

Adapting to Rising Tides

A regional program that uses findings, processes, tools and relationships built by ART and its partners to lead and support efforts that increase the resilience of Bay Area communities to sea level rise and storm events



San Francisco Bay Conservation and Development Commission
www.adaptingtorisingtides.org

Adapting to Rising Tides

Why focus on understanding and addressing flooding in the Bay Area?

While storm events and sea level rise will be an issue for all of California, the Bay Area has unique challenges:

- Some of the region's highest density development, including homes and job centers, are located on the shoreline
- Many shoreline communities and businesses rely on ad-hoc flood protection, in some cases roadways or rail lines, to keep them dry during extreme high tides and storm events



ART Program Objectives

- Provide guidance and support to lead or assist successful adaptation efforts at local, regional and sector scales
- Leverage best available data, information and research to support local and regional efforts
- Continue to develop and refine approaches that lead to action
- Provide consistent assessments that address regional issues and provide a foundation for local action



ART Alameda County Project

Initiated in 2011, the **ART Alameda County Project** was the first in the region to evaluate current and future flooding across multiple jurisdictions and sectors

Key factors of the ART approach – **collaborative by design, a transparent process, and sustainable from start to finish** – were foundational to the project

Project Area



Sectors

- Airport
- Community characteristics
- Community services
- Contaminated lands
- Energy, pipelines, telecom
- Flood control
- Hazardous material sites
- Ground transportation
- Parks and recreation
- Natural shorelines
- Residential land uses
- Seaport
- Storm water
- Structural shorelines
- Wastewater

Working Group
ART emphasizes close collaboration among stakeholders to ensure a shared understanding of the issues, build trust, and achieve buy-in for shared solutions and joint action



ART Alameda Project Outcomes

- ✓ Issue papers, many reports, maps, data, etc
- ✓ A clearly defined approach to adaptation planning
- ✓ A road-tested **planning process**



ART Program Projects



ART Contra Costa Project

Expected Project Outcomes

- A robust and transparent near county-scale assessment of current and future flooding
- A working group of public, private, and community stakeholders with capacity to further adaptation assessment and action
- An integrated understanding of how flooding could impact all frames of sustainability (society and equity, the environment, economy and governance)
- A clear and compelling case for taking action to solve near term issues and work together on longer term challenges



Contra Costa ART Project Timeline



Stakeholder Working Group

- **County Agencies:** Conservation and Development, Flood Control, Public Works, Health Services, Mosquito and Vector Control, Office of Emergency Services
- **Cities:** Planning and Public Works
- **Special Districts:** Water, Wastewater, Parks
- **Regional, State and Federal Agencies:** ABAG, MTC, Congestion Management/Transportation, NOAA, FEMA
- **Private Entities and Non-Governmental Organizations:** Power, rail, refineries, industrial alliances and councils, community based organizations



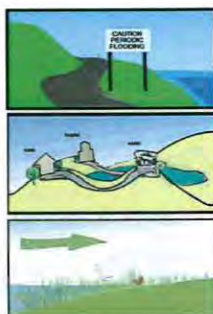
Contra Costa ART Project Area



Flooding Impacts and Scenarios

Impacts from coastal and/or riverine flood events including:

- More frequent flooding of existing flood-prone areas
- Flooding in areas that are not currently at risk
- Elevated groundwater and increased salinity intrusion
- Permanent inundation along the shoreline, in particular tidal wetland systems
- Shoreline erosion and overtopping



Sectors and Assets

Community Characteristics

Individuals, households, neighborhoods

Residential Housing

Single-family, multi-family, mobile homes

Community Facilities and Services

Public health infrastructure
Emergency facilities and services
Waste collection and transfer stations
Commercial land uses

Industrial Land Uses

Industrial land uses
Brownfields
Hazardous Materials Sites
Landfills (closed and open)

Parks and Recreation Facilities

Shoreline parks
Bay trail
Marinas

Water Management

Water supply
Wastewater
Flood management
Stormwater infrastructure

Transportation

Passenger and freight rail
Local, state, interstate roads
Bay trail
Seaport (Port of Richmond)
Marine oil terminals

Energy and Fuel Supply

Pipelines
Refineries
Power generation
Power distribution (substations)

Contra Costa Assessment

ART Contra Costa Project

The assessment included:

- An exposure analysis that determined what assets may experience flooding
- Answers to ART assessment questions that reveal existing conditions and characteristics that make assets vulnerable
- Consideration of the consequences of asset vulnerability on all frames of sustainability
- Review and validation of the findings by working group stakeholders, asset managers, local and topical experts

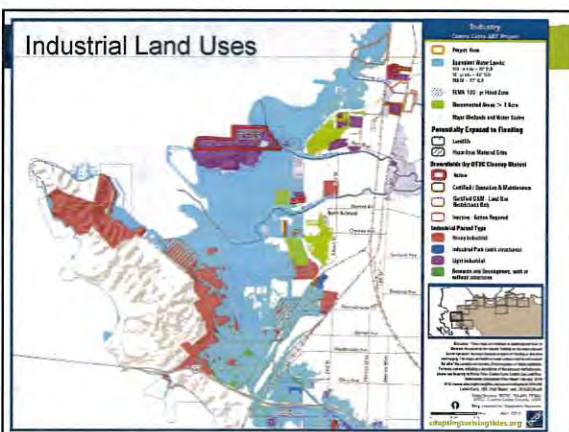


Shoreline Mapping and Analysis

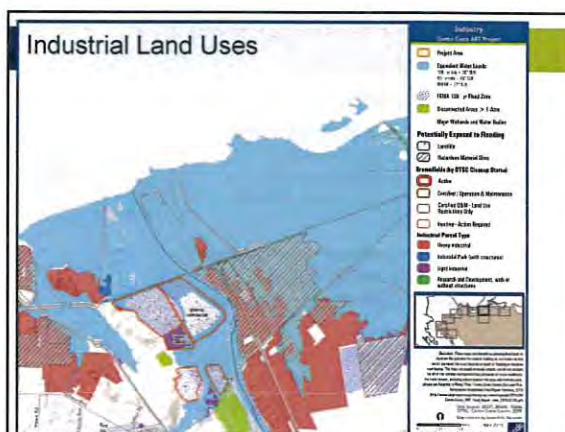
- Ten new locally refined maps representing different amounts of sea level rise (0 to 66") and tide levels (daily high tide to 100-year extreme tide)
- Mapping of the shoreline by type, location and elevation
- Analysis of where the shoreline may be too low resulting in overtopping
- Use of FEMA's new effective FIRMs to understand current coastal and riverine flood risk



Industrial Land Uses



Industrial Land Uses



Findings: Industrial

ART Contra Costa Project

- 128 industrial parcels in the project area are in the 100-year floodplain.
 - 1/2 are heavy and 1/2 are light industrial
 - 3/4 may experience more extensive or frequent flooding as sea level rises
- 137 parcels not in the current floodplain could experience flooding as sea levels rise – most of these are light industrial



Key Issues:

While heavy industry comprises 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 in the current 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.

Findings: Pipelines

ART Contra Costa Project

- 276 miles of pipeline in the project area
- 55 miles in the 100-year floodplain
- 51 miles exposed to 6 ft of sea level rise



Key Issues:

Exposure to salt water can corrode pipes, and pipelines that are not weighted or anchored may float during prolonged flooding 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.

Findings: Brownfields

ART Contra
Costa Project

- The majority of Brownfields at risk are in the City of Richmond (63)
- 22 of the 28 Brownfields in the current 100-year floodplain are at greater risk due to sea levels rise
- 10 Brownfields not currently at risk could experience flooding as sea levels rise



Key Issues:

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

Opportunities for further brownfields cleanup to address changing flood or groundwater conditions will vary, and there may not be means to compel the further cleanup of certified sites

Findings: Hazardous Materials Sites

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- 1287 Hazardous Materials Business Plan sites in the project area
- 226 sites are in the current 100-year floodplain, 76 of these are at greater risk due to sea levels rise
- 103 sites are not within the current floodplain but are at risk of future flooding due to sea level rise



Key Issues:

Facilities may be particularly vulnerable if materials are stored at or below grade, are improperly contained, or if there is not time to safely shut down operations in advance of a storm

Managers and owners of sites not currently in the floodplain may not be aware of the flood risks, and therefore may not be planning, preparing or operating in a manner to reduce the impacts of flooding should they occur

Opportunities to Responses

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Plan and Policy Actions

- Require facilities to consider sea level rise, storm events, and elevated groundwater in emergency plans, facility operations plans, and capital improvement plans
- Prioritize the remediation of contaminated sites based on the timing of exposure, degree of vulnerability, and extent of the consequence
- Evaluate and recommend new standards and practices for facilities that are vulnerable to current and future flooding



Opportunities to Responses

ART Contra
Costa Project

Capacity Building Actions

- Develop and keep current a centralized system with information about contaminated lands and hazardous materials sites needed to prepare and respond to a flood event
- Facilitate greater communication and coordination between those that own/manage the shoreline and those that own/manage the assets protected by these shorelines
- Increase inspection and reporting for facilities with infrastructure or hazardous materials on site that are sensitive to water, salinity, or elevated groundwater



Opportunities to Responses

ART Contra
Costa Project

Education and Outreach

- Educate a broad audience of facility owners, site operators, private business owners, and the general public about the risks of, and how to respond to, current and future flooding
- Encourage facilities that could be exposed to flooding to reduce the amount of hazardous materials stored on site



Contra Costa ART Project

How to Get Involved

Visit the project website:

<http://www.adaptingtorisingtides.org/project/contra-costa-county-adapting-to-rising-tides-project/>

Join the working group:

Next meeting: Adaptation Open House in June (day/location TBD)

Contact ART Program staff:

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