



## Subarea Description

South Beach (Subarea 3-1) includes the waterfront area just south of the Bay Bridge crossing and stretches to the northern shore of Mission Creek at China Basin. This subarea contains a portion of the South of Market (SoMa) neighborhood, with 4th Street being the southern boundary. South Beach is home to historic buildings, piers, South Beach Harbor, parks, affordable housing developments, and city and regional assets important for disaster response. Along the shoreline, the South Beach waterfront has piers with a variety of berths to allow for temporary and longer-term docking and harbor services, water recreation visitor berths and South Beach Marina, Bay excursions, a water-taxi landing, and inactive/reserve berths as well as four public access locations with water access. There are two affordable housing developments, Steamboat Point and Delancey Street Apartments, located across the Embarcadero roadway from South Beach Marina and Brannan Street Wharf, respectively. Oracle Park, the San Francisco Giants ballpark, is a significant community resource and economic generator. The Oracle Park Ferry Terminal in this location provides water-transit service on game days from throughout the Bay area.

The subarea shoreline is entirely engineered, and without the protection of the piers, most of the shoreline would be in a wave hazard zone. Winter storms with large waves have damaged the piers and shoreline, and under existing conditions the wave hazards are greatest between the Bay Bridge and the Pier 40 breakwater.

The primary flooding pathway is overtopping along the shoreline. Overtopping first occurs over several stretches of the Embarcadero shoreline (not including piers), impacting the Embarcadero roadway and immediate inland areas. Flooding also comes along with the adjacent Subarea 2-2. Flooding also enters Subarea 3-1 from the adjacent Subarea 3-2 via a flood pathway on Berry Street near the Peter R. Maloney Bridge (4th St Bridge). Higher Bay water levels would result in overtopping along most of the shoreline, allowing floodwaters to extend several streets inland.



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## Assets and Landmarks



### Maritime

- |  |  |
|--|--|
| 1. Pier 26   | 13. Seawall Lot 331  |
| 2. Pier 26 Annex   | 14. Seawall Lot 332  |
| 3. Pier 28   | 15. Seawall Lot 333-N  |
| 4. Pier 30/32 Parking  | 16. Seawall Lot 333-S  |
| 5. Brannan Street Wharf  | 17. Seawall Lot 334  |
| 6. Pier 38 (out of service)  | 18. Seawall Lot 335  |
| 7. Water Taxi Dock (Pier 40)   | 19. San Francisco Giants Baseball Park (Seawall Lot 336)       |
| 8. South Beach Harbor  | 20. Seawall Lot 336-1  |
| 9. International Longshoreman and Warehouse Union Hall (Seawall Lot 334) | 21. South Beach Harbor Underground Storage Tank (2,000 gal.)   |
| 10. Seawall Lot 328  | 22. Oracle Park Above & Belowground Storage Tank (21,320 gal.) |
| 11. Seawall Lot 329  | 23. WETA Ferry Terminal (Oracle Park)                          |
| 12. 200-Bed Homeless Navigation Center (Seawall Lot 330)                 |  |



### Disaster Response

- |   |   |
|---|---|
| 7. Water Taxi (Pier 40)                         | 30. EFWS suction connections (6)          |
| 23. Oracle Park Ferry Terminal                  | 31. EFWS cisterns (3)                     |
| 24. Assembly Area and Staging Area (Pier 30-32) | 32. EFWS Pump Station 1                   |
| 25. Assembly Area (Seal Plaza)                  | 33. Large Vessel Berth (Pier 30-32)       |
| 26. Staging Area (Seawall Lot 328, 330)         | 34. Small Boat Berth (South Beach Harbor) |
| 27. Assembly Area (South Beach Park)            | 35. Fire Department Headquarters          |
| 28. Assembly Area (Brannon Street Wharf)        | 36. The Embarcadero                       |
| 29. EFWS Fireboat Manifolds (2)                 |   |



### Transportation

- |                     |                                  |
|---------------------|----------------------------------|
| 36. The Embarcadero | 38. Muni T-Line                  |
| 37. Muni E-Line     | 39. SFMTA King Street Substation |



### Utilities

#### Water

- |  |
|--|
| 40. Bay Bridge Pump Station (conveys water to Treasure Island) |
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## Assets and Landmarks

### Wastewater

- 41. Brannon Street Tunnel
- 42. North Point Main - Moscone Tunnel
- 43. Combined Sewer Discharge Outfalls (2)

### Power

- 44. Moscone Substation




## Open Space and Ecology

### Open Space

- 5. Brannan Street Wharf
- 8. South Beach Harbor
- 27. South Beach Park
- 45. Bay Trail
- 46. Bay Water Trail Launch (Pier 40 launch)
- 47. Giant's Promenade
- 48. Embarcadero Promenade
- 49. Public fishing pier (Pier 42)
- 50. Willie Mayes Plaza (paved plaza)
- 51. South Park




## 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
 <b>Maritime</b>							
<ul style="list-style-type: none"> <li>Brannan Street Wharf</li> <li>South Beach Harbor</li> <li>Seawall Lot 328</li> <li>Seawall Lot 329</li> <li>200-Bed Homeless Navigation Center (Seawall Lot 330)</li> <li>Seawall Lot 331</li> <li>Seawall Lot 332</li> <li>Seawall Lot 333-N</li> <li>Seawall Lot 333-S</li> <li>South Beach Harbor Underground Storage Tank (2,000 gal.)</li> </ul>	66" (11.8 ft. NAVD)	High tide +66" SLR	>2150	>2150	2143	2106	2086
		100-YR + 26" SLR	>2150	2116	2073	2061	2053
<ul style="list-style-type: none"> <li>Pier 26</li> <li>Pier 26 Annex</li> <li>Pier 28</li> <li>Pier 30/32 (Parking)</li> <li>Pier 38 (out of service)</li> <li>Water Taxi Dock (Pier 40)</li> <li>International Longshoreman and Warehouse Union Hall (Seawall Lot 334)</li> <li>Seawall Lot 334</li> <li>Seawall Lot 335</li> <li>San Francisco Giants Baseball Park (Seawall Lot 336)</li> <li>Seawall Lot 336-1</li> <li>Oracle Park Above &amp; Belowground Storage Tank (21,320 gal.)</li> <li>WETA Ferry Terminal (Oracle Park)</li> </ul>	77" (12.7 ft. NAVD)	High tide +77" SLR	>2150	>2150	>2150	2116	2095
		100-YR + 37" SLR	>2150	2145	2092	2075	2064




## 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
 <b>Disaster Response</b>							
<ul style="list-style-type: none"> <li>EFWS Suction Connections (2 of 6)</li> </ul>	12" (7.3 ft. NAVD)	High tide +12" SLR	>2150	2070	2047	2038	2034
		1-YR + 0" SLR	Today	Today	Today	Today	Today
<ul style="list-style-type: none"> <li>EFWS Pump Station 1</li> </ul>	36" (9.3 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"> <li>Staging Area (Seawall Lot 328, 330)</li> <li>Assembly Area (Brannan Street Wharf)</li> <li>EFWS Fireboat Manifold</li> <li>Embarcadero Roadway</li> </ul>	66" (11.8 ft. NAVD)	High tide + 66" SLR	>2150	>2150	2143	2106	2086
		100-YR + 26" SLR	>2150	2116	2073	2061	2053
<ul style="list-style-type: none"> <li>Assembly and Staging Area (Pier 30,32)</li> <li>Assembly Area (Seal Plaza)</li> <li>Assembly Area (South Beach Park)</li> <li>WETA Ferry Terminal (Oracle Park)</li> <li>Water Taxi Dock (Pier 40)</li> </ul>	77" (12.7 ft. NAVD)	High tide + 77" SLR	>2150	>2150	>2150	2116	2095
		100-YR + 37" SLR	>2150	2145	2092	2075	2064
<ul style="list-style-type: none"> <li>EFWS Cisterns (3)</li> <li>Fire Department Headquarters</li> </ul>	> 108"	--	--	--	--	--	--
<ul style="list-style-type: none"> <li>Large Vessel Berth (Pier 30-32)</li> <li>Small Boat Berth (South Beach Harbor)</li> <li>Fire Department Headquarters</li> </ul>	--	--	--	--	--	--	--




## 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
 <b>Utilities</b>							
<ul style="list-style-type: none"> <li>Combined Sewer Discharge Outfalls (2)</li> </ul>	24" (8.3 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"> <li>Bay Bridge Pump Station</li> </ul>	84" (13.3 ft. NAVD)	High tide + 84" SLR	>2150	>2150	>2150	2121	2100
		100-YR + 44" SLR	>2150	>2150	2105	2083	2069
<ul style="list-style-type: none"> <li>Moscone Substation</li> </ul>	> 108"	--	--	--	--	--	--
<ul style="list-style-type: none"> <li>Brannon Street Tunnel</li> <li>North Point Main - Moscone Tunnel</li> <li>Channel Transport / Storage Box</li> </ul>	--	--	--	--	--	--	--
 <b>Transportation</b>							
<ul style="list-style-type: none"> <li>The Embarcadero</li> <li>Muni E-line</li> <li>Muni T-Line</li> <li>Muni Stops (4 of 27)</li> <li>SFMTA King Street Substation</li> </ul>	66" (11.8 ft. NAVD)	High tide +66" SLR	>2150	>2150	2143	2106	2086
		100-YR + 26" SLR	>2150	2116	2073	2061	2053
<ul style="list-style-type: none"> <li>Regional Bus Stops (1 of 4)</li> </ul>	108" (15.3 ft. NAVD)	High tide + 108" SLR	>2150	>2150	>2150	2140	2119
		100-YR + 66" SLR	>2150	>2150	2146	2108	2087



## 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
 <b>Open Space and Ecology</b>							
<ul style="list-style-type: none"> <li>Bay Trail</li> <li>Brannan Street Wharf</li> <li>Embarcadero Promenade</li> <li>South Beach Harbor</li> <li>South Beach Park</li> <li>South Park</li> </ul>	66" (11.8 ft. NAVD)	High tide +66" SLR	>2150	>2150	2143	2106	2086
		100-YR + 26" SLR	>2150	2116	2073	2061	2053
<ul style="list-style-type: none"> <li>Giants Promenade</li> <li>Public Fishing Pier (Pier 42)</li> <li>Willie Mays Plaza</li> </ul>	77" (12.7 ft. NAVD)	High tide + 77" SLR	>2150	>2150	>2150	2116	2095
		100-YR + 37" SLR	>2150	2145	2092	2075	2064



## Timing of Exposure: Shoreline

Adaptation Focus	Shoreline Type	Flood Scenario	Timing					
			Return	USACE Low	USACE Inter.	OPC Most Likely	USACE High	OPC 1-in-200
Immediate	--	--	--	--	--	--	--	--
			--	--	--	--	--	--
Tipping Point	Engineered	66" (11.8 ft. NAVD)	High tide +66" SLR	>2150	>2150	2143	2106	2086
			100-YR + 26" SLR	>2150	2116	2073	2061	2053
Long Term >2050	Engineered	77" (12.7 ft. NAVD)	High tide + 77" SLR	>2150	>2150	>2150	2116	2095
			100-YR + 37" SLR	>2150	2145	2092	2075	2064

## Flood Progression

### Substantial Flood Risk (Tipping Point)







## Long-Term Flood Risk (>2050)



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 3-1.

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: 7.3 ft. NAVD88






### Disaster Response

Two fire suction connections (part of the Emergency Firefighting Water System, EFWS) that allow fire engines to draw water from the Bay for fire suppression are inundated. Suction connections become unusable if they are inundated, primarily due to limitations related to fire truck access.

# South Beach

## Subarea 3-1



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: 8.3 ft. NAVD88		 <p><b>Disaster Response</b></p> <p>Four additional fire suction connections would be inundated.</p>				
		 <p><b>Utilities</b></p> <p>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 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.</p>				
High tide + 36" SLR	50-YR + 0" SLR	Today	Today	Today	Today	Today
Water Level Elevation: 9.3 ft. NAVD88		 <p><b>Disaster Response</b></p> <p>EWFS Pump Station 1 is impacted.</p>				
High tide + 48" SLR	100-YR + 8" SLR	2094	2050	2034	2026	2024
Water Level Elevation: 10.2 ft. NAVD88		--	--	--	--	--
High tide + 52" SLR	100-YR + 12" SLR	2145	2068	2045	2037	2033
Water Level Elevation: 10.6 ft. NAVD88		--	--	--	--	--



Flood Scenario	Assets	Consequences				
		USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
High tide + 66" SLR	100-YR + 26" SLR	>2150	2116	2073	2061	2053

Water Level Elevation: 11.8 ft. NAVD88



### Maritime

This water level results in inundation of several Seawall Lots adjacent to the Bay shoreline. This includes Seawall Lots 328, 329, 330, 331, 332, 333-N, and 333-S. Seawall Lot 330 holds a 200-bed Homeless Navigation Center. Seawall Lot 333 (also known as Site K) is owned by the San Francisco Redevelopment Agency and occupies approximately 1.4 acres located at 1 through 59 1/2 Townsend Street in San Francisco. The site was created by placing soil and construction debris from the 1906 earthquake placed over open Bay water, mudflats, and wetlands to create developable land by 1913.

Inundation of the Embarcadero roadway at this scenario limits landside access to most piers (except those south of Pier 40).

South Beach Harbor and the Brannan Street Wharf are also impacted. South Beach Harbor is a marina that contains the Yacht Club and Harbormaster offices. A 2,000 gallon underground storage tank is also impacted due to inundation of South Beach Harbor. The Brannan Street Wharf contains open space for recreational use.



### Disaster Response

Several disaster response assets are impacted, including the Staging Area at Seawall Lot 328 and 330 and the Assembly Area at the Brannan Street Wharf.

The Embarcadero roadway along the shoreline is inundated.

Two EFWS Fireboat Manifolds at the shoreline edge are impacted. Fire boats may still be able to make a secure connection to the manifold even if it is inundated. If the fire boats cannot make a connection, and the emergency firefighting water system loses pressure, the system may become unusable.



### Utilities

Streetlights would experience inundation.



Flood Scenario	Assets	Consequences
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### Transportation

Inundation of the shoreline adjacent to the Embarcadero roadway will result in significant disruption to city mobility and public transportation. The Historic streetcar Muni E-Line, Muni T-Line and several Muni stops along the Embarcadero roadway will be impacted.

The SFMTA King Street Substation is also inundated.



### Open Space and Ecology

A portion of the Bay Trail, public space at the Brannan Street Wharf, South Beach Harbor, South Beach Park, and South Park will experience inundation during this scenario. The Brannan Street Wharf park is a 57,000 square foot public park parallel to the Embarcadero Promenade that reaches out into the Bay.

High tide + 77" SLR	100-YR + 37" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		>2150	2145	2092	2075	2064

Water Level Elevation: 12.7 ft. NAVD88



### Maritime

Additional Seawall Lots near McCovey Cove will be inundated, including Seawall Lots 334, 335, 336, and 336-1. The International Longshoreman and Warehouse Union Hall is located on Seawall Lot 334. The San Francisco Giants ballpark, located on Seawall Lot 336, is the sports stadium primarily used for the San Francisco Giants professional baseball team.

Additional piers become inundated, including Pier 26 (parking and storage), Pier 26 Annex (offices), Pier 28, Pier 30/32 (parking), Pier 38 (out of service), and Pier 40 (Water Taxi Dock). Pier 40 provides access to some of the most iconic views along the San Francisco Waterfront.

The Oracle Park Ferry Terminal is also inundated, impacting transit to and from the San Francisco Giants ballpark during games. A large 21,320 gallon above and belowground storage tank near the ballpark may be impacted.



### Disaster Response

Additional disaster response assets are inundated, including the Assembly and Staging Area on Pier 30/32, the Assembly Areas at Seal Plaza and South Beach Park, the Oracle Park Ferry Terminal, and the Water Taxi Dock at Pier 40.



Flood Scenario	Assets	Consequences				
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### Open Space and Ecology

Giants Promenade and Wille Mays Plaza are inundated.

Public fishing at Pier 42 will also be impacted.

High tide + 84" SLR	100-YR + 44" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		>2150	>2150	2105	2083	2069

Water Level Elevation: 13.3 ft. NAVD88



### Utilities

The Bay Bridge Pump Station could be inundated, preventing the delivery of potable water to Treasure Island.

High tide + 96" SLR	100-YR + 56" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		>2150	>2150	2126	2096	2078

Water Level Elevation: 14.3 ft. NAVD88

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High tide + 108" SLR	100-YR + 68" SLR	USACE Low	USACE Int.	OPC Most Likely	USACE High	OPC 1:200
		>2150	>2150	2146	2108	2087

Water Level Elevation: 15.3 ft. NAVD88



### Transportation

One regional bus stop for Golden Gate Transit is inundated. This bus stop is located on 4th Street near Perry Street.



## Adaptation Focus: Tipping Point



Shoreline Characteristics	Shoreline Overtopping					Timing of Impact (100-YR)				
	Avg. Elev.	Avg. Depth (ft)	Max Depth (ft)	Length (ft)	%	USACE Low	USACE Inter.	OPC Most Likely	USACE High	OPC 1-in-200
Engineered	11.4 ft. NAVD	0.3	0.6	909	5.8%	>2150	2116	2073	2061	2053

### Flood Pathways

- Overtopping occurs over a several stretches of the Embarcadero shoreline (not including piers), resulting in flooding of multiple transit routes. Within this subarea, the shoreline adjacent to either side of Pier 30/32 and Pier 38 is overtopped.
- The Embarcadero roadway acts as a conduit to convey flooding across this subarea and Subarea 2-2.
- Flooding from Subarea 3-2 also flows into this subarea near the Peter R. Maloney Bridge (4th Street Bridge) via Berry Street. This flood pathway from Subarea 3-2 only results in minor flooding within this subarea.

### Shoreline Focus

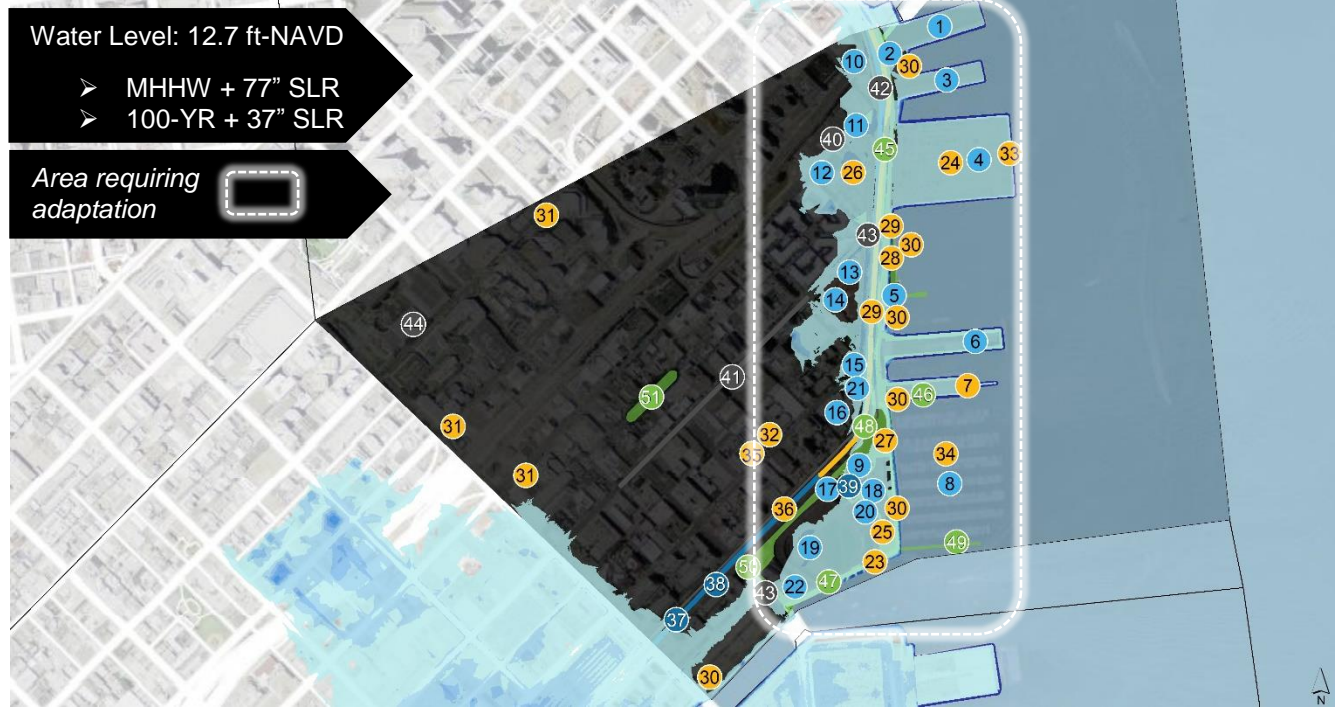
- Addressing overtopping along from the Pier 26 Annex to Pier 40 will reduce flooding in this subarea (during this scenario); however, additional measures are also required the adjacent subareas.

### Adaptation Considerations

- Adaptation measures to reduce flood risk are required across the adjacent subareas in tandem.



## Adaptation Focus: Long-Term >2050



Shoreline Characteristics	Shoreline Overtopping					Timing of Impact (100-YR)				
	Avg. Elev.	Avg. Depth (ft)	Max Depth (ft)	Length (ft)	%	USACE Low	USACE Inter.	OPC Most Likely	USACE High	OPC 1-in-200
Engineered	12.3 ft. NAVD	0.5	1.8	14,275	91.1%	>2150	2145	2092	2075	2064

### Flood Pathways

- Overtopping occurs over most of the Embarcadero shoreline, including most piers, resulting in flooding of multiple transit routes and the assets within this subarea.
- The Embarcadero roadway acts as a conduit to convey flooding between the adjacent subareas.
- Flooding extends across Subareas 2-2 and 3-2.

### Shoreline Focus

- Subarea wide shoreline adaptation measures are required.

### Adaptation Considerations

- Adaptation measures to reduce flood risk are required over most of the Embarcadero shoreline, as well as the shoreline of the adjacent Subareas (2-2 and 3-2).