

Pier 80

Subarea 4-1



Subarea Description

Pier 80 (Subarea 4-1) includes Pier 80, a 60-acre working cargo pier that provides important maritime, industrial, and disaster response services. Pier 80 includes two warehouses, four deepwater large vessel berths, two cranes used to offload materials from ships, and a railroad connection. Seawall Lot 356 and portions of the Potrero Hill neighborhood's southern industrial area, which contains Muni Metro East and Warm Water Cove Park, are also in this subarea.

The Bay facing shoreline is comprised of an embankment fortified with revetment and an engineered pier (on piles). The Islais Creek facing shoreline has a similar shoreline type except the sections with an embankment have varying degrees of fortification.

The primary pathways of flooding are from overtopping along the northern shoreline of Islais Creek near the 3rd Street Bridge and the Illinois Street Bridge. Flooding from this subarea extends into the adjacent Subarea 4-2 (Islais Creek). Flood risk reduction strategies in this subarea will also benefit Subarea 4-2.



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Assets and Landmarks



Maritime

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|--------------------------------------|--------------------|
| 1. Cargo Terminal (Pier 80) | 4. Seawall Lot 355 |
| 2. Administration Building (Pier 80) | 5. Seawall Lot 356 |
| 3. Quonset Building (Pier 80) | |



Disaster Response

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| 6. Secure Maritime Facility, FEMA Unloading Area (Pier 80) | 9. Large Vessel Berth (Pier 80) |
| 7. Oil Spill Response Equipment Storage (Pier 80) | 10. San Francisco Bay Railroad |
| 8. FEMA Staging Area (Pier 80) | 11. Illinois Street |



Transportation

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|-----------------------------|--------------------------------|
| 12. Muni T-Line | 10. San Francisco Bay Railroad |
| 13. Muni Metro East Station | |



Utilities

Wastewater

- 14. Channel Force Main
- 15. Combined Sewer Discharge Outfalls (2)
- 16. Southeast Deepwater Outfalls



Open Space and Ecology

Open Space

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| 17. Tulare Park | 19. Warm Water Cove Park |
| 18. Bay Trail / Blue Greenway | 20. 22nd St. Access |



Timing of Exposure: Assets and Landmarks

Assets / Landmarks	Flood Scenario	Equivalent Events	Timing				
			USACE Low	USACE Inter.	OPC Most Likely	USACE High	OPC 1-in-200
 Maritime							
<ul style="list-style-type: none"> Pier 80 Seawall Lot 356 	48" (10.2ft. NAVD)	High tide + 48" SLR	>2150	>2150	2113	2088	2073
		100-YR + 7" SLR	2088	2048	2032	2025	2023
<ul style="list-style-type: none"> Cargo Terminal (Pier 80) 	52" (10.8 ft. NAVD)	High tide + 52" SLR	>2150	>2150	2120	2092	2076
		100-YR + 11" SLR	2139	2066	2044	2035	2032
<ul style="list-style-type: none"> Administration Building (Pier 80) Quonset Building (Pier 80) 	77" (12.9 ft. NAVD)	High tide + 77" SLR	>2150	>2150	>2150	2116	2095
		100-YR + 36" SLR	>2150	2144	2091	2074	2063
<ul style="list-style-type: none"> Seawall Lot 355 	108" (15.4 ft. NAVD)	High tide + 108" SLR	>2150	>2150	>2150	2140	2119
		100-YR + 67" SLR	>2150	>2150	2145	2107	2087
 Disaster Response							
<ul style="list-style-type: none"> Illinois Street Secure Maritime Facility, FEMA Unloading Area (Pier 80) Oil Spill Response Equipment Storage (Pier 80) FEMA Staging Area (Pier 80) San Francisco Bay Railroad 	52" (10.8 ft. NAVD)	High tide + 52" SLR	>2150	>2150	2120	2092	2076
		100-YR + 11" SLR	2139	2066	2044	2035	2032
<ul style="list-style-type: none"> Large Vessel Berth (Pier 80) 	--	--	--	--	--	--	--
 Utilities							
<ul style="list-style-type: none"> Combined Sewer Discharge Outfalls (1) 	24" (8.4 ft. NAVD)	High tide + 24" SLR	>2150	2112	2070	2059	2051
		5-YR + 0" SLR	Today	Today	Today	Today	Today



Timing of Exposure: Assets and Landmarks

Assets / Landmarks	Flood Scenario	Equivalent Events	Timing				
			USACE Low	USACE Inter.	OPC Most Likely	USACE High	OPC 1-in-200
<ul style="list-style-type: none"> Combined Sewer Discharge Outfalls (1) 	36" (9.4 ft. NAVD)	High tide + 36" SLR	>2150	2144	2091	2074	2063
		50-YR + 0" SLR	Today	Today	Today	Today	Today
<ul style="list-style-type: none"> Channel Force Main Hunter's Point Tunnel 	--	--	--	--	--	--	--



Transportation

<ul style="list-style-type: none"> Muni T-Line 	24" (8.4 ft. NAVD)	High tide + 24" SLR	>2150	2112	2070	2059	2051
		5-YR + 0" SLR	Today	Today	Today	Today	Today
<ul style="list-style-type: none"> San Francisco Bay Railroad 	52" (10.8 ft. NAVD)	High tide + 52" SLR	>2150	>2150	2120	2092	2076
		100-YR + 11" SLR	2139	2066	2044	2035	2032
<ul style="list-style-type: none"> Muni Metro East Station 	108" (15.4 ft. NAVD)	High tide + 108" SLR	>2150	>2150	>2150	2140	2119
		100-YR + 67" SLR	>2150	>2150	2145	2107	2087



Open Space and Ecology

<ul style="list-style-type: none"> Warm Water Cove Park 22nd St. Access 	36" (9.4 ft. NAVD)	High tide + 36" SLR	>2150	2144	2091	2074	2063
		50-YR + 0" SLR	Today	Today	Today	Today	Today
<ul style="list-style-type: none"> Tulare Park Bay Trail / Blue Greenway 	52" (10.8 ft. NAVD)	High tide + 52" SLR	>2150	>2150	2120	2092	2076
		100-YR + 11" SLR	2139	2066	2044	2035	2032



Timing of Exposure: Subarea

Adaptation Focus	Shoreline Type	Flood Scenario	Timing					
			Return	USACE Low	USACE Inter.	OPC Most Likely	USACE High	OPC 1-in-200
Immediate	Engineered	48" (10.2ft. NAVD)	High tide + 48" SLR	>2150	>2150	2113	2088	2073
			100-YR + 7" SLR	2088	2048	2032	2025	2023
Tipping Point	Embankment; Engineered	52" (10.8 ft. NAVD)	High tide + 52" SLR	>2150	>2150	2120	2092	2076
			100-YR + 11" SLR	2139	2066	2044	2035	2032
Long Term >2050	Embankment; Engineered	77" (12.9 ft. NAVD)	High tide + 77" SLR	>2150	>2150	>2150	2116	2095
			100-YR + 36" SLR	>2150	2144	2091	2074	2063

Flood Progression

Immediate Flood Risk



Pier 80

Subarea 4-1



Substantial Flood Risk (Tipping Point)



Long-Term Flood Risk (>2050)



Pier 80

Subarea 4-1



The following describes the progression of potential extreme tide and sea level rise flooding, along with a brief discussion of the assets that will be impacted within Subarea 4-1.

Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 12" SLR	1-YR + 0" SLR	Today	Today	Today	Today	Today

Water Level Elevation: 7.4 ft. NAVD88

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Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 24" SLR	5-YR + 0" SLR	Today	Today	Today	Today	Today

Water Level Elevation: 8.4 ft. NAVD88



Utilities

The higher Bay water levels may reduce the gravity-driven flow of excess combined wastewater and stormwater from the transport / storage boxes to the Bay. This scenario results in overtopping and backflow at one combined sewer discharge outfall. This impact is only of concern during intense and prolonged rainfall events that exceed the capacity of the large underground transport / storage boxes that ring the city. This could result in an increase in localized flooding in low-lying areas.



Transportation

The Muni T-Line will be impacted once the Illinois Street Bridge (Subarea 4-2) experiences inundation. The Muni T-Line is track-based and could not be rerouted.

Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 36" SLR	50-YR + 0" SLR	Today	Today	Today	Today	Today

Water Level Elevation: 9.4 ft. NAVD88



Utilities

A second combined sewer discharge outfall will be overtopped and potentially experience backflow from the higher Bay water levels.



Flood Scenario	Assets	Consequences				
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Open Space and Ecology

Open space and aquatic areas (owned and managed by the Port) along the shoreline experience impacts. Warm Water Cove Park and the 22nd Street shoreline access location have overtopped shorelines and inundation of public viewing and access areas.

High tide + 48" SLR	100-YR + 7" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		2088	2048	2032	2025	2023

Water Level Elevation: 10.2 ft. NAVD88



Maritime

Pier 80 will begin to experience some inundation. Seawall Lot 356 (currently a self-storage company) becomes inundated. Future plans for this site include expanding Warm Water Cover Park and the Pier 80 Cargo Terminal.

High tide + 52" SLR	100-YR + 12" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		2139	2066	2044	2035	2032

Water Level Elevation: 10.8 ft. NAVD88



Maritime

Pier 80 is significantly inundated, including associated Port operations, which has two working cranes for loading and offloading, and connections to the railroad for goods movement.



Disaster Response

Port operations will be impacted at Pier 80, including FEMA's unloading and staging area. Pier 80 also serves as an oil spill response equipment storage location.

A portion of Illinois Street will also be inundated. Illinois Street is a truck route for providing heavy truck access to Piers 90-96, and closures along Illinois Street would increase traffic and congestion for the remaining transit network.

The San Francisco Bay Railroad will be impacted. It connects to the regional Joint Powers Board Caltrain line that provides access to Union Pacific Railroad. The railroad serves as a conduit to move goods and materials from vessels to the regional railroad system and is critical to the City's emergency response and recovery plan.



Flood Scenario	Assets	Consequences
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Utilities

Flooding will begin impacting streetlights and overhead transmission lines. If the streetlights are flooded for a short period, limited damage would occur, and would remain functioning. However, if streetlights are flooded for a prolonged period, the electrical infrastructure is likely to fail, causing the streetlight to be inoperable. The overhead lines and utility poles would also be impacted and vulnerable.



Transportation

A portion of the San Francisco Bay Railroad is inundated. For over a decade, the Port has contracted with the railroad to provide railroad services and rail terminal operations. It hauls soils and other cargo to and from the railyard for interchange with Union Pacific Railroad via the Caltrain line where it can then be transferred to other regions of the United States.



Open Space and Ecology

Tulare Park, a small shoreline park located east of Third Street, has overtopped shorelines. The Bay Trail/ Blue Greenway is also impacted by this water level.

High tide + 66" SLR	100-YR + 25" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		>2150	2115	2072	2060	2053

Water Level Elevation: 11.9 ft. NAVD88

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High tide + 77" SLR	100-YR + 36" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		>2150	2144	2091	2074	2063

Water Level Elevation: 12.9 ft. NAVD88



Maritime

The entire Pier 80 shoreline is overtopped, inundating the Pier 80 Administration Building and open space adjacent to the Quonset Building.

Pier 80

Subarea 4-1



Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 84" SLR	100-YR + 43" SLR	>2150	>2150	2104	2083	2069

Water Level Elevation: 13.4 ft. NAVD88



Maritime

The Quonset Building structure is impacted.

Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 96" SLR	100-YR + 55" SLR	>2150	>2150	2125	2096	2078

Water Level Elevation: 14.4 ft. NAVD88

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Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 108" SLR	100-YR + 67" SLR	>2150	>2150	2145	2107	2087

Water Level Elevation: 15.4 ft. NAVD88



Maritime

Seawall Lot 355 is inundated. This area contains the Muni Metro East Facility.



Transportation

The Muni Metro East facility would be inundated. This facility spans 13 acres, including storage, maintenance, and operations facilities, and is currently the main facility where light rail vehicles and historic streetcars are repaired and maintained. There are plans to expand this facility eastward into additional areas that may be subject to flooding as sea levels rise. System-wide impacts to the Muni transit lines would occur if this facility is out of service for an extended period.



Adaptation Focus: Immediate



Shoreline Characteristics	Shoreline Overtopping					Timing of Impact (100-YR)				
	Classification	Avg. Elev.	Avg. Depth (ft)	Max Depth (ft)	Length (ft)	%	USACE Low	USACE Inter.	OPC Most Likely	USACE High
Engineered	9.0 ft. NAVD	0.3	0.3	200	2.0%	2088	2048	2032	2025	2023

Flood Pathways

- Overtopping occurs over a short stretch of engineered shoreline (riprap) adjacent to Seawall Lot 356 and Pier 80
- Overtopping of this shoreline allows flooding to traverse south across Seawall Lot 356 into the northern portion of Pier 80.

Shoreline Focus

- Initial adaptation measures for this scenario could focus on the shoreline edge to protect the existing open areas.

Adaptation Considerations

- While adaptation measures at the shoreline edge can maintain use of the adjacent areas, if this impacted area is not critical then further evaluations may justify addressing this shoreline at a later scenario when flooding is more widespread.



Adaptation Focus: Tipping Point



Shoreline Characteristics	Shoreline Overtopping					Timing of Impact (100-YR)				
	Classification	Avg. Elev.	Avg. Depth (ft)	Max Depth (ft)	Length (ft)	%	USACE Low	USACE Inter.	OPC Most Likely	USACE High
Embankment; Engineered	9.5 ft. NAVD	1.8	3.5	1,200	12.2%	2139	2066	2044	2035	2032

Flood Pathways

- Overtopping occurs along the south facing shoreline of this subarea (Islais Creek shoreline) near the 3rd Street Bridge and Illinois Street Bridge, resulting in inundation of the adjacent areas. Significant inundation of this Subarea comes from relatively short overtopped shoreline segments.
- Overtopping adjacent to the 3rd Street Bridge allows floodwaters to flow west into Subarea 4-2. Overtopping adjacent to the Illinois Street Bridge allows floodwater to flow east along a low-lying pathway, resulting in significant inundation of Pier 80.
- The smaller portion of the shoreline near Seawall Lot 356 and Pier 80 that overtops during an earlier scenario still results in inundation of the immediate shoreline area.
- Overtopping occurs over both embankments and engineered shoreline types.

Shoreline Focus

- Adaptation measures to address flooding in this scenario can focus on a relatively short stretch of the total subarea shoreline to reduce flood risk within this subarea (and adjacent Subarea 4-2). The priority areas to address is the shoreline adjacent to the 3rd Street Bridge and Illinois Street Bridge.

Pier 80

Subarea 4-1



Adaptation Considerations

- Adaptation measures to reduce flood risk to this subarea will benefit the adjacent Subarea 4-2.
- Several facilities where overtopping occurs along the Islais Creek shoreline are immediately adjacent to the shoreline and may require adaptation measures within a narrow footprint at the shoreline if facilities cannot be relocated.

Adaptation Focus: Long-Term >2050



Shoreline Characteristics	Shoreline Overtopping					Timing of Impact (100-YR)				
	Classification	Avg. Elev.	Avg. Depth (ft)	Max Depth (ft)	Length (ft)	%	USACE Low	USACE Inter.	OPC Most Likely	USACE High
Embankment; Engineered	11.3 ft. NAVD	1.5	5.6	8,000	81.4%	>2150	2144	2091	2074	2063

Flood Pathways

- Overtopping occurs over most of the shoreline in this subarea, resulting in significant inundation of Pier 80 and Seawall Lot 356.
- Overtopping of any portion of the shoreline within this subarea contributes to flooding outside of the subarea into the adjacent Subarea 4-2.



Shoreline Focus

- Adaptation measures to address flooding during this scenario are required over most of the total shoreline to minimize flood risk within this subarea (and adjacent Subarea 4-2). Most of this shoreline is engineered (vertical structure or hardened with riprap)

Adaptation Considerations

- Adaptation measures to reduce flood risk to this subarea will benefit the adjacent Subarea 4-2.
- Several facilities along the Islais Creek shoreline are immediately adjacent to the shoreline and may require adaptation measures within a narrow footprint at the shoreline if facilities cannot be relocated.