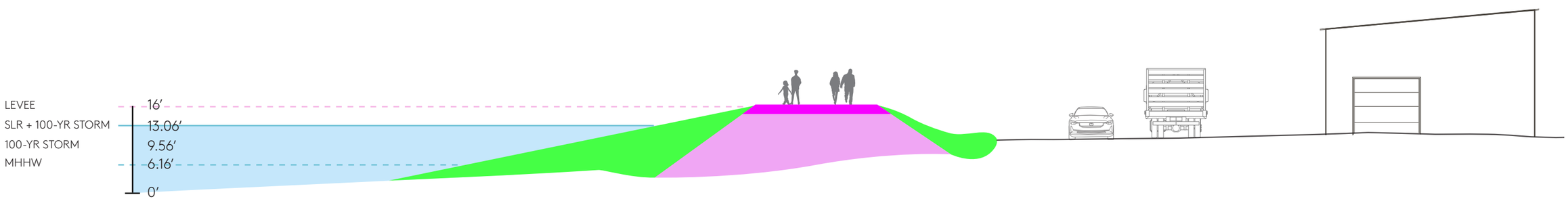
This sea-level rise projection has informed the selected levee crest elevation in the conceptual design. The design elevation of the crest of the new flood protection levee is based on the present-day 100-year coastal flood elevation, plus the projected amount of sea-level rise and an allowance for freeboard. Freeboard is additional height above the predicted flood elevation that is included in a levee design as an allowance for factors that are not directly accounted for in the flood elevation estimates. These factors include local variations in the coastal flood elevation, for example due to wave runup and the influence of nearby creeks, and as an allowance for potential subsidence of the levee over time.

Based on this calculation, the conceptual design for the Phase 1 demonstration project at the West County Wastewater treatment plant proposes a levee crest elevation at 16.0ft NAVD. Levee crest elevations elsewhere along the shoreline will likely be similar to the levee crest elevation at the West County Wastewater treatment plant, however there might be some slight differences in the recommended freeboard at other locations due to variations in the local wave exposure, and different subsoil conditions which could affect the local risk of subsidence.

Some levee segments might need to be constructed in phases to accommodate soft subsoil conditions. Levees could be initially construction to a lower elevation during an initial phase, and then raised at a future date to the full design elevation. See discussion of Geotechnical Considerations on page 111.

Levee Crest Design Elevation (based on NAVD88)

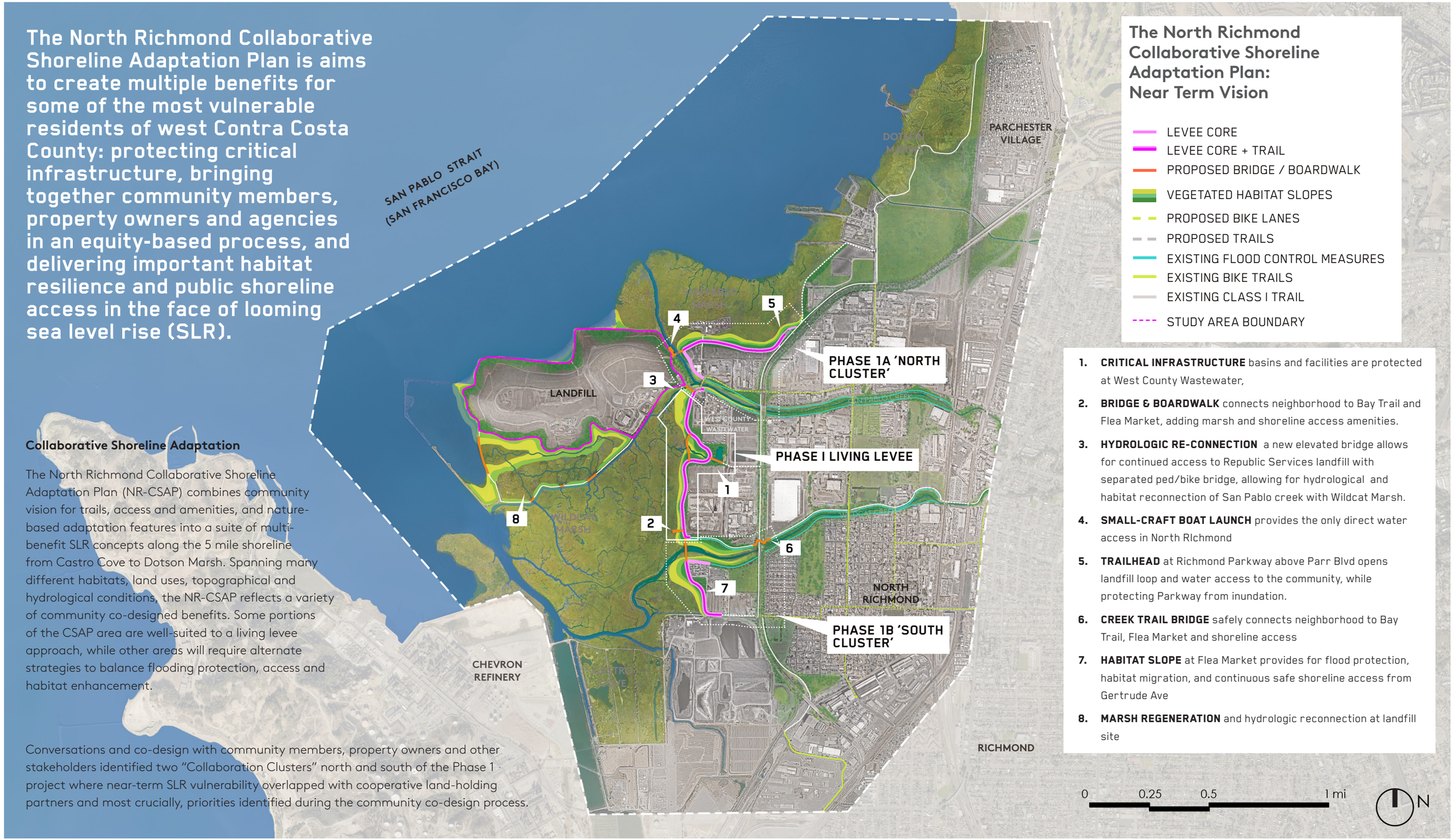
Present day 100-year Coastal Flood Elevation	9.8 feet
Projected sea-level rise (SLR)	+ 3.5 feet
Allowance for freeboard	+ 2.5 feet
	= 15.8 feet *(round up to 16')*



Levee Height + Sea Level Rise: The levee height is based on sea level rise (SLR) projections, plus calculations for gravitational settling and freeboard, to a total height to 16' elevation.

THE NORTH RICHMOND COLLABORATIVE SHORELINE ADAPTATION PLAN: NEAR-TERM VISION

The North Richmond Collaborative Shoreline Adaptation Plan is aims to create multiple benefits for some of the most vulnerable residents of west Contra Costa County: protecting critical infrastructure, bringing together community members, property owners and agencies in an equity-based process, and delivering important habitat resilience and public shoreline access in the face of looming sea level rise (SLR).



The North Richmond Collaborative Shoreline Adaptation Plan: Near Term Vision

- LEVEE CORE
- LEVEE CORE + TRAIL
- PROPOSED BRIDGE / BOARDWALK
- VEGETATED HABITAT SLOPES
- PROPOSED BIKE LANES
- PROPOSED TRAILS
- EXISTING FLOOD CONTROL MEASURES
- EXISTING BIKE TRAILS
- EXISTING CLASS I TRAIL
- STUDY AREA BOUNDARY

1. **CRITICAL INFRASTRUCTURE** basins and facilities are protected at West County Wastewater,
2. **BRIDGE & BOARDWALK** connects neighborhood to Bay Trail and Flea Market, adding marsh and shoreline access amenities.
3. **HYDROLOGIC RE-CONNECTION** a new elevated bridge allows for continued access to Republic Services landfill with separated ped/bike bridge, allowing for hydrological and habitat reconnection of San Pablo creek with Wildcat Marsh.
4. **SMALL-CRAFT BOAT LAUNCH** provides the only direct water access in North RIchmond
5. **TRAILHEAD** at Richmond Parkway above Parr Blvd opens landfill loop and water access to the community, while protecting Parkway from inundation.
6. **CREEK TRAIL BRIDGE** safely connects neighborhood to Bay Trail, Flea Market and shoreline access
7. **HABITAT SLOPE** at Flea Market provides for flood protection, habitat migration, and continuous safe shoreline access from Gertrude Ave
8. **MARSH REGENERATION** and hydrologic reconnection at landfill site

0 0.25 0.5 1 mi

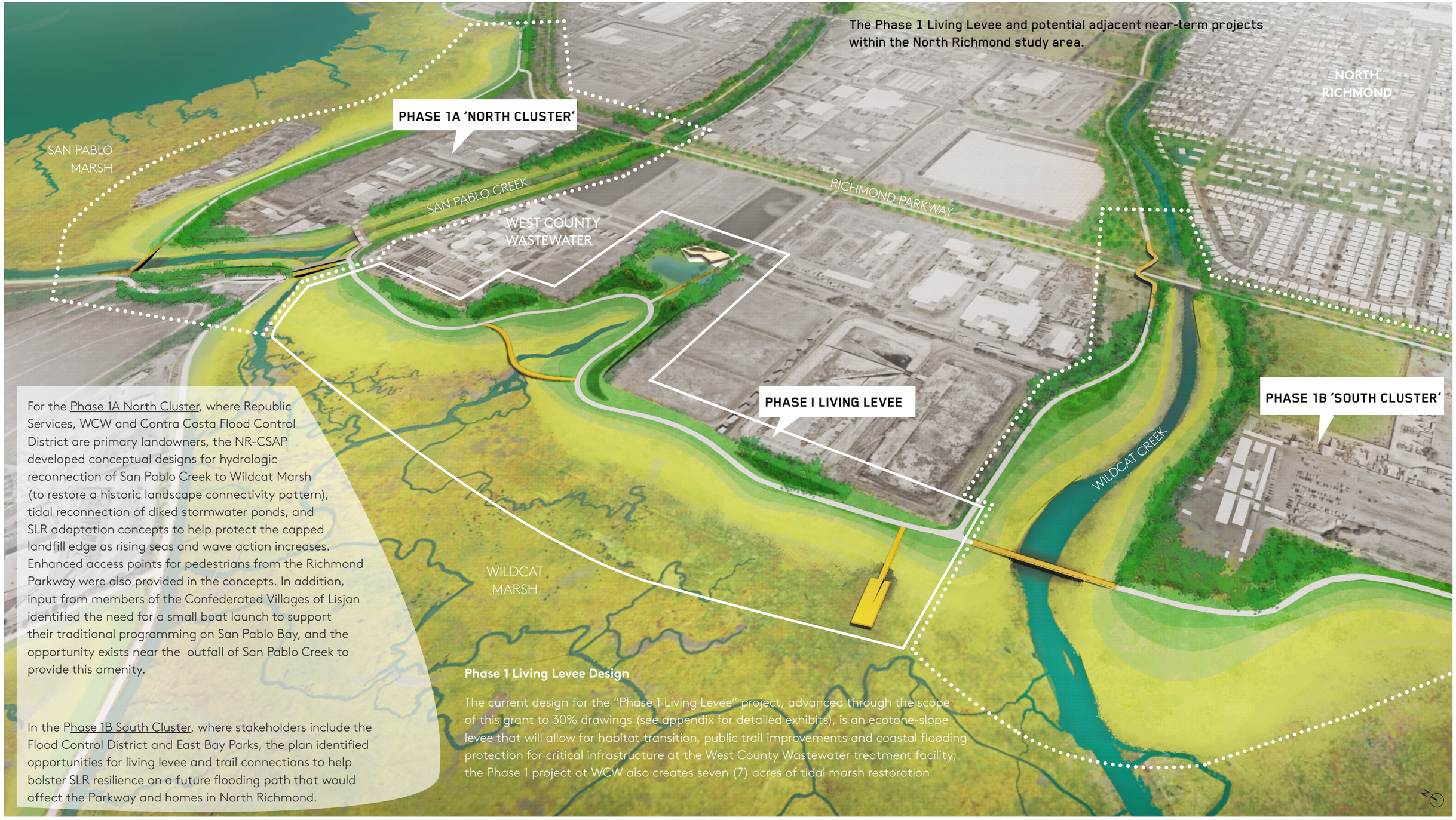
N

Collaborative Shoreline Adaptation

The North Richmond Collaborative Shoreline Adaptation Plan (NR-CSAP) combines community vision for trails, access and amenities, and nature-based adaptation features into a suite of multi-benefit SLR concepts along the 5 mile shoreline from Castro Cove to Dotson Marsh. Spanning many different habitats, land uses, topographical and hydrological conditions, the NR-CSAP reflects a variety of community co-designed benefits. Some portions of the CSAP area are well-suited to a living levee approach, while other areas will require alternate strategies to balance flooding protection, access and habitat enhancement.

Conversations and co-design with community members, property owners and other stakeholders identified two "Collaboration Clusters" north and south of the Phase 1 project where near-term SLR vulnerability overlapped with cooperative land-holding partners and most crucially, priorities identified during the community co-design process.

CRITICAL NEAR-TERM PROJECTS



The Phase 1 Living Levee and potential adjacent near-term projects within the North Richmond study area.

For the Phase 1A North Cluster, where Republic Services, WCW and Contra Costa Flood Control District are primary landowners, the NR-CSAP developed conceptual designs for hydrologic reconnection of San Pablo Creek to Wildcat Marsh (to restore a historic landscape connectivity pattern), tidal reconnection of diked stormwater ponds, and SLR adaptation concepts to help protect the capped landfill edge as rising seas and wave action increases. Enhanced access points for pedestrians from the Richmond Parkway were also provided in the concepts. In addition, input from members of the Confederated Villages of Lisjan identified the need for a small boat launch to support their traditional programming on San Pablo Bay, and the opportunity exists near the outfall of San Pablo Creek to provide this amenity.

In the Phase 1B South Cluster, where stakeholders include the Flood Control District and East Bay Parks, the plan identified opportunities for living levee and trail connections to help bolster SLR resilience on a future flooding path that would affect the Parkway and homes in North Richmond.

Phase 1 Living Levee Design

The current design for the "Phase 1 Living Levee" project, advanced through the scope of this grant to 30% drawings (see appendix for detailed exhibits), is an ecotone-slope levee that will allow for habitat transition, public trail improvements and coastal flooding protection for critical infrastructure at the West County Wastewater treatment facility; the Phase 1 project at WCW also creates seven (7) acres of tidal marsh restoration.

PHASE I – LIVING LEVEE AT WEST COUNTY WASTEWATER

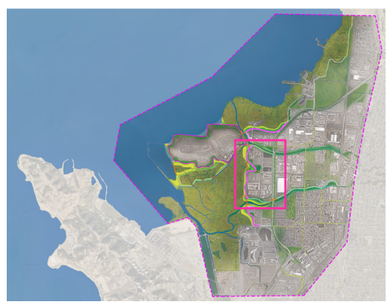
SECTION “A” WILDCAT MARSH BOARDWALK & TRAIL ACCESS

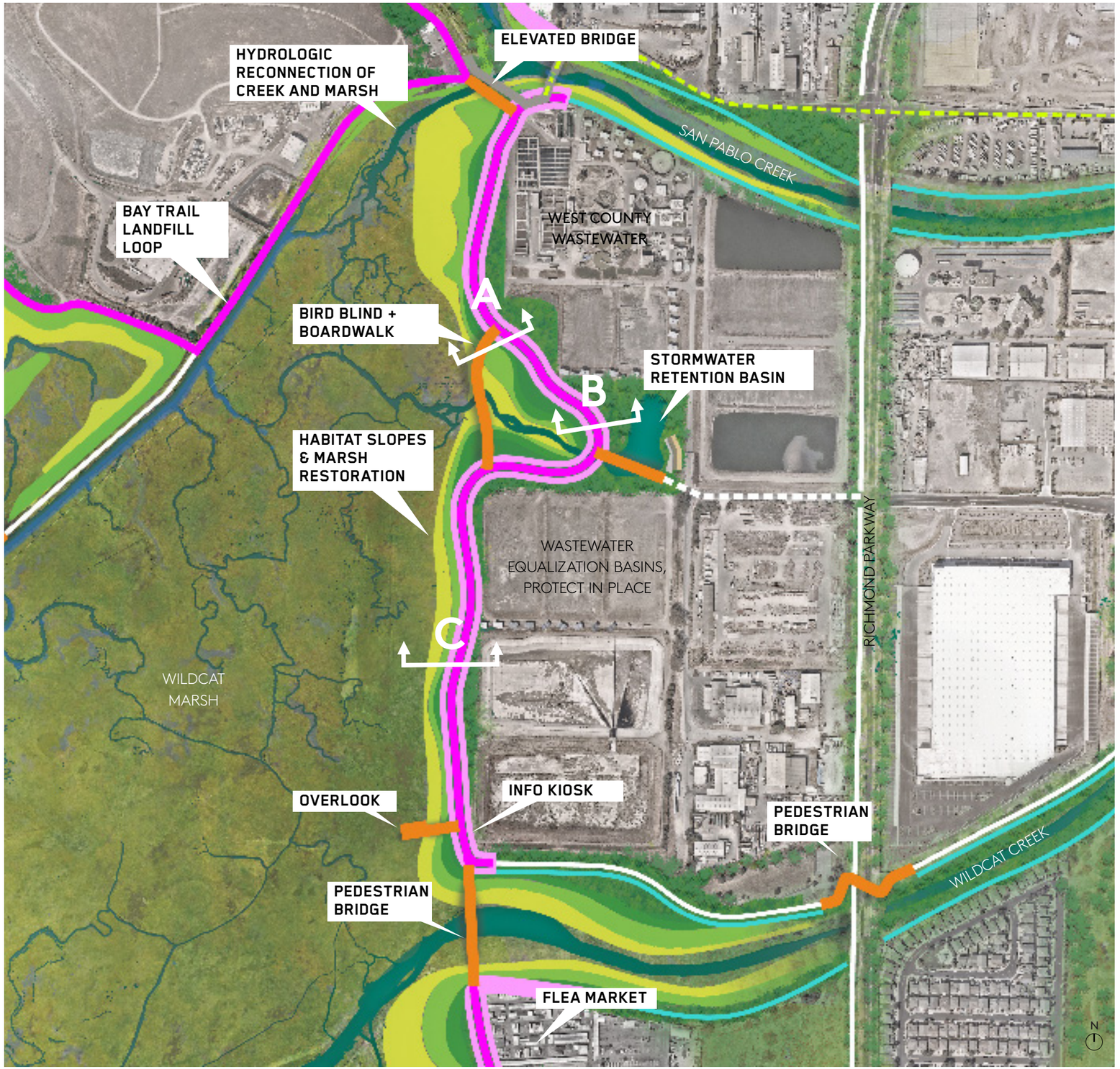
SECTION “B” STORMWATER RETENTION

SECTION “C” EQUALIZATION BASIN

SEE SECTION ENLARGED EXHIBITS ON FOLLOWING PAGES .
SEE APPENDIX FOR DESIGN DETAILS.

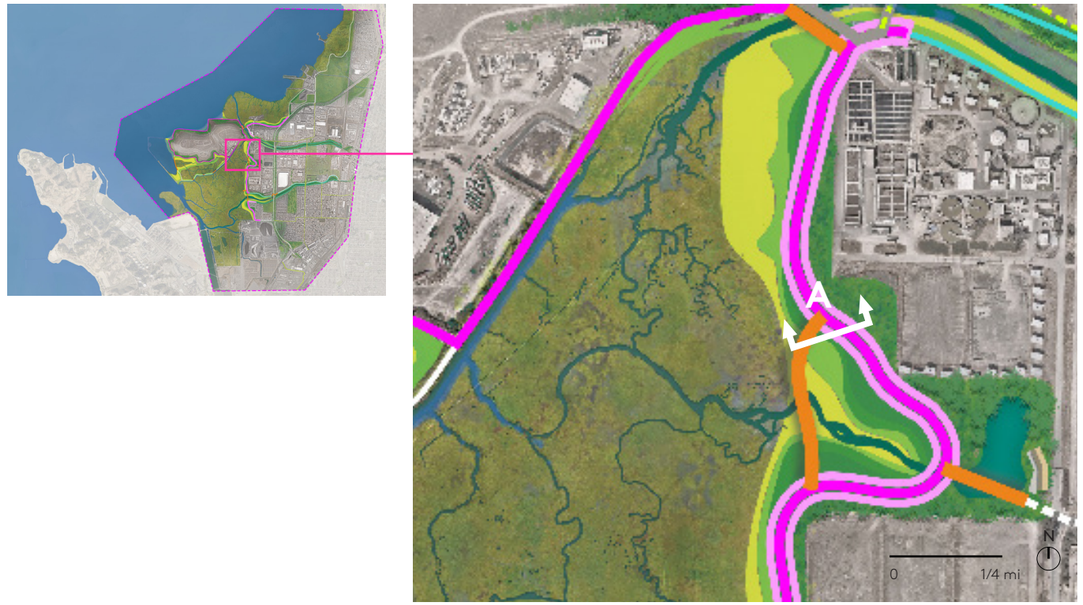
- LEVEE CORE
- LEVEE CORE + TRAIL
- PROPOSED BRIDGE / BOARDWALK
- VEGETATED HABITAT SLOPES
- PROPOSED BIKE LANES
- PROPOSED TRAILS
- EXISTING FLOOD CONTROL MEASURES
- EXISTING BIKE TRAILS
- EXISTING CLASS I TRAIL
- STUDY AREA BOUNDARY

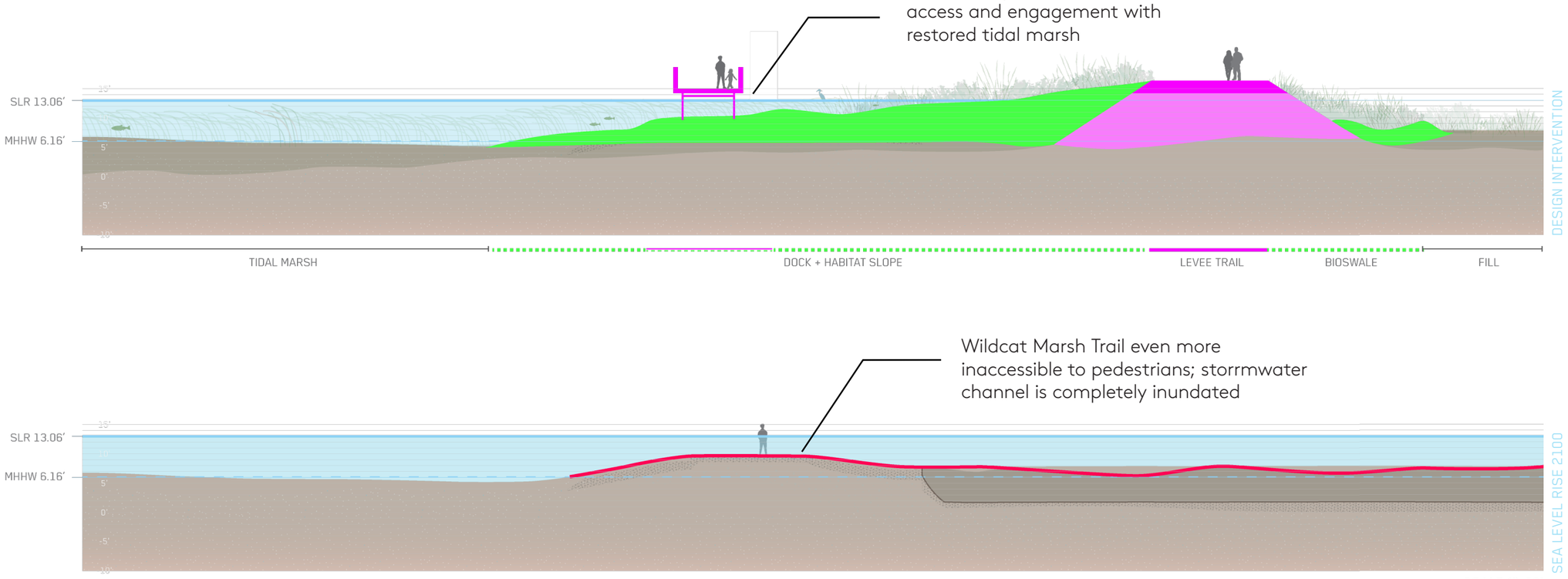




A Wildcat Marsh Boardwalk & Trail Access

OPENING THE WATERFRONT





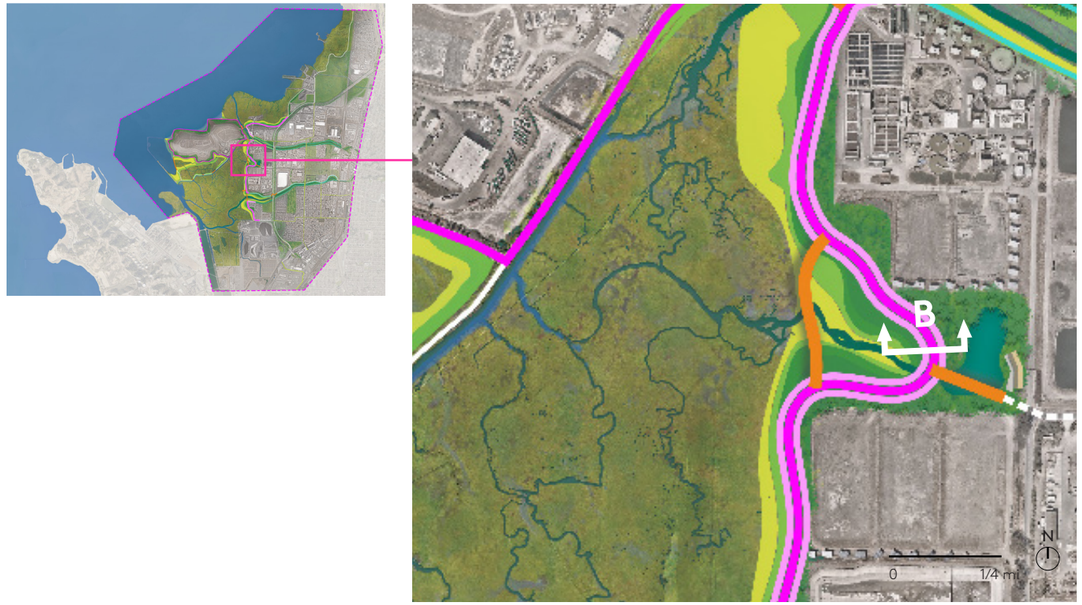
LEGEND

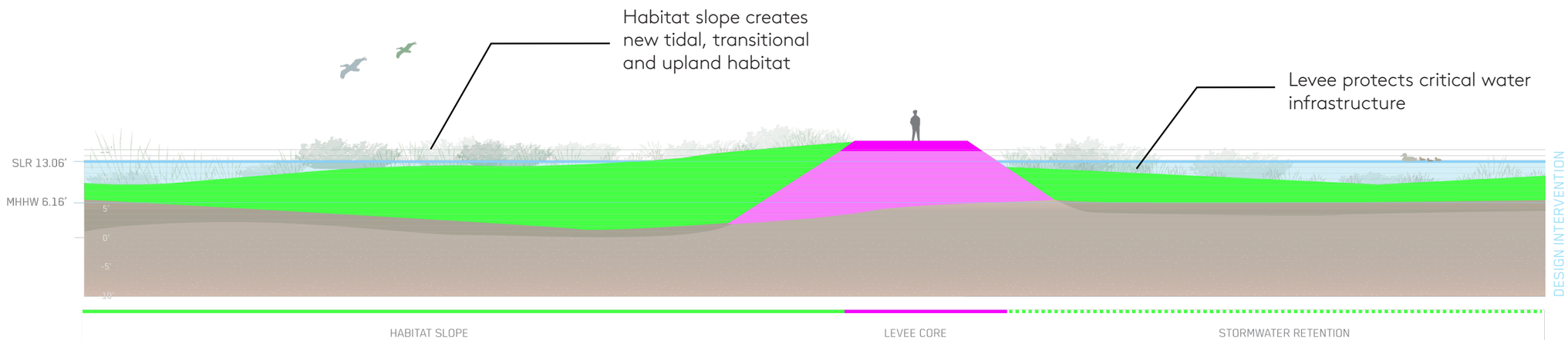
- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

SCALE 1"=20'
(section is 250' wide)

B Stormwater Retention

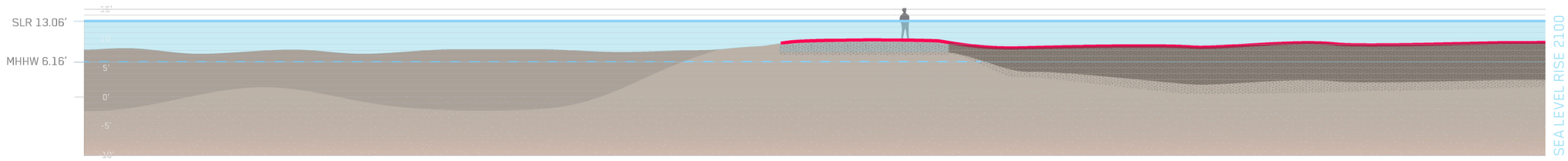
PROTECTING WATER AND ADDING HABITAT





LEGEND

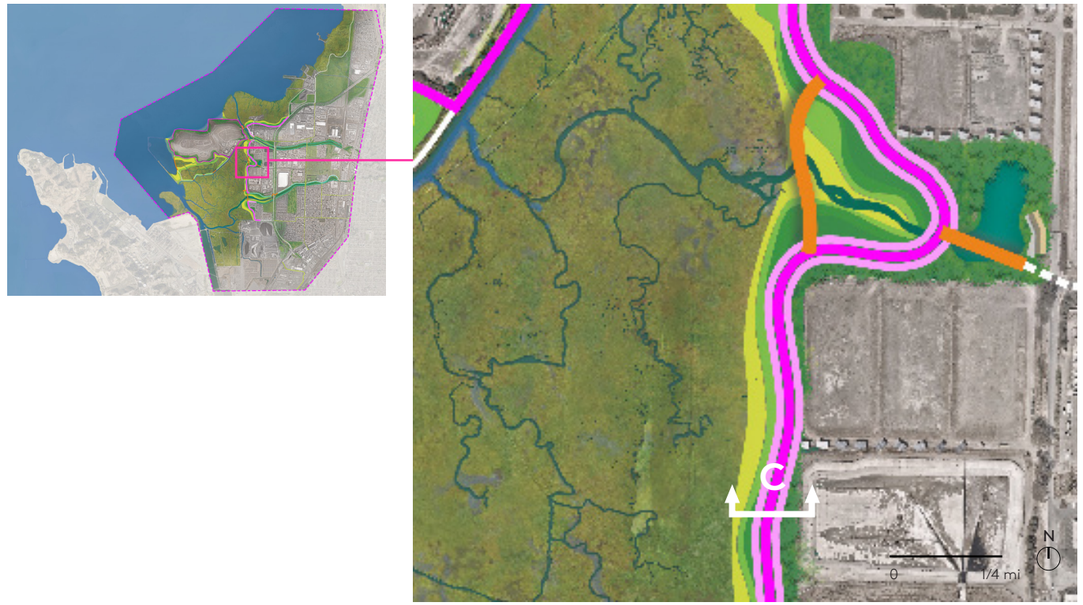
- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

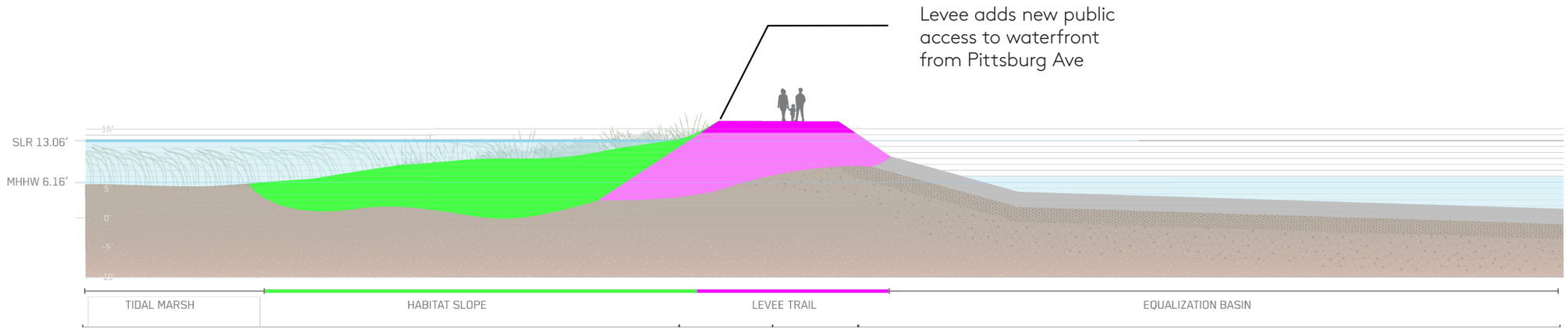


SCALE 1"=20'
(section is 250' wide)

C Equalization Basin

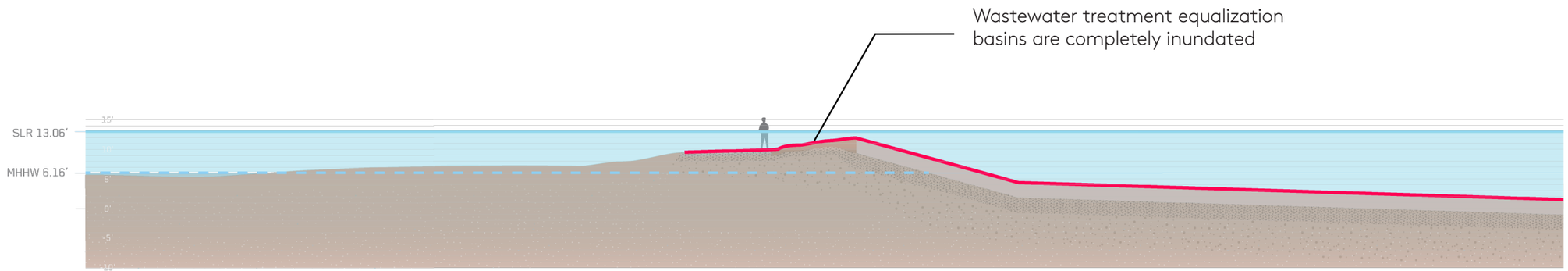
INTEGRATING PERMANENT PUBLIC ACCESS WITH INFRASTRUCTURE





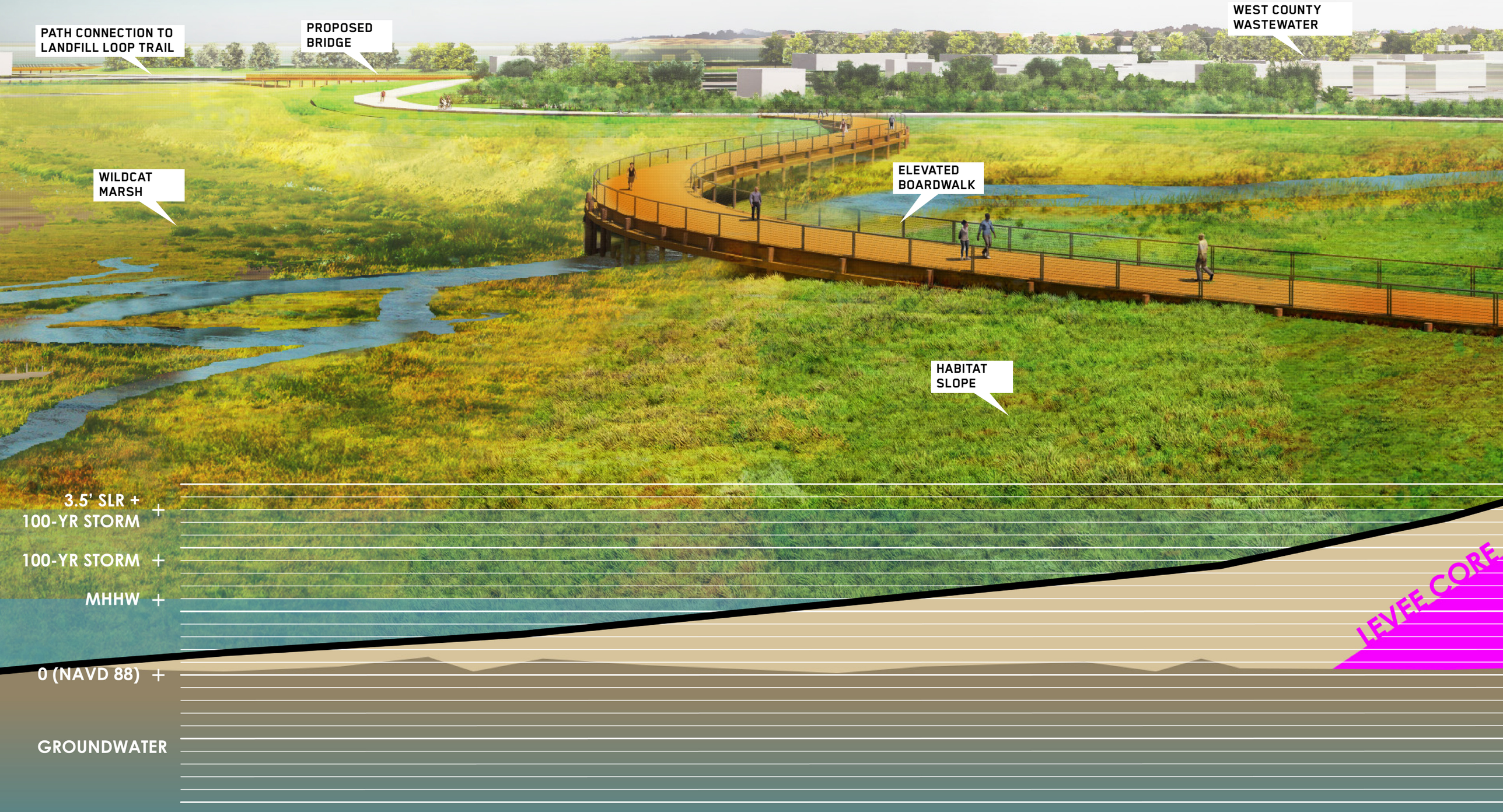
LEGEND

- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)



SCALE 1"=20'
(section is 250' wide)

PROPOSED VIEW (CUTAWAY): A 'Living Levee' at West County Wastewater frontage on Wildcat Marsh in North Richmond, combining flood protection, new trails and amenities, habitat restoration and stormwater management.




INTERPRETIVE CENTER
IMPROVED BAY TRAIL ALONG LEVEE CREST
STORMWATER BIORETENTION
ECOTONE SLOPE FILL

PHASE 1A: "CLUSTER NORTH" CONCEPT DESIGN

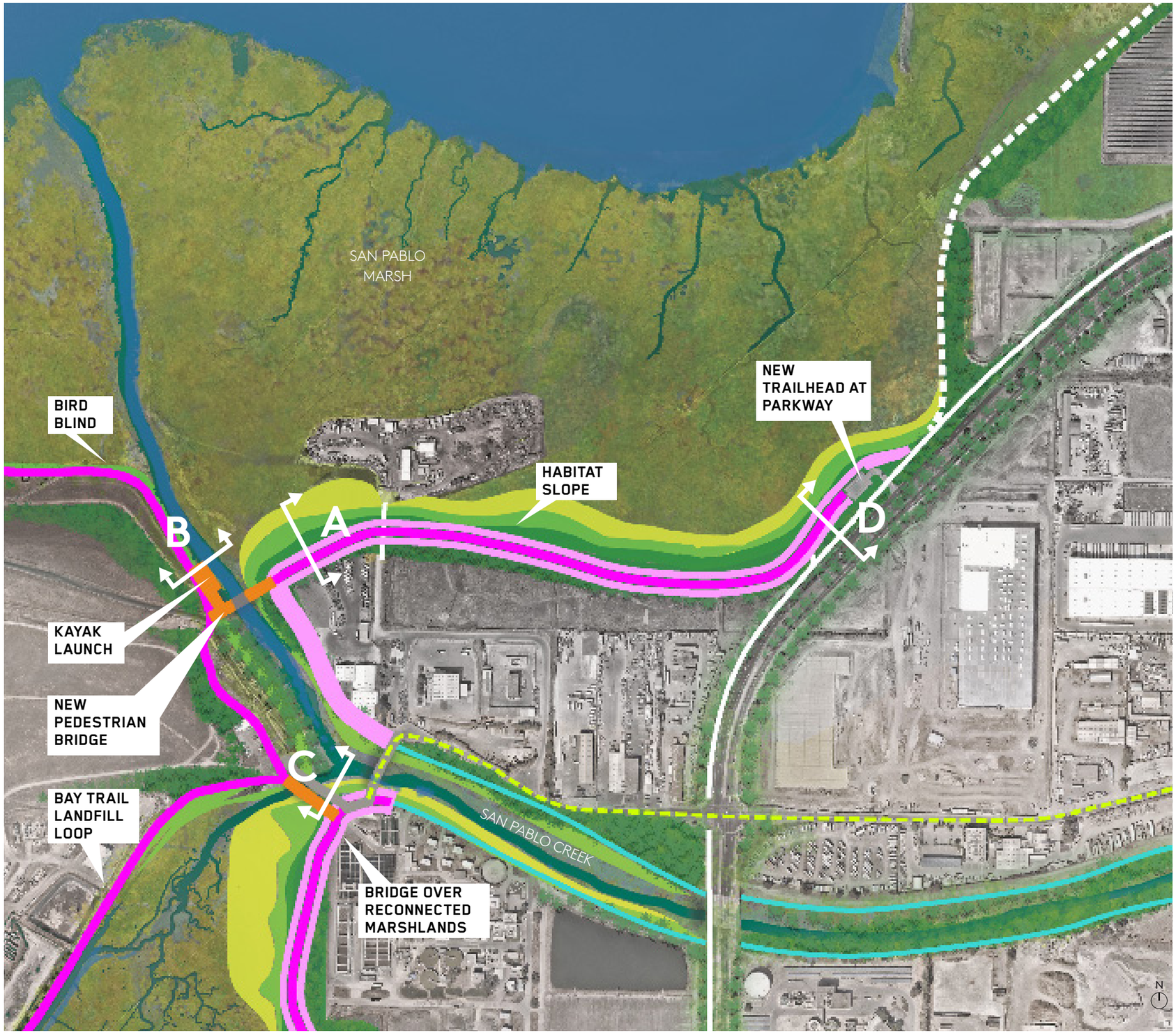
SECTION "A" REPUBLIC SERVICES

SECTION "B" SMALL-CRAFT LAUNCH

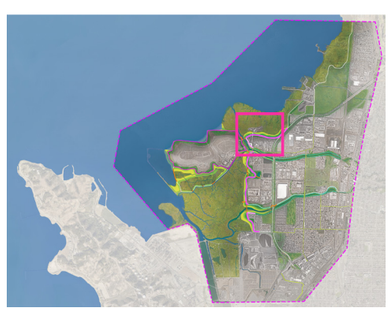
SECTION "C" MARSH RE-CONNECTION

SECTION "D" RICHMOND PARKWAY

SEE SECTION ENLARGED EXHIBITS ON FOLLOWING PAGES

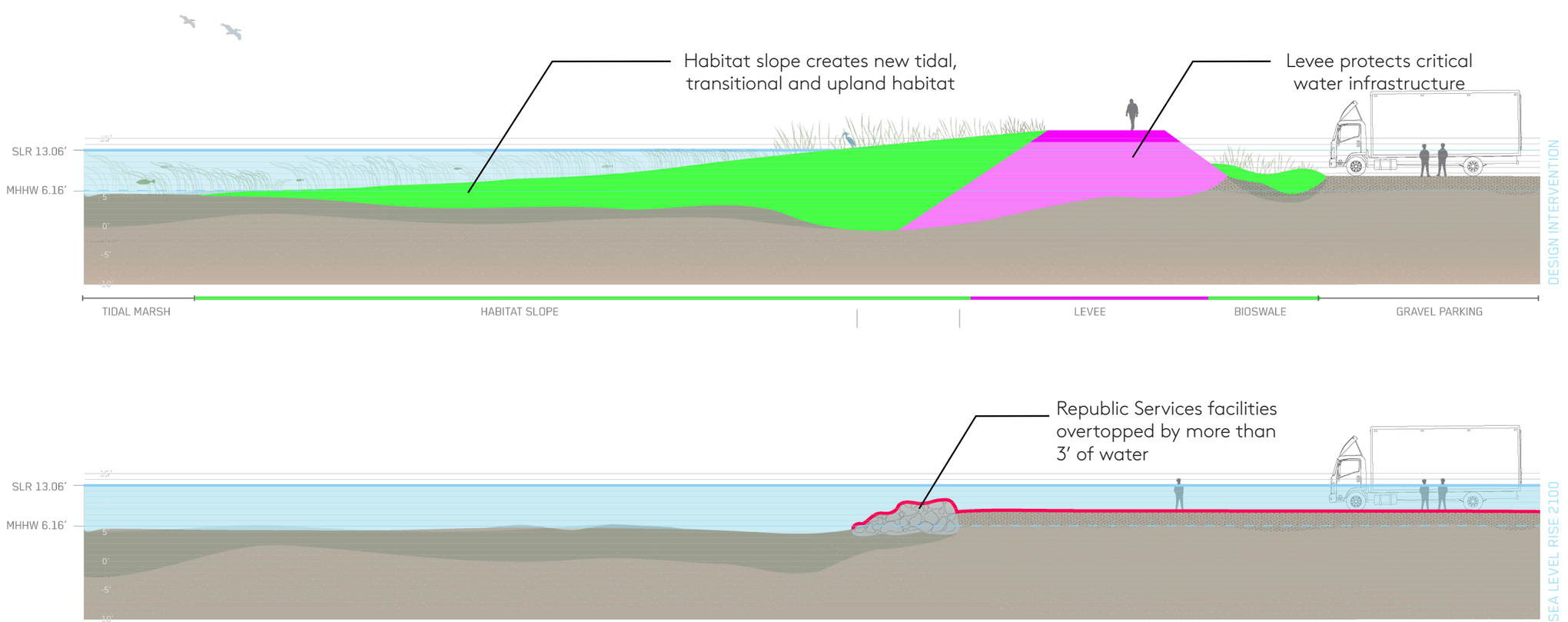


- LEVEE CORE
- LEVEE CORE + TRAIL
- PROPOSED BRIDGE / BOARDWALK
- VEGETATED HABITAT SLOPES
- PROPOSED BIKE LANES
- PROPOSED TRAILS
- EXISTING FLOOD CONTROL MEASURES
- EXISTING BIKE TRAILS
- EXISTING CLASS I TRAIL
- STUDY AREA BOUNDARY



A Republic Services

INTEGRATING HABITAT ADAPTATION, PERMANENT PUBLIC ACCESS WITH CURRENT FACILITIES



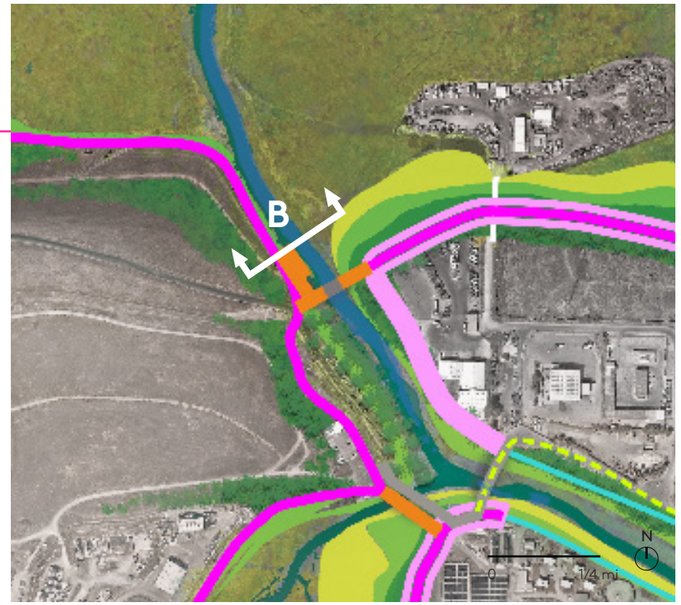
LEGEND

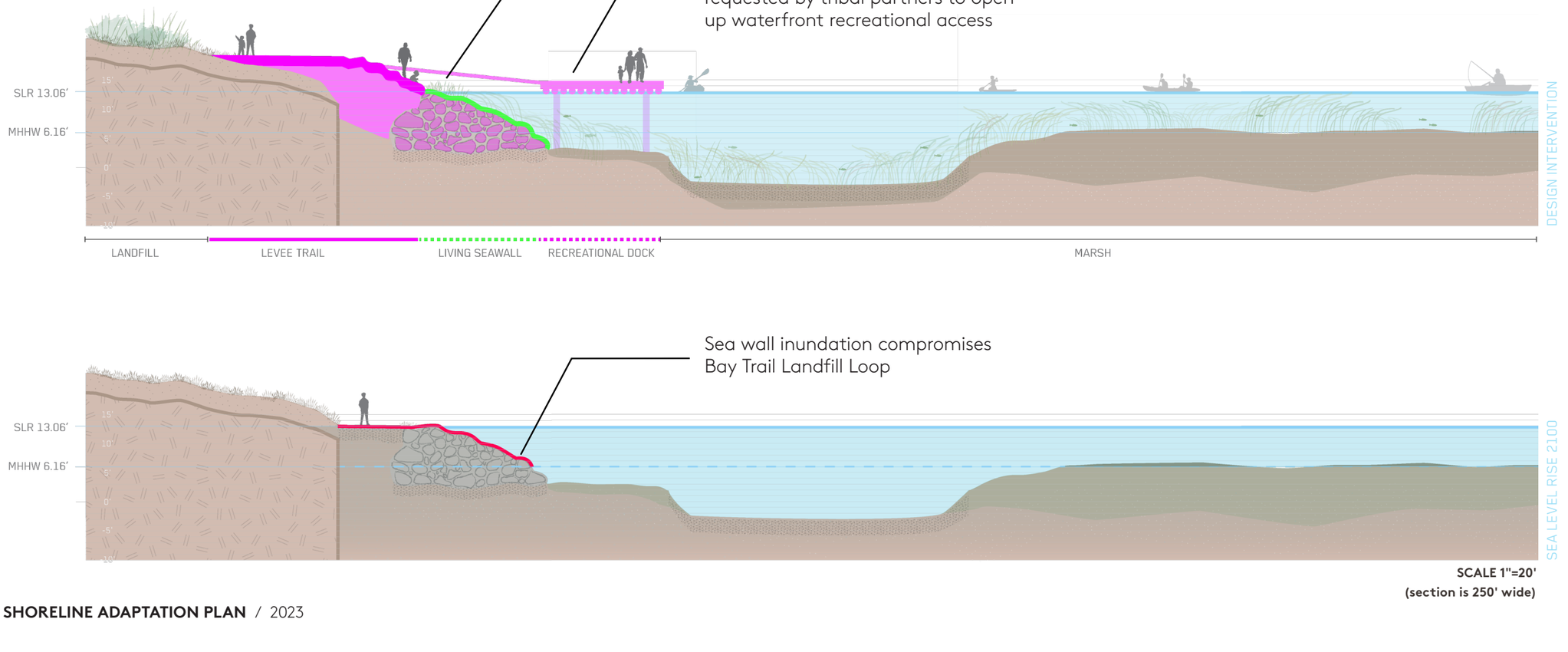
- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

SCALE 1"=20'
(section is 250' wide)

B Small-Craft Launch

ELEVATING PERMANENT PUBLIC ACCESS WITH RECREATIONAL ASSETS





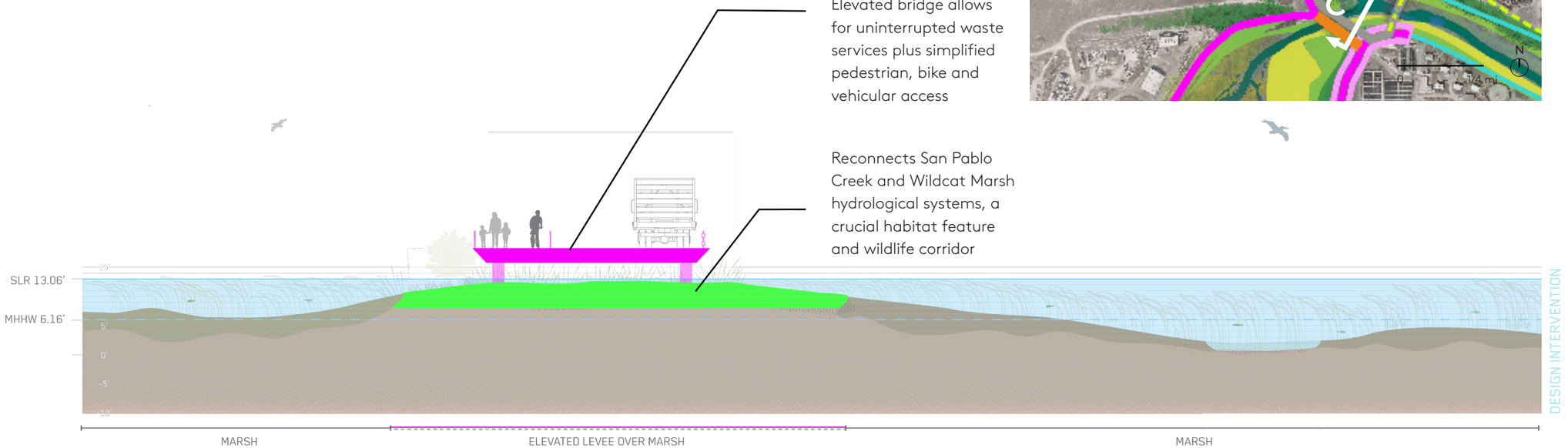
LEGEND

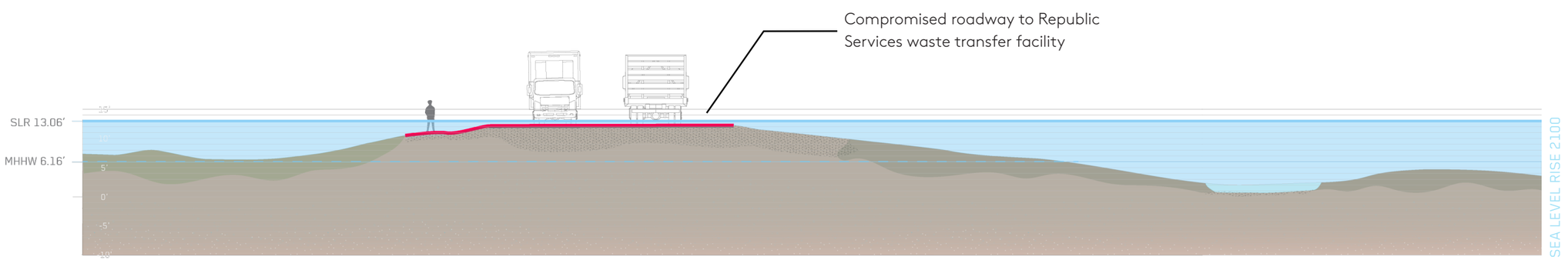
- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

SCALE 1"=20'
(section is 250' wide)

C Marsh Re-Connection

RECONNECTING HABITAT CORRIDORS AND HYDROLOGICAL FLOWS; INSTALLING PERMANENT, SAFE PUBLIC ACCESS





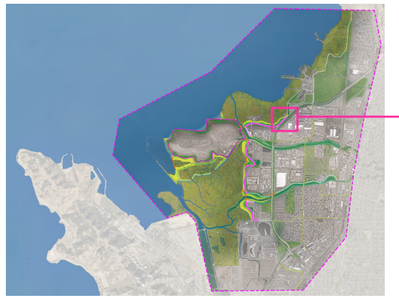
LEGEND

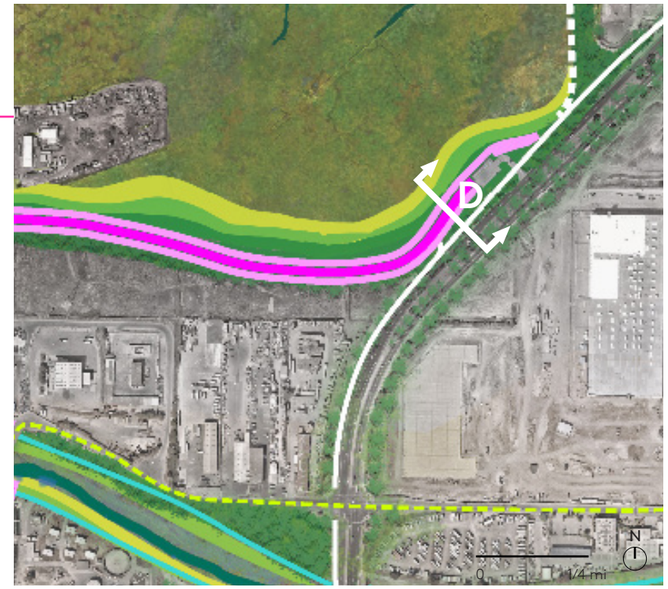
- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

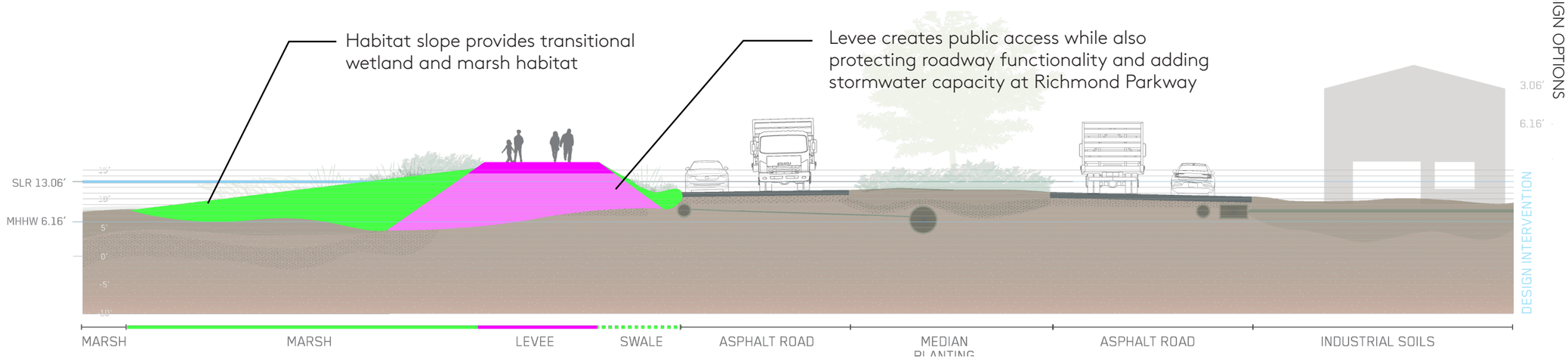
SCALE 1"=20'
(section is 250' wide)

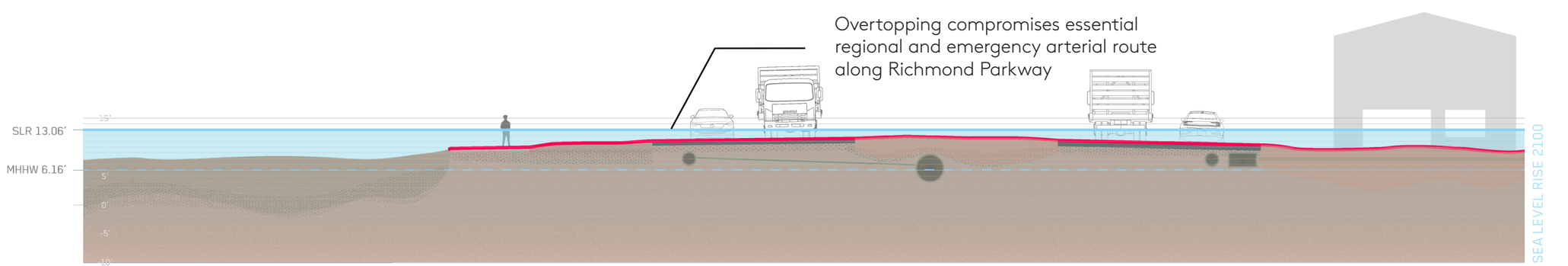
D Richmond Parkway

PROTECTING A CRITICAL TRANSIT CORRIDOR









LEGEND

- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

SCALE 1"=20'
(section is 250' wide)

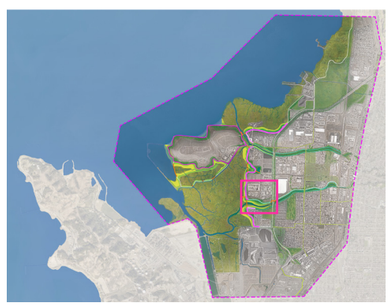
PHASE 1B: "CLUSTER SOUTH" CONCEPT DESIGN

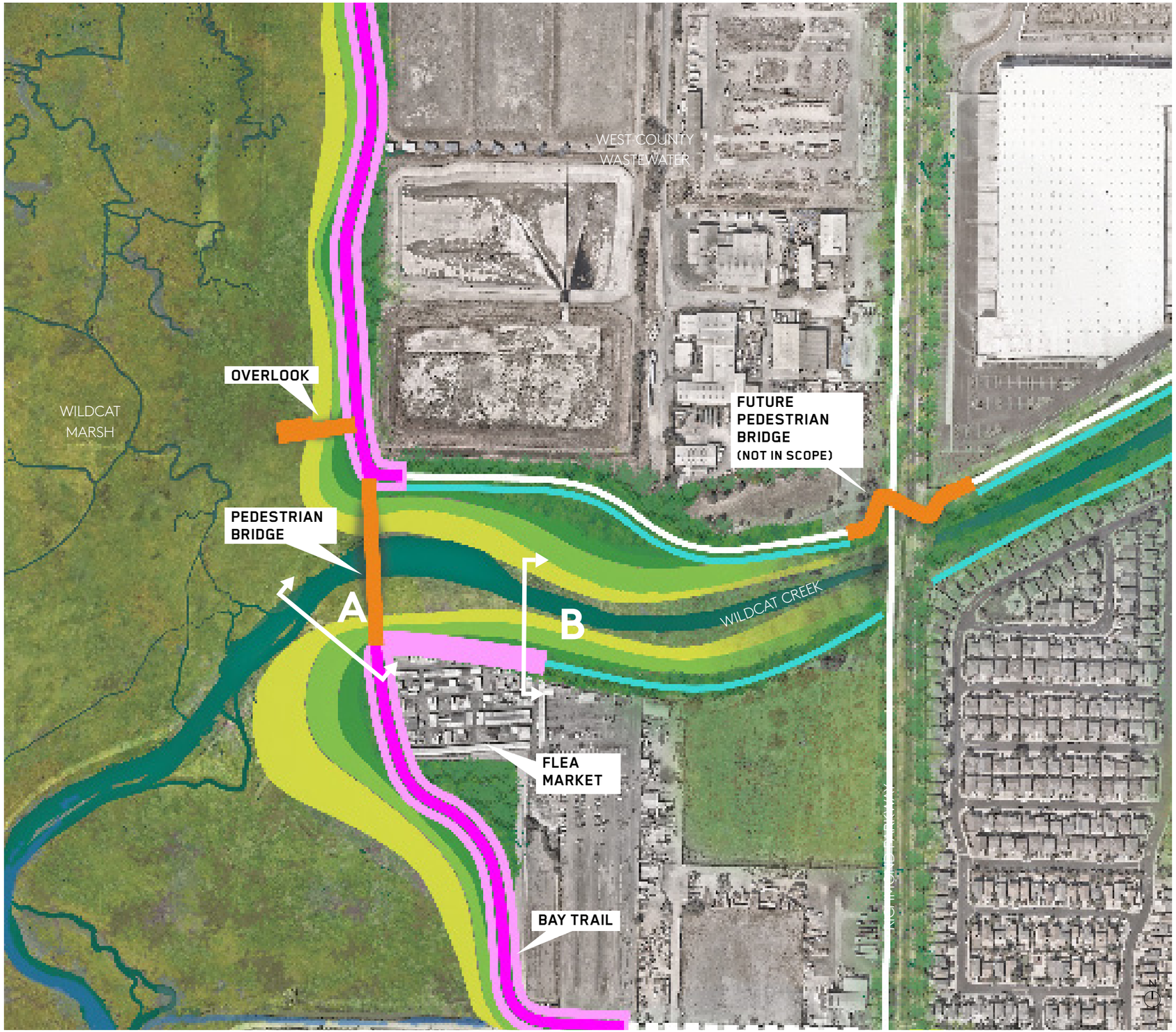
SECTION "A" MARKET-TO-TRAIL CONNECTION

SECTION "B" RIPARIAN HABITAT

SEE SECTION ENLARGED EXHIBITS ON FOLLOWING PAGES

- LEVEE CORE
- LEVEE CORE + TRAIL
- PROPOSED BRIDGE / BOARDWALK
- VEGETATED HABITAT SLOPES
- PROPOSED BIKE LANES
- PROPOSED TRAILS
- EXISTING FLOOD CONTROL MEASURES
- EXISTING BIKE TRAILS
- EXISTING CLASS I TRAIL
- STUDY AREA BOUNDARY

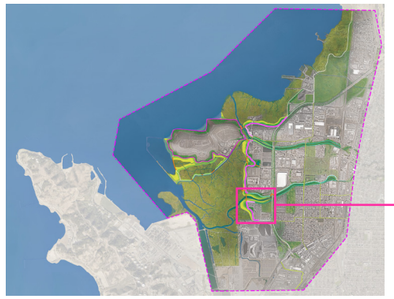


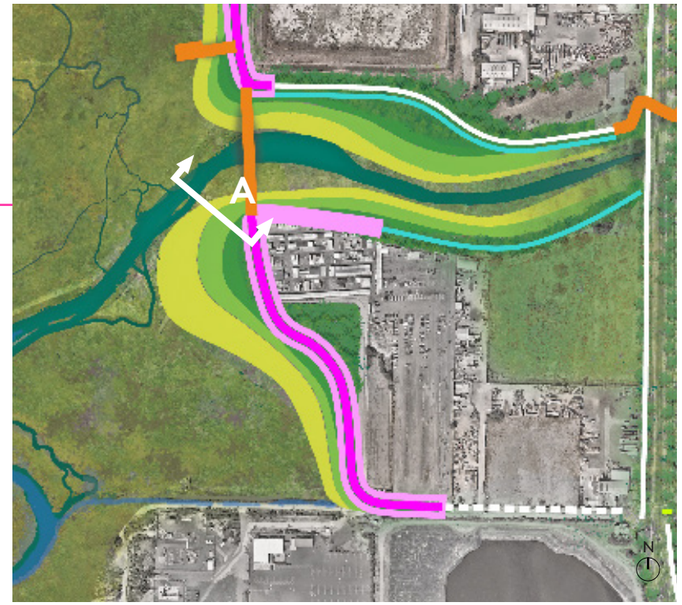


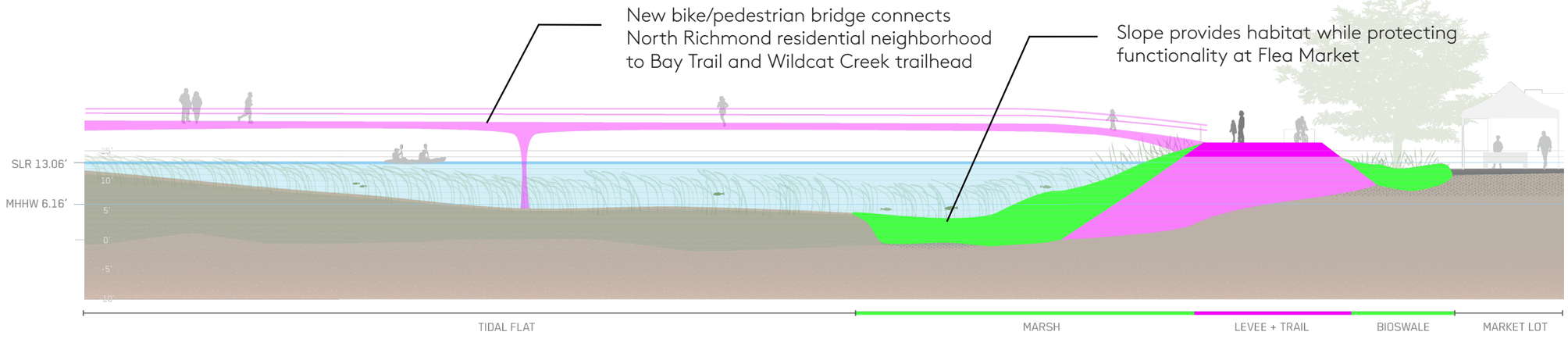
A Market-to-trail connection

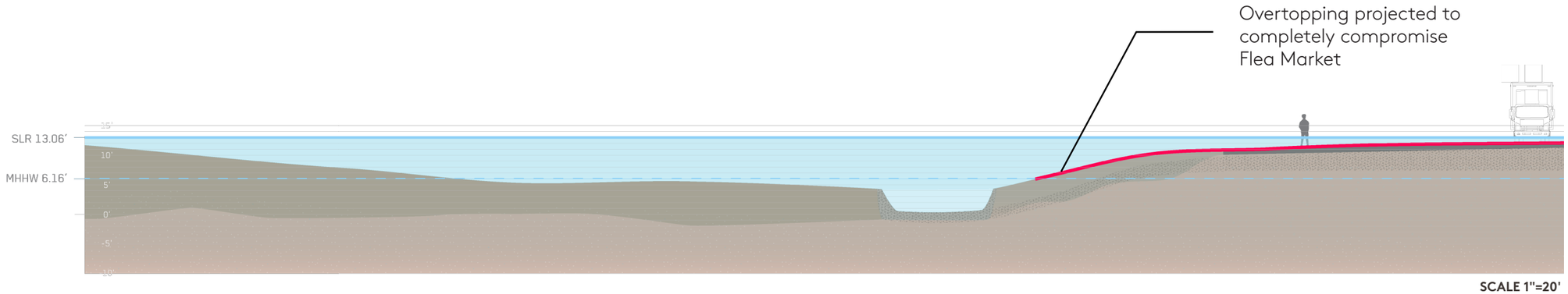
INSTALLING PERMANENT, SAFE PUBLIC ACCESS;

PROTECTING AN ESSENTIAL COMMUNITY ASSET









LEGEND

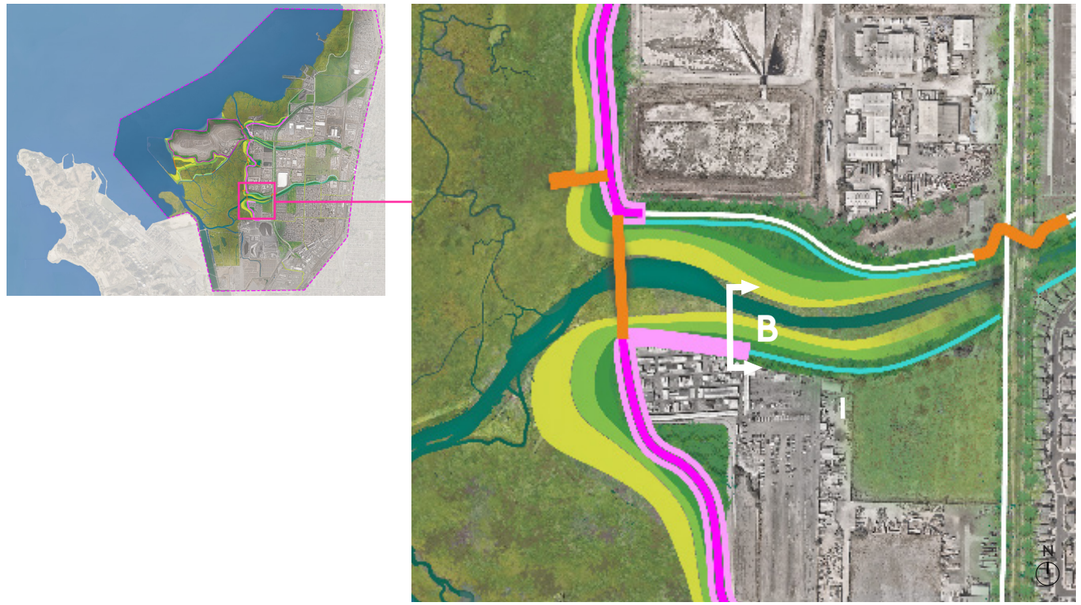
- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

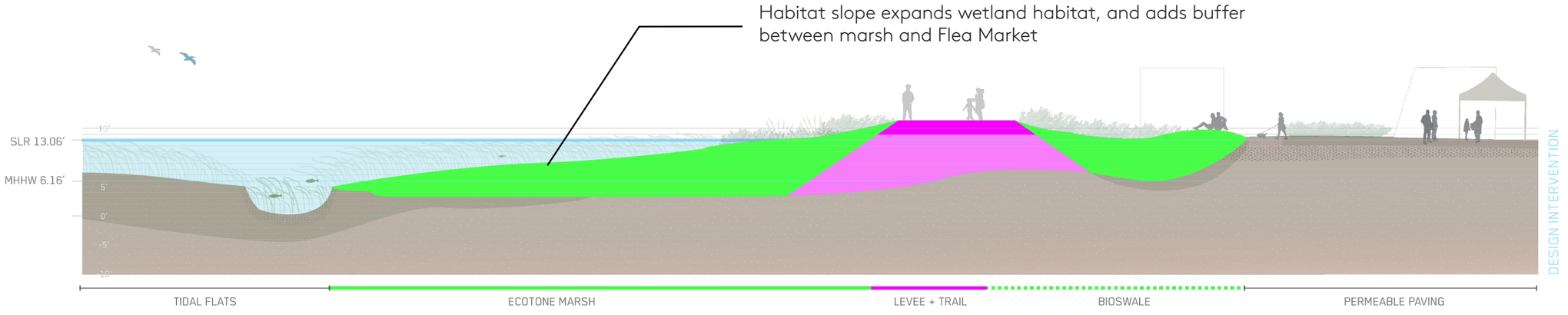
SCALE 1"=20'
(section is 250' wide)

B Riparian habitat

INSTALLING PERMANENT, SAFE PUBLIC ACCESS;

PROTECTING A RIPARIAN ECOSYSTEM





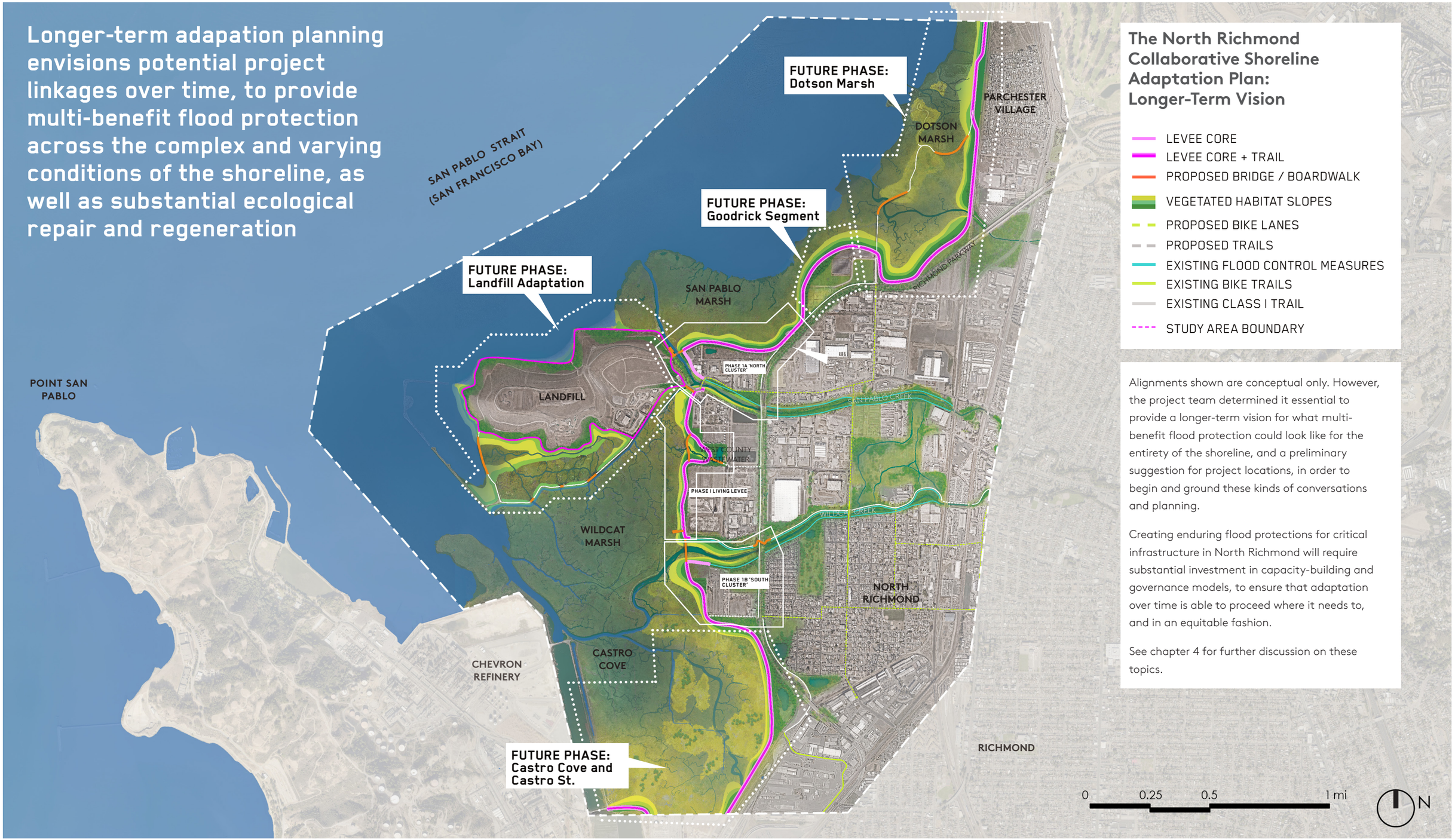
LEGEND

- LEVEE
- HABITAT
- WATER LEVELS
- OVERTOPPING
- GROUND
- SUB-SURFACE GROUNDWATER (ESTIMATED)

SCALE 1"=20'
(section is 250' wide)

LONGER-TERM VISION

Longer-term adapation planning envisions potential project linkages over time, to provide multi-benefit flood protection across the complex and varying conditions of the shoreline, as well as substantial ecological repair and regeneration



The North Richmond Collaborative Shoreline Adaptation Plan: Longer-Term Vision

- LEVEE CORE
- LEVEE CORE + TRAIL
- PROPOSED BRIDGE / BOARDWALK
- VEGETATED HABITAT SLOPES
- PROPOSED BIKE LANES
- PROPOSED TRAILS
- EXISTING FLOOD CONTROL MEASURES
- EXISTING BIKE TRAILS
- EXISTING CLASS I TRAIL
- STUDY AREA BOUNDARY

Alignments shown are conceptual only. However, the project team determined it essential to provide a longer-term vision for what multi-benefit flood protection could look like for the entirety of the shoreline, and a preliminary suggestion for project locations, in order to begin and ground these kinds of conversations and planning.

Creating enduring flood protections for critical infrastructure in North Richmond will require substantial investment in capacity-building and governance models, to ensure that adaptation over time is able to proceed where it needs to, and in an equitable fashion.

See chapter 4 for further discussion on these topics.

4. Challenges, Critical Questions + Next Steps

OUTLOOK

The challenges and complexities around sea level rise adaptation in North Richmond make the Collaborative Shoreline Adaptation Plan and Phase I Living Levee Project a crucial effort to support the community in better understanding the potential for adaptation to reduce future risks such as flooding and environmental hazards to their neighborhood & infrastructure, support continued ecological function of the Baylands and ensure that residents have improved access to and enjoyment of the shoreline as a local amenity. In keeping with the generations of positive environmental advocacy work in North Richmond, this is a community that can continue to be a leader by example in the broader region, by working with nature and with one another to prepare for sea level rise and climate change.

However, there are challenges to overcome for the implementation of the Collaborative Plan vision.

During the engagement and design process over the past two years, barriers to full implementation of the Collaborative Plan were identified, including:

- complex jurisdictional overlaps on the shoreline
- dozens of privately-owned marsh parcels
- a limited local tax base
- questions of long-term funding

The components of the community-supported, multi-benefit approach to SLR (living levees, habitat enhancement, increased trails access and amenities) enumerated in the NR-CSAP don't fit neatly into one government silo, further underscoring the need for a collaborative governance model.

Each of these are important considerations, both for implementing SLR adaptation, and also for ensuring that the adaptation is driven by community self-determination.

Through this point in the process, the Collaborative Shoreline Plan team's approach has been to focus on surmounting these barriers through a community-centered process to identify the partners who would need to be involved in the conversation, to solve these complex considerations around governance and long-term management of nature-based solutions along the 5 miles of shoreline.

NEXT STEPS:
Collaboration, Design Development and Capacity-Building across communities, parcels and agencies, as well as securing essential funding will be critical to achieving truly resilient outcomes in North Richmond

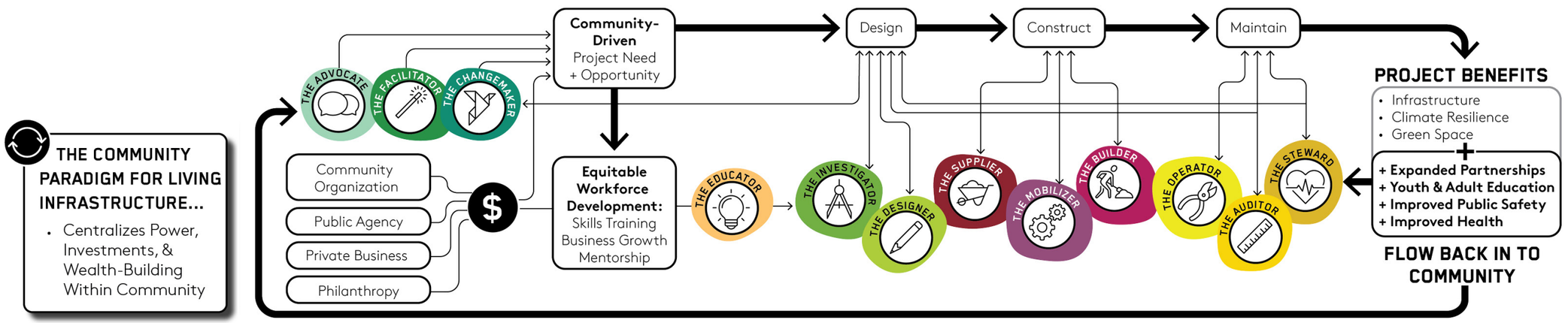
GOVERNANCE CHALLENGES

Pursuing the goal of consensus for a community-centered governance that is capable of delivering funding in the near-term, and assuring that projects are adaptively managed over the long-term, is the crucial missing component for providing SLR protection for North Richmond residents. But in-roads are being made. In 2023, Contra Costa County Board of Supervisors approved an ad hoc committee on sea level rise, and the county planning office began engaging on the issues of adaptation with the North Richmond Horizontal Levee Work Group. Conversations with the county, (planning, flood control, and elected officials), community leaders, and WCW continued as this scope of the project concluded, with parties agreeing to pursue funding to support solving the governance modeling.

Other critical public entity partners along the 5-mile stretch of shoreline, particularly the City of Richmond and the East Bay Parks District, need to be engaged in these future conversations. The city is both the jurisdictional overlay for much of the shoreline, and a property owner of two key parcels west of the Richmond Parkway that could play a role in adaptation design. East Bay Regional Parks District manages maintenance and other aspects of public trail access on the shoreline. It's important for these two partners to be brought into the process as governance conversations move forward.

As the Phase 1 Living Levee moves forward towards construction, it can serve as a continued source of community knowledge sharing, as a kind of testing ground for nature-based solution management in the area, along with cross agency coordination between WCW and the Flood Control district (which owns parcels adjacent to the WCW property at the southern end of the Phase 1 project alignment)

Building partnerships across sectors and silos is critical to the success of multi-benefit sea level rise adaptation; Wastewater, Flood Control, Transportation and Regional Parks districts, private property owners and local community members all have a stake in implementing a successful nature-based levee.



ADAPTIVE MANAGEMENT: HOW TO FORMULATE PRIORITIES?

An equity framework for balancing tradeoffs

Tradeoffs are inevitable. Between protection and retreat. Between agencies. Among community groups. Between regional vision and local priorities. Those tradeoffs are rarely binary. How do we establish a gradient of decision-making for subregional plans that allow for nuance in identifying and balancing tradeoffs, while still meeting goals for regional resilience (and without re-creating any existing inequities)? How do we structure sub-regional plans, and their process, to set up local leaders to find the balance that fits their communities?

These conversations about trade-offs demand a robust & clear Equity Strategy. Mithun's work in coastal adaptation planning is inextricably linked to our desire to assist in the dismantling of environmental injustice. These approaches and formats also need to be re-evaluated and calibrated throughout the life of project(s). As a team, we have brought an earnest desire for communication around these issues and hope that co-creating a shared vision for this Collaborative Shoreline Adaptation Plan will help lay the groundwork for truly more equitable outcomes around infrastructural transformation in North Richmond.

That being said, these initial concepts for alignments for flood protection and nature-based features will need to be continually evaulated and re-calibrated as they are advanced into the next stages of design and development with all of the relevant partners and agencies on the ground.

BIRDS-EYE VIEWS, NEAR AND LONGER-TERM:

A 'Living Levee' at West County Wastewater frontage on Wildcat Marsh in North Richmond, combining flood protection, new trails and amenities, habitat restoration and stormwater management;

longer-range projects conceptual alignment to provide continuous flood protection over timethrough nature based features.

PHASING

As sea-level rise and climate change accelerate over the coming decades and centuries, it will be important for our communities and landscapes to be able to adapt to new conditions. There is no single project that could be built that will make our shoreline "resistant" to sea-level rise. Instead we will be faced with a long-term, ongoing need to adapt and manage the landscape in response to ever-changing conditions.

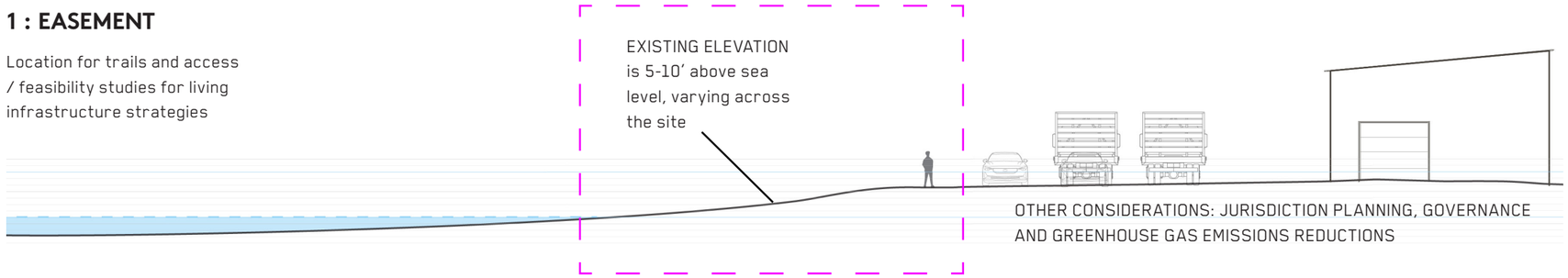
The Collaborative Shoreline project is envisioned as a long-term, ongoing shoreline management framework that will include many projects that will be implemented in many phases over time. The proposed Phase 1 project at the West County Wastewater treatment plant represents the first of a series of necessary projects to protect this community.

The Phase 1 project will provide an opportunity to test many of the innovative features and methods that will be needed along the entire shoreline. As long term sea-level rise accelerates into the future, coastal communities will need to be prepared to adapt to more extensive and rapid changes along their shorelines. This project will give the community an opportunity to learn and build capacity for these many future project phases.

IMPLEMENTATION PATHWAYS

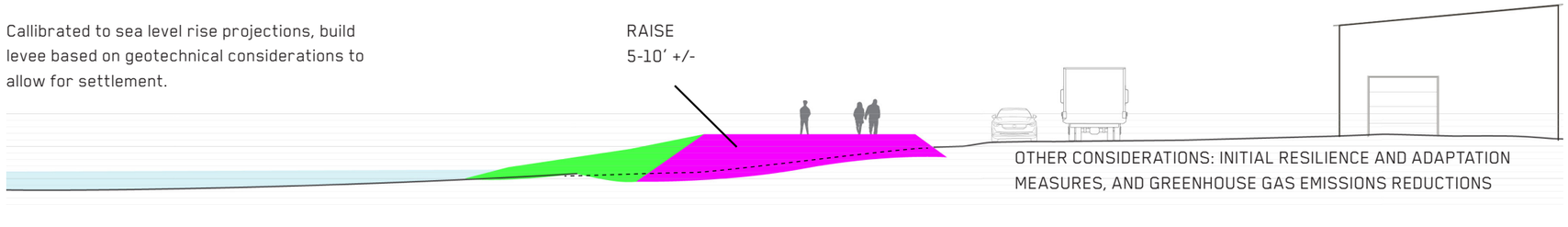
1 : EASEMENT

Location for trails and access / feasibility studies for living infrastructure strategies



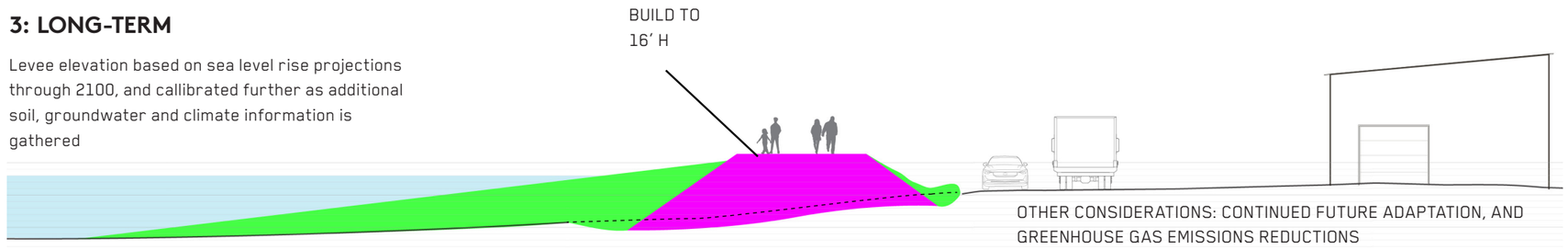
2: NEAR-TERM

Callibrated to sea level rise projections, build levee based on geotechnical considerations to allow for settlement.



3: LONG-TERM

Levee elevation based on sea level rise projections through 2100, and callibrated further as additional soil, groundwater and climate information is gathered



IMPLEMENTATION: The levee will be phased in over time, beginnning with preliminary site preparation of easement and coordination across jurisdictions (step 1, above). The base of the levee (step 2) is built and requires time to settle in place according to geotechnical and hydrological conditions. The levee will eventually be built to a trail at its top, 20-feet wide, to an elevation of 16' above sea level, which offers resilience to projections through the year 2100.

DATA GAPS

The project is well-positioned to help the local community, government agencies, and land managers working throughout the San Francisco Bay shoreline better understand the challenges posed by rising sea levels and potential options for adaptation. However, there are some challenges that the current project identifies, but is unable to solve for within the currently funded scope.

Groundwater and Soil Contaminant Mobility

For example, the current grant funding does not include scope to fully investigate and address issues related to groundwater and soil contaminant mobility due to rising water. These topics are crucial to expore further, and will need to identify the current available data, data gaps, and potential next steps toward more fully addressing groundwater concerns in the project area, and to help position those concerns for funding and research in subsequent design phases, well before any construction activity.

RIsing Waters Inland and Outboard

It is also important to note that with or without a multi-benefit flood mitigation project like a living levee, sea-level rise will alter groundwater elevations and groundwater flow; even with the proposed suite of adaptation options in the Collaborative Shoreline Plan, sea-level rise will still alter groundwater conditions. However, projects like the living levee create the opportunity to also install pumps and other infrastructure that could help manage these changes in groundwater elevations.

Landfill

The Republic Landfill is a prominent feature along the modern North Richmond Shoreline. The landfill no longer receives fill material but it is used for various other waste management functions including sorting and transfer. Portions of the landfill's stormwater management system, including the large lagoon on the southwest side of the site, will be vulnerable to rising sea-levels. There may be opportunities to reconfigure the stormwater management system to provide more water treatment along the upland slopes of the landfill, potentially in bioswales or subsurface infiltration wetlands. This would allow for the restoration of tidal marsh habitats in the large stormwater lagoon.

Creeks & Tide Gates

In addition, portions of the landfill's northern shoreline are steeply armored with rip-rap and concrete rubble. It may be possible to improve the ecological value of these armored shorelines by covering the rip-rap and rubble with imported coarse beach material (cobbles and gravel). The resulting gently sloped coarse sediment shorelines would provide habitats for shorebirds, fish spawning, and would improve the aesthetic experience for users of the nearby landfill loop trail.

Other Factors

Finally, there may be opportunities to improve the diversity of upland habitats on the closed portions of the landfill. Currently the vast majority of the landfill surface is ruderal grassland, however these areas likely could support coastal scrub and other native upland habitats, providing benefits to wildlife and recreational users. Additional research is needed to determine whether deep-rooting vegetation (trees, large shrubs) would be compatible with the surface cap layers that were installed during the landfill closure and decommissioning.

APPARENT FLOODING PATHWAYS (in light blue) in one enlarged portion of the North Richmond study area, based on lidar analysis.

Actual conditions on the ground will need to be surveyed, and other latent considerations, such as groundwater and contaminant mobility studied in depth on a site-by-site basis. Above, areas A and B (red, dashed line) represent examples of catalyst locations that will need further on-the-ground study

SURVEY PROTOCOLS / FILL / SEDIMENT SOURCE / TRANSPORTATION

Fill, Sediment Source And Transportation

The proposed living levees will require a large volume of imported fill material. The Phase 1 project is estimated to require approximately 150,000 cubic yards of imported fill. Approximately half of that fill, the material used for the core of the new living levee, will need to meet strict standards for levee material. These standards place limits on the types of soils that can be used, including limits on the sand content, expansive or liquifying clays, and organic materials. The remainder of the material, which would be used for the habitat slopes, will not need to meet a levee material standard. The imported soils will also need to meet Regional Water Quality Control Board standards for wetland fill materials, which places limits on the allowable concentrations of a wide range of chemical contaminants in order to protect wetland habitats, aquatic wildlife, and public health.

Sourcing and importing this material could become a very large portion of the overall construction costs, so it will be important to identify sources for the imported material that meet the standards and that can be cost-effectively delivered to the project site. It might be beneficial to establish stockpiles near the Phase 1 project site in advance of the Phase 1 project. This will allow WCW and project partners to begin to import suitable fill whenever it becomes available locally (for example from nearby upland construction projects and flood control channel maintenance work).

Conversations are underway about sourcing material for the Phase 1 Living Levee, but final arrangements would be further developed as design and community engagement progresses prior to the completion of 100% engineering drawings.

FILL & SEDIMENT SOURCES: intial estimates suggest ~150,000 cubic yards of fill will be required for the phase 1 project at West County Wastewater, which must meet strict requirements from the California Regional Water Quality Control Board;

Construction and Maintenance of the project should be linked to creating local jobs, neighborhood stabilization, and community wealth-building.

CONSIDERATIONS ON LEVEE HEIGHT AND EXTENTS

During this early stage in project planning the designs are evolving as the project team completes technical studies and learns more about the constraints and design requirements. It is likely that the design may continue to change as additional studies are completed and the project team gains a better understanding of the geotechnical and hydraulic conditions along this segment of shoreline. With this in mind, below we provide a summary of the current basis for the levee crest elevation, but recognize that these calculations may change as future analyses are completed.

Please refer back to Chapter 3 for regulatory guidance on levee height.

The Phase 1 Living Levee is proposed to protect the critical infrastructure at the West County Wastewater facility, and would tie-into existing levees maintained by Contra Costa County Flood Control District on San Pablo and Wildcat Creeks. These existing levees are currently at ~14' NAVD88; so the relative height of the proposed levee would be only ~2.5' higher than adjacent existing levees on Wildcat Creek and San Pablo Creek. As demonstrated at our site visits during the working groups, because the Bay Trail would be located on the top of the new living levee, the project would provide greater access to open water views from the public trail, rather than obscure them.

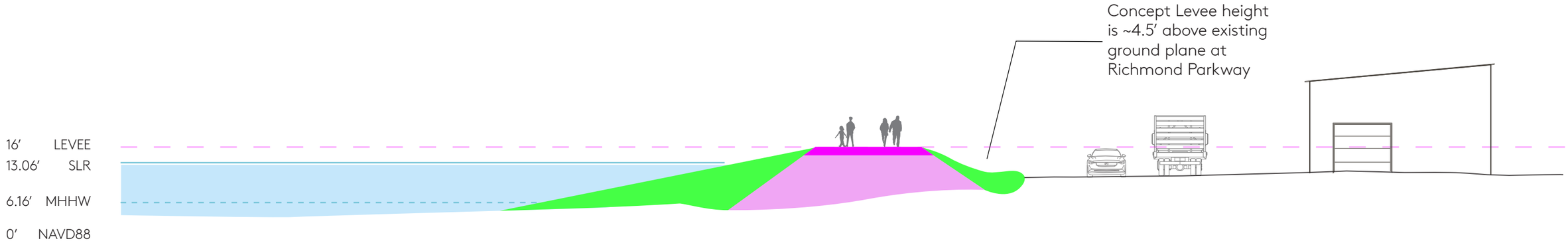
Similarly, the typical elevation of the Richmond Parkway road surface is between 11 ft to 13ft NAVD, making the crest of a living levee ~2.5 to 4.5 feet above the existing road surface; furthermore, it may ultimately be the preference of West County agencies and the public to elevate the parkway itself, which would make an adjacent levee elevation moot.

We understand that there may be concerns regarding the extents of the proposed living levee.

The total project study area covers approx ~5 mile length of shoreline in North Richmond, from Castro Cove in the south to Parchester Village in the north. Though one of the primary goals is to provide effective flood protection from sea level rise to vulnerable areas within this zone, this should not be confused with a continuous levee along this length. Any proposed design under consideration from this project will be calibrated to the many complexities of hydrology, habitat, infrastructure, etc within this study area, and, as noted during the Community Working Group sessions, will be engineered to work with existing creeks, flood plains and stormwater flows. One of the initial conclusions from the project is that effective flood protection in North Richmond will likely require a number of multi-benefit infrastructure projects that are strategically linked to address the multiple vulnerable locations.

For example, the Phase 1 Living Levee proposed to protect the critical infrastructure at the West County Wastewater facility, is approximately .65 miles long and would tie-into existing levees maintained by Contra Costa County Flood Control District at either end; this accommodates the existing flows and configuration of San Pablo and Wildcat creeks. Stormwater drainage that falls within the footprint of this project is accommodated in the proposed design.

LEVEE HEIGHT: The levee height is designed to address project sea level and geotechnical considerations, resulting in an overall elevation at 16' feet above sea level (about 10' above high tide). Though elevations vary throughout the study area, this results in a levee that is typically between 2-6 feet above the current ground plane. In the example below, a typical section of the North Richmond shoreline at Richmond Parkway, the levee would be ~4.5 feet higher than current ground level, providing resiliency to sea level rise while minimizing disruption to the existing ground area.



COSTS & FUNDING OUTLOOK

Rough Order Of Magnitude Cost Assumptions

The project team has developed rough order of magnitude probable construction costs to inform project planning, detailed in the Appendix.

One major uncertainty in the construction costs is the source of the imported fill material. The cost for importing fill material is strongly influenced by the distance that the material is hauled. It is not possible to estimate the costs for the imported fill with a high level of accuracy without knowing the location of the source of the material.

Funding Opportunities, Including Regional, State, and Federal Opportunities

Over the course of development of the Collaborative Shoreline Plan, the paradigm of future funding for the project has been dynamic.

Two crucial funding pathway opportunities with the US Army Corps of Engineers (USACE) emerged during the planning process. Leaders from WCW worked with staff from the office of (then-) U.S. Congressman Mark De Saulnier to include the two scopes (Phase 1 Living Levee and Collaborative Shoreline Adaptation Plan) in the 2022 Water Resources Development Act (WRDA).

The larger 5-mile shoreline scope area was identified as a potential General Investigations (GI) project of the USACE with a funding amount to be determined. The need for governance models described in the earlier section of this report are the important missing step in establishing partnership with USACE on the 5-mile Collaborative Plan. With Contra Costa County continuing to put in place their overall approach to SLR adaptation, the project team will continue to support as a liaison between the county and other project partners and the USACE with the intent of determining if the WRDA GI opportunity is the preferred path for continued funding for the broader planning effort.

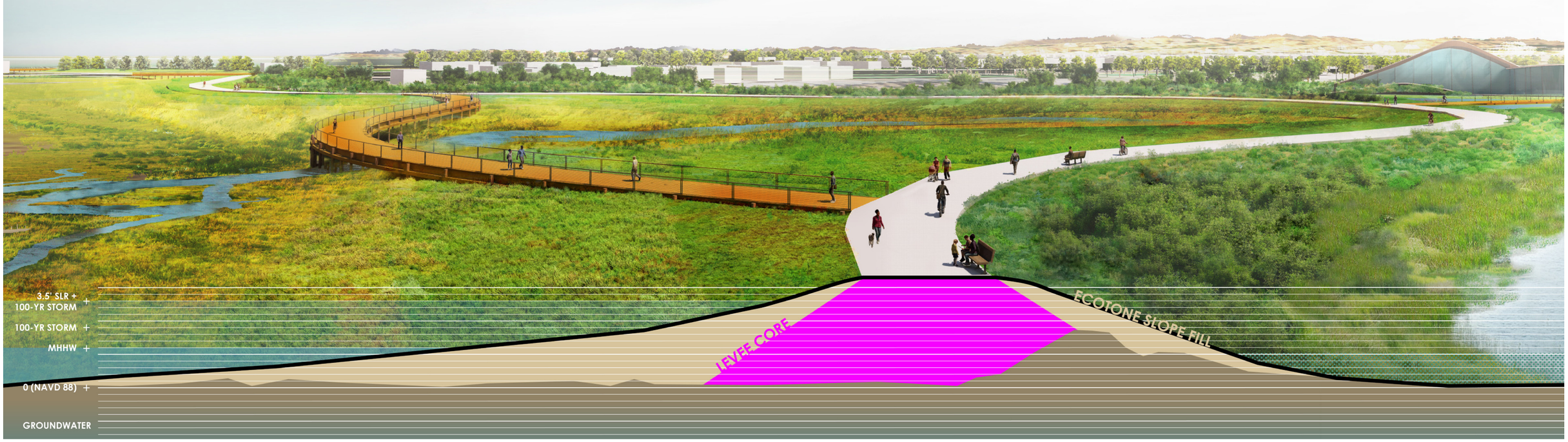
The Phase 1 project was also included in the WRDA as an Environmental Infrastructure (EI) project, with an authorization of $45 million. The WCW team continues to work with leaders from the SF district office of USACE to coordinate next steps to potentially advance from authorization to a budget appropriation. Several steps and coordination points are required, including establishing partnership agreements with the USACE, working with federal USACE leaders, elected officials and Assistant Secretary of the Army to support inclusion of the project in an upcoming federal budget.

If an agreement is ultimately reached with USACE, the cost-sharing requirements will mean WCW (as the local partner on Phase 1) will need to support the project with a 25% match of federal funding.

And so, WCW is continuing to pursue regional and state funding that can continue to drive community engagement design, and potentially meet local match requirement down the road, if the USACE pathway becomes the preferred line to project implementation.

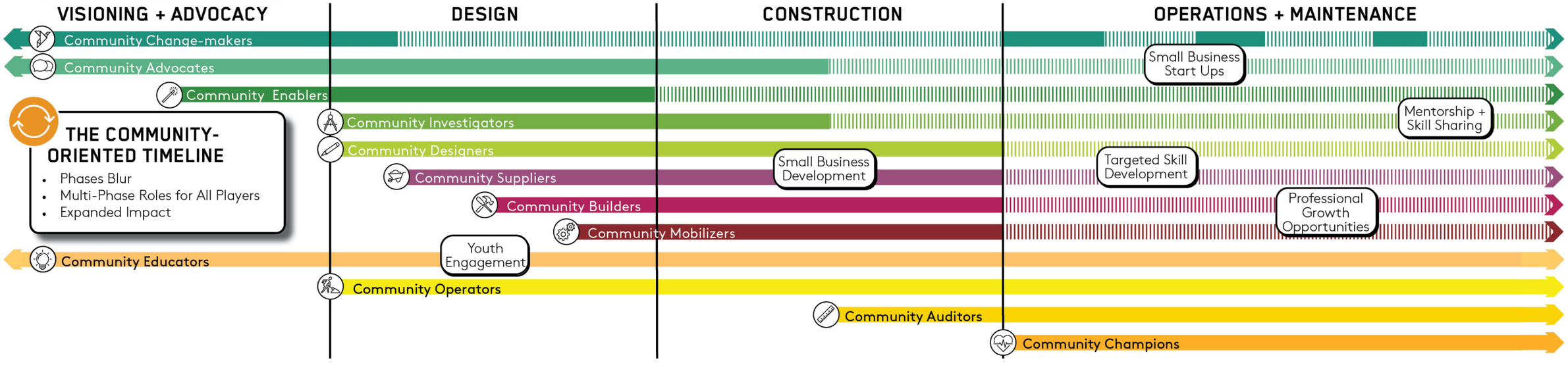
Whether or not the USACE funding ultimately becomes the implemention funding source, WCW is committed to continuing to work with the project's crucial regional and state supporters. WCW provided a new request for funds to the SFBRA in October of 2023, seeking support to advance Phase 1 to draft CEQA documents and the two Collaboration Clusters to 30% design, along with continuing the track of deep community engagement. SFBRA and other regional and state support are currently seen as key to maintaining momentum and advancement of the community-driven project, and as supportive to the USACE match funding for construction if or when that becomes a reality for Phase 1.

WCW and the Watershed Project have also played key roles in supporting other community coalitions pursuing funding for climate resilience thoroughout west Contra Costa in the previous two years, which seek to fund projects further into the watershed that also can posivitively impact the shoreline, such as EPA Water Quality Infestment Fund monies with the San Francisco Estuary Partnership. Further detail on all the funding opportunities is listed in the Appendix.



NORTH RICHMOND COLLABORATIVE SHORELINE ADAPTATION PLAN / 2023

WORKFORCE DEVELOPMENT



Can the next generation of infrastructure projects be designed to generate benefits beyond flood protection, public access, and habitat creation, but also more equitable economic opportunities and outcomes?

Focusing on the workforce development consequences of such projects – meaning, who is in the position to build wealth and experience project benefits – this re-imagines how such projects can be built. By centering people and community in North Richmond, this plan attempts to integrate workforce, job creation and economic opportunity to be community-based in the creation of Living Levees and other infrastructural adaptations within the study area.

From investing in places to investing in people, a new paradigm of regenerative infrastructure – a focus on more equitable workforce development – can direct the benefits of green infrastructure projects, such as living levees towards community generational wealth and sustainable livelihoods. The North Richmond Collaborative Shoreline Plan promotes a community-centered paradigm of 'Living Infrastructure', in dialogue with community members and community-based organizations doing the important work of engaging, educating, and inspiring communities around green infrastructure projects and career path jobs. Through working groups, surveys, and community partners seeking to understand goals, barriers, and needs for generating green career paths in workforce development, this plan strives to reflect how current work and a vision for a more just future – using the real-world example of West County Wastewater coastal adaptation – can catalyze multiple benefits of climate change adaptation, job creation and environmental justice, meeting needs as defined by local communities themselves.

Though still in a very preliminary concept discussion period, the project team has been in conversation with the Watershed Project and others about the creation of a 'green-benefits' or other special district in North Richmond to ensure that economic benefits from the creation of large scale living infrastructure can prioritize local jobs and wealth-building. The Urban Tilth watershed stewards program may be an ideal local partner as well.

A prospective native plant nursery could also be co-located within the North Richmond Phase 1 projects, as there will be an increasing need for native plant material for habitat slopes and nature-based feature projects.

A Community-Oriented Timeline for integration of advocacy and long -term operations of living infrastructure projects to achieve lasting local benefit.

GOING FORWARD

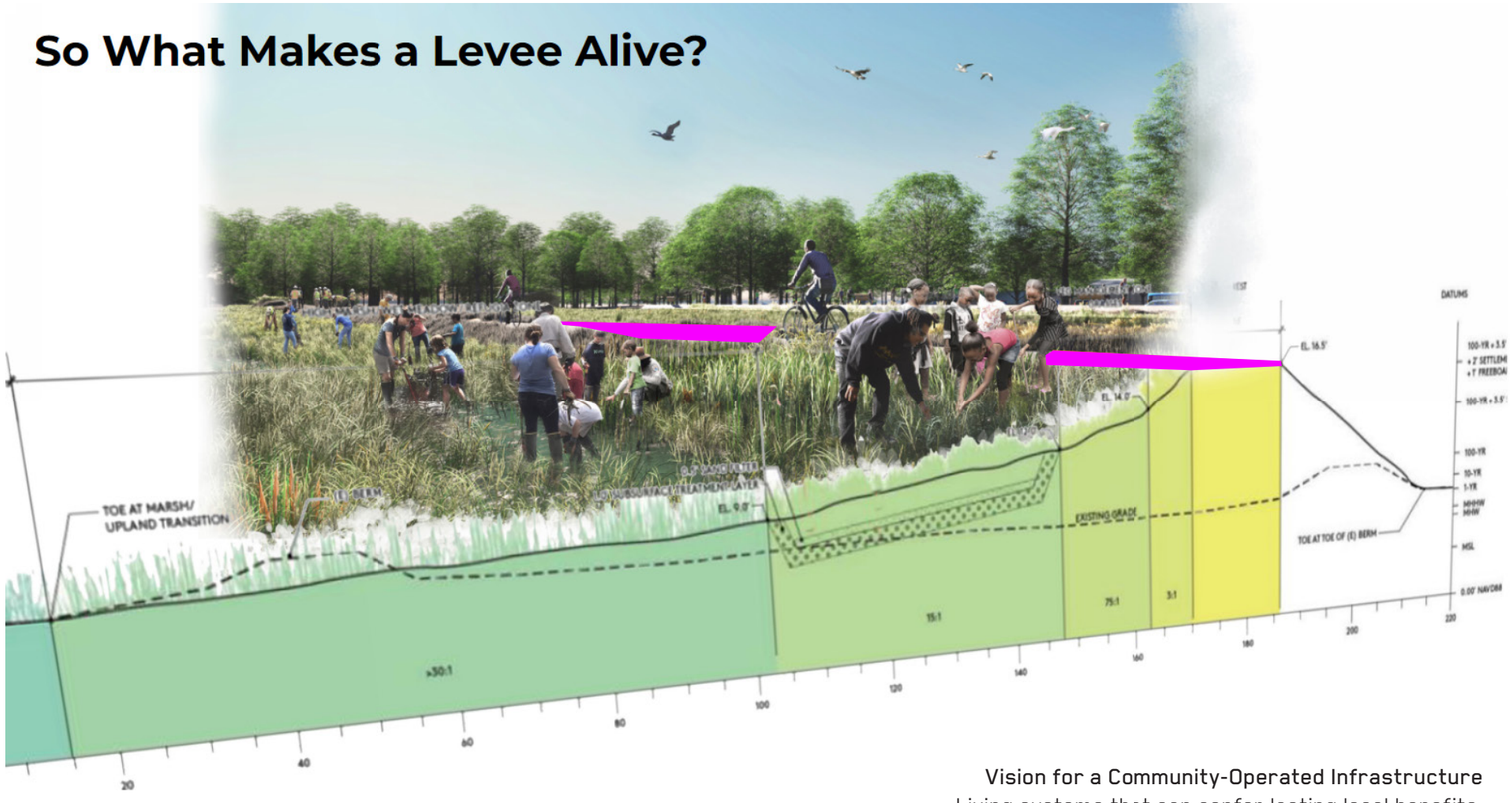
Sea-level Rise Planning: The Bigger Picture

The widespread extraction and burning of fossil fuels over the past two centuries has greatly increased the concentration of greenhouse gasses like carbon dioxide and methane in the atmosphere, leading to increased average temperature across the globe. These temperature changes are altering the earth's water systems, causing glaciers to melt, the oceans to warm, and changing rainfall patterns across the globe.

Existing atmospheric greenhouse gas concentrations are projected to cause several feet of sea-level rise over the coming century, which will lead to dramatic harmful changes along shorelines around the globe. These changes include increased risk of coastal flooding, adverse effects on coastal habitats, and increased risk of spreading harmful contaminated soils and groundwater. It is incredibly important that humanity reduce greenhouse gas emissions in order to slow the rate of future climate change and sea-level rise. However, even with efforts to reduce future greenhouse gas emissions, the existing concentrations of greenhouse gasses already in the atmosphere will inevitably cause several feet of sea-level rise.

The North Richmond Collaborative Shoreline Adaptation Plan presents an array of potential strategies that can be applied at a local level to help the North Richmond community adapt to future sea-level rise over the coming decades. Sea-level rise will cause many problematic changes along the shoreline, however there will also be opportunities to change the shoreline landscape for the better, for example by increasing the quality of native habitats, creating new trails and recreation features, creating opportunities for science and education, and conducting projects in a way that supports and empowers community members, local workers, businesses, and community organizations. Prioritizing processes and projects that build on connections with North Richmond leaders and champions will be essential, as well as capacity-building at each stage of development.

We hope this document will help further this important work.



Vision for a Community-Operated Infrastructure
Living systems that can confer lasting local benefits, from flood protection and habitat creation to neighborhood stabilization and green local jobs.

APPENDIX

SELECTED PROJECT AND LITERATURE REVIEW

Baylands Ecosystem Habitat Goals, December 2012; California State Coastal Conservancy

Breuner Marsh Restoration Project, August 2012; California State Coastal Conservancy

Castro Cove/Chevron Richmond Refinery: Damage Assessment and Environmental Restoration Plan/Assessment, June 2010; NOAA, USFWS, CDFG

Centering Communities in Adaptation Planning, December 2020; North Richmond Horizontal Levee Working Group

City of Richmond Climate Action Plan, October 2016; City of Richmond

Contra Costa County Climate Action Plan, December 2015; Contra Costa County

Contra Costa County Envision 2040, 2018-2023; Contra Costa County

District-Wide Master Plan: Technical Memorandum, Climate Change Impacts and Mitigation, September 2012; West County Wastewater

East Bay Regional Park District Master Plan, 2013; East Bay Regional Park District

Lower Rheem Creek Preliminary Restoration Plan, June 2002; The Urban Creeks Council of California

North Richmond: A Priority Resilience Area | Resilient by Design, May 2018; North Richmond Community Advisory Board, Mithun HOME Team

North Richmond IRWM DAC Project Development, October 2020; The Watershed Project

North Richmond Shoreline Vision, June 2017; San Francisco Estuary Partnership and The Watershed Project

North Richmond Water Needs Assessment, October 2020; The Watershed Project

Recommendations for Habitat Conservation Planning on the North Richmond Shoreline, April 2010; Restoration Design Group

Resilient Communities Initiative: Equity Checklist, March 2018; California Office of Planning and Research Technical Advisory Group

Richmond Resilience Roadmap, December 2019; City of Richmond

San Francisco Bay Living Shorelines Project, March 2017; California State Coastal Conservancy

San Francisco Bay Plan, May 2020; San Francisco Bay Conservation and Development Commission

San Francisco Bay Subtidal Habitat Goals Report: Conservation planning for the submerged areas of the bay, 2010; California State Coastal Conservancy

San Francisco Bay Trail: West County Wastewater District Segment Construction (San Pablo Creek to Wildcat Creek), December 2019; California State Coastal Conservancy

San Francisco Creosote Piling Removal and Pacific Herring Habitat Restoration Project, Technical Memorandum, January 2015; California State Coastal Conservancy

San Francisco Estuary Institute Adaptation Atlas, April 2019; San Francisco Estuary Institute

Sea Level Rise and Resilient Design in Tidal Marsh Restoration: Breuner Marsh, Richmond, CA, 2016; WRA Environmental Consultants

SF Bay Trail: Risk Assessment and Adaptation Prioritization Plan, April 2021; East Bay Regional Park District

West County Action Plan for Routes of Regional Significance, January 2014; Fehr and Peers, WCCTAC and Contra Costa Transportation Authority

Wildcat Creek Fish Habitat Basis of Design, February 2014; Northwest Hydraulic Consultants

Wildcat Creek Flood Control Project Fish Ladder Retro-Fit | 65% design, 2014; US Army Corps

Wildcat Creek Restoration Action Plan, August 2010; The Urban Creeks Council & Wildcat-San Pablo Watershed Council

Wildcat Creek Trail Feasibility/Conceptual Engineering and Biological Assessment Study: Final Report, March 2008; DKS Associates, Alta Planning + Design, Donaldson Associates, and Environmental Collaborative

Wildcat Creek Watershed, June 2001; San Francisco Estuary Institute

DATA SOURCES

Bay Shoreline Flood Explorer; Adapting to Rising Tides, BCDC
https://explorer.adaptingtorisingtides.org/home
https://www.adaptingtorisingtides.org/maps-and-data/

Digital Coast, NOAA
https://coast.noaa.gov/digitalcoast/

Drainage maps, 1988

Flood Insurance Study, 2017, Federal Emergency Management Agency (FEMA)

National Flood Hazard Layers, FEMA

San Francisco Bay Tidal Datums and Extremes study, AECOM, 2016

State of California Sea-Level Rise Guidance 2018 Update, California Ocean Protection Council (OPC)

USGS Lidar, 2018-2019 USGS Lidar: Northern California Wildfire - QL2
https://www.fisheries.noaa.gov/inport/item/58957

USGS Streamstats Webtool, https://www.usgs.gov/streamstats

Watershed mapping, Contra Costa County flood maps
https://www.contracosta.ca.gov/1818/GIS

Wildcat & San Pablo Creek watersheds, Contra Costa County Flood Control District, GIS

Previous Planning + Design Summary Index

01 North Richmond Shoreline Vision Plan
02 North Richmond Water Needs Assessment
03 North Richmond WNA Development Report
04 Resilient by Design - Home Team Final Report
05 San Francisco Estuary Institute Adaptation Atlas
06 Contra Costa County Climate Action Plan
07 BCDC San Francisco Bay Subtidal Habitat Goals Report
08 RCI Coalition Resource - Equity Checklist
09 East Bay Regional Park District - Master Plan 2013
10 Centering Communities in Adaptation Planning
11 Coastal Conservancy Living Shorelines
12 Coastal Conservancy Creosote Piling Removal Tech Memo
13 RDG Habitat Conservation Planning Recommendations
14 BCDC Bay Plan
15 Wildcat Creek Watershed Report SFEI
16 Lower Rheem Creek Preliminary Restoration Plan
17 Wildcat Creek Fish Habitat Basis of Design (Sediment #s)
18 WCW SLR Technical Memo
19 SFEI Baylands Ecosystem Habitat Goals Project
20 Contra Costa County Envision 2040
21 Risk Assessment and Adaptation Prioritization Plan for the SF Bay Trail
22 San Pablo Creek Info and Sediment Loads
23 Groundwater Levels and Projections (GIS layer)
24 Heat Island + Air Quality (GIS layer)
25 Various East Bay Parks Plans

KEY
Document located in G Drive
Document to be acquired
Identified data gaps

North Richmond Shoreline Vision Plan

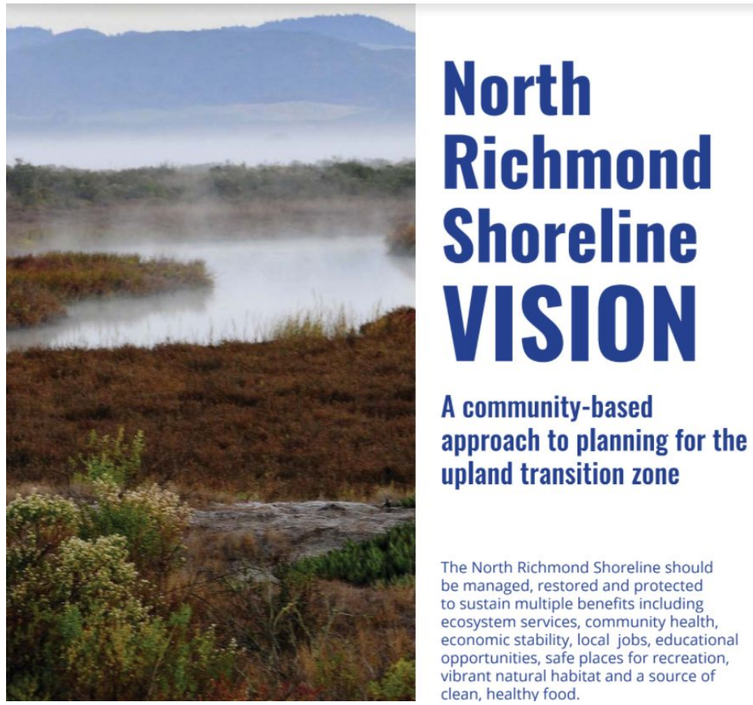
01a

Vision Statement

- The North Richmond Shoreline should be managed, restored and protected to sustain multiple benefits including ecosystem services, community health, economic stability, local jobs, educational opportunities, safe places for recreation, vibrant natural habitat and a source of clean, healthy food
- Goal: Develop a community-informed vision for climate-ready adaptations with a focus on the upland transition zone, environmental justice and resiliency

Five Strategies

1. Protect and conserve open space
2. Improve and increase shoreline public access and understanding
3. Advance community revitalization with urban greening and compatible improvements
4. Restore and enhance a diversity of habitats and living resources
5. Build capacity for equity, environment and economic development among stakeholders



North Richmond Shoreline Vision Plan

01b

Challenges

- Major challenges to a healthy resilient transition zone: fragmented Baylands (lost due to diking, draining or filling for development), urbanization, altered stream corridors and sea level rise
- Most of North Richmond northern shoreline was historically wet meadow
- Sea level rise threatens current tidal marshes; today's preserved or restored transition zone could provide the opportunity for marsh migration
- North Richmond Shoreline communities face high exposure to toxins and pollution, limited access to healthy foods, insufficient local employment options
- Biggest barrier to shoreline use by local residents is an understanding of its uses, plus the need for improved access (walking + public transit) to the shoreline
- Critical vulnerabilities and key planning issues from sea level rise from **Adapting to Rising Tides Program**:
    1. Water-dependent industries
    2. Employment sites
    3. Creek-side communities
    4. Access to services
    5. Ad-hoc flood protection
    6. Parks and Open Space

Actions and Opportunities

- Seepage terraces with shallow slopes (non-engineered, relatively stable during seismic events) could create wetland-upland transition zone habitat, buffer sea level rise, allow marsh migration and provide additional ecosystems services such as carbon sequestration and wastewater effluent polishing
- Near-term implementable actions and opportunities:
    1. Horizontal levee and Interpretive Center at West County Wastewater District
    2. Interpretive Center at Point Pinole Regional Shoreline
    3. Bay Trail Gap Closures and Richmond Parkway Overpass on Wildcat Creek Trail
    4. Giant Marsh Living Shorelines Project
    5. Wildcat Creek Improvements (Fish Ladder and Sediment Basin)
    6. Fred Jackson First Mile, Last Mile Green Street/Watershed Connections Project
    7. Rheem Creek Realignment through Dotson Family Marsh

North Richmond Water Needs Assessment

02a

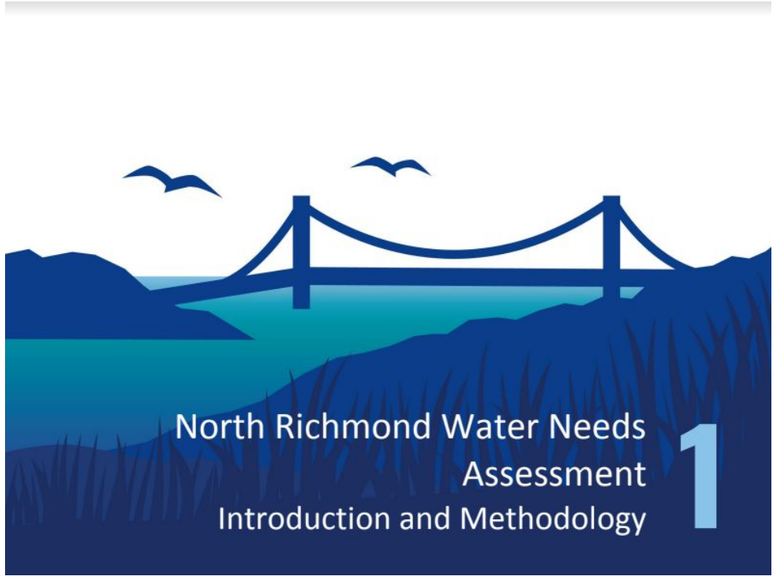
Goal

- Gain insight as to which types of water-related improvements are of greatest community priority

Top Takeaways for Residents

1. North Richmond's tap water is safe to drink (access to clean, safe water is a high priority for residents)
2. North Richmond's vulnerability to sea level rise is a concern
3. There is interest in investing in water-related improvements

- Residents want to see: clean drinking water improvements and pipe upgrades, urban greening/green infrastructure/parks, sea level rise and flooding solutions, improved sewer system, more water conservation measures, using some recycled water (that goes to Chevron) used for irrigation in the community



North Richmond Water Needs Assessment

Evaluated Areas of Need

1. Sea level rise and stormwater

- Majority of residents have experienced flooding during rain events

2. Habitat protection and access to recreation

- Many residents use Wildcat creek path or North Richmond Shoreline for recreation
- Some residents are unaware of these amenities or don't think of them

3. Drinking water supply

- Tap water mainly used for drinking water, along with other household uses
- Nearly half of residents unsure where water comes from and if it's safe to drink
- Nearly half of residents have experienced problems with tap water

4. Wastewater and recycled water

- Wastewater treatment plant could be protected by horizonal levee/natural buffer
- Many residents have experienced sewer backups in their homes

North Richmond Project Development Report

03a

Top Takeaways

1. Residents are interested in addressing immediate health, safety and quality of life issues first (drinking water safety, flood prevention)
2. Next priority is creating more access to parks and green spaces (recreational benefits for North Richmond community, habitat restoration opportunities and benefits)
3. Community education is important (introducing children to new experiences and knowledge, education and transparency to establish trust within community, following through with implementing plans)

North Richmond Project Development Report

03b

Project Priorities

Tier 1:

- North Richmond Pump Station Upgrade
- Tap Water testing, education and outreach

Tier 2:

- Flood risk reduction in the Rheem Creek watershed
- Wildcat Creek Trail improvements

Tier 3:

- K-12 Environmental Education with field trips
- Green Benefit District
- Green Street Corridor

Priority Improvements

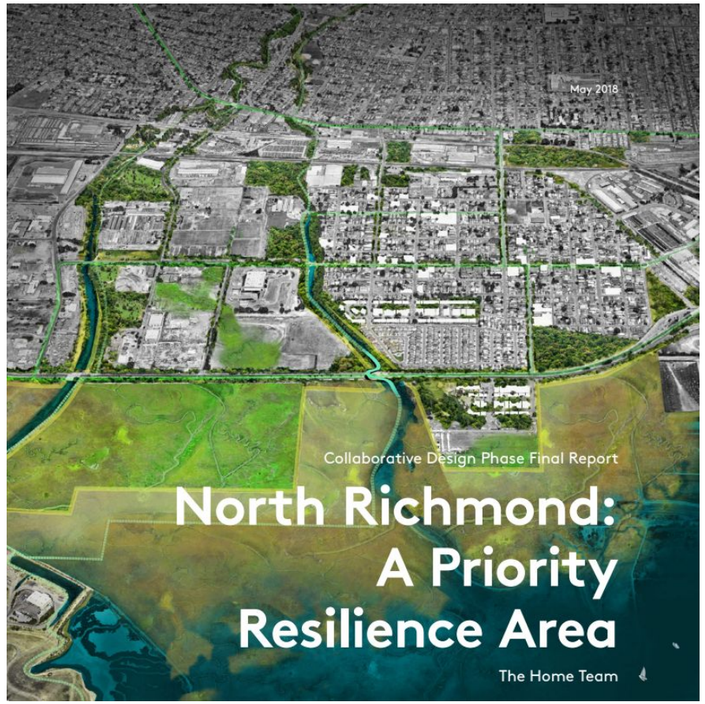
1. Solutions to flooding during rainy season
2. More green spaces, parks and opportunities for walking and biking
3. Improvements to drinking water quality

RBD Home Team (ouR-HOME)

04a

Home Team Summary

- The Home Team prompts a series of sea level rise response projects that are linked to health and financial well-being of residents while also restoring ecosystems that build health, wealth and home ownership opportunities for North Richmond residents including the pump and outfall, the wastewater facility, marsh habitat and Richmond Parkway.
- Strategies include bringing the ‘marsh to Main Street’ with a horizontal levee and wetlands restoration, planting 20,000 trees, a pilot for decentralized wastewater (creating reclaimed water for local uses) and an overpass to the Richmond Parkway to provide access to the Bay and close bay trail gaps
- Equitable, innovative funding investment opportunities include social impact bonds (fund new and renovated housing to stabilize costs), mitigation funds (address historic inequities and existing health impacts) and a green benefits district (for community-wide green infrastructure improvements funded by new commercial development projects).



RBD Home Team (ouR-HOME)

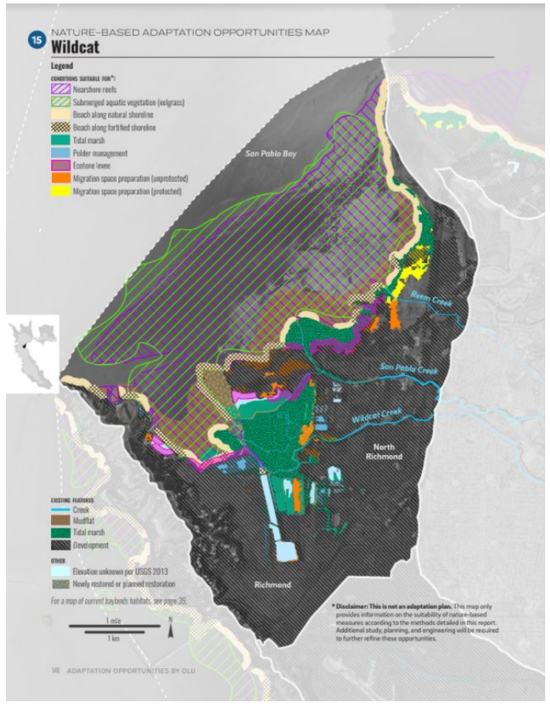
ouR-HOME projects

- **Thrive** Home Ownership for Longtime Residents (split lots, community land trust, opportunities for health and wealth building)
- **Filter** 20,000 Trees of Justice (combat asthma, mass green “forcefield” against particulates and toxins, greenbelt corridor at Richmond Parkway and other significant streets, potential heritage walk)
- **Flow and Grow** Marsh to Main Street (horizontal levee as placemaking tool, wetlands restoration, tertiary wastewater treatment, levee trails, pilot tested decentralized wastewater reclamation for irrigation)
- **Relate** A Doctor’s Prescription for Wildcat Creek Trail (connection to nature as healing experience, safe access to the Bay, sense of identity, educational opportunity)
- **Green Benefits District** (new policy tool proposed to collect funding and re-localize labor, capital and resources (water, biomass) within the community, new CDC for sustainable development practices to funnel funding, public works contracts and maintenance along with neighborhood improvements and employment outcomes)

San Francisco Estuary Institute Adaptation Atlas

Nature-base Adaptation Measures

- The Wildcat OLU has opportunities for all of the nature-based adaptation measures analyzed in the report, including the potential for oysters and eelgrass (these measures are being tested as part of the San Francisco Bay Living Shorelines Project at the Giant Marsh)
- Creek connection to marshes could be enhanced to steer sediment loads directly into tidal marshes (supporting micro-deltas)
- Coarse or composite beaches could reduce erosion along pocket marsh edges and at the toe of bluffs and railroad berms (riprap alternative)
- Unprotected, undeveloped land behind marshes could be prepped for marsh migration with SLR
- Ecotone levees would support high-tide refuge and transition zones where marshes are adjacent to development
- The majority of land in the Wildcat OLU is open (undeveloped) and at risk of near-term flooding with SLR (industrial and infrastructure land)
- Public agencies could buy more land or easements to create floodable spaces (along shoreline, Wildcat creek, San Pablo creek)
- Vulnerable industrial sites could raise their site elevation or implement flood-proofing techniques or relocate
- Policy tools could include rezoning, relocation tax incentives, buyouts, a TDR program and environmental cleanup



Contra Costa County Climate Action Plan

06a

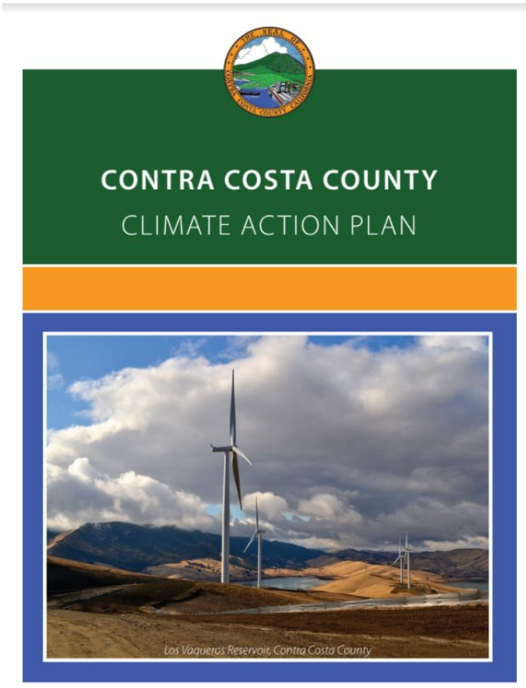
Table of Contents

1. Introduction

- Purpose and Scope: address climate change and GHG while improving community health
- Plan Area: applicable to all unincorporated areas of Contra Costa County
- Local Setting: waterfront geography, varying local climate, demographics

2. Scientific and Regulatory Setting

- Climate Change Overview: climate change impacts include more extreme hear, air quality, decreased fresh water supply, increased storm severity and flood event frequency, rising sea levels, wildfires
- Sustainable Communities Strategy: this area is an important hub for future job and population growth within the Bay Area
- Cap-and-Trade emissions are regulated and have programs to enable industrial emitters to reduce overall emissions and invest in cleaner fuels and energy efficiency



Contra Costa County Climate Action Plan

06b

- CEQA Guidelines address GHG emissions
- BAAQMD Guidance

3. GHG Inventory and Forecast

- Introduction
- Inventory Background
- Climate Action Plan
- GHG Reduction Targets

4. GHG Reduction Strategy

- Reduction Strategy Structure
    - Energy Efficiency and Conservation
    - Renewable Energy
    - Land Use and Transportation
    - Solid Waste
    - Water Conservation
    - Government Operation
- Evaluation Criteria
- Healthy Community Strategies
    - Public Health Considerations
    - Public Health Priority Benefits
- Existing Local and Public Health Actions

5. Implementation

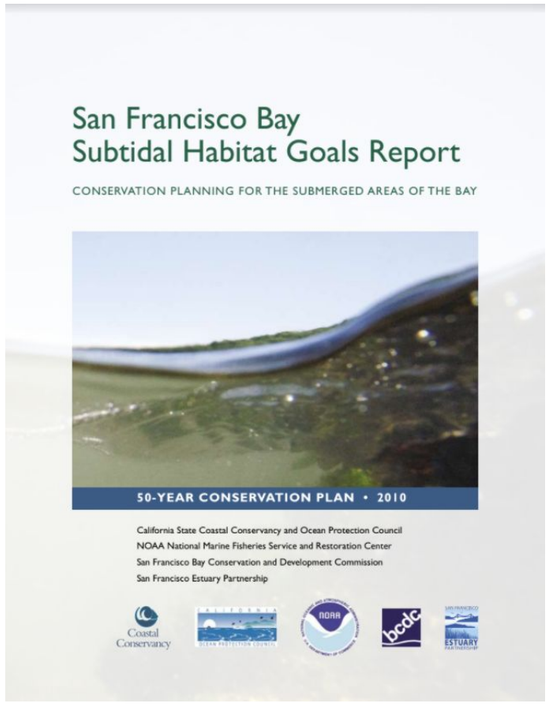
- Implementation Policies
    - GHG Reduction Strategies: Monitoring, Updated GHG Inventory and Climate Action Plan, Collaborative Partnerships, Funding Sources
- Healthy Community Measures
    - Cap-and-Trade Funding, Regional Coordination, Preparedness, Adaptation Integration, Public Health, Community Engagement, Health Equity

BCDC San Francisco Bay Subtidal Habitat Goals Report

07

Executive Summary

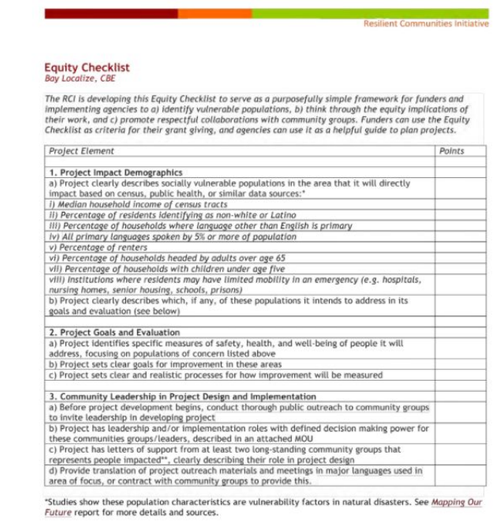
- Subtidal habitat is critical to the Bay Area ecosystem and includes all of the submerged area beneath the water's surface: mud, shell, sand, rocks, artificial structures, shellfish beds, eelgrass beds, macroalgal beds and the water column above the bay bottom
- Indirect ecosystem services include nutrient cycling, climate regulation, flood protection, water quality maintenance and sediment transport
- Recommendation: preserve and restore subtidal resources for ecosystem functions and human services
- Vision: achieve a net improvement of the subtidal ecosystem in San Francisco Bay through science-based protection and habitat restoration over the next 50 years
- Goal: support, maintain and improve upon ecosystem functions, values and services
- Designed to give basic information to resource managers, regulatory agencies, environmental groups, researchers, industries and anyone interested in bay habitat to plan conservation, restoration, research and protection activities for implementation
- Collaboration among SF Bay Conservation and Development Commission (BCDC), California Ocean Protection Council (OPC), California State Coastal Conservancy (SCC), National Oceanic and Atmospheric Administration (NOAA) and the San Francisco Estuary Partnership (SFEP)
- Offers guidance on opportunities for subtidal restoration and protection (neither a policy not regulatory document)



RCI Coalition Resource - Equity Checklist

Equity Checklist

- This list was developed to serve as a purposefully simply framework for funders and implementing agencies to:
  - Identify vulnerable populations
  - Think through equity implications
  - Promote respectful collaborations with community groups
  - Criteria for grant giving
  - Be used as a guide for project planning
- Points are assessed for Project Impact Demographics, Project Goals and Evaluation and Community Leadership in Project Design and Implementation
- Sample Partnering Agreement to be used as a template for collaborations and includes:
  - Background
  - The Oakland Resilient Neighborhoods Partnership (ORNP)
  - Goal Statement
  - Roles of Co-Leads
  - Role of the Steering Committee
  - Roles of Partners
  - Workgroups
  - Facilitation
  - Duration
  - Decision-Making and Conflict Resolution



Resilient Communities Initiative

Equity Checklist
Bay Localize, CBE

The RCI is developing this Equity Checklist to serve as a purposefully simple framework for funders and implementing agencies to a) identify vulnerable populations, b) think through the equity implications of their work, and c) promote respectful collaborations with community groups. Funders can use the Equity Checklist as criteria for their grant giving, and agencies can use it as a helpful guide to plan projects.

Project Element	*Points*
1. Project Impact Demographics	
a) Project clearly describes socially vulnerable populations in the area that it will directly impact based on census, public health, or similar data sources:*	
i) Median household income of census tracts	
ii) Percentage of residents identifying as non-white or Latino	
iii) Percentage of households where language other than English is primary	
iv) All primary languages spoken by 5% or more of population	
v) Percentage of renters	
vi) Percentage of households headed by adults over age 65	
vii) Percentage of households with children under age five	
viii) Institutions where residents may have limited mobility in an emergency (e.g. hospitals, nursing homes, senior housing, schools, prisons)	
b) Project clearly describes which, if any, of these populations it intends to address in its goals and evaluation (see below)	
2. Project Goals and Evaluation	
a) Project identifies specific measures of safety, health, and well-being of people it will address, focusing on populations of concern listed above	
b) Project sets clear goals for improvement in these areas	
c) Project sets clear and realistic processes for how improvement will be measured	
3. Community Leadership in Project Design and Implementation	
a) Before project development begins, conduct thorough public outreach to community groups to invite leadership in developing project	
b) Project has leadership and/or implementation roles with defined decision making power for these communities groups/leaders, described in an attached MOU	
c) Project has letters of support from at least two long-standing community groups that represents people impacted**, clearly describing their role in project design	
d) Provide translation of project outreach materials and meetings in major languages used in area of focus, or contract with community groups to provide this.	

*Studies show these population characteristics are vulnerability factors in natural disasters. See *Mapping Our Future* report for more details and sources.

East Bay Regional Park District - Master Plan 2013

09a

Purpose of the Master Plan

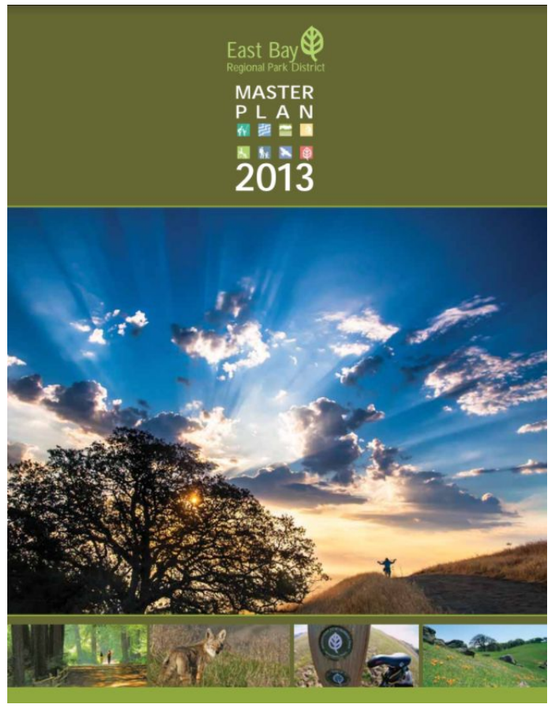
- Define the overall mission and vision for the Park District within the East Bay Regional Park District
- Plan guide contains policies for stewardship and development of parks
- Goal: maintain a careful balance between the need to protect and conserve resources and the need to provide opportunities for recreational use of parklands, both now and in the future
- Highlights the public's opportunities to participate in the planning, development, operation, interpretation and stewardship of the District
- Details the District's multifaceted responsibilities, designates opportunities for community input and provides a framework for decision making of the staff, Park Advisory Committee (PAC) and elected Board of Directors

Mission Statement

- East Bay Regional Park District preserves a rich heritage of natural and cultural resources and provides open space, parks, trails, safe and healthful recreation and environmental education. An environmental ethic guides the District in all of its activities

Vision Statement

- The District envisions an extraordinary and well-managed system of open space parkland in Alameda and Contra Costa counties, which will forever provide the opportunity for a growing and diverse community to experience nature nearby

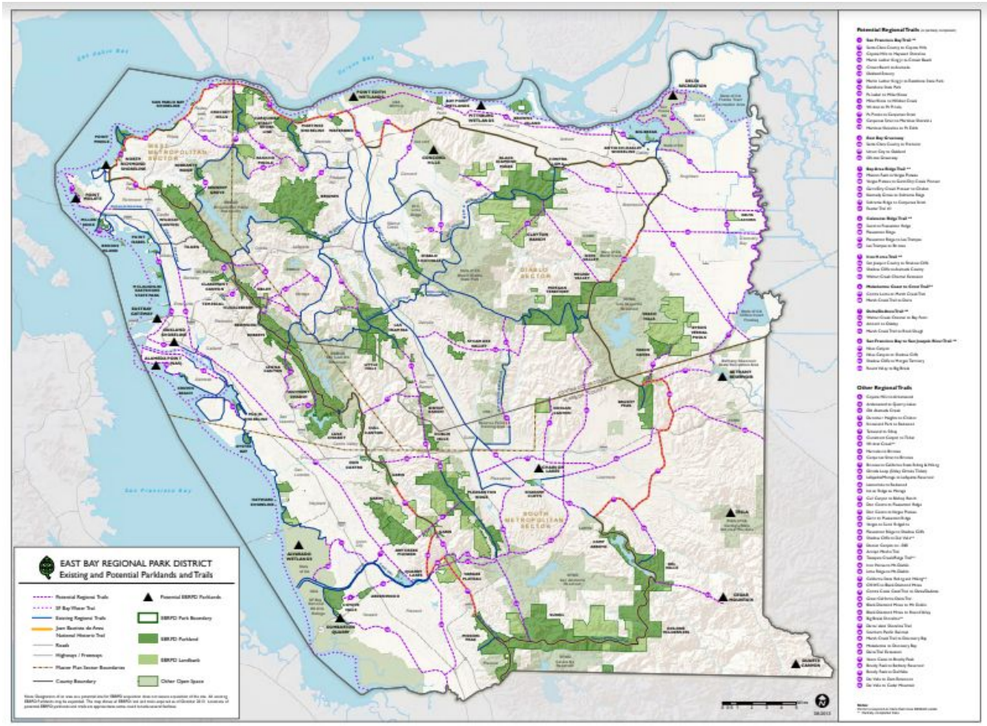


East Bay Regional Park District - Master Plan 2013

09b

Major Assets

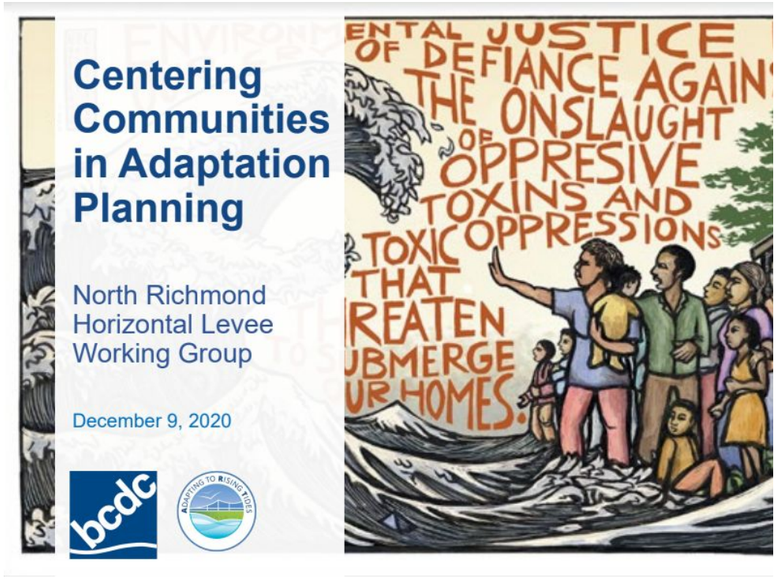
- Description of the East Bay Regional Park District (EBPRD)
- EBPRD Board of Directors
- Policy and Legislation
- History of EBPRD
- Current Challenges and Priorities
- Natural and Cultural Resources
- Resource Management
- Rare, Threatened and Endangered Species Management
- Vegetation Management
- Wildfire Hazard Reduction Plan
- Wildlife Management
- Water Management
- Geology, Soils and Paleontology
- Cultural Resource Management
- Native Peoples of the East Bay
- Public Access and Service
- Planning and Acquisition
- Human and Financial Resources
- Our Shared Future
- Appendices



Centering Communities in Adaptation Planning

Horizontal Levee Working Group

- North Richmond designated as a vulnerable community
- Defines Environmental Justice
- Causes of Environmental Injustice: discriminatory public policies and race-based zoning and exclusionary lending practices
- Defines Equity in planning as ensuring fair outcomes, treatment and opportunities for all people including requiring societies and systems to remove existing barriers placed between groups and resources
- Includes diagram of the spectrum from community engagement to ownership
- Resilient Communities Initiative Equity Checklist
- BCDC Community Mapping Data



Coastal Conservancy Living Shorelines

11a

Living Shorelines Project at Giant Marsh

Introduction

a. Goal: Share results from projects with multiple agencies so the techniques can be incorporated into multiple restoration projects to enhance endangered species habitat, pilot climate adaptation techniques and integrate habitat connectivity and functions
b. Builds on major habitat enhancement programs in the Bay
c. SF Bay has lost more than 90% of historic tidal wetlands and the Bay itself if ⅓ smaller in size due to fill projects in the Bay and along its shoreline
d. Subtidal and intertidal habitat loss are from contamination, freshwater diversions, dredging and mining projects and species invasions
e. Project Goal: restore ecological function and ecosystem resilience through creation and enhancement of a range of biologically rich shoreline habitats from subtidal to estuarine-terrestrial transition zone

Objectives to Accomplish Project Goal

1. Create or enhance a variety of habitats ranging from the shallow subtidal to the tidal marsh to the estuarine-terrestrial transition zone.
2. Experimentally evaluate techniques to advance restoration practice for each of these habitat types.

SAN FRANCISCO BAY LIVING SHORELINES PROJECT
AT GIANT MARSH, PT PINOLE REGIONAL SHORELINE
(RICHMOND, CONTRA COSTA COUNTY)
Project Description

Prepared by
California State Coastal Conservancy

~~revised December 2016~~March 2017

Coastal Conservancy Living Shorelines

11b

3. Assist recovery of particular species of concern, including Pacific cordgrass, eelgrass, Olympia oysters, and endangered species such as California sea-blite, California Ridgway's rail, and salt marsh harvest mouse.
4. Evaluate the use of restored habitats for wildlife, including invertebrates, fish, and birds.
5. Evaluate the efficacy of nearshore restoration treatments in attenuating wave energy and reducing shoreline erosion.

Project Setting

- Site location is the Giant Marsh (historically included industrial use for gunpowder and dynamite manufacturing)
    - Shorelines show trends of long term erosion and retreat

Project Description and Design Basis

- 7 Proposed Treatments
    - Offshore Eelgrass Bed and Oyster Reef
    - Oyster Reef Elements at Different Elevations, with and without shading from Rockweed
    - Nearshore Oyster Reef Elements at Existing Marsh Edge
    - Pacific Cordgrass Revegetation Inshore from Nearshore Reef
    - Pacific Cordgrass Revegetation Adjacent to Existing Pacific Cordgrass
    - Marsh Scarp Revegetation and Arboring for Sea-blite and Pickleweed
    - Estuarine-Terrestrial Transition Revegetation Enhancement

Conservation Measures

- Avoidance and Minimization Measures
    - Avoidance of Protected Species
    - Previously Unknown Cultural Resources
    - Erosion and Sediment Control
    - Pile Removal BMPs
    - Eelgrass-Specific Planting Measures
    - Staff Training
    -

Monitoring, Management and Reporting

- Project Success Criteria
- Actions if Project Success Criteria are Not Achieved
- Project Monitoring
- Monitoring Data Reporting Format and Schedule

References

Coastal Conservancy Creosote Piling Removal Tech Memo

12a

Technical Memorandum 3

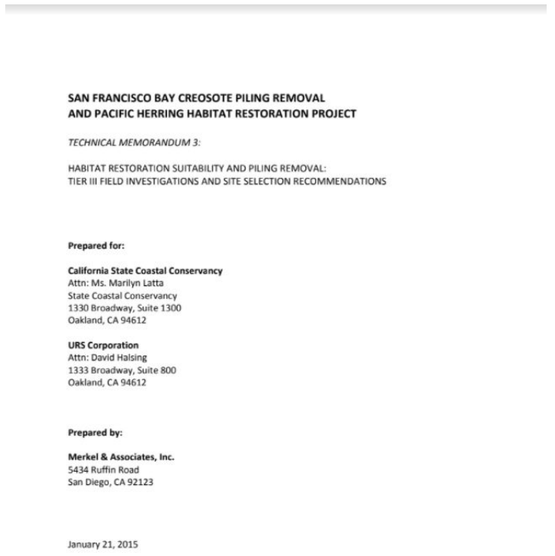
- Habitat Restoration Suitability and Piling Removal: Tier III Field Investigations and Site Selection Recommendations

Introduction

- Prepared in support of SF Bay Creosote Piling Removal and Pacific Herring Habitat Restoration Project
- Goal of screening process: identify pile clusters that best fit objectives of removing creosote piling from herring spawning habitat where restoration may be accomplished to replace lost physical structure of pilings for spawning herring
- Related goal: provide benefits of implemented habitat restoration over an area of at least one acre

Methods

- Bathymetry
- Substrate Characteristics
- Existing Spawning Habitat Resources
- Avian/Marine Mammals
- Herring Spawning History
- Historic Resources
- Bottom Debris and Navigation Hazards
- Current and Wave Energy
- Pile Conditions
- Property Ownership
- Construction Access/Staging



SAN FRANCISCO BAY CREOSOTE PILING REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

TECHNICAL MEMORANDUM 3:

HABITAT RESTORATION SUITABILITY AND PILING REMOVAL:
TIER III FIELD INVESTIGATIONS AND SITE SELECTION RECOMMENDATIONS

Prepared for:

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January 21, 2015

Coastal Conservancy Creosote Piling Removal Tech Memo

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Results

- Pipeline Trestle - Breuner Marsh
- Richmond Red Rock Warehouse
- Richmond Terminal 4
- Marina and Ferry Terminal at Castro Point
- El Campo Site Marina
- Sausalito 3 (Nunes Brothers Boat and Ways Co. Piers)

Summary Recommendation

- Summary Matrix supports site selection recommendations (see matrix)
- First Recommended Option: Marina and Ferry Terminal at Castro Point
- Second Recommended Option: Richmond Red Rock Warehouse and the El Campo Site Marina
- Sites Recommended for Dismissal: Pipeline Trestle - Breuner Marsh, Richmond Terminal 4 and Sausalito 3 (Nunes Brothers Boat and Ways Co. Piers)

Table 8. Summary matrix supporting site selection recommendations.

FACTOR CONSIDERED	Pipeline Trestle Breuner Marsh	Richmond Red Rock Warehouse	Richmond Terminal 4	Marina and Ferry Terminal at Castro Point	El Campo Site Marina	Sausalito 3 (Nunes Bros. Boat & Ways Co. Piers)
41 Year Herring Spawning Frequency	4.9%	4.9%	4.9%	12.2%	41.5%	75.6%
Last 6 Year Herring Spawning Frequency	33.3%	33.3%	33.3%	83.3%	100.0%	33.3%
Creosote Pile Count	270	350	2,500	1,500	250	45
Creosote Piles Wrapped	Yes		Yes			
Creosote Pile Estimated Age (Years)	76-113	58-76	99-164	62-76	51	89-100+
Likely Leachate Toxicity Levels	Low	Moderate	Low	Moderate	Mod-High	Low
Availability of desirable spawning habitat	High	Mod-High	Moderate	Mod-High	Moderate	Moderate
Spawning Habitat Restoration Potential	Low	Low-Mod	Moderate	Moderate	Moderate	Low
Biological Resource Constraints	None	Low	Moderate	Low	Low	Low
Historic Resource Constraints				Maybe		Yes
Ownership Suitability	High	High	High	High	Moderate	Low
Implementation Unit Cost and Risk	Very High	Low	Very High	Mod-High	Mod-High	Moderate
Public Visibility	Low	Low	Low	High	Low	High
Elimination Recommendations	**Yes**		**Yes**			**Yes**
Potential Use Option		**Combine with El Campo**		**Stand Alone Site**	**Combine with Red Rock**	

RDG Habitat Conservation Planning Recommendations

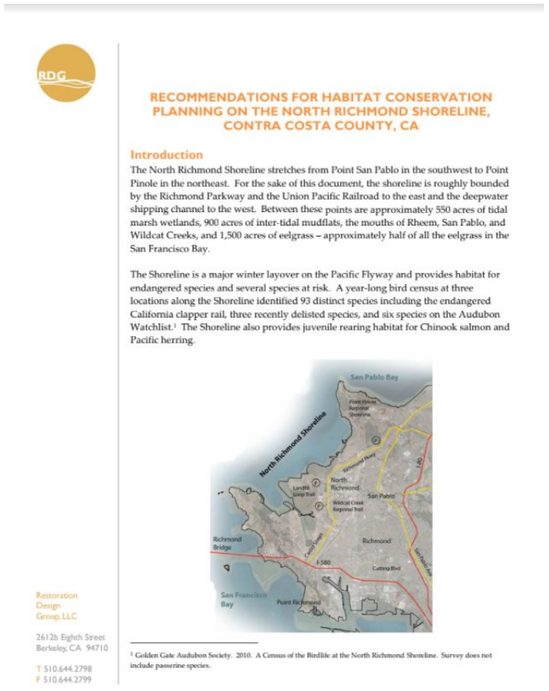
Habitat Conservation Planning Recommendations

Introduction

- As the City of Richmond and unincorporated county areas evolve - building new roads, trails, infrastructure, and parks – there exist enormous opportunities to restore and protect key habitats along the shoreline
- RDG charged to estimate the likely scope and cost, identify key stakeholders, and generate interest in the local community
- The scope of this project shifted away from generating community interest for an imminent conservation plan and toward identifying restoration opportunities, sources of information, and documenting the existing visions for the Shoreline
- This document will serve as a reference for parties interested in restoring or funding restoration on the North Richmond Shoreline

Existing Shoreline Visions

- Richmond General Plan Update
  - Goal 1: Preserve and Restore Natural Habitat and Biodiversity
  - Policy: Habitat and Biological Resources Protection and Restoration
  - Actions: Habitat Conservation Plans, Priority Conservation Areas and Habitat Restoration Plan
  - Goal 2: Conserve Open Space
  - Policy: Richmond Shoreline
  - Action: Open Space Plan



RECOMMENDATIONS FOR HABITAT CONSERVATION PLANNING ON THE NORTH RICHMOND SHORELINE, CONTRA COSTA COUNTY, CA

Introduction

The North Richmond Shoreline stretches from Point San Pablo in the southwest to Point Pinole in the northeast. For the sake of this document, the shoreline is roughly bounded by the Richmond Parkway and the Union Pacific Railroad to the east and the deepwater shipping channel to the west. Between these points are approximately 550 acres of tidal marsh wetlands, 900 acres of inter-tidal mudflats, the mouths of Rheem, San Pablo, and Wildcat Creeks, and 1,500 acres of eelgrass – approximately half of all the eelgrass in the San Francisco Bay.

The Shoreline is a major winter layover on the Pacific Flyway and provides habitat for endangered species and several species at risk. A year-long bird census at three locations along the Shoreline identified 93 distinct species including the endangered California clapper rail, three recently delisted species, and six species on the Audubon Watchlist.[1] The Shoreline also provides juvenile rearing habitat for Chinook salmon and Pacific herring.

[1] Golden Gate Audubon Society. 2010. A Census of the Birdlife at the North Richmond Shoreline. Survey does not include passerine species.

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RDG Habitat Conservation Planning Recommendations

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- Shoreline Academy's North Richmond Shoreline Community Vision
  - Vision: the shoreline should be restored and protected to provide jobs, educational opportunities, a safe place to recreate, and a source of clean, healthy food
  - The community envisioned the long-term acquisition of shoreline properties from willing landowners and the conversion of that property to parks and open space
  - There was a demand from the community members for higher quality park amenities than what is currently available in publicly accessible open spaces (specifically at the Landfill Loop Trail)
  - The community specified that they would like to see the planned nature center at Point Pinole sited to overlook the North Richmond Shoreline

- Subtidal Habitat Goals Project
  - Collaborative effort to plan for the restoration and management of subtidal habitats in the San Francisco Bay
  - Living Shoreline Vision: a gradual transition through several habitat types from upland, through marsh, mudflat, and subtidal zones

- Developer Visions
  - Including residential, mixed use and light industrial development on the parcels near the mouth of Rheem Creek
  - Developers have proposed removing the open space zoning designations on their properties to maximize economic development

Inventory of Restoration Opportunities

- North Richmond Shoreline consists of over 170 parcels owned by over 40 parties
- Dispersed land ownership is perhaps the single greatest impediment to coordination conservation planning
- Parcels include:
  - Breuner Marsh
  - Breuner Creekside
  - Murray Property
  - Panattoni Property
  - Richmond Rod & Gun Club
  - Freethy
  - San Pablo Marsh
  - Additional San Pablo Marsh Properties
  - Karnes
  - West County Landfill
  - Wildcat Creek Marsh

RDG Habitat Conservation Planning Recommendations

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Inventory of Restoration Opportunities (cont'd)

- State Lands Commission Subtidal Lands - North Richmond Strategic Eelgrass Reserve
- Richmond Parkway Overpass

Recommendations

- Conservation Action Plan:

  1. Identify people involved in the project
  2. Define project scope and focal conservation targets
  3. Assess viability of focal conservation targets
  4. Identify critical threats
  5. Conduct situation analysis
  6. Develop strategies: objectives and actions
  7. Establish measures
  8. Develop work plans
  9. Implement
  10. Analyze, Learn, and Share

- Given the value of the habitat and the interest of the community, RDG recommends implementing a Conservation Action Planning process with the following critical caveats:
  - Willing Participants
  - Two-tier Conservation Action Plan
  - Cultural Sensitivity
  - Scope, Schedule, and Budget

- South of Parchester Specific Plan
- Richmond Shoreline Restoration Working Group
- Fund Current Restoration and Acquisition Activities
- Restoration Opportunity Inventory of the Entire Richmond Shoreline
- Job Training and Local Involvement

Conclusion

- The North Richmond Shoreline is a resource of enormous ecological value and lacking a coordinated conservation plan. This document serves as a reference for the initiation of a conservation action plan on the Shoreline
- The greatest impediment to conservation action planning is the lack of landowners willing to commit their lands for restoration and participate in conservation planning
- In the absence of a conservation action plan, the Coastal Conservancy can invest funds in the acquisition of lands or easements from willing sellers until a critical mass of land is available for conservation planning

BCDC Bay Plan

Essentials

- This document has policies to guide future uses of the Bay and shoreline along with maps that apply these policies to the present Bay and shoreline
- Provides a formula for developing the Bay and shoreline to their highest potential while protecting the Bay as an irreplaceable natural resource

Major Conclusions and Policies

1. The Bay
2. Uses of the Bay
3. Uses of the Shoreline
4. Justifiable Filling
5. Effects of Bay Filling
6. Pressures to Fill
7. Water Quality
8. Fill Safety

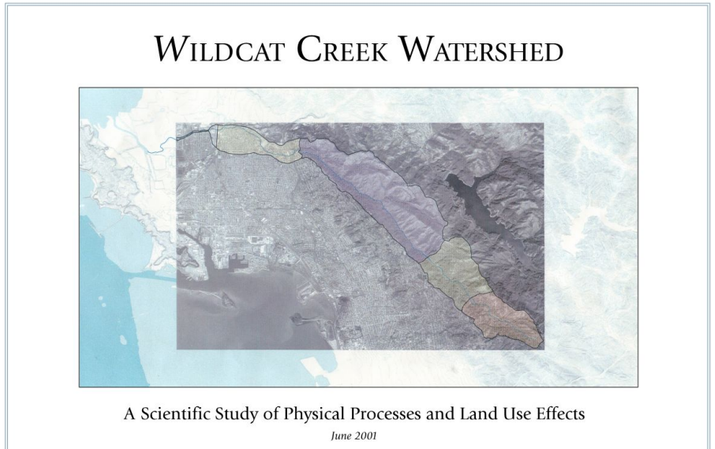
Major Plan Proposals

1. Develop Maritime Ports
2. Deepen Shipping Channels
3. Develop and Preserve Land for Water-Related Industry
4. Develop Waterfront Parks and Recreation Facilities
5. Expand Airport Facilities on Land
6. Maintain Wildlife Refuges in Diked Historic Baylands
7. Encourage Private Shoreline Development

Wildcat Creek Watershed Report SFEI

Executive Summary

- Principal objective: determine the change and effects of land use and nature on the distribution and supply of sediment and water
- Land Use History: marked by sudden changes in culture, numbers of people and land practices (rapid conversion possibly aided by general drought conditions from 18502-early 1900s)
- Compared to other north coast watersheds of larger size, Wildcat Creek has a very large sediment supply
- Key diagnostics: rates of erosion and deposition of sediments on hillsides, terraces and in channels, as indicated by the volumes of sediment voids and deposits
- This approach to watershed assessment (despite uncertainties caused by assumptions needed to fill data gaps) provides a rigorous basis to hypothesize future landscape responses to management actions, to compare one watershed to another and to monitor changes over time



Lower Rheem Creek Preliminary Restoration Plan

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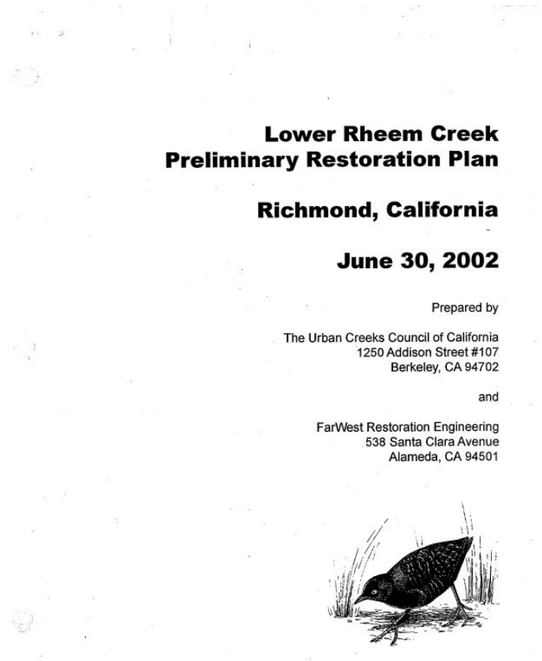
Overview

- Document presents a preliminary plan for restoring lower Rheem Creek
- Offers opportunity to transform a flood control channel with little habitat value into a significant amenity for wildlife and people
- Restored creek will provide educational opportunities for local schools and community groups
- Rheem Creek has the potential to be recreated as a riparian woodland and associated freshwater wetland rather than just a drainage ditch

Restoration Plan Objectives

- Evaluate existing conditions and identify opportunities and constraints within the proposed plan area
- Develop preliminary restoration design for a stable, more natural creek throughout the project area and an environmentally-preferable alternative to the existing flood-control channel
- Integrate the creek restoration project with the adjacent wetland restoration project to the north (Edgewater/Breuner mitigation bank)
- Prepare conceptual drawings and cost estimates for restoring the creek
- Provide recommendations for additional steps
- Provide a report that serves as the basis for additional design work, for negotiations with property owners and agencies, and for funding for implementation



Lower Rheem Creek Preliminary Restoration Plan

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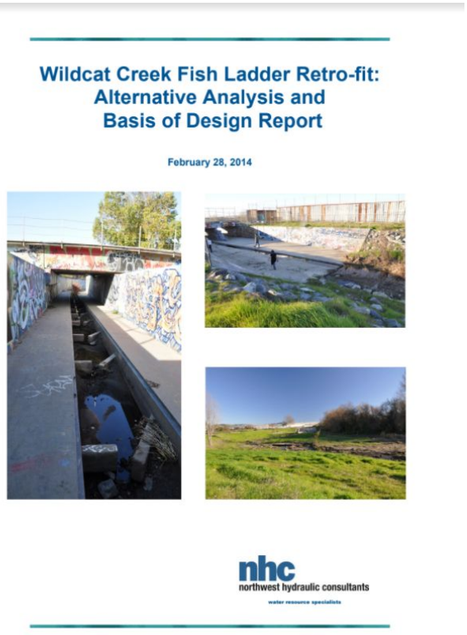
Wildcat Creek Fish Habitat Basis of Design (Sediment #s)

Overview

- Low lying areas within the Wildcat floodplain were said to have been inundated to a depth of about 1 foot about once every 3 years
- In its current state, the fishway frequently clogs with urban debris, which renders it impassable for potential upmigrating adult fish
- The absolute minimum flow that fish passage structures must provide function are 3 cfs for adult anadromous salmonids, 2 cfs for non-anadromous salmonids and 1 cfs for juvenile salmonids
- The maximum hydraulic drop (calculated by the difference between downstream and upstream water surfaces that a fish has to leap to pass a man made structure) for adult salmonids and non-salmonids is 1 foot and 0.5 feet for juvenile salmonids
- Using critical flow assumptions to compute the conveyance capacity, they estimate a maximum capacity of about 16 cfs within the fish channel (assuming the channel is free of debris and sediment)
- Increases in sediment transport capacities could induce scour and instability upstream, while decreases in sediment transport could lead to sediment deposition and reduced channel capacity
- The sediment basin was originally built with earthen berms to help establish a low flow channel through the basin; however they've proven unsuccessful as winter storms fill the basin and low flow channel before the spring migratory flows occur which potentially inhibits fish passage, traps downstream migration and limits access to the fish ladder for upstream migration
- Contra Costa County maintains the sediment basin and removes deposits
- Sediment transport rate increases as a power function of stream flow



Wildcat Creek Fish Habitat Basis of Design (Sediment #s)

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WCW SLR Technical Memo

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Summary

Introduction

- Purpose: to provide a summary of potential effects future climate change may have on the West County Wastewater District facilities
- Changes in precipitation patterns could cause increases in peak wet weather flows, resulting in a need for increased wet weather storage and/or capacity
- SLR could increase the frequency of flooding observed at the WPCP and low-lying areas of the collection system, affecting their operation and maintenance
- Addresses the District's potential to mitigate climate change by developing GHG emissions-reducing projects

Key Findings and Recommendations

- The frequency of extreme daily wet weather events is projected to increase by a factor of two by 2050 and a factor of three by 2100
- Sea barriers (including the local levee system and land barriers) should be surveyed and inspected regularly
- The lowest earth barrier surrounding WPCP is 8' (other barriers may be lower)
- Actual sea levels and projected range of SLR should be evaluated regularly (at least every 5 years)

Climate Change Impacts

- Analyses of local historical precipitation and sea level data, as well as literature review of relevant climate change studies, was conducted

WEST COUNTY WASTEWATER DISTRICT
DISTRICT-WIDE MASTER PLAN

TECHNICAL MEMORANDUM
CLIMATE CHANGE IMPACTS AND MITIGATION

September 2012

2700 YGNACIO VALLEY ROAD, SUITE 300 • WALNUT CREEK, CALIFORNIA 94598 • (925) 932-1710 • FAX (925) 930-0208
pw:\Carollo\Documents\Client\CA\WCWD\8072A00\Deliverables\Task 2 – Background and Planning Parameters\TM - Climate Change Impacts and Mitigation (Final)

WCW SLR Technical Memo

18b

Climate Change Impacts

- The district's collection system is designed to collect and convey wastewater from residential, industrial and commercial customers to the WPCP
- Stormwater and groundwater flows enter the collection system through cracks, misaligned joints and broken pipelines
- WCWD receives an average of 23.7" of precipitation (rainfall) annually (long-term annual average across the contiguous US is 30.2" annually)
- Average rainfall appears to be increasing slightly, but is statistically insignificant
- Most of the observed increase in storms with heavy and extreme precipitation levels since the early 1900s has occurred in the last three decades
- At the national level, climate change scientists have observed a trend towards increasing frequency of extreme precipitation events
- At the state level, the trend toward increasingly frequent extreme precipitation events remains consistent
- MHHW data were collected from the Richmond, Alameda, and San Francisco tide gages located within the San Francisco Bay (these tide gages have the longest running verified records of sea level data within proximity of the WPCP)
- The Richmond tide gage is the closest of the three to the WPCP; however, it has the least data on record
- A levee system and land barriers surrounding the plant prevent Bay waters from inundating the low lying areas of the WPCP and the greater service area
- At the maximum sea level rise condition, almost the entire WPCP and a larger portion of the service area, primarily on the western border, would be below sea level

WEST COUNTY WASTEWATER DISTRICT
DISTRICT-WIDE MASTER PLAN

TECHNICAL MEMORANDUM
CLIMATE CHANGE IMPACTS AND MITIGATION

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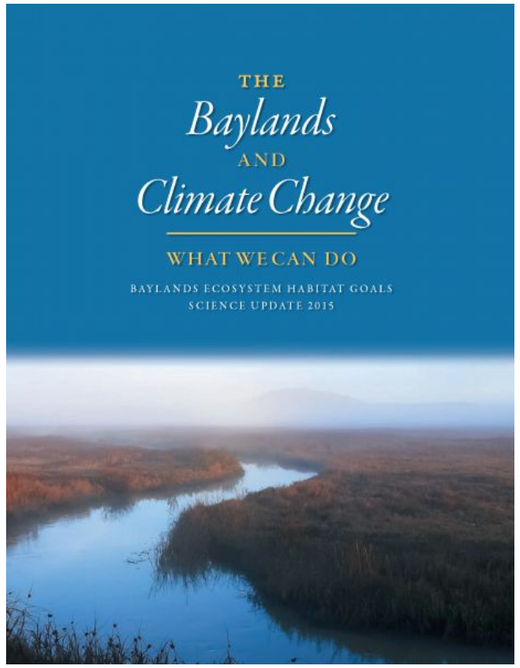
The Baylands and Climate Change

Summary

- The report is an update to the 1999 *Baylands Ecosystem Habitat Goals*, which for the first time set comprehensive restoration goals for the San Francisco Bay estuary
- This report synthesizes the latest science—particularly advances in the understanding of climate change and sediment supply—and incorporates projected changes through 2100 to generate new recommendations for achieving and sustaining healthy baylands ecosystems

Key Findings

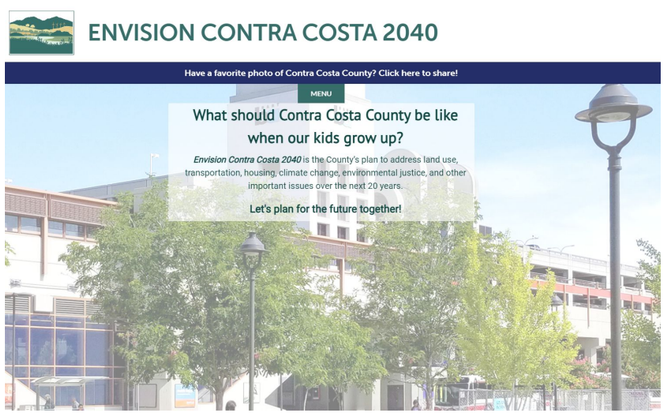
- **Work with nature, not against it**
  - Protect existing wetlands and provide the needed sediment for wetlands to keep pace with sea level rise)
- **Start today**
  - An accelerated effort in the next few decades can save over 80% of our existing wetlands over the next 100 years)
- **Remember our streams**
  - We should manage our land and streams to deliver sediment and clean water to the bay shore to nourish marsh growth. We should work with the entire watershed system, from the hills to the Bay
- **Sediment is essential to grow and sustain our wetlands**
  - Wetlands can keep up with rising seas only if sediment builds up along the surface of a marsh over time



Contra Costa County Envision 2040

Summary

- Envision Contra Costa 2040 is the County's plan to address land use, transportation, housing, climate change, environmental justice and other important issues over the next 20 years
- Four sections: General Plan, Climate Action Plan, Zoning Code and Environmental Review
- General Plan: outlines the County's goals for physical growth, conservation, and community life in the unincorporated area, and contains the policies and actions necessary to achieve those goals
- Helps guide decisions about zoning, permitted development, provision of public services, and transportation improvements
- Responds to current concerns about sustainability, environmental justice, and affordable housing, while carrying forward enduring County values like balancing growth and conservation
- General Plan Elements: Land Use, Growth Management, Transportation and Circulation, Housing, Public Facilities/Services, Conservation, Open Space, Safety and Noise
- The Climate Action Plan (CAP) is the County's strategic approach to reduce greenhouse gas (GHG) emissions from sources throughout the unincorporated area



- The CAP reflects the County's programs and actions to decrease energy use, improve energy efficiency, develop renewable energy, reduce vehicle miles traveled, increase multi-modal travel options, expand green infrastructure, reduce waste, and improve the efficiency of government operations
- Individual projects throughout the County still need to complete a project-specific EIR

Risk Assessment and Adaptation Prioritization Plan for the SF Bay Trail

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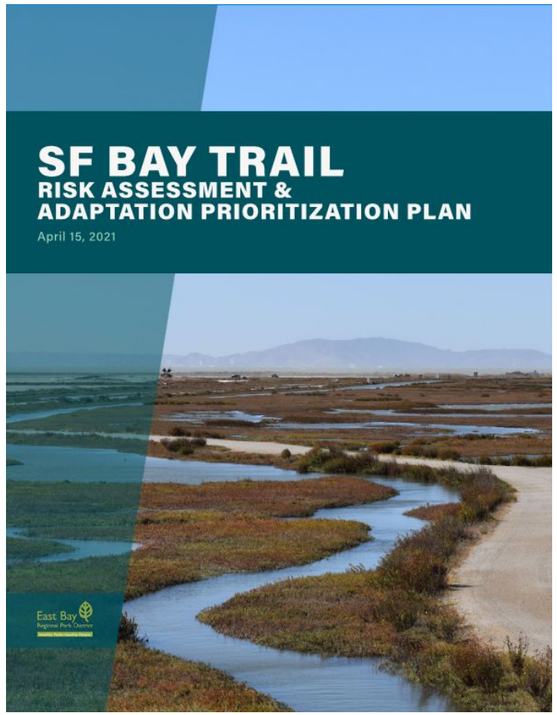
Summary

- East Bay Regional Park District (Park District) is looking ahead to understand the future changes anticipated along the East Bay shoreline to develop the San Francisco Bay Trail Risk Assessment and Adaptation Prioritization Plan (SF Bay Trail RAAPP)
- Study evaluates the vulnerabilities facing the East Bay's shoreline and assists the Park District in prioritizing nature-based adaptation projects to provide multiple benefits for the region
- Focused on balancing goals related to advancing ecological restoration, recreation, critical mobility, and building important interpretive educational opportunities
- Also focuses in on a several prototype sites to demonstrate how the latest techniques related to coarse beach and marsh adaptation, for example, can be implemented to provide shoreline access as sea levels rise
- By working with a wide range of experts, from research partners to local community stakeholders, the team has developed an integrated approach to adaptation planning and design that will benefit the community and broader region over time



Bay Trail

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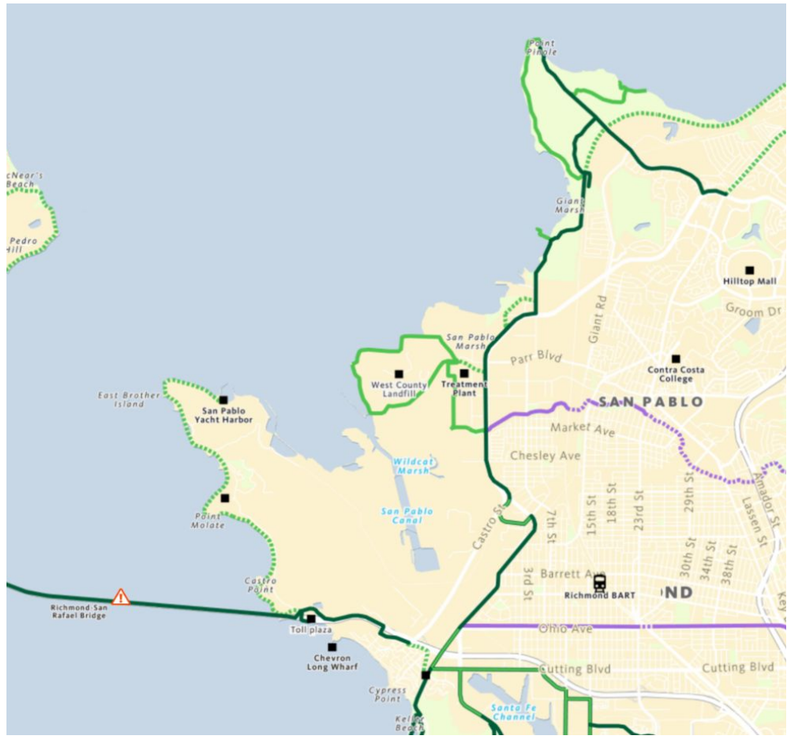
Map

- Highlighting the Bay Trail throughout North Richmond



PROJECT PARTNERS AND FUNDING PURSUITS

Grant Pursuit	Granting Organization	Primary Applicant	Supporting Applicant	Status	Date submitted	Scope and Intent
SFBRA Measure AA, Round 2	San Francisco Bay Restoration Authority	West County Wastewater		Applied, awaiting decision	10/1/2023	Design and Engagement continuation for Phase 1 and Collaboration Clusters
EPA Water Quality Investment Fund	EPA	SFEP	Watershed Project	Applied, awaiting decision	6/29/2023	Update Wildcat Creek Restoration Action Plan, support trail and habitat links
USACE Environmental Infrastructure	United States Army Corps of Engineers	West County Wastewater		Potential	6/22/2023	WRDA authorization for $45 mill to support Phase 1 living levee
State Coastal Conservancy	SCC	Watershed Project		Potential	12/1/2023	Supporting community engagement on sea level rise adaptation in four communities in Contra Costa
CREST/NOAA	NOAA	SFEP	West County Wastewater	Applied, awaiting decision		prep in 2029 on Phase 1 (link to LOI: https://app.box.com/s/jwsk7kl7dkj97ow1t14ug9njewewgwg1/file/1354975189788)
Countywide SLR governance modeling	OPR	Contra Costa County	Watershed Project	Applied, awaiting decision		Supporting countywide efforts to build capacity for SLR adaptation throughout the county

FUNDING EFFORTS

Listed above are related grants and funding project pursuits in progress in the area

FUTURE CONDITIONS FOR TIDAL HABITAT

Habitat conditions in the study area are projected to change over time as a result of rising sea levels. These changes are driven by sea level rise and sedimentation rates. Data from Point Blue Conservation Science's SF Bay Future Tidal Marsh project was evaluated to consider how these environmental processes are projected to change habitat composition over time.

Two conditions for each process were considered:

1) A high and low sea level rise condition and
2) A high and low sedimentation rate condition.

Two sea level rise scenarios were considered
1) a high sea level rise and
2) a low sea level rise conditions, in conjunction with a low sedimentation rate.

With a low level of sea level rise and a low sedimentation rate, in 2050 the majority of the site is covered by mid marsh habitat with a loss of high marsh from baseline conditions. By 2090, we begin to see an encroachment of low marsh habitats in the area and by 2110 the majority of the site will be converted to low marsh habitat with almost no remaining high marsh and very little mid marsh present. If we consider a high sea level rise scenario, by 2050 the majority of the site is already converted to low marsh habitats. In 2070, we begin to see an encroachment of mud flats into the site and by 2090 the site has effectively been converted to mudflats.

This modeling tool only considers sediment entering into the site through estuaries, however this site also sees sediment influxes from neighboring creeks which may suggest that the site will have a greater level of resilience than suggested by the results of the low sedimentation rate conditions.

WATERSHEDS AND CORRIDORS

The project site falls within the San Pablo Watershed. Two notable creeks flow into San Pablo Bay within the Study Area. Wildcat Creek flows into Wildcat Marsh immediately to the south of the West County Wastewater Treatment Plant, and San Pablo Creek flows to the Bay immediately north of the Republic Landfill.

These creeks are a significant source of sediments supporting the tidal marshes near the creek mouths. The creeks are also important ecologically, providing some of the only wildlife corridors connecting the Bay to Wildcat Canyon Regional Park and other protected open space in the hills east of Richmond. These creeks both historically supported a run of steelhead, however the steelhead run on Wildcat Creek was eliminated with the construction of several major fish passage barriers in the early 1900s, including the dams forming Lake Anza and Jewel Lake.

San Pablo and Wildcat Creeks provide some connectivity as riparian corridors, especially for fish, birds, and flying invertebrates. San Pablo and Wildcat Creeks historically supported anadromous fish, and conditions in the Study Area may be suitable for some limited spawning; upstream passage barriers limit population viability (Leidy et al., 2005; The Urban Creeks Council, 2010).

The FEMA Flood Insurance Study publishes estimated streamflows for storm events of various recurrence intervals for both San Pablo and Wildcat Creeks. Both creeks experience a significant amount of overbank flow during large streamflow events. These overbank flows are reflected in the FEMA streamflow estimates - the streamflows in the creek channels decrease between Church Lane and the mouth of each creek, reflecting streamflow moving onto the adjacent floodplains.

USGS Stream Stats Web Tool applies regional regression equations to estimate streamflows associated with major storm events. This web tool provides estimates for a larger range of storm events than are published in the FEMA study, however the Stream Stats estimates are presumably less accurate than the FEMA estimated because they are based on regional regression equations which estimate streamflows based on correlations with watershed parameters like drainage area and length of flow path, rather than detailed studies of the specific watersheds used by FEMA. The "streamflows" table presents the streamflows on Wildcat Creek and San Pablo Creek for a range of recurrence intervals.

STORMWATER DRAINAGE

The estimated stormwater drainage area for this site is approximately 145 acres, with a peak flow of approximately 109cfs. The drainage area is primarily categorized by developed areas. Several smaller stormwater drainages flow from developed areas along the North Richmond Shoreline directly into the marshes along San Pablo Bay: West County Wastewater, Republic Landfill, Drainages under Richmond Pkwy between Parr Blvd and Goodrick, Dotson Family Marsh.

The area south of Wildcat Creek has not been evaluated in detail for this research. The majority of this segment of the shoreline consists of managed ponds and other facilities associated with the Chevron refinery in North Richmond. While the historic Castro Creek channel is still evident in aerial photos, nearly the entire length of the remnant creek channel is bordered by pond berms or levees. The stormwater flow paths in this area cannot be determined from aerial photo review without greater knowledge of pond operations and a more detailed study of the culverts, berms, pumps, and other stormwater infrastructure in the area.

STREAMFLOWS

	Wildcat Creek			San Pablo Creek		
	Streamstats	FEMA		Streamstats	FEMA	
		at Church Lane	at mouth		at church lane	at mouth
Drainage area (sq mi)	11.1	8	9	42.3	39	40
Length of Longest Flow Path (mi.)	13			20		
Recurrence Interval (aka Annual Chance of Exceedance / yr) and Associated Streamflow (cfs)						
2 YEAR	385	-		1330	-	
5 YEAR	833	-		2790		
10 YEAR	1170	1250	1020	3870	2250	2450
25 YEAR	1620			5320	-	-
50 YEAR	1980	1950	1180	6450	4000	3920
200 YEAR	2710	-	-	8730	-	-
500 YEAR	3200	2600	1330	10200	7550	4680

Source: USGS Streamstats

COASTAL PROCESSES

The study area is located along the southeast shoreline of San Pablo Bay, a sub-embayment of the San Francisco Estuary. San Pablo Bay is characterized by a deep channel connecting from the Carquinez Strait to Point San Pablo, with wide shallows and mudflats extending from the deep channel towards the northwest Marin and Sonoma county shorelines, and slightly narrower shallows and mudflats between the channel and the Contra Costa county shoreline.

Prominent natural headlands at Point Pinole and Point San Pablo bound the historically marshy North Richmond/ San Pablo shoreline. Artificial fill has heavily reshaped this shoreline segment, for example the creation of the Republic Landfill which now divides Wildcat Marsh from San Pablo Creek.

TIDES

Tidal water levels in the study are expected to be similar to those measured at the nearby NOAA Richmond Tide Gage (Station #9414863), with minor variations due to local wind and wave conditions (expected to be less than 0.2ft). The Richmond Tide Gauge is located approximately 3 miles southwest of the West County Wastewater Treatment Plant.

NOAA publishes tidal datums for the Richmond gauge ("Water levels | NOAA", at right). These tidal datums are expected to be generally representative of conditions along the open Bay shoreline within the study area, however local tides along the tidally influenced portions of the creek channels, the interior of Wildcat Marsh, and other areas that are partially disconnected from the open bay and/or influenced by streamflow's may vary from those on the open Bay.

COASTAL FLOODING

The Federal Emergency Management Agency (FEMA) has evaluated the risk of coastal flooding along the shore of San Francisco Bay. FEMA's 2017 Flood Insurance Study for Contra Costa County, California (FIS #s 06013CV001C to #06013CV005C) publishes estimated water elevations associated with coastal flood events along the North Richmond shoreline. The study area includes transects 78 (near Dotson Family Marsh) to 83 (at the Chevron Refinery) of the FIS. Table X lists the Stillwater Elevations and Base Flood Elevations ("BFE") for each of these transects. Stillwater Elevations represent the highest water level associated with tides and stormsurge, but not including the effects of waves. Base Flood Elevation represents the estimated water surface elevation during a flood event accounting for the effects of tides, storm surge, and wave setup and runup.

The Base Flood Elevations (BFE) within the study area are generally between 10ft and 12ft NAVD (see Stillwater Elevation table, at right), however the BFE at Transect 83, located along the north shore of the Chevron Refinery, is 16ft NAVD due to the higher estimated wave runup at that location. The north-facing shoreline of the Chevron refinery at transect 83 has much narrower mudflats and a generally steeper sea-bed approaching the shoreline, consequently the influence of waves on flood elevations is much greater in this location. The north and west-facing shorelines of the landfill likely experience similar levels of wave exposure, however these segments were not studied in detail in the FEMA study.

WATER LEVELS | NOAA

Tidal Datum (NAVD88)	NOAA Richmond Tide Gauge (Station #9414863)
Highest Astronomical Tide (HAT)	7.60′
Mean Higher High Water (MHHW)	6.06′
Mean High Water (MHW)	5.45′
Mean Sea Level (MSL)	3.27′
Mean Low Water (MLW)	1.14′
Mean Lower Low Water (MLLW)	0.02′

Source: NOAA Tides and Currents website, Station 9414863 Richmond, CA. Epoch 1983-2001. Accessed 11/3/2021

STILLWATER ELEVATION **

Transect	X,Y coordinates	1%	0.2% chance	Zone	BFE
78	6014825.0766, 2181051.8715	9.8	11	VE	12*
79	6013260.7753, 2179812.6679	9.7	10.9	AE	10
80	6012911.4446, 21628728.4793	9.7	10.9	VE	12*
81	6011122.1641, 2178256.1094	9.7	10.9	AE	10*
82	6008839.7478, 2179910.5747	9.7	10.8	AE	10
83	6007599.6737, 2179508.6725	9.7	10.9	VE	16*

** North American Vertical Datum of 1988
* Wave runup elevation
3 Data not available

Source: FEMA FIS #06013CV003C

PHYSICAL OCEANOGRAPHY

The project team measured temperature, salinity, pH and dissolved oxygen in the tidal waters offshore of Giant Marsh from July 2019 to August 2020. The Giant Marsh site is located along the Richmond shoreline approximately 2 miles north of the WCW plant, and conditions at the Giant Marsh site are expected to be generally representative of conditions along the North Richmond shoreline, except during periods of high streamflows where water entering the bay from Wildcat, San Pablo and Rheem Creek may influence conditions near the creek mouths. The table below provides a summary of the measured oceanographic conditions during this monitoring period:

OCEAN CONDITIONS

Tidal Datum	MIN	MAX
Temperature (C)	10	24
Salinity (PSU)	18	27
pH	7	9
Dissolved Oxygen (mg/L)	5	13

WAVES

The primary sources of waves in San Pablo Bay are locally generated wind waves and ship wakes. A small amount of swell may travel from the central Bay into San Pablo Bay, however these waves would generally be propagating northwards and are unlikely to strongly influence wave conditions along the North Richmond shoreline.

ESA measured waves at the nearby Giant Marsh shoreline, approximately 2 miles north of the WCW plant, from July 2019 to August 2020. The charts at right show the statistical distribution of significant wave height (Hmo) and wave period (Tp) measured at Giant Marsh during this period.

These measurements include measurement of both wind waves and ship wakes. The highest observed significant wave height during this period was 0.4 meters (1.3 feet).

ESA also performed numerical modeling of wave formation and propagation in San Pablo Bay using the SWAN model for the Giant Marsh project. This analysis resulted in the following findings:

· The largest waves reaching the study area are generated by strong winds from the northwest, which produce waves that develop and propagate across the open waters of San Pablo Bay.

· Significant wave heights are typically less that 1.0ft, but during storm events wave heights may increase to as high as 2.6ft. There was not a detailed analysis to estimate extreme wave heights, but this 2.6ft wave appears to be a reasonable estimate suitable for the largest storm wave height in this region of the bay, and provides an appropriate value to inform planning and preliminary design for shoreline features.

· Actual wave heights reaching specific segments of shorelines and inter-tidal areas are influenced by the tide elevation and the amount of dissipation of wave energy over the shallow mudflats, as well as diffraction and refraction in the shallow inter-tidal zone at that location.

SHORELINE EROSION AND PROGRADATION

The North Richmond shoreline consists of a mix of armored shorelines constructed from large rocks, concrete or other engineered materials, and natural shorelines, including tidal marshes, beaches and rocky headlands.

The San Francisco Estuary Institute's 2015 "Shifting shores: Marsh Expansion and Retreat in San Pablo Bay" report provides an overview of historic and recent shoreline changes on San Pablo Bay. Key findings of that study are summarized below:

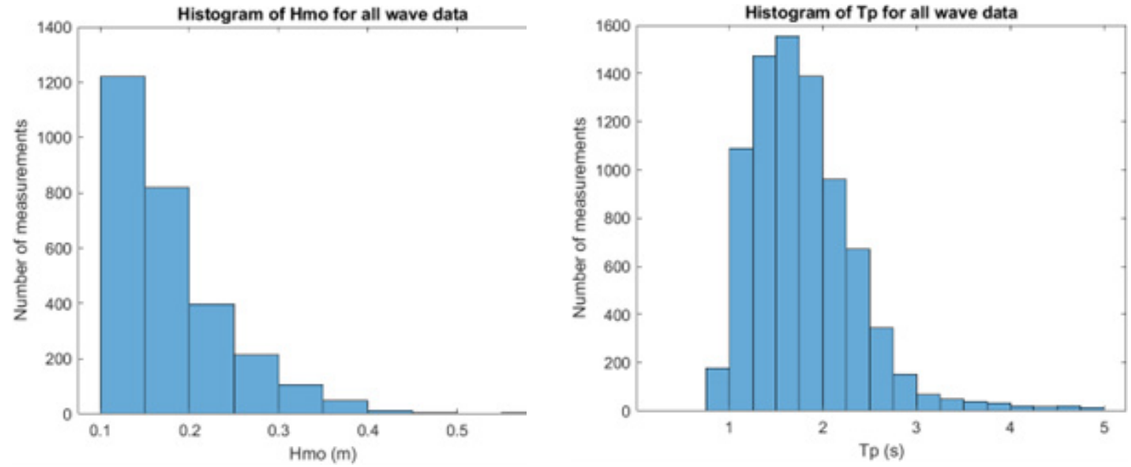
Historic Shoreline Change (mid 1800s to 2010)

Relocation of the shoreline associated with the construction of the landfill on former mudflats. Bayward expansion of the marsh north of the Landfill, at the mouth of San Pablo Creek (~4.1 to 6 meters per year).

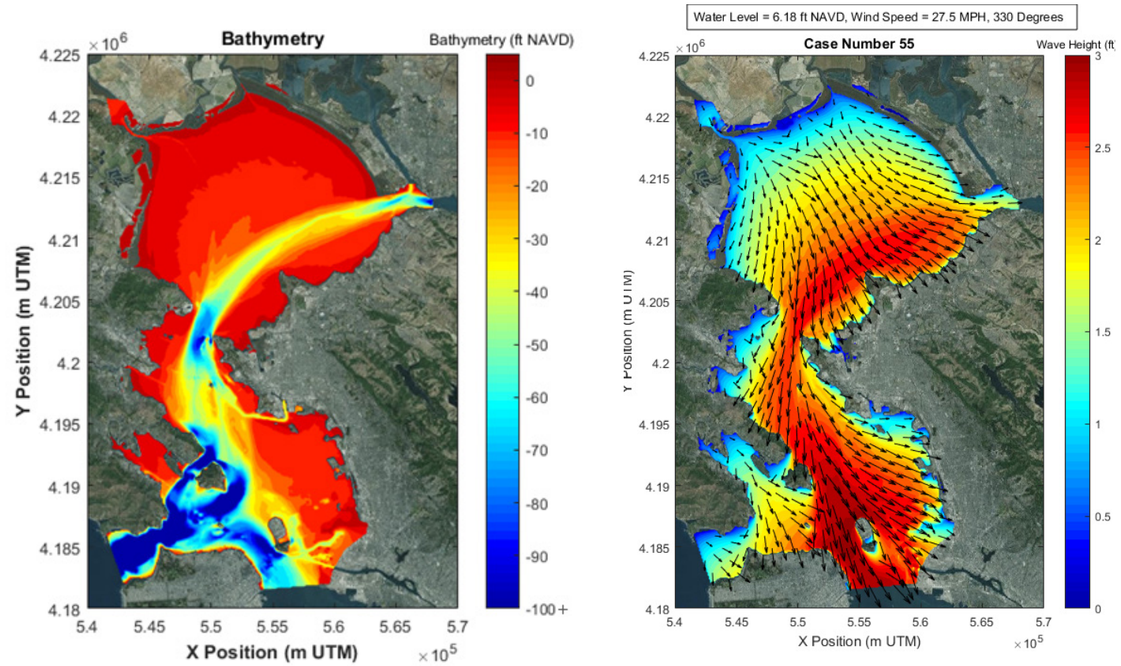
Recent Shoreline Change (1993 to 2010)

Majority of the shoreline is relatively stable (less than 1 meter per year retreat or expansion). Small areas of localized shoreline retreat (-3.6 to -10 meters per year).

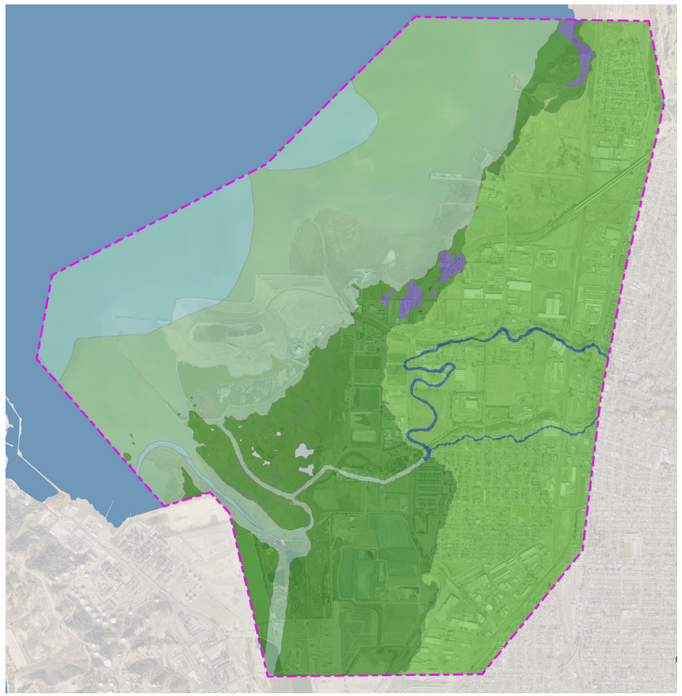
While the rates of recent shoreline change are not high along the majority of the North Richmond shoreline, even small rates of shoreline change can lead to significant changes in the landscape and ecological functions over time. The team recommends continued monitoring of the shoreline in the region, in particular the north-facing shorelines of the marshes at the mouth of San Pablo Creek for indications of progressive erosion. These marshes formed recently, likely as a result of the construction of the landfill diverting San Pablo Creek's sediment northward which allowed the marshes to expand despite the relatively high wave exposure. These marshes are likely to be highly dynamic, and a reduction to the local balance of sediment supply could lead to a transition to an erosive regime, leading to the loss of these marsh habitats.



WAVES: Wave heights (left) and frequency (right), for the outboard sensor (SB2) for all wave data collected.



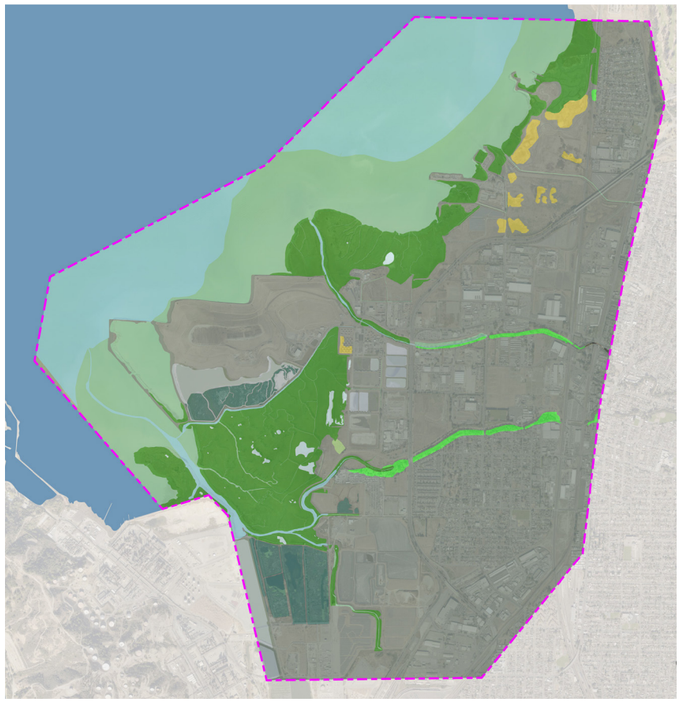
BATHYMETRY: Water depths (left), and modeled wave heights for a typical storm event (right), informed erosion, projected wave height variations, and other calculations for the coastline.



HISTORICAL HABITAT

- HISTORICAL SHALLOW BAY
- HISTORICAL TIDAL FLAT
- HISTORICAL TIDAL MARSH
- HISTORICAL UPLAND
- HISTORICAL TIDAL MARSH FLAT
- HISTORICAL RIVERS
- HISTORICAL SALT POND
- HISTORICAL TIDAL PANNE
- STUDY AREA BOUNDARY

SOURCE: NAIP 2018, ESRI 2021, SFEI 2017, ESA 2021



EXISTING HABITAT

- DEVELOPED / RUDERAL
- SHALLOW BAY
- TIDAL FLAT
- TIDAL MARSH
- TIDAL PANNE
- SEASONAL WETLAND
- POND
- DIKED WETLAND
- GRASSLAND
- RIPARIAN
- STUDY AREA BOUNDARY

SOURCE: NAIP 2018, ESRI 2021, SFEI 2017, ESA 2021

HABITAT MAPS: As seen above, the shoreline has become more fixed, and fragmented over time, from marsh and wetland to filled aquatic areas, and hardened slopes to support industrial development and commercial land uses. See chapter 1 for larger maps and detail.

HABITAT DESCRIPTIONS

SHALLOW BAY + TIDAL FLAT

These habitat types are typically found offshore, and plant communities include diatoms and

other microalgae, macroalgae, and eelgrass. Microalgae are foundational to the San Francisco Estuary food web, supplying food for invertebrates that are then consumed by shorebirds and waterfowl. Macroalgae and eelgrass support invertebrates and fish by providing shelter, food, and spawning areas. Pacific harbor seal and California sea lion forage in the shallow bay habitat for fish, shellfish and crustaceans. Tidal flats and channels provide foraging and roosting habitat for shorebirds at low tide which hunt for worms, shellfish, and other invertebrates that inhabit the bay mud. The tidal channel also provides habitat for ducks.

Eelgrass (Zostera marina)

Black-necked stilt (Himantopus mexicanus)

Bufflehead (Bucephala albeola)

Lesser scaup (Aythya affinis

Pacific herring (Clupea harengus)

Longfin smelt (Spirinchus thaleichthys)

Pacific harbor seal

California sea lion

Least sandpiper (Calidris minutilla)

Greater yellowlegs (Tringa melanoleuca)

Black-bellied plover (Pluvialis squatarola)

Mallard (Anas platyrhynchos)

Northern shoveler (Spatula clypeata)

Green-winged teal (Anas crecca)

NORTHERN COASTAL SALT MARSH AND TIDAL PANNES

Northern coastal salt marsh, also called saline emergent wetland or tidal marsh, is a highly productive, herbaceous community of salt-tolerant species forming a moderate to dense cover up to 3 feet tall. This community is usually found along sheltered inland margins of bays, lagoons, and estuaries where the hydric soils are subject to regular tidal inundation for at least part of the year. Most species grow actively in the summer and are dormant in winter. San Francisco Estuary salt marshes provide food and nesting habitat for a wide variety of bird species.

Tidal pannes are natural depressional areas that develop in higher elevation marsh areas. They typically are unvegetated and are inundated only during highest tides. Their salinity rises when the water evaporates. Though they are typically not highly utilized by wildlife, except for shorebirds when flooded, the edges of tidal pannes are associated with rare plants.

Pacific cordgrass (Spartina foliosa),

Pickleweed (Sarcocornia pacifica),

Marsh gumplant (Grindelia stricta var. angustifolia),

Seaside arrow grass (Triglochin maritima),

Saltgrass (Distichlis spicata)

Jaumea (Jaumea carnosa)

California Ridgway's rail

California black rail

Saltmarsh common yellowthroat

San Pablo song sparrow

Bryant's savannah sparrow

Willet (Tringa semipalmata)

Black-necked stilt (Himantopus mexicanus)

Mallard (Anas platyrhynchos)

Salt marsh harvest mouse

San Pablo vole

Salt marsh wandering shrew (Sorex vagrans halicoetes)

Raccoon (Procyon loctor)

Non-native red fox (Vulpes vulpes).

Johnny-nip

Soft salty bird's beak

DIKED WETLAND AND SEASONAL WETLAND

Diked wetlands are areas of historic marsh that have been isolated from tidal influence by levees or berms. They generally retain salt marsh vegetation, typically pickleweed, due to the high salt content of the soil. They can subside over time as organic material decomposes and the soil dewaters from evaporation. Low areas can accumulate rainwater and vegetation more typically associated with seasonal wetlands can become dominant. Seasonal wetlands are generally saturated and/or inundated annually during winter and early spring when water drains into and through the Study Area.Birds and bats may forage over or in the seasonal wetlands especially when the area is inundated in the winter and spring. Large and small mammals may also utilize the seasonal wetlands in the summer and fall months when the seasonal wetlands are not inundated.

American coot (Fulica americana),

Black phoebe (Sayornis nigricans),

Snowy egret (Egretta thula),

Marsh wren (Cistothorus palustris),

Northern harrier

POND

Managed ponds, including flood control basins, at industrial facilities provide open water habitat within the Study Area. Ponds can include islands and emergent vegetation, as well as deep freshwater habitat.

The ponds support waterbird breeding in spring and summer and provide foraging and resting habitat for overwintering and migrating waterbirds. Islands and substantial clumps of vegetation provide suitable roosting habitat for shorebirds, gulls, ducks, and geese.

RIPARIAN

Trees in riparian habitat typically include arroyo willow (Salix lasiolepis), alder (Alnus spp.), coast live oak, and California bay laurel, as well as non-native species such as black acacia and eucalyptus.

Bird and mammal species commonly found in riparian habitat are similar to those found in mixed woodland habitat. Fish species that may be found in stream channels within riparian habitat include:

Steelhead (Oncorhynchus mykiss)

Threespine stickleback (Gasterosteus aculeatus)

Western mosquitofish (Gambusia affinis)

Rainwater killifish (Lucania parva) (non-native)

GRASSLAND

Grassland occurs in relatively small patches within the Study Area. Additional areas in developed or ruderal areas are primarily dominated by annual grasses, including the inactive portions of the landfill, as well as levee or berm slopes. Most of the grassland in the Study Area is dominated by common non-native and invasive grasses. The grassland habitat in areas directly adjacent to tidal and non-tidal wetlands is used as foraging habitat by the salt marsh harvest mouse and is important as refugia for them during high tides, storms, and flood events.

Fescue (Festuca spp.),

Wild oats (Avena spp.),

Ripgut brome (Bromus diandrus), as well as non-native and invasive forbs including

Wild radish (Raphanus sp.)

Poison hemlock (Conium maculatum)

Fennel (Foeniculum vulgare)

Western fence lizard (Sceloporus occidentalis)

Black-tailed jackrabbit (Lepus californicus)

San Pablo vole

California ground squirrel (Otospermophilus beecheyi)

Savannah sparrow (Passerculus sandwichensis)

Western meadowlark (Sturnella neglecta)

Salt marsh harvest mouse

UPLAND

There are additional uplands habitats at the site including coastal scrub and mixed woodlands. Coastal scrub habitats are found in a band between tens to hundreds of meters wide along the west coast stretching from Monterey to Oregon (National Parks Service). Species found within these habitats include:

Coyote brush (Baccharis pilularis),

Toyon (Heteromeles arbutifolia),

Poison oak (Toxicodendron diversilobum) and

invasive Himalayan blackberry (Rubus armeniacus)

Bushtit (Psaltriparus minimus),

California towhee (Melozone crissalis),

Lesser goldfinch (Spinus psaltria),

Coyote (Canis latrans)

Brush rabbit (Sylvilagus bachmani).

Eucalyptus (Eucalyptus spp.)

Coast live oak (Quercus agrifolia).

Black acacias (Acacia melanoxylon)

California bay laurel (Umbellularia californica

Dark-eyed junco (Junco hyemalis),

Oak titmouse (Baeolophus inornatus),

Chestnut-backed chickadee (Poecile rufescens),

House wren (Troglodytes aedon),

Ruby-crowned kinglet (Regulus calendula),

Spotted towhee (Pipilo maculatus),

Great horned owl (Bubo virginianus),

Red-tailed hawk (Buteo jamaicensis),

Nuttall's woodpecker (Picoides nuttallii).

Fox squirrel (Sciurus niger),

Striped skunk (Mephitis mephitis)

Raccoon (Procyon lotor)

DEVELOPED

Developed areas within the Study Area include levees and berms, ruderal areas, landscaped areas, and some grassland areas in locations disturbed by human activities. Other areas are mostly devoid of vegetation as the result of buildings, pavement and other hardscapes, regular mowing, soil compaction, or lack of suitable substrate for plant establishment and growth.

Buildings may however have potential to support some roosting bats and nesting birds. The levees are likely used by wildlife to move between other wetland and upland habitats. Developed areas provide limited wildlife habitat and usually support only generalist species, and sometimes non-native wildlife species that are tolerant of human presence and activities. Shoreline areas with rip-rap can provide foraging and roosting habitat for shorebirds.

Barn swallow (Hirundo rustica),

Cliff swallow (Petrochelidon pyrrhonota),

House sparrow (Passer domesticus), and

House finch (Haemorhous mexicanus).

Striped skunk

Raccoon

Norway rat (Rattus norvegicus)

Virginia opossum (Didelphis virginiana)

Black oystercatcher (Haematopus bachmani)

Black turnstone (Arenaria melanocephala)

SPECIES OF SPECIAL INTEREST

The Study Area provides suitable habitat for special-status fish, wildlife, and plant species including: obscure bumble bee (Bombus caliginosus), western bumble bee (Bombus occidentalis), Central California Coast steelhead (Oncorhynchus mykiss), longfin smelt (Spirinchus thaleichthys), Pacific herring (Clupea pallasii), California black rail (Laterallus jamaicensis coturniculus), California Ridgway's rail (Rallus obsoletus obsoletus; also California clapper rail, Rallus longirostris obsoletus), northern harrier (Circus hudsonius), white-tailed kite (Elanus leucurus), saltmarsh common yellowthroat (Geothlypis trichas sinuosa), Bryant's savannah sparrow (Passerculus sandwichensis alaudinus), San Pablo song sparrow (Melospiza melodia samuelis), Pacific harbor seal (Phoca vitulina richardsii), California sea lion (Zalophus californianus), salt marsh harvest mouse (Reithrodontomys raviventris), San Pablo vole (Microtis californicus sanpabloensis), Suisun marsh aster (Castilleja ambigua var. ambigua), soft salty bird's beak (Chloropyron molle ssp. molle), and Johnny-nip (Castilleja ambigua var. ambigua).

The smaller Phase I area provides suitable habitat for a subset of the special-status species: obscure bumble bee, western bumble bee, California black rail, California Ridgway's rail, northern harrier, white-tailed kite, saltmarsh common yellowthroat, Bryant's savannah sparrow, San Pablo song sparrow, salt marsh harvest mouse, San Pablo vole, Suisun marsh aster, soft salty bird's beak, and Johnny-nip.

OBSCURE BUMBLE BEE (BOMBUS CALIGINOSUS)

This bumble bee inhabits open grassy coastal prairies and Coast Range meadows on the Pacific coast of North America from southern British Columbia to southern California. The obscure bumble bee nests underground in old rodent nests, as well as above ground in abandoned bird nests, clumps of grass, and natural cavities (Hatfield et al., 2014).

WESTERN BUMBLE BEE (BOMBUS OCCIDENTALIS)

This species historically was widely distributed in western North America, inhabiting open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. The western bumble bee typically nests underground in old animal nests, and occasionally above ground in cavities.

CENTRAL CALIFORNIA COAST (CCC) STEELHEAD (ONCORHYNCHUS MYKISS)

Steelhead possess the ability to spawn repeatedly, maintaining the mechanisms to return to the Pacific Ocean after spawning in freshwater. Juvenile steelhead may spend up to four years residing in freshwater prior to migrating to the ocean as smolts. CCC steelhead migrate through San Pablo Bay waters in transit between freshwater spawning areas and the Pacific Ocean.

LONGFIN SMELT (SPIRINCHUS THALEICHTHYS)

The Longfin smelt is a small schooling fish that inhabits the freshwater section of the lower Delta and has been observed from south San Francisco Bay to the Delta, with the bulk of the San Francisco Bay population occupying the region between the Carquinez Straight and the Delta. In the fall, adults from San Francisco and San Pablo Bays migrate to upstream into the lower reaches of rivers during the late fall and winter to spawn. Longfin smelt reside as juveniles and pre-spawning adults in the more saline habitats within San Pablo Bay and Central Bay during a majority of their life. Adults and juvenile smelt are found in the open water habitat within the estuary, mostly in the middle or at the bottom of the water column.

PACIFIC HERRING (CLUPEA PALLASII)

Pacific herring in California forage for phytoplankton and zooplankton in nutrient-rich waters associated with oceanic upwelling during the spring and summer months. Adult Pacific herring migrate into estuaries to breed once per year; in California, the largest spawning aggregations occur in the San Francisco Estuary and Tomales Bay in fall and winter, as early as October and as late as April. Pacific herring spawn along shorelines in calm intertidal and subtidal zones with reduced salinity. This species is known to spawn along the Oakland and San Francisco waterfronts and attach its egg masses to eelgrass, seaweed, and hard substrates such as pilings and rip-rap. After spawning, adult Pacific herring return to the ocean, while young herring school in shallow, protected areas and then move to deeper water.

CALIFORNIA BLACK RAIL (LATERALLUS JAMAICENSIS COTURNICULUS)

This species lives in coastal salt and brackish marshes. Year-round residents, these species stay mainly in the upper to lower zones of coastal marshes that are dominated by pickleweed. Threats to this species include loss and degradation of salt marsh habitat, encroachment of human activities, genetic isolation due to habitat fragmentation, and depredation by coyotes, raptors, raccoons, and feral cats.

CALIFORNIA RIDGWAY'S RAIL (RALLUS OBSOLETUS OBSOLETUS)

CRR is a secretive, hen-like waterbird, and is currently restricted to the San Francisco Estuary and Tomales Bay. CRR typically only occur within tidal salt and brackish marshes with daily tidal flows, well-developed networks of

channels for foraging and cover, and adequate cover from predators for nesting and during extreme high tides.

NORTHERN HARRIER (CIRCUS HUDSONIUS)

Northern harrier nest and forage along in open areas including wet meadows, slough, savanna, prairie, and marshes, feeding on small wildlife, including small mammals, reptiles, and birds. Destruction of marsh habitat is the primary reason for the decline of this species. Northern harriers nest on the ground in clumps of dense vegetation, often in moist habitat.

WHITE-TAILED KITE (ELANUS LEUCURUS)

White-tailed kites are typically found in open areas, including grassland, savanna, river valleys, and marshes. Scattered trees are needed for nesting and perching. This species primarily hunts for small mammals. Breeding activity starts in January and nests are usually built atop of a tree or shrub, 20 to 50 feet off the ground.

SALTMARSH COMMON YELLOWTHROAT (GEOTHLYPIS TRICHAS SINUOSA)

The saltmarsh common yellowthroat inhabits tidal salt and brackish marshes year-round. Nests are placed on or near the ground in complex, dense stands of vegetation during spring to early summer.

BRYANT'S SAVANNAH SPARROW (PASSERCULUS SANDWICHENSIS ALAUDINUS)

The bryant's savannah sparrow is found in tidal marshes and adjacent grasslands and ruderal areas. They forage primarily on the ground and low vegetation for invertebrates during the breeding season and vegetable matter during the non-breeding season. This sparrow nests on or near the ground under dense grass tufts or matted weeds.

SAN PABLO SONG SPARROW (MELOSPIZA MELODIA SAMUELIS)

This particular subspecies is endemic to the marshes fringing San Pablo Bay, and forages for invertebrates and plant matter on the ground, exposed mud, and vegetation. San Pablo song sparrows nest in tall emergent vegetation including alkali bulrush, marsh gumplant, and pickleweed.

PACIFIC HARBOR SEAL (PHOCA VITULINA RICHARDSII)

The Pacific harbor seal is found in coastal waters throughout the San Francisco Estuary, and when not swimming or foraging underwater for fish, shellfish, and crustaceans, harbor seals will haul out on rocks or land next to water to rest. This species frequents relatively shallow water, staying close to shorelines.

CALIFORNIA SEA LION (ZALOPHUS CALIFORNIANUS)

This species is found in coastal waters foraging in upwelling areas for fish and squid, and within the San Francisco Estuary predominately along the San Francisco shoreline. However, sea lions are known to forage throughout San Francisco and San Pablo Bay and into Suisun Bay. California sea lions will haul out on rocks, docks, beaches, and buoys to rest.

SALT MARSH HARVEST MOUSE (REITHRODONTOMYS RAVIVENTRIS)

The salt marsh harvest mouse is endemic to the marshes which border San Francisco, San Pablo, and Suisun Bays. The primary habitat of the SMHM is the middle to upper zone of salt and brackish marshes. However, salt marsh harvest mice frequently utilize terrestrial grassland habitats adjacent to tidal marsh and grass-pickleweed ecotones. The SMHM is dependent on dense vegetation cover, usually in the form of pickleweed or other dense vegetation. Flooding is a significant factor in SMHM mortality, as flooding exposes salt marsh harvest mice to predators, and increases the risk of mortality due to exposure or drowning. Mice move locally from flooded tidal marsh to emergent high ground or vegetation.

SAN PABLO VOLE (MICROTUS CALIFORNICUS SANPABLOENSIS)

The San Pablo vole is found in salt marsh and adjacent grassy habitats in the vicinity of San Pablo Creek. This subspecies builds a network of runways in dense vegetation and feeds on grasses, sedges, and herbs.

SUISUN MARSH ASTER (SYMPHYOTRICHUM LENTUM)

A California endemic, this species is an herbaceous annual plant in the Asteraceae (Compositae) family that can bloom May through November. This species is found primarily in brackish and freshwater marshes, and also in the upper elevations of rip-rap, primarily around Suisun Bay and the Bay-Delta. Soft salty bird's beak (Chloropyron molle ssp. molle)

It is an erect annual herb in the Orobanchaceae broomrape) family which blooms from July through November. Soft salty bird's beak is a hemiparasite, meaning it is a parasitic plant with chlorophyll capable of some photosynthesis. Soft salty bird's beak grows in the coastal tidal marshes and brackish marshes from San Pablo Bay to Suisun Bay in Napa, Solano, and Contra Costa counties. The principal habitat of soft salty bird's-beak is the high marsh zone or upper middle marsh zone of brackish marshes with full tidal range, and is rarely found in non-tidal conditions. Large, dense patches are sometimes found along the margins of emergent salt pannes, or scalds.

JOHNNY-NIP (CASTILLEJA AMBIGUA VAR. AMBIGUA)

This species is a hemiparasitic annual herb in the Orobanchaceae (broomrape) family which blooms from March through August. Johnny-nip is typically found in high tidal marsh and adjacent upland ecotones with relatively low, sparse vegetation cover.

GEOTECHNICAL CONSIDERATIONS

Many sea-level rise adaptation strategies are based around large earthwork elements to reshape the shoreline landscape. These can include placement of and shaping earth fill to construct new shoreline levees, excavation to create new channels, and grading to great other desired drainage conditions, habitat features, and recreational landscapes.

The costs and feasibility of large earthwork projects along the bay shore can be strongly influenced by the underlying soil conditions and their geotechnical properties. The shoreline setting results in the potential to encounter challenging geotechnical conditions, including soft surface materials and subsoils, soils will low cohesive and/or shear strength, and a mix of subsurface permeability conditions, from low permeability such as silts and clays, to high permeability such as sands and gravels.

GEOLOGICAL SETTING

Geologic conditions within the study area generally consist of artificial fill over quaternary marine and marsh deposits (commonly referred to as "Bay Mud"). Some legacy (unfilled) marshes exist, for example at Wildcat Marsh and at the mouth of San Palbo Creek. No known active faults cross the project area. The Hayward Fault is located approximately 2 miles to the east.

WORK NEAR INFRASTRUCTURE

Bay mud is highly deformable, which introduces challenges when designing earthwork projects near existing infrastructure. The study area includes a variety of utility infrastructure, including electrical transmission lines, natural gas pipelines, potable water and sanitary sewer pipes, and roadways.

Both underground and aboveground utilities are often sensitive to earthwork performed above or near the buried infrastructure. Geotechnical concerns include risk of damage to the infrastructure due to soil deformation, for example soil displacement or differential settlement

Future design phases should include geotechnical analysis to evaluate potential impacts to existing infrastructure and to develop appropriate design measures to protect existing facilities.

SLOPE STABILITY

Fill slopes will likely need to be 3:1 (horiz:vert) or gentler for geotechnical stability. Gentler slopes and/or broad stability berms along the toes of the new fill slopes may be required depending on local site conditions. Site-specific geotechnical analysis is required to verify allowable slopes.

SETTLEMENT | CONSOLIDATION + SUBSIDENCE

New fill placed to construct levees, berms and other graded areas places additional weight on the underlying soft bay mud. The subsequent consolidation and subsidence of the bay mud results in settlement, a gradual sinking of the ground surface under this added weight. The amount of settlement depends on the weight of the new fill, the thickness of the underlying bay mud, and other factors. Typical amounts of elevation loss due to settlement vary from 16% to 50% of the thickness of the new fill thickness. Typically approximately half of this settlement would be expected within ~8 years of initial fill placement, with the remaining settlement occurring within 40 years of initial fill placement.

PHASED FILL PLACEMENT

New levee construction can sometimes require placing new fill in phases in order to allow the soft subsoils to slowly adjust to the added weight of the new material. In areas with a history of pre-loading (e.g. historic fill placement, or installation of perimeter berms or dikes), potential fill heights up to 7 feet thick might be allowable in a single phase. In areas without a history of pre-loading, potential fill heights might be limited to 3 to 5 feet per phase.

Site-specific geotechnical analysis is required to verify allowable fill heights.

SPECIFICATIONS FOR FILL MATERIALS

Shoreline levee projects will likely need to import fill material from off site sources. Imported fill should be evaluated by geotechnical engineers to confirm suitability for the proposed levee design. FEMA, CA DWR, and the US Army Corps of Engineers publish guidelines for levee design and construction that include recommendations for fill materials.

The following is an example of potential levee fill specification:

30% passing No. 200 sieve. 100% passing 2-inch sieve.

Plasticity Index: Between 8 and 40

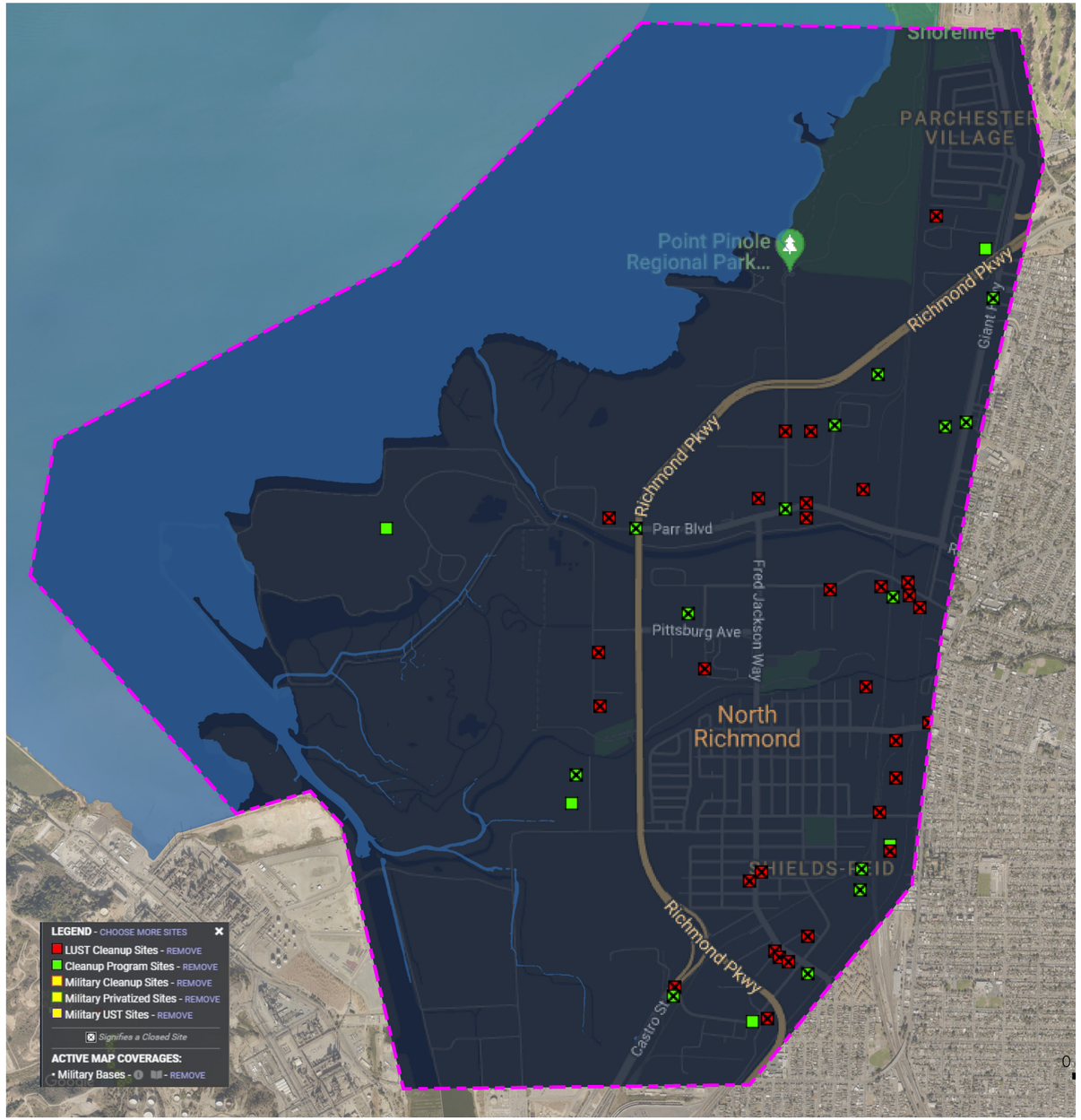
Liquid Limit: Less than 45

Must not contain excessive organic material

Site-specific geotechnical analysis is required to verify allowable levee material.

SOURCING OF FILL MATERIALS

One major challenge for shoreline levee projects will be identifying sources of imported fill material. Potential sources include dredged materials from creek channel maintenance, navigational bay dredging, and major upland earthwork projects. Given the large volume of fill material required to construct a complete shoreline levee system, it may be necessary to establish temporary stockpiles and to import and stage materials from several sources over several years prior to construction.



CONTAMINANTS

The project team has not conducted a detailed study to evaluate the presence or potential presence of chemical contaminants in the soils, groundwater and surface water within the study area. The North Richmond Shoreline includes a history of land uses associated with an elevated potential for unregulated and/or accidental discharges of chemical contaminants. These include petroleum storage and refineries, and associated pipelines, heavy industry, wastewater treatment ponds, municipal and hazardous materials landfills, and maritime industry facilities.

- Geotracker, at left, tracks sites that have potential to impact state water quality.
- WCW testing and water treatment
- Republic testing and water treatment
- Chevron
- Dr. Christina Hill
- SFEI REPORT: Shallow Groundwater Response to Sea-Level Rise (May CL, Mohan A, Plane E, Ramirez-Lopez D, Mak M, Luchinsky L, Hale T, Hill K. 2022. Shallow Groundwater Response to Sea-Level Rise: Alameda, Marin, San Francisco, and San Mateo Counties. Prepared by Pathways Climate Institute and San Francisco Estuary Institute. doi.org/10.13140/ RG.2.2.16973.72164)

BRITT | CONTAMINANT INFO

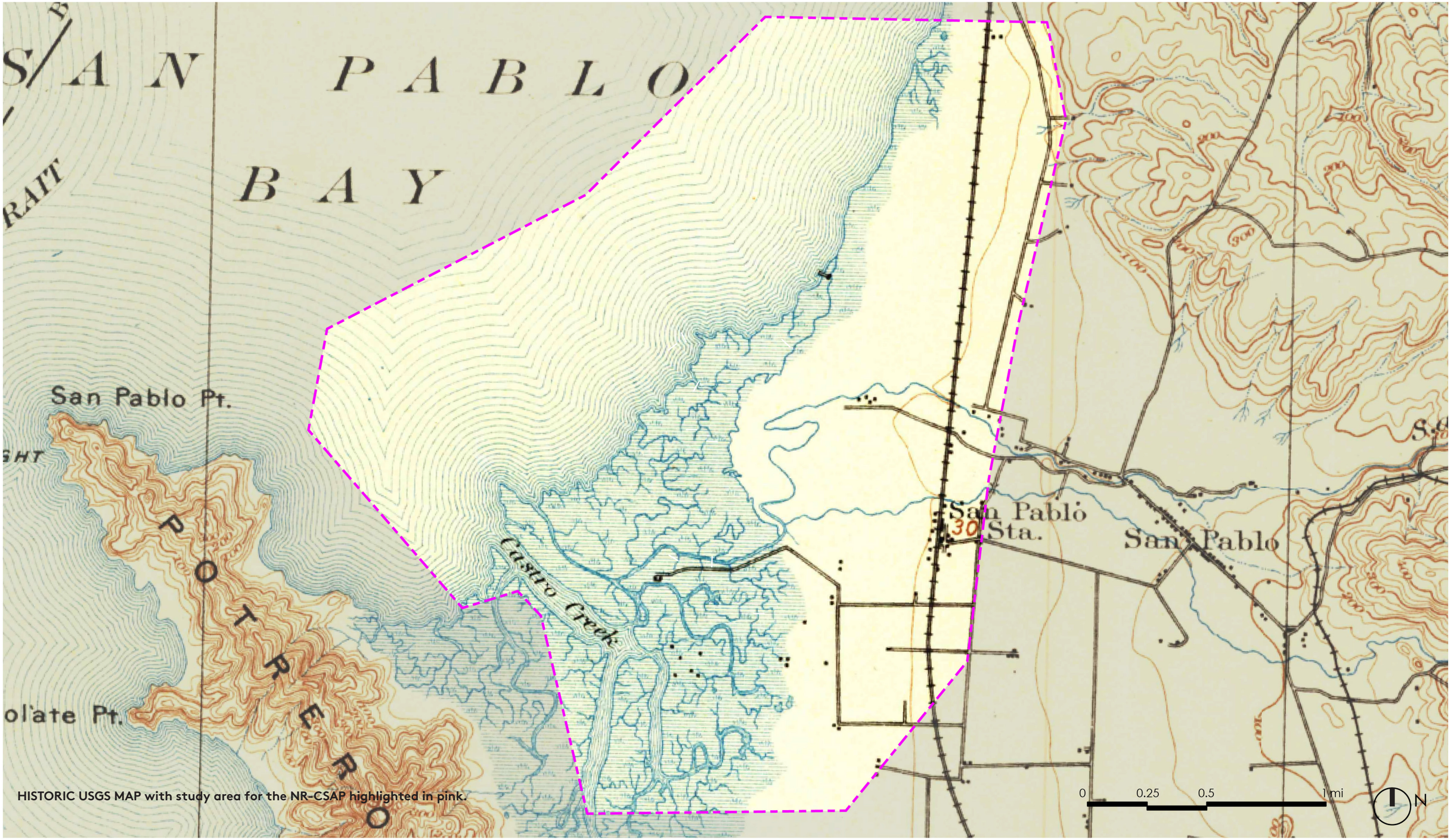
In 1998, three embryos of California Ridgeway Rail eggs from Wildcat Marsh exhibited polydactyly and reduced digits and limbs. A study done by Schwarzbach et al 2006 concluded these abnormalities were likely due to elevated levels of chromium and barium, with a potential that mercury may have also contributed.

The California WaterBoards geotracker website indicates that there are two closed Leaking Underground Storage Tank (LUST) cleanup sites (Color Spot Inc and NUSBAUM) and one active cleanup program site (West Contra Costa Landfill) with close proximity to the project area. Without further analysis, it cannot be ruled out that these sites may contribute some contamination to the project area.

CHANGING RISK OF EXPOSURE DUE CLIMATE CHANGE

The effects of climate change, including sea-level rise, groundwater rise, and changes in precipitation, have the potential to alter surface water and groundwater flow paths. If these waters contain contaminants or contact contaminated soils, then these changes in flow could lead to the mobilization of contaminants into new areas, increasing the risk of exposure of the public, and wildlife.

HISTORIC MAP | USGS 1895



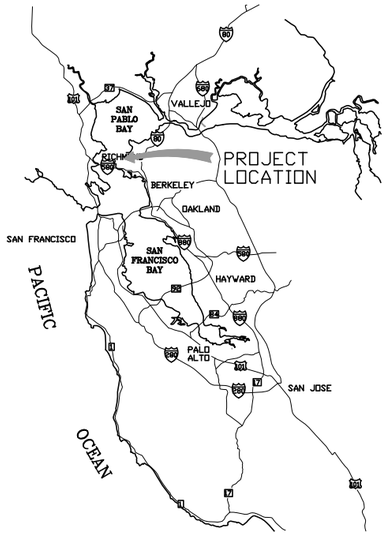
HISTORIC USGS MAP with study area for the NR-CSAP highlighted in pink.

NORTH RICHMOND LIVING LEVEE PROJECT

30% DESIGN DRAWINGS

RICHMOND, CALIFORNIA
WEST COUNTY WASTEWATER

JULY 2023



REGIONAL MAP

NTS

PROJECT TEAM
OWNER: WEST COUNTY WASTE WATER DISTRICT
CONTACT:
PHONE:
EMAIL:

CIVIL ENGINEERING CONSULTANT:
ENVIRONMENTAL SCIENCE ASSOCIATES
CONTACT: EDWARD DIVITA
PHONE:
EMAIL: EDIVITA@ESASSOC.COM

LANDSCAPE ARCHITECTURAL CONSULTANT:
MITHUN
CONTACT: TIMOTHY MOLETTE-PARKS
PHONE:
EMAIL:

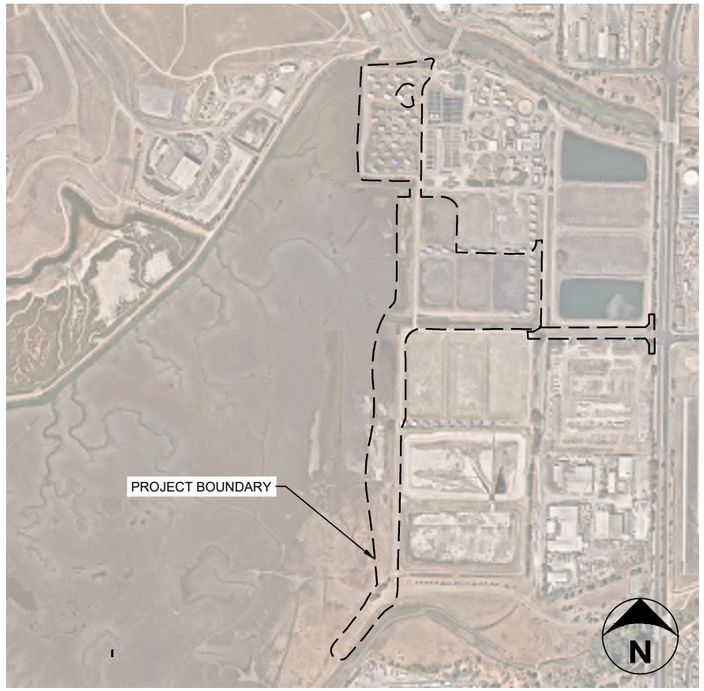
SCOPE OF WORK
NORTH RICHMOND LIVING LEVEE PROJECT: CONSTRUCT NEW COASTAL FLOOD PROTECTION LEVEE. CONSTRUCT NEW PUBLIC TRAIL, INCLUDING GRADING, SURFACING, AND INSTALLATION OF ELEVATED TRAIL STRUCTURES. EARTHWORK TO CREATE TIDAL MARSH AND ADJACENT UPLAND HABITATS ON BAY-SIDE LEVEE SLOPE AND TO CREATE STORMWATER RETENTION POND AND ADJACENT HABITATS ON LAND-SIDE OF LEVEE. NATIVE PLANT INSTALLATION AND ESTABLISHMENT MAINTENANCE.

30% DESIGN PACKAGE
THE 30% DESIGN DRAWINGS HAVE BEEN PREPARED BY ESA AND MITHUN AS PAR OF THE FINAL DELIVERABLE PACKAGE FOR THE 30% DESIGN PHASES OF THE NORTH RICHMOND LIVING LEVEE PROJECT.

- THE 30% DESIGN PHASE ALSO INCLUDES:
- NORTH RICHMOND COLLABORATIVE SHORELINE PLAN
- 30% BASIS OF DESIGN REPORT
- BIOLOGICAL ASSESSMENT REPORT
- 30% QUANTITIES AND PROBABLE CONSTRUCTION COST
- INITIAL GEOTECHNICAL REVIEW AND RECOMMENDATIONS MEMORANDUM
- INITIAL CIVIL/STRUCTURAL REVIEW AND RECOMMENDATIONS MEMORANDUM

VICINITY MAP

NTS



LOCATION MAP

NTS

SHEET LIST

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SAN FRANCISCO / 585 Howard Street, #300
California, CA 94105 / 415.956.0688
LOS ANGELES / 5837 Adams Blvd
Culver City, CA 90232 / 323.937.2150
mithun.com

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SUITE 3700
SAN FRANCISCO, CA 94105
OFFICE - 415.896.5900
WWW.ESASSOC.COM

STAMP
30% DESIGN
(INTERNAL DRAFT)
-
NOT FOR CONSTRUCTION

PROJECT NAME
NORTH RICHMOND LIVING LEVEE DEMONSTRATION PROJECT
2377 GARDEN TRACT ROAD
RICHMOND, CA 94801

REVISIONS

#	DATE	DESCRIPTION

DESIGNED	ELD
DRAWN	LCT, SM
CHECKED	ELD
IN CHARGE	ELD C 81281
PROJECT NUMBER	D202000458
ISSUE DATE	JULY 21, 2023

SCALE IS AS SHOWN WHEN PLOTTED TO FULL SIZE (22"x34")

PHASE
DRAFT 30%
PRELIMINARY DESIGN

SHEET TITLE
TITLESHEET

SHEET NUMBER
G-1.1

SHEET 1 OF 47

GENERAL NOTES

GENERAL

1. THESE NOTES HIGHLIGHT SOME OF THE KEY REQUIREMENTS FROM THE SPECIFICATIONS AND PROVIDE ADDITIONAL PROJECT INFORMATION. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS CONTAINED IN THE PLANS, SPECIFICATIONS, PERMITS, AND OTHER CONTRACT DOCUMENTS.

PROTECTION OF FACILITIES

2. THE LOCATION OF EXISTING UTILITIES KNOWN TO THE OWNER ARE SHOWN IN THEIR APPROXIMATE LOCATION BASED ON INFORMATION AVAILABLE AT THE TIME THE DRAWINGS WERE PREPARED. THE ACTUAL LOCATION, SIZE, TYPE, AND NUMBER OF UTILITIES MAY DIFFER FROM THAT SHOWN, AND UTILITIES OR UNDERGROUND FACILITIES MAY BE PRESENT THAT ARE NOT SHOWN.
3. PROTECT ALL EXISTING UTILITIES WHETHER SHOWN OR NOT SHOWN ON THE DRAWINGS.
4. THE CONTRACTOR SHALL EXPOSE ALL UNDERGROUND FACILITIES THAT ARE TO BE CONNECTED TO OR THAT ARE IN THE PATH OF THE PROPOSED IMPROVEMENTS PRIOR TO THE COMMENCEMENT OF WORK IN THE VICINITY OF EACH UNDERGROUND UTILITY. CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY UPON DISCOVERY OF DISCREPANCIES BETWEEN EXISTING CONDITIONS IN THE FIELD AND INFORMATION SHOWN ON THESE PLANS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNER OF ANY DIFFERENCES IN LOCATIONS OF EXISTING UTILITIES SHOWN, OR ANY CONFLICTS WITH THE DESIGN THAT BECOME APPARENT DURING CONSTRUCTION, BEFORE CONTINUING WORK IN THAT AREA.
5. IF ANY DAMAGE TO EXISTING UTILITIES OCCURS, THE CONTRACTOR SHALL NOTIFY THE OWNER AND SHALL THE REPAIR THE DAMAGE AS DIRECTED BY THE OWNER AT NO ADDITIONAL COMPENSATION.
6. THE SITE INCLUDES OVERHEAD POWER LINES. EXERCISE CAUTION WHEN WORKING AROUND EXISTING ELECTRICAL LINES. COMPLY WITH ALL SAFETY REGULATIONS AND REQUIREMENTS.
7. THE CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT (800-227-2600) FOR BURIED UTILITY INFORMATION AT LEAST 48 HOURS IN ADVANCE OF

BEGINNING WORK

8. [placeholder for note related to temporary stormwater management].
9. IF NECESSARY, THE CONTRACTOR SHALL PROVIDE FOR TEMPORARY BYPASS SERVICES IN ORDER TO MAINTAIN THE FACILITY'S OPERATIONS, AT NO ADDITIONAL COST TO THE OWNER. THE OWNER'S REPRESENTATIVE SHALL COORDINATE ALL UTILITY INTERRUPTIONS DURING ALL PHASES OF CONSTRUCTION. CONTRACTOR SHALL COORDINATE ALL 'DOWN TIME' WITH THE OWNER.

SITE ACCESS

10. CONSTRUCTION ACCESS SHALL BE FROM GARDEN TRACT ROAD NEAR PITTSBURGH AVENUE.
11. [XXX 90% DESIGN: INSERT NOTE ABOUT RWQCP ACCESS POINT OF CONTACT]
12. [SECURE SITE]
13. [PUBLIC ACCESS]
14. [XXX 90% DESIGN: INSERT NOTE ABOUT CONTRACTOR COORDINATION WITH OTHER ONGOING WORK AT WCW PLANT]

TOPOGRAPHIC DATA

15. ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88). HORIZONTAL CONTROL IS CALIFORNIA STATE PLANE COORDINATE SYSTEM, ZONE 3, NORTH AMERICAN DATUM 1983 (NAD83, 2011), U.S. SURVEY FEET.
16. ALL ELEVATIONS AND HORIZONTAL COORDINATES ARE IN FEET. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
17. THE AERIAL PHOTO IS BASED ON [add citation].
18. EXISTING TOPOGRAPHY IS NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION 2018 LIDAR. SUPPLEMENTAL TOPOGRAPHIC DATA PROVIDED BY ESA (MAY 2023).
19. ELEVATIONS ARE APPROXIMATE AND PROVIDED FOR GENERAL REFERENCE ONLY. THE ACCURACY OF THE ELEVATION CONTOURS IS LIMITED BY DISTORTION DUE TO EXISTING VEGETATION AND WATER SURFACES AT THE TIME OF THE SURVEY.
20. EXISTING GRADES MAY HAVE CHANGED SINCE TIME OF SURVEY, FOR EXAMPLE DUE TO SUBSIDENCE AND CONSOLIDATION, AND DUE TO TREATMENT PLANT OPERATIONS.
21. THE CONTRACTOR SHALL PERFORM PRE-CONSTRUCTION SURVEYS, SITE INVESTIGATIONS, ESTIMATE QUANTITIES AND INCLUDE SUFFICIENT CONTINGENCY IN ITS BID TO COVER TOPOGRAPHIC AND BATHYMETRIC VARIABILITY.

ENVIRONMENTAL PROTECTION

REGULATORY PERMITS:

22. THE OWNER HAS OBTAINED PERMITS FROM RESOURCE AGENCIES FOR THIS PROJECT. COMPLY WITH ALL PERMIT REQUIREMENTS FOR THE PROTECTION OF WATER QUALITY, WILDLIFE AND VEGETATION.
23. CONTRACTOR SHALL OBTAIN ALL OTHER PERMITS NOT PROVIDED BY OWNER.
24. COMPLY WITH ALL SCHEDULE RESTRICTIONS INCLUDED IN PROJECT PERMITS, INCLUDING REQUIREMENTS FOR THE PROTECTION OF NESTING BIRDS, PROTECTED FISH, AND OTHER WILDLIFE. SEE SHEET [GXX] AND SPECIFICATIONS SECTION [XXX] ENVIRONMENTAL PROTECTION AND PROJECT PERMITS FOR COMPLETE REQUIREMENTS.
25. CONTRACTOR SHALL PREPARE AND IMPLEMENT A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY THE STATE WATER RESOURCES CONTROL BOARD. INCORPORATE SEDIMENT CONTROL AND EROSION CONTROL MEASURES TO PREVENT EROSION, SEDIMENT, AND HAZARDOUS MATERIALS RUNOFF FROM THE CONSTRUCTION SITE. SEE SHEET [XXX] AND SPECIFICATIONS SECTION [XXX] FOR COMPLETE REQUIREMENTS.
26. ELIMINATE OR MINIMIZE NON-STORM DISCHARGE FROM THE CONSTRUCTION SITE TO THE BAY AND ALL OTHER WATER BODIES, INCLUDING GROUNDWATER.
27. STORE AND USE ALL MATERIALS THAT COULD CAUSE WATER POLLUTION (I.E. MOTOR OIL, FUELS, PAINTS, ETC.) IN A CONTAINED AREA THAT WILL NOT CAUSE ANY POLLUTION. REMOVE ALL DISCARDED MATERIAL AND ANY ACCIDENTAL SPILLS AND DISPOSE AT AN APPROVED DISPOSAL SITE.
28. CONSTRUCTION EQUIPMENT SHALL BE STORED, REFUELED, AND MAINTAINED IN DESIGNATED STAGING AREAS.
29. DUST FROM GRADING OPERATIONS SHALL BE CONTROLLED. AT MINIMUM, WATER ACTIVE WORK AREAS TO PREVENT VISIBLE DUST FROM LEAVING THE SITE.

EARTHWORK AND WATER MANAGEMENT

30. THE PROJECT INVOLVES EXCAVATION, TRANSPORT, AND PLACEMENT OF MATERIAL BELOW GROUNDWATER LEVELS AND/OR WITHIN TIDAL WATERS. ACCESS WITH CONVENTIONAL EQUIPMENT INCLUDING WHEELED SCRAPERS MAY BE DIFFICULT OR IMPOSSIBLE, PARTICULARLY IN AREAS EXCAVATED BELOW EXISTING GROUND SURFACE. PORTIONS OF THE WORK MAY REQUIRE USE OF LOW GROUND PRESSURE EQUIPMENT AND/OR USE OF CRANE MATS.
31. THE CONTRACTOR SHALL DEVELOP EARTHWORK PLANS AND UTILIZE EQUIPMENT APPROPRIATE FOR SOFT, DIFFICULT CONDITIONS.
32. CONTRACTOR IS RESPONSIBLE FOR ESTIMATING ALL EARTHWORK QUANTITIES. APPROXIMATE EARTHWORK QUANTITIES ARE PROVIDED FOR CONTRACTOR'S REFERENCE ONLY. [XXX 90% DESIGN: MATERIAL QUANTITIES TABLE WILL BE ADDED TO EARTHWORK SHEET. XXX]
33. THE CONTRACTOR IS RESPONSIBLE FOR ALL WATER MANAGEMENT THROUGHOUT CONSTRUCTION, INCLUDING ISOLATING WORK FROM TIDAL WATERS. DEWATER AS REQUIRED FOR LEVEE KEYWAY CONSTRUCTION AND OTHERWISE AS NECESSARY TO SAFELY AND EFFICIENTLY PERFORM AND CONTROL THE WORK

MATERIALS

34. THE PROJECT REQUIRES THE FOLLOWING IMPORTED FILL MATERIALS:
    a. LEVEE FILL MATERIAL: MATERIAL MEETING THE REQUIREMENTS DEFINED IN SECTION [XXXX] OF THE SPECIFICATIONS.
    b. MISC. FILL MATERIAL: MATERIAL MEETING THE REQUIREMENTS DEFINED IN SECTION [XXXX] OF THE SPECIFICATIONS.
    c. TRAIL BASE MATERIAL: MATERIAL MEETING THE REQUIREMENTS FOR CALTRANS ¾-INCH MAXIMUM CLASS 2 AGGREGATE BASE
    d. ROCK SLOPE PROTECTION: MATERIAL MEETING THE REQUIREMENTS THE REQUIREMENTS FOR CALTRANS CLASS III ROCK SLOPE PROTECTION

ABBREVIATIONS

@	AT	N	NEW
AC	ASPHALT CONCRETE	NAVD	NORTH AMERICAN VERTICAL DATUM
APPROX	APPROXIMATE	N.T.S.	NOT TO SCALE
BLVD	BOULEVARD	OC	ON CENTER
CBA	COPPER AZOLE	PED	PEDESTRIAN
CMP	CORRUGATED METAL PIPE	PG&E	PACIFIC GAS AND ELECTRIC
COORD.	COORDINATED	P.I.P.	PRESERVE IN PLACE
CY	CUBIC YARDS	PTDF	PRESSURE TREATED DOUGLAS FIR
DEMO	DEMOLITION	SLR	SEA LEVEL RISE
DIA	DIAMETER	SPEC	SPEICIFCATION
E	EXISTING	STA	STATION
EL.	ELEVATION	TBD	TO BE DETERMINED
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY	TYP	TYPICAL
HDR	HEADER	UON	UNLESS OTHERWISE NOTED
MHHW	MEAN HIGH HIGH WATER	W/	WITH
MHW	MEAN HIGH WATER	WCW	WEST COUNTY WASTEWATER
MIN	MINIMUM	YR	YEAR
MISC.	MISCELLANEOUS		
MSL	MEAN SEA LEVEL		

LEGEND

	EXISTING	PROPOSED
WORK LIMIT	N/A	
GRADING LIMIT	N/A	
PARCEL BOUNDARY		N/A
CENTERLINE ALIGNMENT		
CONSTRUCTION ACCESS	N/A	
EDGE OF PAVEMENT		
ENVIRONMENTAL PROTECTION FENCE	X	X
MATCH LINE	N/A	
MAJOR CONTOUR		5
MINOR CONTOUR		4
GRADE ELEVATION	X.X	
GROUND (SECTION/PROFILE)		
TYPE 1 LEVEE	N/A	
TYPE 2 LEVEE	N/A	
TYPE 3 LEVEE	N/A	
TIDAL CHANNELS	N/A	
TIDAL STORMWATER CHANNELS	N/A	
GAS LINE	G G	G G
POTABLE WATER LINE	W W	W W
SANITARY SEWER LINE	SS SS	SS SS
STORM DRAIN / CULVERT LINE	SD SD	
IRRIGATION LINE	IRR	IRR
UNDERGROUND GAS LINE - LIMITED FILL AREA PLACEMENT (100-FT BUFFER)	N/A	
STAGING AREA		
LEVEE CORE		
LIVING LEVEE IRRIGATION ZONE		
WETLAND		
WATER		
DEMOLITION AREA		
MISC. FILL MATERIAL		
LEVEE CORE FILL		
TRAIL		
RECREATION AREA		
UNDERGROUND GAS LINE - LIMITED CONSTRUCTION VEHICLE ACCESS AREA (20-FT BUFFER)		

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OFFICE - 415.896.5900
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STAMP

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-
NOT FOR
CONSTRUCTION

PROJECT NAME

NORTH RICHMOND LIVING LEVEE DEMONSTRATION PROJECT

2377 GARDEN TRACT ROAD
RICHMOND, CA 94801

REVISIONS

#	DATE	DESCRIPTION

DESIGNED	ELD
DRAWN	LCT, SM
CHECKED	ELD
IN CHARGE	ELD C 81281

PROJECT NUMBER D202000458

ISSUE DATE JULY 21, 2023

SCALE IS AS SHOWN WHEN PLOTTED TO FULL SIZE (22"x34")

PHASE

DRAFT 30%
PRELIMINARY DESIGN

SHEET TITLE

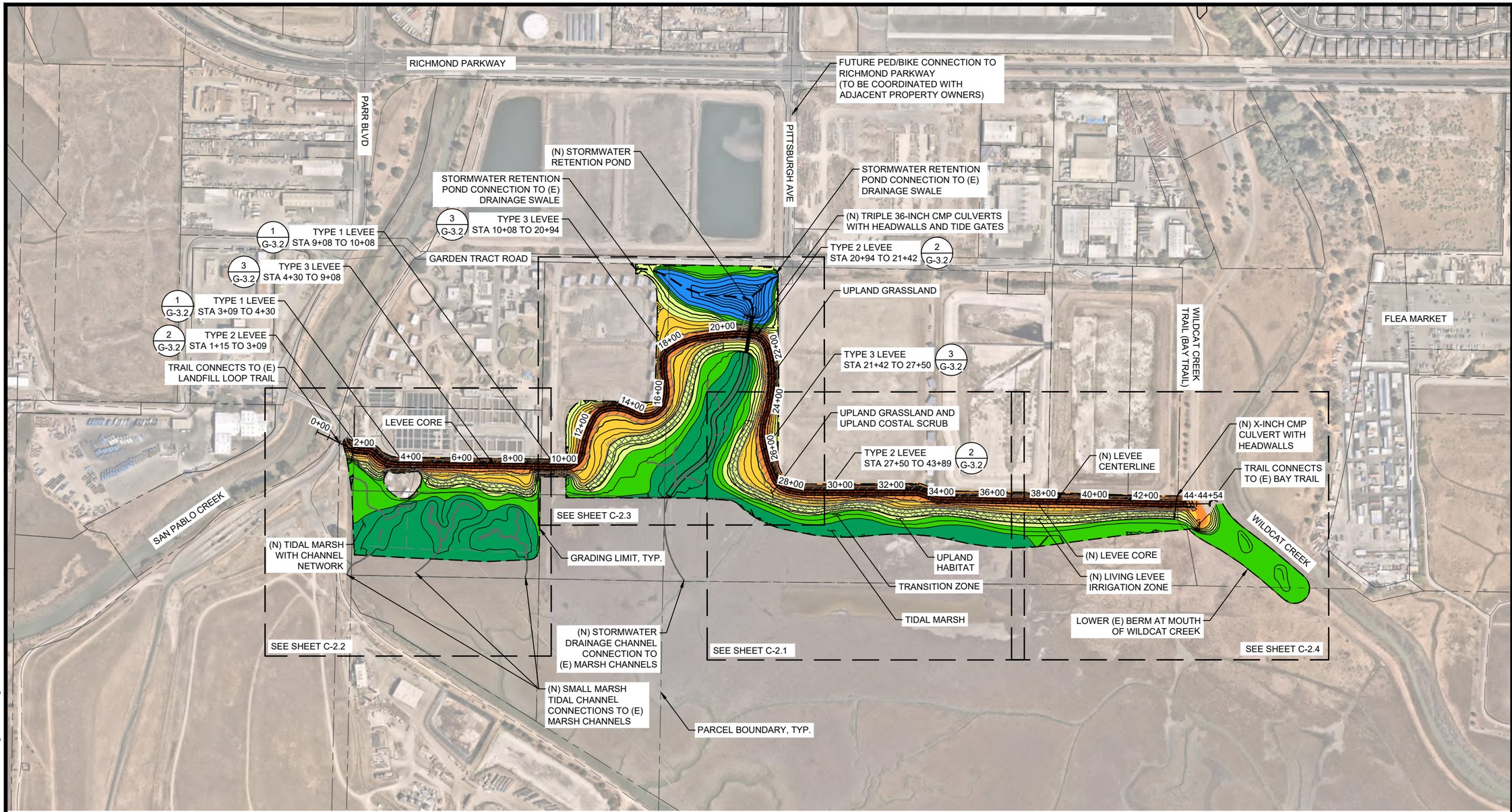
LEGEND, ABBREVIATION AND NOTES

SHEET NUMBER

G-1.2

SHEET 2 OF 47

FILE: P:\01 CAD\2020\xxxx\D202000458.00 - North Richmond Shoreline\DWG\G-02 LEGEND, ABBREVIATION AND NOTES.dwg PLOT DATE: 7/27/2023 1:22:32 PM PLOTTED BY: LINNEA TUCKER



LEGEND

COLOR	HABITAT TYPE
	FLOOD PROTECTION LEVEE CREST (EL 16)
	UPLAND GRASSLAND (VEGETATION MANAGEMENT ZONES, TRAIL, AND RECREATIONAL AREAS)
	UPLAND GRASSLAND AND UPLAND COSTAL SCRUB (EL 12 TO 16)
	UPLAND HABITAT (EL 9 TO 12) WITH POTENTIAL STORM WATER IRRIGATION
	TRANSITION ZONE (EL 7 TO 9)
	TIDAL MARSH (EL 5 TO 7)
	STORMWATER POND (EL 1 TO 7)

N

1"=200' SCALE 200 100 0 200 400 FEET

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PROJECT NAME

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RICHMOND, CA 94801

REVISIONS

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DESIGNED	ELD
DRAWN	LCT, SM
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IN CHARGE	ELD C 81281
PROJECT NUMBER	D202000458
ISSUE DATE	JULY 21, 2023

SCALE IS AS SHOWN WHEN PLOTTED TO FULL SIZE (22"x34")
1"

PHASE
DRAFT 30% PRELIMINARY DESIGN

SHEET TITLE

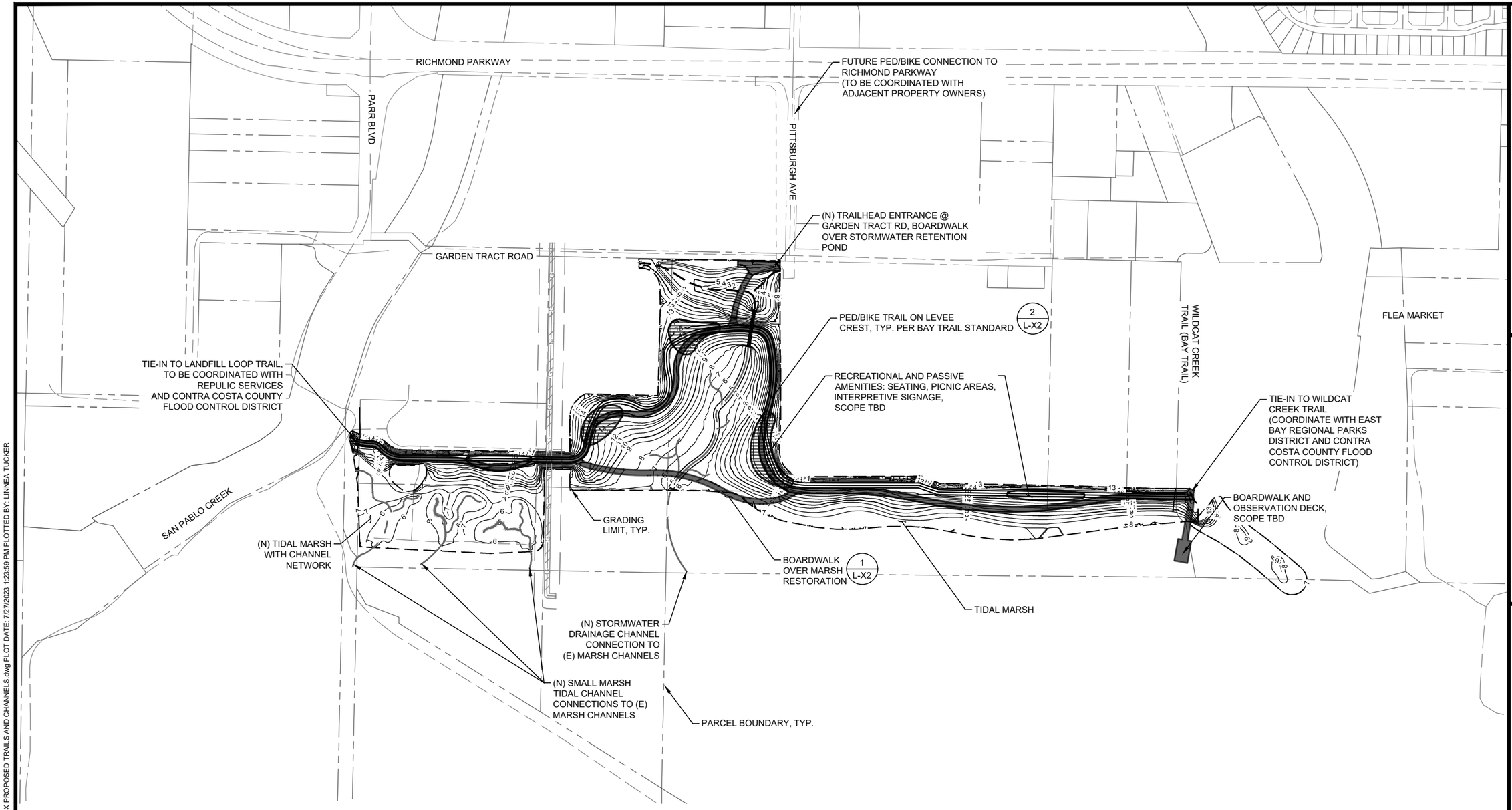
EARTHWORK OVERVIEW

SHEET NUMBER

G-2.1

SHEET 3 OF 47

FILE: P:\01 CAD\2020xxxx\D202000458.00 - North Richmond Shoreline\DWG\C-1.1 WCW Levee Grading Overview.dwg PLOT DATE: 7/27/2023 1:23:24 PM PLOTTED BY: LINNEA TUCKER



N

1"=200' SCALE 200 100 0 200 400 FEET

FILE: P:\01 CAD\2020xxxx\D2020000458.00 - North Richmond Shoreline\DWG\C-X PROPOSED TRAILS AND CHANNELS.dwg PLOT DATE: 7/27/2023 1:23:59 PM PLOTTED BY: LINNEA TUCKER

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PROJECT NAME

NORTH RICHMOND LIVING LEVEE DEMONSTRATION PROJECT

2377 GARDEN TRACT ROAD
RICHMOND, CA 94801

REVISIONS

#	DATE	DESCRIPTION

DESIGNED	ELD
DRAWN	LCT, SM
CHECKED	ELD
IN CHARGE	ELD C 81281
PROJECT NUMBER	D202000458
ISSUE DATE	JULY 21, 2023

SCALE IS AS SHOWN WHEN PLOTTED TO FULL SIZE (22"x34")

1"

PHASE

DRAFT 30% PRELIMINARY DESIGN

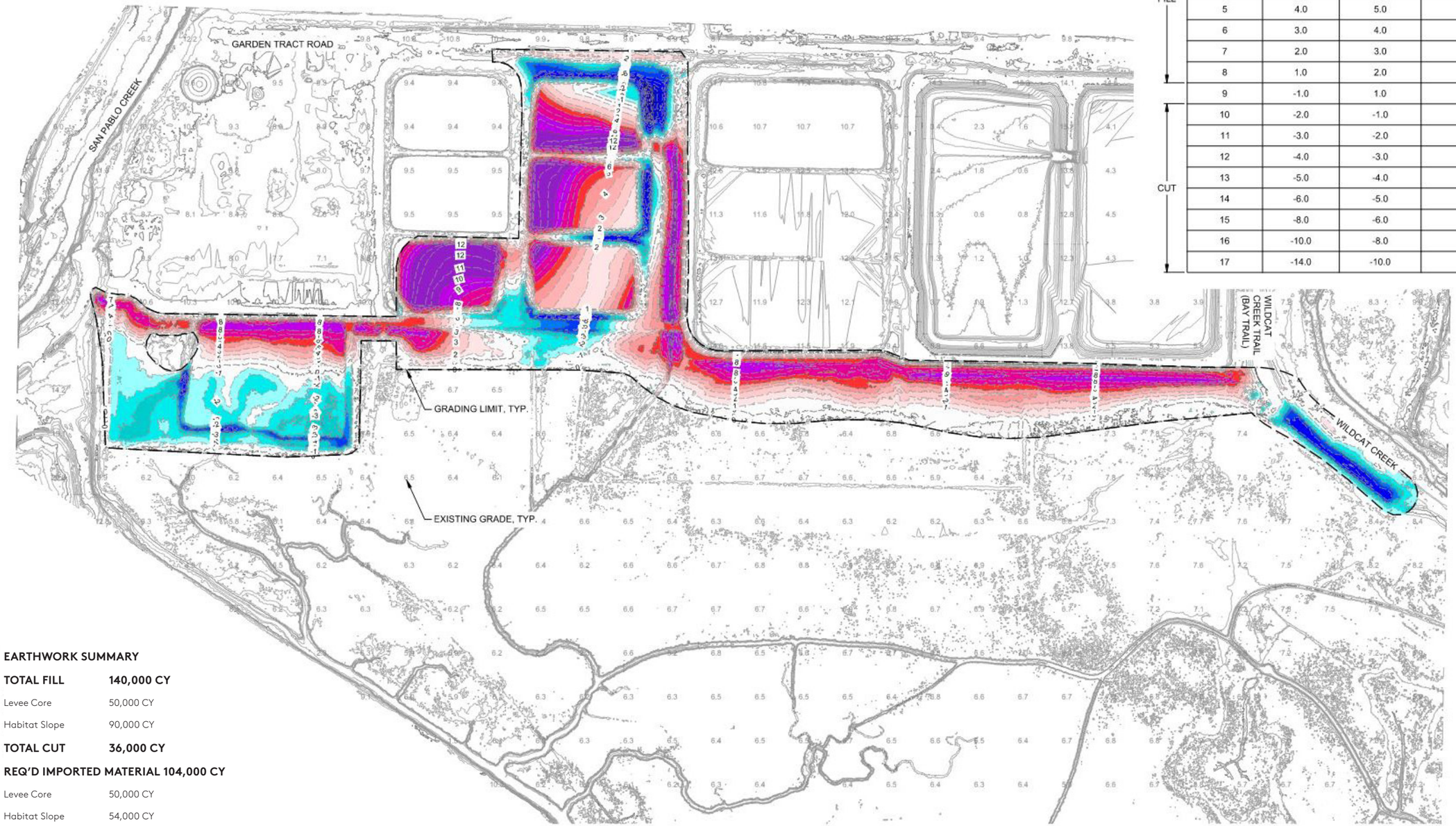
SHEET TITLE

PROPOSED TRAILS AND CHANNELS

SHEET NUMBER

G-2.2

SHEET G-2.2 OF 47



APPROXIMATE DEPTH OF CUT/ HEIGHT OF FILL (FEET RELATIVE TO EXISTING GRADE)

	NUMBER	MINIMUM	MAXIMUM	COLOR
FILL	1	10.0	14.0	
	2	8.0	10.0	
	3	6.0	8.0	
	4	5.0	6.0	
	5	4.0	5.0	
	6	3.0	4.0	
	7	2.0	3.0	
	8	1.0	2.0	
	9	-1.0	1.0	
CUT	10	-2.0	-1.0	
	11	-3.0	-2.0	
	12	-4.0	-3.0	
	13	-5.0	-4.0	
	14	-6.0	-5.0	
	15	-8.0	-6.0	
	16	-10.0	-8.0	
	17	-14.0	-10.0	

EARTHWORK SUMMARY

TOTAL FILL	**140,000 CY**
Levee Core	50,000 CY
Habitat Slope	90,000 CY
TOTAL CUT	**36,000 CY**
REQ'D IMPORTED MATERIAL	**104,000 CY**
Levee Core	50,000 CY
Habitat Slope	54,000 CY

N

1"=150' SCALE 150 75 0 150 300 FEET

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PROJECT NAME
NORTH RICHMOND LIVING LEVEE DEMONSTRATION PROJECT
2377 GARDEN TRACT ROAD RICHMOND, CA 94801

REVISIONS

#	DATE	DESCRIPTION

DESIGNED	ELD
DRAWN	LCT, SM
CHECKED	ELD
IN CHARGE	ELD C 81281
PROJECT NUMBER	D202000458
ISSUE DATE	JULY 21, 2023

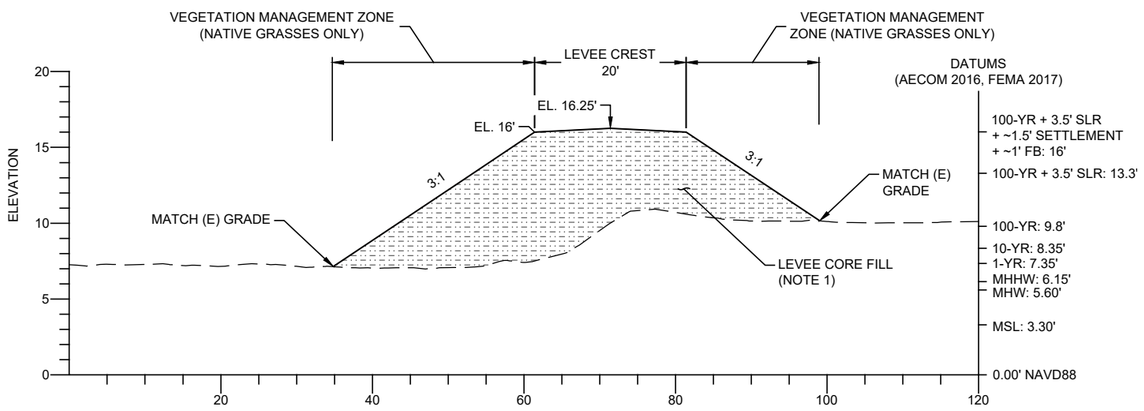
SCALE IS AS SHOWN WHEN PLOTTED TO FULL SIZE (22"x34")

PHASE
DRAFT 30% PRELIMINARY DESIGN

SHEET TITLE
CUT-FILL MAP

SHEET NUMBER
G-3.1

SHEET 5 OF 47

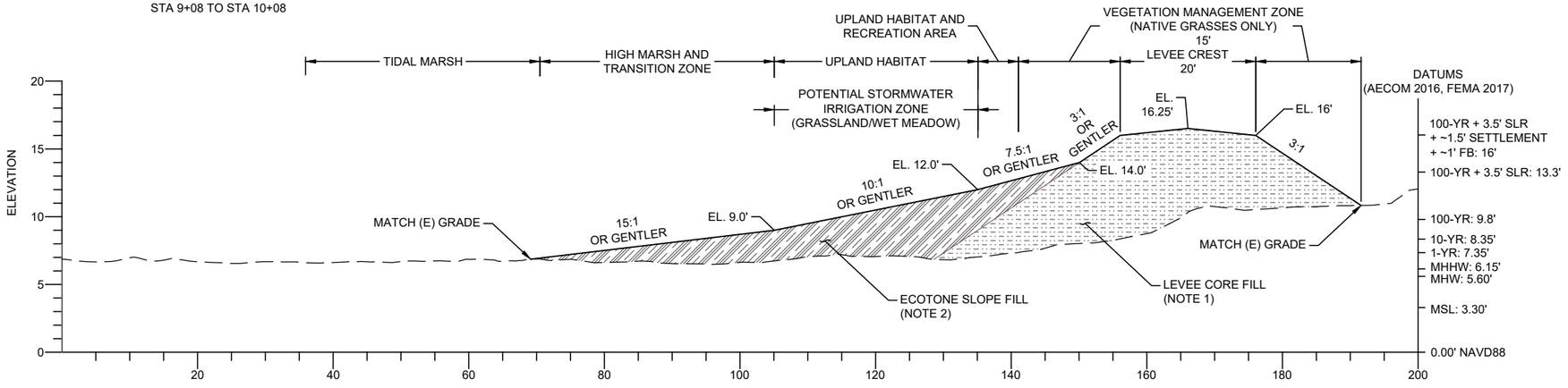


1 / -

TYPE 1 LEVEE (MINIMUM WIDTH)

TYPICAL CROSS SECTION
STA 3+09 TO STA 4+30
STA 9+08 TO STA 10+08

SCALE: 1" = 10'

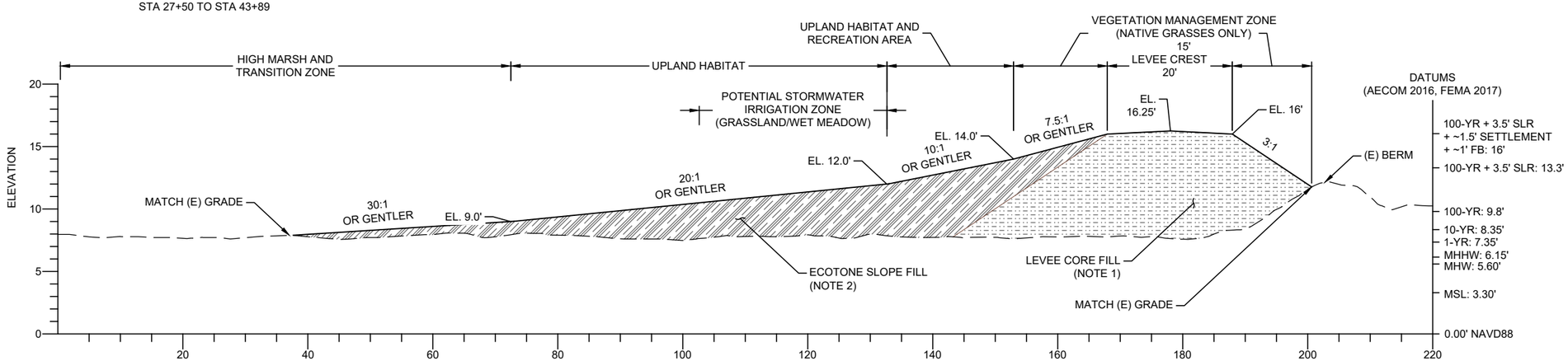


2 / -

TYPE 2 LEVEE (PARTIAL HABITAT SLOPE)

TYPICAL CROSS SECTION
STA 1+15 TO STA 3+09
STA 20+94 TO STA 21+42
STA 27+50 TO STA 43+89

SCALE: 1" = 10'



3 / -

TYPE 3 LEVEE (FULL HABITAT SLOPE)

TYPICAL CROSS SECTION
STA 4+30 TO STA 9+08
STA 10+08 TO STA 20+94
STA 21+42 TO STA 27+50

SCALE: 1" = 10'

NOTES

1. THE LEVEE CORE SHALL BE CONSTRUCTED USING LEVEE CORE MATERIAL, SEE SPECS.
2. THE ECOTONE SLOPE SHALL BE CONSTRUCTED USING MISC. FILL MATERIAL, SEE SPECS.

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PROJECT
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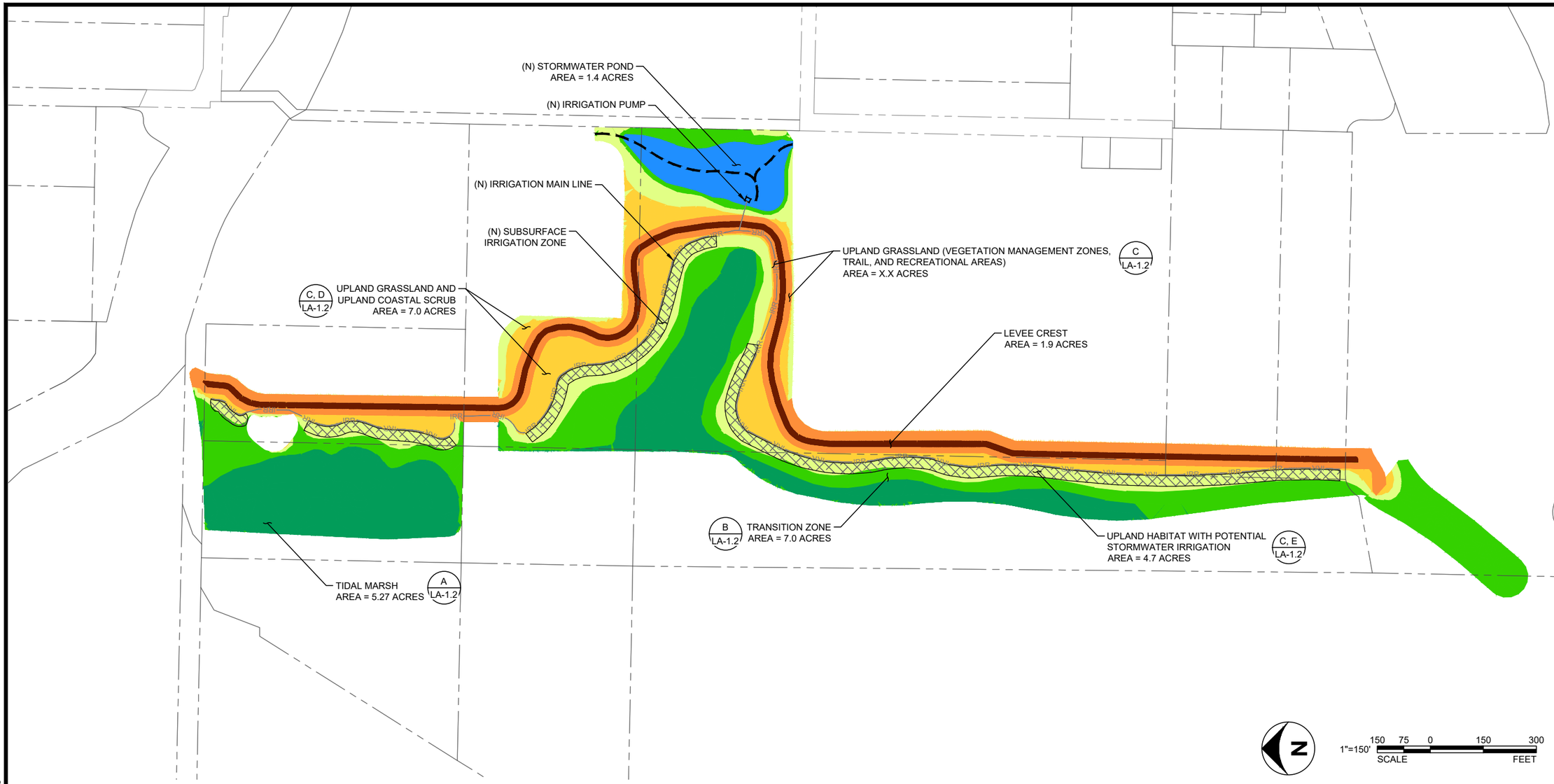
DRAFT 30%
PRELIMINARY DESIGN

SHEET TITLE
TYPICAL CROSS
SECTIONS 1

SHEET NUMBER
G-3.2

SHEET 6 OF 47

FILE: P:\01 CAD\2020xxxxx\D202000458.00 - North Richmond Shoreline\DWG\C-1.X_WCW Levee Typ XS.dwg PLOT DATE: 7/27/2023 1:26:22 PM PLOTTED BY: LINNEA TUCKER



LEGEND

COLOR	HABITAT TYPE
	FLOOD PROTECTION LEVEE CREST (EL 16)
	UPLAND GRASSLAND (VEGETATION MANAGEMENT ZONES, TRAIL, AND RECREATIONAL AREAS)
	UPLAND GRASSLAND AND UPLAND COSTAL SCRUB (EL 12 TO 16)
	UPLAND HABITAT (EL 9 TO 12) WITH POTENTIAL STORM WATER IRRIGATION
	TRANSITION ZONE (EL 7 TO 9)
	TIDAL MARSH (EL 5 TO 7)
	STORMWATER POND (EL 1 TO 7)

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1"

PHASE
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PRELIMINARY DESIGN

SHEET TITLE
PLANTING PLAN

SHEET NUMBER
LA-1.1

SHEET 46 OF 47

FILE: P:\01 CAD\2020xxxx\D202000458.00 - North Richmond Shoreline\DWG\PLANTING_PLAN.dwg PLOT DATE: 7/27/2023 1:38:50 PM PLOTTED BY: LINNEA TUCKER

COMMON NAME	SCIENTIFIC NAME	CONTAINER TYPE	SPACING	DETAIL NO.	QUANTITY/ACRE
Pickleweed	*Salicornia pacifica*	PLUG			
Saltgrass	*Distichlis spicata*	PLUG			
Alkali heath	*Frankenia salina*	DEEPOT			
Jaumea	*Jaumea carnosa*	DEEPOT			
Marsh gumplant	Grindelia stricta var. angustifolia	DEEPOT			
Marsh rosemary	*Limonium californicum*	DEEPOT			
Large-flowered sand spurry	*Spergularia macrotheca*	DEEPOT			
Sea arrow-grass	*Triglochin maritima*	DEEPOT			

A LA-1.1 TIDAL MARSH PLANTING ZONE

PLANT LIST

COMMON NAME	SCIENTIFIC NAME	CONTAINER TYPE	SPACING	DETAIL NO.	QUANTITY/ACRE
Ragweed	*Ambrosia psilostachya*	PLUG			
Field sedge	*Carex praegracilis*	PLUG			
Baltic rush	*Juncus balticus*	DEEPOT			
Salt grass	*Distichlis spicata*	DEEPOT			
Creeping wildrye	*Elymus triticoides*	DEEPOT			
Alkali-heath	*Frankenia salina*	DEEPOT			
Marsh gumplant	Grindelia stricta var. angustifolia	DEEPOT			
Marsh rosemary	Limonium californicum	DEEPOT			
Common spikeweed	*Centromadia pungens*	DEEPOT			

B LA-1.1 TRANSITION ZONE PLANTING ZONE

PLANT LIST

COMMON NAME	SCIENTIFIC NAME	CONTAINER TYPE	SPACING	DETAIL NO.	QUANTITY/ACRE
California brome	*Bromus carinatus*	PLUG			
Blue wildrye	*Elymus glaucus*	PLUG			
Creeping wildrye	*Elymus triticoides*	PLUG			
Idaho fescue	*Festuca idahoensis*	PLUG			
Purple needlegrass	*Stipa pulchra*	PLUG			
California poppy	*Eschscholzia californica*	DEEPOT			
Miniature lupine	*Lupinus bicolor*	DEEPOT			
Yellow ray goldfields	*Lasthenia glabrata*	DEEPOT			
Meadow barley	*Hordeum brachyantherum*	PLUG			

C LA-1.1 UPLAND GRASSLAND PLANTING ZONE

SEED MIX

COMMON NAME	SCIENTIFIC NAME	CONTAINER TYPE	SPACING	DETAIL NO.	QUANTITY/ACRE
Coyote brush	*Baccharis pilularis*	DEEPOT			
Naked buckwheat	*Erigonum nudum*	DEEPOT			
California coffeeberry	*Frangula californica*	TREEPOT			
Toyon	*Heteromeles arbutifolia*	TREEPOT			
Holly leaf cherry	*Prunus ilicifolia*	TREEPOT			
Coastal sage brush	*Artemisia californica*	DEEPOT			
Silver bush lupine	*Lupinus arboreus*	DEEPOT			
California wild rose	*Rosa californica*	DEEPOT			

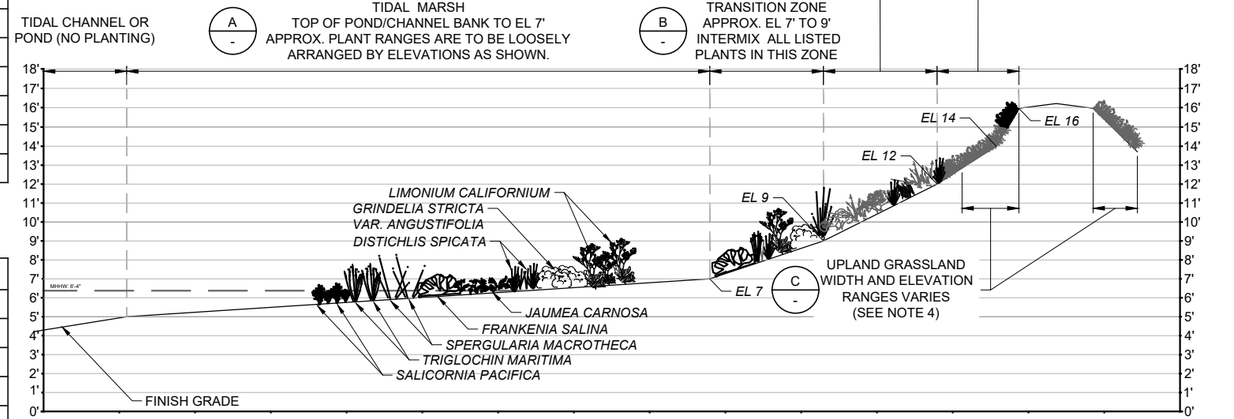
D LA-1.1 UPLAND COASTAL SCRUB PLANTING ZONE

PLANT LIST

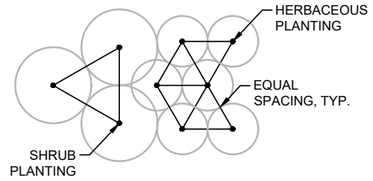
COMMON NAME	SCIENTIFIC NAME	CONTAINER TYPE	SPACING	DETAIL NO.	QUANTITY/ACRE

E LA-1.1 UPLAND IRRIGATION PLANTING ZONE

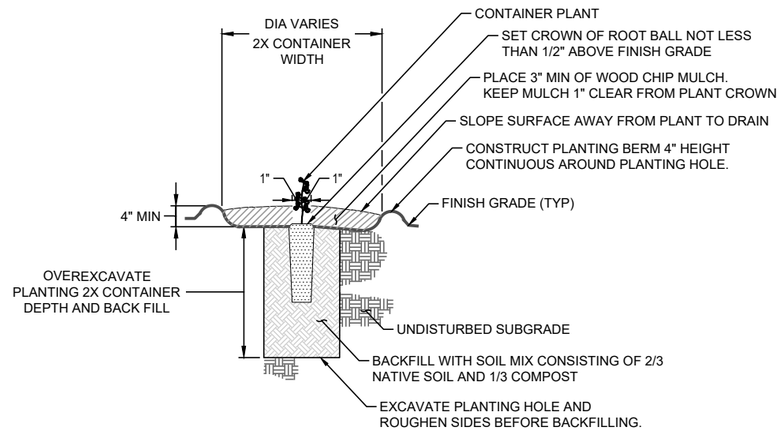
NOTE 5



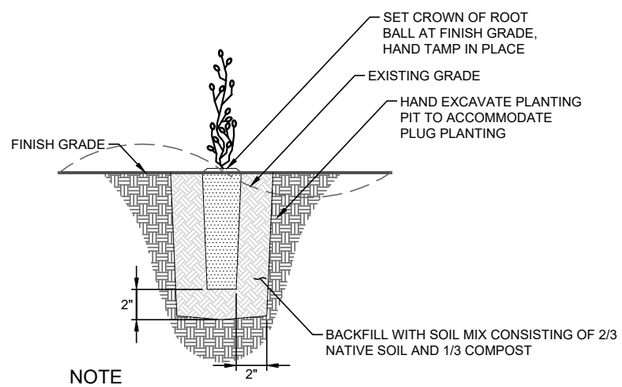
1 REHABILITATION PLANTING ZONES
SECTION SCALE: 1" = 20'



2 REHABILITATION PLANTING SPACING
SECTION SCALE: 1" = 3'



3 CONTAINER PLANTING (DEEPOT & TREEPOT)
SECTION SCALE: 1" = 2'



NOTE

1. USE SPADE OR TROWEL TO DIG PLANTING HOLE BY HAND

4 PLUG PLANTING
SECTION SCALE: 1" = 2'

NOTES

1. CONTRACTOR SHALL REPAIR AND REHABILITATE ALL HABITATS AND INFRASTRUCTURE IMPACTED BY THE WORK TO PRE-PROJECT CONDITION TO THE SATISFACTION OF THE OWNER.
2. HABITAT REHABILITATION SHALL INCLUDE REMOVAL OF ALL TEMPORARY FILL MATERIAL AND RESTORATION OF PRE-PROJECT GRADES. DAMAGED OR REMOVED VEGETATION SHALL BE REPLANTED TO MATCH PRE-PROJECT HABITATS USING NATIVE PLANT PALLET LISTED ON THIS SHEET. TYPICAL PLANTING ZONES ARE SHOWN FOR REFERENCE, ACTUAL SITE CONDITIONS MAY VARY.
3. REPAIR DAMAGE TO PATHS AND ACCESS ROAD REPAIR IN A MANNER CONSISTENT WITH THE STANDARD DETAILS SHOWN ON THIS SHEET. INFORM CITY IF PRE-PROJECT CONDITION OF PATHS OR TRAILS DEVIATES FROM STANDARD DETAILS.
4. UPLAND GRASSLANDS ARE TO EXCLUSIVELY BE PLANTED A MINIMUM OF WIDTH OF 15-FEET FROM THE THE EDGE OF THE LEVEE CREST AND THE RESTRICTED PLANTING ZONE EXTEND BEYOND THE 15-FOOT BUFFER ON ANY SLOPE 3:1 OR STEEPER (VEGETATION MANAGEMENT ZONE). UPLAND GRASSLANDS EXCLUSIVELY TO BE PLANTED IN RECREATIONAL AREAS.
5. [PLACEHOLDER FOR PLANTING TABLE FOR THE IRRIGATION UPLAND PLANTING ZONE. TO BE ADDED AT 65% DESIGN]

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1"

PHASE
DRAFT 30% PRELIMINARY DESIGN

SHEET TITLE
PLANTING DETAIL PLAN

SHEET NUMBER
LA-1.2

SHEET 47 OF 47

OVERALL SITE PLAN LEGEND

- PED/BIKE PATH; ASPHALT WITH DECOMPOSED GRANITE EDGING ON BOTH SIDES PER BAY TRAIL GUIDELINES — 2 / L-X2
- BOARDWALK — 1 / L-X2
- BIORETENTION AREA
- UPLAND PLANTING AREA
- MARSH & TRANSITION PLANTING AREAS
- RECREATIONAL AMENITIES & PASSIVE-USE AREAS, SCOPE TBD
- PROJECT BOUNDARY

1 OVERALL SITE PLAN
1" = 160'-0"

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REVISIONS

#	DATE	DESCRIPTION

PARTNER IN CHARGE	TMP
PROJECT MANAGER	GLP
PROJECT LANDSCAPE ARCHITECT	GLP
TEAM MEMBER	LL
PROJECT NUMBER	2123400
ISSUE DATE	JULY 21, 2023

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1"

PHASE
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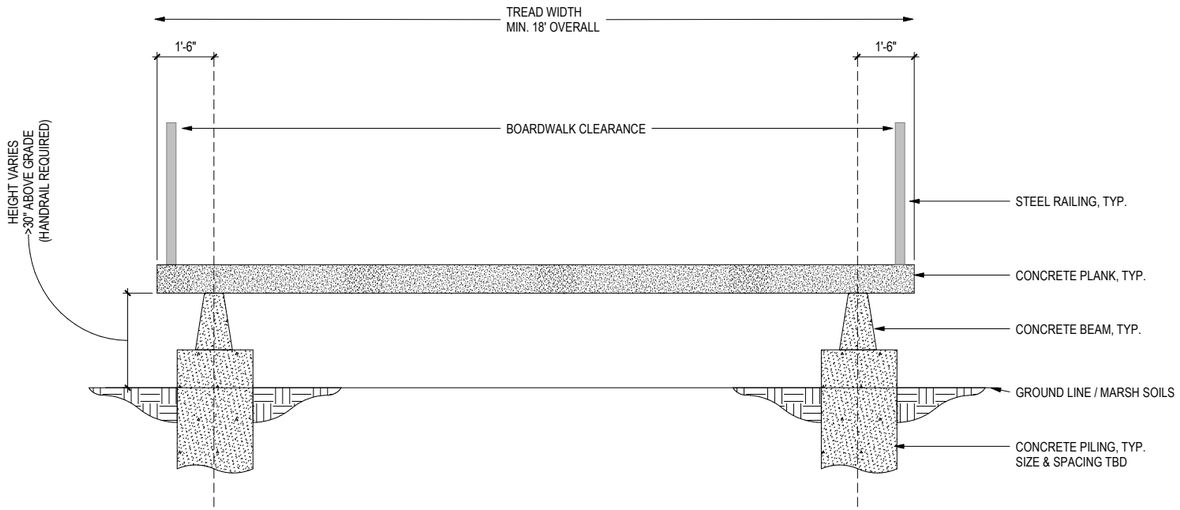
SHEET TITLE

OVERALL SITE PLAN

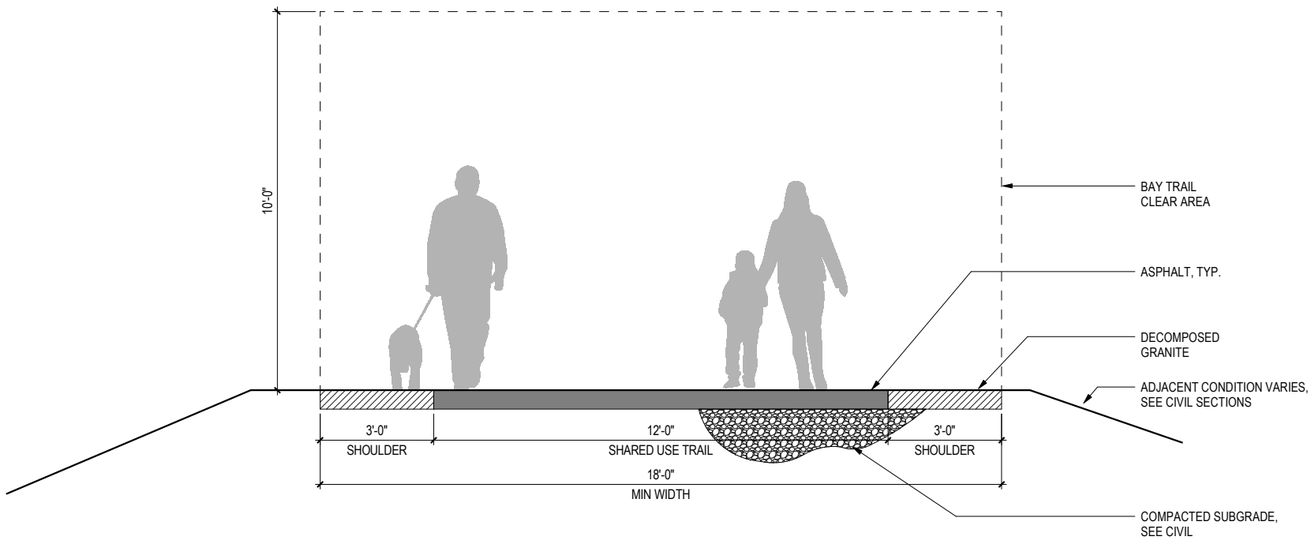
SHEET NUMBER

L-X1

SHEET 48 OF 47



1 BOARDWALK SECTION, TYP.
1/2" = 1'-0"



2 BAY TRAIL SECTION, TYP.
1/2" = 1'-0"

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PROJECT LANDSCAPE ARCHITECT	GLP
TEAM MEMBER	LL

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SHEET TITLE
TRAIL SECTIONS
SHEET NUMBER
L-X2
SHEET 49 OF 47

the watershed project

North Richmond Shoreline Adaptation
Community Survey

Hello, my name is _____ and I am conducting a survey as part of a design project that is currently being planned for the North Richmond shoreline. The goal of the project is to protect the shoreline, the facilities that are located near it, and the North Richmond neighborhood from sea level rise. I will tell you more about this shortly.

I am part of the design team for this plan. A group of community members, including myself, work with the engineers and architectural designers to ensure that community preferences and priorities are heard and taken into consideration as much as possible in the design plans.

I would like to ask you a few questions to help us understand community preferences and priorities for the North Richmond Shoreline Adaptation project design. The discussion will take about an hour. Your participation is voluntary, and you may choose not to answer some or all the questions.

Do I have your permission to continue?

Demographic Information:

a. Name
b. Address
c. Occupation
d. Relation to North Richmond (resident / previous resident / works in the region / other - specify)
e. Affiliation to a community or other local organization
f. Gender
g. Age (15-25, 25-35, 35-45, 45-55, 55-65, >66)
h. Ethnicity

Discussion Question:

1. **Do you currently visit or use the San Francisco Bay Shoreline in any way?**
   a. Yes / No
   b. [If yes] Which part?
   c. [If yes] What type of activities do you use it for?
   d. What do you like about the shoreline?
   e. What don't you like about the shoreline? What are some of the challenges you have with the shoreline currently?

the watershed project

North Richmond Shoreline Adaptation
Community Survey

2. **What type of services or activities would you like to see more of at the North Richmond Shoreline? These would be things the Shoreline Adaptation project can consider including in the design plans.**

   The Shoreline Adaptation project will not be able to include everything we want. For each of the following items, do you think it Is of high (H), medium (M), low (L), or no priority (N)? Please explain why.

- Boardwalk H/M/L/N _____
- Hiking trails H/M/L/N _____
- Biking trails H/M/L/N _____
- Interpretive signage on the history and nature of the area H/M/L/N _____
- Observation tower to see the Bay H/M/L/N _____
- Kayak/boat launch H/M/L/N _____
- Exercising opportunities/park H/M/L/N _____
- Restored wetland H/M/L/N _____
- Park for toddlers and small children H/M/L/N _____
- Activities for older children H/M/L/N _____
- Restaurants/food shacks H/M/L/N _____
- Community center: H/M/L/N _____
  - Art and culture H/M/L/N _____
  - Education H/M/L/N _____
  - Ecology and climate H/M/L/N _____
  - Community development H/M/L/N _____
- Other, specify_____ H/M/L/N _____

3. Reaching the North Richmond Shoreline is currently not an easy thing to do. There are only a few access points, with limited parking spaces (if at all), and often, they require to unsafely cross the highway. This needs to change.

   Look at the attached map with options for improved access to the North Richmond shoreline:
   - Points A-K represent access gaps, or areas that are difficult to navigate through. **Which of these areas is of the highest priority when considering improvement of the accessibility at these locations? Explain why.**
   - **What would be the most beneficial access routes for the community** (1:I-J, 2:G-H, 3:E-A, 4:D-C-B-A)? Explain why.
   - **What transportation methods would you prefer to use to access the shoreline, and why? Driving, public transportation, walking, biking.**

4. These questions are intended to create a deeper and richer open discussion. Encourage people to say more, explain why, give examples, etc. You do not have to cover all topics if people had enough.

   - Do you think that the North Richmond Shoreline Adaptation project should work to create jobs for the community?
   - If yes, what kind of jobs (some suggestions - construction workers, engineers, restoration nursery, maintenance, education, etc.)?
   - Who should have priorities to be employed in this project?
   - How can such hiring priorities be ensured? Think about entry-level vs. professional positions, transferable skills vs. training, and short vs. long-term hiring.
   - What other opportunities for community development can be linked to the Shoreline Adaptation project?
   - Would you be interested in being involved in the planning, building, and maintenance of this project? How would this look like for you?
   - What should be the role of community members? What should be the role of the County?

the watershed project

North Richmond Shoreline Adaptation
Community Survey

NORTH RICHMOND COMMUNITY SURVEY RESULTS

North Richmond Shoreline Adaptation – Survey Results

This document summarizes the main results of the Survey conducted on community preferences and priorities for the North Richmond Shoreline Adaptation project.

1. Methodology

The survey was co-designed with the Community Survey workgroup and included questions to elucidate community preferences and priorities, especially around amenities, access to the shoreline and the amenities, and additional community benefits such as employment and workforce development.

The community workgroup decided to conduct the survey in small focus group discussions (FGD) as this methodology can encourage more in-depth conversations with community members as opposed to large community events in which only a small portion of community members are actively participating. Also, there was a concern that online surveys will not produce enough traction, and door-to-door stenciling would require too much input from the community workgroup.

2. Sample Size and Demographics

FGDs

Participants were selected by the community facilitator with guidance from TWP staff to assure some balance and saturation in the sample were maintained.

Six FGD were held:

- Corine Sain Multicultural Senior & Family Center
- New Hope Church, 321 Alamo Ave., Richmond
- Groundwork Richmond Green Team
- Point Richmond residents
- Parchester Village MAC
- North Richmond Spanish-only speaking group

Online Survey: seven responses; 6 are Richmond residents and the other person works in Richmond. Ages 25-65.

Field Tour Notes: Collected from ten different community workgroup members.

3. Results

3.1. Current use of the shoreline

Most survey participants use the shoreline, mainly at Point Pinole and Dotson Marsh. Some use it on a regular base (daily to weekly) and most go there sometimes. They go there to

exercise (walk), for social gatherings (parties and picnics; mainly the youth), and to enjoy nature.

The Senior Center group uses the shoreline less, only 2 of the 13.

Some reported benefits: "I appreciate the openness and the feeling of freedom. There's a part of the path that goes by the ocean and there's a nice seat and you can sit there and look at the water" (Parchester Village); "The breeze, the view, it just really beautiful to look at" (GWR); "Very peaceful – trees in the wind, sailboats at a distance, bird songs" (Field trip). "I like to see seals. The aquarium is really cool too. The views are nice. We like to eat clam chowder" (Spanish-speaking group).

Some reported disadvantages, especially for the North Richmond shoreline: "The smell, the poop of the animals" (GWR), "A lot of trash and not enough shade" (GWR), "I can see the refinery and smell a horrible odor. Why is there a gate?" (Field trip), "I'm concerned about safety" (Point Richmond). "There's also a bit of an unsafe feeling. There are also people that go to the shoreline and do different things that might not always be good for kids to be around. There's a lack of cleanness and people with dogs don't pick up their poop" (Spanish-speaking group).

3.2. Project Amenities

High Priority:

- Hiking trails ('high' for all)
- Wetland restoration ('high' for all)
- Boardwalk ('high' for all except youth, which defined it as 'medium')
- Parks for children ('high' for all)
- Benches
- Restrooms
- Picnic and rest areas
- Shade, preferably with native trees

Medium Priority:

- Exercise opportunities ('high' for youth and Spanish-speaking group, 'low' for seniors)
- Biking trails ('high' for some, but many others are concerned about the interference with walking and nature viewing)
- Kayaking ('low' for youth – they don't know how to swim and kayaking in the bay is hard, 'medium' or 'high' for others)
- Water fountains (mentioned by a few)
- Lighting (mentioned by a few)
- Fishing pier
- Food carts or trucks, small restaurants that provide picnic baskets
- Bike rental

Low Priority:

- Observation tower (perceived as dangerous and not a great benefit as views can be seen from the raised levee).

- Community center. Note: many informants said that there is no need to build a full-size community center as there are specialized community centers (for children, seniors, and at schools) in the surrounding neighborhoods, and they are often not occupied enough. However, the majority of survey participants asked for more educational activities and interpretive signage, as described below.
- Soccer or basketball fields ('high' for Spanish-speaking group but low for others, who don't find it related to the shoreline).

Educational activities and interpretive signage
The majority of participants want activities that will help them learn more about the natural habitat and history of the people.

Some ideas include:

- I'd like to see information on native plants and wildlife, and information on the Ohlone people that lived here. I'd like a resource center that would bring different people in and each will do activities for the public. (Parchester Village)
- I think that there is a need for activities on the history of Richmond. That talks about how we came to be. It will show people that live here and people that come to visit what Richmond is about. We want the opportunity for people to tell their own stories. (Parchester Village)
- The natural history is important. How we evolved based on climate change. This is what it was, this is what it is now. It would be good to have guided natural walks that explain this (Field trip).
- Signs should recognize the Native Americans. We can have hands-on classes and workshops to restore their cultural artifacts (Point Richmond)
- Activities for mind and body awareness– yoga, meditation, martial arts (online survey)

Other interesting points and ideas:
- Beach volleyball fields and races
- Have activities for adults, not just children
- Platform or amphitheater for summer plays, outdoor music events
- Access for handicapped and other people with disabilities
- Separate walking trails from biking trails and from dogs
- Train for small children
- Floating/mobile aquatic research center/museum that moves with rising water

3.3. Shoreline Access

More than half of the survey participants (from the church, Parchester village, GWR, Spanish-speaking group, and senior center FGDs) spoke about the need for a shuttle that will bring people to the shoreline. They said that the shuttle needs to be free. They suggested that this will be a rotational shuttle that will connect the NR Shoreline with the neighborhood and with other nearby locations such as Dotson Marsh and Rosie the Riveter.

Some participants spoke about the need for parking that is open during long hours.

- Highest priority – links 2 and 3. Already established but need to provide walkable/bikeable access to the neighborhood with good parking and an open gate.
- Medium to low priority – link 4; Some said this is an important link as they use it to go to La Pulga Market and the 66 bus drops them off at a far location with an unsafe crossing of the highway. Others said it would be fun to go to the beach after the market, while some said it is not a priority to connect the market.
- Low priority – link 1, as it moves through industrial zones
- Points A and H are critical as they are the base for this whole trail
- Point G is valuable as it connects the Bay Trail
- Point K is interesting as it is an open area close to the shoreline
- There is some interest in point F, connecting Verde school, but for most, this is a bit outside the scope.

3.4. Additional Community Benefits

Most participants think that leveraging this project to create jobs for the community is important. Jobs for teens and high-school children were mentioned as important by more than a few. Involvement of youth organizations and the Contra Costa Community College. There is a request to include volunteers and seniors. Some said that jobs should be given first to undocumented people that desperately need general jobs.

A few participants spoke of the need to include community members 'early and often and that 'Designers should really listen to the community".

Some interest in being involved in the next phases but not high, as information is vague on what this will look like.

SITE WALKS

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

1. From where I'm at, I can see the refinery & smell a horrible odor. I can hear the refinery.

2. I feel like you can probably plan a picnic in this area.

3. I feel like less smell would encourage me to come more

PAUSE POINT #1:
OVERLOOK AT THE CREEK, FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

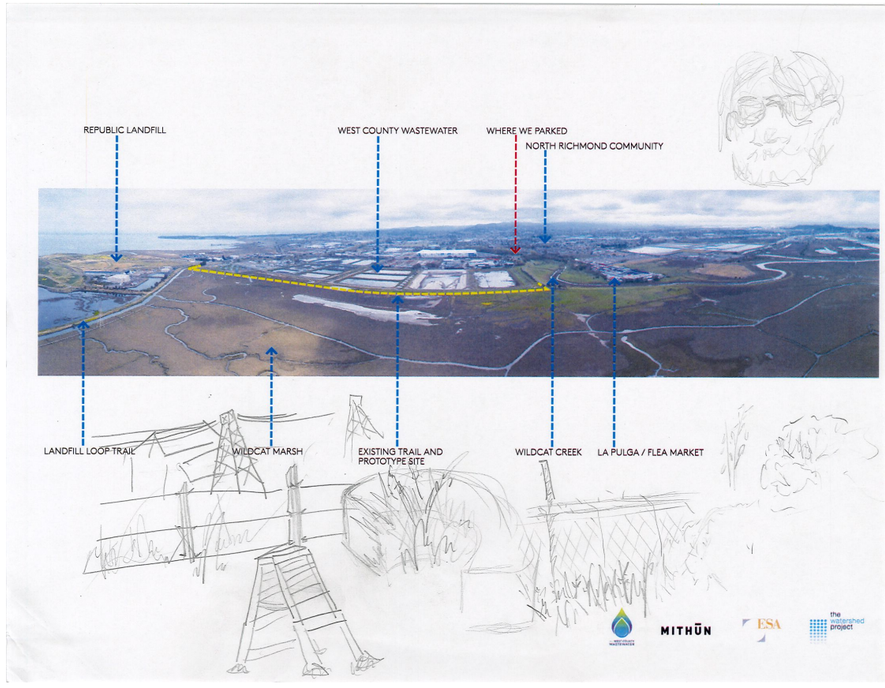
>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?


LIVING LEVEE
REPUBLIC LANDFILL
WEST COUNTY WASTEWATER
RICHMOND PARKWAY
WILDCAT MARSH
EXISTING TRAIL AND PROTOTYPE SITE
WILDCAT CREEK TRAIL
WHERE WE PARKED
WILDCAT CREEK
EXISTING TRAIL AND PROTOTYPE SITE
MITHŪN
ESA
the watershed project


POINT PINOLE
WEST COUNTY WASTEWATER
RICHMOND PARKWAY
VERDE SCHOOL
WHERE WE PARKED
NORTH RICHMOND COMMUNITY
WILDCAT MARSH
EXISTING TRAIL AND PROTOTYPE SITE
WILDCAT CREEK
MITHŪN
ESA
the watershed project


REPUBLIC LANDFILL
WEST COUNTY WASTEWATER
WHERE WE PARKED
NORTH RICHMOND COMMUNITY
LANDFILL LOOP TRAIL
WILDCAT MARSH
EXISTING TRAIL AND PROTOTYPE SITE
WILDCAT CREEK
LA PULGA / FLEA MARKET
MITHŪN
ESA
the watershed project


REPUBLIC LANDFILL
WEST COUNTY WASTEWATER
WHERE WE PARKED
NORTH RICHMOND COMMUNITY
LANDFILL LOOP TRAIL
WILDCAT MARSH
EXISTING TRAIL AND PROTOTYPE SITE
WILDCAT CREEK
LA PULGA / FLEA MARKET
MITHŪN
ESA
the watershed project

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

The wind is beautiful. Distant views. / Chain link fence is a bit urban for the location. Garbage odor is here, unpleasant.
Overview actually looks peaceful, despite seeing striking workers.
The quiet is lovely. Bird song, wish there were more.
Distant powerlines, but they are so far away, they don't disturb.
Trees in the winds, Sail boats in the distance.
Very peaceful.

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

I see the Wildcat creek but cannot see where the creek enters into San Pablo Bay.

I see a large salt marsh and hear some geese but do not see a lot of wild life in the marsh.

I see the landfill, garbage mountain and do not smell any foul smells from here

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

1. Chevron
2. Hills
3. tall grass
4. Cloudy (very)
5. a lot of flat land
6. Fences
7. power towers/lines
8. tons of trees

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

- wide, vast, and natural
- smelly
  - Unknown origin
- refinery in view
- next to flea market
  - contaminated soil
- distant mountains
- decommitioned landfill

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

Industrial mix w/ natural.
And vice versa.

How large area/lay in the area covered by this project?

~~Does this area~~ Is the area shopped in a variety of parcels, owned by different private entities?

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

1. For when the water will rise:
   Floating / mobile
   ~~Lounge~~ → museum, ~~#~~
   ~~aquatic~~ research center G-P,
   & floating so that it can move & not disturb the natural ~~ecology~~ environments changes - W/ little lounges, boats used to give small educational tours & research -
2. Classes offered: build ~~[illegible]~~ Peepee & Workshops
   Yoga, meditation, arts & crafts, hands-on activities, guided tours - Not too many bikes!!!
   Just a few designated bike trails -
3. Botanical garden
   & Walking Trail w/ Plant/Tree ~~[illegible]~~ identification little stickers -

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

The Land is Beautiful
The view is Beautiful
Great walking trail
We need a bank on the Living Levee
Bikecycle trail
Art & craft classes

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

Nature
Nature
A lot of nature activities
Just to get out in Nature
Wanting to get in nature
Just to come out & enjoy this beautiful. —

Classes & workshops
Recognition of Native Americans

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

- The palm trees are cool!
- fence next to look out pt.
  - 1:1 w/ parcel owners: how many parcel owners are there. 21 indiv parcels
- Waste Water smell - ewww!!
- Bridge over water property
- Most of Marsh is Channels
- lots of green space
- Endangered species: red eye tree frog
- Waste water solar panels — new panels

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

PAUSE POINT #1:
OVERLOOK AT THE CREEK,
FLEA MARKET AND MARSH

WHAT DO YOU SEE? Eagle, heron
WHAT DO YOU HEAR? geese

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

- Solar panels
- Next to waste water
- Lots of green space
- Before Mud flats — Access to the Bay.
  - low tide
- rainy season flocks
- Park on the dump: Republic willingness
- High levee + education center
- keep Quiet
- AA work
- Binoculars in the area
- Meditation center + art classes
- Recognition of Ohlone — and acknowledgment

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

1. I See more Flatlands
I hear more natural noises
2. I could imagine doing walks
3. I feel more lighting would encourage me to visit

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

In this location you hear the nearby operations. Beautiful flat area to walk and ride bikes. Maybe a picnic spot would be nice. Mt. Tam! Marsh is lovely, We need birds, birds. Maybe nesting piles for large birds?

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

- Ecological Center – Learning center
- Bathrooms / rest area
- Bridge to Pulgas
- Inviting Fences

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

Trail is gravel and not handicap accessible,
Levee would be 15' wide and 7' tall providing better views of the marsh, Bay and other features.

What would encourage me to visit more often:
Better restroom facilities
Better seating along trail
Bike path that is paved

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

1. Benches
2. Public restroom
3. native plants
4.

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL
MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

I just love this place
A beautiful place to be.

PAUSE POINT #2:
OVERLOOK AT THE MARSH TRAIL MIDPOINT

WHAT DO YOU SEE?
WHAT DO YOU HEAR?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

NATURE WALKING TOURS
TOURS FOR LOOKING
HANDS ON ACTIVITIES
BOARD WALK

MITHŪN ESA the sustained project

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

- several bird calls & sighting snails
- wide variety of plant life
- no smell
- can view distant mountains
- can view point pinole park
- san Pablo creek/marsh

PAUSE POINT:
OVERLOOK AT SAN PALBO MARSH, BAY INTERFACE

- WHAT DO YOU SEE?
- WHAT DO YOU HEAR?
- WHAT IS DIFFERENT BETWEEN THIS PLACE, AND THE WILDCAT CREEK MARSH AREA?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

1) Work on a vegetal screen that can hide the Wood Recycling Depot (parts of it) & especially, Republic facilities. Some kind of trees that can grow in the marshes?

2) Keep this beautiful feel of wilderness & great outdoors
3) peace & tranquility.
More outdoor small land spaces for Tai-Chi, yoga, meditation classes & workshops.
3) No bikes.
4) Marine fauna to help slow waves when levee is created and water rises.

PAUSE POINT:
OVERLOOK AT SAN PALBO MARSH, BAY INTERFACE

- WHAT DO YOU SEE?
- WHAT DO YOU HEAR?
- WHAT IS DIFFERENT BETWEEN THIS PLACE, AND THE WILDCAT CREEK MARSH AREA?

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?

PLEASE RECORD YOUR THOUGHTS HERE IN WORDS OR SKETCH...

I live walking distance from here. I never knew this existed?? Why is the trail in the middle of a waste water treatment.
Why is there a gate?
Nobody knows about this trail. Why doesn't the trail connect from Dotson marsh
I see so much diversity, animals, I can actually see the water drain out to the Bay.

Princess

PAUSE POINT:
OVERLOOK AT SAN PALBO MARSH, BAY INTERFACE

- WHAT DO YOU SEE? Beauty
- WHAT DO YOU HEAR? Diversity
- WHAT IS DIFFERENT BETWEEN THIS PLACE, AND THE WILDCAT CREEK MARSH AREA?
Accessibility & Access

>> WHAT ACTIVITIES COULD YOU IMAGINE HAPPENING HERE?
Parks, Hiking, walking, Play, adventure

>> WHAT WOULD ENCOURAGE TO VISIT THIS SPOT MORE OFTEN?
Access

ACKNOWLEDGMENTS

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