



Mayor Gavin Newsom
Philip A. Ginsburg, General Manager

Date: November 19, 2009

To: Recreation & Park Commission

From: Daniel LaForte
Park Planner

Thru: Dawn Kamanalathan
Planning Director

Subject: Sharp Park Sea Wall Evaluation Report

Agenda Wording: For discussion only, review and consider findings and recommendations contained in the Sharp Park Sea Wall Evaluation Report.

Background: Sharp Park is located in the City of Pacifica approximately 6 ½ miles south of the San Francisco/ San Mateo boundary. Sharp Park contains an 18-hole golf course, archery range, hiking trails, a former rifle range, and wetlands complex.

The San Francisco Recreation and Park Department has initiated a comprehensive restoration planning process for the Sharp Park wetlands at Sharp Park. The wetlands include Laguna Salada, Horse Stable Pond, and the channel that connects the two bodies of water. The main goal of the restoration is to enhance the habitat for the federally endangered and state fully protected San Francisco garter snake, and federally threatened California red-legged frog. As part of that effort, the Department entered in to a contract with San Francisco Department of Public Works and ARUP consulting firm to prepare the Sharp Park Evaluation Report (Report) for the 3,200-foot earthen Sea Wall running north-south along the beach between the wetlands complex and the ocean. The Sea Wall protects the golf course and wetlands from flooding associated with sea tidal action, salt water intrusion, and storm surges.

The Sea Wall is also a popular recreation destination area and serves as an important connection to Mori Point National Recreation Area. The purpose of the Report is to assess the existing and condition of the Sea Wall, projected conditions under climate change projections in 2040 and 2060, and provide recommendations for capital improvements to the Sea Wall.





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The coastline of Pacifica is subjected to severe storm waves and associated erosion. The Sharp Park Golf Course and surrounds are susceptible to severe flooding from storm water runoff, and overtopping and breaching of the Sea Wall. Flooding on a large scale has the potential to cause property damage, lost revenue, and loss of wildlife.

ARUP reports that the Sea Wall was breached in 1958 and in 1983. Over time, several holes along the beach side of Sharp Park were lost due to shoreline erosion. In 1989, the Sea Wall was reconstructed and raised to prevent waves from overtopping onto the golf course and protecting fresh water aquatic habitat in the wetlands from higher salinity levels that could otherwise be harmful to the species.

In May 2009, the California Climate Change Center (CCCC) released a report detailing how climate change and sea-level rise will affect the California Coast. They determined, based on several scenarios, that sea-level rise approximately 1.0 foot by 2040, 1.8 to 2.0 feet by 2060, and 4.6 feet by 2100. The report also states that the combination of climate change and sea level rise would result in more intense storm surges that would be more stress on the Sea Wall and could result in overtopping or breach.

Sea Wall Evaluation Report Findings: The Sea Wall is in poor, fair, and good condition¹. The rip-rapped sections on the northern and southern ends, which encompass about 1,400 feet of the wall ($\pm 40\%$), are in fair to good condition; the remainder 1,800 foot unarmored section is in poor condition. The composition of the Sea Wall is loose fill left over from the golf course reconfiguration in 1989, which erodes quicker than engineered, compact soils.

While much of the Sea Wall is showing signs of erosion, there have been no breaches or overtopping for over 20 years, despite a lower height elevation than the recommended 30-foot (NAVD88) industry standard. No significant slumping has occurred. During high tides waves and winter storms the waves may come within two feet from the base of the Sea Wall.

¹ A condition classification of Good signifies little to no erosion, a slope less than 45 degrees from horizontal, and slope cover (i.e., good armoring with rip rap on outboard slope and vegetation on inboard slope). A condition classification of Fair indicates moderate erosion, a slope between 45 and 60 degrees, and fair outboard slope armoring. A condition classification of Poor signifies the presence of major erosion, a portion of the slope is between 60 and 90 degrees, and/or no outboard slope armoring.



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Based on their review, ARUP states that under normal weather conditions – including average winter storm activity – the seawall is unlikely to breach or experience overtopping.

However, under extreme storm conditions², like those experienced in 1983, there is a high risk of breach and/or overtopping. ARUP found about 2/3 of the wall to be in vulnerable condition, indicating significant erosion with little to no protection of the ocean facing side of the sea wall (outboard side). The overall condition of the wall, and its height, increase the risk of overtopping and breach.

ARUP Recommendations: ARUP proposed several potential alternatives to address two risks (breach and overtopping), in the event of a 100 Year Storm event:

Alternative #1

This alternative involves no maintenance or improvements to the Sea Wall. Under this alternative, the Sea Wall would be susceptible to breach or overtopping during a 100 Year Storm event.

Alternative #2

To moderately reduce risk of overtopping and breach, the Sea Wall would be raised to 30 feet (NAVD88) and erosion on the ocean side of the Sea Wall would be repaired. These improvements would cost \$1-2 million, and then \$100,000-500,000 per year in annual maintenance, depending on storm damage.

Alternative #3

To significantly reduce risk of overtopping and breach, the most vulnerable 1,800 feet of the Sea Wall would be strengthened. For this section, recommended measures include installing rip rap to armor the Sea Wall and increasing the height to 30 feet. Additionally, the erosion on the ocean side of the Sea Wall would be repaired. A lower risk of overtopping and breach would still exist for the remaining portion of the wall. This alternative would cost \$6-7 million, plus \$70,000 in annual maintenance costs.

² ARUP built its recommendations around avoiding breach and overtopping during a 100-year storm event. As defined by the California Climate Change Center, a 100 Year Storm is a storm that has a 1% chance of occurring every year. For example, using the above definition, the probability of a 100 Year Storm occurring over a 30 year period is 26%.



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Alternative #4

A fourth alternative which would almost entirely reduce risk of overtopping and breach includes rip rap along the entire wall (including replacing existing rip rap with more durable rip rap) and raising the Sea Wall elevation to 30 feet. This alternative would cost \$12-14 million, plus \$140,000 in annual maintenance costs.

ARUP Preferred Alternative Recommendation: Based on level of risk, cost, and long term Department goals for Sharp Park golf course and the wetlands, ARUP recommends Alternative #3. This alternative offers a significant reduction of risk to overtopping and breach by repairing the most vulnerable segment of the Sea Wall. Alternative No. 3 offers a better cost benefit than Alternatives No. 2 and No. 3, which most likely would require high annual maintenance costs and high up-front costs, respectively.

ARUP also importantly noted that the City of Pacifica's portion of the Sea Wall is at significant risk for overtopping, and that overtopping at that portion of the wall during an extreme storm event would subject the northern portion of the Sharp Park golf course to seawater flooding.

Staff Recommendation: None. Discussion only.

Attachments:

Location Map
Sharp Park Sea Wall Evaluation Report



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