Adapting to Rising Tides

Working together to increase the resilience of Bay Area communities to sea level rise and storm events

San Francisco Bay Conservation and Development Commission
Contra Costa ART Working Group

Working Group Meeting #4 – December 8, 2015

Objectives

• Provide an update on assessment organization and work products
• Share findings for the 24 asset categories and 9 sectors investigated
• Introduce the Plan Step and the approach to developing adaptation responses for the project area

Agenda

9:00 am  -  Welcome, Meeting Objectives, and Announcements
9:15 am  -  Presentation: Assessment Organization and Work Products
9:45 am  -  Presentation and Discussion: Assessment Findings
10:30 am  -  Break
10:45 am  -  The Plan Step: Developing Adaptation Responses
11:30 am  -  Wrap Up and Next Steps
Project Timeline

**Project Initiation – Fall 2014**

**Project Scoping – Fall/Winter 2015**

**Conduct Assessment – Winter/Spring 2015**

**Determine Assessment Outcomes – Summer 2015**

**Transition to Adaptation – Fall 2015**

**Develop Adaptation Responses – Winter 2015**

**Evaluate and Select Adaptation Responses + Opportunities for Implementation – Spring 2016**

Working Group Meeting

Individual or small group meetings
Adapting to Rising Tides Planning Process

SCOPE & ORGANIZE
- Convene Partners & Stakeholders
- Choose Project Area
- Identify Sectors, Services, Assets
- Select Climate Scenarios & Impacts
- Set Resilience Goals

ASSESS
- Review Existing Conditions
- Assess Vulnerability
- Consider Risks

DEFINE
- Characterize Vulnerabilities & Risks
- Identify Key Planning Issues

Society & Equity Environment Governance

PLAN
- Integrate Adaptation Responses into Plans
- Evaluate & Select Adaptation Responses
- Develop Adaptation Responses
- Select Evaluation Criteria
- Refine Resilience Goals

IMPLEMENT & MONITOR

Working Group Meeting #3
Focus of today’s meeting

1. Present Summarized Findings
   We have developed **outcome-oriented issue statements** that summarize assessment findings for each asset category and asset assessed.

2. Shift to Adaption
   We will present the Plan Step today, and work with you to determine how **key planning issues will be selected for adaptation response** development.
Reminder, the Contra Costa ART assessments has included:

- Answers to assessment questions about existing conditions, types of vulnerabilities and potential consequences
- Review and validation of assessment outcomes by the working group, other stakeholders, asset managers, topical experts
- An exposure analysis that identified exposure to current and future flooding
Reminder: What is the Define Step?

- Serves as the bridge between Assess and Plan
- Organizes and communicates the assessment findings to support adaptation response development
- Avoids the challenge of ranking, scoring or prioritizing, improving transparency
- Helps make sure important vulnerabilities are not left behind
The Contra Costa ART Define step has included so far:

- An introduction at the last working group meeting in August
- Profile sheets that summarized and characterized the vulnerabilities and risks of assets and asset categories
- A World Café style table top exercise to share ideas for how to organize project area findings before launching into the Plan Step
Two Components of the Define Step

So, while last meeting we started into the Define Step, we didn’t finish...

✓ **Summarize Findings**
   Develop outcome-oriented vulnerability and consequence statements that clearly and concisely summarize answers to the assessment questions for each asset or asset category assessed.

✓ **Shift to Adaption**
   Determine the key planning issues that will be advanced for adaptation response development.
So, where have we been?
Actually…..

Finishing the assessment and working through the Define Step!

• We started with 67 separate profile sheets that presented summarized findings for both individual assets or an entire asset category.

• We heard from working group members that more specific information was needed for certain assets, and it needed to be communicated more clearly for others.

• We finished the exposure analysis for all asset categories using existing regional mapping (NOAA SLR Viewer).

• AND – we are working with AECOM and you to complete locally refined draft inundation and shoreline mapping.
Asset Category Chapters

- **People** – project area, cities, neighborhoods
- **Business & Industry** – commercial, industrial, haz material sites
- **Contaminated Lands** – Brownfields and landfills
- **Energy** – refineries, pipelines, power generation and distribution
- **Housing** – single family, multi-family and mobile homes
- **Natural Areas** – tidal marshes
- **Parks, Recreation, Open Space** – parks, marinas, Bay Trail
- **Public Services** – health, police, fire, schools, waste collection
- **Seaport** – Port of Richmond and marine oil terminals
- **Transportation** – railways and roadways
- **Water Management** – water, wastewater, stormwater, flood control
Asset Specific Profiles

- City of Richmond Stormwater
- Contra Costa Water District
- EBMUD Pt. Isabel Wet Weather Facility
- EBMUD RARE
- Alhambra Creek
- Pinole Creek
- Rodeo Creek
- Rheem Creek
- Walnut Creek
- Wildcat and San Pablo Creek
- Plains Products Martinez Oil Terminal
- Tesoro Martinez Refinery
- West Contra Costa Sanitary Landfill
- West County Wastewater District WPCF

These assets were selected because the owner or manager shared specific information about the asset and its operations and provided critical review and feedback to ensure the profile was as accurate and reflective of existing conditions as possible.
Inundation and Shoreline Mapping
Where to find these products

Project website, password protected working group page:

http://www.adaptingtorisingtides.org/contra-cost-county-working-group-page

password: cccwg

Available now:
- 14 asset-specific profile sheets
- 10 draft asset category chapters (images and maps to be added)
- Draft 12, 24, 36” SLR + overtopping maps

Coming soon:
- Two remaining asset category chapters
- Flood exposure chapter
- Final SLR and shoreline maps
Questions?

http://www.adaptingtorisingtides.org/contra-costacounty-working-group-page

password: cccwg
Select findings presented through the lens of the project resilience goals

If we presented all of the findings you would:
  a) never come to another meeting
  b) not read the chapters and profile sheets!
Society and Equity
Protect all communities and what they rely on including safe and healthy housing, jobs, and access to goods and services, with a focus on characteristics that could make them more vulnerable

Protect the health, safety and welfare of those who live, work and recreate in Contra Costa County
Housing: Single Family

- 75% of housing county-wide is single family
- 507 single family parcels in the project area are within the 100-year floodplain
- Over half of these are at risk of more extensive or frequent flooding as sea levels rise
- 74 parcels not currently at risk of flooding could experience flooding as sea levels rise
- 392 parcels are in low-lying areas adjacent to areas that could flood with 6 feet of SLR

Key Issue:
Most single-family homes were not built with their first floor elevated above the current 100-year flood level, nor designed to withstand flooding, meaning that any exposure to flooding is likely to cause lasting damage. Ultimately, displaced residents will have difficulties finding other comparable housing due to the low housing-vacancy rate and limited availability of affordable housing in the county.
Housing: Multi-Family

- 25% of housing county-wide is multi-family
- 506 multi-family units in the project area are within the 100-year floodplain
- 101 of these are at risk of more extensive or frequent flooding as sea levels rise
- 274 parcels not currently at risk of flooding could experience flooding as sea levels rise
- 196 parcels are in low-lying areas adjacent to areas that could flood with 6 feet of SLR

Key Issue:
Multi-family residential in Contra Costa County provides an affordable housing alternative to single-family homes, which is particularly important for lower-income residents. Renters living in multi-family housing have limited opportunity to improve the flood resilience of their residences; while improvements to housing in shared ownership, for example condominium or mutual homeowner associations, require cooperative decision-making.
The two mobile home parks in the project area are at risk from flooding:

- Tara Hills Mobile Manor in Bayview-Montalvin, a +55 community next to Garrity Creek and protected from the Bay by UP/BNSF rail lines.
- Rodeo Mobile Home and RV Park which is within the 100-year floodplain of Rodeo Creek also has two of the larger parcels at risk from 6 feet of sea level rise.

Key Issue:
Mobile homes are vulnerable both during and after flood events because of their design and the materials used to construct them. Mobile homes provide affordable housing options, however once damaged they are difficult to repair and typically need to be replaced. This can cause the permanent displacement of mobile home park residents to other more affordable areas, where they could become disconnected from jobs, schools, and other community ties.
Water Management: Flood Control

- Rodeo Creek conveys only the 15 to 20-year riverine flow, and the 2005 New Year’s Eve storm almost caused overbank flooding
- County Flood Control receives only 5% of the funds necessary to maintain the channel due to Prop 13 and 218 restrictions
- Since desilting is both expensive and difficult to permit, the last sediment removal effort was in the mid-1990s

Key Issue:
Watershed-specific hydraulic modeling is needed to understand if higher Bay water levels will exacerbate existing flooding or cause areas beyond the existing 100-year floodplain to flood as sea levels rise. This is very important for Rodeo Creek where ongoing sedimentation in addition to rising sea levels will further reduce flood capacity.
Public Services

- Public health facilities
- Fire stations
- Law enforcement (police and sheriff)
- Schools (K-12)
- Waste transfer stations
- Household Hazardous Waste Collection

Key Issues:
While most of the public services facilities in the project area are not directly at risk of flooding, their function is at vulnerable because they rely on roads and access routes that could flood, as well as uninterrupted power, communications, water and food, and wastewater services.

Public service facilities in the project area are fairly limited, and even a temporary closure could cause significant disruption for residents, both increasing the distance need to travel and expense of obtaining services.
Outfalls which are the city stormwater system’s first line of defense against sea level rise do not have gates to keep the tides out.

Where capacity is insufficient to store both stormwater and Bay water, there could be street and basement flooding during extreme tides or even the daily high tide.
Economy
Maintain and improve local economic vitality and access to diverse employment opportunities by preserving the function of major employment centers, infrastructure and utilities.

Recognizing Contra Costa County’s regional role, ensure the energy and transportation sectors and the interconnected networks and systems they rely on are resilient.
Key Issues:
Most commercial buildings are not designed to withstand flooding, and even those not directly at risk will be vulnerable if roads that provide access are flooded, or if power, water or wastewater services are disrupted. Even temporary closure of commercial uses can have significant social and economic impacts on neighborhoods and communities, including workers being unable to report to work, and necessary goods and services becoming unavailable to community members.
Key Issues:
While the four refineries in the project area comprise the majority of the acres at risk, light industrial comprises the majority of parcels at risk. About half of the light industrial parcels at risk are not current in the 100-year floodplain and therefore property owners and site operators may not be prepared for, or aware of, the flood risk they may face in the future.
Three of the four refinery have at least a portion of their land area within the existing 100-year floodplain, and the shoreline of each is exposed to as little as one foot of sea level rise.

Disruption of refinery operations could result in lost jobs at the refinery site and associated sectors, and potentially impact the regional economy, resulting in higher fuel prices and potentially shortages.

**Key Issues:**
Temporary or permanent disruption of operations could occur due to on-site flooding or because access to the refinery is disrupted. Improving the resilience of refinery operations will require coordination with asset owners and managers that operate on-site as well as those that provide goods and services from off-site.

Because refineries are physically large sites, further analyses are needed to understand which if any vulnerable assets or facilities are located in areas that could be flooded due to shoreline overtopping or a failure of the stormwater system to drain adequately.
Miles of Pipelines
- 276 in the project area
  - 55 in the 100-year floodplain
- 12 that carry natural gas
- 43 that carry hazardous liquids
- 51 potentially exposed to 6 ft SLR

Contra Costa is the epicenter of refining and heavy manufacturing in the Bay Area and pipelines, which span the County, are an essential component to the regional economy.

**Key Issues:**
Buried pipelines are sensitive to higher groundwater and salinity intrusion. Exposure to salt water can corrode pipelines, and pipelines that are not weighted or anchored may float and become exposed, particularly during prolonged flooding and in marshy or sandy soils.

Damage to pipelines could result in significant regional disruptions to the energy and transportation sectors, and threaten public safety and the environment if there is an explosion or release of hazardous contents.
Environment

Protect and enhance the environmental value of Contra Costa County by preserving habitat, continuing to improve water quality, and air quality, cleaning up contaminated lands, and by using natural approaches wherever possible to improve community and economic resilience.
Natural Areas: Tidal Marshes

Key Issues:
The fifteen tidal marshes in the project area may downshift as sea level rises to eventually become mudflat by the end-of-century, and marsh erosion will increase due to greater wind-wave action in deeper water, narrowing marshes such as Stege Marsh in the Central Bay.

Species
- Song Sparrow
- Marsh Wren
- Black Rail
- Common Yellowthroat
- Clapper Rail

Point Blue Future SF Bay Tidal Marshes
http://data.prbo.org/apps/sfbslr
Brownfields
• 63 in the project area, the majority of which are in Richmond
• 28 within the 100-year floodplain
• 22 of these are at risk of more extensive or frequent flooding with sea level rise
• 10 not currently at risk could experience flooding as sea levels rise

Brownfields that have not been fully cleaned up, were cleaned up to less stringent upland or reuse standards, or employ remediation or engineering control practices that may not continue to be effective as sea level rises may pose a risk to public and environmental health

Key Issues:
Upland sites that become aquatic as sea level rises will not have been remediated to a high enough standard, as allowable aquatic contaminant concentrations are greater than upland concentrations

Opportunities for further cleanup of brownfields to address changing flood or groundwater conditions will vary; remedies are site specific, and there may not be means to compel the further cleanup of certified sites
**Key Issue:**
Wastewater treatment plants are highly vulnerable to flooding, however, the combination of existing infrastructure problems and limited funding may prevent some agencies from fully address the challenges of sea level rise.

If storm events or sea level rise overwhelm and compromise the treatment plants, toxic substances and excessive nutrients could overflow into the adjacent shoreline areas and Bay, degrading water quality and harming fish and other aquatic organisms.
Governance:

Build resilience within Contra Costa County by improving capacity within and cooperation among agencies, organizations, and the community.
Transportation: Rail Lines

Key Issues:
Given the interconnected nature of rail, and lack of redundancy, a disruption of any segment, either within or beyond the project area, could have significant impacts on moving agricultural, automotive, chemical, industrial, and other goods from the region’s seaports to local and national markets.

Collaboration between private rail owners (Union Pacific and Burlington Northern Santa Fe (BNSF)), local agencies that own or manage adjacent lands, and those that rely on rail either for providing service or for flood protection, will be necessary to find and implement appropriate, multi-benefit solutions to address flood risks.

Miles of Rail
- 153.5 miles in the project area, including rail track, sidings, and minor yards
- 14 miles of rail is within or crosses over the current 100-year riverine and coastal floodplains
- 40 miles of rail is exposed to sea level rise, almost half at risk from 4 feet or less
Key Issues:
Agency coordination is required to maintain connections between interstates and local streets and roads. This will increase the complexity, time and cost of planning for and address future flooding impacts.

The lack of planning funds, capital improvement financing, regulatory mechanisms or incentives limits the ability of public agencies to assess or address the impacts of sea level rise, in particular where roadways will be impacted by diminished capacity of the stormwater system or where there will be increase riverine flood risks.
Key Issues:
Increased flooding, higher groundwater levels, and increased tidal, wind and wave energy could have significant consequences on landfill waste containment systems.

Currently, the Regional Water Quality Control Board long-term flood protection requirements are one opportunity for landfills to identify and address increased flood risks due to sea level rise, however, this approach is geared towards site-specific actions, and may not suffice in locations where landscape-scale responses are warranted.
Questions? Discussion? Break?

Waterfront Road – this year!
Outcomes of the Plan Step:

- Adaptation responses for individual assets, agencies, organizations
- Cross-cutting adaptation responses for the key planning issues
- Implementation options
- Evaluation criteria based on resilience goals
An adaptation response is an action or series of actions to address identified vulnerabilities (governance, information, physical, or functional) for individual or multiple assets.

Adaptation responses include:

- The vulnerability being addressed, which provides a direct link to the outcomes of the assessment.
- One or more actions, some that can be taken at the same time and others are sequential and incrementally build towards resilience.
- Implementation options that serve as a guide for those that want to initiate action, including leads, partners, possible funding sources, and ways to mainstream into existing processes.
### Information Vulnerability

#### Vulnerability O4:

There is a limited understanding of how dynamic baylands habitats such as tidal marshes, intertidal mudflats, and subtidal areas will respond to accelerating sea level rise, or how these habitats will be affected by shoreline adaptation responses (e.g., structural solutions such as levees) that may change tide, wave or sediment conditions.

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Action</th>
<th>Action Type</th>
<th>Process</th>
<th>Possible Actors</th>
<th>Action Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>O4.1</td>
<td>Establish and support a regional research agenda to advance the understanding of how baylands will respond to accelerating sea level rise in light of declining sediment supply and limited space to migrate inland</td>
<td>Evaluation, Coordination</td>
<td>New Initiative</td>
<td>EBRPD, HARD, ACFCWCD, SCC, DFW, BCDC, RWQCB, Port, USACE, USFWS, FEMA, City, County, CBOs, Private Sector, SFBRA</td>
<td>Unlocking, Regional, High Priority</td>
</tr>
<tr>
<td>O4.2</td>
<td>Research and test restoration and management actions that will improve baylands resilience</td>
<td>Evaluation</td>
<td>Project Planning and Design</td>
<td>EBRPD, HARD, ACFCWCD, SCC, DFW, BCDC, RWQCB, Port, USACE, USFWS, FEMA, City, County, CBOs, Private Sector, SFBRA</td>
<td>Unlocking, Regional, High Priority</td>
</tr>
<tr>
<td>O4.3</td>
<td>Develop and implement a Regional Sediment Management Plan for the Bay</td>
<td>Coordination, Policy Development</td>
<td>Long-range Planning, New Initiative</td>
<td>CSMW, BCDC, USEPA, USACE, RWQCB, LTMS stakeholders, USFWS, NOAA, City DPW, Flood Control Agencies, Private Sector</td>
<td>Unlocking, Multi-benefit, Regional, High Priority</td>
</tr>
</tbody>
</table>
• Will highlight key issues in the project area

• Will be adequate for certain vulnerabilities, such as systemic issues, information gathering needs, or policy development

• Will set the stage for more focused, landscape or asset scale, assessment and adaptation response development
Focus areas studies based on functions to be protected, issues that cut across multiple sectors, and where there were many vulnerable assets in a specific location – for example ART Hayward and Oakland / Alameda Shoreline Studies

Alameda County ART Assessment

County-scale adaptation responses to address asset category key issues organized by sector

Asset and landscape scale adaptation responses

Focus area asset-scale assessments
**BART Coliseum Station**

**PHYS4:** The A30 pedestrian tunnel is below-grade; there is a sump pump that helps keep the tunnel dry, however this pump system was not designed for major overland flooding events and may be taxed by consistently high groundwater.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>Process</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install manual, remote control, or automatic temporary barriers or waterproof closures to protect at- or below-grade critical elements such as station entrances, tunnels, maintenance facilities, storage areas, and rail alignments</td>
<td>Capital Planning, Operations, Codes and Standards, Project Planning and Design</td>
<td>UP, Amtrak, Caltrans, CCJPA, Cities, Counties</td>
</tr>
<tr>
<td>Construct permanent structures to protect at- or below-grade critical elements such as station entrances, tunnels, maintenance facilities, and asset storage areas, and rail alignments</td>
<td>Capital Planning, Operations, Codes and Standards, Project Planning and Design</td>
<td>UP, Amtrak, Caltrans, CCJPA, Cities, Counties</td>
</tr>
</tbody>
</table>
Long, sloping horizontal levee with habitat supported by treated wastewater discharges

Horizontal Levee Option

- Utility infrastructure protected
- Industrial and commercial lands protected
- Tidal marshes migrate landward and connect with Eden Landing restoration
- Bay Trail on levee with adjacent habitat
- Relocated Hayward Interpretive Center
- Decentralized wastewater system

Hayward Focus Area

Focus Area Boundary
ART Inland Extent
EBDA Pipeline

Scale: 0.25 0.5 1 Miles
KEY ISSUE

Retaining housing is crucial to expediting and ensuring an effective disaster recovery.

Limiting catastrophic housing damage and keeping residents in their homes not only helps people who may lack the resources to effectively recover from a disaster, but also keeps communities intact.
Multi-family residences are often rented, and renters often lack flood insurance, which could provide assistance with replacing damaged personal items or providing an alternative place to live if there was a flood event.

In addition, flooding of multi-family housing with a large number of units could displace a sizable number of renters who would need to find alternative, affordable, housing.

There are seven neighborhood-scale areas in the project area with multi-family residential housing at risk from either current or future flooding. These areas are within the Cities of Richmond, San Pablo, and Martinez and in the unincorporated communities of North Richmond and Rodeo.
Community resilience-building actions:
• Require hazard disclosure for renters
• Advocate for changes to post-disaster federal and state multifamily housing rebuilding programs
• Create a community capacity inventory
• Disseminate best available hazard and climate risk information through community-based organizations and non-traditional partners

Housing resilience-building actions:
• Increase standards in local floodplain management ordinances beyond the minimum requirements of FEMA's NFIP program
• Require flood-proof construction methods and techniques within and adjacent to special flood hazard zones
• Revise minimum building elevation standards and maximum building height-limits for new development
### Community Land Use, Facilities and Services Adaptation Response

**Management Control Vulnerability**

**Vulnerability C4:** Neighborhoods are informal networks whose function depends on the relationship among the individuals and services within them. These informal connections are easily severed during disasters and are often difficult to rebuild once disrupted. Neighborhoods without a strong social network, where residents do not know each other, or are not invested in the overall community good, are especially vulnerable to sea level rise and storm events.

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Action</th>
<th>Action Type</th>
<th>Process</th>
<th>Possible Actors</th>
<th>Action Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4.1</td>
<td>Provide expanded Community Emergency Response Team (CERT) trainings, refresher classes, and annual exercises that include flooding preparedness and response</td>
<td>Education/outreach</td>
<td>Emergency and Hazard Planning</td>
<td>ABAG, CalOES, FEMA, Cities, County, ACPHD, CBOs, NPOS</td>
<td>Multi-benefit, Local, Regional</td>
</tr>
<tr>
<td>C4.2</td>
<td>Coordinate with non-profit, community, and faith-based organizations to build strong social networks in neighborhoods, in particular those with certain characteristics such as less mobile or medically dependent residents</td>
<td>Coordination</td>
<td>Emergency and Hazard Planning, New Initiative</td>
<td>CalOES, FEMA, Cities, County, ACPHD, CBOs, NPOS, Private Sector</td>
<td>Multi-benefit, Local</td>
</tr>
<tr>
<td>C4.3</td>
<td>Provide technical assistance to neighborhoods to support the development and maintenance of disaster plans, including storm evacuation procedures and shelter-in-place guidelines</td>
<td>Education/outreach, Program/operation</td>
<td>Emergency and Hazard Planning</td>
<td>ABAG, CalOES, FEMA, Cities, County, ACPHD</td>
<td>Multi-benefit, Local</td>
</tr>
</tbody>
</table>
What issues will we be developing adaptation responses for in the Contra Costa project area?

Suggestions…issues that:

• Need to be addressed collectively
• Have broad or significant consequences
• Need to be addressed by actions that to implement will take a long time, or the time to accrue benefits will be long
• Affect multiple assets or sectors due to inter-dependencies
• Are focused in specific geographies

Your Thoughts?
Adaptation Response “open house”

- A relatively rapid way for you to gain familiarity with content of the adaptation responses

- An interactive yet self-paced format where you will be able to spend time with the information you are most interested in

- The ART team will document your feedback and explore any of your questions or ideas in greater depth
Next Steps

• Visit the password protected webpage to find and review assessment products

• Provide us feedback or comments before the next meeting

• Ask us to present assessment findings and products to your agency co-workers, decision makers or stakeholders

• Get ready and document upcoming King Tides (california.kingtides.net)