

GOAL: Describe timing considerations and confirm assessment findings.

1. Kinds of exposure

Map: Rodeo Creek (because FEMA Flood Insurance Rate Maps (FIRMs) relatively accurate for Rodeo)

Current flood risk

- FEMA FIRMs overlay of the 100-year coastal and riverine floodplains, whereby the 100-year tide sets the downstream flood extent and the 100-year flow sets the upstream extent (@ MHHW).
 - Coastal flooding ~ Bay side of the RR
 - Zone VE and Zone AE
 - BFEs may differ dramatically within a small area because waves can diminish in size over a short distance upon encountering obstructions or steep ground.
 - Riverine flooding ~ USACE 100-yr channel design now only conveys 15-20-year flow (sedimentation; anyone remember how close things got during 2006 New Year's storm?!)
- The joint probability of coincident riverine and coastal events – high tide during storm events -- likely increases the elevation and extent of the 100-year floodplain, but FEMA FIRMs depict the higher of the two flood elevations where riverine and coastal floodplains overlap.

Future flood risk

- FEMA FIRMs do not factor in sea level rise and therefore do not illustrate the community's future increased flood risk.
- HOT extends to 3rd St (upstream is regulated floodway) and sea level rise will cause the tides to extend further ('migrate') upstream and raise water levels in the creek.
- This will progressively reduce the capacity of the creeks to discharge flood flows, such that smaller, more frequent storms will cause overbank flooding and stormwater backups, particularly in low-lying areas that will no longer be able to effectively gravity drain against the higher downstream tidal condition.
- Sea level rise may worsen flood risk in existing flood zones and bring new areas into the floodplain (photos 1, 2, 3 illustrate progressive risk).

2. Short/long-term impacts and temporary/permanent inundation

Map: Vulnerabilities adjacent to Walnut Creek

Setting: Very high tides typically overtop the channel levees along the west side of lowermost Walnut Creek and flood Waterfront Road (parallel to Union Pacific Railroad, UPRR), blocking traffic into and out of the Tesoro Refinery. The west side of the creek between UPRR and BNSF also has drainage issues.

Acme Landfill (short/long and temporary/permanent?)

INFO: There is a lack of publically available and centrally coordinated information for contaminated lands and hazardous materials in the Vine Hill area, including the Acme Landfill, which is needed for effective emergency and adaptation planning and response, particularly to protect nearby communities and ecosystems.

BACKGROUND: Acme Fill Corporation owns and manages the landfill, which provides permanent containment for hazardous and municipal waste as well as some active waste disposal services. The landfill consist of a 516-acre landfill consisting of three separate waste disposal sites: the North Parcel, a closed 135-acre Class I (hazardous waste) landfill; the South Parcel, a closed 22-acre closed Class III landfill; and the East Parcel, an active 87-acre Class II landfill that is scheduled to close in 2021. There is a groundwater and leachate monitoring system in place. The Department of Toxic Substances Control (DTSC) oversees monitoring of the North Parcel, due to the presence of hazardous waste. Permits are also required from the Regional Water Quality Control Board and CalRecycle for operation of the leachate system and ongoing waste collection. Acme Landfill is inspected monthly by the Contra Costa Health Services Environmental Health Division.

All three parcels are within the 100-year floodplain. Although the landfills may not be directly flooded due to their elevation, the base of the landfills and lower-elevation facilities on site could be at risk. Access to the landfills could also be compromised in a flood event. Protection from flooding will require coordination with the Contra Costa Flood Control District, as well as railroad and wetlands managers to the north.

QUESTIONS: Has there been a past release of contaminants into the environment at Acme Landfill? Do any of the three landfills have liners/what is the risk of leaching with rising groundwater? Where does the leachate treatment system discharge? Is Pittsburg Landfill an alternative site?

Tesoro (short/temporary impacts)

FUNC4: Access to and from the refinery could be disrupted if key roads or access to these roads is disrupted by flooding during a storm events, for example Highway 4, Imhoff Drive, or Marsh Drive all which cross Walnut Creek.

*Note, similar situation with Vine Hill Complex and Contra Costa Waste Transfer Stations

BACKGROUND: The primary purpose of an oil refinery is to process crude oil to make petroleum products and other chemicals, including motor gasoline, jet fuel, diesel fuel and lubricants. Connections to the Tesoro site are essential to refinery operations. Pipes, pumps, electrical utilities, and other mechanical equipment connect services and operations located on site. Transmission lines, roads, interstate roads (i.e. I-680), terminals, pipelines (i.e. Kinder Morgan) and rail (i.e. Union Pacific) connect the refinery to services and markets located off site. Tesoro receives water from the Contra Costa Water District and is developing a plan to use

recycled water from Central Contra Costa Sanitary District. The Refinery treats wastewater onsite and the treated water is discharged into Suisun Bay, Pacheco Slough, or Hastings Slough, depending on the wastewater type.

Often, refinery operations and associated industries are co-located. For example, in addition to Tesoro's refinery operations, the site includes the Amorco (import) and Avon (export) Marine Oil Terminals and seven facilities that are owned and operated by other companies who either own or lease the land where the facility is located: Chevron Products Company bulk fuel terminal; a Monsanto catalyst and chemical manufacturing plant; a Shell Oil Company crude oil pump station and pipeline; a Kinder Morgan refined product pump station and the Santa Fe pipeline; a Foster Wheeler cogeneration plant; an Air Liquid plant where CO₂ and compressed natural gas are manufactured; an Air Products hydrogen gas plant; Wickland Oil Company and Shore Terminals LLC pipelines and Tosco (via its successor ConocoPhillips) parcel that includes Tank 241 and its associated piping, valves, connections, and containment structures.

QUESTIONS: How does Tesoro handle flooding now? How do you plan for temporary flooding on roads (no real standards for passable/impassable)?

Marshes (long/permanent flood impacts)

PHYS: The brackish marshes in this area (Bullhead, Pt. Edith, and Pacheco) are mostly mid-marsh and predicted to drown around 2070 depending on sea level rise rates and sediment supply.

BACKGROUND: Point Edith Marsh is the largest marsh in the project area and is managed by the California Department of Fish and Wildlife. (Concord Naval Weapons Station Marsh is actually just a bit bigger, but is managed by the Department of Defense and information is very limited.) Sea level rise will increase the depth, duration, and frequency that Point Edith Marsh is flooded, such that mid-marsh will downshift to low marsh and then mudflat. The marsh supports black rails (threatened), Ridgway's rails (endangered), the salt marsh harvest mouse (endangered), and thousands of shorebirds and waterfowl. In addition, Point Edith Marsh is approximately 6,400 feet wide and studies show that approximately 1,000 feet of tidal marsh can reduce wave height and energy associated with extreme storm events by over 50%, where increased width increases the natural flood protection benefits and decreases the necessary height of the inland levee. If no actions are taken, the wildlife habitat and flood protection benefits that the marsh provides will be lost.

There are governance challenges in implementing marsh restoration and enhancement actions. Already, the process of obtaining permits from U.S. Army Corps of Engineers, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the San Francisco Bay Regional Water Quality Control Board, the California Department of Fish and Wildlife, and the San Francisco Bay Conservation and Development Commission as well as obtaining local authorization from cities or counties is cumbersome and time-consuming. Projects that cross paths with railroad tracks, highways, pipelines, and PG&E towers require additional approvals.

All of these entities can and do require design and monitoring changes according to their specific laws, policies, and cultures.

QUESTIONS: Accommodation space for them to migrate landward to avoid being squeezed between development/transportation assets and a rising Bay?

Walnut Creek Flood Control Channel

GOV: At present, there is no framework for planning and permitting innovative, multi-benefit flood protection projects.

BACKGROUND: Contra Costa County Flood Control and Water Conservation District (CCFC&WCD) is working on the innovative Lower Walnut Creek Restoration Project to reduce current flood risk, improve wildlife habitat, accommodate sea level rise, and provide more recreation opportunities. While Lower Walnut Creek was designed to provide 100-year flood protection, the current level of protection is approximately a 40-year storm due to increased development in the watershed and channel sedimentation. CCCFC&WCD requested from Congress that the lowermost four miles of the USACE Walnut Creek Project be reauthorized so that it is no longer subject to USACE standards. This work is being conducted in conjunction with the San Francisco Estuary Institute's regional Flood Control 2.0 project, which aims to develop approaches to reconnect watershed freshwater flows and sediment transport to marshes. Increasing the sediment supply to the marsh and identifying transition zone habitat would help Point Edith Marsh build upward or move landward to avoid drowning as sea level rises.

Just upstream of the Lower Walnut Creek Restoration Project, CCCFC&WCD is working with Central Contra Costa Sanitary District (CCCSD) to rehabilitate the levees protecting the Wastewater Treatment Plant just north of Highway 4. The levees protecting the plant currently provide protection from a 100-year storm but lack freeboard. CCCFC&WCD and CCCSD are sharing the cost to increase flood protection to a 500-year storm with freeboard, taking sea level rise into account, because the facility is extremely sensitive to flood damage. Project completion is anticipated by the end of 2018.

QUESTIONS: Preliminary results on how joint coastal-flooding will affect protection? How will restoration project be funded? How does Flood Control 2.0 fit into local planning (are those findings being adopted/implemented?) Does CCCFCWCD have good relationships with neighboring landowners?