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 #2 – May 28, 2015

Objectives

- Confirm project resilience goals
- Share preliminary assessment findings
- Understand how asset relationships contribute to vulnerabilities and consequences
- Discuss approach to organizing assessment outcomes

Agenda

- 9:30 Welcome, meeting objectives, and announcements
- 9:45 Presentation and discussion: Proposed project resilience goals
- 10:15 Presentation: Preliminary assessment findings
- 10:45 *Break*
- 11:00 Exercise: Understanding Vulnerabilities and Dependencies
- 11:40 Discussion: Approach to organizing assessment outcomes
- 12:00 Wrap-up and Next Steps

Project Timeline

ART Contra Costa Project

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







Expected Project Outcomes

- Assessments at the sector, system, individual asset and component scale
- Consequences on society and equity, the environment and economy
- An understanding of issues that affect multiple assets and jurisdictions
- Adaptation responses that include specific actions, actors, possible funding sources and implementation tools
- Early and **priority actions** identified



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ART Planning Process



ART Contra Costa Project

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

Working Group Meeting #1

Society & Equity Environment Economy Governance IMPLEMENT & MONITOR

Integrate Adaptation Responses into Plans

Evaluate & Select Adaptation Responses

Develop Adaptation Responses

Select Evaluation Criteria

Refine Resilience Goals

PLAN

ASSESS

Review Existing Conditions

Assess Vulnerability

Consider Risks

Vulnerabilities & Risks

Identify Key Planning Issues

DEFINE

Characterize

Project Team

ART Staff Team: leads and manages the project, engages the working group, completes work products

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Working Group: actively participates in the project, attends meetings, provides local data and knowledge, communicates with their own stakeholders, brings additional expertise and perspectives to the project

- Cities
- County Agencies
- Special Districts
- Regional, State and Federal Agencies
- Non-Governmental Organizations
- Private Entities

Other Stakeholders: a wide range of organizations and individuals with interests and perspectives that can provide feedback on project components and outcomes

Project Area



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The shoreline from Richmond to Bay Point, including areas potentially exposed to current and future coastal and riverine flooding



Flooding Impacts and Scenarios

Impacts from either coastal and/or riverine flood events including:

- More frequent flooding in existing flood-prone areas
- More extensive, longer duration flooding
- Permanent inundation
- Shoreline erosion and overtopping
- Elevated groundwater and increased salinity intrusion



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Resilience Goals

Project resilience goals help guide the project

- Goals based on project scope,
 e.g., flooding impacts and
 scenarios, assets, project area
- Opportunity for working group to help define the project scopes
- Should include all four frames of sustainability
- Evaluated midway and changed if appropriate
- Used to develop evaluation criteria to evaluate and prioritize action





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Example Resilience Goals: Hayward

- Protect the health, safety, and welfare of those who live, work, and recreate in the Hayward Shoreline area
- Prevent the disruption of key community services by protecting critical infrastructure
- Protect the environmental value of the Hayward Shoreline area by preserving habitat, water quality, and endangered species
- Build organizational and community capacity so stakeholders can work collaboratively to address future conditions



Hayward Vision: Horizontal levee



Process of developing project resilience goals

- 1. Functions and Values mapping exercise at first working group meeting
- 2. ART staff reviewed exercise outcomes and relevant goals from City and County general, specific and hazard mitigation plans
- 3. Draft project resilience goals presented to working group for review, input and confirmation (today!)
- 4. Will be reviewed and refined by the working group based on the outcomes of the assessment

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

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



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







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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



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Governance

Build resilience within Contra Costa County by improving capacity within and cooperation among agencies, organizations, and the community



Your input!

You can either return the handout today or email us your comments and suggestions by June 12th





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Draft Project Resilience Goals

Project Resilience Goals

The draft resilience goals for the Contra Costa County ART project should be read in context of the project area, assets included, climate scenarios and impacts, and the functions and values identified as important for each participating agency and organization. If you have suggestions or comments on the goals below, please provide them to the ART project team today or by June 12th via email: miriam.torres@bcdc.ca.gov.

Governance

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

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.

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.

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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.

ART Planning Process



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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 Society & Equity Environment Economy Governance

DEFINE

& Risks

Issues

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Vulnerabilities

IMPLEMENT & MONITOR

Integrate Adaptation Responses into Plans

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Select Evaluation Criteria

Refine Resilience Goals

PLAN

ASSESS

Review Existing Conditions

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Working Group Meeting #2

The Assess Step

The assessment has three parts:

- A step-wise exposure analysis that saves time and resources by pinpointing the most pressing issues and areas to explore further
- Assessment questions that help efficiently gather information needed for action identification
- Review and validation of assessment outcomes by stakeholders, asset managers, local and topical experts



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Asset Category



Bay trail and water trail* Brownfields and contaminated lands Commercial land uses Community-supporting facilities* Emergency response facilities* Hazardous Materials Sites Housing Industrial land uses Local, state and interstate roads* Marinas* **ART** Contra

Marine oil terminals* Passenger and freight rail* People and communities* Pipelines Power distribution* Public health infrastructure* Refineries Schools* Stormwater infrastructure* Transit services (bus routes)

^{*} Supplemented by investigating one or more representative asset

Asset Specific



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Manageable number of assets, asset-specific information

- Flood control channels
- Household hazardous waste facilities^
- Landfills
- Parks and natural areas
- Power generation
- Seaport
- Waster transfer stations^
- Wastewater systems[^]
- Water supply systems^
- Investigating individual assets but may combine findings in one profile sheet





Current Coastal and River Flooding

FEMA effective flood insurance rate maps (FIRMs)



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Contact Esri Report Abuse

Future and Current Coastal Flooding

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NOAA SLR viewer 1 to 6 feet at daily high tide (mean higher high water, MHHW)



Future River Flooding

Al Co

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Studies where available or best professional judgment based on current maps

Alhambra Creek







Total Water Level Approach



The "total water level" approach unlocks the NOAA SLR maps because one map = many futures

		Total water level above today's daily high tide,						
		MHHW (inches NAVD88), by tide recurrence interval						
	MHHW	1-yr						100-yr
Sea Level	(≈ daily high	(≈ King	2-yr	5-yr	10-yr	25-yr	50-yr	(1% annual
Rise	tide)	Tide)						chance)
+0	0	12	19	23	27	32	36	41
+6	6	18	25	29	33	38	42	47
+12	12	24	31	35	39	44	48	53
+18	18	30	37	41	45	50	54	59
+24	24	36	43	47	51	56	60	65
+30	30	42	49	53	57	62	66	71
+36	36	48	55	59	63	68	72	77
+42	<u>A2</u>	54	61	65	69	74	78	83
+48	48	60	67	71	75	80	84	89
+54	54	66	73	77	81	86	90	95
+60	60	72	79	83	87	92	96	101

One Map = Many Futures

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NOAA SLR Viewer 4 feet

Permanent Inundation High tide with 48" SLR

Temporary Flooding

1-year tide with 36" SLR

25-year tide with 12" SLR

100-year tide with 6" SLR



Shoreline Delineation

Location and elevation of seven shoreline defense types that can prevent inland flooding:

- Engineered Flood Protection
- Engineered Shoreline Protection
- Embankments
- Transportation Structures
- Non Engineered Berms
- Wetlands
- Natural Shoreline/Beach







Example Exposure Results



Three Land Llose Types	Number of Parcels Exposed				
Three Land Uses Types	Commercial	Industrial	Residential		
Current and future (50-year flood with 3 ft SLR) flooding	61	178	791		
Current 100-year flood only (FEMA FIRM)	194	127	726		
Total	255	305	1517		

	Miles Exposed				
Inree Networks	Bay Trail	Rail	Pipelines		
Current and future (50-year flood with 3 ft SLR) flooding	15	37	50		
Current 100-year flood only (FEMA FIRM)	18	16	63		
Total	33	53	113		

The Assess Step

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Existing conditions questions describe the asset or asset category and highlight any current conditions or stressors that could affect its vulnerability

Examples

- Where is the asset located?
- Who owns and manages it
- What is its function?

EXISTING CONDITIONS: Power Distribution

- Eleven of the 35 substations in the project area are *potentially* at risk of flooding, four of these eleven are owned by PG&E
- Some substations function as nodes along the transmission line system, while others transform high voltage energy into lower voltage
- Substations have local service area and are part of a networked system such that if several are disrupted at once power could be interrupted



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<u>Information</u> questions determine if data or information is lacking, incomplete, poorly coordinated, or difficult to access

Examples

- What types of information sources are publicly available?
- What is the quality of available information?
- What types of mechanisms exist to share information between owners of connected infrastructure?

INFORMATION: State/Interstate Roads

- Most Caltrans planning-grade data (e.g., the location of storm drain and bridge crossings) is readily available and can easily be shared
- Caltrans design and survey-grade data (e.g., as-built plans with elevation information) can be challenging to access because they are created and stored on a project-by-project basis
- Caltrans has a searchable repository of records (e.g., as-built and layout plan sheets), however these are shared as PDFs that are not geo-referenced



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<u>Governance</u> questions identify challenges with management, regulatory authority, or funding options for adapting to impacts

Examples

- What systems are in place to manage the assets?
- What funding sources exist that can be used for adaptation?
- What types of permits are needed to make changes?

GOVERNANCE: Flood Control

- Today's challenges of deferred maintenance, aging infrastructure, and a lack of funding inhibits the ability to manage flood control channels for current, let alone future, conditions
- Prop 13 resulted in frozen/limited funding, e.g., Pinole Creek gets zero dollars while Rodeo and Wildcat-San Pablo Creeks get less than 10% of the current funding needed
- Planning and permitting innovative, multi-benefit flood protection projects, for example reconnecting tidal channels to tidal wetlands systems, is complex and time consuming





http://www.ccrcd.org/

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<u>Functional</u> questions consider the function of the assets and their relationship to or dependence on other assets

Examples

- Does the asset provide functions or services that are limited?
- What services does the asset rely on?
- Is it physically connected to other assets such that failure in one part of the system disrupts the entire system?

FUNCTIONAL: Transfer Stations

- Transfer stations rely on trucks that use local streets and roads for waste drop-off and transport, and both Golden Bear and Contra Costa Waste Transfer Stations have a single access point (entrance/exit) that connect to roads that could flood
- The two waste transfer stations in the project area transport municipal solid waste to the same landfill (Keller Canyon Landfill in Pittsburg) – if this landfill is not accessible waste collection services will be interrupted









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<u>Physical</u> questions identify conditions or design aspects that make an asset particular vulnerable

Examples

- To what extent is the asset exposed to tidal, wind or wave erosion or scour?
- Does the asset have openings are at-grade or belowgrade that are entry points for flooding? Are there pumps or other systems in place to remove floodwaters?
- What water- or salt-sensitive components of the asset are located at- or below-grade?

PHYSICAL: Port of Richmond

- Seaport facilities have been built to withstand existing tidal, wind and wave energy conditions
- Graving basins at historic Shipyard 3 could be inundated and do not have pumps to remove excess floodwaters
- Flooding could damage electrical equipment in the graving basins that is located at- or below-grade
- The Seaport does not have a system to pump groundwater, and rising groundwater may cause nuisance flooding and increased liquefaction susceptibility of Port facilities as well as the Port's landside connections







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<u>Consequences</u> questions informs how climate change may impact society and equity, the economy and environment.

Examples

- How would the community, particularly at-risk members, be affected by damage, disruption, or loss of asset function?
- What critical emergency services would be affected if the asset was damaged, disrupted or failed?
- If the asset was damaged, disrupted or failed would there be a loss of public access, recreational, educational or interpretation?

CONSEQUENCES: Community Services

- The County has limited public health infrastructure to serve residents with medical or special needs, and flooding could limit access to needed services even further
- Critical emergency services are provided by fire stations and law enforcement facilities in the project area, and if these facilities were flooded local capacity to respond to emergencies or disasters would be affected
- City shoreline parks offer local recreation such as playgrounds, sports facilities, and fishing piers that if damaged would greatly limit local opportunities to access the shoreline and engage in passive or active recreation









Preliminary Assessment Answers

ART staff has compiled preliminary assessment information

- Using readily available data, maps, studies
- By contacting working group members for additional information

Examples Information Sources

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Integrated Regional Water Management Plan CA Department of Transportation California Energy Commission California Public Utilities Commission County and city plans (General Plans, Capitol Plans, Emergency Operations Plans, Zoning Code) County and city special studies County Tax Assessor Parcel Data Local Agency Formation Commission MTC 2011TeleAtlas National Pipeline Mapping System PG&E Plan Bay Area's Sustainable Community Strategy **Regional Housing Needs Assessment** State Employment Statistics State Water Resources Control Board Geotracker U.S. Census / American Community Survey **Urban Water Management Plans US EPA Envirofacts**

Working Group Review and Input

Answers to the assessment questions are ready for working group review and input

Draft profile sheets that summarize the assessment findings are also ready for working group feedback

All materials communicating the assessment outcomes will be available for working group review before they are finalized and shared with other

XISTING CONDITIONS describe the asset and highlight current conditions or stressors.			
Questions	Answers (include data sources)		
1. Briefly describe the asset and its functions, e.g., service area, level of service provided for commuter or goods movement.	Caltrans Assets in Contra Costa County: I-80: The highway connects Contra Costa County to the region and Solano County through the Carguings bridge. "The bridge carries approximately 104,000 vehicles per day." ¹ Averag daily traffic on I-80: 290,000 vehicles, it is one of the most congested freeways in the region. ² It is a route of regional importance, truck route 14 and carries the third-largest truck volume in the region. ³ This segment currently has eight lanes (4 in each direction). I-580: The highway connects Contra Costa County to the region and Marin County through the Richmond-San Rafael Bridge. Average daily traffic on I-580: 67,000 vehicles ⁴ Route of regional importance, Truck route 13 / 21. ² I-680: The highway connects Contra Costa County to the region, including Santa Clara, and Alameda Counties and to Solano County through the Benicia-Martinez bridge. As of 2000, the highway lanes ranged from 8 to 10 to 6 from South to North. Annual average daily traffic on I-880 at Waterfront, Marina Vista: 100,000 vehicles. There is a Park and Ride Lot and Maintenance Yard at Willow Ave. In Hercules (southeast corner of I-80 and SR-4) that is on the edge of the 100-year floodplain. The two toll plazas in the study area (I-580, Richmond-San Rafael Bridge and I-680, Benicia-Martinez Bridge) are both located on high ground well above future projected SLR Inundation areas and floodstones.		
2. Where is the asset located and what is its geographic extent? Attach maps or diagrams if necessary.	Within the ART project area: 1-80: I-80 begins at the Contra Costa County boundary with Alameda County and continues north to the <u>Carquings</u> Bridge. 1-580: From the Alameda County boundary in Richmond to the Richmond-San Rafael Bridge 1-680- From the Alameda County line near Dublin to the Benicia-Martinez bridge. San Pablo Ave runs from the City of El Cerrito at the Contra Costa County boundary to Crockett, connecting to 1-80.		
3. Is asset located within a FEMA Special Flood Hazard Area (SFHA), e.g., within the current 100- year floodplain (1% annual chance event12 is it located	The I-80 area in FEMA's 100-YR and 500-YR floodplain: from the San Pablo Ave. interchange to the <u>Carquinez</u> bridge in Crockett [®] . CC-80-13.8/14.139		

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Understanding Vulnerabilities and Dependencies

- Identify the relationships and connections among assets
- Explore the vulnerabilities of assets, particularly those related to asset function and connections
- Discuss the consequences of the vulnerabilities and how they affect different assets, sectors, and scales







Understanding Vulnerabilities and Dependencies



Organizing Assessment Outcomes

Why spend time on organizing the assessment outcomes?

- A robust assessment can result in hundreds of vulnerabilities
- Many assets share similar vulnerabilities and may need a similar or shared solution
- Some vulnerabilities are best addressed by individual asset managers and owners
- Some issues cannot be solved without collective action because the issue is the result of multiple vulnerabilities that have high consequences
- In certain locations geography matters and vulnerabilities need to be considered together





AR Cost

- 1st: Assessment answers are summarized into clear, outcome-oriented statements that describe the vulnerabilities and consequences of the sectors, asset categories, and specific geographies evaluated
- 2nd: Outcome-oriented statements are organized based on the findings of the assessment to support adaptation and implementation, e.g.;
 - ✓ By geography
 - ✓ By sector
 - ✓ By owner
 - ✓ By consequence
 - \checkmark By timing

Example Organizational Approaches

- Geography
 Hayward Shoreline
- Sector

Overarching, Community Land Use, Transportation, Utilities, Shorelines

Owner or Manager

Shoreline parks owned or managed by EBRPD Capitol Corridor intercity passenger rail service

Consequence

Certain Land Uses, Emergency Preparedness and Response, Populations Characteristics, Networked Infrastructure, Information Gaps

• Timing

Of the impact, how long to implement response, how long to accrue the benefit





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Next Steps



- Your feedback on how we should organize the assessment outcomes
- Your input on project resilience goals
- Asset owner, manager or topical expert review of assessment answers
- Visit the project webpage!
- Next meeting: End of July



http://www.adaptingtorisingtides.org/workinggroups-overview/contracosta/

Example Resilience Goals

Hayward Shoreline Resilience Study

Prevent the disruption of key community services by protecting critical infrastructure

Oakland/Alameda Resilience Study

Protect local and regional economy by preserving major employment centers, airport services, regionally significant transportation, and local infrastructure investments



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Contra Costa ART Assessment



Winter 2015

Assessment Scope: ART staff and working group determined if specific assets or asset categories as a whole will be assessed

Winter/Spring 2015

Assessment Questions: ART staff used desktop research and reached out to working group members to gather preliminary assessment

Spring 2015

Exposure Analysis:

ART staff is using available data to analyze current and future flooding until further studies are complete

Spring/Summer 2015

Review and Validation:

ART staff is sharing preliminary assessment findings with working group members for review and input