Regional Transportation Infrastructure
Sea Level Rise Assessment and Adaptation Guidance

PRESENTED BY SARAH PIERCE
Shoreline Preservation Working Group

DECEMBER 5, 2019
Overview

01 Project Team, Goals, and Key Definitions
02 Vulnerability Assessment
03 Best Practices
04 Adaptation Pathways
05 Conclusions and Next Steps
06 Stakeholder Comments and Working Group Recommendation
Project Team, Goals, and Key Definitions
Project Team

- SANDAG (Sarah Pierce, Katie Hentrich)
- Dudek (Zoë Carlson, Sarah Richmond, Kaitlin Carney)
- Moffatt & Nichol (Chris Webb, Conor Ofsthun)
- Caltrans
- Shoreline Preservation Working Group
- Local jurisdictions and agencies
Project Goals

- Assess vulnerabilities and risk to regional facilities (e.g. highways, bikeways, trails, light and heavy rail)
- Document sea-level rise (SLR) best practices/lessons learned
- Adaptation “toolkit” – local and regional measures to mitigate sea-level rise impacts (policies, projects, and funding sources)
Regional Transportation Infrastructure

- Any transportation asset that crosses jurisdictional boundaries including highways, bikeways, and trails (ATPs), light and heavy rail.
02 Vulnerability Assessment
02 | Vulnerability Assessment

Local SLR Planning

CoSMoS

VAST
Table 2-2. Selected Sea Level Rise and Storm Scenarios

<table>
<thead>
<tr>
<th>Sea Level Rise Scenario</th>
<th>Storm Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 feet (0.75 meters)</td>
<td>No Storm: 2.5-foot sea level rise + no storm</td>
</tr>
<tr>
<td></td>
<td>100-Year Storm: 2.5-foot sea level rise + 100-year storm</td>
</tr>
<tr>
<td>6.6 feet (2.0 meters)</td>
<td>No Storm: 6.6-foot sea level rise + no storm</td>
</tr>
<tr>
<td></td>
<td>100-Year Storm: 6.6-foot sea level rise + 100-year storm</td>
</tr>
</tbody>
</table>
## Vulnerability Assessment

### Orange Line Trolley @ Downtown

<table>
<thead>
<tr>
<th>SLR Level</th>
<th>Hazard</th>
<th>Population</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>No hazard</td>
<td>0</td>
<td>No impact.</td>
</tr>
<tr>
<td>6.6</td>
<td>Flooding and inundation</td>
<td>1,400</td>
<td>Daily wetting and drying will likely permanently close Orange Line access in the area of the MTS Trolley Plaza downtown.</td>
</tr>
</tbody>
</table>

### Blue Line Trolley @ Downtown

<table>
<thead>
<tr>
<th>SLR Level</th>
<th>Hazard</th>
<th>Population</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>No hazard</td>
<td>0</td>
<td>No impact.</td>
</tr>
<tr>
<td>6.6</td>
<td>Flooding and inundation</td>
<td>2,430</td>
<td>Daily wetting and drying will likely permanently close Blue Line access in the area of the MTS Trolley Plaza downtown, eliminating trolley access to Tijuana.</td>
</tr>
</tbody>
</table>

### Blue Line Trolley @ North National City

<table>
<thead>
<tr>
<th>SLR Level</th>
<th>Hazard</th>
<th>Population</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>Flooding</td>
<td>3,330</td>
<td>Vulnerable at North National City to 100-year storm conditions, temporarily disrupting access from Tijuana to Downtown San Diego.</td>
</tr>
<tr>
<td>6.6</td>
<td>Flooding and inundation</td>
<td>13,760 (approx. 2.6 mi)</td>
<td>Daily wetting and drying will likely permanently close the Blue Line south of downtown San Diego, eliminating trolley access to Tijuana.</td>
</tr>
</tbody>
</table>
Vulnerability Assessment

Local SLR Planning

CoSMoS

VAST

Exposure

Damage

Sensitivity

Vulnerability

Adaptive Capacity
Vulnerability Assessment

Local SLR Planning

CoSMoS

VAST

PHASE 1
Analyses of SPWG Selected Assets

Roadways
- Carlsbad Boulevard at Las Encinas Creek
- SR-75 at the Silver Strand

Transit
- Railroad at Del Mar Bluffs
- Green Line Trolley

Bikeways and Trails
- San Luis Rey Bike Trail
- Bayshore Bikeway

PHASE 2
Analyses of Regional Roadways (coast Hwy 101 and SR-75)

Coast Hwy 101
- San Luis Rey River
- Loma Alta Creek
- Buena Vista Lagoon
- Agua Hedionda Lagoon
- Las Encinas Creek
- Batiquitos Lagoon
- San Elijo Lagoon
- Camino Del Mar
- Torrey Pines

SR-75
- Glorietta Bay
- Fiddler’s Cove
- Coronado Cays
02 | Vulnerability Assessment

**Local SLR Planning**

- Most effective comparing within a specific category
- VAST indicators not appropriate across asset categories
- Stakeholder feedback important to gauge value
- VAST is transparent and user friendly
- Uniquely suited for transportation
Adaption Planning
Best Practices
Adaptation Planning Best Practices

Interviews

- Nine interviews
- Best practices identified in two or more interviews

Regional sea level rise adaptation guidance for transportation infrastructure
Best Practices Interview

Over the next two years, SANDAG, with the support of Chubeck and Muffatt & Tech, will develop a guidance document that examines potential sea level rise impacts to regional transportation infrastructure and presents a suite of adaptation measures to address these impacts, including policies, funding mechanisms, and projects. Because a number of local jurisdictions are already conducting sea level rise vulnerability assessments and preparing local Coastal Program Amendments to include adaptation policies, a critical component of this SANDAG project is to build on local efforts.

The goal of this interview is to learn from [local jurisdiction] and document lessons learned from sea level rise planning. We will synthesize your responses to the questions below along with those from the other nine coastal jurisdictions in San Diego County, and include best practices for local jurisdictions to consider when conducting vulnerability assessments or updating local policies in the guidance document. Given that sea level rise can present unprecedented challenges along urbanized shorelines like San Diego County, these best practices aim to minimize conflict and facilitate effective and efficient adaptation planning at the regional and local level.

Interview date: [date]
Local jurisdiction: [jurisdiction]
Local contact: [contact]

1. Introduction
- Please describe your jurisdiction’s overall process of sea level rise planning (e.g., scope, schedule, objectives).
  - What was the impetus in initiating the sea level rise planning process (e.g., funding, community demand, other factors)?
  - How did you identify your objectives (e.g., regulatory requirements, stakeholder interests, other factors)?
  - What stage of the sea level rise planning process are you currently in?
- What are your lessons learned from the process so far?
  - What has worked well?
  - What would you have done differently if you were to do it again?

2. Vulnerability assessments
- What was your biggest lesson learned during the vulnerability assessment process?
  - What worked well?
  - What would you have done differently if you were to do it again?
Adaptation Planning Best Practices

- Collaborate
- Conduct outreach
- Conduct vulnerability and risk assessments
- Develop adaptation polices
- Pursue multi-jurisdictional planning efforts
Adaptation Pathways
Adaptation Pathways

Policies

Projects

Funding
Potential Sea-Level Rise Adaptation Strategies

**Policies**

- Policies

**Projects**

- Projects

**Funding**

- Funding

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**Adaptation Pathways**

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**Key (Feet of Sea Level Rise)**

- Inundation: 6.6 ft.
- Flooding: 2.5 ft.
04 Adaptation Pathways

Policies

Projects

Funding

YES on AA
for a clean and healthy SF Bay
05 Conclusions and Next Steps
Conclusions and Next Steps

**Local Jurisdictions**

- Pursue funding for feasibility study for RBSP III
- Consider update to the SPS to account for SLR
- Consider adding biological monitoring to RSMP
- Discuss sand retention pilot with SPWG and jurisdictions
- Implement improvements to I-5 and the LOSSAN corridor

**SANDAG**

**Regional Planning**
Shoreline erosion and cliff retreat

Include additional facilities in VA and/or VAST (i.e. Harbor Drive; Jimmy Durante Blvd.)

Sediment sources discussion and analysis
Timeline and Next Steps

- **December 2019 SPWG Meeting**

- **SPWG scoping meeting**
- **Two public feedback meetings**

- **Timeline**
  - June 2018
  - September 2018
  - January 2019
  - April 2019
  - September 2019
  - January 2020

- **Steps**
  - Policy Review Interviews
  - Vulnerability Assessment
  - Draft Guidance Document
  - Revise Guidance Document
  - Finalize Guidance Document
  - Accept/publish Guidance Document
The Shoreline Preservation Working Group is asked to recommend that the Regional Planning Committee recommend acceptance of the Regional Transportation Infrastructure Sea-Level Rise Assessment and Adaptation Guidance by the SANDAG Board of Directors.