

CHAPTER 9

PUBLIC SAFETY

This chapter focuses on City facilities that enhance or provide public safety benefits, such as fire and police stations, homeless shelters, and other community safety buildings that are managed by the City and County of San Francisco and that have been identified as potentially vulnerable. They are either wholly or partially located in the SLR Vulnerability Zone. This chapter also discusses potentially contaminated lands and known facilities that handle hazardous materials that could pose a public safety or health hazard risk if they are inundated by floodwaters or rising groundwater levels.

The following sections describe the assets and discuss how these assets may be vulnerable to SLR and coastal flooding.

9.1 FIRE DEPARTMENT

Established in 1866, the San Francisco Fire Department serves an estimated 1.5 million people, providing fire suppression and emergency medical services to residents, visitors, and workers. SFPUC manages and maintains both the low-pressure fire hydrants connected to the local potable water supply (see Section 6.2.1.4) and the Emergency Firefighting Water System for the use of the Fire Department.

9.1.1 Potentially Vulnerable Assets

San Francisco has 45 fire stations located through the City, with seven fire stations located within the SLR Vulnerability Zone, as well as the Bureau of Fire Investigation and the Arson Task Force. The fire stations are organized geographically into two divisions (Divisions 2 and 3), with five battalions in each division (see Figure 9.1). Division 2 serves the northern and western regions within the City, and Division 3 serves San Francisco's eastern and southern regions. Only Battalions 1, 2, 3, and 10 have fire stations within the SLR Vulnerability Zone. There are no Fire Department facilities in the SLR Vulnerability Zone on the open Pacific shoreline. SFO also has three fire stations organized under the Airport

Division, and these fire stations are not included in this Assessment.

The primary responsibility of the Fire Department is the delivery of fire suppression and emergency rescue services. To provide responsive and effective service, crews must be able to respond within a minimum amount of time after an incident has been reported, and with sufficient resources to initiate fire, rescue, or emergency medical activities. Each fire station is associated with a Fire Response Area that considers the amount of time it takes for a Fire Department vehicle or ambulance to travel from the fire station to an incident scene (i.e., the response time).¹ If a given fire station is out of service, adjacent fire stations in the same battalion provide alternate service, although response times will be longer. If an entire battalion is out of service, adjacent battalions will provide additional backup service. For severe or significant incidents, multiple response vehicles may be dispatched to the incident; however, the first

¹ Total fire station reflex time considers: dispatch time (the time it takes to receive and process an emergency call), turnout time (the time from when a unit acknowledges notification to respond to an incident to when the response vehicles leaves the station), response time (the time the response vehicle is in route to an incident, from wheel start to wheel stop), access time (time it takes for responders to move from the wheel stop location to the incident location), and setup time (the time required for responders to set up and activate emergency equipment).



A fire truck parked in front of Fire station 35. Nicolas Lannuzel (CC BY-SA 2.0)



Figure 9.1 Fire Stations and Battalions



Inundation at 108" Sea Level Rise ● Fire Station

**DIVISION 2 Battalions**

- B1 Battalion 1
- B4 Battalion 4
- B5 Battalion 5
- B7 Battalion 7
- B8 Battalion 8

DIVISION 3 Battalions

- B2 Battalion 2
- B3 Battalion 3
- B6 Battalion 6
- B9 Battalion 9
- B10 Battalion 10

1 Bureau of Fire Investigation

2 Fire Station 49, Emergency Medical Services



Photo 9.1 Fire Station 13, Frank Farm (CC BY-NC-ND 2.0)



Photo 9.2 Fire Station 4 at the new Public Safety Campus. Flickr user throggers (CC BY-NC-ND 2.0)



Photo 9.3 Fire Station 35, Fireboat Headquarters. Melinda Young (CC BY-NC-ND 2.0)



Photo 9.4 Bureau of Fire Investigation Building at 1275 Third Street. HOK

responder on the scene is generally from the fire station located within the Fire Response Area of the reporting incident.

9.1.1.1 Battalion 1

Battalion 1 includes four fire stations (2, 13, 28, and 41) that provide coverage for the Financial District. Fire Station 13, located at 530 Sansome Street, is within the SLR Vulnerability Zone (see Photo 9.1 and Figure 9.2).

9.1.1.2 Battalion 2

Battalion 2 includes four fire stations (1, 6, 29, and 36) that provide coverage for the South of Market (SOMA) Area. Fire Station 1, located at 935 Folsom Street, is within the SLR Vulnerability Zone.

Fire Station 1 is located at 935 Folsom at 5th Street, Division 3, Battalion 2 (see Figure 9.3).

9.1.1.3 Battalion 3

Battalion 3 includes four fire stations (4, 8, 35, and 48) that provide coverage for the southern portion of the Embarcadero, SOMA waterfront, and Treasure Island. Fire Stations 4, 8, and 35 are all within the SLR Vulnerability Zone (Photo 9.2 and Figure 9.4). Fire Station 48, located on Treasure Island, is also within the SLR Vulnerability Zone; Treasure Island, however, is not included in this Assessment.

Because all fire stations of Battalion 3 are in the SLR Vulnerability Zone and since several of the neighboring fire stations from Battalions 1, 2, and 10 (Fire Stations 1, 13, and 25) are also in the SLR Vulnerability Zone, impacts from SLR and coastal flooding could compromise emergency and fire response times in SOMA's waterfront area south of Market Street (Figure 9.5).

Figure 9.2
Fire Station 13 Response Area

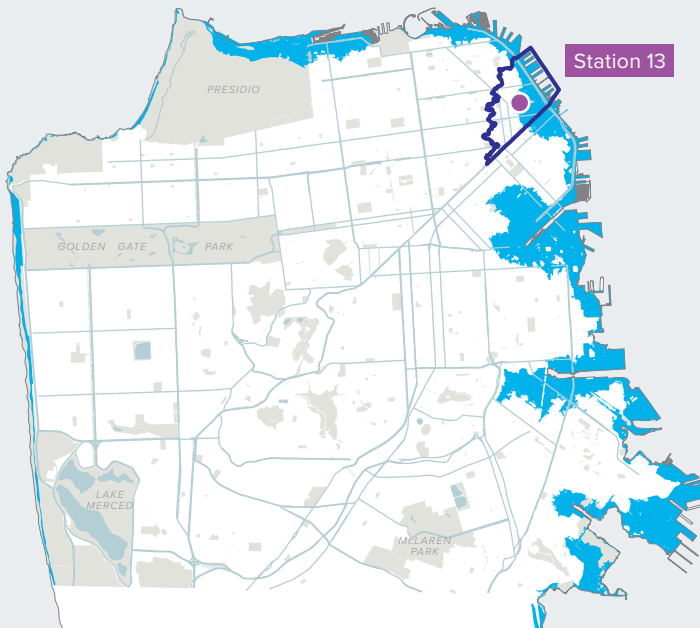


Figure 9.3
Station 1 Response Area

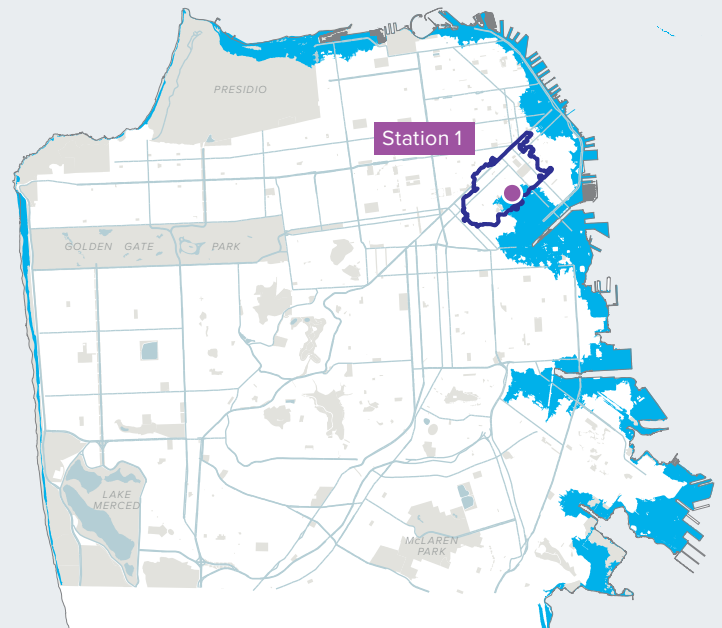


Figure 9.4
Fire Station 4, 8, and 35 Response Areas

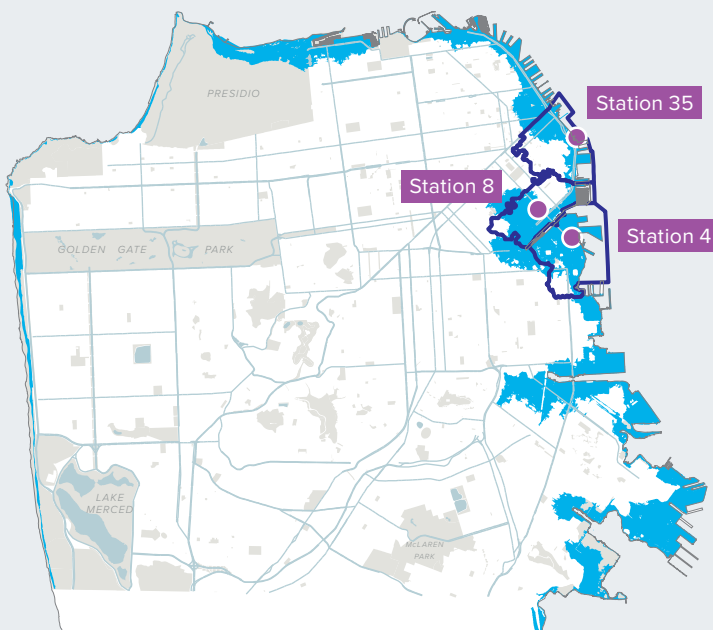
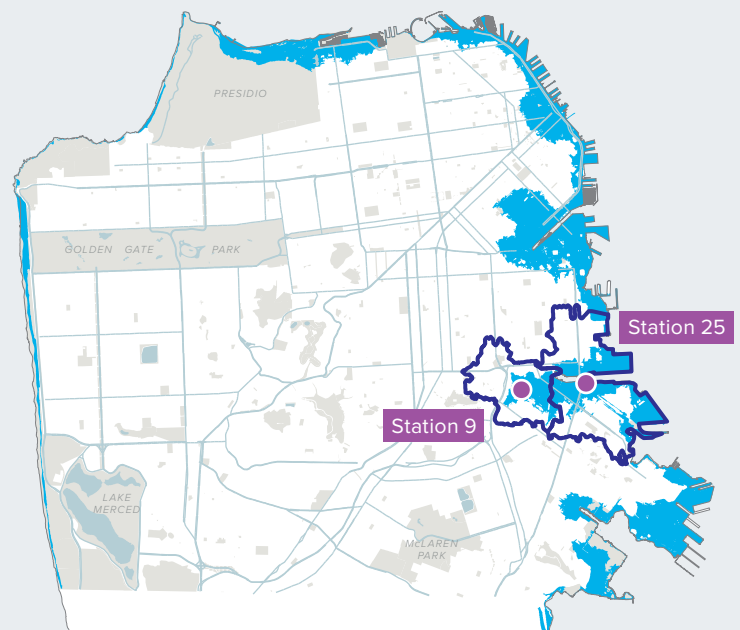


Figure 9.5
Fire Station 9 and 25 Response Areas



Fire Station 4 is located at 449 Mission Rock at 3rd Street (see Photo 9.2 and Figure 9.4). This station is part of the new (April 2015) Public Safety Campus that also contains the San Francisco Police Department headquarters (discussed below), the Arson Task Force, and a Community Room to serve the growing Mission Bay neighborhood.²

Fire Station 8 is located at 530 Sansome Street between 4th Street and 5th Street (Figure 9.4).

The new Fireboat Station No. 35 at Pier 22 ½ will be a two-story, 15,000+ sq. ft. fireboat station behind the existing fireboat house. The fireboat house is a San Francisco Landmark, and will continue to function as Engine Company No. 35. The new structure will be built on top of a steel float and anchored by four guide piles. This will allow the new fireboat station to rise and fall with the natural tide of the Bay, King Tides and projected Sea Level Rise. San Francisco Fire Department's three fireboats and rescue watercraft will be moored at the new floating facility. The existing dilapidated Piers 22 1/2 and 24 will be demolished. Fire Station 35 is the fireboat headquarters located on Pier 22 1/2, along the Embarcadero at Harrison Street (see Photo 9.3). This fire station is located on Port land and is located within the Seawall Program area discussed in Chapter 4. Three fireboats, the Phoenix, Guardian, and Saint Francis, can connect directly to the emergency firefighting water distribution system via five manifold connections along the shoreline, and pump saltwater from the Bay into the distribution system for fire suppression. The manifolds and the overall emergency firefighting water system are described Section 6.3. The fireboats provide emergency backup protection in the event of a failure of the reservoirs and/or pump stations.

9.1.1.4 Battalion 10

Battalion 10 includes six fire stations (9, 17, 25, 37, 42, and 44) that provide coverage for the Islais Creek and Bayview Hunters Point neighborhoods. Fire Stations 9 and 25 are located within the SLR Vulnerability Area (see Figure 9.5).

Fire Station 9 is located at 2245 Jerrold Avenue at Bush Street. Fire Station 25 is located within Port property at 3305 3rd Street at Cargo Way, and is also

discussed in Chapter 11, *Port of San Francisco*.

9.1.1.5 Bureau of Fire Investigation

The Bureau of Fire Investigation is located at 1275 3rd Street. It is housed in a refurbished brick building as part of the public safety campus in the Mission Bay District (see Photo 9.4).

The Bureau of Fire Investigation is responsible for investigating the origin and cause of all fire incidents and explosions to which it is assigned. Investigators prepare detailed fire investigation reports and coordinate with the National Incident Fire Investigation Reporting System for these incidents. Investigators are responsible for the collection of evidence and for providing testimony in court when subpoenaed. Bureau of Fire Investigation members work cooperatively with the Police Department and the District Attorney to make up the Arson Task Force.³

9.1.1.6 Fire Station 49, Emergency Medical Services

Fire Station 49, Division of Emergency Medical Services is located at 1415 Evans Avenue. San Francisco Fire Department's emergency medical services are currently housed in this cramped, seismically-deficient warehouse on Evans. The new Ambulance Deployment Facility replacement project is under construction as of October 2018. This new facility located at 2241 Jerrold Street behind Fire Station 9 is part of the 2016 voter-approved Public Health and Safety Bond, which dedicated \$350 million toward capital improvements for City facilities to meet the critical health and safety needs of San Francisco.

The new ambulance deployment facility will be a four-story seismically-safe structure sited at 14 feet. The designed building will serve the needs of a growing, 21st-century San Francisco. In addition to bolstering emergency response time and efficiency, the Ambulance Deployment Facility will become headquarters for the state-of-the-art new building and site will be equipped with ample parking for the fleet and storage for ambulance supplies and vehicle restocking, as well as emergency medical services offices, conference and training rooms, locker rooms and communal space. The location also will have on-site fueling and 72-hour emergency generator.

2 <https://sanfranciscopolice.org/san-francisco-police-department-headquarters>.

3 <https://sf-fire.org/about-division>. Accessed August 18, 2018.

Table 9.1 Fire Department Facility Exposure with Sea Level Rise

Structure		Exposure under Each Scenario (Y/N)									
		1	2	3	4	5	6	7	8	9	10
Battalion 1	Fire Station 13	-	-	-	-	-	-	-	-	Y	Y
Battalion 2	Fire Station 1	-	-	-	-	-	-	-	-	-	Y
Battalion 3	Fire Station 4	-	-	-	Y	Y	Y	Y	Y	Y	Y
	Fire Station 8	-	-	-	-	-	Y	Y	Y	Y	Y
	Fire Station 35, Fireboat Headquarters	-	-	-	-	Y	Y	Y	Y	Y	Y
Battalion 10	Fire Station 9	-	-	-	-	-	-	-	Y	Y	Y
	Fire Station 25	-	-	-	-	-	Y	Y	Y	Y	Y
Other Fire Department Facilities	Bureau of Fire Investigation	-	-	-	Y	Y	Y	Y	Y	Y	Y
	Fire Station 49, Arson Task Force	-	-	-	-	-	-	-	-	-	Y*

* Inundated under H++ Scenario.

9.1.2 Exposure Assessment

The exposure of each fire station, associated facilities, and Fire Department buildings was evaluated relative to the 10 SLR scenarios (see Chapter 2) and presented in Table 9.1.

9.1.3 Consequences

Key consequences that could occur to society and equity, the economy, environment, and governance (see Chapter 3) were evaluated assuming no action is taken to address the impacts associated with SLR or extreme tide flooding. These consequences are listed below.



KEY ISSUE: Fire stations in the SLR Vulnerability Zone are susceptible to flooding because the facilities generally have at-grade openings and were not built to withstand flooding. In addition, emergency response services rely on roads that could be flooded and power supplies that could be disrupted. Ensuring that emergency and disaster response services are not interrupted will require actions to improve the individual facilities to increase flood resilience, and coordination across the fire stations and battalions to provide backup or alternate services from fire stations that are not flooded outside of the Flood Response Area. Coordination

will also be required with City, county, and state transportation agencies to ensure road access and utility services are maintained.



Society and Equity: Fire station personnel respond to large-scale disasters and smaller emergencies in the community, benefitting residents and those who work in the area. Emergency response could be impacted in Fire Response Areas with flooded fire stations, resulting in delays in response time and dangers to public health and safety.



Economy: By protecting the local community, fire stations provide value to the local economy. If emergency response is delayed or impaired due to flooding, recovery costs could increase, and local communities and the region could suffer long-term economic consequences.



Environment: Emergency response facilities and personnel play a critical role in hazardous materials spills and emergencies, including oil spills and other environmental contamination events. Emergency responders provide a critical function in helping protect environmental and human health from these events.

9.2 EMERGENCY FIREFIGHTING WATER SYSTEM

The Emergency Firefighting Water System (EFWS; also known as the Auxiliary Water Supply System or AWSS) is a high-pressure water supply network built in response to the failure of the emergency water system during the 1906 earthquake and the ensuing fires (see Figure 9.6). The system includes one water reservoir, two pump stations, two storage tanks, and approximately 135 miles of buried pipelines.

Anticipating the possibility of the high-pressure pipelines rupturing during an earthquake, the distribution system was divided into three zones: the West of Twin Peaks Zone (connected to the Twin Peaks Reservoir), the Upper Zone (connected to the Ashbury Tank), and the Lower Zone (connected to the Jones Street Tank). Isolation gate valves are also located at frequent intervals throughout the zones so that a damaged section can be isolated, leaving the remainder of the system in operation. The isolation gate valves are located in areas of Bay fill, because pipeline in these areas are more likely to experience movement that could cause pipeline rupture during an earthquake.

If there is insufficient freshwater within the system during a fire emergency (i.e., if there is a loss of water pressure that affects firefighting abilities), two pump stations have direct underground connections to the Bay that can pump 10,000 gallons per minute (gpm) of saltwater into the firefighting water distribution system using onsite generators. Pump Station No. 1 is in the basement of the San Francisco Fire Department Headquarters at 698 Second Street, and Pump Station No. 2 is in Fort Mason.

Although the SFPUC maintains the Emergency Firefighting Water System, the Fire Department is the primary end user of this system. Information on the City's Fire Stations and Fire Department operations is presented in Section 9.1.

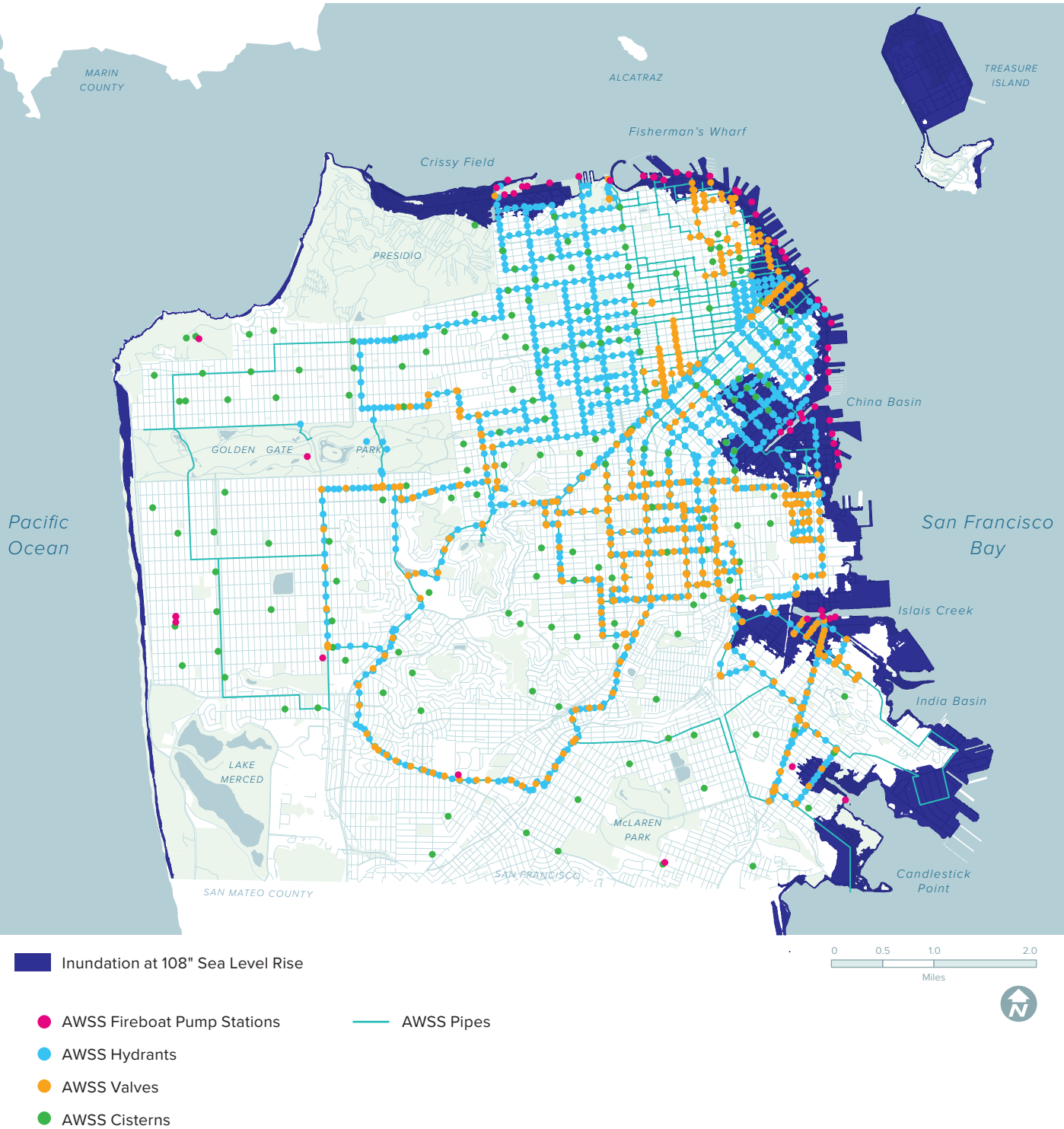
The Fire Department also maintains three fireboats that can connect to one of five manifolds located along the San Francisco shoreline and deliver saltwater to the Emergency Firefighting Water System in an extreme emergency. The fireboats provide additional backup protection in the event of a failure of the reservoirs and/or pump stations. The three fireboats currently dock at Pier 22 ½ (see Section 9.1.1.3). There



Fire boat. Geo Swan



Figure 9.6 Emergency Firefighting Water System



are 41 additional suction connections located along the northeastern shoreline, which allow fire engines to pump water directly from San Francisco Bay for fire suppression.

As a final back-up fire protection measure, there is a network of approximately 210 operational⁴ and independent underground water cisterns located primarily at roadway intersections. The cisterns are large, underground concrete tanks that store water for firefighting purposes.

9.2.1 Potentially Vulnerable Assets

The Emergency Firefighting Water System assets within the SLR Vulnerability Zone include distribution pipelines, a pipe yard, high-pressure fire hydrants, isolation gate valves, pump stations, manifolds, suction connections, and cisterns.

9.2.1.1 Distribution Pipelines

The emergency firefighting water distribution system is constructed of cast iron pipe that is primarily 10 to 12 inches in diameter, although some sections have diameters as large as 20 inches. Much of the pipeline that was installed in 1912 is still in service today, and the system was expanded and improved over time in the 1930s, 1970s, 1980s, and today through the Earthquake Safety Emergency Response Bond passed in 2014.

The distribution system was installed with restrained pipeline joints, using fewer branches than the local potable water supply, and no service connections. This makes the system less vulnerable to earthquake damage due to land movement than the local potable water supply distribution pipelines. Although the system is intended for use with both freshwater and saltwater, the primary (i.e., non-earthquake/land movement) vulnerability of the system is associated with saltwater corrosion. The use of freshwater within the system is preferred, and saltwater can be pumped in via the pump stations or fireboats in case of extreme emergency. As sea levels rise and the shallow groundwater layer rises and becomes more saline, portions of the distribution pipelines will be subjected to enhanced external corrosion.

9.2.1.2 Pipe Yard

A pipe yard for the emergency firefighting water distribution system is located behind Fire Station 9 at 2245 Jerrold Avenue. The pipe yard stores materials for maintenance and repairs. If the pipe yard is inundated by SLR or a coastal flood event, materials stored onsite could be damaged and maintenance delays could occur.

9.2.1.3 Isolation Gate Valves

Isolation gate valves are located throughout the system and are used to isolate portions of the AWSS in the event of damage. These isolation gate valves can be operated via a truck-mounted actuator. Additionally, the 1986 Bond provided funding to motorize and enable remote operation of 30 of these isolation valves, mostly in the low-lying areas of the City built on fill. Remote operation allows the AWSS to close valves much more quickly in response to pipe breaks.

In an emergency such as an earthquake, this will reduce the loss of stored water. Remotely operated valves are monitored and operated from the Jones Street Tank control building and can also be operated from a control system near the Lake Merced Pump Station. Operation of the valves relies on electricity. After the Loma Prieta earthquake in 1989, loss of power resulted in an inability to close some of the isolation gate valves, rendering portions of the Emergency Firefighting Water System inoperable. The motorized isolation gate valves are highly vulnerable to inundation, and floodwaters could affect the electrical equipment and render the valves inoperable, potentially compromising the entire Lower Zone of the Emergency Firefighting Water System.

9.2.1.4 High-Pressure Fire Hydrants

High-pressure fire hydrants are connected to the emergency firefighting water distribution system and located throughout the City for fire suppression. The color of the fire hydrant indicates which pressure zone the hydrant is in (i.e., which reservoir or tank the hydrant is connected to). Black-topped hydrants are in the West of Twin Peaks Zone and fed by the Twin Peaks Reservoir; red-topped hydrants are in the Upper Zone and fed by the Ashbury Street tank; and blue-topped hydrants are in the Lower Zone and fed by the Jones Street Tank (see Photo 9.6).

⁴ There are additional cisterns that are currently no longer operational (i.e., they may leak, be damaged, or may no longer be accessible), and these cisterns were not included in this Assessment.

In general, fire hydrants are moderately vulnerable to SLR and coastal flooding, with vulnerabilities directly related to flooding along the roadways (see Chapter 5, *Transportation*). Areas with inaccessible (i.e., flooded) high-pressure fire hydrants will not have direct access to fire suppression services from fire engines. Services should resume after floodwater recede. Fire hydrants in flooded areas will require inspections for corrosion to ensure each hydrant is fully operational in the event of an emergency. The suction connections along the shoreline provide redundancy for the high-pressure fire hydrants, and the cisterns provide an additional emergency back-up firefighting water supply.

9.2.1.5 Pump Station No. 1

Pump Station No. 1 was built in 1911 and is located in the basement of the San Francisco Fire Department Headquarters on the corner of Second and Townsend streets (see Photo 9.7). The Fire Department Headquarters building was built on top of the existing Pump Station No. 1 in 1998. The pump station contains four diesel-driven pumps, each with a pumping capacity of 2,700 gpm at 300 pounds per square inch (psi).

An approximately 1,100-foot concrete intake tunnel located underneath the pump station floor runs under Townsend Street and connects directly to the Bay (see Photo 6.5). The tunnel conveys seawater from the Bay to the pumps and ultimately to the Emergency Firefighting Water System for emergency fire suppression. This pump station is manually operated. A backup generator powers the electrical systems at the pump station in the event of a power outage. The pumps were originally steam powered but were converted to diesel in the 1970s.

Although Pump Station No. 1 is outside of the SLR Vulnerability Zone (see Figure 9.7), its direct connection to the Bay through the tunnel makes it potentially vulnerable to SLR. The pump station tunnel connection has limited freeboard during King Tides (i.e., Bay waters can be seen at the tunnel connection to the pump station during King Tide conditions in the Bay). As sea levels rise, the lower levels of the pump station could flood. The tunnel connection would require modifications to maintain a watertight seal during extreme high tides.



Photo 9.6 High-pressure fire hydrant. Kitty DuKane (CC BY-NC 2.0)

Figure 9.7 Pump Station No. 1 / Fire Department Headquarters

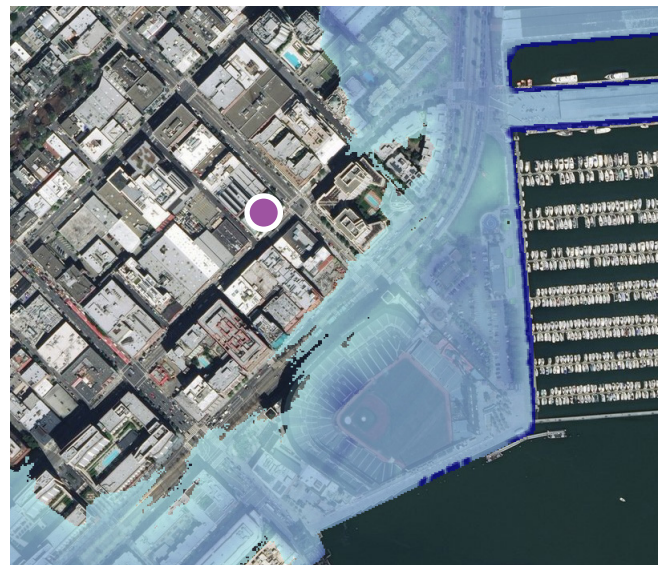


Photo 9.7 Pump Station No. 1. Photo by Flickr user sftrajan.

9.2.1.6 Pump Station No. 2

Pump Station No. 2 pumps saltwater from the San Francisco Bay to the AWSS. Pump Station No. 2 is located at the foot of Van Ness Avenue near Fort Mason (see Figure 9.8 and Photo 9.8). This pump station contains four diesel-driven pumps, each with a pumping capacity of 2,700 gpm at 300 psi. An approximately 160-foot concrete intake tunnel located underneath the pump station floor conveys seawater from the Bay to the pumps. A back-up generator powers the electrical systems at the pump station in the event of a power outage. The pumps were originally steam powered but were converted to diesel in the 1970s. This pump station connects directly to the Ashbury Tank and Jones Street Tank. However, the connection from the pump station to the Ashbury Tank is normally closed, and the connection to the Jones Street Tank is normally open.

Pump Station No. 2 is directly adjacent to the shoreline and could be inundated by Scenario 9 (i.e., 96 inches of SLR, or 54 inches of SLR coupled with a 100-year coastal flood event). The pump station includes sensitive electrical equipment that is at and below grade and sensitive to any inundation. A combination of wet- and dry-floodproofing would be required to increase the resilience of this pump station to rising sea levels.

9.2.1.7 Manifolds

Three fireboats anchored at Pier 22 ½ can supply Bay water to the Emergency Firefighting Water System along the City's northeastern waterfront (see Photo 9.9). The fireboats connect to the distribution system via five manifolds located along the Bay shoreline (see Figure 9.9). The manifold connections have moderate to low vulnerability to SLR and coastal flooding. Manifold connections are suction driven and can still be operated if they are underwater if the fireboat is able to connect. It is possible that a suction connection can even be made if the manifold is fully inundated – in this instance, the safety of emergency fire personnel making the connection may control whether the manifolds can be used.

9.2.1.8 Suction Connections

There are 52 suction connections in the City (see Figure 9.10), with 41 suction connections located directly along the Bay shoreline that allow fire

Figure 9.8 Pump Station No. 2

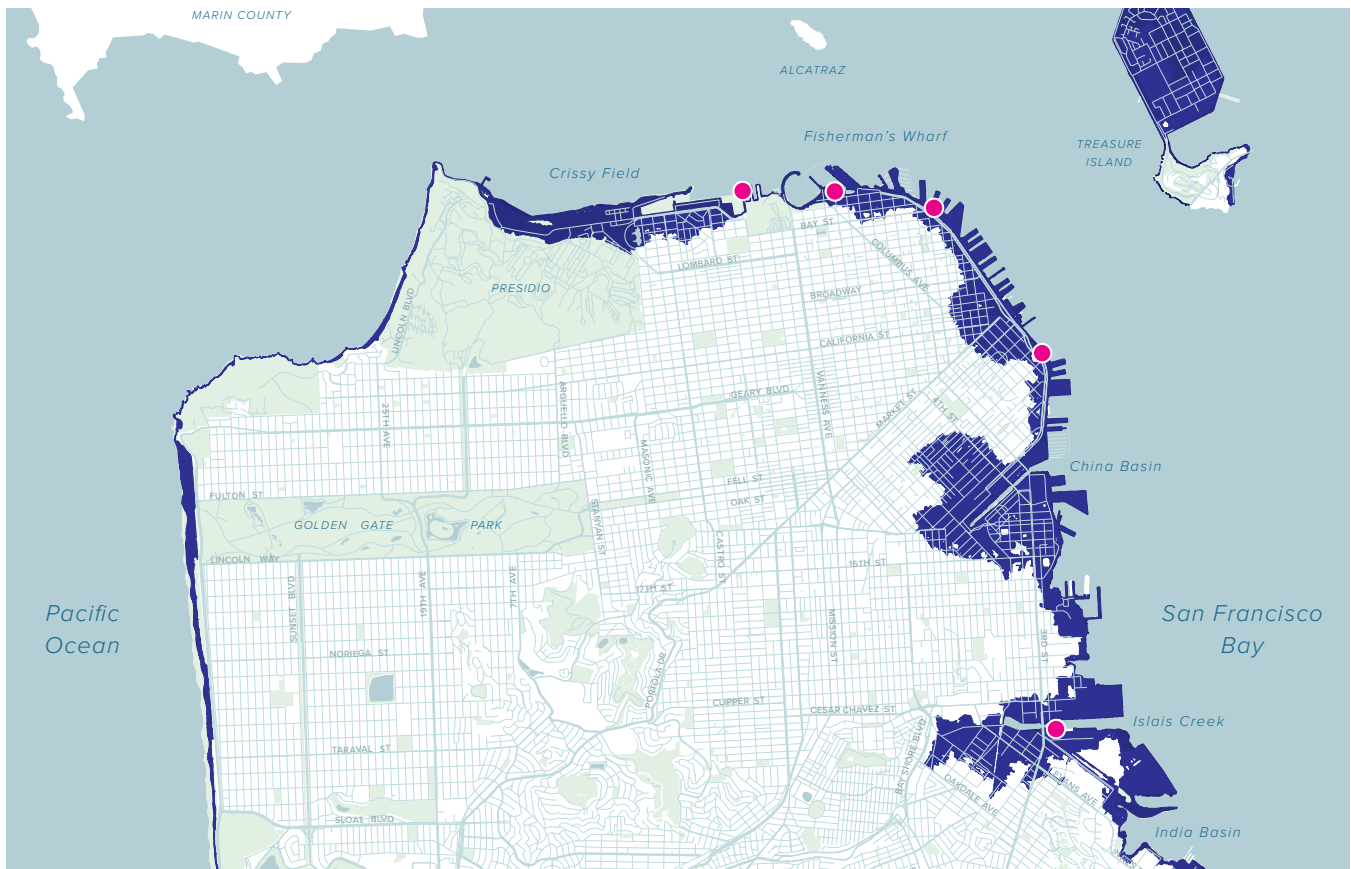


Photo 9.8 Pump Station No. 2. Katherine Du Tiel, SFPUC



Photo 9.9 Pier 22 ½ with docked fireboats. Dave R (CC BY-NC 2.0)

Figure 9.9 Manifold Locations



engines to draw water from the Bay for fire suppression. The suction connections resemble fire hydrants and are painted light green (see Photo 9.10). Suction connections become unusable if they are inundated, and if the fire engines cannot access the connections due to roadway flooding (see Chapter 5, *Transportation*).

9.2.1.9 Cisterns

One of the most basic and reliable means for storing large amounts of water for firefighting is an individual fire cistern. The cisterns are underground water storage tanks that are completely disconnected from the rest of the AWSS system and the City's water domestic water supply. The cisterns range in size from 75,000 to more than 200,000 gallons, with a total storage capacity of over 11 MG of water. The stored water is accessed by firefighters through green-topped fire hydrants adjacent to each cistern. Water levels in the cisterns are checked periodically and they are filled manually, usually with water from a nearby LPFH. Cisterns are the last water resource of Fire Department.



Photo 9.10 Suction connection (Baywater 'fire hydrants'). Jason Randall

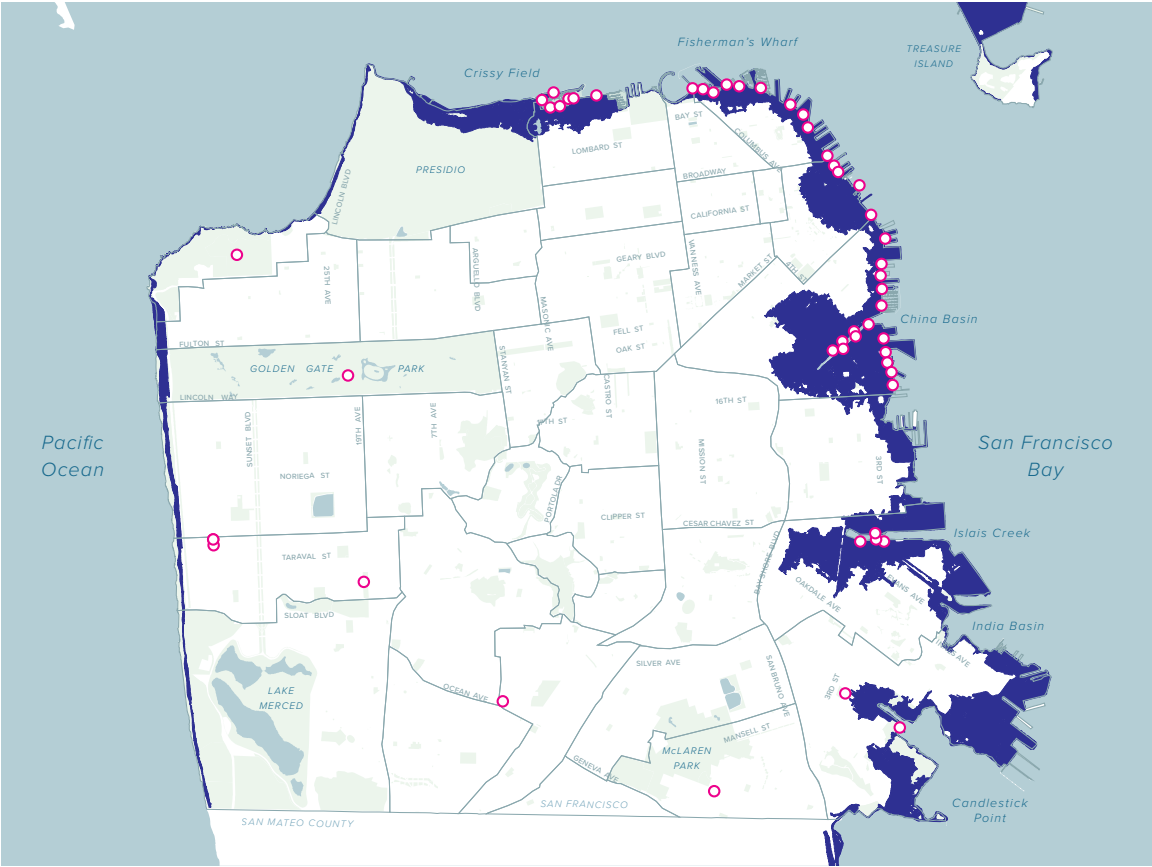


Figure 9.10
Suction Connection
Locations

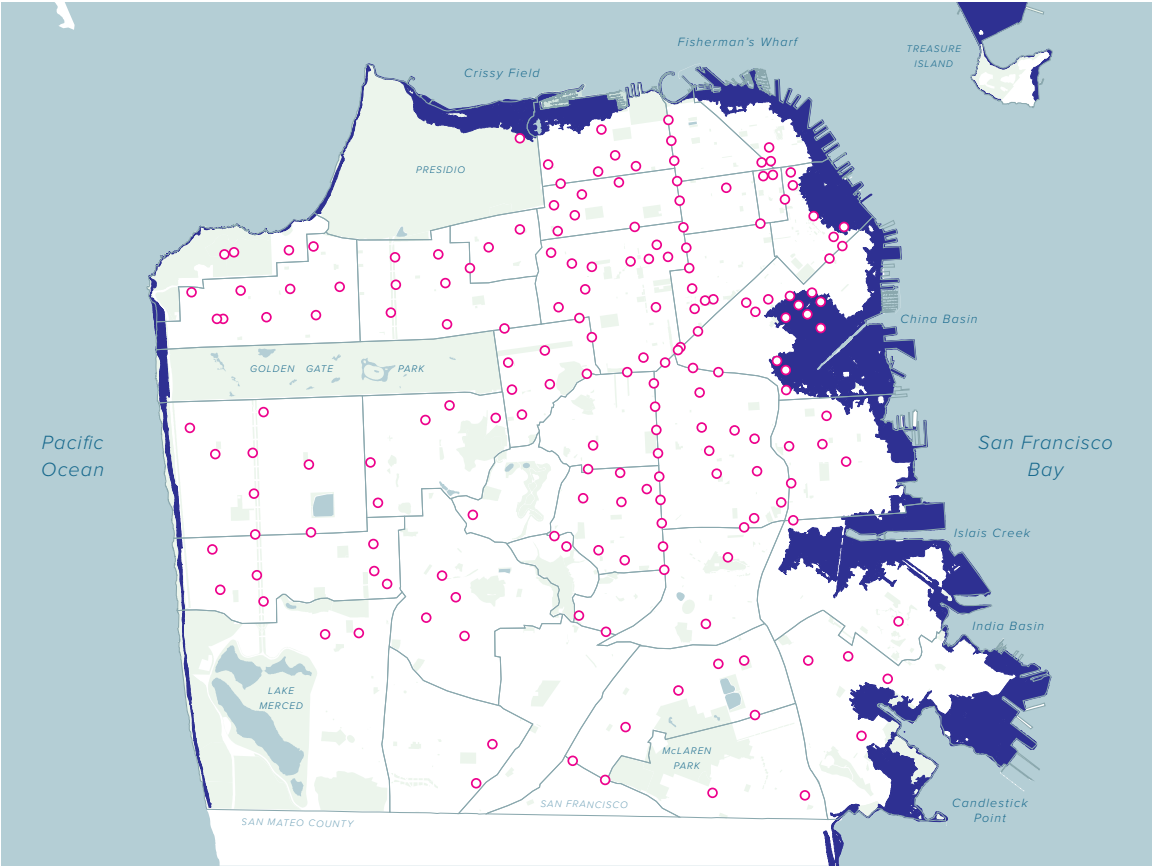


Figure 9.11
Cistern Locations

There are approximately 200 operational cisterns located throughout the City (see Figure 9.11). Fifty-four cisterns were built in the mid-1800s, and an additional 85 were built in the early 1900s after the 1906 earthquake. The oldest cisterns are constructed of brick, but most of the operational cisterns are constructed of reinforced concrete. SFPUC is currently making repairs to aging cisterns and has installed 30 new cisterns to improve coverage throughout the City.

Cisterns are below grade, and the water within them is non-potable and would not be impacted if saltwater leaked in during a flood event. The cisterns are the least vulnerable components of the Emergency Firefighting Water System. Although the cisterns may become unusable during a flood event, they will return to service once floodwaters recede. These low-technology, last-resort fire suppression water supply tanks can remain in service until they are permanently inundated. Although rising groundwater salinity levels may shorten repair cycles, the stored water is considered non-potable and would still be usable for fire suppression if it is contaminated by saltwater.

9.2.2 Exposure Assessment

The exposure of the Emergency Firefighting Water System was evaluated relative to the 10 SLR scenarios (see Chapter 2, *Climate Science*). The exposure assessment is presented relative to the neighborhoods, and if a neighborhood is not listed in a specific exposure table, then no respective assets were found to be within the SLR Vulnerability Zone.

Only the Lower Zone connected to the Jones Street Tank is within the SLR Vulnerability Zone. Table 9.2 presents the miles of distribution pipeline located within the SLR Vulnerability Zone that could be exposed to SLR and coastal flooding under each scenario. The distribution pipelines are buried underground and have limited vulnerability to temporary flooding.

However, as sea levels rise, and the shallow groundwater layer also rises and increases in salinity near the shoreline, corrosion could shorten the life expectancy of the buried pipelines. The repair and replacements cycles would shorten, and the frequency of

emergency repairs could increase. The Pipe Yard, which supports maintenance and repair activities, is first inundated under Scenario 8 (i.e., 84 inches of SLR, or 42 inches of SLR coupled with a 100-year coastal flood event).

Buried infrastructure is not easily adaptable to rising sea levels or increases in salinity. All adaptation measures would likely require significant investments, as well as disruptions to roadways and traffic during repairs and modifications to address changing conditions.

Table 9.3 presents the number of motorized isolation gate valves located within the SLR Vulnerability Zone. If an isolation gate valve is inundated, the floodwaters could affect the electrical equipment, resulting in an inability to close the isolation gate valves, rendering portions of the Emergency Firefighting Water System inoperable.

Table 9.4 presents the number of hydrants that are inundated under each SLR scenario. As with the LPFH, hydrants become unusable when the depth of flooding exceeds about 20 inches because fire engines can no longer safely access the hydrants via flooded roadways. The hydrants should resume operability once floodwaters recede.

Table 9.5 presents the suction connections within the SLR Vulnerability Zone. Most of the suction connections are at or near the shoreline, and the connection itself is typically located within three feet of the ground surface (see Photo 9.10). Therefore, most of the suction connections are inundated under Scenarios 2 and 3 (i.e., 24 and 36 inches of SLR, respectively).

An exposure assessment of the manifold connections was not completed. Although the suction connections become unusable when inundated, largely due to limitations in fire engine access, the manifold connections can remain in service when inundated as long as a fireboat can safely establish a connection.

Table 9.6 presents the number of cisterns that are exposed under each SLR scenario. Most of the cisterns are not located within the SLR Vulnerability Zone.

Table 9.2 Emergency Firefighting Water Distribution Pipeline Exposure Summary

Neighborhood	Miles of Emergency Firefighting Water Distribution Pipelines Exposed under Each Scenario									
	1	2	3	4	5	6	7	8	9	10
Bayview North	-	-	-	-	0.6	1.5	1.7	1.9	2.2	2.7
Bayview South	-	-	0.7	0.8	1.0	1.8	2.1	2.4	2.6	2.7
Financial District	-	-	-	0.2	0.5	2.9	3.4	3.7	4.3	4.9
Marina	-	0.1	0.1	0.1	0.1	0.3	0.3	0.5	0.6	1.1
North Beach	-	-	-	-	-	0.9	1.3	1.6	2.0	2.3
Potrero Hill	-	-	-	-	-	-	-	-	0.2	0.3
South of Market	-	-	-	0.5	1.3	3.7	4.6	5.2	5.9	6.6
Total	-	0.1	0.7	1.5	3.5	11.1	13.5	15.3	17.8	20.6

Table 9.3 Isolation Gate Valve Exposure Summary

Neighborhood	Number of Isolation Gate Valves Exposed under Each Scenario									
	1	2	3	4	5	6	7	8	9	10
Bayview North	-	-	-	-	-	-	-	-	1	1
Bayview South	-	-	-	-	-	-	-	-	-	-
Financial District	-	-	-	-	1	1	1	1	1	1
Marina	-	-	-	-	-	-	-	-	-	1
South of Market	-	-	-	1	2	7	7	8	9	9
Total	-	-	-	1	3	8	8	9	11	12

Table 9.4 High-Pressure Fire Hydrant Exposure Summary

Neighborhood	Number of Isolation Gate Valves Exposed under Each Scenario									
	1	2	3	4	5	6	7	8	9	10
Bayview North	-	-	-	-	12	19	20	21	24	32
Bayview South	-	-	-	-	-	2	5	5	5	6
Financial District	-	-	-	2	8	41	46	51	58	66
Marina	-	-	-	-	-	2	2	5	7	13
North Beach	-	-	-	-	-	16	20	22	28	31
Potrero Hill	-	-	-	-	-	-	1	2	4	5
South of Market	-	-	-	4	13	49	59	70	80	86
Total	-	-	-	6	33	129	153	176	205	238

Table 9.5 Suction Connection Exposure Summary

Neighborhood	Number of Suction Connections Exposed under Each Scenario									
	1	2	3	4	5	6	7	8	9	10
Bayview North	-	4	4	4	4	4	4	4	4	4
Bayview South	-	1	1	1	1	1	1	1	1	1
Financial District	1	2	2	3	3	4	4	4	4	4
Marina	1	7	7	7	7	7	7	7	7	7
North Beach	4	8	8	8	8	8	8	8	9	9
Russian Hill	1	1	1	1	1	1	1	1	1	1
South of Market	3	15	16	16	16	16	16	16	16	16
Total	10	38	39	40	40	41	41	41	42	42

Table 9.6 Cistern Exposure Summary

Neighborhood	Number of Cisterns Exposed under Each Scenario									
	1	2	3	4	5	6	7	8	9	10
Financial District	-	-	-	-	-	-	-	-	1	2
South of Market	-	-	-	-	-	3	3	3	7	7
Total	-	-	-	-	-	3	3	3	8	9

9.2.3 Consequence Summary



KEY ISSUE: The Emergency Firefighting Water System provides back-up water for fire suppression in the event of a loss of pressure in the low-pressure system (i.e., the LPFH connected directly to the Local Potable Water Supply System). However, portions of the Emergency Firefighting Water System can be rendered inoperable in the event of a coastal flood event. The lack of firefighting services could prevent adequate protection of homes, businesses, or entire neighborhoods in the SLR Vulnerability Zone.



Society and Equity: The neighborhoods in the SLR Vulnerability Zone, many of which include vulnerable populations, could be left without functioning firefighting infrastructure.



Economy: The cost of infrastructure repairs, including fire damage to private systems, could be extensive.

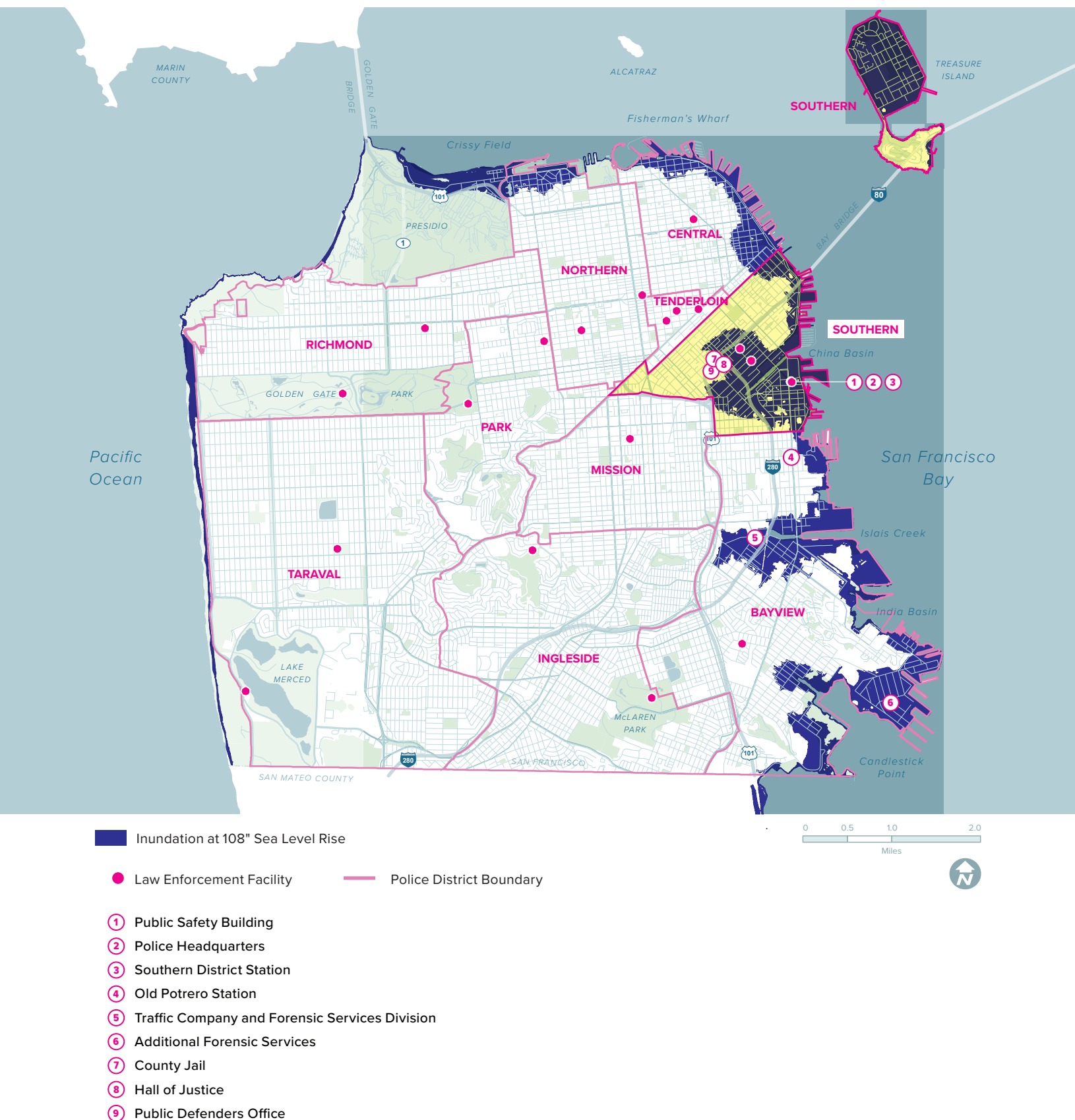


Environment: If a fire spreads because of containment issues due to lack of firefighting water supplies to extinguish it, it could lead to loss of life, air quality issues, and contaminated water runoff into the Bay.



Governance: Multi-agency cooperation, public-private partnerships, and coordinated local and regional action will be necessary to improve the resilience of San Francisco's Emergency Firefighting Water System. The fireboats and the fireboat manifold connections currently provide the most resilient to SLR back-up firefighting water supply.

Figure 9.12 Law Enforcement Facilities in the SLR Vulnerability Zone



9.3 SAN FRANCISCO LAW ENFORCEMENT

The Police Department and the San Francisco Sheriff's Department serve an estimated population of 1.5 million, including the daytime-commuter population, tourists, and visitors. San Francisco maintains the 11th largest police department in the United States. The Police Department has 10 districts and respective stations, with two police stations located in the SLR Vulnerability Zone (see Figure 9.12). The Forensic Service/Traffic Company and the Crime Laboratory at Hunters Point Shipyard Building 606 are also located in the SLR Vulnerability Zone.

9.3.1 Potentially Vulnerable Assets

The following facilities are owned and maintained by the Police Department and the Sheriff's Department.

9.3.1.1 Public Safety Building

The Public Safety Campus (opened in April 2015) is in the Mission Bay neighborhood between 3rd Street, between Mission Rock and China Basin streets (Photo 9.11). The building has a seismically advanced

structure to maintain its capabilities during an earthquake event, and the latest in law enforcement technology and amenities. The Public Safety Building also houses the new Fire Station 4 (see Section 8.1.1.2).

9.3.1.2 Police Headquarters

The Police Department's Headquarters moved into the new Public Safety in 2015. The office houses approximately 430 department personnel, and this facility enables the Police Department to coordinate public safety services during major events and/or critical incidents promptly and properly.

9.3.1.3 Southern District Station

The Police Department's Southern District Station moved into the new Public Safety Building in 2015. The Southern District includes the SOMA neighborhood, from the Ferry Building and extending south from Mission Street to Mariposa Street and east to the Bay (see Figure 9.12). Originally an industrial area, in recent years the Southern District has been the center of residential loft development, a nightlife destination, and the home of the San Francisco Giants at Oracle Park.



Photo 9.11 Public Safety Building / Southern District Police Station. HOK

9.3.1.4 Old Potrero Station

The Police Department's Old Potrero Station is located on the corner of 3rd Street and 20th Street and is adjacent to but outside of the SLR Vulnerability Zone and the H++ zone. The Old Potrero police station was originally called the Southeast station and is situated in the Dogpatch and remains one of the few historic buildings in the Potrero Hill neighborhood located in the northern portion of District 10. The building is in close proximity to District 9 and District 6 and is served by the Bayview Police station. The parcel is approximately 12,000 square feet, hosting a 9,000 square foot structure that was constructed in 1915. The building consists of a two-story portion on the northern wing and a single-story on the southern wing.

The 1915 building housed the Potrero Police station (now called Bayview police station) until a modern Bayview police station was constructed in 1995. A fire in 2012 rendered the Old Potrero Police station unusable. In 2016, the Dogpatch neighborhood and outlying community requested the building to be revitalized, as the surrounding community experienced an influx of new residents and businesses. The surrounding community and buildings consist of commercial space, high density residential, mixed-use residential, and access to public transportation infrastructure.

The Old Potrero police station is expected to house the Police Department Community Engagement Division (CED) as the primary use of the building. The intent of the building is to include a space for many of the department's community discussions and events. It will also provide a community facility that will be utilized for meetings and events that do not include the police department.

The police department plans to include the Muni Enforcement Team due to the close proximity to the transit system. The department recognizes that with the ongoing development in the area (e.g. Chase Center, new housing, commercial buildings, and open space), the area will be experiencing an influx in commuters which will demand a greater transit police presence.

9.3.1.5 Traffic Company and Forensic Services Division

The Traffic Company and Forensic Services Division are located at 1995 Evans Avenue in the Hunters

Point – Bayview Neighborhood. These facilities were recently relocated from a seismically deficient structure at 850 Bryant Street. Both the Police Department's Traffic Company (i.e., motorcycle police) and the Forensic Services (i.e., crime laboratory) play major roles in earthquakes and disasters, as well as providing public safety services on a daily basis. When a disaster strikes, traffic emergency responders and investigative forensic personnel must be housed in seismically safe structures, professional work environment, with the facilities necessary for a citywide response. These facilities are where emergency response efforts are assembled, organized, and deployed.

9.3.1.6 Additional Forensic Services

The Police Department operates a second crime laboratory at Hunters Point Shipyard in Building 606. Approximately 41 personnel were stationed at this location; however, there are plans to co-locate the two crime laboratories at 1995 Evans Avenue and demolish the existing structure to make way for new residential development (see Chapter 13, *A Changing Shoreline*).

9.3.1.7 County Jail

The Sheriff's Department is organized into divisions and units to efficiently provide a variety of services. The Custody Division is the Sheriff's Department's largest division. It is charged with the operation of six County Jails, the Hospital Ward, the Classification Unit, and the various Jail Programs. The Custody Division strives to maintain a safe and secure jail system and to facilitate an environment in which the various educational and rehabilitation programs can accomplish their mission. These in-custody programs offer a variety of educational, vocational, substance abuse treatment, and violence intervention classes. Jail programs help offenders prepare for re-entry into the community and assist in transitioning sentenced individuals to a community-based program setting.⁵

The County Jail located at 425 7th Street in the SOMA neighborhood is just outside of the SLR Vulnerability Zone and within the H++ zone (see Chapter 2). This facility includes County Jail 1, County Jail 2, and the Classification Unit. County Jail 1 is the Intake and Release Center and is the facility where all persons are booked into and released from the San Francisco County Jail system. Inmates are not housed

5 <http://www.sfsheriff.com/about.html>. Accessed August 2018.

at County Jail 1. They are only at County Jail 1 for the period of time required to complete the booking and release processes.

County Jail 2 is a direct-supervision facility that uses pod architecture for inmate housing areas. This design plan offers deputized staff better visual and audio monitoring of the inmate population. The rated capacity for this jail is 392 inmates. Although County Jail 2 holds both men and women, it is the only jail where women are housed. This jail is used to confine both sentenced and pre-sentenced inmates. County Jail 2 has its own infirmary in addition to a dental office and medical observation pod that provides specialized medical and psychiatric care to those with special needs (see Photo 9.12). Medical care is provided 24 hours a day, seven days a week.

The Classification Unit is also located at this facility. The Deputy Sheriffs assigned to the Classification Unit determine the safest and most appropriate housing for each inmate that will be remaining in the custody of the Sheriff.

County Jail 4 is located at 850 Bryant Street and is a traditional linear jail facility located on the 7th floor of the Hall of Justice. This jail is the maximum-security facility of the San Francisco County Jail system. The rated capacity for this jail is 402 inmates and it houses both sentenced and pre-sentenced inmates.. This jail offers inmate programs such as parenting, independent study, alcoholics anonymous, and narcotics anonymous. Parenting skills classes and inmate-child visitation is also offered to mend and heal broken family relationships. County Jail 4 has an industrial size kitchen that feeds about 850 inmates three meals a day. This jail has a full-scale laundry operation for providing clean clothing and linens to the inmates. This jail has its own infirmary and provides medical care to the inmate population 24 hours a day, seven days a week.

9.3.1.8 Hall of Justice

The Hall of Justice Building at 850 Bryant Street houses the Criminal Court, Behavioral Health Court, and Traffic Court of the Superior Court of California, County of San Francisco, as well as multiple supporting services for the Superior Court, including Office of Court Reporting, the Interpreter Division, and jury services.



Photo 9.12 San Francisco County Jail at 425 Seventh Street.

The Hall of Justice also houses County Jail 4, and serves as the base of operations and headquarters for the San Francisco Sheriff's Department. The San Francisco Police Department's motorcycle traffic division is also located in the Hall of Justice, and the Hall of Justice parking garage houses most of the San Francisco Police Department vehicles.

9.3.1.9 Public Defenders Office

The San Francisco Public Defender's Office at 555 7th Street provides legal representation for people who are charged with a crime and unable to afford an attorney. The office provides legal representation to over 25,000 people charged with crimes each year and employs over 100 attorneys and 60 staff members. Courts within its jurisdiction include the San Francisco Superior Court, the California Court of Appeal for the First District, and the California Supreme Court.

9.3.2 Exposure Assessment

The exposure of each police station and department associated facilities was evaluated relative to the 10 SLR scenarios (see Chapter 2). The percentage of each station that could be inundated under each scenario was calculated and is presented in Table 9.7.

Table 9.7 Law Enforcement Facility Exposure with Sea Level Rise

Name	Exposure under Each Scenario (Y/N)									
	1	2	3	4	5	6	7	8	9	10
Police Headquarters and Public Safety Building	-	-	-	Y	Y	Y	Y	Y	Y	Y
Southern District Station	-	-	-	Y	Y	Y	Y	Y	Y	Y
Forensic Service/Traffic Company	-	-	-	-	-	Y	Y	Y	Y	Y
Additional Forensic Services	-	-	-	Y	Y	Y	Y	Y	Y	Y
County Jail 1	-	-	-	-	-	-	-	-	-	Y *
County Jail 2	-	-	-	-	-	-	-	-	-	Y *
County Jail 4	-	-	-	-	-	-	-	Y	Y	Y
Hall of Justice	-	-	-	-	-	-	-	Y	Y	Y
Public Defenders Office	-	-	-	-	-	-	Y	Y	Y	Y

* Inundated under H++ Scenario.

9.3.3 Consequences

Key consequences and consequences that could occur to society and equity, the economy, environment, and governance (see Chapter 3) were evaluated assuming no action is taken to address the impacts associated with SLR or extreme tide flooding. These consequences are listed below.



KEY ISSUE: Law enforcement facilities in the SLR Vulnerability Zone are vulnerable to flooding because the facilities generally have at-grade openings and were not built to withstand flooding. In addition, emergency response services rely on roads that could be flooded and power supplies that could be disrupted. Ensuring that emergency and disaster response services are not interrupted will require actions to improve the individual facilities to increase flood resilience, and coordination across the police stations to provide backup or alternates. Coordination will also be required with City, county, and state transportation agencies to ensure road access and utility services are maintained.



Society and Equity: Law enforcement personnel respond to large-scale disasters and smaller emergencies in the community, protecting public safety and maintaining a safe environment for all residents during large- and small-scale incidents and events. These services

benefit residents, commuters, tourists, and those who work in the area. Incident response could be impacted in flooded areas, resulting in delays in response time and dangers to public health and safety.



Economy: By protecting the local community, law enforcement provide value to the local economy. If incident response is delayed or impaired due to flooding, recovery costs could increase, and local communities and the region could suffer long-term economic consequences.



Environment: Law enforcement personnel play a critical role in protecting public safety during emergencies, including oil spills and other environmental contamination events. Emergency responders provide a critical function in helping protect the environment and human health during these events.



Governance: If the County Jail is flooded, capacity and services at the remaining facilities would be compromised. Coordination with Sheriff Departments outside of San Francisco may be required to maintain intake and release services, and to house female inmates (i.e., no other jails in San Francisco currently house women).

9.4 OTHER PUBLIC SAFETY FACILITIES

9.4.1 Potentially Vulnerable Assets

The following assets are also important to public safety, health, and wellbeing and are either owned, maintained, or supported by the City. The facilities are located either wholly or partially within the SLR Vulnerability Zone.

9.4.1.1 Southeast Health Center

Southeast Health Center at 2401 Keith Street is a full-service health clinic that provides affordable, comprehensive, and quality care to people of all ages (see Photo 9.14). Located in the Bayview Hunters Point neighborhood since 1979, the center provides care for common illnesses, high blood pressure, and sexually transmitted diseases. The center also provides additional services such as confidential HIV testing and counseling, pregnancy testing, prenatal care, mental care, and vision care. Although additional private medical clinics are available to provide healthcare, the Southeast Health Center is the only City-owned and operated healthcare center located within the SLR Vulnerability Zone. Eleven additional City-owned and operated healthcare centers are located outside of the SLR Vulnerability Zone.

9.4.1.2 Fifth Street Homeless Center

Located at 525 5th Street and bounded by Bryant and Welch Streets, the Saint Vincent de Paul Society Homeless Shelter is San Francisco's largest and most extensive homeless facility (see Photo 9.15). It is also

the largest homeless shelter in Northern California, offering a wide range of services and assistance programs aimed to improve the basic quality of life for the individuals and families served. Each day, this center shelters, feeds, and supports over 340 homeless men and women, in addition to providing drop-in care to another 70 people struggling to find adequate food or shelter throughout the City.⁶

9.4.1.3 Waste Management (i.e., Recology)

Waste management in San Francisco is not managed directly by the City; however, it is considered an essential City function that is an important part of public health and safety and, therefore, is included in this Assessment. In San Francisco, waste management services are provided by Recology. Recology maintains two major waste management facilities in the SLR Vulnerability Zone.

Recology Golden Gate at 900 Seventh Street in San Francisco is located at the head of the Mission Creek inlet. Recology Golden Gate offers compost, recycling, and landfill collection and disposal services to residential and commercial customers in the Financial District, SOMA, the Marina, and North Beach neighborhoods. The facility includes offices and a large parking area for collection trucks.

Recology Recycle Central at Pier 96 is a materials recovery facility that extracts recyclables from the waste stream. This site also hosts a recycling buy-back center. Pier 96 is a low-lying area built on fill material and is vulnerable to near-term inundation from SLR.

6 <https://svdp-sf.org/what-we-do/msc-shelter/>. Accessed August 2018.



Photo 9.14 Southeast Health Center



Photo 9.15 5th Street Homeless Center, St Vincent de Paul Society, MSC-South

Table 9.8 Other Public Safety Facility Exposure with Sea Level Rise

Name	Exposure under Each Scenario (Y/N)									
	1	2	3	4	5	6	7	8	9	10
Southeast Health Center	-	-	-	-	-	-	-	-	-	Y*
Fifth Street Homeless Center	-	-	-	-	-	Y	Y	Y	Y	Y
Recology Golden Gate	-	-	-	-	-	Y	Y	Y	Y	Y
Recology Recycle Central at Pier 96	-	-	Y	Y	Y	Y	Y	Y	Y	Y

* Inundated under H++ Scenario.

9.4.2 Exposure Assessment

The exposure of the other public safety facilities was evaluated relative to the 10 SLR scenarios (see Chapter 2) and presented in Table 9.8.

9.4.3 Consequences

Key consequences and consequences that could occur to society and equity, the economy, environment, and governance (see Chapter 3) were evaluated assuming no action is taken to address the impacts associated with SLR or extreme tide flooding. These consequences are listed below.



KEY ISSUE: Public safety facilities, including healthcare, homeless shelters, and public services such as waste management, need to ensure continuity of services for the community. Individuals with ongoing medical needs – particularly those in vulnerable communities – are more likely to be at risk in a disaster. The buildup of household waste products, lack of reliable and safe shelter, and the loss of local medical services could impact the health and welfare of vulnerable populations and create a wider public health and safety hazard.



Society and Equity: Healthcare facilities and homeless shelters serve already vulnerable community members who rely on these services for care and quality of life. Disruption of facilities can result in significant hardships for these community members and their families, who may not have access to alternative care and housing that is equivalent, affordable, and in an easily accessible

location. Damage to neighborhoods where staff and clients live may also result in access issues and disconnection from healthcare and homeless services. Nearby healthcare and homeless facilities that are located outside the SLR Vulnerability Zone may be further strained.

Disruption of Recology's waste management and recycling services could have a citywide impact on waste collection and recycling efforts, resulting in additional public safety and health hazards from the local buildup of household waste.



Environment: Healthcare facilities often store materials such as medical waste, pharmaceuticals, cleaners, and toxics that can impair water quality if released into the Bay or near-shore habitats. The displacement of the homeless population from homeless shelters to homeless encampments can lead to an increase in public health hazards and waste management issues. The buildup of household waste throughout the City could result in garbage impacting local parks, open space, and sensitive environmental areas, including waterways and the Bay.



Economy: Damage to healthcare, homeless, and waste management facilities can result in financial burdens for building owners and operators, as well as staff that may end up out of work. Specialized equipment and facilities can be extremely costly and difficult to replace if damaged. This can result in lost wages for employees and lost revenues for the facilities.

9.5 CONTAMINATED LANDS

Contaminated lands are sites with substances or materials that pose a health hazard to people and/or the environment. The degree of the hazard generally depends on the potential for the substance(s) to be released, the characteristics of the substance (e.g., toxicity and quantity), and the sensitivity of the people, wildlife, waterways, etc. potentially affected. The release of hazardous substances from a contaminated site generally occurs through four pathways: ground-water migration, surface water flow, soil exposure, and release to the air. These pathways can result in direct exposure to human populations and sensitive ecosystems, as well as contamination of drinking water and food chains.

Contaminated lands are vulnerable to SLR and storm events that could cause flooding or groundwater intrusion. Temporary or permanent surface flooding, erosive tidal or wave energy, and elevated groundwater levels could disturb the contaminated soils. This could cause the release of hazardous substances with potentially significant consequences on public health, the environment, and the local economy. Known contaminated sites are often remediated in place due to the technical challenges and environmental risks of hazardous substance removal and disposal.

The extent to which contaminated lands are cleaned up depends on the site's current land use designation or on its intended reuse. Sites intended for heavy industrial uses have less stringent cleanup standards than those intended for light industrial or commercial uses. In addition, cleanup standards vary depending on the location of the site relative to the Bay, with dry upland sites having less stringent requirements than wet (e.g., aquatic) locations.

Depending on the cost of remediation and the level of risk posed to public health and the environment, some contamination can be allowed to remain onsite. In these cases, there are often restrictions placed on the future use of the site. Long-term monitoring, maintenance plans, and site reviews are required when some contamination remains in place. Additionally, these sites are generally subject to deed restrictions, covenants, and administrative, institutional, or engineering controls.

Along the San Francisco shoreline, some hazardous sites have been remediated through the removal of the top layer of heavily contaminated soils, and the placement of clean topsoil and a cap to minimize soil disturbance of remaining contamination (see Figure 9.13).

While there have been many advances in the field of remediation, most cleanup practices have not considered the potential for climate change, such as SLR and changing groundwater conditions. While remediation of contaminated lands offers opportunities for economic growth, redevelopment, and the creation of new parks and open space, the cleanup of contaminated lands must consider future SLR and groundwater conditions to ensure the safety of the public and environment.

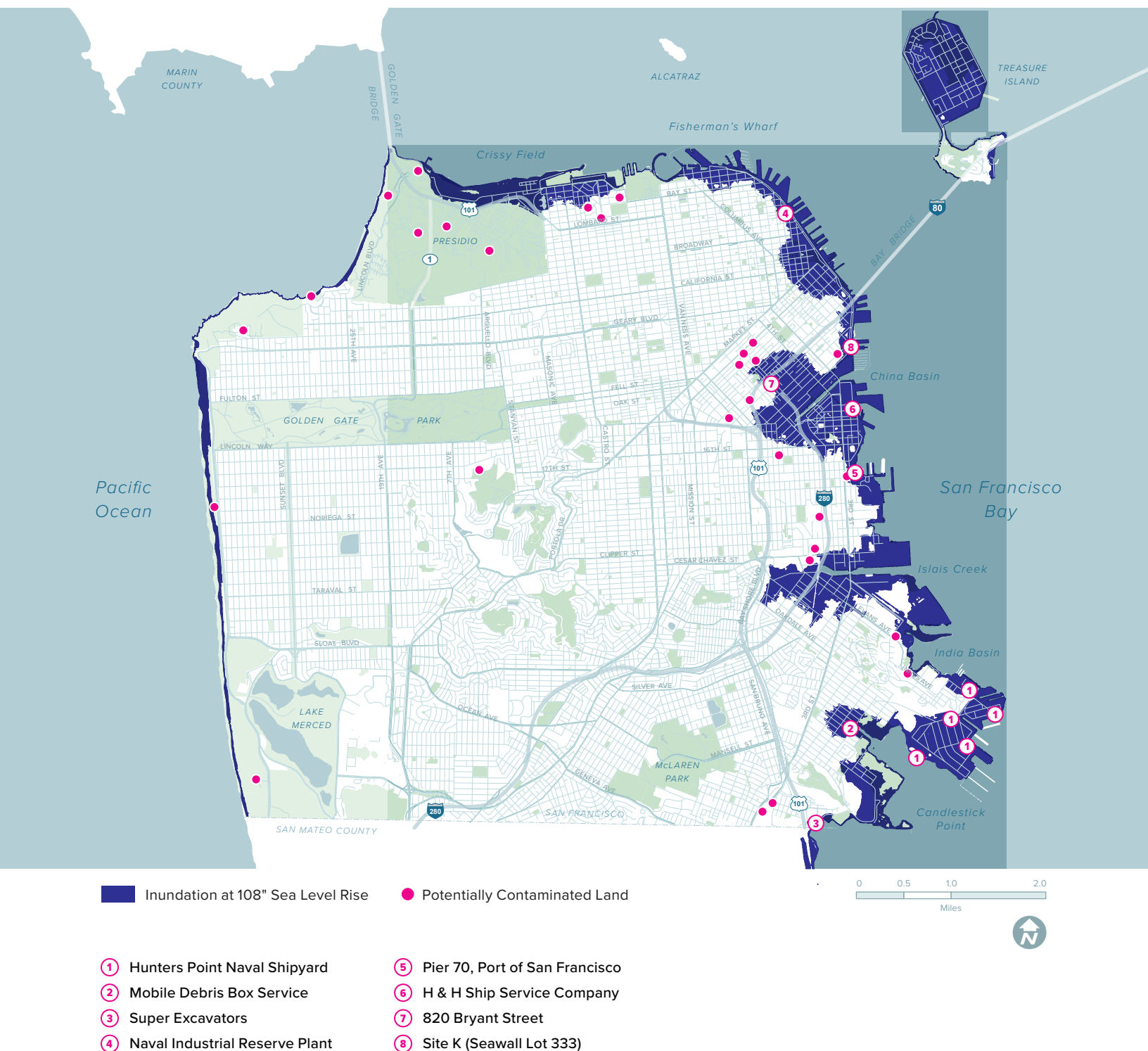
9.5.1 Potentially Vulnerable Locations

The California Department of Toxic Substances Control (DTSC) tracks the status of known, potentially contaminated sites, including cleanup efforts, permitting, enforcement, and investigation efforts at hazardous waste facilities and sites with known contamination or sites where further investigation is required. The potentially contaminated lands in San Francisco include: Federal Superfunds, State Response, Voluntary Cleanup (by the responsible party), Evaluation (sites that are at a pre-cleanup and investigation stage), Military Evaluation, Tiered Permit Facilities, and sites where Corrective Action is required.

There are 51 known potentially contaminated land sites in San Francisco that are currently tracked by DTSC, 11 of which are located in the SLR Vulnerability Zone. Four of the known locations are associated with contamination in the Hunters Point Naval Shipyard. This section presents the information contained with DTSC's EnviroStor tracking database.⁷ For each site, several attributes were reviewed, including site type, past uses, potential media affected, regulatory agencies involved, and the status of the site.

⁷ <https://www.envirostor.dtsc.ca.gov/public/>.

Figure 9.13 Potentially Contaminated Lands within the SLR Vulnerability Zone



9.5.1.1 Hunters Point Naval Shipyard

The Hunters Point Naval Shipyard has been identified as a federal superfund site (Photo 9.16). The former Hunters Point Naval Shipyard is located in the Bayview South neighborhood on a peninsula that extends into the San Francisco Bay. The facility consists of approximately 965 acres of land (with approximately 443 acres of submerged land). The shipyard was divided into multiple parcels to help expedite the environmental cleanup efforts and to facilitate the timely transfer of the property to the City. In December 2004, the Navy transferred the first 75-acre parcel (known as Parcel A) to the City for residential and commercial development and community parks. The remainder of the shipyard will be transferred to the City as the environmental cleanup efforts are complete.

Previous land uses that have led to potential contamination include:

- Shipyard activities including port operations, dry dock, ship building and repair including sand blasting, metal plating, paint stripping, and painting operations
- Fuel terminal, vehicle storage, refueling, fuel hydrant pumping stations, oil/water separators, and a degreasing facility
- Naval Radiological Defense Laboratory (i.e., radioactive laboratory)
- Machine Shop activities, including metal plating and finishing, sand blasting, paint stripping and painting, and onsite landfill disposal of waste products

See also Chapter 13, *A Changing Shoreline*

9.5.1.2 Mobile Debris Box Service

The 0.5-acre site is located at 1301 Yosemite Avenue in the Bayview South/Hunters Point neighborhood on reclaimed land that was from the Bay between 1943 and 1955 (i.e., bayfill was used to fill the Bay and create upland space to expand the City shoreline). Operations at the site included a lumber yard (1954-1986), storage, and debris box operations. A waste pile was created that contains friable asbestos at levels above hazardous waste criteria. The City is currently suing the property owner and tenants to



Photo 9.16 Hunters Point Naval Shipyard. Todd Lappin (CC BY-NC 2.0)

address the waste located on the site. As of July 2009, this site is listed in EnviroStor as inactive and in need of further evaluation to assess the need for any additional corrective actions.

9.5.1.3 Super Excavators

This less than 1-acre site is located at Harney Way and Alana Way just south of the Candlestick Point State Recreation Area, California's first urban state park, which is currently undergoing an extensive renovation, including wetland rehabilitation. EnviroStor classifies this location as a tiered-permit site.

9.5.1.4 Naval Industrial Reserve Plant

The Naval Industrial Reserve Plant in San Francisco was established in 1942. The General Engineering and Dry Dock Company formerly owned the 1-acre site. Facilities on the site that may contain hazardous materials include oil tanks, steam plants, painting sheds, and a boiler house. In 1959, the 0.53-acre site was turned over to the General Services Administration. The current owner of the site is Blue Jeans Equities West, and the site is currently part of the Levi Strauss Corporate Headquarters complex known as Levi's Plaza. The site is currently classified as a formally used defense site (FUDS).

9.5.1.5 Pier 70, Port of San Francisco

Most of Pier 70 is listed on the National Register of Historic Places as the Union Iron Works Historic District and is home to the headquarters for both Union Iron Works and Bethlehem Steel. Pier 70 has been the home of shipbuilding and repair operations from the time of the Spanish American War in 1898 through today, supporting multiple war efforts. The

Historic District contains many contributing resources, including buildings, piers, slips, cranes, segments of a railroad network, and landscape elements. Most of the buildings are of an industrial architectural style and historic use, and made of unreinforced brick masonry, concrete, and steel framing, with corrugated iron or steel cladding.

Pier 70, and much of San Francisco's eastern waterfront, is comprised largely of fill that was historically placed in the Bay to construct new land. These "fill soils" contain chemical constituents that were present in the debris, soil, and native serpentine rock that comprise the fill. In some areas, the soil was also impacted by the former industrial uses and legacy shipbuilding activities. The constituents found in the Pier 70 soils include naturally occurring and introduced metals (lead, arsenic, cadmium), petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and asbestos. Some contaminants may be present at concentrations above environmental screening levels. Environmental investigations of Pier 70 have found that the contaminants present are associated with the soil and are not soluble or volatile. The risk of exposure to hazardous materials is only associated with direct exposure to contaminated soil. Historic buildings at Pier 70 may also contain hazardous building materials such as lead-based paint and asbestos.

The soil within the Pier 70 area is subject to a "Risk Management Plan" that functions as the remedial action plan for the site and ensures that contaminants in the existing soil do not pose a risk to human health or the environment. The remedial action includes installation of durable cover over contaminated soil areas to prevent exposure to, or dispersion of, the soil by wind, water, or construction activities. The required durable cover also mitigates the potential for soil mobilization during a flood event. Abatement of hazardous building materials is accomplished as buildings are rehabilitated and renovated for reuse. Pier 70 is in the process of being redeveloped and required environmental cleanup and decontamination are part of the agreements the Port has created with developers and in conjunction with the building of nearby Crane Cove Park.

Work to rehabilitate the iconic historic buildings is underway and being spearheaded by Orton Development, Inc., the Port's tenant and development

partner. With General Obligation Bond funds and other funding, the Port is beginning work on site preparation for Crane Cove Park, a 9-acre park on the northwest corner of the site. The Port has entered into an Exclusive Negotiation Agreement (ENA) with Forest City Development to develop a 25-acre mixed-use development at Pier 70. See Chapter 13, *A Changing Shoreline* for details on proposed site redevelopment.

9.5.1.6 H & H Ship Service Company

The Port of San Francisco currently owns this 8.6-acre site located near Pier 50 in Seawall Lot 337-MB1. H&H Ship Service Company formerly treated waste sludge and wastewater in various steel aboveground storage tanks at this location. The site was previously a permitted facility for the treatment and storage of hazardous wastes. Soil and groundwater were found to be contaminated with arsenic, polychlorinated biphenyls, and polynuclear aromatic hydrocarbons. The facility was cleaned up and closed, with a Land Use Covenant that restricted future usage of the site to commercial/industrial uses in the terms of closure. The City is pursuing redevelopment plans for this location to transform it into a mixed-use residential and commercial area with open park areas. The Port has submitted a request for variance to DTSC in 2018 to allow residential redevelopment.

9.5.1.7 820 Bryant Street

Site K, owned by the San Francisco Redevelopment Agency, occupies approximately 1.4 acres located at 1 through 59 1/2 Townsend Street in San Francisco. The site was reclaimed from the Bay by 1913 with soil and construction debris from the 1906 earthquake. Previous site occupants included a paint warehouse, ship service company, and a forklift service company that left contaminants in the soil. The land use restriction includes prohibiting disturbing the remedy and monitoring systems without approval. Additional excavation of contaminated soils is also prohibited. Currently, the building and sidewalks act as a cap over the contaminated soil. A site inspection was last performed in February 2018.

9.5.1.8 Site K (Seawall Lot 333)

Site K, owned by the San Francisco Redevelopment Agency, occupies approximately 1.4 acres located at 1 through 59 1/2 Townsend Street in San Francisco. The site was reclaimed from the Bay by 1913 with soil and construction debris from the 1906 earthquake.

Previous site occupants included a paint warehouse, ship service company, and a forklift service company that left contaminants in the soil. The land use restriction includes prohibiting disturbing the remedy and monitoring systems without approval. Additional excavation of contaminated soils is also prohibited. Currently, the building and sidewalks act as a cap over the contaminated soil. A site inspection was last performed in February 2018.

9.5.2 Exposure Assessment

The exposure of the contaminated lands was evaluated relative to the 10 SLR scenarios (Table 9.9). The EnviroStor database notes an approximate point location and size of each potentially contaminated site but does include a detailed delineation of each site's geographic boundaries. Therefore, this Assessment may overestimate the potential area of each site that is located within the SLR Vulnerability Zone.

9.5.3 Consequences

Key consequences and consequences that could occur to society and equity, the economy, environment, and governance (see Chapter 3) were evaluated assuming no action is taken to address the impacts associated with SLR or extreme tide flooding. These consequences are listed below.



KEY ISSUE: Flooding of contaminated sites – including sites that have been cleaned and closed with some remaining contamination

– by SLR, coastal storm surge, or rising groundwater levels could result in the release and mobilization of hazardous substances and could cause significant impacts to public health and the environment.



Society and Equity: The flooding or other disruption of contaminated sites can expose communities to substances that are harmful to human health and safety.



Environment: The flooding or other disruption of contaminated sites can have significant environmental impacts. The release of persistent and mobile hazardous materials can have long-lasting and far-reaching consequences for wildlife and habitats and can affect water quality.



Economy: Flooding of contaminated sites can strain local emergency resources and result in high cleanup and recovery costs. It may render surrounding land unusable and hinder further development, affecting real estate values.



Governance: Redevelopment of contaminated lands along the San Francisco shoreline does consider future flood risks associated with SLR. However, rising groundwater levels may pose an additional hazard. This threat is not currently well understood. For sites that have been cleaned up and closed, long-term monitoring plans should consider changing environmental and climate conditions.

Table 9.9 Potentially Contaminated Lands Exposed under Each Scenario

Name	Acres	Exposure under Each Scenario (Y/N)									
		1	2	3	4	5	6	7	8	9	10
Hunters Point Naval Shipyard	965	-	-	-	Y	Y	Y	Y	Y	Y	Y
Mobile Debris Box Service	0.5	-	-	Y	Y	Y	Y	Y	Y	Y	Y
Super Excavators	< 1	-	-	-	-	-	-	-	-	-	Y
Naval Industrial Reserve Plant	1	-	-	-	-	-	Y	Y	Y	Y	Y
Pier 70	30	-	-	-	-	-	Y	Y	Y	Y	Y
H&H Ship Service Company	8.6	-	-	-	-	-	Y	Y	Y	Y	Y
820 Bryant Street	1	-	-	-	-	-	-	-	Y	Y	Y
Site K (Seawall Lot 333)	1.4	-	-	-	-	-	Y	Y	Y	Y	Y

* Inundated under H++ Scenario.

9.6 HAZARDOUS MATERIAL SITES

There are a variety of industries that handle potentially hazardous substances as a part of their regular business activities. The U.S. Environmental Protection Agency (EPA) requires that all such facilities report their activities and follow proper procedures regarding waste handling, management, and disposal as well as pollution prevention activities. This section provides information on the industries that handle potential hazardous materials within the City of San Francisco and within the SLR Vulnerability Zone (see Figure 9.14).

9.6.1 Potentially Vulnerable Locations

EPA maintains a database of all industries that handle potentially hazardous materials, separated by industry and facility type. A detailed evaluation of each facility was not completed as part of this Assessment. However, the number of each type of industry within the SLR Vulnerability Zone was evaluated. Table 9.10 presents the industries that are currently regulated by EPA, along with a brief definition of the breadth of services included under each industry.

Table 9.10 Hazardous Material Industries and Services

Industry	Definition / Type of Services
Buildings	Parking lots, garages, housing construction sites, and commercial buildings
Construction	Construction services and development locations
Culture	Motion picture and video production, museums, churches, and other large events venues
Education	Elementary- to university-level schools, including the many Academy of Art University buildings and locations
Finance	Large banks and finance corporations
Government	Federal and state buildings, municipal buildings and transportation operations, wastewater treatment plants, municipal water supply, fire stations, and military sites
Healthcare	Hospitals, medical centers, pharmacies, and general freight and marine services
Infrastructure	Highway, street, and bridge infrastructure sites
Manufacturing	Chemical, clothing, construction, electronics, food, leather goods, machinery equipment, metal, paint, petroleum, and pharmaceutical products wholesalers or manufacturers
No Industry Information	Hazardous material sites without industry/use information
Oil and Gas	Gas stations
Professional and Technical	Animal control center, antique restoration sites, auto repair and car dealerships, courier and postal services, pest control, paint and photography services and supply, and printing and graphic design services
Dry Cleaning/Laundry	Dry cleaning and laundry facilities
Real Estate Rental/Leasing	Hotels, general warehouses, and property management facilities
Retail	Supermarkets, department stores, cosmetic and perfume (salon) locations and auto parts suppliers
Scientific R&D Services	Medical laboratories
Telecom	Telecom providers
Transport	Taxi cabs, van and tour buses, trucking and hauling services, and transportation logistics
Utility	Electric power distribution and control and natural gas distribution



Figure 9.14 Hazardous Material Sites

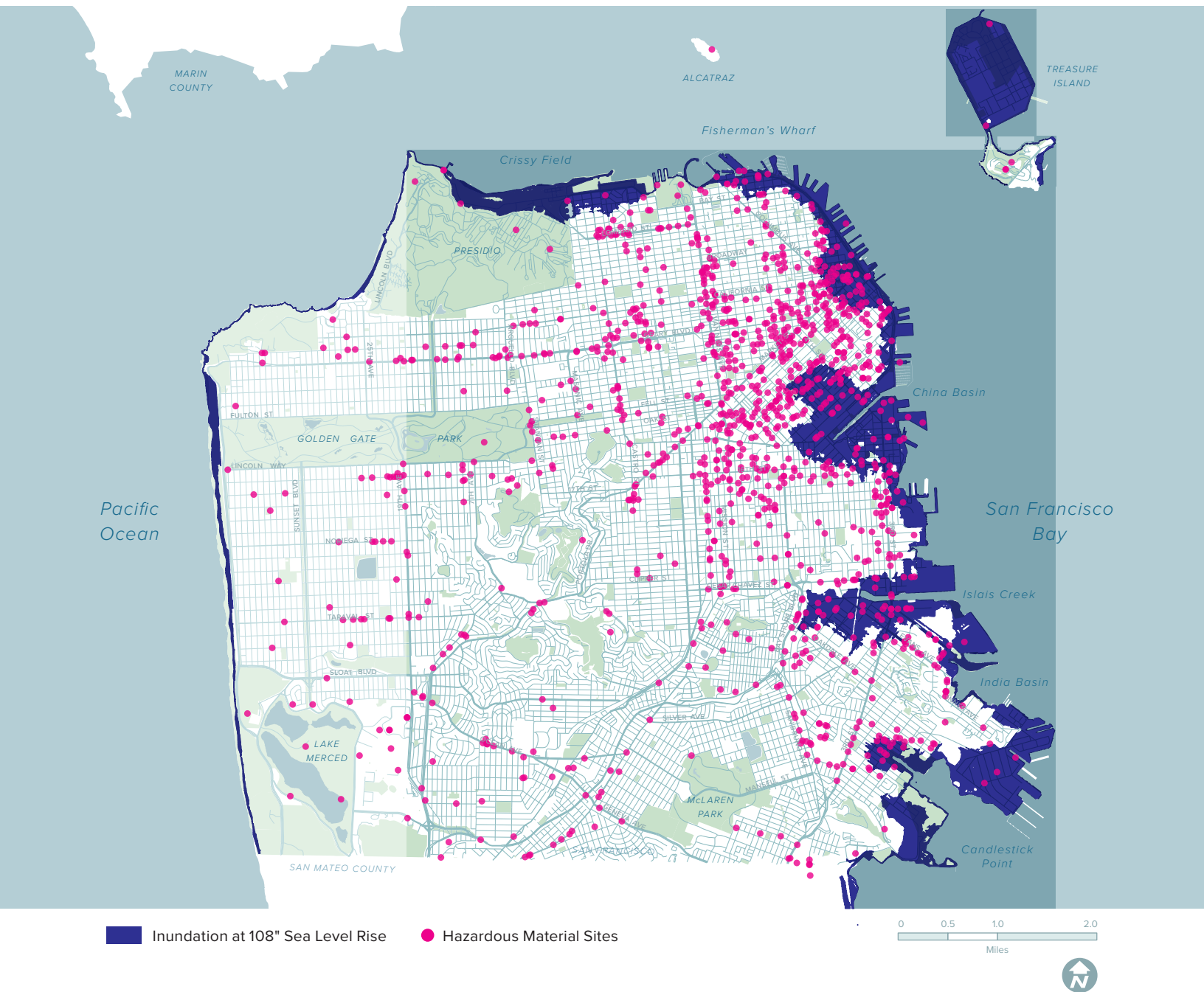


Table 9.11 Hazardous Material Sites Exposed under Each Scenario

Industry	Total Facilities Citywide	Exposure under Each Scenario (Number of Facilities)									
		1	2	3	4	5	6	7	8	9	10
Buildings	27	-	-	-	-	1	1	3	3	3	5
Construction	23	-	-	-	2	2	2	3	3	4	5
Culture	11	-	-	-	1	1	1	3	3	3	3
Education	56	-	-	-	-	2	2	4	5	6	7
Finance	4	-	-	-	-	-	-	-	-	-	1
Government	62	-	-	-	1	3	10	10	10	12	14
Healthcare	132	-	-	-	-	-	-	15	17	19	20
Infrastructure	5	-	-	-	-	-	-	2	2	2	3
Manufacturing	157	1	1	2	5	7	7	34	39	44	48
No Industry Information	8	-	-	-	-	-	-	1	1	2	3
Oil and Gas	83	-	-	-	-	1	1	4	5	8	10
Professional and Technical	338	-	-	-	-	3	3	22	27	32	38
Dry Cleaning/Laundry	96	-	-	-	-	-	-	2	2	2	2
Real Estate Rental/Leasing	57	-	-	-	-	-	-	8	8	8	11
Retail	29	-	-	-	-	-	-	2	2	2	2
Scientific R&D Services	12	-	-	-	-	-	-	2	2	2	3
Telecom	44	-	-	-	-	-	-	2	2	2	2
Transport	82	-	-	-	2	7	7	11	13	14	19
Utility	18	-	-	-	-	-	-	2	2	5	5

9.6.2 Exposure Assessment

The exposure of the hazardous material sites was evaluated relative to the 10 SLR scenarios (see Chapter 2). The total number of each facility type exposed under each scenario is presented in Table 9.11).

9.6.3 Consequences

Key consequences and consequences that could occur to society and equity, the economy, environment, and governance (see Chapter 3) were evaluated assuming no action is taken to address the impacts associated with SLR or extreme tide flooding. These consequences are listed below.



KEY ISSUE: Flooding of facilities or locations with hazardous substances stored onsite could result in the release and mobilization of hazardous substances and could cause significant impacts to public health and the environment. Facilities with hazardous materials stored at or below grade, or improperly contained, are the most vulnerable. Facilities without a plan to safely shut down operations in advance of a storm event are also vulnerable. Managers and owners of sites not currently in the floodplain may not be aware of the current or future flood risks; therefore, these locations may not be operated with sufficient plans in place to reduce the impacts of flooding, should they occur.



Society and Equity: The flooding or other disruption of hazardous material sites can expose communities to substances that are harmful to human health and safety.



Environment: The flooding or other disruption of hazardous material sites can have significant environmental impacts. The release of persistent and mobile hazardous materials can have long-lasting and far-reaching consequences on wildlife and habitats and can affect water quality.



Economy: Facilities that generate, treat, or transport hazardous materials are usually job sites, and their disruption or closure can result in lost wages and larger-scale economic impacts. Additionally, flooding of hazardous materials sites can strain local emergency resources and can result in high cleanup and recovery costs.



Governance: Current emergency planning and response for many hazardous material sites do not require consideration of future flood risk. The number and locations of hazardous material sites, and the potential extent of flooding that could occur during a large storm may stress available resources and require a high degree of coordination and contingency planning.



San Francisco Bay Trail at Heron's Head Park. Photo by Ed Brownson (CC BY-NC-ND 2.0)