

28. MIRADA ROAD

County of San Mateo

VULNERABILITY SUMMARY

Mirada Road (Road) is **highly vulnerable** to sea level rise. It is exposed to high water levels and waves and has experienced erosion failures under current conditions. For instance, the north and south segments of this location have been converted to trails and informal beach access after severe erosion eliminated vehicle access. Bluff erosion rapidly undercuts the road, making it very sensitive to storm conditions. The Road provides sole access to residences and businesses on the waterfront, which would need an alternative route if the road were damaged, though the scale of impact is local.

SENSITIVITY
High

EXPOSURE
High

ADAPTIVE CAPACITY
Low

CONSEQUENCES
High

ASSET CHARACTERISTICS

Mirada Road | Half Moon Bay

Asset Description and Function:

The Road between Magellan Avenue and the Pedestrian Bridge south of Medio Avenue is a two-lane asphalt road lying along the California Coastal Trail (CCT) in Half Moon Bay, directly adjacent to an eroding bluff. The Road is managed by the County and provides pedestrian, bicycle, and vehicle access to the beach, the bluffs, and local shorefront dining, residences, and businesses. Water and sewer lines serving these properties are located beneath the Road. Specifically, water and sewer lines are approximately 6 and 10 feet from the bluff, respectively.

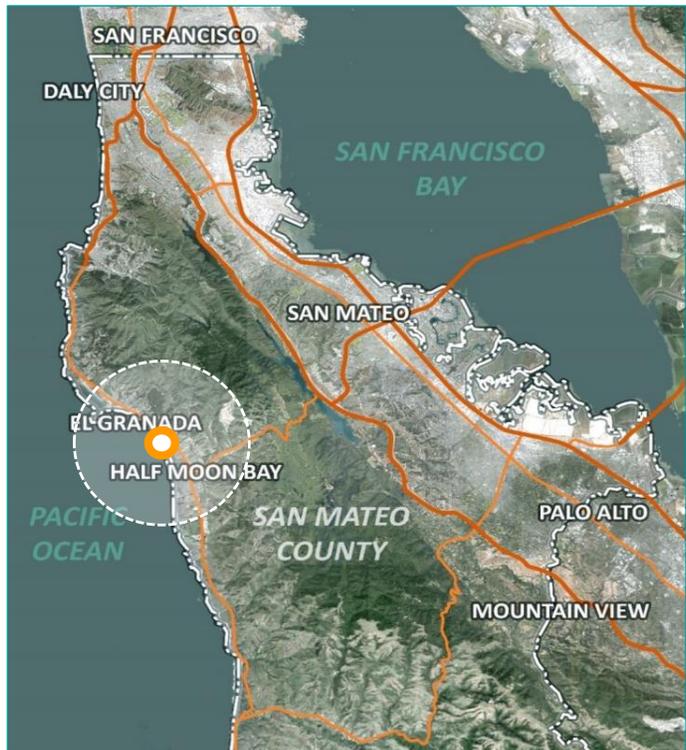


Asset Type	Transportation Infrastructure
Asset Risk Class	3
Size	1000 linear feet
Year of Construction	Early 1900s
Elevation	30 feet, NGVD29
Level of Use	500 ppl/day (weekend)
Annual O&M Cost	\$400,000 (varies)
Special Flood Hazard Area	Asset is not in SFHA
Physical Condition	Poor
Landowner	County of San Mateo
Underground Facilities	

There are underground water and sewer lines at this site.

Environmental Considerations

Special status plants, animals, and natural communities may be present in the project area; a more detailed analysis will be needed before implementing adaptation strategies.



MIRADA ROAD

ASSET SENSITIVITY

The Road is in poor condition, and is extremely sensitive to erosion and wave impacts. If erosion were to cause a section of the Road to collapse (see photographs on following pages), the level of service of the Road, including access to bluffs, beaches, residences, and connection to the CCT, would be lost.

This damage could reach utility lines underneath the road, which are as little as 6 feet from the current bluff, and if exposed, the underground utility lines could also lose service. If erosion caused this section of the Road to collapse, the use of the Road could be permanently lost. This is clear from the north and south segments of the area, which collapsed in the past and were converted to trail segments instead of being rehabilitated. If exposed, underground utilities would be very sensitive to collapse of the road infrastructure or waves and salt water.

Google Street View showing poor but functional maintenance.



SHORELINE VULNERABILITY

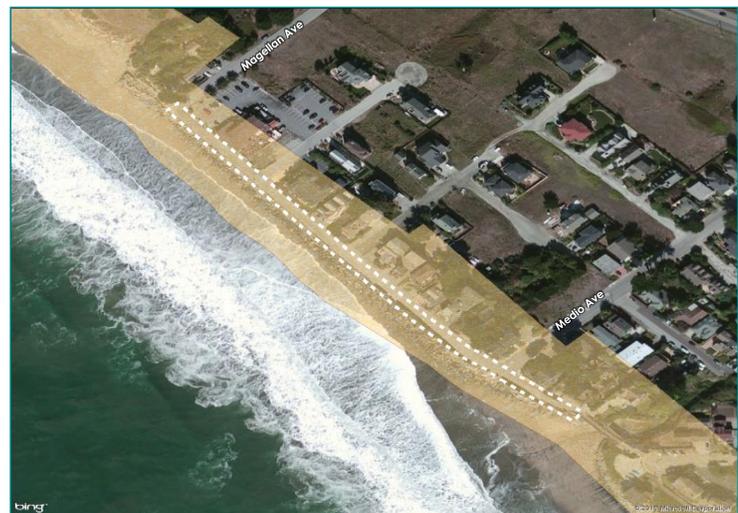
Erosion Analysis

This segment of the Road is located within the area identified by the Pacific Institute study (2012) as susceptible to erosion (eastern extent by 2100 in yellow). The Coastal Sediment Management Workgroup (CSMW) has specifically identified the coastline near this asset as an erosion concern area, due to expected damages to nearby assets, including the Road and nearby sewer lines. See the "Exposure Discussion" section for more details.

Cross-Cutting Vulnerabilities

This is the only access road for properties with frontage along the Road.

Erosion Analysis: Site is entirely in future erosion area.



MIRADA ROAD

SEA LEVEL RISE EXPOSURE ANALYSIS

Exposure Discussion

The site is currently highly exposed to coastal hazards, particularly erosion from wave action. Waves routinely overtop the bluff and throw water across the full width of the Road during storm events. Large storms in the winter of 1997/98 caused significant damages to this section of the Road and adjacent properties. Even when the Road is not flooded by wave overtopping, wave-driven erosion of the bluff has led to displacement of the rock slope protection there, and severe erosion has caused the edge of the road to collapse. There is currently ongoing repair from recent bank failures adjacent to the Road. Higher water levels will likely increase the frequency with which the Road and its adjacent properties are exposed to wave impacts, and will increase erosion impacts on this section of the Road. Currently, the Road protects underground water and sewer utility lines; under future conditions, wave erosion could expose the underground utility lines.

Baseline Scenario: Asset under 0 to 2 feet of water.



Mid-Level Scenario: Asset under 0 to 3 feet of water.



High-End Scenario: Asset under 0 to 4 feet of water.



Exposure Analysis Results

Potential Inundation Depth (feet)		
Scenario	Minimum	Maximum
First Significant Impacts	Area Not Included in Overtopping Analysis	
Baseline 1% Flood	0	2
Mid-Level 1% + 3.3 feet	0	3
High-End 1% + 6.6 feet	0	4

MIRADA ROAD

ADAPTIVE CAPACITY, CONSEQUENCES, AND POTENTIAL ADAPTATION

Adaptive Capacity

This segment of Road is the only access to the coastal properties here, giving it very low adaptive capacity in the near-term. In the long-term, it may be possible to extend roads perpendicular to the beach or behind properties to provide improved access. However, absent the acquisition of separate access easements, additional roads would not provide direct access for several properties that lack frontage on these "back roads", nor would they address the delivery of utilities that Mirada Road properties will require. Further evaluation is needed to understand the feasibility of this option, and solutions will need to be developed in partnership with property owners and community members. While small interventions, like reinforcing the Road with riprap, could slow the erosive impacts of sea level rise, additional solutions such as an inboard sheet pile wall that would support a one way road and multiuse path, as is currently being considered, would have to be a part of a long-term solution. Past events indicate that a failure could lead to a loss of service lasting over 7 days, and with no alternative access, local residents and businesses would suffer. As an extreme example, the north and south segments of the Road have failed in the past (in the 1960s) and are no longer suitable for motor vehicles. Instead of being rehabilitated for vehicle traffic, the former roadway serves pedestrian beach access to the north and south.

Consequences

Damage at the Road could have high consequences. Direct damage to the Road could cost up to \$1.5-2.5 million in repairs, depending on the extent of damages. Indirect damages are also possible if the Road were damaged by wave erosion at the bluff, because vehicle access to the businesses and residences on the coast here could be eliminated. Access to the CCT is less likely to be eliminated. Furthermore, water and sewer utility lines under the Road could be damaged if the bluff eroded and the road collapsed, which could pose health and safety hazards to nearby properties as well as interruption of service. The Road has suffered erosion damage in the past and is likely to suffer more severe damage in the future. Impacts from future severe storms could permanently damage the Road and adjacent properties, which would likely drive loss of business, loss of homes, and loss of recreational opportunities (CCT). The scale of the impacts would be local as the Road is not a major thoroughfare, but the area draws thousands of tourists during the summer and loss of access could lead them to visit other coastal areas or cities.

Additional Important Information

Repair and improvement of the Road is challenging given the multiple jurisdictions and permitting agencies involved. For example, protecting the Road (County jurisdiction) is likely to impact beach habitat (City of Half Moon Bay jurisdiction).

Asset-Specific Adaptation

In the short-term, the bluff could be reinforced to protect the Road. In the long-term, structures could be elevated to mitigate wave damage, but the erosion hazard would remain. Following erosion damage to the Road, properties would need alternative access, and eventually a phased relocation could be necessary.

Vulnerable Roads

There is another Asset Vulnerability Profile on vulnerable roads in the County: Old Bayshore Highway and Airport Blvd (AVP #12). The vulnerability assessment analysis shows that there are 373.8 miles of vulnerable local roads in the project area.

Warning sign and barricades at eroded segment of Mirada Rd.



Eroded segment of Mirada Rd with temporary riprap protection.

