



**City of Santa Barbara**  
Airport Department

Meeting: 01/15/2025  
Agenda Item No. 13

**DATE:** January 15, 2025

**TO:** Airport Commission

**FROM:** Chris Hastert, Airport Director *CH*

**SUBJECT:** Santa Barbara Airport Climate Adaption Plan – Vulnerability Assessment

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**RECOMMENDATION:**

That Airport Commission receive a presentation on the Santa Barbara Airport Climate Adaption Plan – Vulnerability Assessment and Risk Evaluation.

**SUMMARY:**

This report presents an update on the Santa Barbara Airport (SBA) Climate Vulnerability Assessment and Risk Evaluation (CVA). This is the first phase of the Climate Adaption Plan (CAP) and will assess SBA's susceptibility to future flooding and inundation due to climate change, specifically focusing on SBA's exposure to climate change and inundation from the surrounding Carneros, Tecolotito, and San Pedro Creeks, the Goleta Slough, groundwater, and the ocean. Key updates include the identification of historical flooding patterns, projected sea level rise scenarios, and potential impacts on airport operations, which will inform the next upcoming next phase of the CAP, the adaptation measures.

**DISCUSSION:**

**Background Information**

SBA is a vital regional asset. This CVA builds on the City of Santa Barbara Sea Level Rise Adaptation Plan prepared in 2021<sup>1</sup> and the Goleta Slough Area Sea Level Rise and Management Plan completed in 2015<sup>2</sup>. The CVA studies three different aspects of climate change and sea-level rise including historic and current flooding, sea level rise scenarios, flood hazards analyses, SBA asset vulnerability, as well as reviewing the impacts of these changes on SBA's economy and habitat changes.

**Sea Level Rise Scenarios**

The assessment employs the 2024 California Ocean Protection Council (OPC) guidance<sup>3</sup>, analyzing sea level rise amounts of 0, 0.8, 2.5, and 6.6 feet. The Intermediate-

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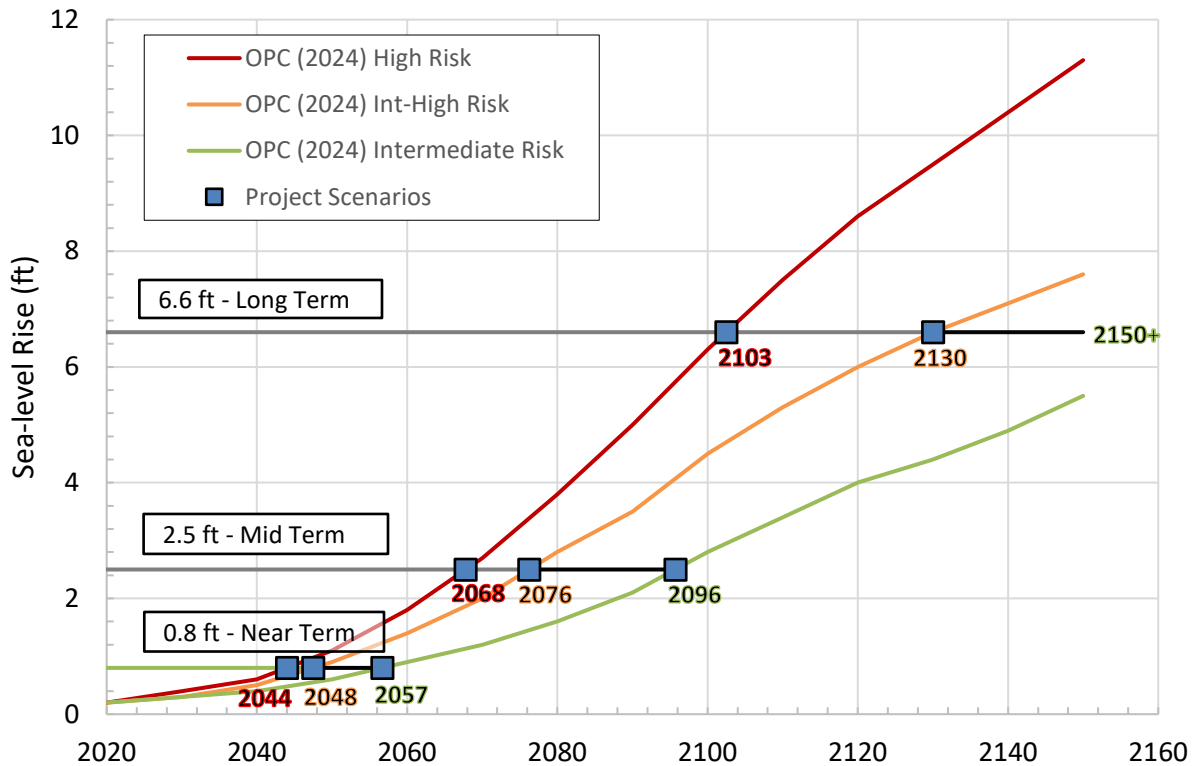
<sup>1</sup> SantaBarbaraCA.gov/SLR

<sup>2</sup> FlySBA.SantaBarbaraCA.gov/projects/goleta-slough-management

<sup>3</sup> <https://opc.ca.gov/2024/01/draft-slr-guidance-2024/>

High Risk scenario is used to project potential flooding impacts, with timelines indicating that by 2048, 0.8 feet of sea level rise could be realized. It also recognizes that sea level rise may occur sooner under the low probability High Risk Scenario and later under the Intermediate Risk Scenario.

Figure 1. Sea Level Rise Projections and Project Scenarios



### Flood Hazards Analyses

Historically, SBA has experienced significant flooding events, with notable occurrences in 1969 and 1995. Recent years have shown an increase in flooding frequency, with four major events in the past decade and three closures due to flooding over the last two years. The assessment highlights vulnerabilities from surrounding creeks and groundwater to critical infrastructure at SBA.

The Goleta Slough and local creeks have been modified for flood management, with Carneros Creek realigned during airport development projects in 1967-1975 and 2006. Sediment is regularly dredged from the San Pedro, Tecolotito, and Carneros Creek basins by Santa Barbara County Flood Control (Flood Control) to mitigate flood risks. However, no dredging has occurred at the creeks themselves in many years. Mechanical breaching of the Goleta Slough inlet was also previously done by Flood Control to manage flooding and mosquito control but was halted in 2012 due to Federal regulatory restrictions.

The CVA predicts a significant increase in the frequency and severity of flood events from 2024 to 2100. The annual chance of storm flooding in SBA's Northwest Quadrant (see Attachment A for Vicinity Map) is expected to rise from 12% to 28% due to increased precipitation linked to climate change. Information on precipitation data was obtained from Santa Barbara County Department of Public Works (SBCDPW) rain gages and precipitation records, and estimated storm frequency and tidal data from NOAA<sup>4</sup>.

With the Intermediate-High scenario of 0.8 feet of sea level rise by 2048, this risk increases to 29%, and reaches 100% with 0.8 to 2.5 feet by 2076. The annual chance of runway flooding and airport closures will grow from 7% to 21%, remaining at 21% with 0.8 feet of sea level rise and increasing to 61% with 2.5 feet by 2076. Additionally, the risk of overall airport flooding will rise from 1% to 3% with future precipitation, and to 4% with 0.8 to 2.5 feet of sea level rise during the same period. The following summarizes flood hazards and risk analyses results for near, mid, and long term:

- Near Term (2024-2100): Increased precipitation due to predicted climate change significantly raises flood risks. In the NW Quadrant, the annual flood chance rises from 12% to 28%. Runway flooding and airport closures triple from 7% to 21%, while overall airport flooding increases from 1% to 3%. An additional 0.8 feet of sea level rise slightly heightens these risks.
- Mid Term (2048-2076): With sea level rise between 0.8 and 2.5 feet, NW Quadrant flooding reaches a 100% annual chance. Runway flooding and airport closures increase from 21% to 61% with 2.5 feet of sea level rise, while overall airport flooding remains at a 4% annual chance.
- Long Term (2076-2130): With sea level rise of 2.5 to 6.6 feet, the entire airport faces a 100% annual flooding chance. Around 3.3 feet of rise by 2087 could lead to biweekly tidal flooding, making the airport inoperable. This scenario, likely between 2.5 and 3.3 feet of rise, indicates increasing vulnerabilities for most assets and operations, except for some north of Hollister Avenue.

### **Vulnerability Assessment**

Vulnerability of SBA assets was calculated and ranked from low to high based on a combination of an asset's exposure level (Attachment B) which shows the flood threshold the asset is exposed during, sensitivity or the consequence of exposure, and adaptive capacity to modify or change in response to a hazard. The most vulnerable assets include:

- NW General Aviation Aprons
- Runways 15R/33L and 15L/33R
- Glide Slope Antenna and RVR
- Remote Transmitter Receiver
- Air Traffic Control Tower
- Sanitary Sewer and Storm Drain Infrastructure

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<sup>4</sup> <https://www.ncdc.noaa.gov/cdo-web/datasets/GHCND/stations/GHCND:USW00023190/detail> and <https://rain.cosbpw.net/>

The next most vulnerable are the SE and NE General Aviation Aprons, Taxiways, Terminal Apron, Airport Rotating Beacon, Instrument Landing Systems (ILS), Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) System, Precision Approach Path Indicator, Runway End Identifier Lights, Airport Access Roads, Airport Maintenance Buildings, Airport Rescue and Firefighting (ARFF) Station, SE Terminal Building, NW Buildings/Hangars, Fuel Tank Sites, Gas Infrastructure, Long-Term and Short-Term Parking Lots, and Water Infrastructure.

The vulnerability of airport operations was also considered. Three of the four airport operations categories have high vulnerability: Disembarking at the Terminal, Closure of Private Aviation Operations, and Closure of Commercial Runway (7/25). Flooding of Runways 15R/33L and 15L/33R has medium vulnerability. Adaptation of any of the airport operations areas would require significant effort.

### **Economic Analysis**

The economic assessment evaluates the expected costs of flight delays and cancellations due to flooding of the main departure runway at the airport. It estimates annual losses for the airport, commercial operators, passengers, and general aviation based on flood hazard analysis, historical data, and future aviation projections.

Key findings include:

- The average runway closure lasts 21.6 hours, resulting in 21 canceled flights, while severe floods can lead to 25.5-hour closures and 34 cancellations.
- Annual flooding-related costs are expected to rise until the airport may become non-operational due to 2.5 to 3.3 feet of sea level rise (2068-2108).
- Estimated total undiscounted losses from an average storm through 2075 could reach \$68.5 million<sup>5</sup> (\$11.3 million discounted losses<sup>6</sup>), while severe storms might incur losses of \$158.8 million (\$36.5 million discounted losses).
- Passengers are projected to bear up to 71% of the losses, primarily from delays and cancellations, while airlines face significant operational losses from increased costs.
- Airport revenue losses during full shutdowns are estimated at \$120,000 per day or \$8,500 per hour.
- General aviation, which makes up 80% of flights at the airport, is expected to be less affected due to flexibility and access to alternate airports, although data on its impact is limited. Further surveys could enhance understanding of these potential losses.

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<sup>5</sup> Losses are in current (2024) dollars.

<sup>6</sup> "Discounted losses" refers to the process of adjusting the value of future losses to their present value using a discount rate. This concept accounts for the time value of money. The discounted losses take into account the FAA mandated 7% discount rate, to capture the fact that the value of those projected losses decreases over time (the present value of those losses).

### **Habitat Change**

The habitat change assessment for Goleta Slough utilized an inundation frequency habitat model to predict future habitats in response to rising sea levels. Key findings include:

- Subtidal Habitats: Expected to expand by up to 46 acres with 6.6 feet of sea level rise.
- Mudflat Habitats: Anticipated to increase by nearly 200 acres, which may benefit shorebirds but could negatively affect existing marsh habitats and water quality.
- Marsh Areas: Low to mid marsh areas are likely to grow, while high marsh and transitional habitats may decline, leading to potential losses of plant species and the wildlife that depend on them due to limited space for migration as habitats shift upslope.

### **Public Outreach**

An informational meeting was held with a Public Open House on the evening of January 7, 2025. At the Public Open House members of the community could learn about the CAP and airport staff and consultants were available to answer any questions and receive comments.

### **Next steps**

- Phase II: Climate Adaptation Plan Development  
SBA will identify and evaluate protection strategies, balancing nature-based solutions with traditional infrastructure.
- Phase III: Airport Coastal Land Use Plan Update  
SBA will update its Coastal Land Use Plan by 2026 to incorporate adaptation policies, aligning with the latest state and local guidance on sea level rise and resource protection.

### **BUDGET/FINANCIAL INFORMATION:**

Full financial implications of the Climate Adaptation Plan are yet to be detailed; however, funding will be necessary for both the adaptation measures and ongoing assessments to mitigate flooding risks. The CAP is funded through the Airport Budget (\$255,000), and two separate grants from the California Coastal Commission (\$245,000 and \$243,000).

### **SUSTAINABILITY IMPACT:**

The Climate Adaptation Plan aims to align sustainability goals by addressing environmental vulnerabilities and enhancing the resilience of SBA operations against climate change impacts.

### **ENVIRONMENTAL REVIEW:**

The projects identified in the second phase of the CAP will be subject to additional California Environmental Quality Act (CEQA) review. Any projects that are selected for

development will be subject to the National Environmental Policy Act (NEPA), as well as the California Coastal Act.

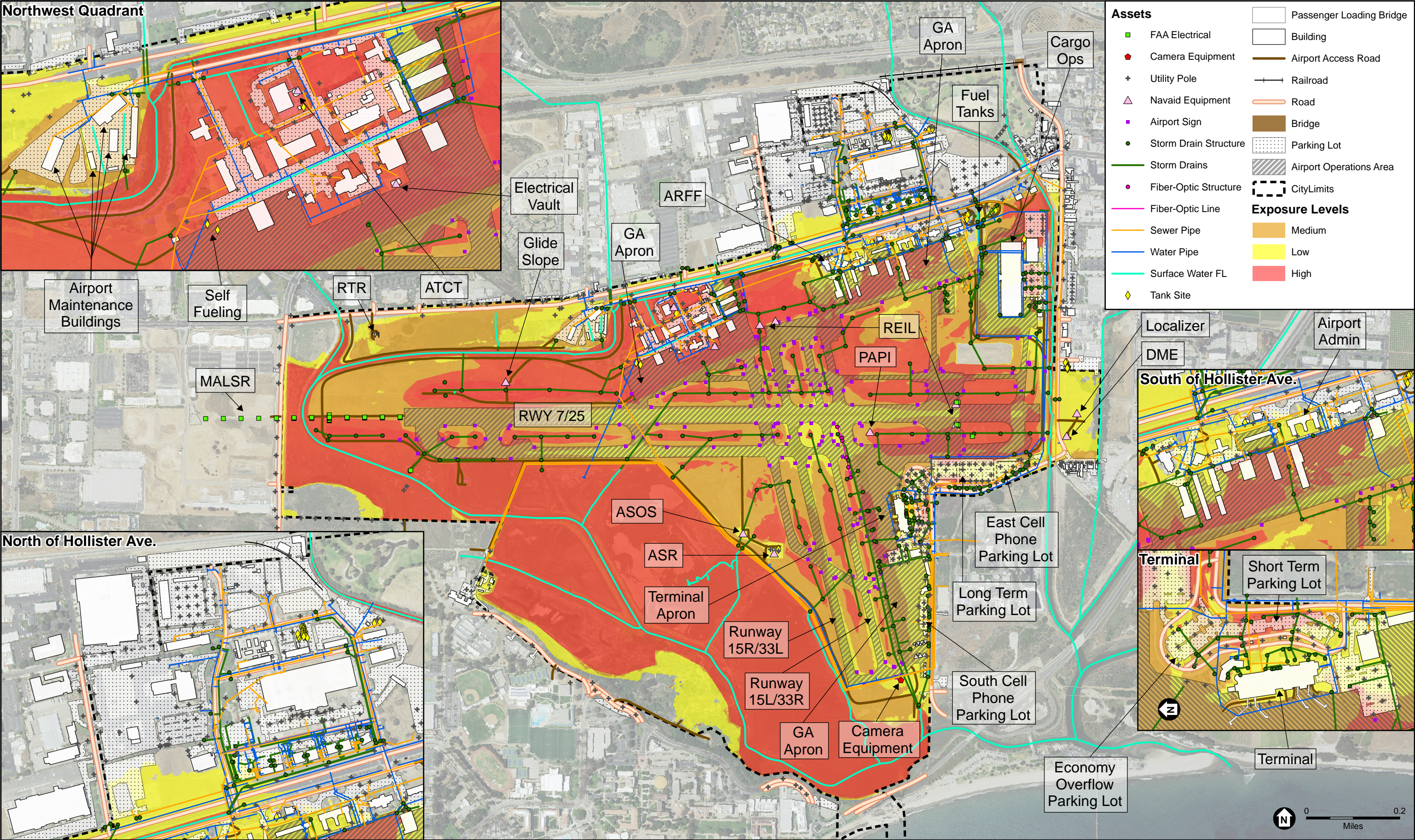
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**ATTACHMENTS:** A –Vicinity Map  
B – Asset Exposure Level









SOURCE: ESA/SB County, USGS, NAIP, GSD, Santa Barbara Airport, UCSB, GWSD

**Figure ES-2**  
Asset Exposure Levels