Santa Barbara Airport Climate Adaptation Plan

Sustainability Committee- February 5, 2026

Purpose

- Summarize the SBA Vulnerability Assessment (VA)
- Present update for the SBA Climate Adaptation Plan (CAP)
- Present draft adaptation measures and current preferred adaptation measures
- Opportunity to provide input for next steps

Scope for the CAP

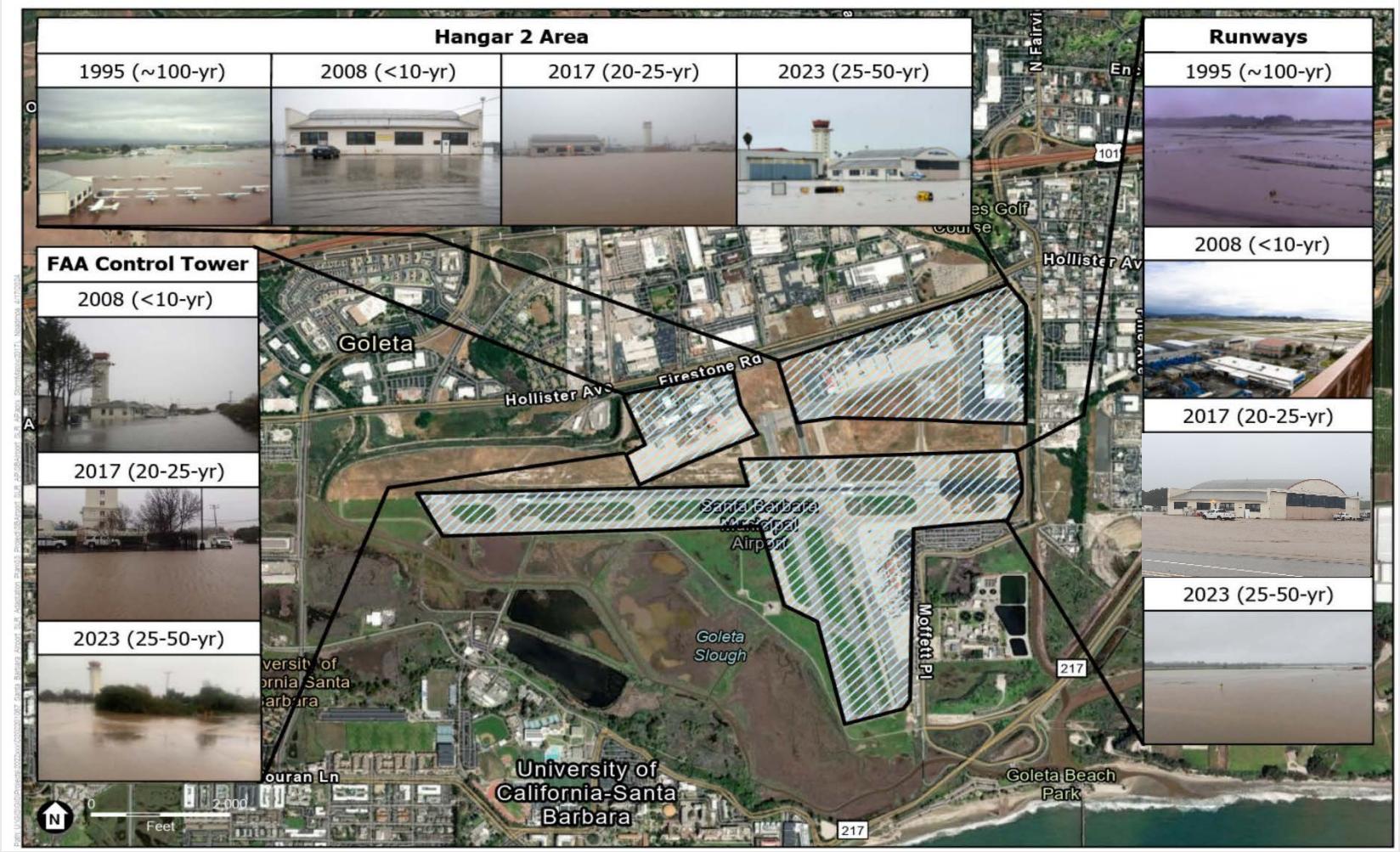
- Identifying future potential adaptation measures
- Developing planning-level cost estimates for three measures
- Public outreach
- Preparing a Coastal Land Use Plan update

RESULTS FROM VA AND ADAPTATION TIMEFRAMES

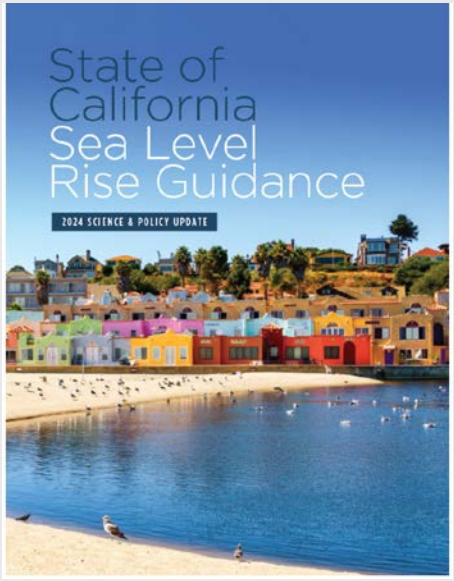
CVA focus of SLR and Climate Change

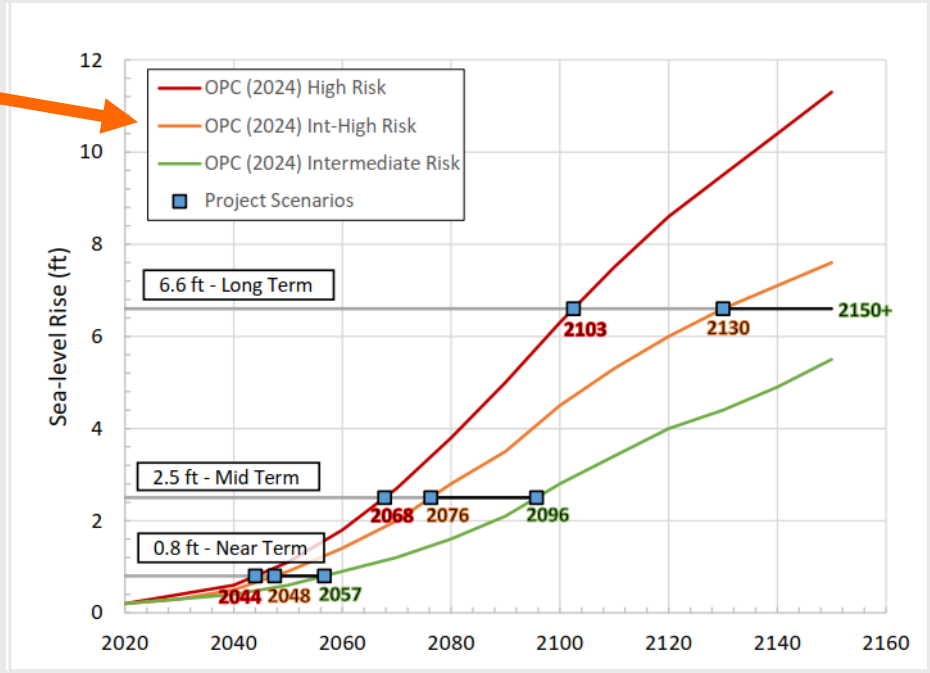
1. Historic and current flooding
2. Flood hazard analyses
3. SBA asset vulnerability
   - SBA economy
   - Habitat changes

Flood History

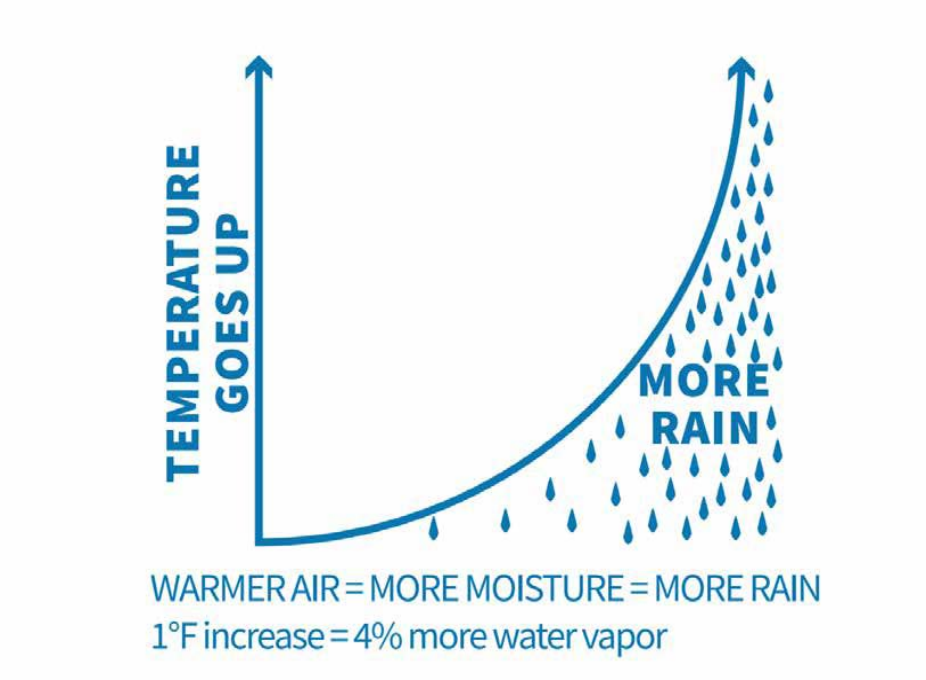


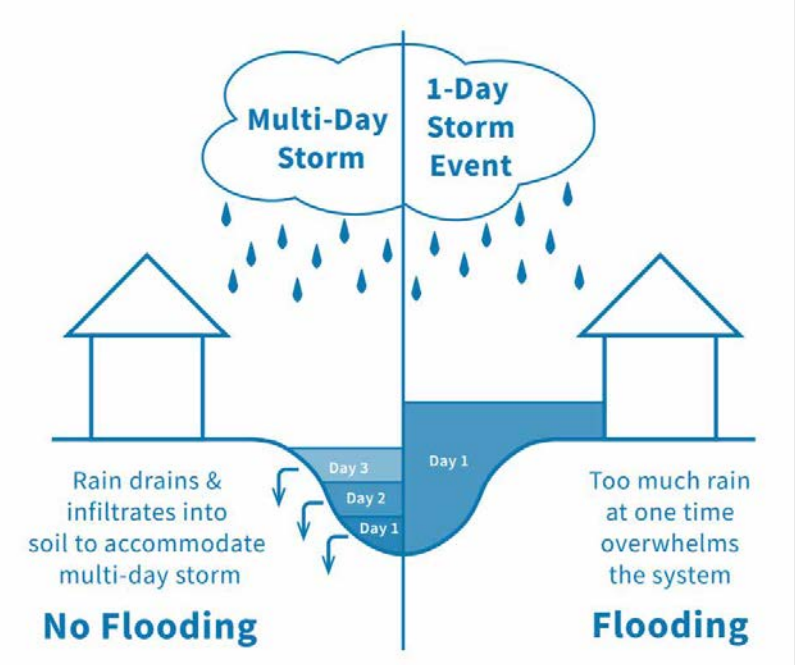
Sea Level Rise Scenarios



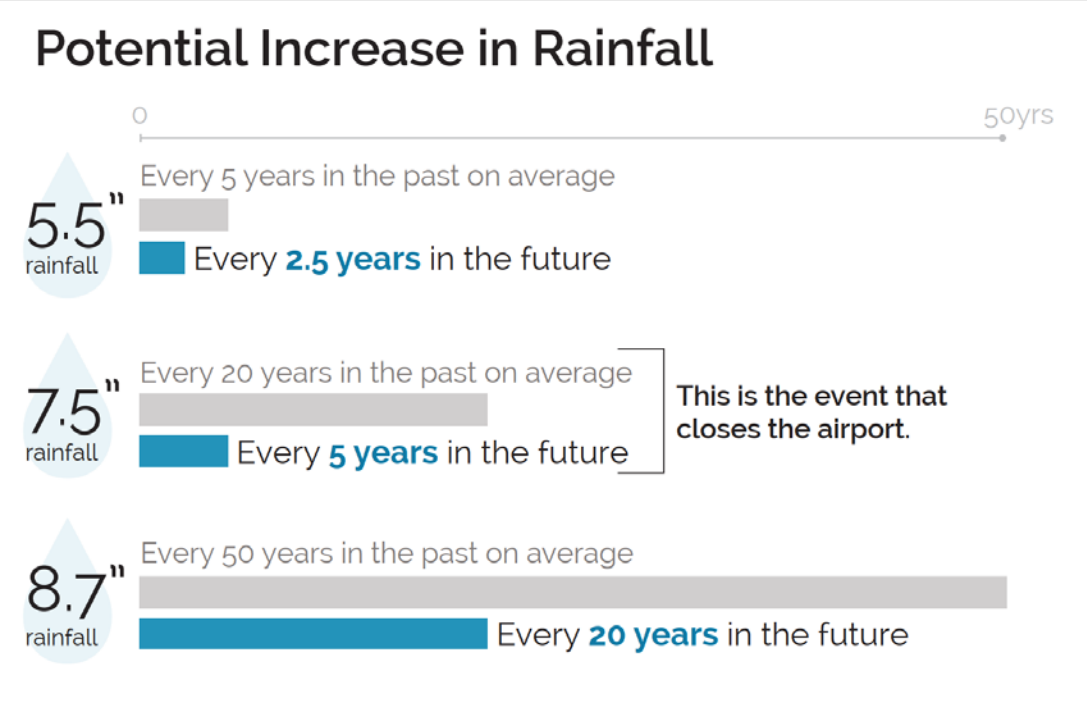


Climate Change: Increasing Intensity of Rainfall





Precipitation Modeling Results



Projected increase in extreme rainfall frequency from climate change

Future Precipitation

Past Precipitation

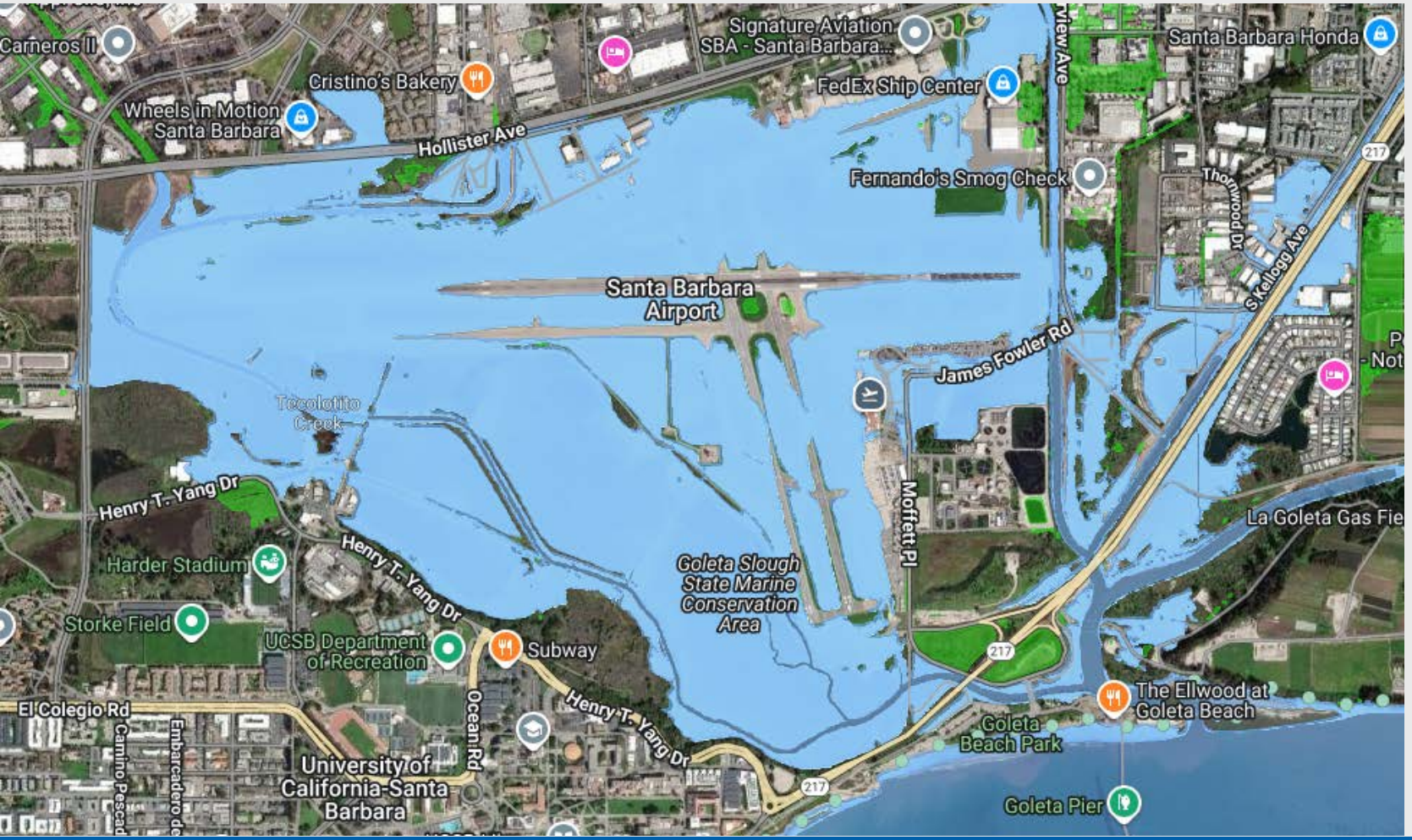
5-Year Storm

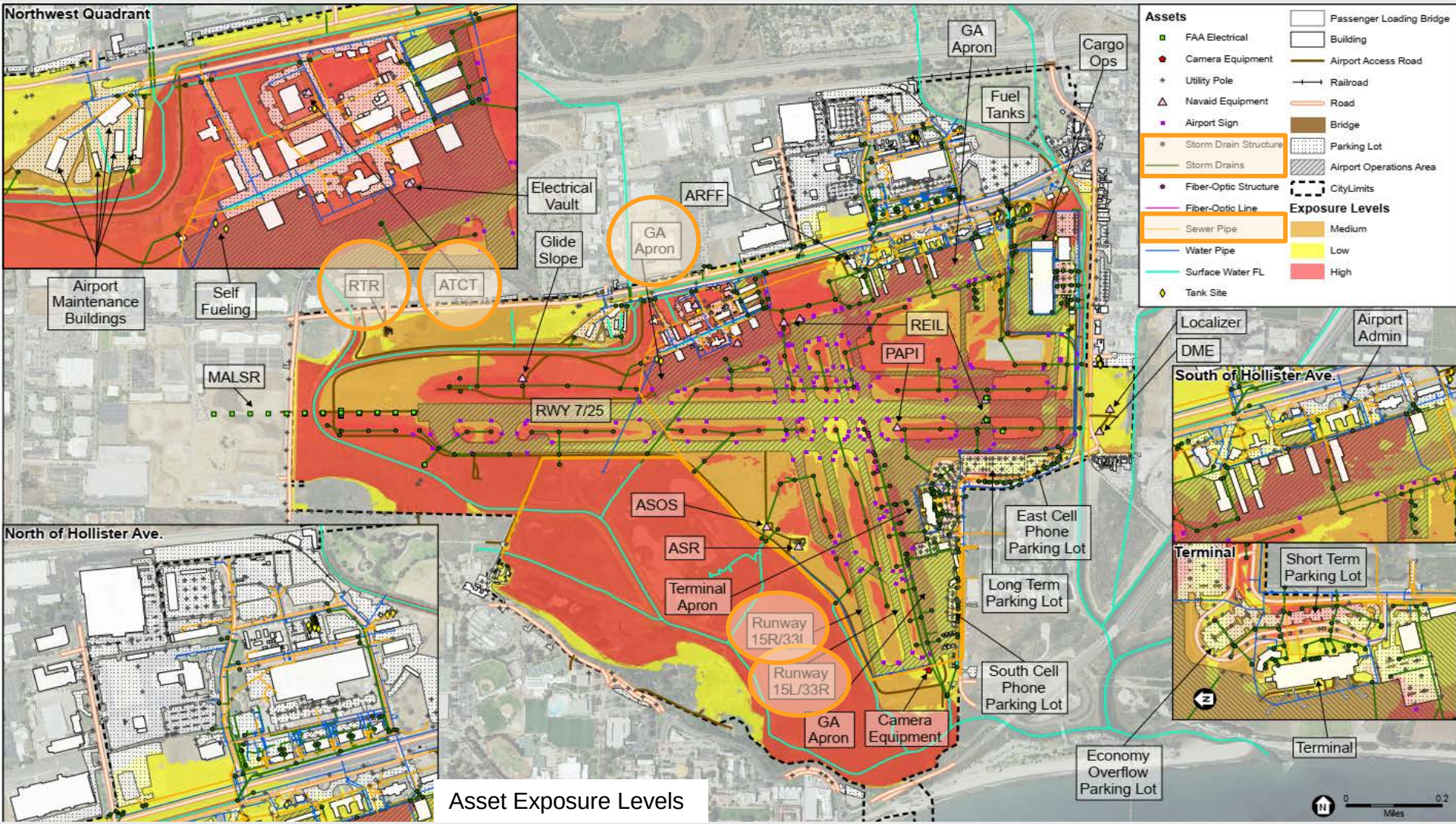
10-Year Storm (Jan. 2023)

10- to 20-Year Storm

100-Year Storm (Feb. 1998)

Tidal Inundation with 3.3 ft SLR (2090)





Asset Exposure Levels

Adaptation Timeframes & Vulnerabilities

Immediate need to move forward with ongoing & planned flood reduction measures to address recent flooding

	CAP Study Time Period	Sea Level Rise	Corresponding Year
Ongoing & planned efforts	current	-	-
Immediate Next Steps	0 to 5 Years	-	-
Near-Term	5-25 years	Now to 0.8 ft	Now to 2050
Mid-Term	25-50 years	0.8 ft to 2.5 ft.	2050 - 2075
Long-Term	50-65 years	2.5 ft to 3.3 ft.	2075 - 2090

Intense precipitation events are predicted to occur **more frequently now** & in the Near-Term.

Projected **bi-weekly tidal flooding** of the airport in the Mid-Term, rendering the airport inoperable.

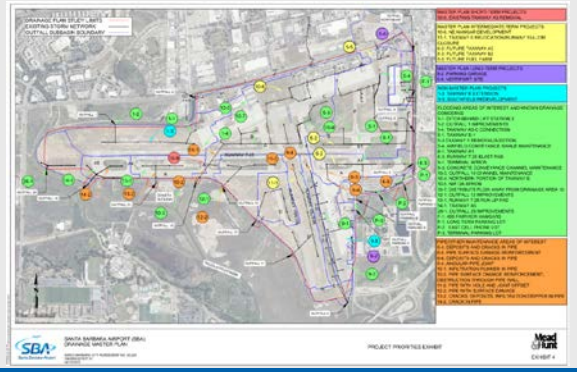
Adaptation Plan Framework

- Flood frequency threshold has already been reached & has triggered ongoing & planned measures
- **Goal** is to maintain or reduce flood frequency & impacts
- As measures are implemented in the near-term (~2050), conditions & improvements will be reassessed
- The plan for mid- & long-term adaptation will be refined & updated based on future conditions

ONGOING & PLANNED ADAPTATION MEASURES

Ongoing & Planned Adaptation Measures – Flood Management

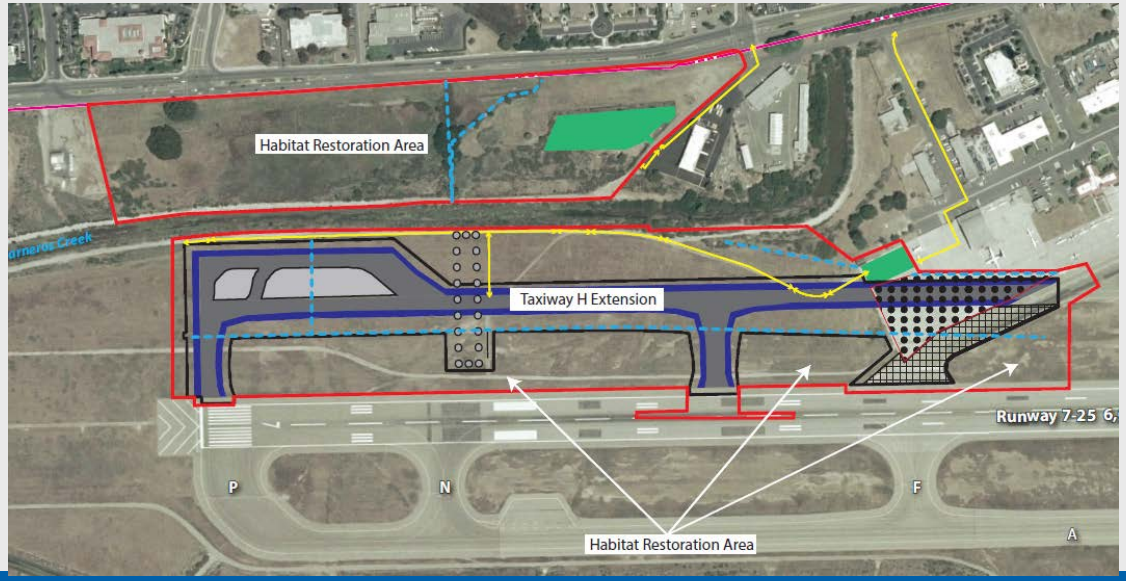
- County Creek sediment management (ongoing)
- Carneros Creek K-rail temporary flood barrier (ongoing)
- Firestone Channel inflatable “tiger dam” flood berm
- Carneros Creek maintenance dredging (planned)
- Storm drain improvements (per Drainage Master Plan, planned)

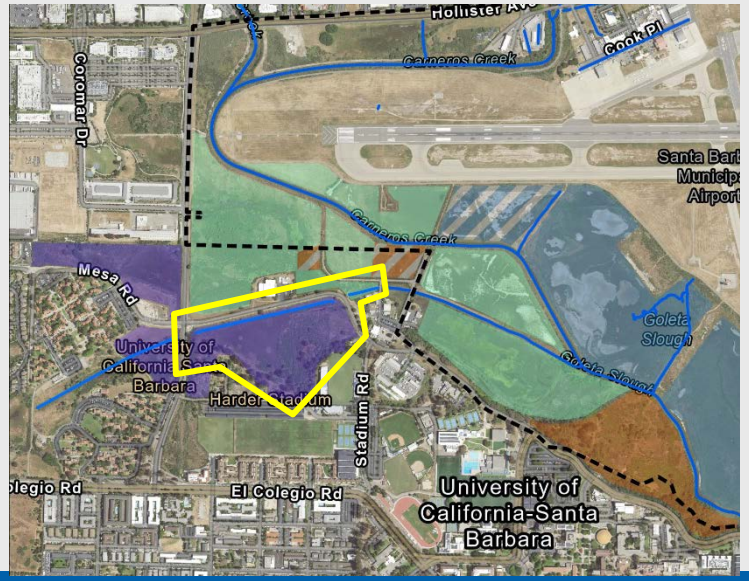


Ongoing & Planned Adaptation Measures

Related projects

- Taxiway B extension & north habitat restoration mitigation area (planned)
- UCSB Western Goleta Slough Tidal Restoration (planned)
- CCC Goleta Slough Resilience Project (ongoing)





POTENTIAL FUTURE ADAPTATION MEASURES

Near-Term (5-20 years): Now to 0.8 ft SLR (2050)

Goleta Slough & Creeks adaptation measures

- Carneros Creek flood management
- Goleta Slough remnant levee removal /channel expansion
- Tidal restoration & flood storage
- Channel sediment management & wetland sediment augmentation
- Goleta Slough mouth management and/or siphon
- San Pedro Creek stormwater detention basin and/or raised bank(s) and channel clearing

AOA adaptation measures

- Firestone Road drainage channel flood management
- Groundwater management
- Storm drainage improvements
- Utility upgrades
- Floodproof buildings/temporary flood management measures
- Modify/improve the existing airfield (e.g., making pavement resilient to flooding)

Carneros Creek Flood Management – Berm South of Channel

Opportunities

- Berm to replace temporary K-rail – aids in prevention of runway flooding
- Enhanced habitat – vegetate berm

Constraints

- May increase flooding offsite
- May conflict with Taxiway B Extension

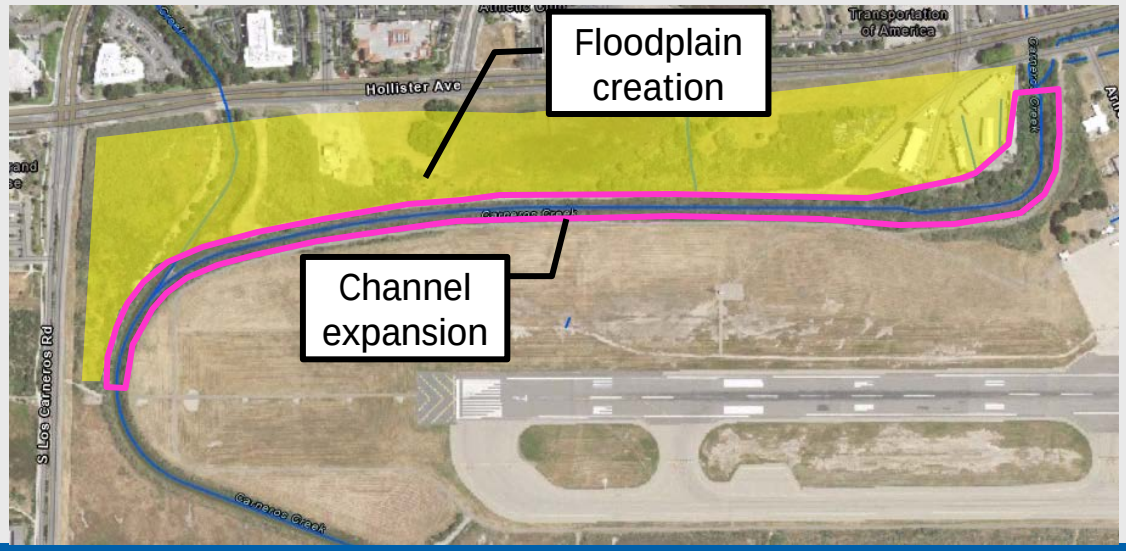
Restore Carneros Creek Floodplain and Expand Channel

Opportunities

- Lower and restored Carneros Creek floodplain and expand channel – provides flood conveyance, area for sediment deposition, enhanced habitat
- Relocate maintenance yard – allows for channel realignment/expansion

Constraints

- Portions are areas already mitigated in the past
  - Feasibility assessment including hydraulic modeling needed



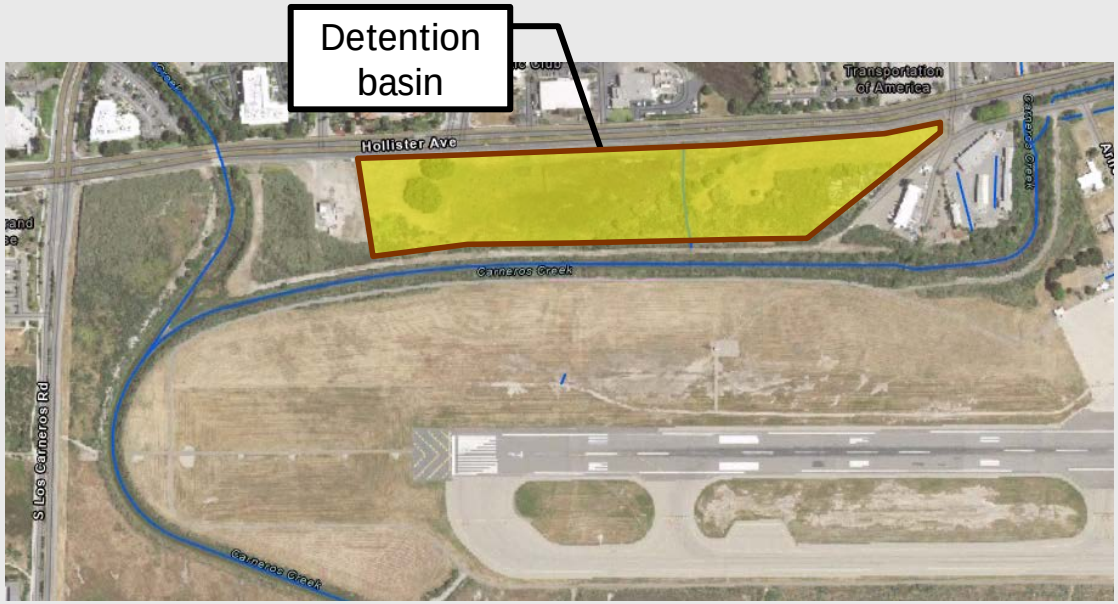
Carneros Creek Stormwater Detention Basin

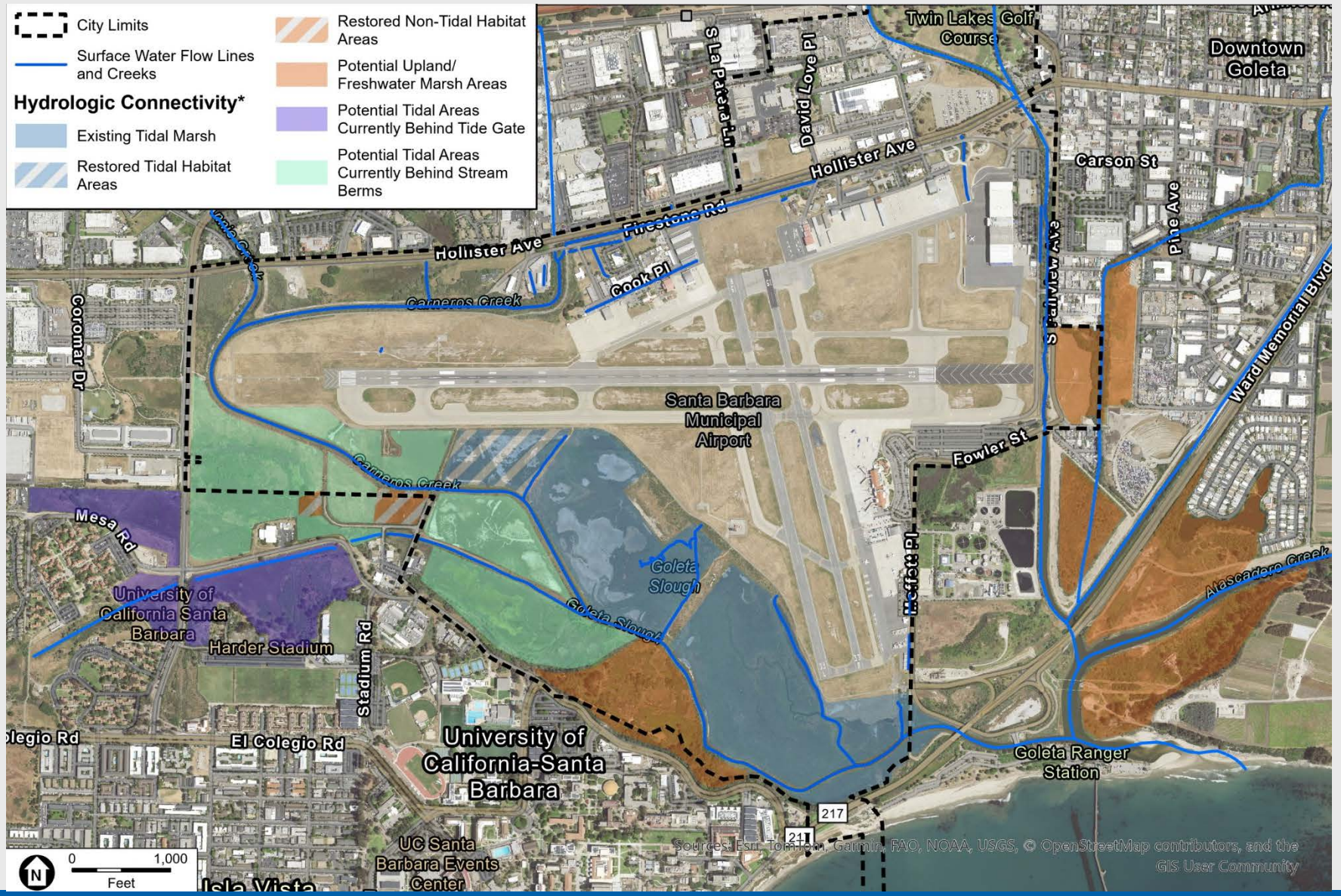
Opportunities

- Enhance Reynolds Wetland detention basin and explore Carneros Creek detention feasibility – provides flood storage

Constraints

- May need to be coordinated with Taxiway B Extension mitigation
- Prior mitigation area
  - Feasibility assessment including hydraulic modeling needed

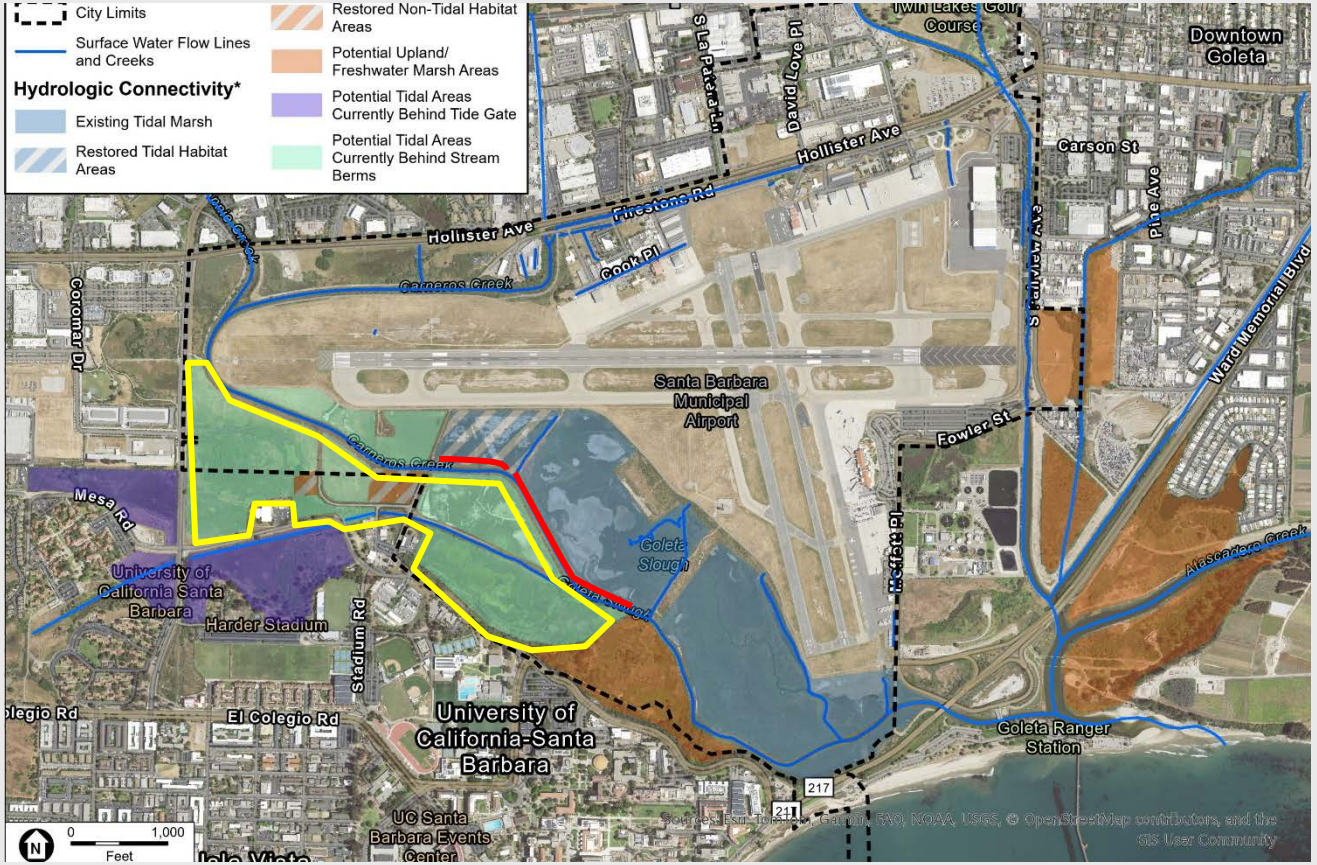



City Limits
Surface Water Flow Lines and Creeks
Hydrologic Connectivity*
Existing Tidal Marsh
Restored Tidal Habitat Areas
Restored Non-Tidal Habitat Areas
Potential Upland/ Freshwater Marsh Areas
Potential Tidal Areas Currently Behind Tide Gate
Potential Tidal Areas Currently Behind Stream Berms
Twin Lakes Golf Course
Downtown Goleta
S La Patera Ln
David Love Pl
Hollister Ave
Carson St
Pine Ave
Ward Memorial Blvd
Firestone Rd
Cook Pl
Cameros Creek
Coromar Dr
Santa Barbara Municipal Airport
Fowler St
Mesa Rd
University of California Santa Barbara
Harder Stadium
Stadium Rd
Goleta Slough
Atascadero Creek
El Colegio Rd
University of California-Santa Barbara
Goleta Ranger Station
UC Santa Barbara Events Center
217
0 1,000 Feet
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Goleta Slough Remnant Levee Removal/Channel Expansion

Opportunities

- Remove remnant levees along tidal areas – increases flood conveyance, lowering flood levels & duration in AOA
- Restore bermed tidal areas per Goleta Slough SLR & Mgmt. Plan
- Enhances habitat - creates wetlands, improves habitat connectivity



Constraints

- Potential prior mitigation constraint

Channel Sediment Management & Wetland Sediment Augmentation

Opportunities

- Channel maintenance dredging – reduces flooding by increasing flood conveyance
- Thin layer sediment placement – aids in marsh accretion to keep pace with sea level rise

Constraints

- Thin layer placement is a new technique in California, though it has been implemented as pilot project at Seal Beach Wetlands

Goleta Slough Mouth Management – Beach Berm Priming

Opportunities

- Grade beach berm to lower elevation without breaching - *mouth will breach sooner during storm event*
- Successfully permitted & performed at Ormond Lagoon in Oxnard & other location
- Permitted breaching may also be an option
  - Permitted & performed at San Lorenzo River lagoon (steelhead habitat) in Santa Cruz

San Lorenzo River (Dan Coyro, www.mercurynews.com/2022/01/10/santa-cruzs-notorious-lagoon-about-to-get-an-upgrade/)

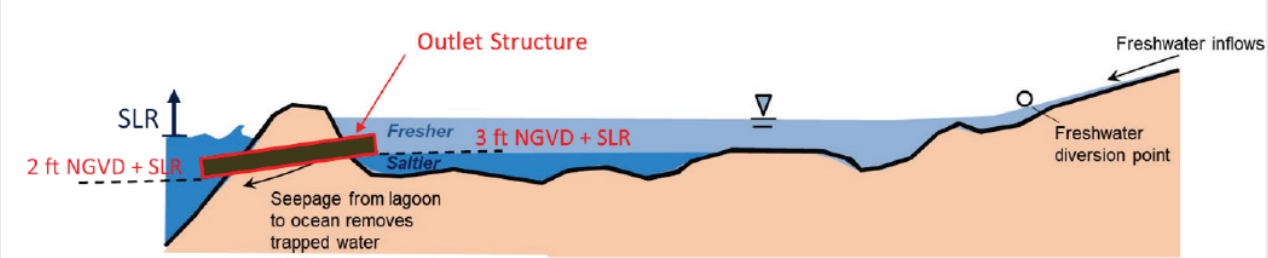
Goleta Slough Mouth Management – Siphon

Opportunities

- Pipe culvert lagoon discharge system
- Potential to benefit flood management, water quality, & habitat
- Potential to attach to Goleta Pier

Constraints

- Pipe maintenance



SOURCE: ESA

Assessment of Climate-Influenced Salinity Changes in Lower San Lorenzo River

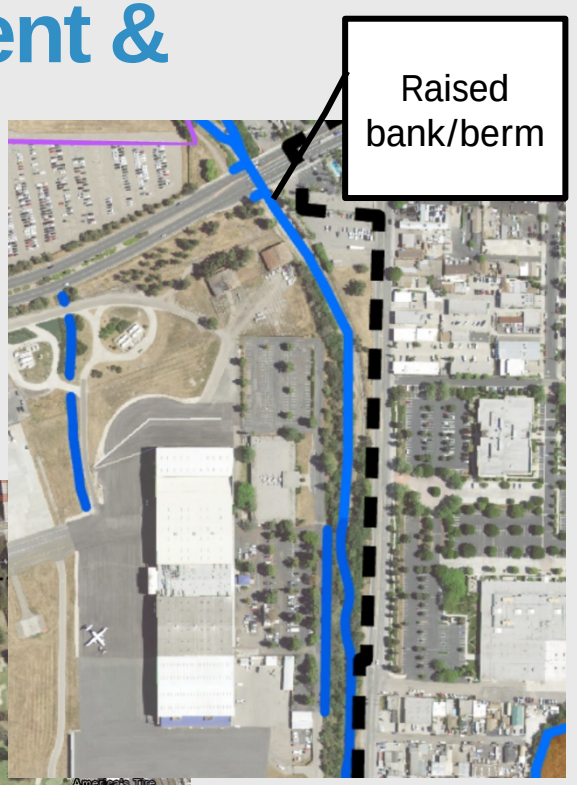
San Pedro Creek Flood Management & Stormwater Detention Basin

Opportunities

- Stormwater detention basin - increases flood storage, potentially lowers flood levels downstream of Hollister
- Raised bank/berm, channel clearing, temporary flood barriers, flood-proofing for buildings

Constraints

- Cultural resources constraints
- Steelhead habitat
  - Feasibility assessment including hydraulic modeling needed



Near-Term (5-20 years): Now to 0.8 ft SLR (2050)

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- Groundwater management
- Storm drainage improvements
- Utility upgrades
- Floodproof buildings/temporary flood management measures
- Modify/improve the existing airfield (e.g., making pavement resilient to flooding)

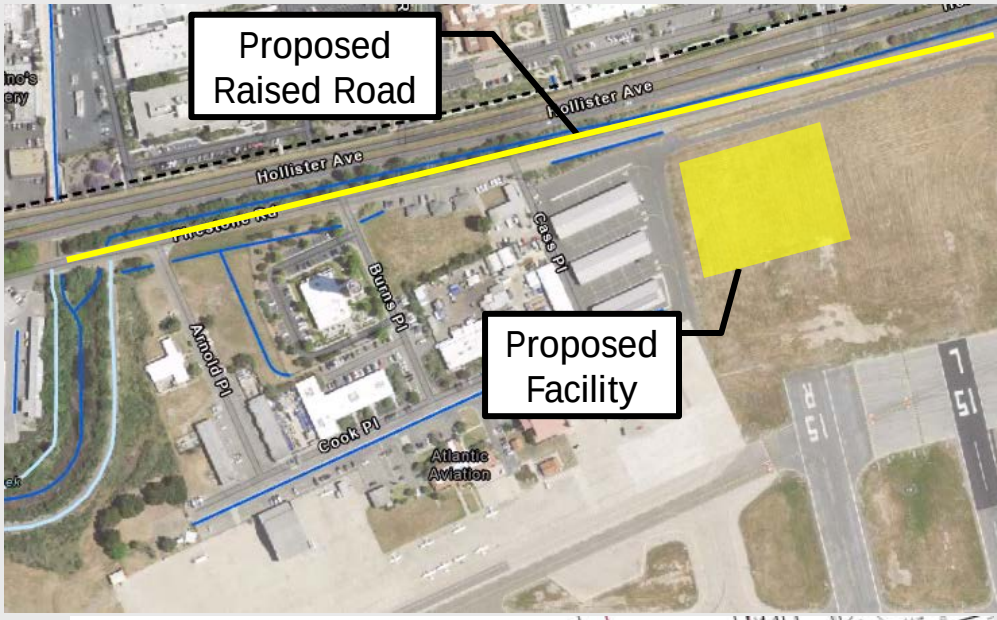
Firestone Drainage Channel Flood Management

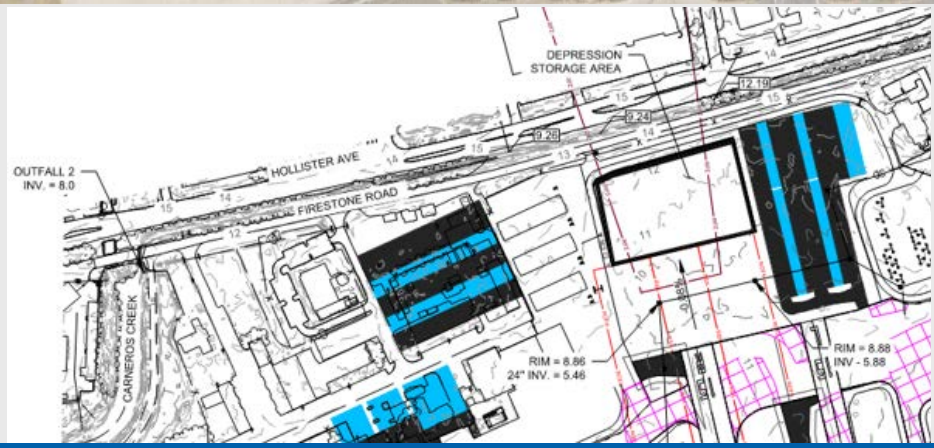
Opportunities

- Channel clearing - increase conveyance
- Raise Firestone road - reduce flooding
- Firestone drainage channel & detention facility (above or below ground) - increase conveyance & flood storage
- Possible pump system if needed

Constraints

- Prior mitigation in Firestone drainage channel
- Depth to groundwater
- FAA requirements (e.g. safety areas, object free areas, grading reqs., and drainage/wildlife)
  - Feasibility assessment needed





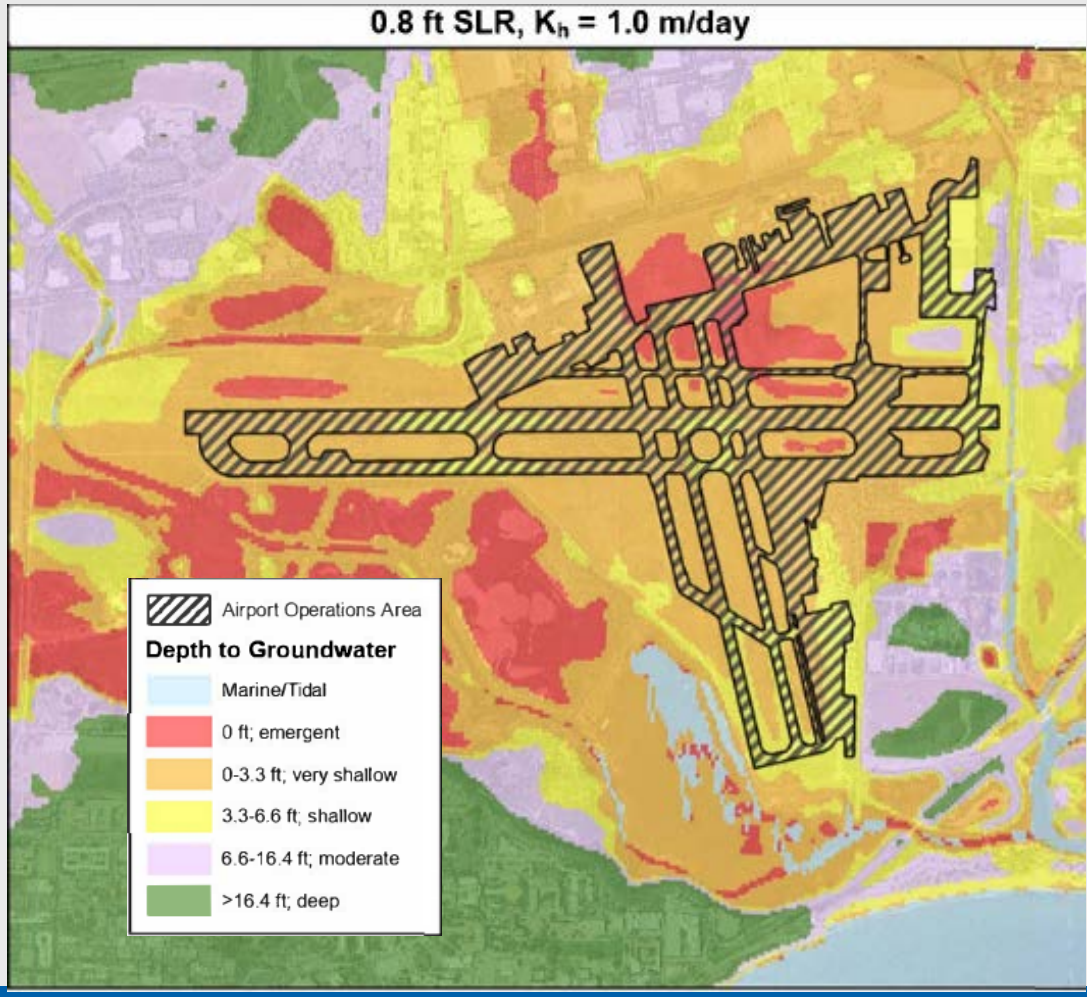
Groundwater Management

Opportunities

- Dewatering
- Raise grades in low areas

Constraints

- Feasibility
  - Groundwater assessment needed to further assess existing & future conditions & measures



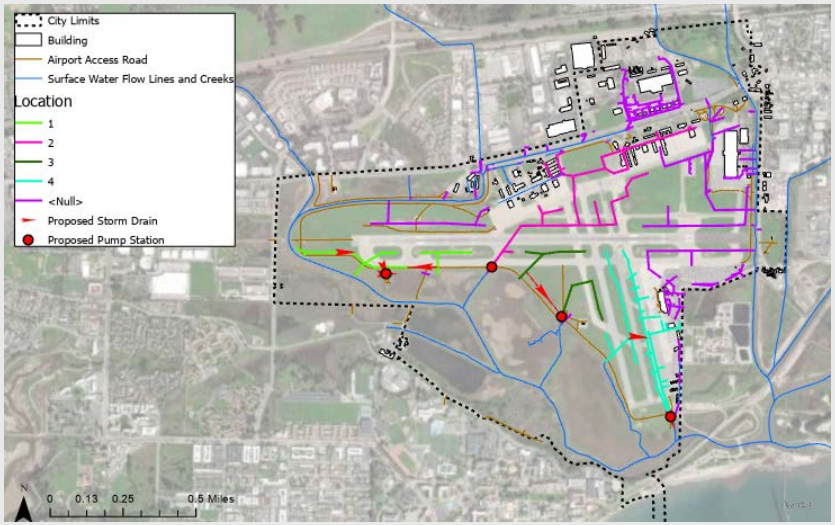
Storm Drainage Improvements

Opportunities

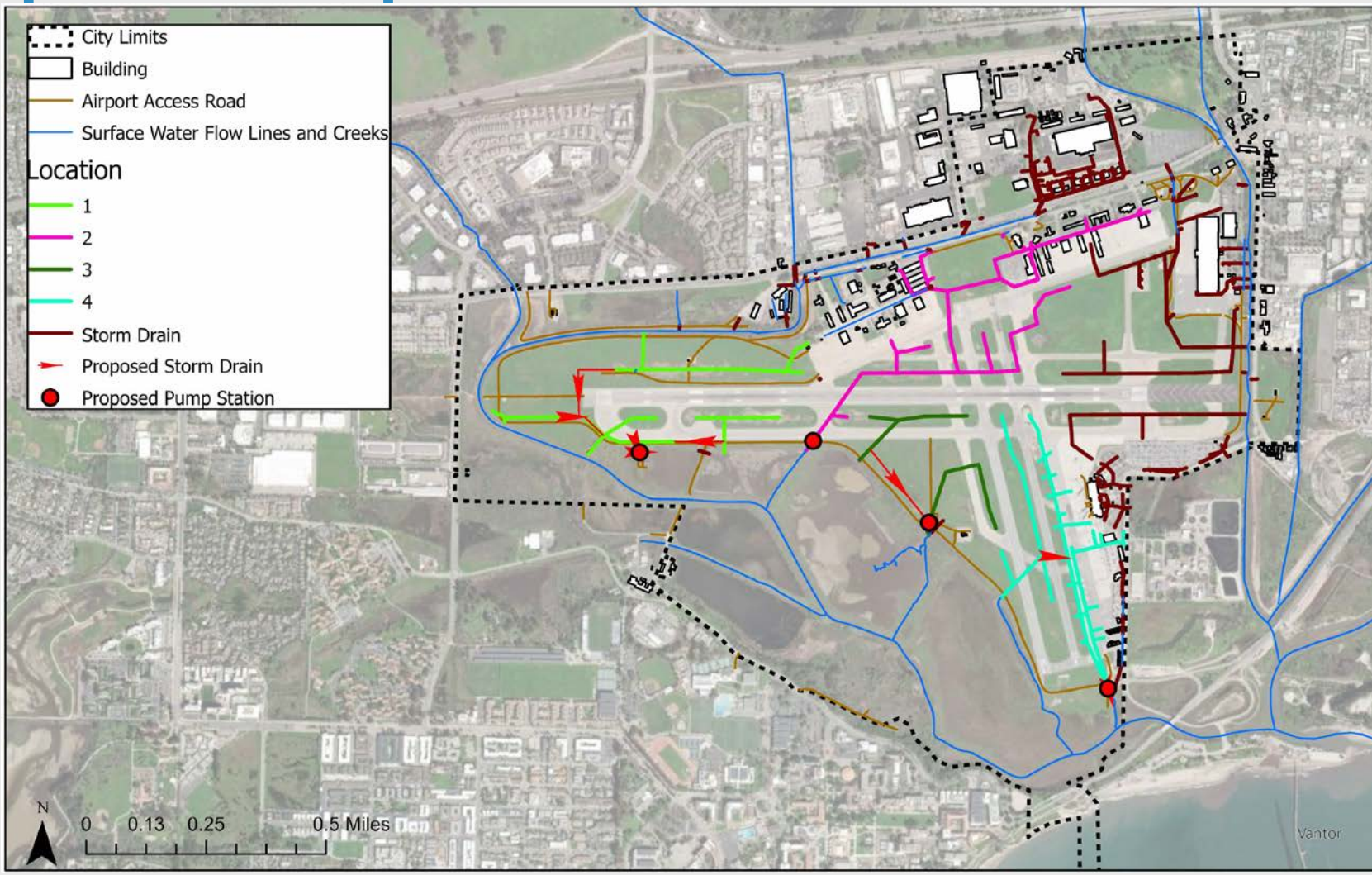
- Convert storm drain networks to pumped system – reduces onsite flooding by improving stormwater conveyance
- Detention galleries under non-airfield pavement – stormwater storage & infiltration, water quality benefits

Constraints

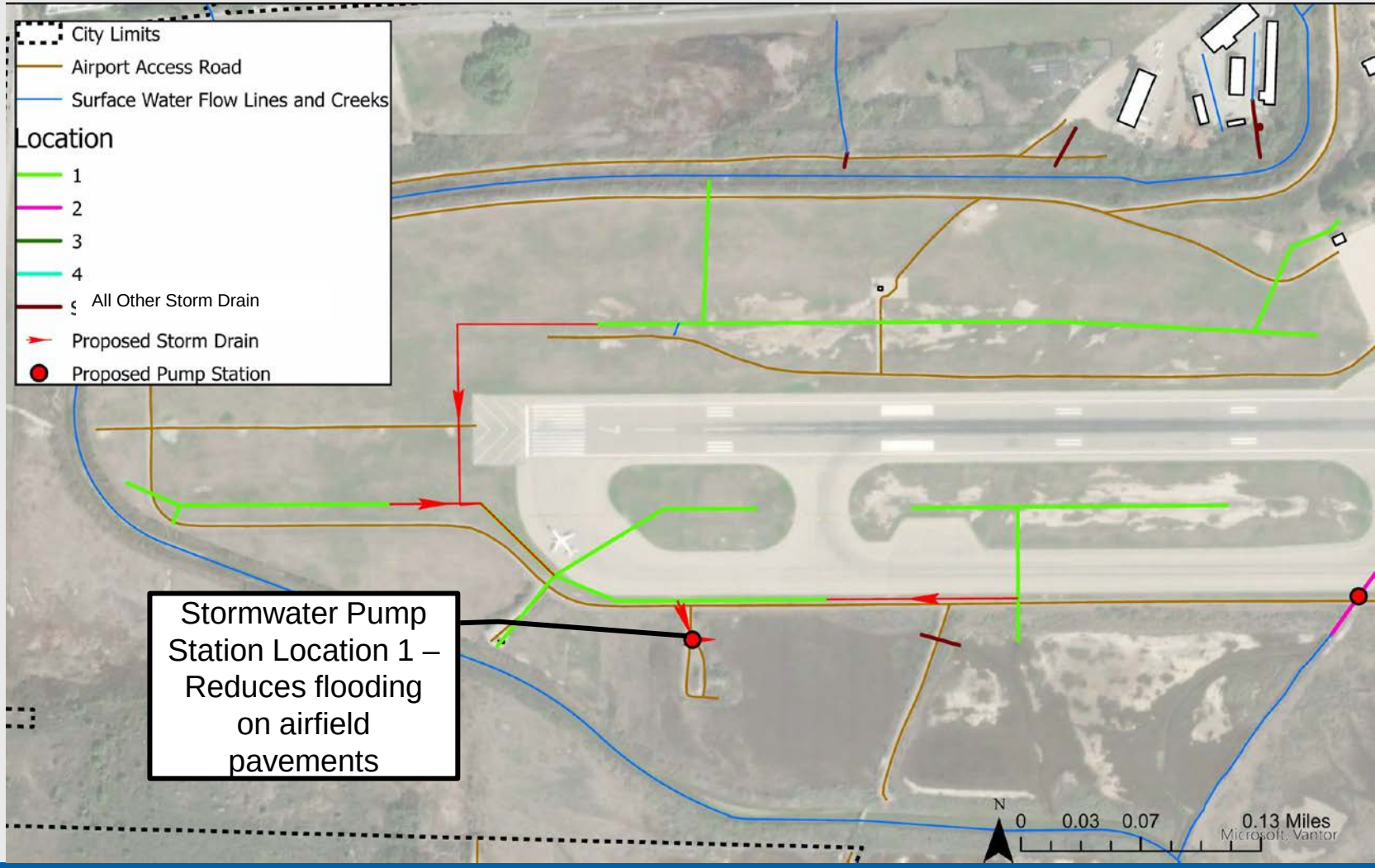
- Challenging in areas with high groundwater table
  - Feasibility assessment including groundwater assessment needed



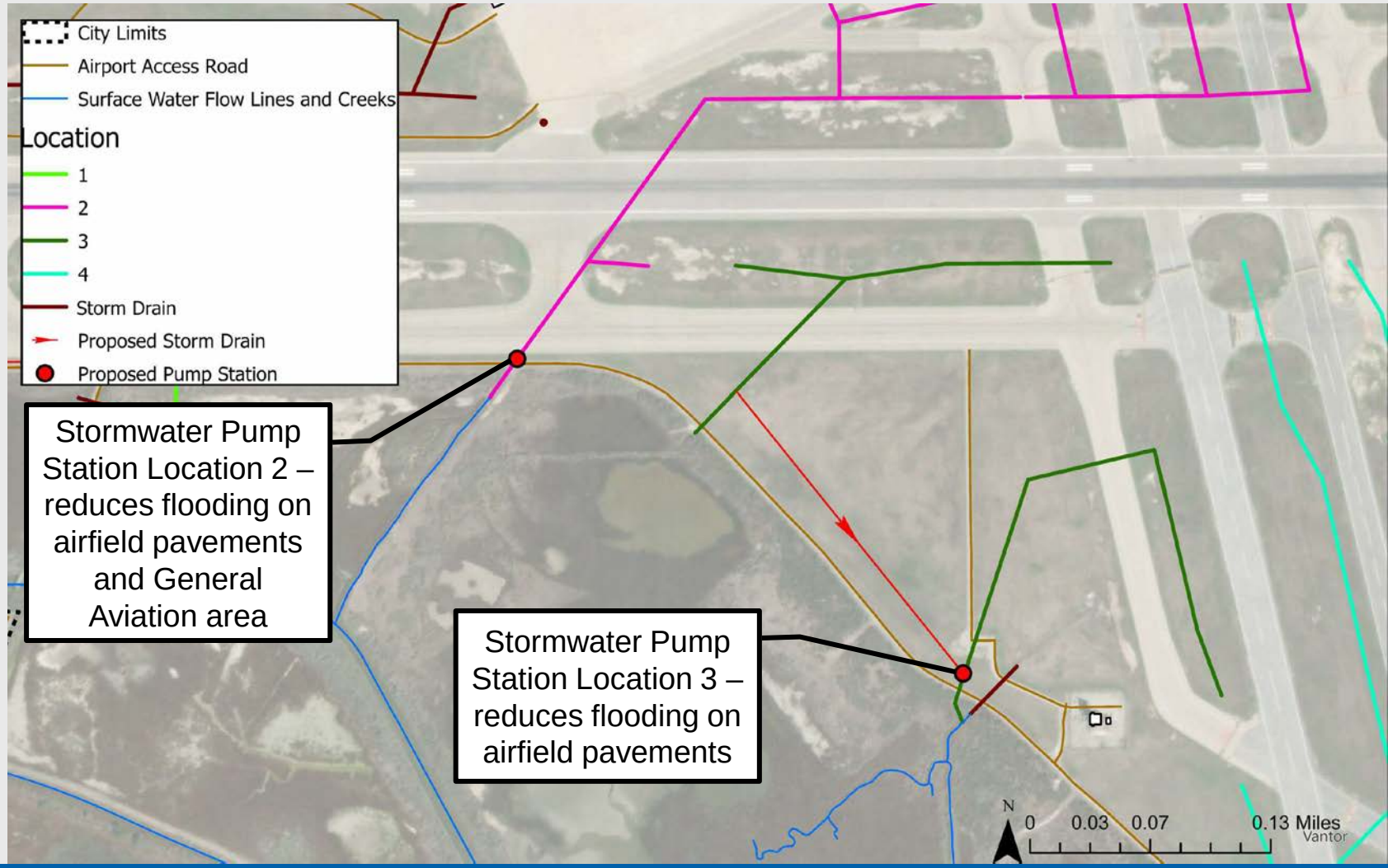
Proposed Pump Station Locations Overview



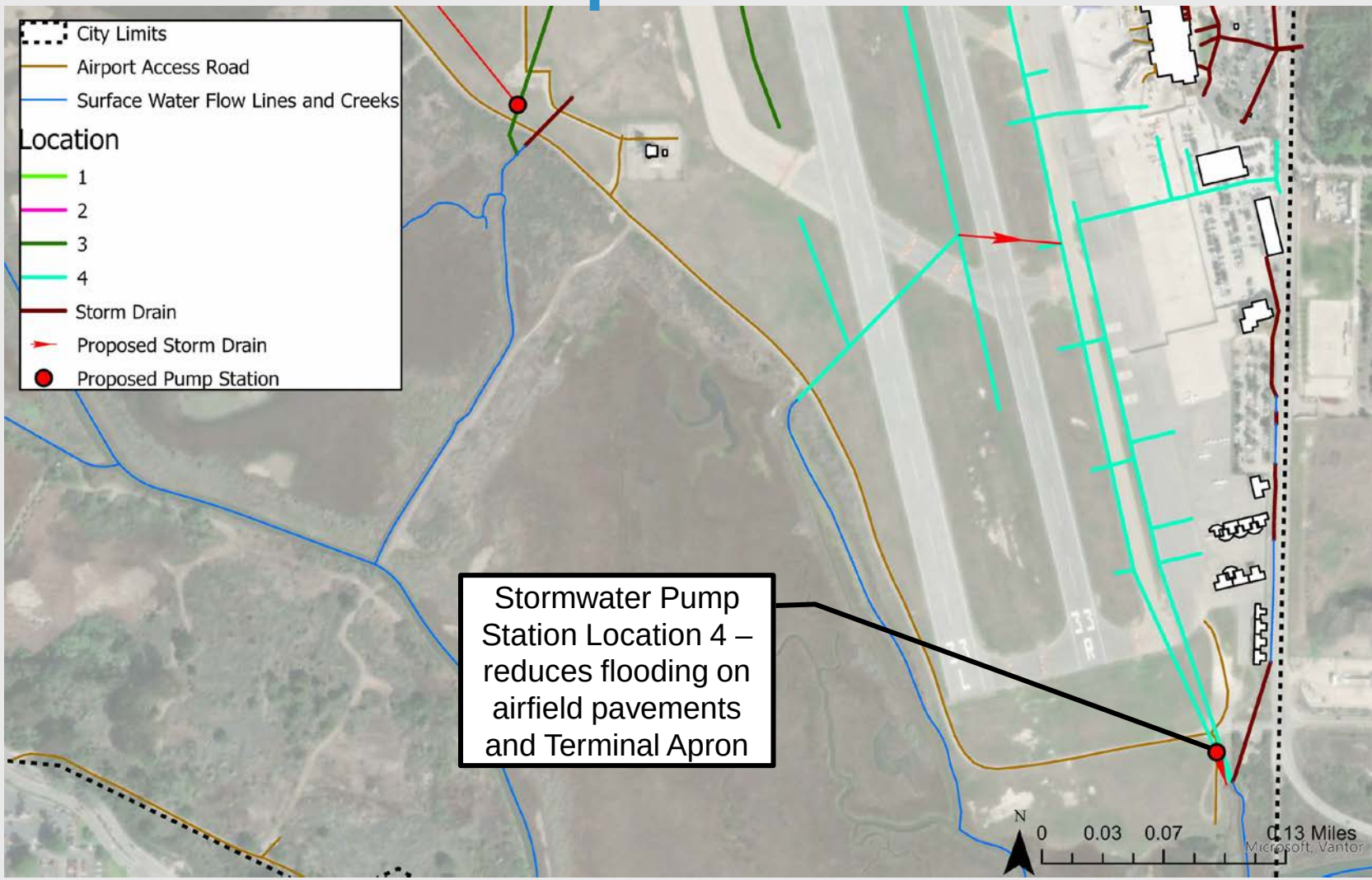
Combined Outfall & Pump Station Location 1



Combined Outfall & Pump Stations 2 & 3



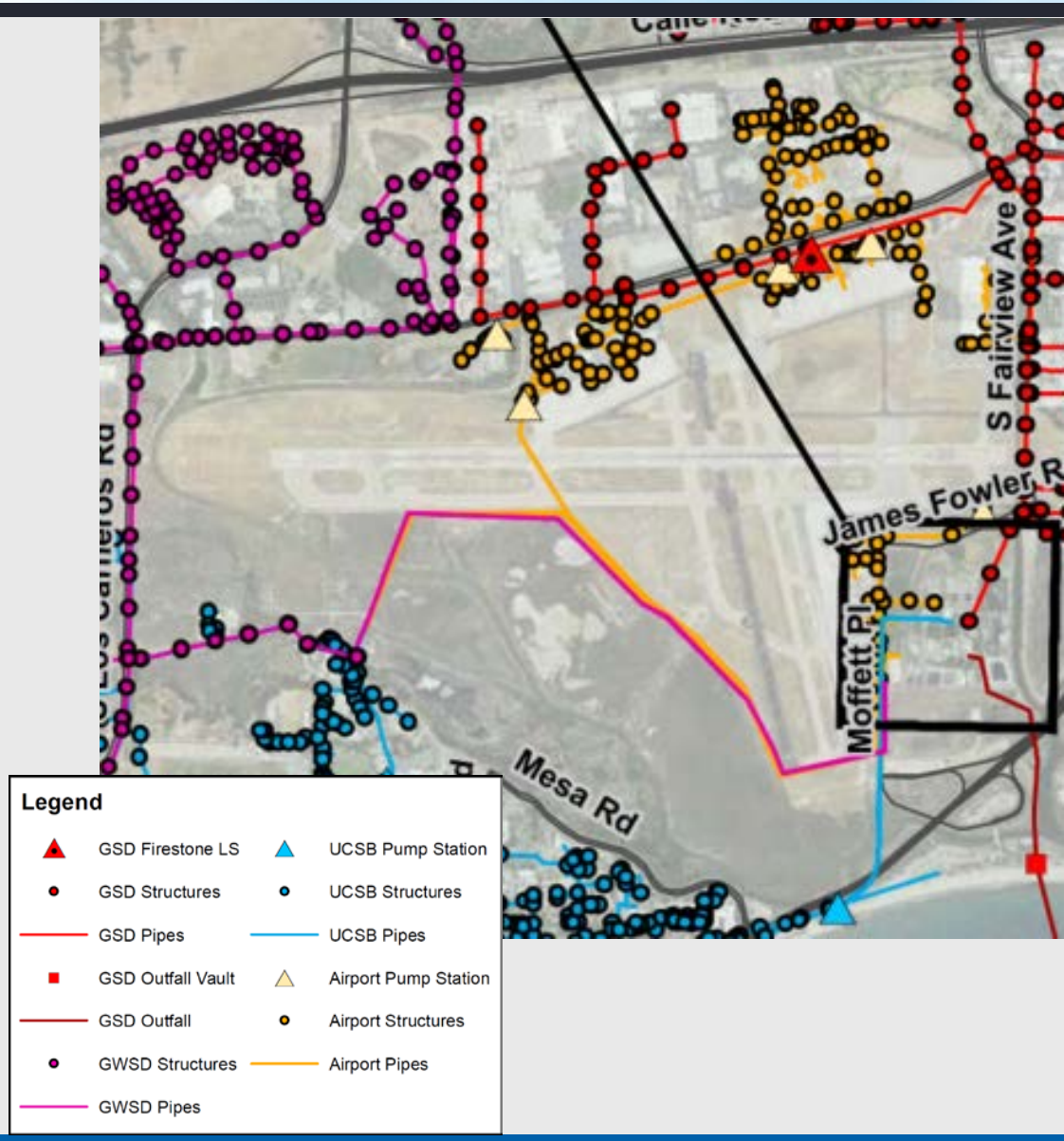
Combined Outfall & Pump Station Location 4



Utility Upgrades

Opportunities

- Wastewater inflow & infiltration study
- Flood proofing electrical conduits
- Pipe material inventory & corrosion risk assessment



Flood-Proofing Measures

Opportunities

- Flood-proofing buildings
  - Temporary barriers
  - Permanent floodwalls with access gates
  - Raising electrical & other utilities
- Other measures for equipment within buildings
  - Raise sensitive equipment
  - Storage racks

Constraints

- Hangars & other infrastructure need to be at ground level

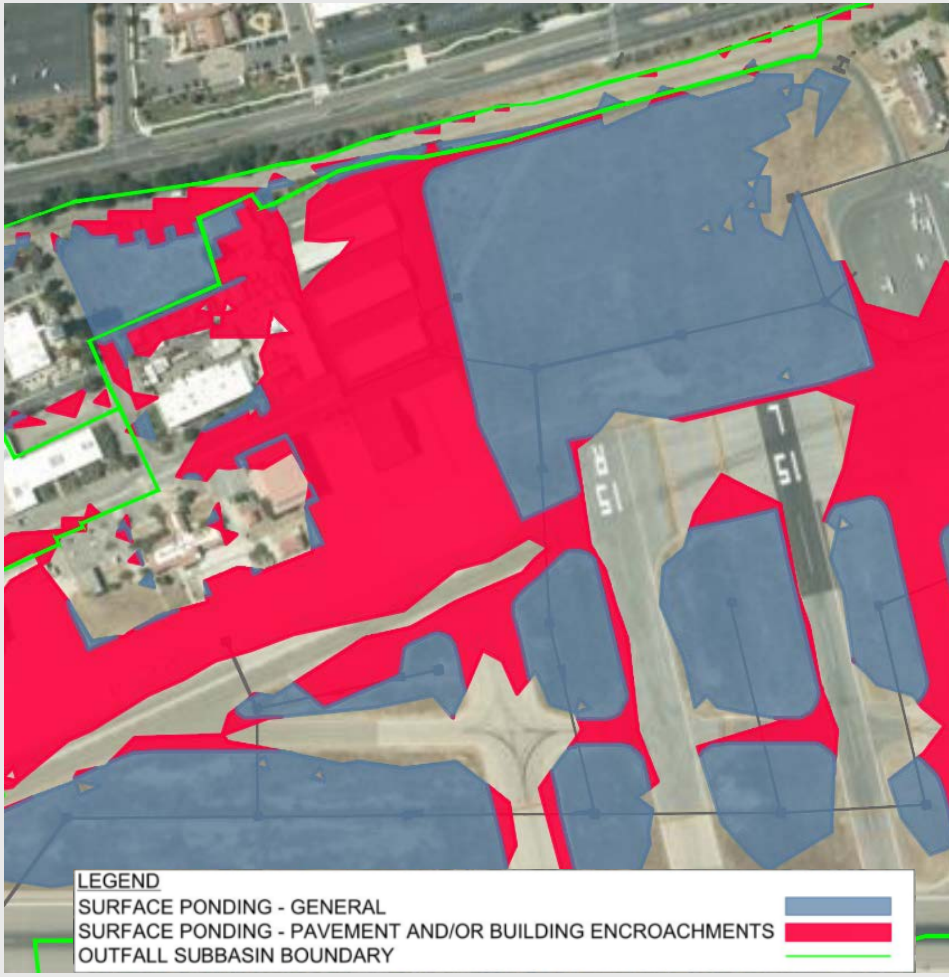
Airfield Modifications

Opportunities

- Modify/improve the existing airfield (e.g., making pavement resilient to flooding)
  - Incremental pavement lift & grading
    - Raise Runway 15R threshold
    - Raise taxiway Charlie (northern taxiway) to block flooding from north

Constraints

- FAA requirements (e.g. safety areas, object free areas, grading reqs., and drainage)
- Significantly raising airfield may increase flooding elsewhere



POTENTIAL FUTURE ADAPTATION MID-TERM & LONG-TERM

Mid-term (20-50 years): 0.8 ft (2050) to 2.5 ft SLR (2080)

During Near-term

- Reassess conditions & improvements made during near-term
- Refine Mid-term plan

Goleta Slough actions

- Explore upstream flood detention in coordination with other jurisdictions

AOA actions

- Modify the existing airfield – incremental pavement life and grading

Raise Runways & Connections

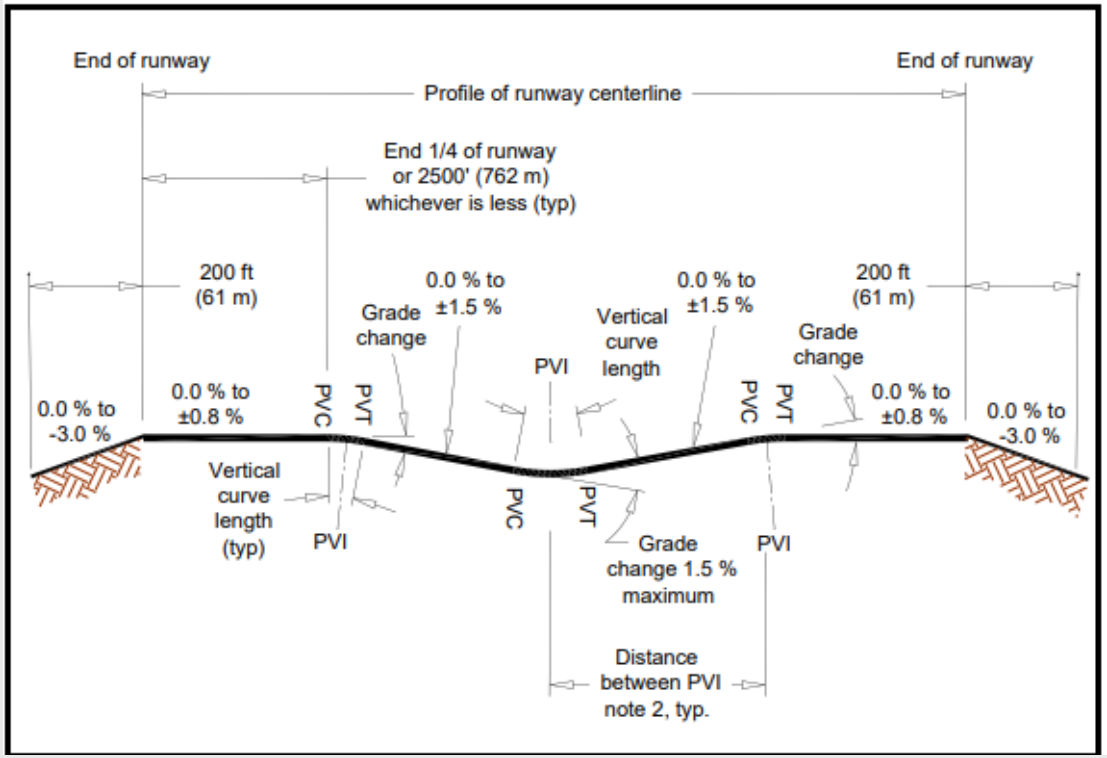
Opportunities

- Raising runways & connections – reduces flooding in raised areas

Constraints

- Potential increased flooding elsewhere – other AOA locations, offsite
- FAA requirements (e.g. surface slopes, etc.)
- May need to reconstruct main runway
- Replacement of electrical infrastructure

Figure 3-32. Longitudinal Grade Limitations for Aircraft Approach Categories C, D, and E



Long-Term (50-60 years): 2.5 ft (2080) to 3.3 ft SLR (2090)

- Reassess conditions & mid-term improvements & refine long-term plan
- Consider the costs and impacts of :
  - Protecting the airport in place
  - Regional levee & flood control channel system
  - Elevating airport infrastructure
  - Other regional air-service solutions
  - Relocating the airport

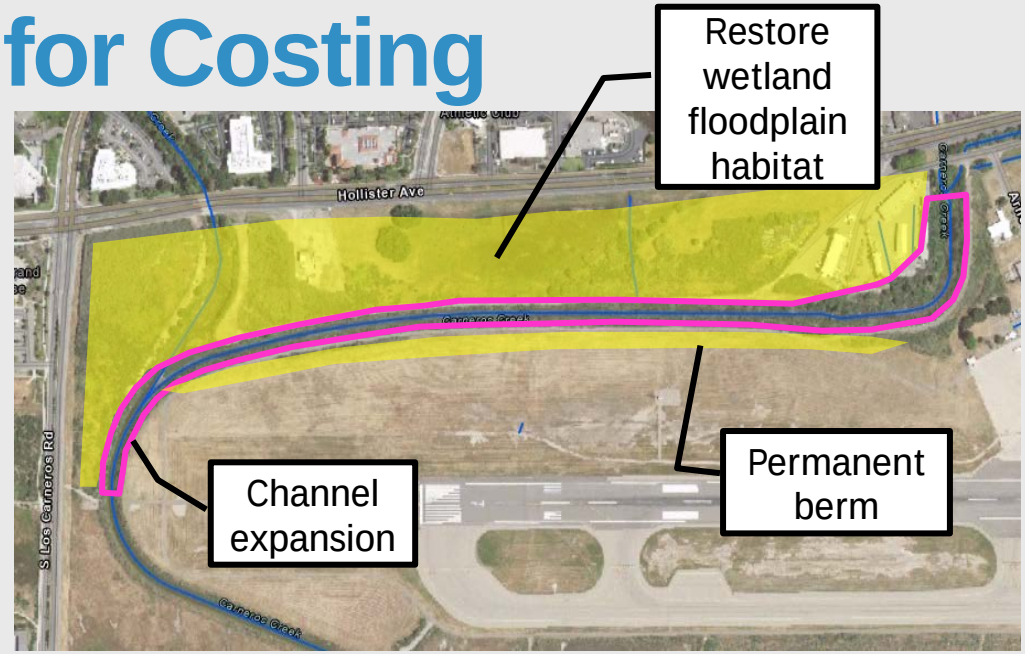
RECOMMENDED NEXT STEPS

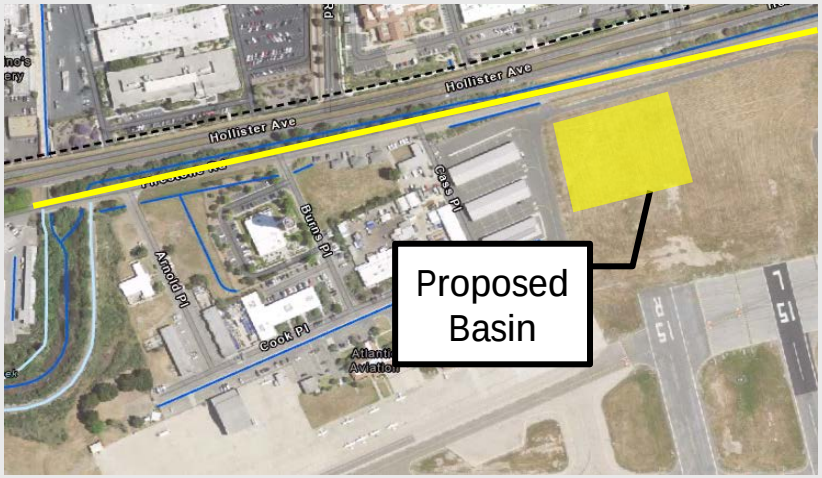
Recommended Next Steps

1. **Feasibility and effectiveness study of adaptation measures**
   - Hydrologic analysis and modeling - confirm and quantify flood reduction benefits and evaluate potential negative impacts to offsite flooding
   - Conceptual plans and cost estimates to inform selection of priority measures that have highest benefits and cost-effectiveness
   - Not within the current scope
2. **Estimate preliminary costs for three selected adaptation measures**
   - Indicates potential funding needed
   - Within the current scope
3. **Ongoing and planned adaptation measures**
   - Implement the SBA Drainage Master Plan in the immediate term (0-5 years)

Measures Selected for Costing

- Near-term (5-20 years)
  1. Permanent berm to replace K-rail along Carneros Creek
  2. Restore wetland floodplain habitat north of Carneros Creek and potentially expand Carneros Creek
  3. Construct Firestone stormwater detention facility north of Runway 15





Next Steps

1. Completion of Phase II: CAP
   - Estimate costs of three adaptation measures
   - Prepare Admin Draft Climate Adaptation Plan Report (May 2026)
   - Public workshop on adaptation measures & options
2. Phase III: Airport Coastal LUP Update
3. Phase IV: Feasibility and Effectiveness Study of Adaptation Measures (new contract required)

Thank you, Questions?

Airport Staff

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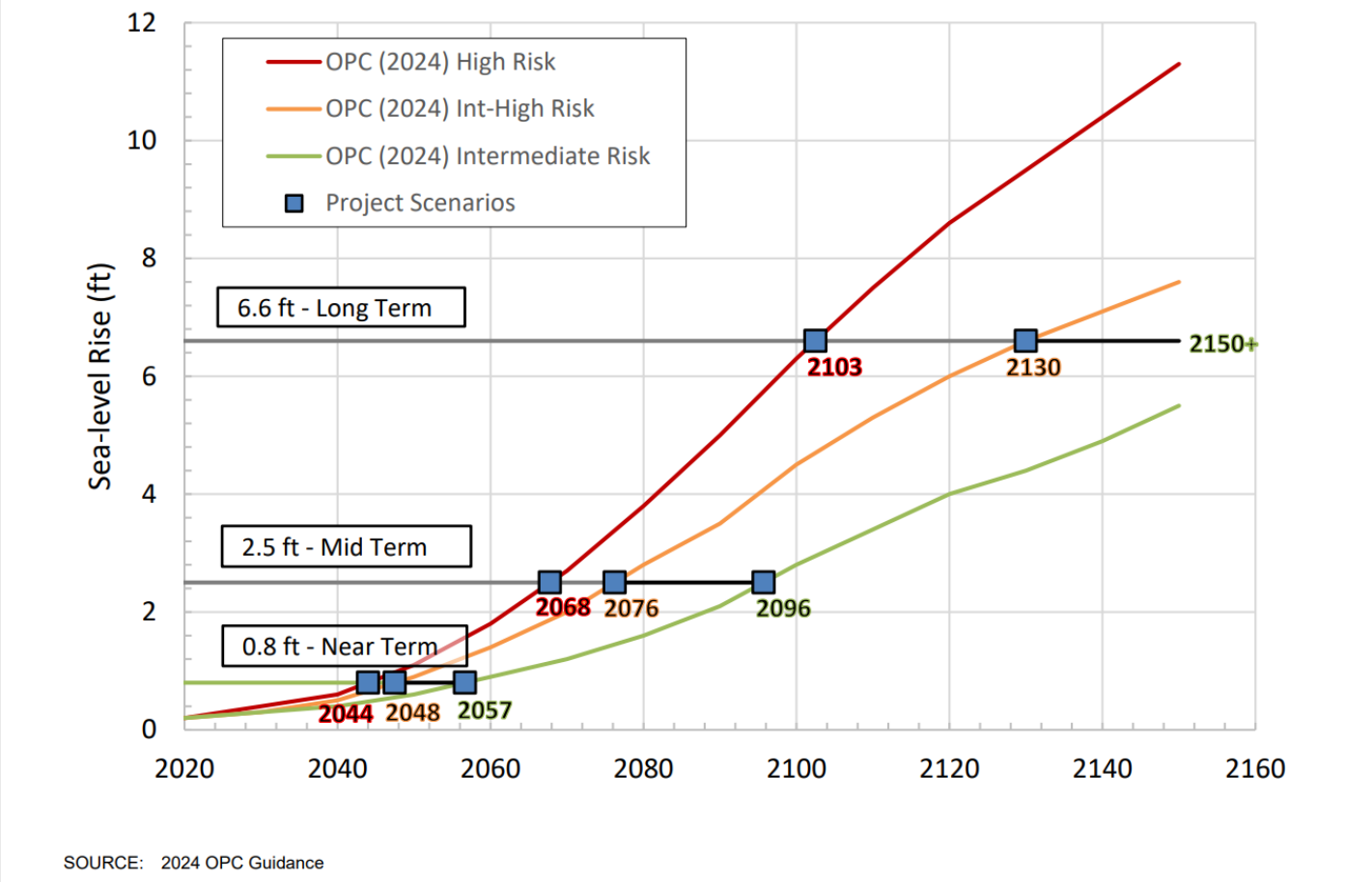
BACKUP SLIDES

Sea Level Rise (SLR) Scenarios

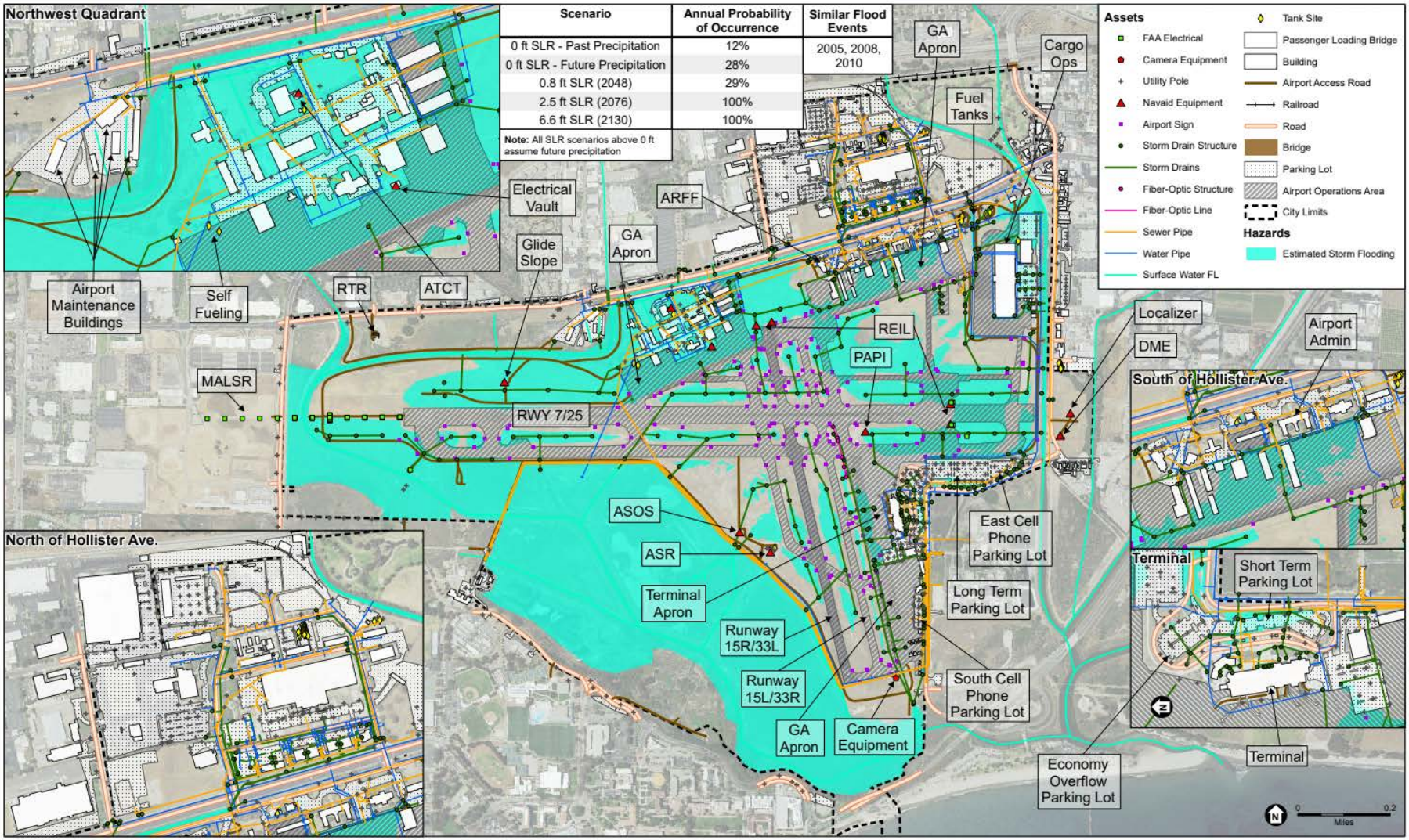


Combined Flooding Results - Annual Probability Summary

Flood Threshold Annual Probability Summary Table			
Sea Level Rise Scenario	**NW Quadrant & Edge of Runway Flooded**	**Runways Flooded, Airport Closed**	**Entire Airport Flooded**
0 ft, Past Precipitation	12%	7%	1%
0 ft, Future Precipitation	28%	21%	3%
0.8 ft (2048)	29%	21%	4%
2.5 ft (2076)	100%	61%	4%
6.6 ft (2130)	100%	100%	100%

Years are for the following scenarios:
(Intermediate High - Intermediate)
Annual probability is chance of the event occurring in **any given year**

Bottom Line: Intense precipitation events are predicted to occur more frequently



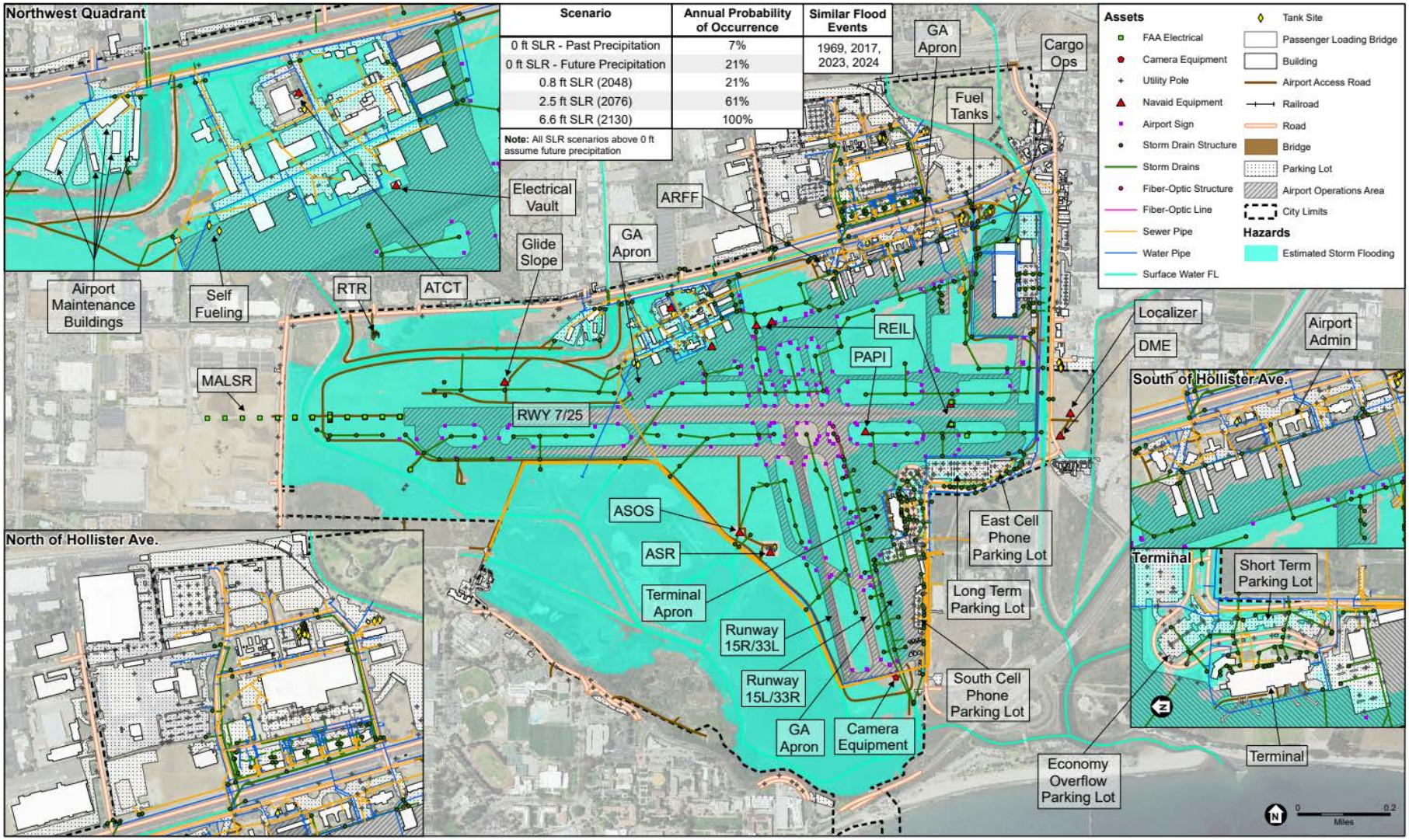
SOURCE: ESA/SB County, USGS, NAIP, GSD, Santa Barbara Airport, UCSB, GWSD

Flood extent southeast of Goleta Slough based on CoSMoS 1-yr Coastal Storm with 10-yr Creek Discharge (0 ft Sea Level Rise); flood extent northwest of Goleta Slough based on FEMA flood profiles, SBA information, M&H 5-year stormwater ponding and ESA estimate

Santa Barbara Airport Sea Level Rise Adaptation Plan . D202201087.00

Figure 4

Northwest Quadrant Flooded, Runway Not Flooded, Airport Open Threshold - Asset Exposure



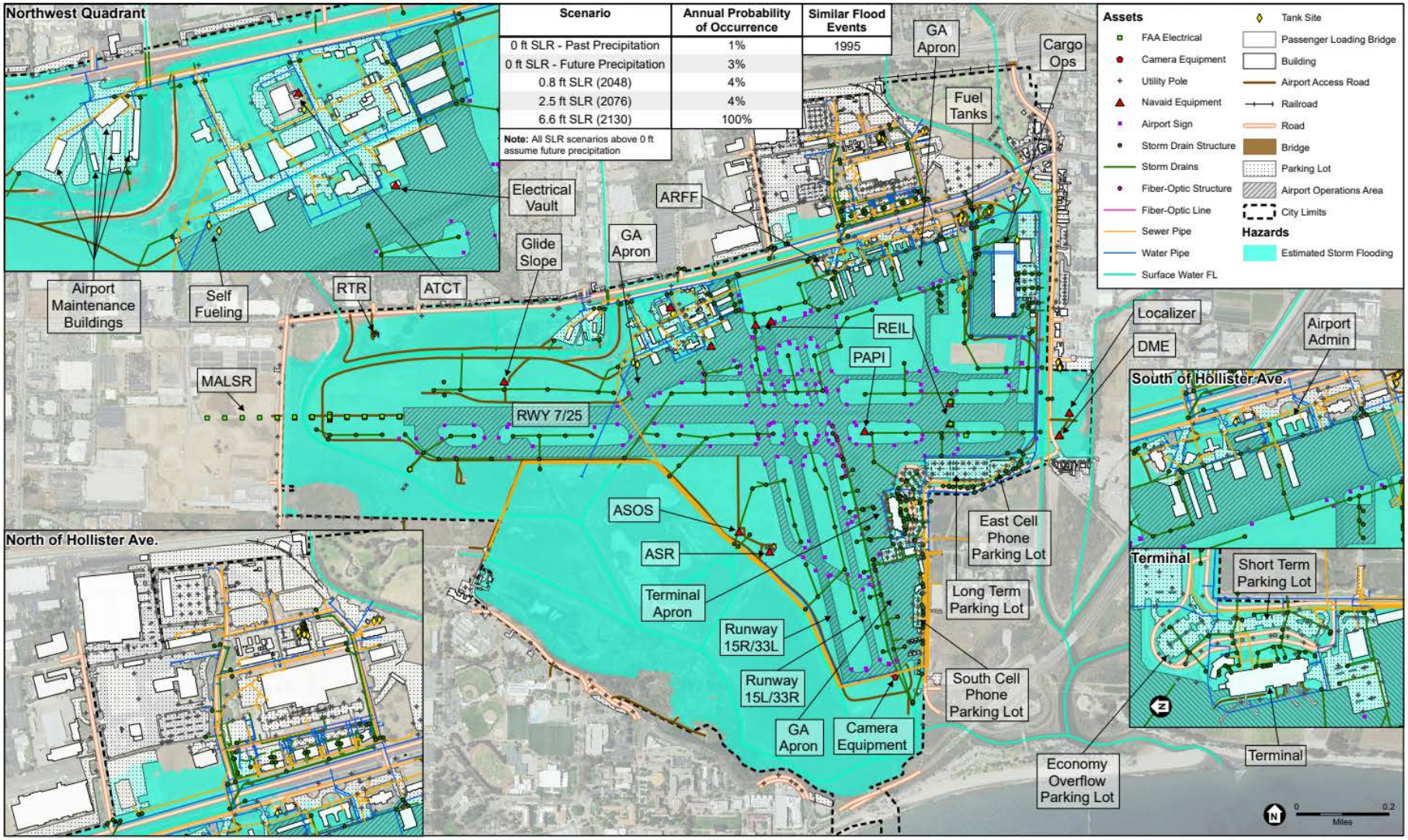
SOURCE: ESA/SB County, USGS, NAIP, GSD, Santa Barbara Airport, UCSB, GWSD

Flood extent from CoSMoS 20-yr coastal storm with 5-yr creek discharge (0 ft sea level rise)

Santa Barbara Airport Sea Level Rise Adaptation Plan . D202201087.00

Figure 5

Runways Flooded, Airport Closed Threshold – Asset Exposure



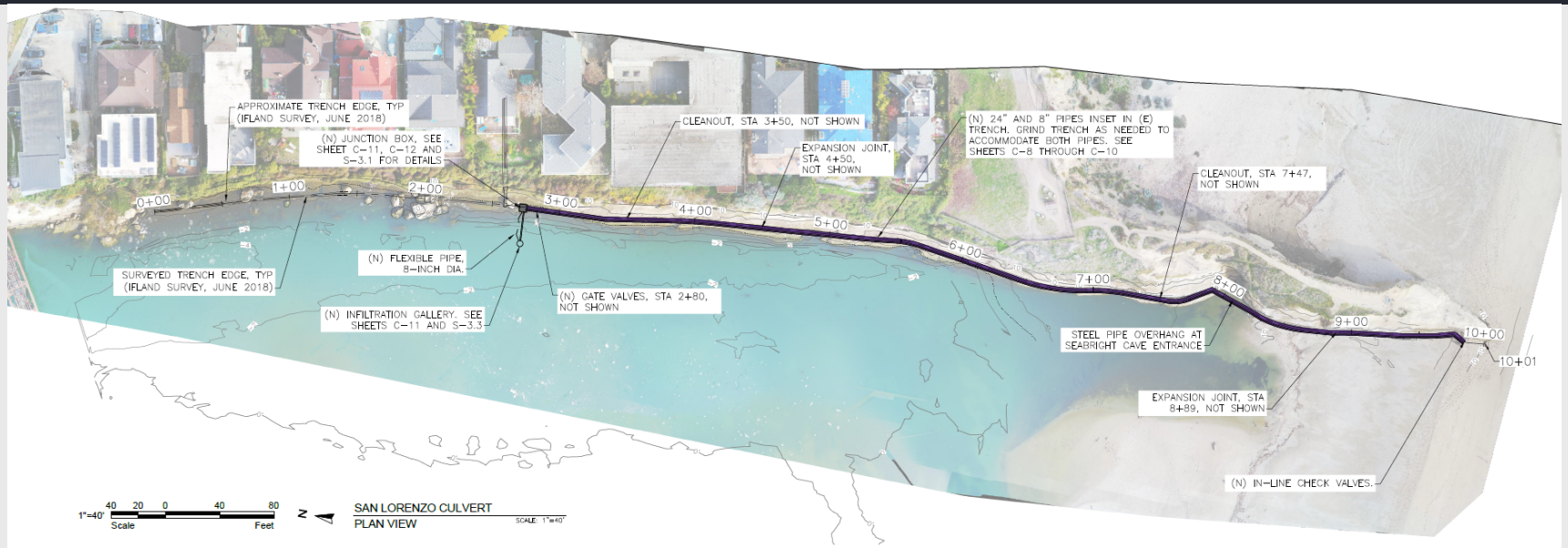
SOURCE: ESA/SB County, USGS, NAIP, GSD, Santa Barbara Airport, UCSB, GWSD

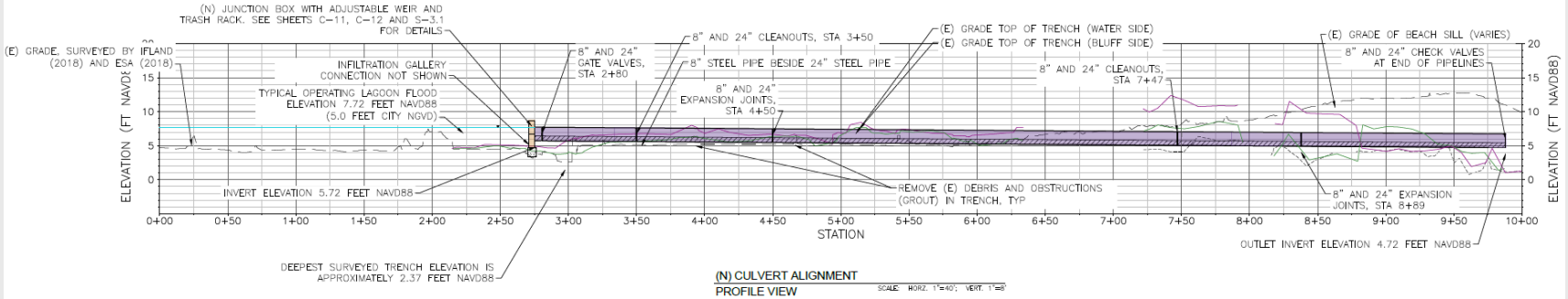
Flood extent from CoSMoS 100-yr Coastal Storm with 7-yr Creek Discharge (6.6 ft Sea Level Rise)

Santa Barbara Airport Sea Level Rise Adaptation Plan . D202201087.00

Figure 6

Entire Airport Flooded Threshold - Asset Exposure





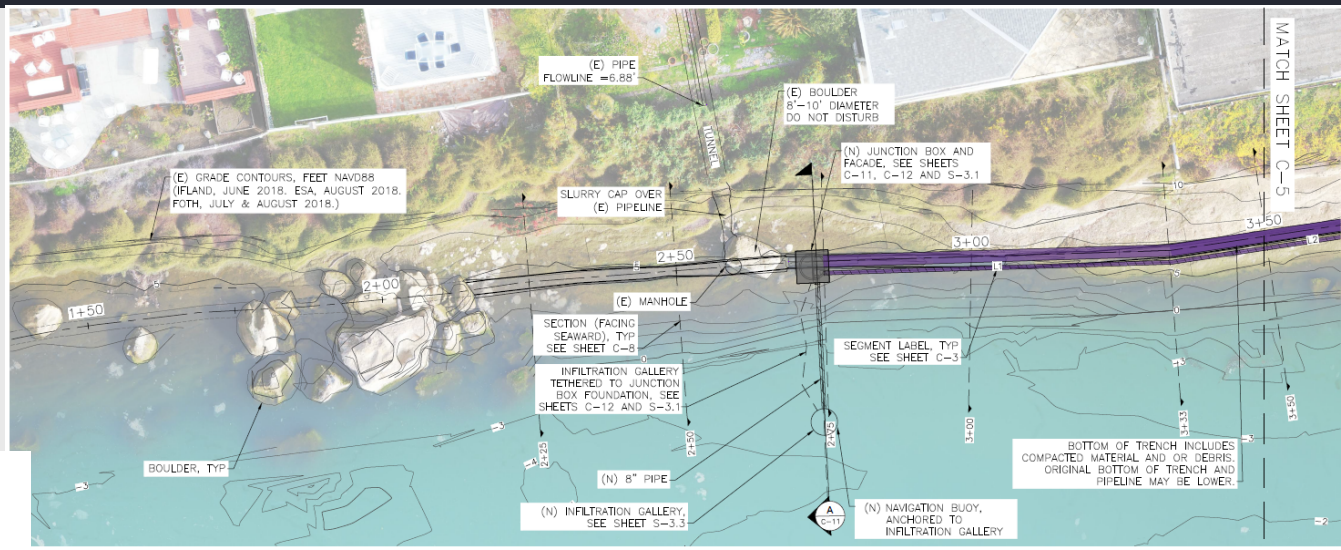
NOTES:

1. ELEVATIONS SHOWN IN NAVD88
2. STEEL PIPE TO BE PAINTED TO MATCH BLUFF COLOR. SEE SPECIFICATIONS FOR DETAILS

LEGEND:

- 24" STEEL PIPE
- 8" STEEL PIPE
- VALVES, CLEANOUT AND PIP
- (E) GRADE, SURVEYED BY IFLAND (2018) AND ESA (2018), SEE NOTE 6
- (E) GRADE, SURVEYED BY ESA (2020)
- (E) GRADE, EAST (BLUFF SIDE) TOP OF TRENCH (2018,2020)
- (E) GRADE, WEST (WATER SIDE) TOP OF TRENCH (2018,2020)

*IN 2018, AN ELEVATED SAND BERM (12+' NAVD88) COMPLETELY COVERED THE EXISTING TRENCH AFTER STA 6+50.

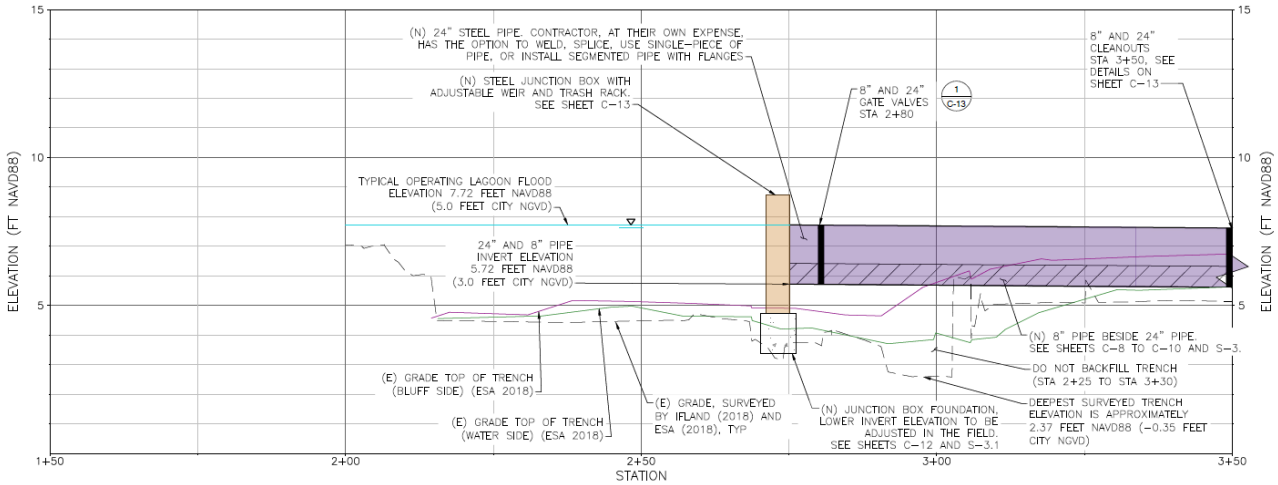


1"=10' Scale 10 5 0 10 20 Feet

(E) CULVERT STA 0+00 TO STA 3+50
PLAN VIEW
SCALE: 1"=10'

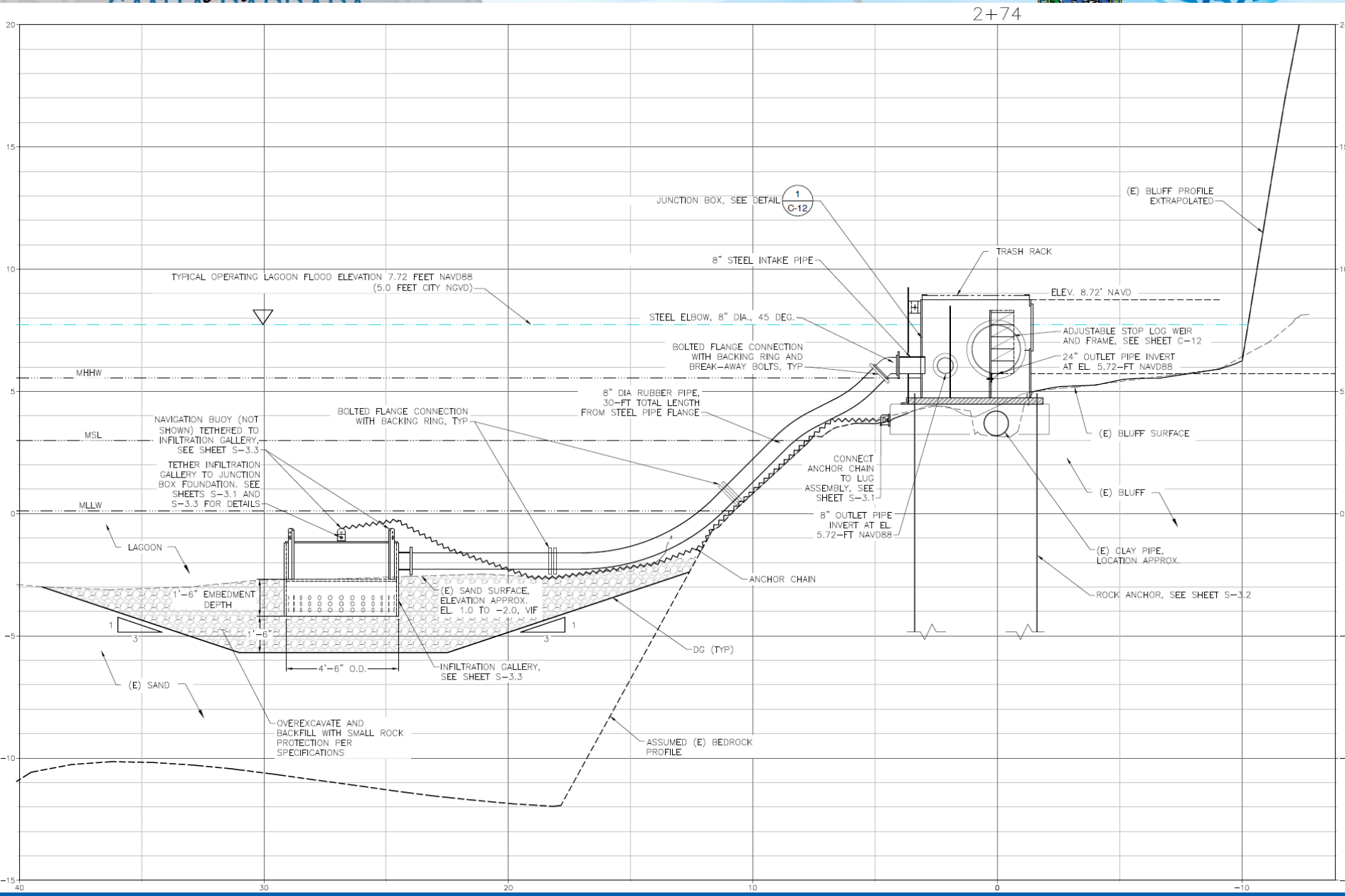
LEGEND:

- 24" STEEL PIPE
- 8" STEEL PIPE
- VALVES, CLEANOUT AND PIPELINE APPURTANCES
- (E) GRADE, SURVEYED BY IFLAND (2018) AND ESA (2018), SEE NOTE 6
- (E) GRADE, SURVEYED BY ESA (2020)
- (E) GRADE, EAST (BLUFF SIDE) TOP OF TRENCH (2018,2020)
- (E) GRADE, WEST (WATER SIDE) TOP OF TRENCH (2018,2020)



VERIFY SCALE 0 1"

(E) CULVERT STA 0+00 TO STA 3+50
PROFILE VIEW
HORZ: 1"=10' VERT: 1" = 2'


2+74
JUNCTION BOX, SEE DETAIL 1/C-12
(E) BLUFF PROFILE EXTRAPOLATED
8" STEEL INTAKE PIPE
TRASH RACK
TYPICAL OPERATING LAGOON FLOOD ELEVATION 7.72 FEET NAVD88 (5.0 FEET CITY NGVD)
ELEV. 8.72' NAVD
STEEL ELBOW, 8" DIA., 45 DEG.
ADJUSTABLE STOP LOG WEIR AND FRAME, SEE SHEET C-12
BOLTED FLANGE CONNECTION WITH BACKING RING AND BREAK-AWAY BOLTS, TYP
24" OUTLET PIPE INVERT AT EL. 5.72-FT NAVD88
MHHW
8" DIA RUBBER PIPE, 30-FT TOTAL LENGTH FROM STEEL PIPE FLANGE
BOLTED FLANGE CONNECTION WITH BACKING RING, TYP
NAVIGATION BUOY (NOT SHOWN) TETHERED TO INFILTRATION GALLERY, SEE SHEET S-3.3
MSL
TETHER INFILTRATION GALLERY TO JUNCTION BOX FOUNDATION, SEE SHEETS S-3.1 AND S-3.3 FOR DETAILS
CONNECT ANCHOR CHAIN TO LUG ASSEMBLY, SEE SHEET S-3.1
(E) BLUFF SURFACE
MLLW
(E) BLUFF
8" OUTLET PIPE INVERT AT EL. 5.72-FT NAVD88
LAGOON
(E) CLAY PIPE, LOCATION APPROX.
ANCHOR CHAIN
1'-6" EMBEDMENT DEPTH
(E) SAND SURFACE, ELEVATION APPROX. EL. 1.0 TO -2.0, VIF
ROCK ANCHOR, SEE SHEET S-3.2
1'-6"
4'-6" O.D.
DG (TYP)
INFILTRATION GALLERY, SEE SHEET S-3.3
(E) SAND
OVEREXCAVATE AND BACKFILL WITH SMALL ROCK PROTECTION PER SPECIFICATIONS
ASSUMED (E) BEDROCK PROFILE
ELEVATION (FT NAVD88)

Tidal Restoration & Flood Storage – AREAS A & B: Restore Tidal Wetland Habitat

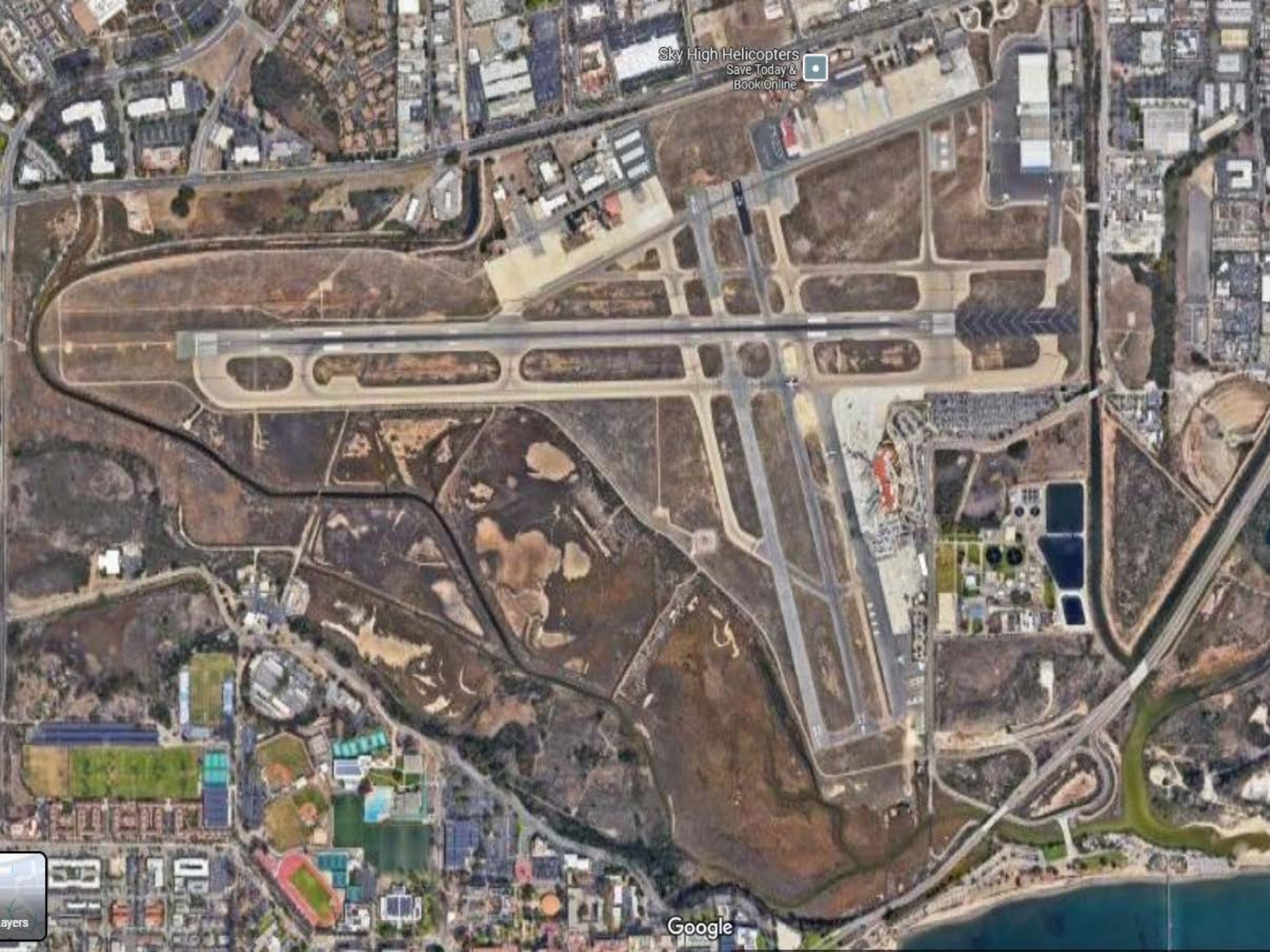
- Restore upland areas to expand floodplain or for mitigation

Tidal Restoration & Flood Storage – AREAS P, Q, & O (CDFG W): Open Tide Gate

- CDFW l&, open tide gate to increase tidal connectivity

Tidal Restoration & Flood Storage - AREAS L & M: Restore Tidal Connection

- Remove levees to restore tidal connection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