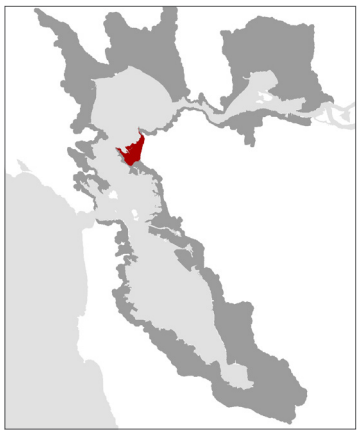
A view of the Wildcat OLU looking southwest from the Giant Marsh. Photo by SF Baykeeper, Cole Burchiel, and LightHawk.

Local Assessments Section F: WILDCAT *Operational Landscape Unit*

JURISDICTIONS WITHIN THIS SECTION

Contra Costa County

Richmond
San Pablo
North Richmond



HOW TO USE THE LOCAL ASSESSMENTS

WHO IS THIS FOR?

Anyone interested in understanding their local shared vulnerabilities to flooding and sea level rise.

Local jurisdictions
- Cities
- Counties
- Special Districts
- Utilities Providers

Stakeholder Groups
- Non-profits/NGOs
- For-profits/Private Associations
- Interested Parties

General Public
- Residents

State/Regional
- Caltrans
- MTC/ABAG

HOW IS IT ORGANIZED?

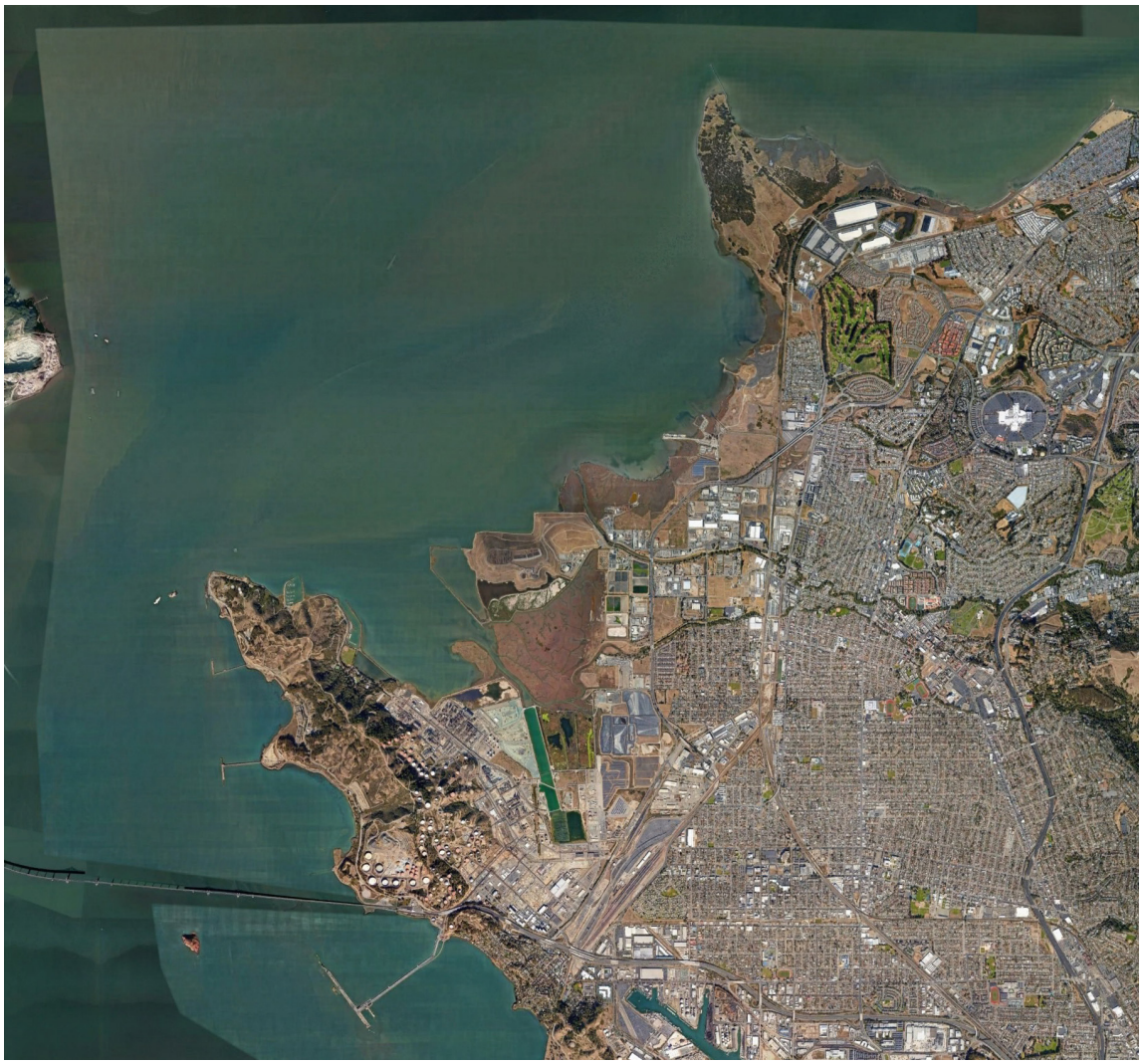
Local assessments are organized by four regional systems assessed: Transportation, Vulnerable Communities, Priority Development Areas (PDAs), and Priority Conservation Areas (PCAs).

Each part of the local assessment provides varying levels of details at three scales: 1) Operational Landscape Unit (OLU), 2) Individual Descriptions, and 3) Shared Stories of Vulnerabilities in Focus Areas/Areas of Impact. This assessment can be reviewed in whole, or individual parts can be reviewed separately depending on interest and level of detail desired.

WHAT'S IN THIS ASSESSMENT?

Where are we in the region?

Located in western Contra Costa County, the Wildcat OLU stretches from Point Pinole to Point San Pablo. This OLU is characterized by large tidal wetlands, numerous tidal creeks and channels, treatment ponds, light and heavy industrial parcels associated with the Chevron Refinery, rail yards, and residential uses primarily in unincorporated North Richmond. Current and historic industrial uses have left a legacy of contamination along the shoreline[1]. The shoreline is characterized by a mix of levees, berms, embankments, tidal marsh wetlands, transportation structures (e.g., rail and roadbeds), and other structures that provide flood mitigation for Richmond's shoreline and creek channels.



Approximate area of the Wildcat OLU. Map data © 2019 by Google

FOCUS AREA A:
North Richmond

AREA OF IMPACT B:
Castro Street

San Pablo Bay

Parr Blvd

North Richmond PDA

SF Bay Trail

Richmond Pkwy

UPRR

AMTRAK/CC

BNSF

RPRC

Chevron Richmond Refinery

Castro St.

BNSF

I-580

SF Bay Trail

Port of Richmond

Contra Costa

N

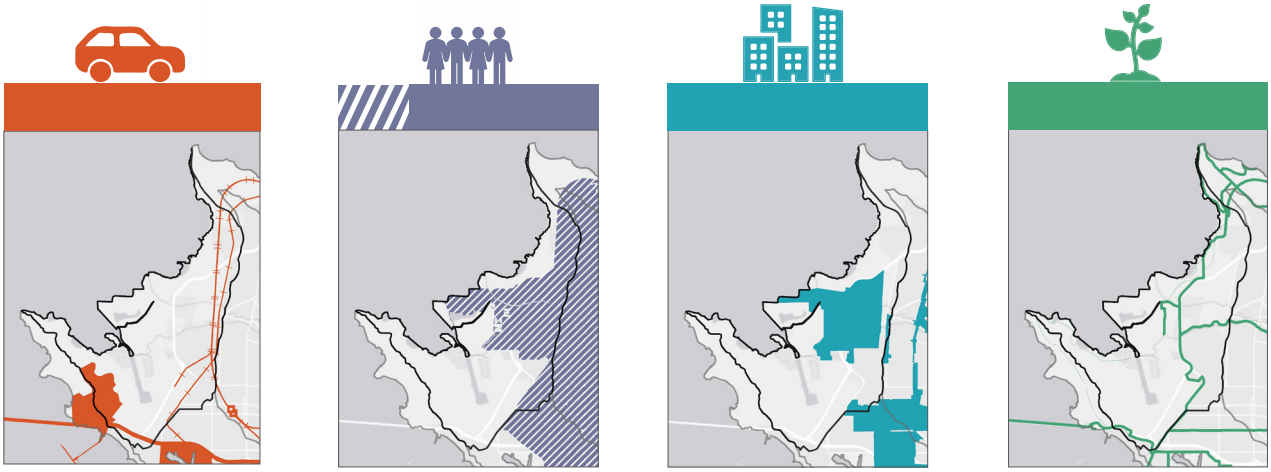
0 0.5 Miles

What regional systems are here?

Operational Landscape Unit (OLU) boundaries were used to organize and help identify regionally significant assets that were co-located together (Methodology can be found in Section 3.0 Local Assessments).

The map on page 4 shows the entire OLU, including all the regional systems present. Colors are used throughout this document to help navigate across these four regional systems. Individual assets that were assessed as part of this local vulnerability assessment are listed in the bullets below and can also be found on the labels on the map (Figure 1f).

Figure 1f. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN BELOW:



TRANSPORTATION

- Union Pacific Railroad
- Burlington-Northern Santa Fe Railroad
- Richmond Pacific Railroad
- I-580
- Chevron Richmond Refinery
- Local Roads

VULNERABLE COMMUNITIES

- North Richmond Community

PRIORITY DEVELOPMENT AREAS (PDAs)

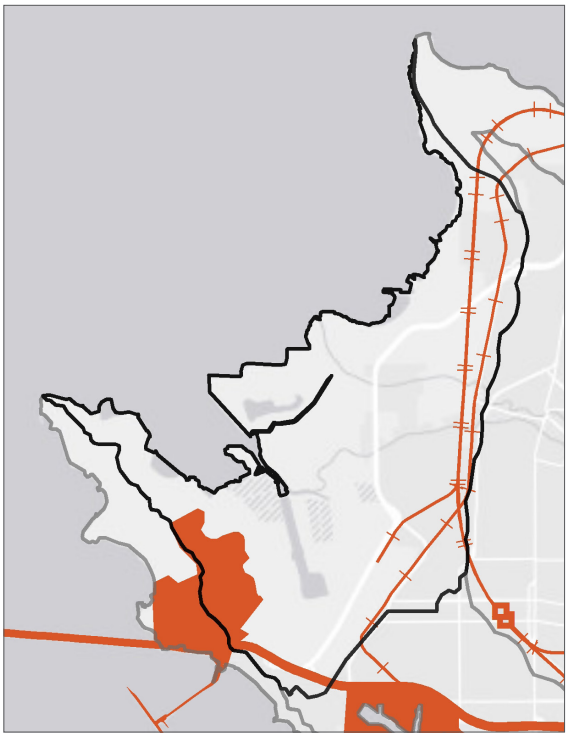
- North Richmond PDA

PRIORITY CONSERVATION AREAS (PCAs)

- San Francisco Bay Trail PCA

What was assessed?

TRANSPORTATION



Richmond Parkway. Map data © 2019 by Google.

Union Pacific Railroad (UPRR) • Union Pacific Railroad is an important heavy freight rail supporting the reliable movement of goods to markets across the Bay Area. The Union Pacific Martinez Subdivision between the Port of Oakland and Martinez is the busiest rail segment in Northern California, carrying both goods and commuters. Freight volumes on the Union Pacific Martinez Subdivision are the highest in the region, and overall freight rail demand is anticipated to grow throughout the Subdivision, making it the largest bottleneck on the freight rail system in the Bay Area.[2] The rail connects many Bay Area ports and connects to areas outside the region. UPRR owns the right-of-way for the rail line from the county boundary in Richmond, around the coast, and past I-680. On this rail line, the Burlington Northern Santa Fe (BNSF) and Richmond Pacific Railroad (RPRR) have trackage rights, while Amtrak, Capitol Corridor, and San Joaquin have passenger rights. Within this OLU, the UPRR follows Richmond Parkway before heading north and paralleling the BNSF line in Pinole. Hazardous materials are also transported through this corridor. Large segments of the rail line near Castro Street, including a large siding rail yard used by UPRR, RPRC, and BNSF, are exposed to flooding starting at 48" TWL.

Burlington Northern Santa Fe • Burlington Northern Santa Fe (BNSF) owns and operates rail line from Richmond to Martinez, although UPRR holds trackage rights in this segment that are not currently in use. The BNSF line parallels the UPRR line from Richmond to Pinole, heads inland, and then rejoins the UPRR line near Bay Point. BNSF operates between 20-30 freight trains on the BNSF owned rail lines.[3] Hazardous materials are also transported through this corridor.[4] Large segments of the rail line near Castro Street, including a large siding rail yard used by UPRR, RPRR, and BNSF, are exposed to flooding starting at 48" TWL.

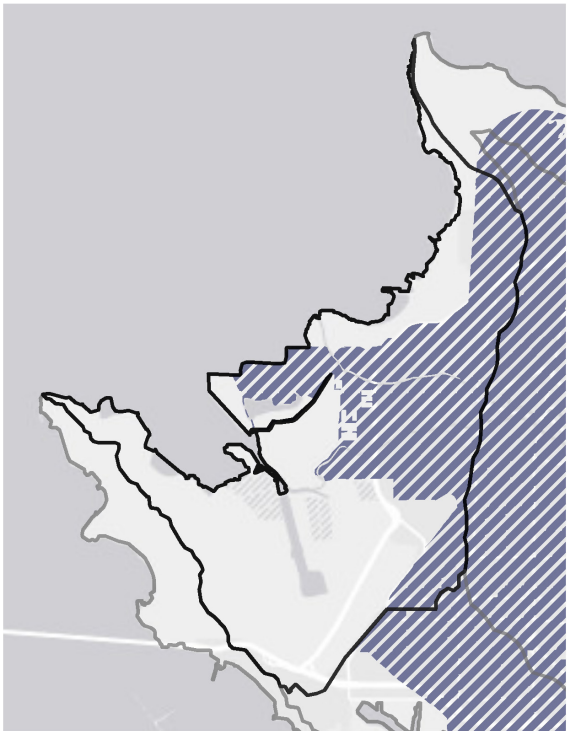
Richmond Pacific Railroad Company (RPRC) • Richmond Pacific Railroad is short-line railroad terminal owned by the Levin-Richmond Terminal Corporation. The RPRR leases 11 miles of track, owned by UPRR and BNSF, in the shipping terminal and wharves supporting operations at the Port of Richmond.[5] The RPRC interchanges with the UPRR and BNSF. Cargo includes stone, ores, lumber, food products and petroleum products.[6] Hazardous materials are also transported through this corridor. RPRC runs two trains with 10 to 20 cars on the northern tracks, and as many as 32 trains with two to 20 cars per day on the southern tracks and handles over 22,000 carloads annually.[7] Large segments of the rail line near Castro Street, including a large siding rail yard used by UPRR, RPRC, and BNSF, are exposed to flooding starting at 48" TWL.

I-580 • Interstate 580 is an east-west interstate highway, running from San Rafael to Tracy in the Central Valley. It provides regional connection from the Bay Area to the southern San Joaquin Valley and Southern California via I-5. The section of I-580 in this OLU is a connection point for the Port of Richmond as well as connection with Marin County and US-101 via the Richmond-San Rafael Bridge and averages 84,500 vehicles[8] and 5,476 trucks[9] per day. While I-580 is not directly flooded within this OLU, Richmond-San Rafael bridge touchdowns in San Rafael flood at 12" TWL and on-ramps from the Port of Richmond (at Canal Street) flood at 48" TWL.

Chevron Richmond Refinery • Chevron's Richmond Refinery site includes refinery operations (e.g., distillation towers, cracking units, cooling towers, storage tanks), a marine oil terminal, a co-generation power plant (125 MW capacity), stormwater and industrial wastewater treatment ponds, and EBMUD's Richmond Advanced Recycling Expansion. Connections on and off the site are essential to the operation of the refinery. Pipes, pumps, electrical utilities, and other mechanical equipment connect services on the refinery site. Transmission lines, roads, interstate roads (i.e. I-580), terminals, pipelines, and rail (UPRR and BNSF) connect the refinery to services and markets located off-site. The refinery's tank farm is located at higher elevation, but the refinery process area and off-site connections are located at lower elevation.[10] Low-lying areas south of the 250 Foot Channel begin to flood at 48" TWL. At 52-66" TWL, the majority of the refinery is flooded as well as access via Castro Street. In addition, elevated groundwater levels may impact existing groundwater containment and extraction systems (groundwater protection system) and may interfere with the refinery's capacity to collect and treat wastewater, groundwater seepage, and stormwater runoff, and consequently discharge these water sources through the existing system of deep-water and perimeter outfalls.

Local Roads • Garden Tract Road (exposed at 36" TWL) and Parr Boulevard (exposed at 48" TWL) provide access to municipal facilities in North Richmond. Castro Street is an important linkage to I-580 and exposed to flooding at 48" TWL and I-580 on-ramps at 66" TWL. Richmond Parkway is a critical north/south arterial through North Richmond and exposed at 84" TWL.

Industrial freight rail coming off of the RPRC line. Photo by BCDC



North Richmond. Map data © 2019 by Google.

North Richmond • For the purposes of this report, eight block groups were assigned to a functional community called "North RIchmond." The block groups that were assessed can be referenced in the Appendix. This is a placeholder designation for a set of block groups that have a moderate, high, or highest social vulnerability ranking within the North Richmond area. We have provided some history and context for these areas, primarily gathered via desktop research, and in some cases stakeholder and community vetting. This should be considered a starting point. Before this is used for any planning purposes, this data should be ground-truthed and vetted with the communities considered. Similarly, block groups or communities with a similar vulnerability rank could and likely will have very different needs, considerations, and capacities that are critical to bring into the planning process.

The North Richmond community was historically a home to workers in the petroleum, railway, and shipping industries. Additionally, the Richmond waterfront became a central location for shipbuilding activities during World War II, recruiting and employing thousands from across the United States, many of which were African Americans from the Midwest and South.[11]

It has been economically stagnant for many years, in part due to its regional isolation. North Richmond is surrounded by the City of Richmond, yet it is part of unincorporated Contra Costa County, which has led to a history of governance issues in this area including no medical facilities within this area, and a lack of

community's members having a voice in decision-making as they are represented at the county-level opposed to at the local or community-level. Additionally, the county seat is nearly 20 miles away, opposed to the nearby City of Richmond government offices a few miles away.[12] There are ongoing conversations with community members and the County about potential annexation with nearby cities, including City of Richmond and City of San Pablo.[13] North Richmond does, though, have a community council that represents the residents' voices at the County level, known as the North Richmond Municipal Advisory Council.[14] Still, the area has suffered from a trend of disinvestment, substandard housing, and infrastructure deficiencies. Now, however, the community is striving to enhance the quality of life for residents and ensure new local jobs. Recent City investments and private redevelopment of the area has started to transform an underutilized, industrial community with improved infrastructure, new jobs, and new affordable housing.

SOCIAL VULNERABILITY PERCENTILES IN NORTH RICHMOND

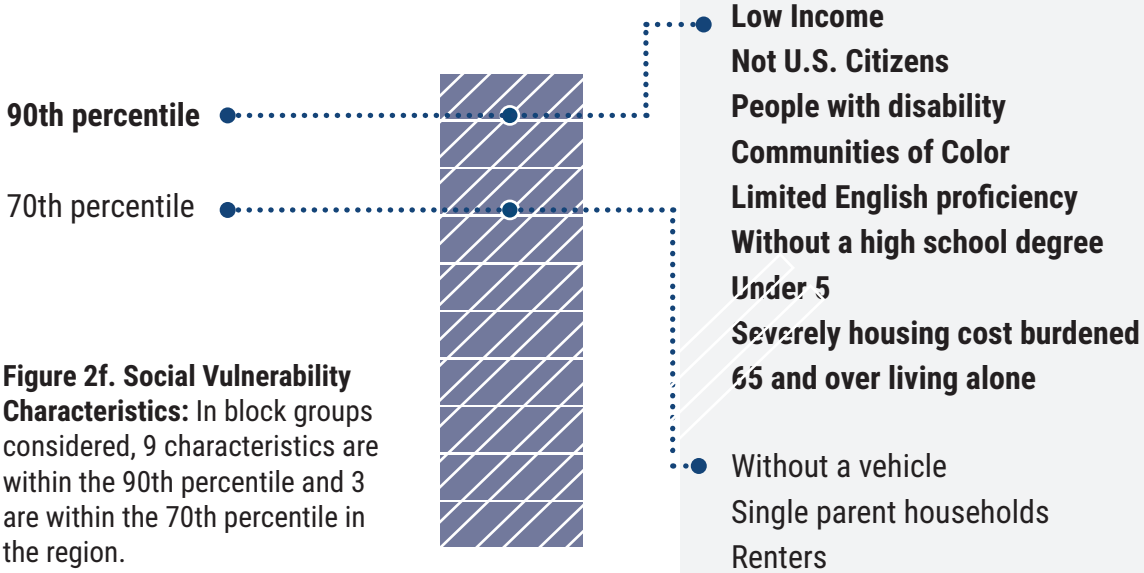


Figure 2f. Social Vulnerability Characteristics: In block groups considered, 9 characteristics are within the 90th percentile and 3 are within the 70th percentile in the region.

SOCIAL VULNERABILITY RANK:

- ☐ Low
- ☐ Moderate
- ☒ **High**
- ☒ **Highest ***

GENTRIFICATION AND DISPLACEMENT RISK:

- ☐ Ongoing Exclusion
- ☒ **Low Income - Not Losing Low Income Households ***
- ☒ **At Risk of Gentrification and/or Displacement**
- ☒ **Ongoing Gentrification and/or Displacement ***

*In block groups considered, this ranking occurred most frequently. *Data Source: ART Bay Area Regional Community Vulnerability Indicators, BCDC (2018).*

Eight block groups are considered high or highest social vulnerability. Nine social vulnerability characteristics are exhibited in at least one block group in the 90th percentile, with three characteristics in the 70th percentile in the region (Figure 2f).

In this section, social vulnerability was used as the starting place for analysis. Contamination burden was assessed only for the block groups included in the functional community groupings. This means that there could be block groups that score in the moderate, high, or highest for contamination burden that were not ALSO in the designated functional community grouping and were not considered. In short, we only look at areas that have contamination burden if they are also ranked as socially vulnerable.

The communities of Richmond have long endured a history of heavy industrial land uses in this area. In the early 1990s, multiple heavy industrial companies moved into the area, including Standard Oil, which later became Chevron, the Ford Motor Company Assembly Plant, and Pullman Railroad Company, among others.[15]

The legacy of contaminated lands and hazardous sites from these industrial uses remains today. The Chevron Oil Refinery Plant is located near the Richmond community, and between 1989 and 1995 alone, the Chevron plant had 304 industrial accidents, including chemical spills and explosions.[16] In 2012, a catastrophic pipe failure at the Refinery led to a major fire at the facilities and the release

CONTAMINATION BURDEN PERCENTILES IN NORTH RICHMOND

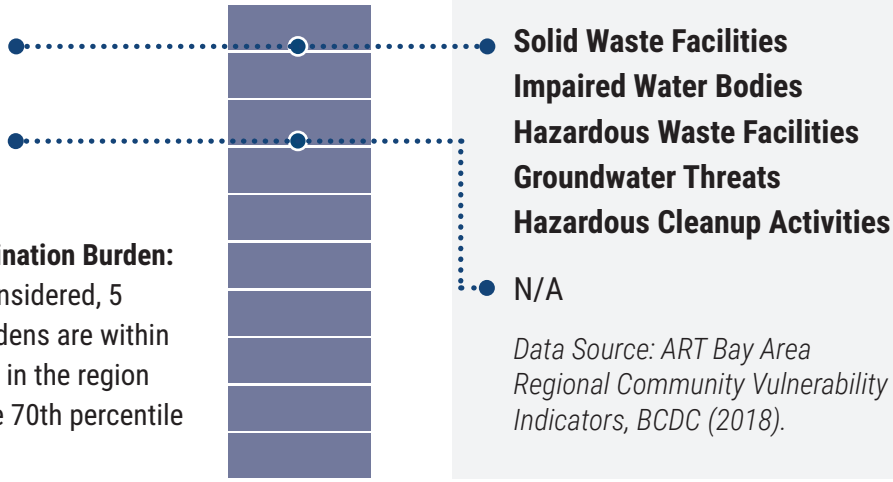


Figure 3f. Contamination Burden: In block groups considered, 5 contamination burdens are within the 90th percentile in the region and none are in the 70th percentile in the region.

of toxic vapor clouds into the surrounding community, where over 15,000 people sought medical treatment due to release.[17] These industrial activities have led to poor air quality and health issues for nearby communities that continue today, and flooding impacts will only exacerbate existing issues and concerns.

Five contamination burdens are exhibited in at least one block group in the 90th percentile, with none in the 70th percentile in the region (Figure 3f).

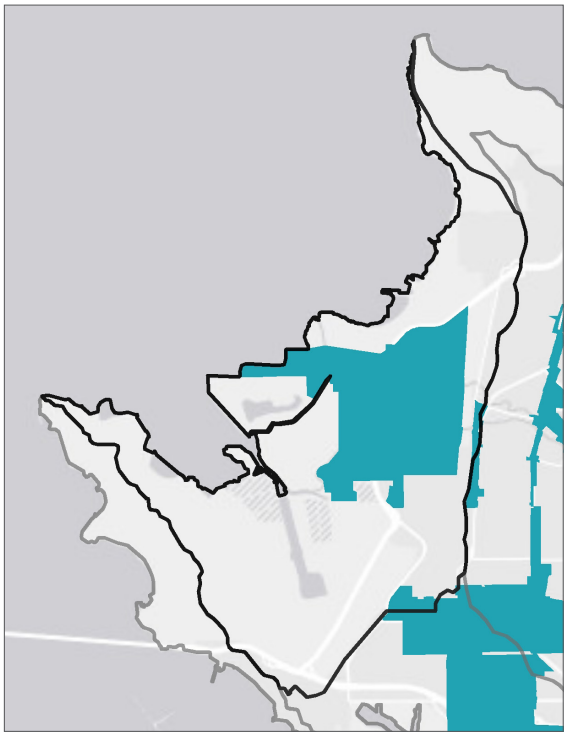
Critical services and facilities that provide community cohesion and emergency services will also be impacted by flooding. First exposure of assessed critical facilities begins at 48" TWL (Table 1f).

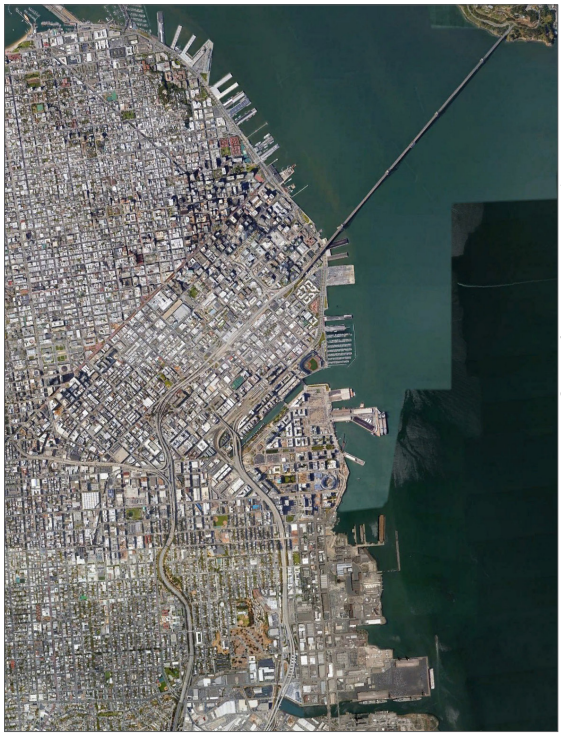
Total water levels (TWLs) are used to represent various combinations of temporary and/or permanent flooding that may occur with future sea level rise. Values in the table reflect potential risks to critical facilities in the absence of adaptation planning.

EXPOSURE OF CRITICAL SERVICES AND FACILITIES IN NORTH RICHMOND

	Critical Facilities/Services Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Places of Faith	The First African Methodist Episcopal Church										
Utilities	Wastewater District West County										

Table 1f. Critical Services and Facilities: First exposure of critical services and facilities. "M" refers to minor impacts such as impacts to access roads. Blue bars represent when asset is first exposed to flooding.





Port of SF PDA. Map data © 2020 by Google.

North Richmond PDA • The North Richmond PDA is a Transit Neighborhood that consists of 1,200 acres in Western Contra Costa County, located in unincorporated Contra Costa County. It is served by AC Transit bus service that connects to BART and Amtrak, but primarily accessed via local roads. The North Richmond community was historically a home to workers in the petroleum, railway, and shipping industries.[18] It was economically stagnant for many years, in part due to its isolation. The North Richmond PDA is surrounded by the City of Richmond, yet it is part of unincorporated Contra Costa County, which has led to a history of governance issues in this area. There are ongoing conversations with community members and the County about potential annexation with nearby cities, including City of Richmond and City of San Pablo.[19]

This PDA currently primarily consists of a mix of industrial and residential uses. The North Richmond PDA is regionally significant in terms of Bay Area growth because of its proximity to the major job centers of San Francisco and Oakland. With improved transit accessibility, the PDA holds considerable smart growth, transit-oriented development potential due to the significant opportunity for high-density, mixed-use infill development.[20] However, contamination from industrial use may require significant environmental remediation for development.[21]

Municipal services within the PDA flood between 36-48" TWL (including landfill areas) and at 52" TWL (wastewater treatment plant).

A view of the Green Waste Recycle Yard along the North Richmond PDA. Photo by SF Baykeeper, Cole Burchiel, and LightHawk.

CURRENT AND FUTURE HOUSING AND JOBS IN THE NORTH RICHMOND PDA

Residential Housing Units

Existing in 2010:	1,080
Projections for 2040:	4,304
Percent Growth:	300%

Job Spaces

Existing in 2010:	1,797
Projections for 2040:	2,400
Percent Growth:	34%

Data Source: Plan Bay Area 2040, MTC/ABAG (2017).

OTHER IMPORTANT ASSETS ASSESSED IN THE NORTH RICHMOND PDA

West Contra Costa Sanitary Landfill (WCCSL) • Closed since February 2012, the West Contra Costa Sanitary Landfill (also known as the West County Sanitary Landfill) is located at Parr Boulevard and Garden Tract Road, adjacent to tidal wetlands (including Wildcat Marsh) and San Pablo Bay. It is a capped facility that includes both Class I and Class II landfill components. The Class I landfill is located within the Class II landfill and is a Hazardous Waste Management Facility (HWMF). The HWMF is 28 acres and the Class II landfill is approximately 160 acres. The HWMF and the Class II landfill are each surrounded by slurry walls with leachate extraction and monitoring wells. Leachate is conveyed to the nearby West County Wastewater Treatment Plant for treatment and discharge. The Golden Bear Transfer Station and the three-megawatt Nove Power Generation Facility are located within the footprint of the landfill. Additional permitted activities at WCCSL include a concrete crushing plant, a green waste grinder, and a construction and demolition debris recycling facility. The WCCSL provides public access and recreational benefits, and there is Bay Trail access around the closed landfill (Wildcat Marsh and Landfill Loop Trails).[22] At 48" TWL access to the WCCSL via Parr Road is exposed to flooding. The landfill itself is exposed to flooding at 66" TWL.

Golden Bear Transfer Station • There is one waste transfer station in Richmond, the Golden Bear Transfer Station, which acts as an intermediate collection point for municipal solid waste. The station transfers locally collected waste to the Keller Canyon Landfill in Pittsburg. Golden Bear Transfer Station is owned and operated by Republic Services, Inc., and is located at the end of Parr Boulevard at the mouth of San Pablo Creek in an area of industrial and commercial land uses. Golden Bear Transfer Station is located within the 100-year floodplain and will be exposed to 24-36" TWL. The station is vulnerable to future flooding because it relies on vulnerable roads and access routes to move trucks and waste in and out of the facilities. The station is accessed solely by Parr Boulevard which is exposed to flooding at 48" TWL, direct flooding impacts occur at 84" TWL.

West County Household Hazardous Waste Facility • The West County Household Hazardous Waste Facility is located with the West County Resource Recovery Recycling Center on Pittsburg Avenue in Northern Richmond. It is owned and managed by different entities. The facility is owned by West Contra Costa Integrated Waste Management Authority ("RecycleMore"), a joint powers authority of the Cities of El Cerrito, Hercules, Pinole, Richmond and San Pablo, and Contra Costa County, and is managed by West County Resource Recovery, Inc., a subsidiary of Republic Services. Inc. Household hazardous waste collection sites serve as a public drop-off point for a variety of household hazardous wastes, including acetone, acids, asbestos, batteries, cleaners, fertilizers, fuel/oils, pharmaceuticals, paint, and poisons. There is one collection site serving the City of Richmond. Hazardous wastes are received at this facility on an ongoing basis. This facility has capacity limitations applicable for each type of hazardous material it receives and only stores waste temporarily on site before it is transported to other locations for recycling or disposal. This facility is not directly exposed to flooding, though exposure of local roads may impact its access and function.

North Richmond Water Reclamation Plant and Richmond Advanced Recycling Expansion Program • East Bay Municipal Utility District (EBMUD) provides wastewater, recycled water, and drinking water service throughout the East Bay, including Contra Costa County. The EBMUD North Richmond Water Reclamation Plant (NRWRP) and the Richmond Advanced Recycling Expansion (RARE) receive secondary treated wastewater from West County Wastewater District and treat it for reuse by industrial, public and private customers. The RARE delivers purified water to Chevron's Richmond Refinery to generate steam and the NRWRP provides tertiary treatment to meet Chevron's tower cooling needs. The expected life of the existing EBMUD assets is to around mid-century.[23] These facilities are first exposed at 96" TWL.

West County Wastewater District Pollution Control Plant • West County Wastewater District (WCWD) currently provides wastewater disposal services to 16.9 square miles of Contra Costa County, including the unincorporated areas of Contra Costa County, portions of the cities of Richmond, San Pablo, and Pinole. WCWD serves a population of approximately 92,976 residents, as well as industrial, commercial and public customers. WCWD conveys wastewater via a system of pipes and pumps to the WCWD Pollution Control Plant for treatment prior to discharge or reuse. Currently, most of WCWD's secondary treated effluent is sent to EBMUD's North Richmond Water Reclamation Plant (NRWRP), and the Richmond Advanced Recycling Expansion (RARE) for reuse by Chevron's Richmond Refinery, but excess flow is dechlorinated and discharged to the Bay through the West County Agency deep-water outfall. A portion of the WCWD Pollution Control Plant is located in the current 100-year floodplain of San Pablo and Wildcat Creeks and a number of pump stations are all located in the 500-year floodplain. The north side of the plant is protected from San Pablo Creek by a county managed levee system, and berms surrounding the treatment plant may protect it through 2030, but will need to be adapted to withstand future flooding and storm events.[24] It is low-lying (but not flooded) from 24-48" TWL, access roads (Pittsburgh Avenue and Garden Tract Road) begin to flood at 48" TWL, and the facility itself is first exposed to flooding at 52" TWL.

MCE Solar One • Marin Clean Energy (MCE) Solar One is the largest publicly owned solar project in the Bay Area and started operating in 2017. MCE Solar One provides 10MW of power, powering over 3,400 homes annually.[25] The pollution-free energy eliminates 3,234 metric tons of carbon dioxide in one year and takes more than 680 fossil fuel cars off the road annually. The solar farm was created as part of a community benefits agreement reached between the city of Richmond and Chevron in connection with the $1 billion Refinery Modernization Project. As part of the agreement, Chevron leased the former, underutilized brownfield site to Marin Clean Energy for 25 years at an extremely low rate, with a five-year extension option. MCE is a nonprofit, public power agency that partners with Pacific Gas & Electric Co. to provide renewable energy to customers, including in Richmond.[26] Southern parcels of the solar farm along Castro St. are impacted at 36" TWL.

EXPOSURE OF CRITICAL FACILITIES IN NORTH RICHMOND PDA

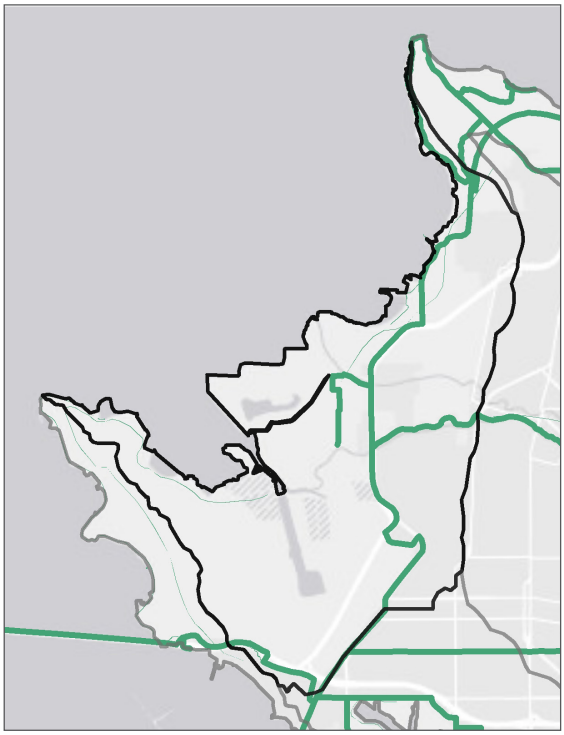
	Critical Facilities/Services Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Community	The West Contra Costa Housing Authority of Contra Costa County										
Fire	Chevron Fire Department at the Richmond Refinery (Chevron Way, Richmond)										
Utilities	Chevron's NGL1043 pipeline										
	Wastewater District West County 1 MW Solar Plant										
	WCCSLF Organic Materials Wastewater Processing										
	Green Waste Recycle Yard (Operated by Arboricultural Specialties, Inc.)										
	Golden Bear Waste Transfer Station		M								
	West County Wastewater District Pollution Control Plant, West County Wastewater District (WCWD)										
	West Contra Costa Sanitary Landfill (Land Disposal Site – Closed w/ monitoring)										
	Nove Power Plant (3 MW Landfill Gas), West Contra Costa Energy Recovery Inc.										
	MCE Solar One (10 MW Solar Farm), leased by Marin Clean Energy										
	Chevron Richmond Refinery Co-generation (Chevron Way, Richmond)										
	North Richmond Water Reclamation Plant & Richmond Advanced Recycling Expansion Program (RARE) - EBMUD										
Contami-nation	DTSC Reported Activities (19)										

Table 2f. Critical Services and Facilities: First exposure of critical services and facilities. "M" refers to minor impacts or impacts to access roads. Blue bars represent when asset is first exposed to flooding.

Critical services and facilities may be impacted by flooding. Table 2f provides details on critical services potentially at risk of flooding within the communities analyzed. First impacts of exposure of assessed critical facilities begins at 24" TWL and increase through 108" TWL.

Total water levels (TWLs) are used to represent various combinations of temporary and/or permanent flooding that may occur with future sea level rise. Values in the table reflect potential risks to critical facilities in the absence of adaptation planning.

A view of the West Contra Costa Sanitary Landfill. Photo by SF Baykeeper, Cole Burchiel, and LightHawk.



Point Pinole. Map data © 2019 by Google

San Francisco Bay Trail • The San Francisco Bay Trail is a 500-mile regional trail that, upon completion, will circumnavigate the bay. The trail connects people and communities to each other, to parks and open space, to home, work and recreation, and to countless areas of cultural and historic interest. It provides opportunities for health and fitness, increase transportation options, opportunities to observe, learn about, and care for the environment, and provides economic benefits to the region through increased tourism.[27]

PCA DESIGNATION:

- [X] **Natural Landscapes**
- [ ] Agricultural Lands
- [ ] Urban Greening
- [ ] Regional Recreation

FUNCTIONS/BENEFITS:

- **Recreation**
- **Community Health**
- **Transportation**
- **Economic Development**
- **Environmental Stewardship**

Data Source: MTC/ABAG Priority Conservation Areas Program (2017).

The Bay Trail at the Landfill Loop East Bay Regional Park.

Within this OLU, there are 14.4 total miles of Bay Trail, including existing (9.88 miles, 17 segments) and proposed (4.51 miles, 9 segments) Bay Trail split into 26 segments.[28] The Bay Trail primarily follows Richmond Parkway with spurs that extend into Wildcat Marsh and the West Coast Sanitary Landfill Loop. Several segments of existing Bay Trail are exposed starting at 12" TWL, including segments along the Bruener Marsh restoration, West County Wastewater Treatment Plant, and along Richmond Parkway. A segment of proposed Bay trail along Freethy Boulevard is exposed at 24" TWL and serves as the first line of defense.

Focus Area A:
North Richmond

Location

This Focus Area is located within the central portion of the OLU around the unincorporated North Richmond community, which includes primarily light industrial, municipal utilities, and residential areas. This Focus Area extends from Freethy Boulevard in the north to the Castro Street/Richmond Parkway in the south and includes both Wildcat and San Pablo creeks (Figure 4f).

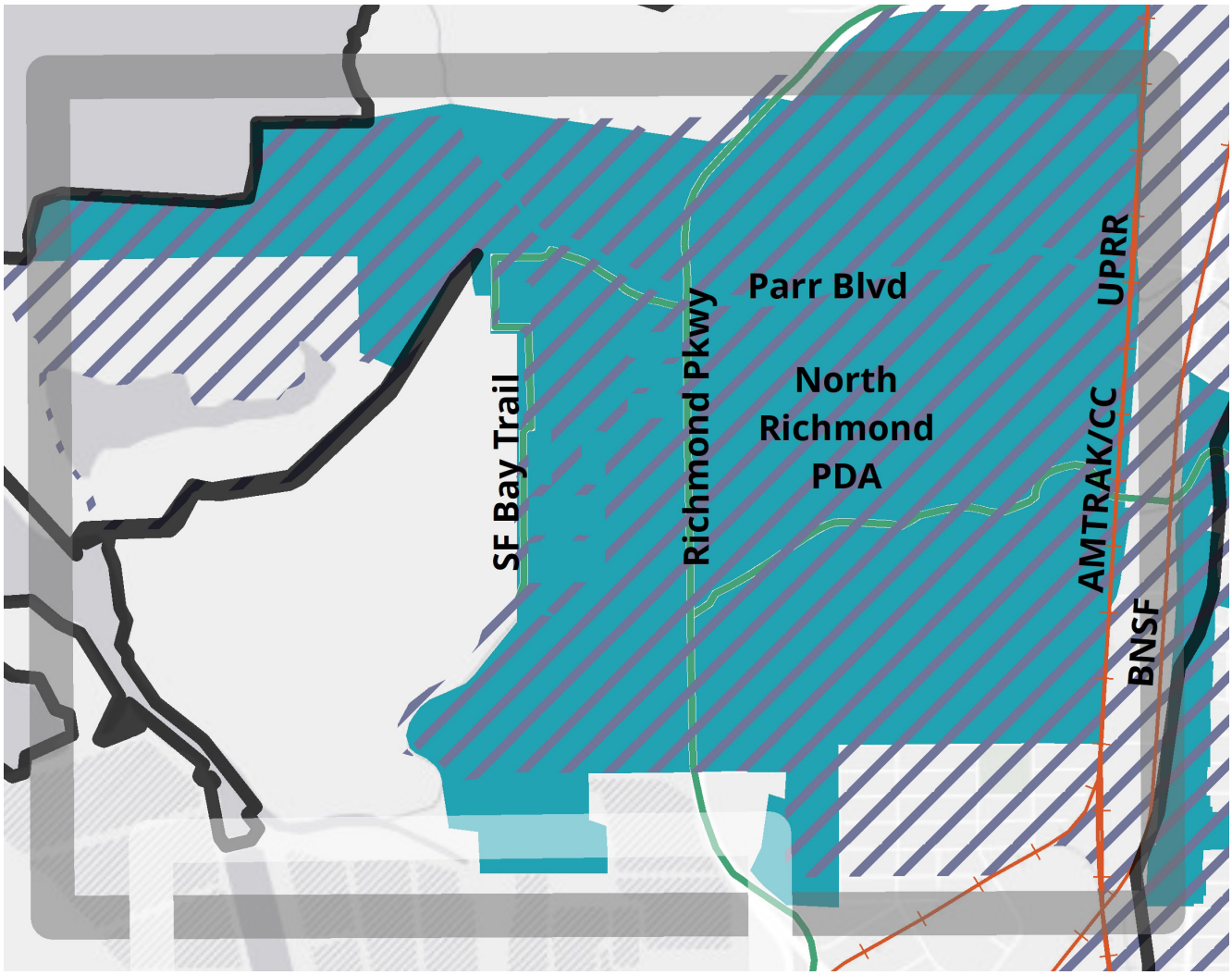
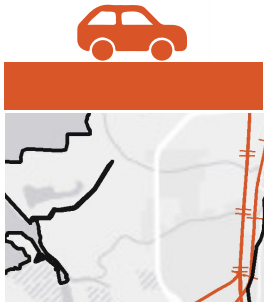


Figure 4f. Top: Identification of where Focus Area is within OLU. Bottom: Map of Focus Area containing regional systems. Individual assets assessed in this Focus Area are labeled on the map and listed on the following page.

Why shared stories of vulnerability?

This Focus Area was selected because it contains a variety of regional systems, including transportation assets such as UPRR and BNSF railroads, local roads, North Richmond PDA, San Francisco Bay Trail PCA, and North Richmond community. Due to overlap and dependencies among these regional systems in this area, the vulnerabilities of these systems to flooding and sea level rise are discussed together in shared stories of the shoreline, overtopping, and exposure to flooding as water levels rise. The goal of communicating shared vulnerabilities and consequences is to encourage multi-benefit solutions through collaborations and coordination.

Figure 4f. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN THIS FOCUS AREA LISTED BELOW:



TRANSPORTATION

- Union Pacific Railroad
- Burlington-Northern Santa Fe Railroad
- Local Roads

VULNERABLE COMMUNITIES

- North Richmond Community

PRIORITY DEVELOPMENT AREAS (PDAs)

- North Richmond PDA

PRIORITY CONSERVATION AREAS (PCAs)

- San Francisco Bay Trail PCA

Shoreline today and into the future

SHORELINE TYPE STORY

What is the shoreline made up of now?

The shoreline is characterized by a mix of levees, berms, embankments, tidal marsh wetlands, transportation structures (e.g., rail and roadbeds), and other structures that provide flood mitigation for the City's shoreline and creek channels.[29] The Contra Costa County Flood Control and Water Conservation district completed a levee remediation project along Wildcat and San Pablo Creeks in 2017, reducing flood risk from tidal creeks in North Richmond and along Parr Boulevard.[30]

SHORELINE DEVELOPMENT STORY

How will the shoreline change in the future?

The following projects may affect the future shoreline:

- **A horizontal levee planned for the WCWD Pollution Control Plant** may decrease flood risk at that facility.[31] (Planned)

Views of the shoreline along the North Richmond Focus Area. Photos by SF Baykeeper, Cole Burchiel, and LightHawk.

Current and future flooding risk

OVERTOPPING STORY

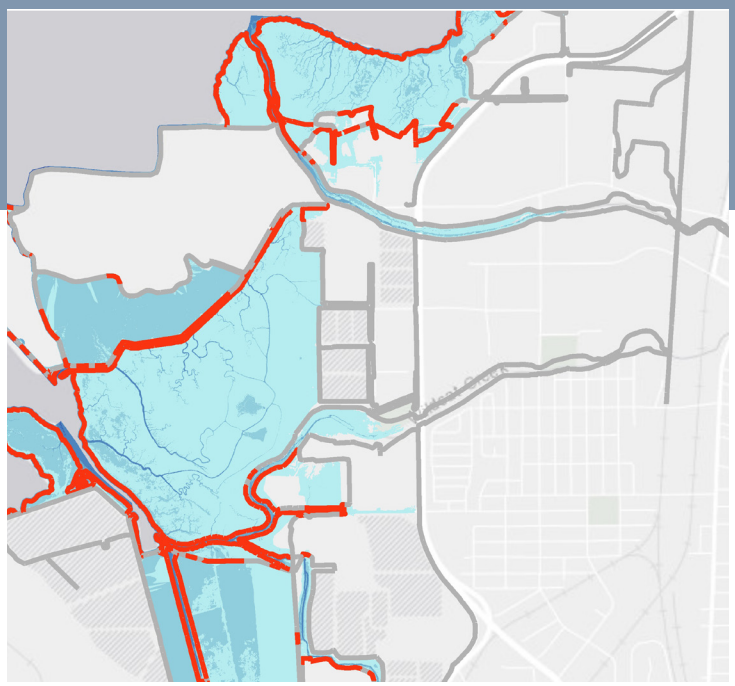
Where is water coming over the shoreline?

Overtopping of wetlands north of the landfill and west of North Richmond occurs at 12" TWL. Embankments along a tidal channel near the recycling center as well as at the end of Gertrude Road are overtopped at 24" TWL. At 36" TWL, overtopping occurs along embankments west of the water treatment plant as well as near mouth of Wildcat Creek and tidal channel near Castro Street. Additionally, natural shorelines north of San Pablo Creek are overtopped. At 48" TWL, embankments are overtopped along Garden Tract Road This overtopping expands with increasing water levels until 84" TWL, when overtopping occurs on a small embankment along Richmond Parkway west of North Richmond. At 108" TWL, a large segment of Richmond Parkway is overtopped (Figure 5f).

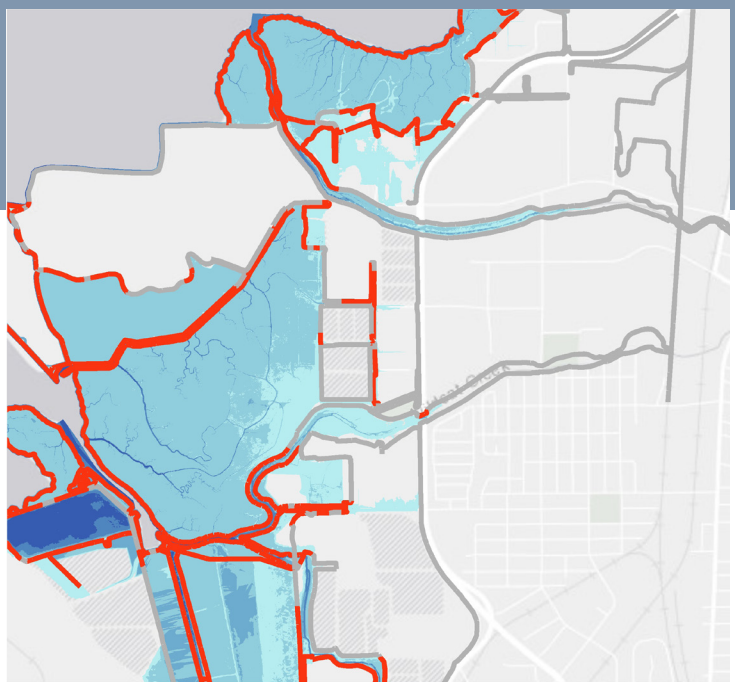
FLOODING EXPOSURE STORY

Where does flooding occur?

Between 12-24" TWL, flooding is primarily of tidal marsh and wetlands north and west of North Richmond, including Wildcat Marsh. At 36" TWL, some light industrial parcels near the recycling center begin to flood as well as Garden Tract Road. At 48" TWL, flooding occurs along Parr Road, which provides access to the West Coast Sanitary Landfill and Golden Bear Transfer Station. Additionally, more than half of the Bay Trail segments in the OLU are flooded at 48" TWL. At 52" TWL, the WCWD Pollution Control Plant begins to flood. At 66" TWL, the WCCSL is exposed to flooding. At 84" TWL, roughly 200 households are exposed to flooding in North Richmond. At 108" TWL, the Household Hazardous Waste Facility is exposed to flooding (Table 6f).



36" TWL



48" TWL

OVERTOPPING AND FLOODING

No overtopping
Overtopping
Shallower depth of flooding
Deeper depth of flooding

Figure 5f. Two total water levels selected that demonstrate first overtopping and/or significant flooding thresholds. Visit the Bay Shoreline Flood Explorer (explorer.adaptingtorisingtides.org) to see more TWLs.

FIRST FLOODING OF REGIONAL SYSTEMS ASSESSED

Regional Systems Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
San Francisco Bay Trail PCA										
North Richmond PDA										
Local Roads (Garden Tract Rd.)										
Local Roads (Parr Blvd)										
North Richmond Community										
Local Roads (Richmond Pkwy.)										

Figure 6f. First exposure of regional systems. Individual assets within the four regional systems in this area are shown and colored bars represent when each asset is first exposed to flooding impacts.

Shared vulnerabilities to flooding

SHARED VULNERABILITY STORIES

Vulnerability assessments were conducted on individual assets and then shared vulnerabilities were identified for regional systems within each focus area. The vulnerability statements below reflect shared stories of vulnerability. Our goal is to emphasize the interconnections among and across local systems, and encourage shared multi-benefits adaptation solutions.

1. Contamination and Future Growth

Current and historical industrial uses in this area have left a significant contamination burden for local communities and the environment. North Richmond currently provides housing and services to vulnerable populations yet is slated for large amount of future housing and commercial development due to its suitability for high-density transit-oriented development. This growth has a potential for displacement and gentrification of existing communities. These areas are directly vulnerable to permanent and temporary flooding, which could mobilize contaminants that result in impacts to public health in nearby communities and sensitive tidal marshes. There is a lack of planning information about how this contamination burden will change or how flooding will mobilize these contaminants or release hazardous materials.

2. Governance Challenges

North Richmond is in unincorporated Contra Costa County, which means it has historically faced a lack of adequate public services, lack of coordinated planning, and fewer opportunities for community members to engage in local decision-making. While the North Richmond Municipal Advisory Council has proved to be effective over the past several decades, recent attempts at annexation of North Richmond failed. This community is directly vulnerable to some residential flooding and indirectly vulnerable to flooding of municipal services. Lack of representation on Richmond City Council and inadequate public services increases the vulnerability of community members who do not have avenues to advocate for their needs.

3. Ecosystem Services

Extensive tidal marsh in this area plays an important role in providing fish and wildlife habitat, flood protection, and recreational opportunities and fed by two large tidal creeks. Wetlands also provide shoreline protection for several facilities in the Focus Area. Flooding in these areas will be exacerbated by the combination of sea level rise and watershed flooding and will reduce these functions in these natural areas. Many of the wetlands are constrained by development or transportation assets, limiting space available for the marshes to migrate. Additionally, Wildcat Marsh requires active management for control of mosquito and other disease vectors, and as wetlands migrate uplands this will pose more of a public health threat to nearby communities. Operations at Piers 96 and 80 are directly vulnerable to flooding, as well as vulnerable to impacts on local ground transportation connections. Numerous jurisdictional authorities and lack of information about combined riverine-tidal flooding may serve to complicate the City's planning efforts to address sea level rise along Islais Creek.

4. Local Utilities

Municipal service facilities in North Richmond (e.g. wastewater treatment, stormwater pumping, natural gas, recycling, and waste transfer) lack redundancy and are indirectly vulnerable due to flooding to surface access on Parr Blvd as well as utility pipelines that are at risk of corrosion. Flooding of access of these services will reduce their function and impact community members in Richmond and North Richmond. Additionally, flooding of wastewater treatment plants, waste transfer stations, and landfills may pose health risks to the surrounding communities.

Shared consequences to flooding

SHARED CONSEQUENCE STORIES

This section translates shared vulnerability statements into stories of shared consequences. The ART program considers consequences through frames of sustainability: Society and Equity, the Economy and the Environment.

Society and Equity • The North Richmond PDA and communities within are already overburdened with environmental contaminants and lack of investment in economic development, healthcare facilities and other community-serving facilities as they are unincorporated and have been historically underserved. Flooding impacts in North Richmond would lead to disproportionately high impacts to the people who live here, as they are identified as high socially vulnerable, and many will have limited opportunities responding to flood impacts.

The West Contra Costa Sanitary Landfill would pose a risk to public health if contaminants currently contained on site were released to surrounding surface or groundwater. In place leachate collection systems may or may not be sufficient to collect and treat additional water-intrusive volumes. Flooding could also result in a disruption or loss of public access and recreation, including the use of picnic areas and trails suitable for walking, biking, and wheelchair access.

At the Household Hazardous Waste (HHW) facility there could be significant consequences for public health if hazardous wastes were released into the environment. If the HHW facility was disrupted, the community would lose access to a safe disposal location for household hazardous waste and would have to find alternative disposal locations either temporarily or permanently. Some individuals might resort to illegal dumping of hazardous waste. Access to HHW facilities is also important for the safe disposal of hazardous waste after a flood event in communities they serve, and disruption of one or both facilities could affect the efficiency and safety of the post-flood clean-up process.

If the Golden Bear Transfer Station was disrupted, waste collection for communities in West and Central Contra Costa County would lack a transfer point and would likely need to be temporarily or permanently re-routed to the Contra Costa Transfer and Recovery Station in Martinez (if active) or directly to the Keller Canyon Landfill. This could disrupt garbage collection services for the community, and some individuals might also resort to illegal dumping of waste without a convenient drop-off location. Access to transfer stations is also important for the safe disposal of waste after a flood event in communities they serve, and disruption of the station could affect the efficiency and safety of the post-flood clean-up process.

Increased flooding in creeks and channels that currently provide adjacent communities flood protection could result in extreme burden on socio-economically disadvantaged communities. In North Richmond, community members have limited resources to pay for flood insurance and do not have the means or access to resources to prepare for, respond to, and recover from flood events. In addition, sea level rise may reduce available freeboard, and channel levees may lose their Federal Emergency Management Agency (FEMA) accreditation, which would require residents and property owners in the newly designated floodplain to purchase flood insurance, which could pose a significant financial burden.

Economy • Economic activity in the North Richmond PDA is largely comprised of those working for the light and heavy industrial sites, and there are also many vacant land parcels in the area. Currently, this PDA is not a major economic driver of activity, and re-development plans have focused on trying to bring more housing and jobs into the region.

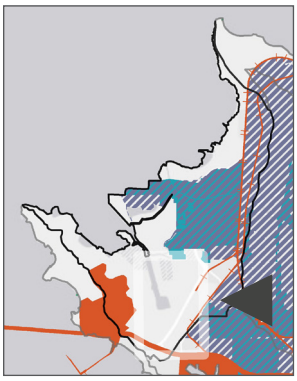
Flooding may impact both local and regional jobs. If refineries or industrial sites located near the creeks and channels are flooded or are inaccessible, and if storm events and sea level rise shut down shoreline wastewater treatment plants, even temporarily, untreated wastewater could back up into homes, businesses, and neighborhoods and spread disease. Furthermore, mobilization of contaminants from facilities that have hazardous materials, some which are within the current 100-year floodplain, could pose a risk to public health.

Environment • Loss of wetland habitat will reduce ecosystem services provided for wildlife habitat, flood protection, recreation, and water quality.

Higher Bay water levels especially during storm events will flood larger areas for longer periods of time, which may result in the increased mobilization of pollutants if contaminated lands such as closed landfills are subjected to prolonged inundation. As the Bay rises it is predicted that groundwater levels will also rise, which could contribute to mobilizing pollutants that are currently in vadose zone at brownfields and other contaminated lands.

The large number of contaminated sites in this area from both heavy and light industrial uses could lead to the mobilization of contamination throughout the area. The presence of both a Wastewater Treatment Plant and landfill, alongside an oil refinery add to the complexity of contamination in the area, which is made up of numerous electrical, water and gas pipelines that run beneath wetlands and other open spaces.

Area of Impact B:
Castro Street



Location

This Area of Impact includes the corridor along Castro Street from the junction with Richmond Parkway to the Chevron Refinery in the southern part of the Wildcat OLU. This includes primarily industrial parcels, the Chevron Refinery, Castro Street, Richmond Parkway, and railroad facilities (Figure 7f).

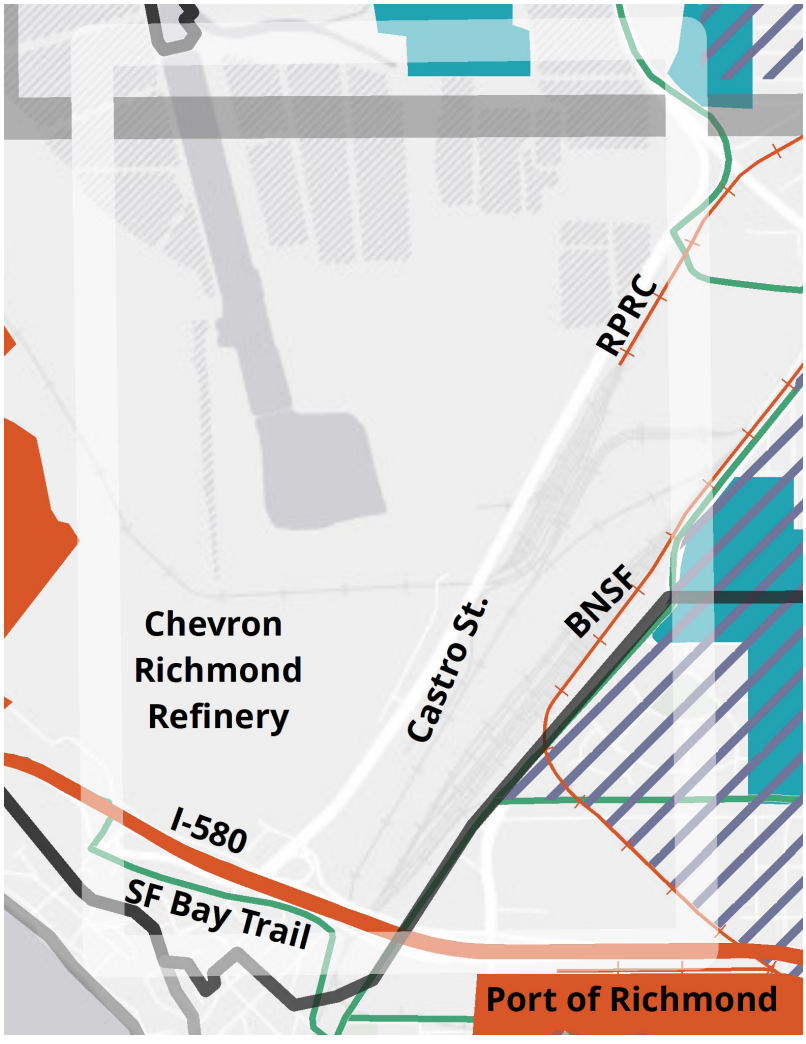


Figure 7f. Top: Identification of where Area of Impact is within OLU. Bottom: Map of Area of Impact containing regional systems. Individual assets assessed in this Area of Impact are labeled on the map and listed on the following page.

Why shared stories of vulnerability?

This Area of Impact was selected because it contains a variety of regional systems, including transportation assets such as UPRR, BNSF, and RPRR railroads, I-580, Chevron Richmond Refinery, Port of Richmond, local roads, North Richmond PDA, San Francisco Bay Trail, and the North Richmond community. Due to overlap and dependencies among these regional systems in this area, the vulnerabilities of these systems to flooding and sea level rise are discussed together in shared stories of the shoreline, overtopping, and exposure to flooding as water levels rise. The goal of communicating shared vulnerabilities and consequences is to encourage multi-benefit solutions through collaborations and coordination.

Figure 7f. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN THIS AREA OF IMPACT LISTED BELOW:

TRANSPORTATION

- Union Pacific Railroad
- Burlington-Northern Santa Fe Railroad
- Richmond Pacific Railroad
- I-580
- Chevron Richmond Refinery
- Port of Richmond
- Local Roads

VULNERABLE COMMUNITIES

- North Richmond Community

PRIORITY DEVELOPMENT AREAS (PDAs)

- North Richmond PDA

PRIORITY CONSERVATION AREAS (PCAs)

- San Francisco Bay Trail PCA

SHORELINE TYPE STORY

What is the shoreline made up of now?

The primary shoreline types are embankments and berms surrounding the Chevron Refinery's 250 Foot Channel and side channels.

A view of the holding ponds near the Chevron Refinery. Photo by SF Baykeeper, Cole Burchiel, and LightHawk.

SHORELINE DEVELOPMENT STORY

How will the shoreline change in the future?

There is no data indicating any future shoreline changes at the time of publication.

The Chevron Refinery is within this Area of Impact. Photo by Scott Hess is licensed under CC BY_NC 2.0.

Current and future flooding risk

OVERTOPPING STORY

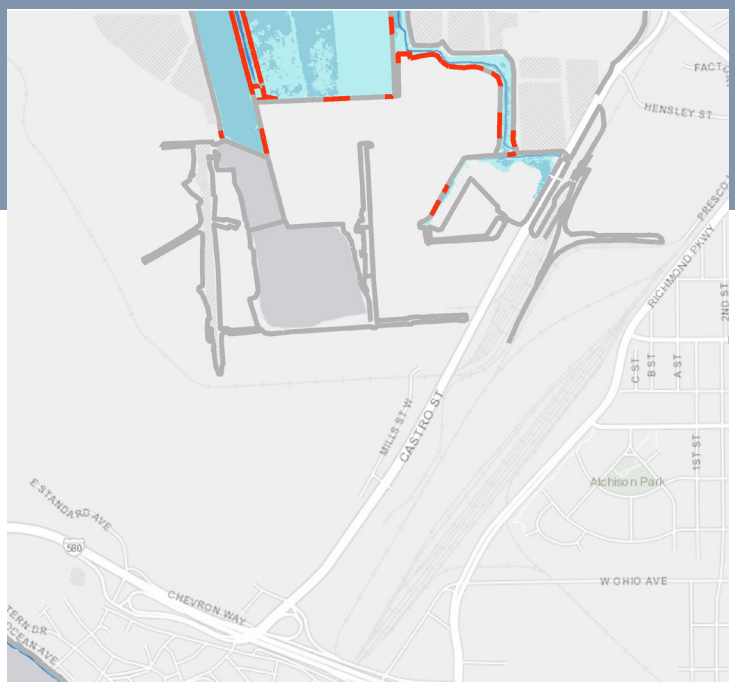
Where is water coming over the shoreline?

At 36" TWL, berms along the northern portion of the 250 Foot Channel are overtopped. Additionally, at 36" TWL, berms and embankments along the unnamed channel that runs close to Castro Street overtop. At 48" TWL, the unnamed channel west of the 250 Foot Channel overtops as well as additional berms in the 250 Foot Channel. At 66" TWL, nearly all the shoreline is overtopped (Figure 8f).

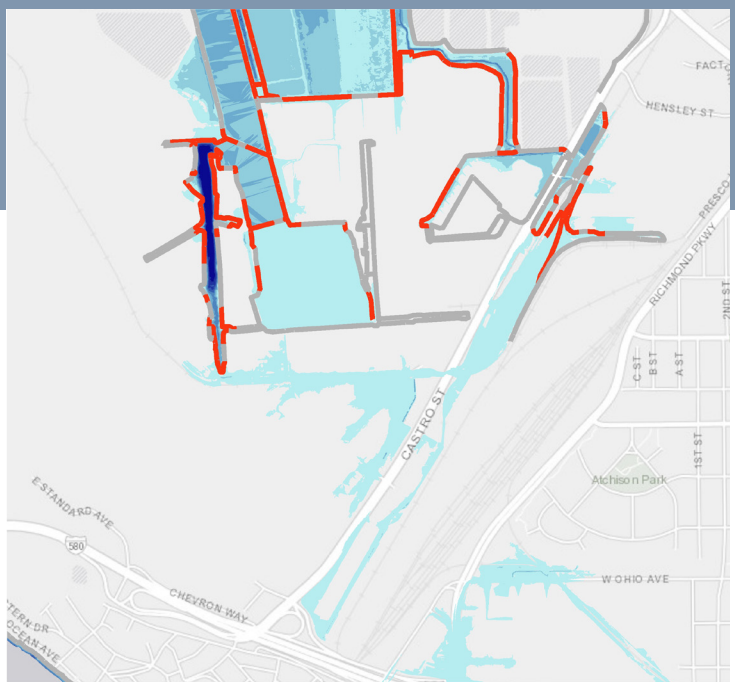
FLOODING EXPOSURE STORY

Where does flooding occur?

At 36" TWL, Chevron's Richmond Water Enhancement Wetland is exposed to flooding. At 48" TWL, BNSF railroad spurs and UPRR/RPRR rail yard near Castro Street are exposed to flooding, industrial parcels west of Castro Street, and small stretch of Castro Street south of Hersley Street are exposed to flooding. At 52" TWL, larger segments of Castro Street are exposed and flooding increases at industrial parcels near the Chevron Refinery. At 66" TWL, on ramps to I-580 at Castro Street are exposed to flooding as well small rail segments at the larger rail yard next to Richmond Parkway. At 77" TWL, large segments of the rail yard are exposed to flooding. At 96" TWL, the NRWRP/RARE facilities are exposed to flooding (Figure 9f).



36" TWL



48" TWL

OVERTOPPING AND FLOODING

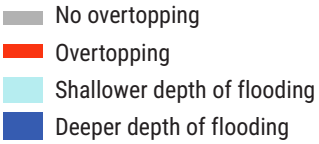


Figure 8f. Two total water levels selected that demonstrate first overtopping and/or significant flooding thresholds. Visit the Bay Shoreline Flood Explorer (explorer.adaptingtorisingtides.org) to see more TWLs.

FIRST FLOODING OF REGIONAL SYSTEMS ASSESSED

Regional Systems Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Chevron Richmond Refinery										
UPRR										
BNSF										
RPRR										
Castro St										
I-580										

Figure 9f. First exposure of regional systems. Individual assets within the four regional systems in this area are shown and colored bars represent when each asset is first exposed to flooding impacts.

Shared vulnerabilities to flooding

SHARED VULNERABILITY STORIES

Vulnerability assessments were conducted on individual assets and then shared vulnerabilities were identified for regional systems within each focus area. The vulnerability statements below reflect shared stories of vulnerability. Our goal is to emphasize the interconnections among and across local systems, and encourage shared multi-benefits adaptation solutions.

1. Industrial Activities

The historic and ongoing operation of the industrial sites (e.g. Chevron Refinery and General Chemical) in this area has provided both locals benefits (i.e. jobs) but also public health detriments (i.e. air quality) to local community members. These refinery sites are directly vulnerable to flooding, which could mobilize contaminants and compromise the function of the plants, impacting public health, jobs and the local, regional, and statewide economy. They are also indirectly vulnerable due to flooding of critical roads and railroad facilities that move goods and people to and from these sites.

2. Railroad Connections

The railroad in this area supports goods movement from the Port of Richmond, Chevron, and General Chemical, and other industrial sites. These rail facilities are vulnerable to flooding, have limited redundancy, and serve regional important economic industries. Disruption of rail cars here has the potential for mobilizing contaminations and impacting public health.

Shared consequences to flooding

SHARED CONSEQUENCE STORIES

This section translates shared vulnerability statements into stories of shared consequences. The ART program considers consequences through frames of sustainability: Society and Equity, the Economy and the Environment.

Society and Equity • Neighborhoods located nearby the Chevron Richmond Refinery have traditionally experienced poor public health due to decreased air quality and presence of industrial waste, flooding in this area may increase the public health impacts of these industrial sectors.

Slowdowns or shutdowns of refinery operations could impact local and regional jobs both on site and in the sectors serving the refinery. Flooding of the refinery site could also result in public health impacts if there is an unscheduled disruption in operations that results in the accidental release of pollutants to the air or waters near the facility.

Economy • Refinery operations disrupted for a significant period of time could result in a loss of jobs at the refinery site and in associated sectors, and potentially impact the regional economy, including higher fuel prices and potentially even fuel shortages.

Disruption of railroad facilities that support the Chevron Richmond Refinery and Port of Richmond will disrupt the local and regional economy.

Environment • Contaminants are present on site that could be carried with floodwaters into inland areas, released into the Bay, or migrate into rising groundwater. Most refineries have fire and emergency response teams on-site that could help mitigate impacts during a flood event. If the rail system is disrupted and trucks are used to bring goods to and from the refineries there may be an increase in roadway congestion, impacts on air pollution levels, and increased greenhouse gas emissions.

Endnotes

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