Addressing Sea Level Rise in Olympia, WA

APWA
April 10, 2024

LOTT Clean Water Alliance

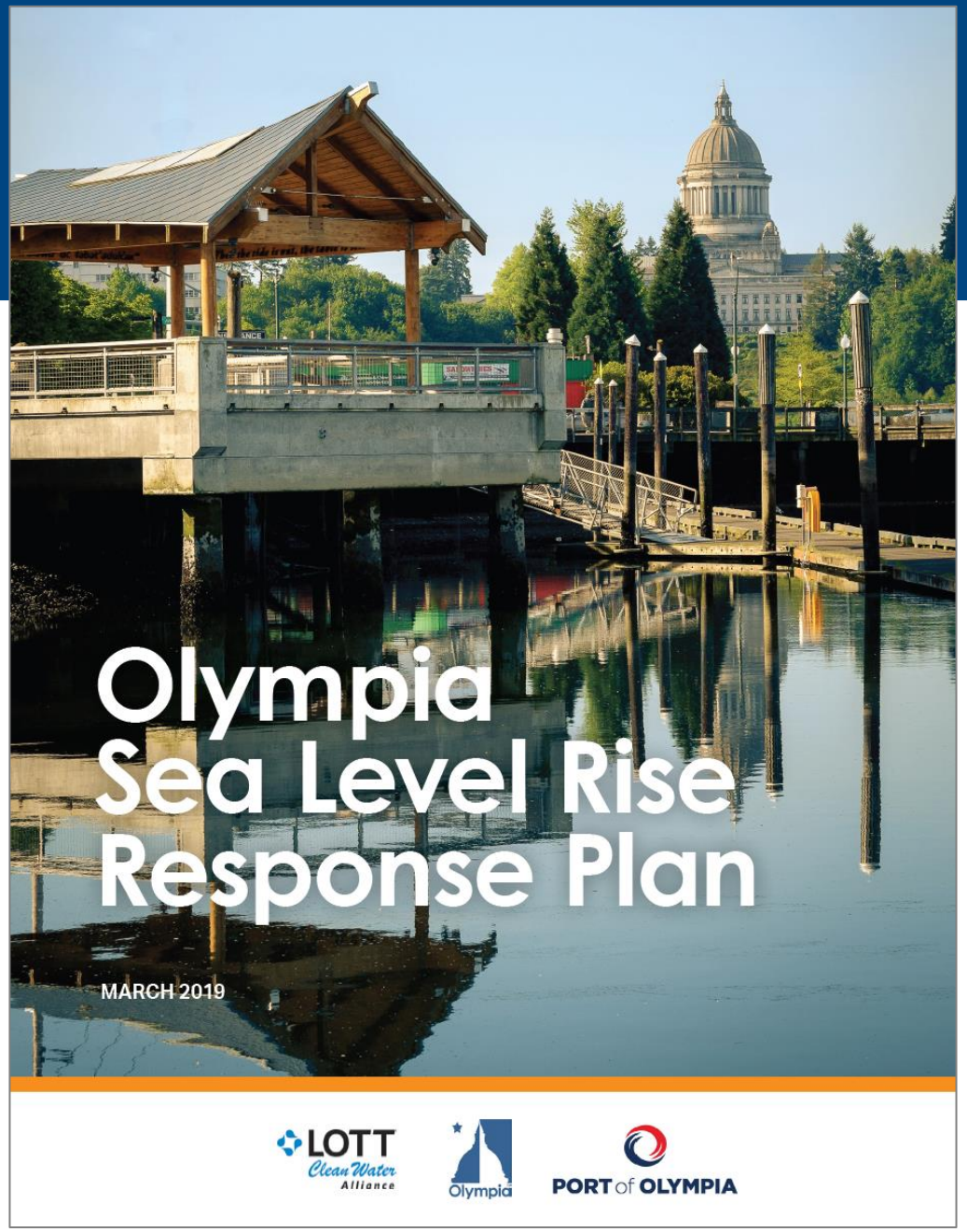
Olympia

PORT of OLYMPIA

We Have A Plan!

The following is available on olympiawa.gov/slr:

- Final SLR Plan
- Story Maps
- Planning Framework
- Climate Science Review
- Vulnerability and Risk Assessment



Learning Objectives

- Objective 1 – Evaluate best practices for interagency sea level rise adaptation planning and implementation.
- Objective 2 – Review sea level rise science, future projections, and drivers of coastal flooding.
- Objective 3 – Evaluate examples of different types of sea level rise response strategies.

Agenda

- General Background & How Olympia Got Started
- Sea Level Rise Science, Projections, & Vulnerability
- Olympia's Strategies for Addressing Sea Level Rise
- Lessons Learned

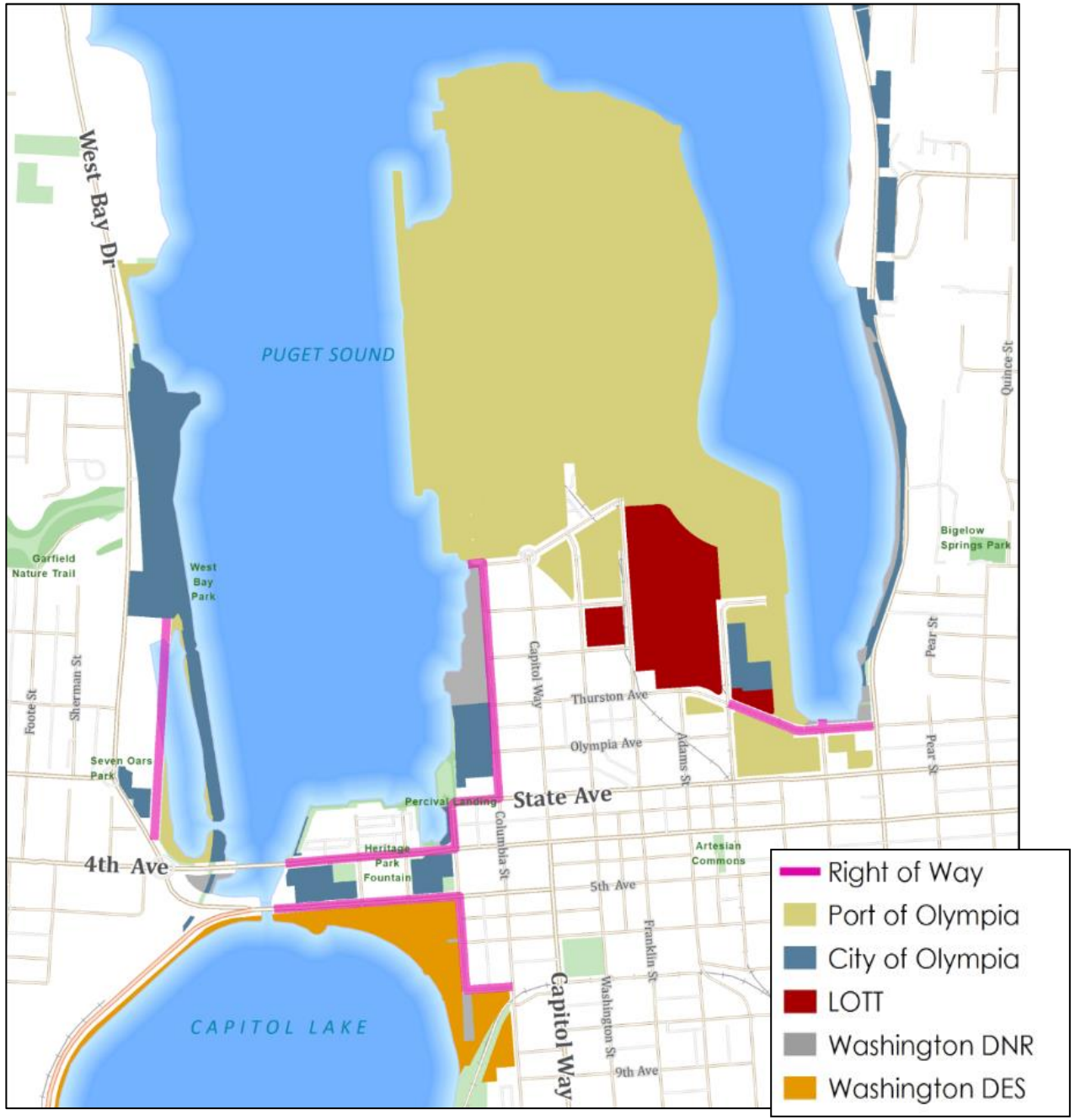
City of Olympia

- Located on the southern terminus of Puget Sound/Budd Inlet

Planning Context

The project area encompasses the downtown peninsula from the eastern shoreline of the 4th Avenue Bridge in West Bay to the intersection of East Bay Drive and Olympia Avenue in East Bay, including Capitol Lake, the Port, and the Budd Inlet Treatment Plant.

Public Ownership Makes us Unique



What Else Makes Us Unique?









Essential Public Infrastructure

Budd Inlet Treatment Plant

- Treats an average of 12 million gallons of wastewater a day
- Represents our communities' largest joint investment
- Valued at over $500 million
- Relocating the plant would cost an estimated $1.2 billion

Essential Public Infrastructure

Port of Olympia

- Owns the southern most deep water Marine Terminal in Puget Sound
- Owns the 7th largest Marina in Washington State
- Is home to the Olympia Farmer's Market and other locally owned businesses
- Boatworks is a recognized sustainable boatyard that hauls and provides services to over 500 boats a year

Port of Olympia

Who took the lead in Sea Level Rise Work at the City of Olympia?

City of Olympia Storm and Surface Water Utility's mission is to reduce flooding, improve water quality, and protect and enhance aquatic habitat in Olympia.

- Responsible for pre-Sea Level Rise Response Plan work
- Funded Sea Level Rise Response Plan for Olympia
- Started the response plan conversations with the Port and LOTT
- Served as project manager for the response plan
- *Now the responsibility of Olympia's Climate Program

Washington State Growth Management Act

Washington State law that requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive plans and implementing them through capital investments and development regulations. **This approach to growth management is unique among states.**

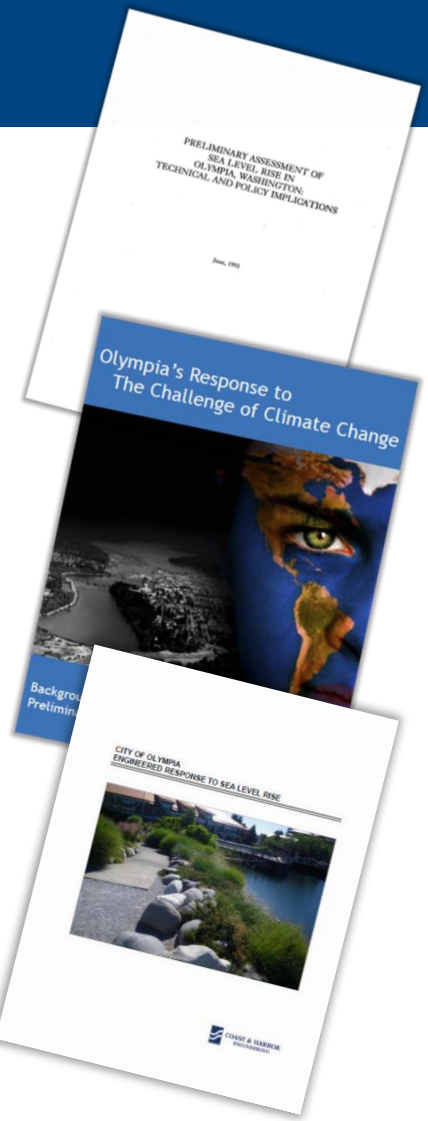
Source: Wikipedia

Beginning in 2024 jurisdictions now required to include a Climate Chapter in Comprehensive Plan updates:

- **Olympia's early approach to sea level rise unique among jurisdictions**?

Work Completed Prior to Sea Level Rise Plan

- Assessment of Sea Level Rise in Olympia (1993)
- Olympia's Response to the Challenge of Climate Change (2007)
- Engineered Response to Sea Level Rise (2010)
- Surveyed elevations of key shoreline areas (2015-2016)
- Established minimum floor elevations for new Downtown development (2016)
- Consolidated storm drainage system on Corky Avenue (2016)
- Disconnected flood-prone area of 7th Avenue from Capitol Lake storm drainage system (2017)
- Developed emergency response plans (2015-2017)
- Maintained and installed tide gates (2017)



Policy & Planning Goals

2010 Sea Level Rise Policy

- The City is committed to protecting Downtown from the impacts of SLR
- The City will seek to understand the implications of potential 100-year sea rise of 50 inches
- Incorporate adaptation and flexibility into both public and private infrastructure projects
- Seek opportunities to maintain control of valuable shoreline

2014 Comprehensive Plan Goal

The City uses best available information to implement a sea level rise management plan that will protect Olympia's downtown.

2016 Sea Level Rise Development Code

- Elevate or floodproof 2 feet above 100-year flood

2017 Downtown Strategy

- A vibrant, attractive regional destination
- Full of distinctive pedestrian-oriented places and spaces
- A mixture of urban housing options
- A home for a variety of businesses
- A place to connect with our culture and historic fabric, and
- **Protected from the effects of sea level rise**

Phased Approach to Response Plan Development

Interlocal Agreement & Project Charter

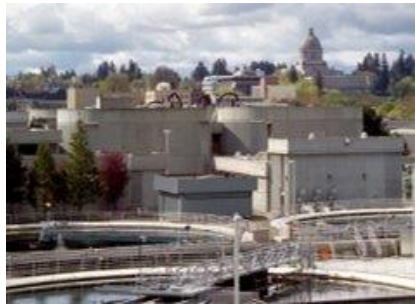
- Funding obligations & participation expectations

Engineering Consultant Contracting

- Phase I – Site walk, kick-off meeting & scope of work finalization
- Phase II - "Response plan development"

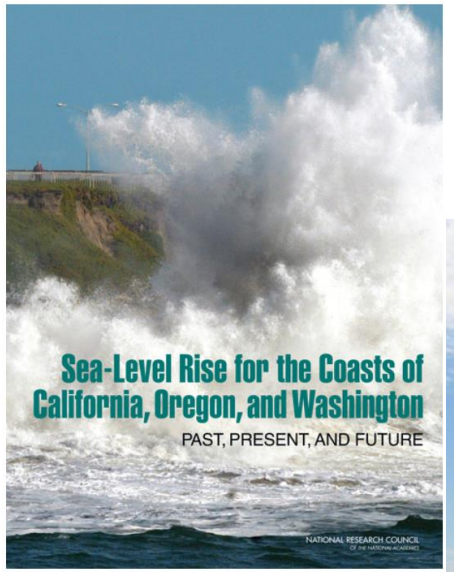
Sea Level Rise Response Plan Development

- Step 1: Planning Framework: Component of the Project Charter

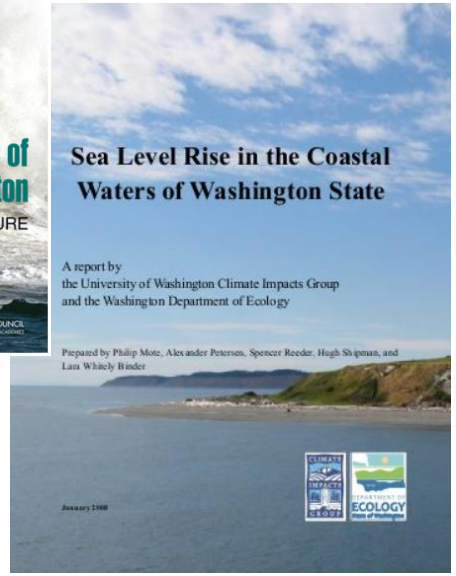


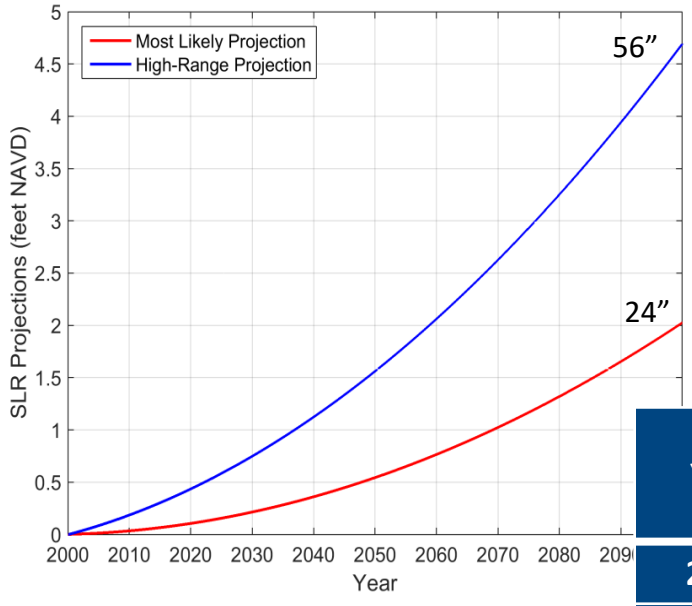
Step 1: SLR Framework

2008



2012





Year	Most Likely (inches)	Upper Range (inches)
2030	3	9
2050	7	19
2100	24	56

Source: NRC (2012) Seattle estimate; assumes 1 mm/yr subsidence for Cascadia region.

Approach

Plan development followed sea level rise adaptation best practices and leveraged experiences and lessons learned from other cities, ports and wastewater treatment facilities throughout the country.

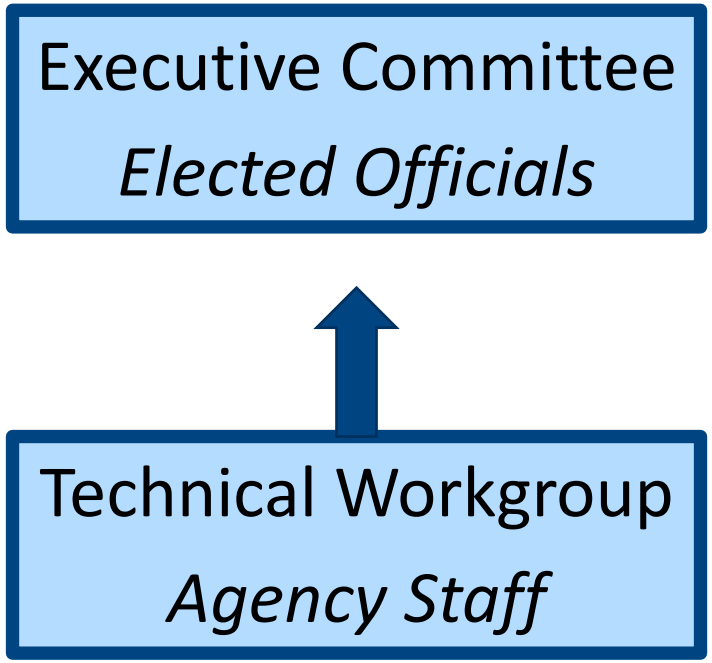
Engagement and Outreach

- Various briefings
  - Community meetings
  - Advisory groups
  - Business associations
- Webpage information
  - E-newsletter
  - Planning documents
  - Science
  - SLR story maps: vulnerability and adaptation
- State agencies
- Local and regional media
- Students and educators
  - Middle/high school, college

WE ALSO HELD 3 ELECTED OFFICIAL JOINT MEETINGS DURING PLAN DEVELOPMENT

Implementation: Governance Structure Formally in Place

OLYMPIA SEA LEVEL RISE COLLABORATIVE



Olympia's Climate Program as Collaborative Lead

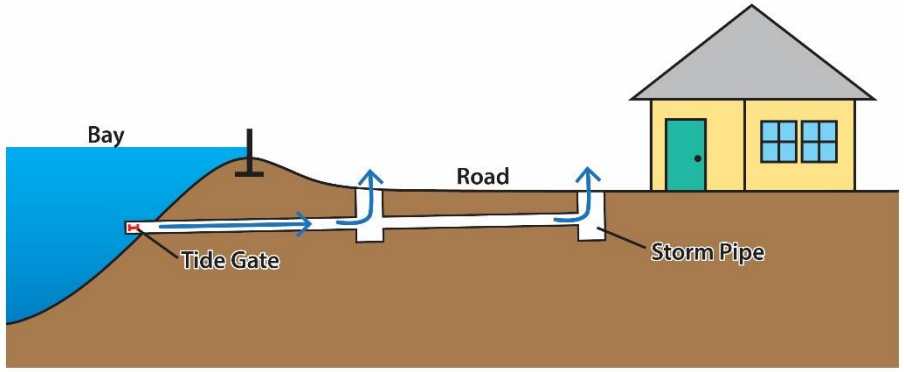
- Port & LOTT leading implementation tasks!
- Olympia's Storm and Surface Water Utility participating & currently funding Olympia's obligations

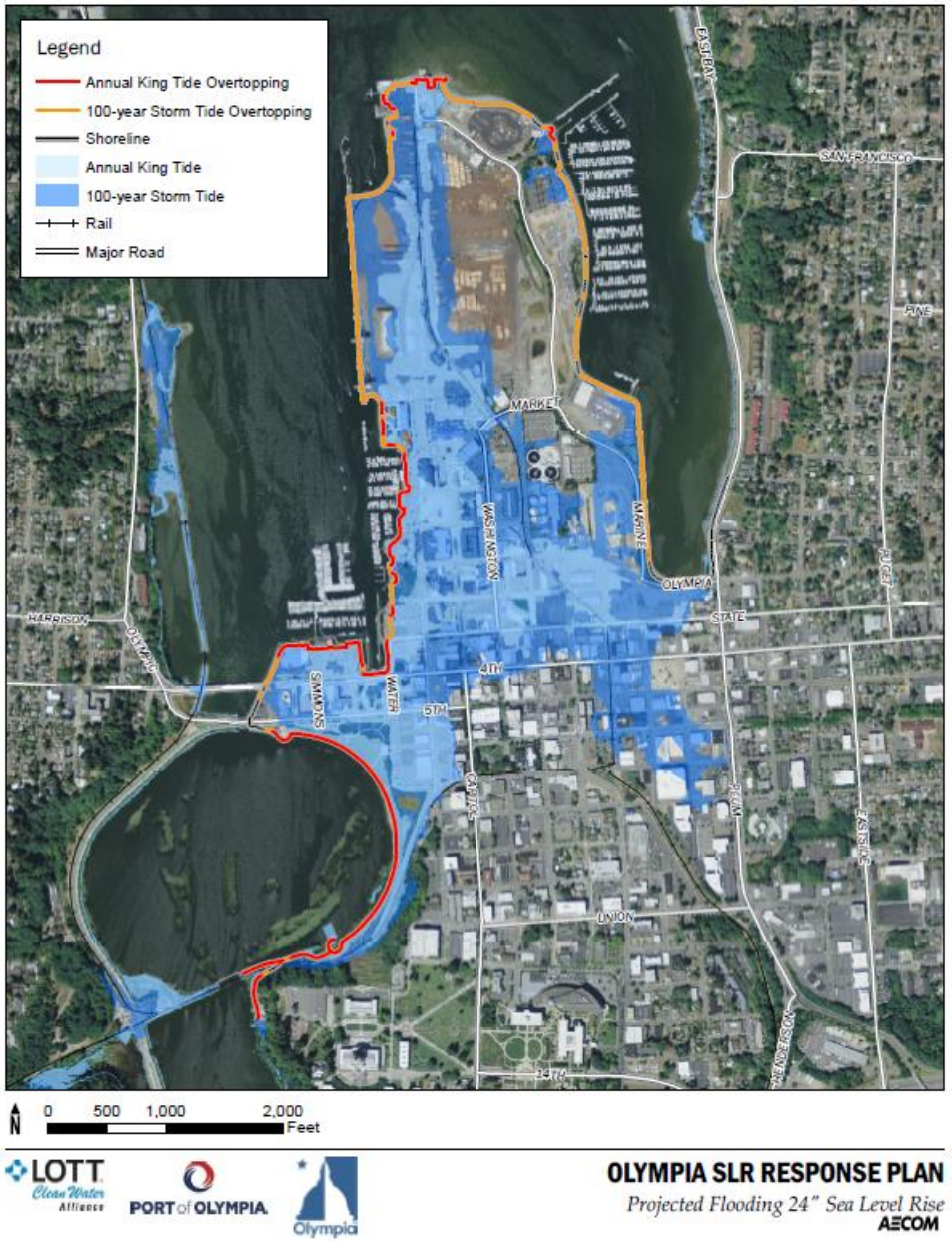
SLR Science and Projections

Chapter 3

Olympia Flooding Dynamics

- High tides
- High river flows
- Backflow through stormwater system





Drivers of Water Levels in Olympia

Tides	Storms	Waves	Precipitation
El Niño-Southern Oscillation	Pacific Decadal Oscillation	Global Sea Level Rise	Land Subsidence

Drivers of Water Levels in Olympia

Tides

Storms

Waves

Precipitation

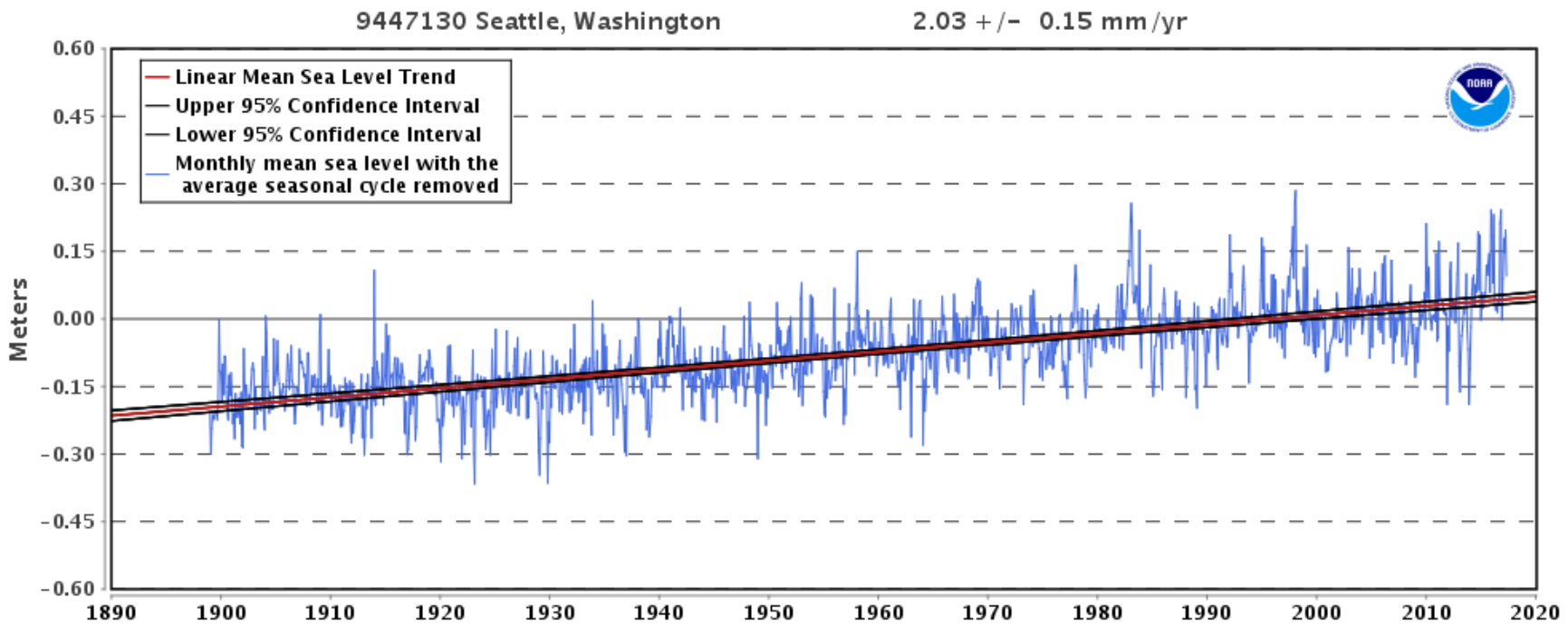
El Niño-Southern Oscillation

Pacific Decadal Oscillation

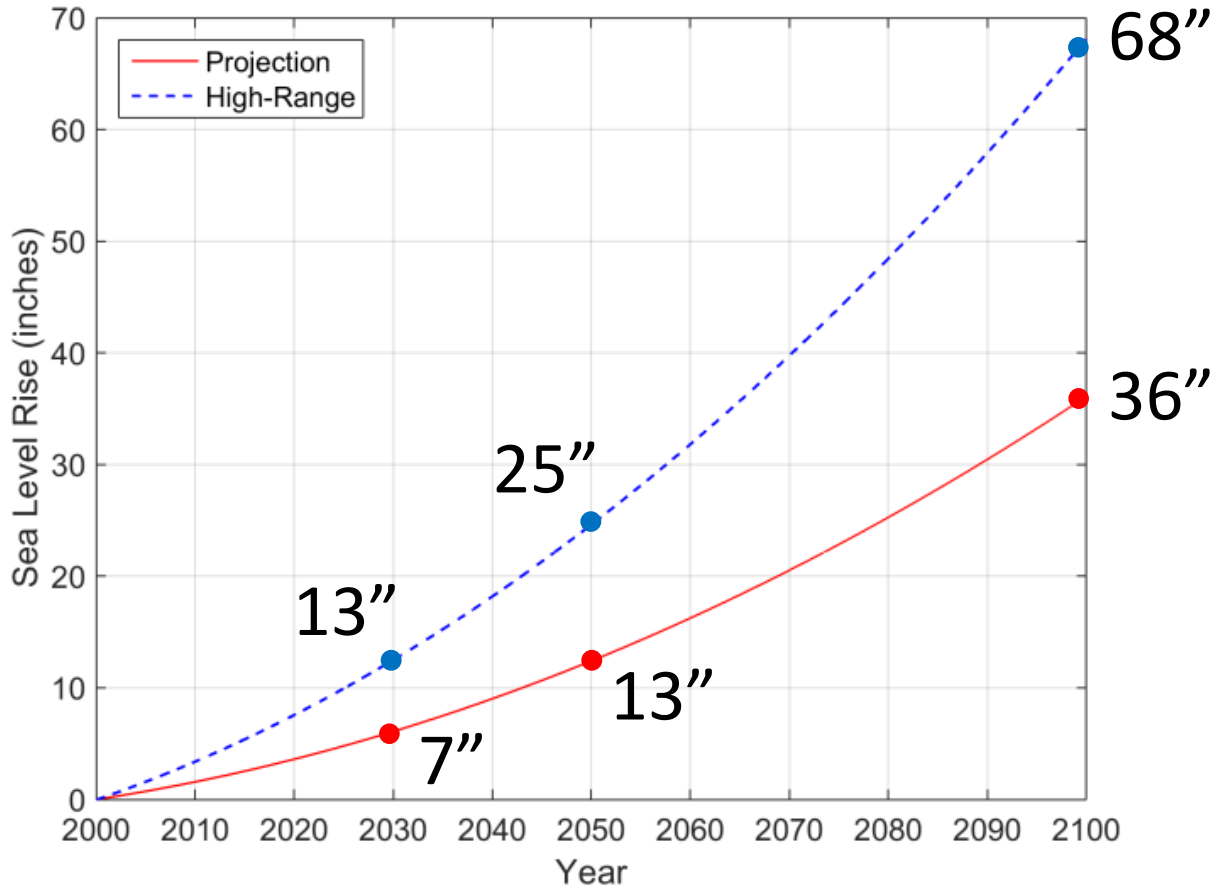
Global Sea Level Rise

Land Subsidence

Seattle Sea Level Rise Trends (Seattle)



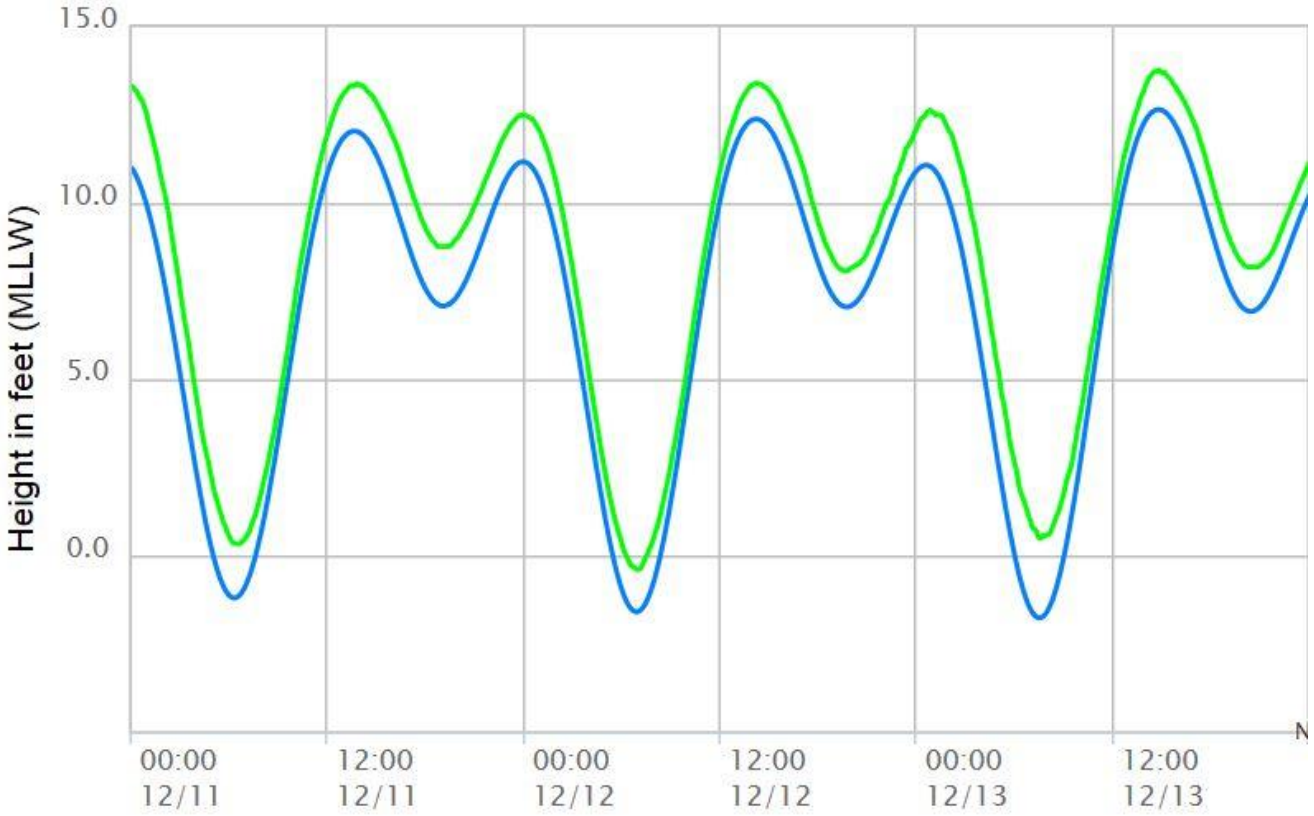
Sea Level Rise Projections for Olympia



Sea Level Rise Projections for Olympia

Year	Most Likely (inches)	High Range (inches)
2020	3	7
2030	**5 – 7**	**11 – 13**
2040	8 – 10	16 – 18
2050	**11 – 13**	**23 – 25**
2060	15 – 17	30 – 32
2070	18 – 20	37 – 39
2080	22 – 25	46 – 49
2090	27 – 31	54 – 58
2100	**32 – 36**	**64 – 68**

An Intermittent Problem



As sea level rises, high tide flooding becomes more frequent and severe.

Weather conditions such as rain, snow, and barometric pressure can exacerbate flooding.

SLR Vulnerability and Risk

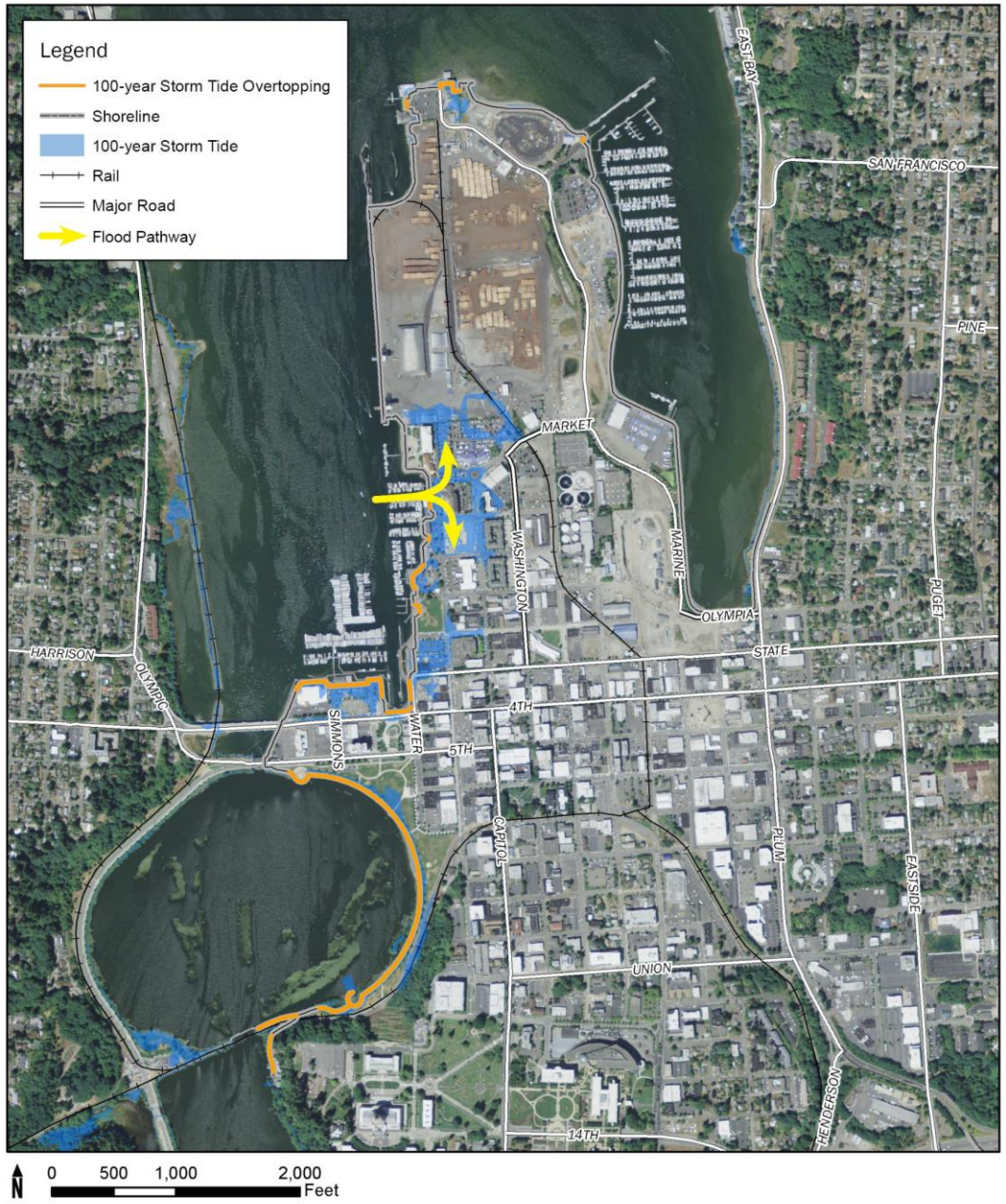
Chapter 4

Water Level and SLR Scenarios

Evaluated the exposure of assets to coastal flooding due to king tides and the 100-year storm tide for 4 sea level rise scenarios:

- **6 inches sea level rise**:
  - most-likely projection at 2030
- **12 inches sea level rise**:
  - most-likely projection at 2050
  - high-range projection at 2030
- **18 inches sea level rise**:
  - most-likely projection at 2060
  - high-range projection at 2040
- **24 inches sea level rise**:
  - most-likely projection at 2080
  - high-range projection at 2050

Projected Flooding
0 inches of SLR



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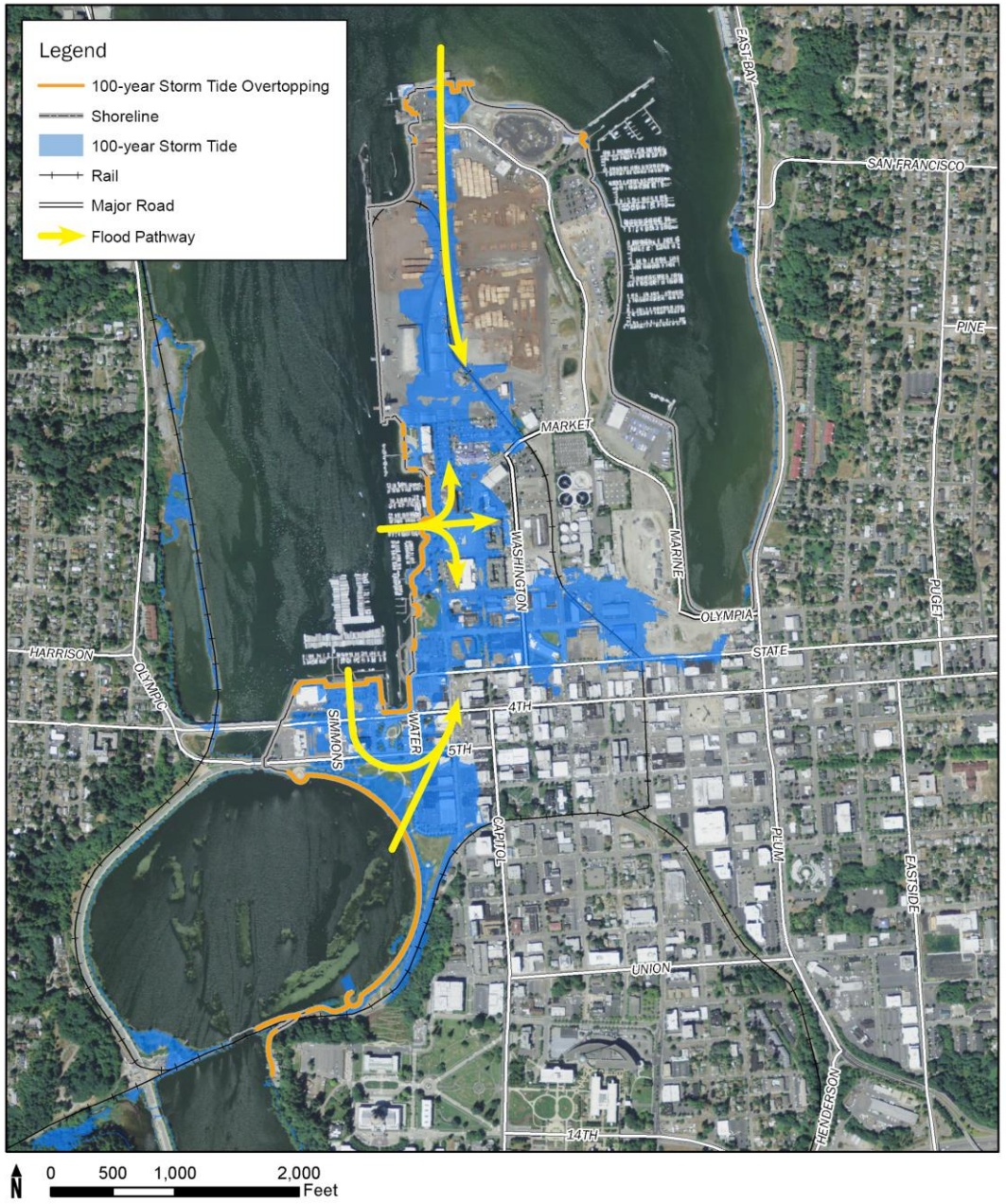
OLYMPIA SLR RESPONSE PLAN

Projected Flooding No Sea Level Rise

AECOM

Projected Flooding
6 inches of SLR

Most-likely 2030 projection



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OLYMPIA SLR RESPONSE PLAN

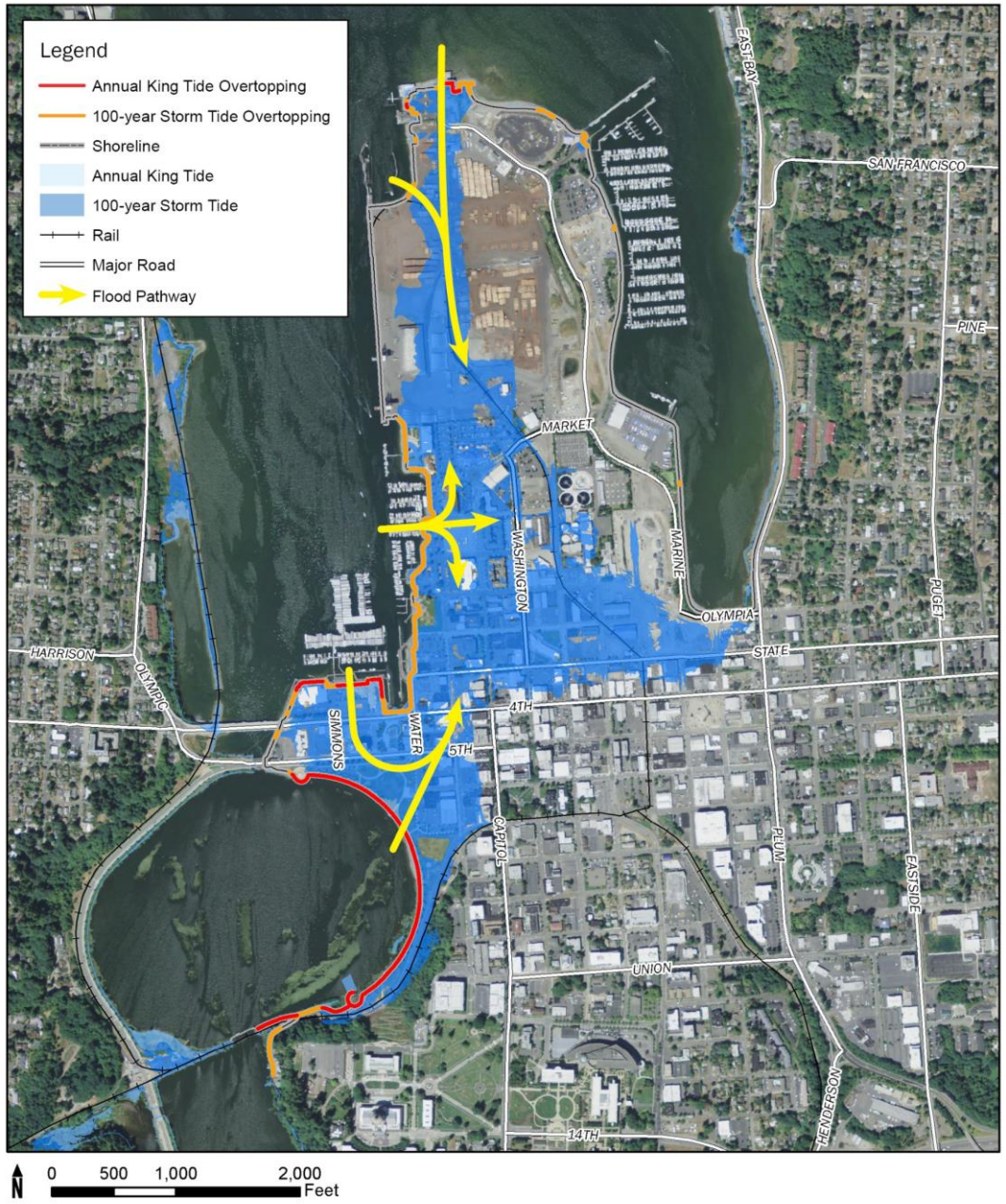
Projected Flooding 6" Sea Level Rise

AECOM

Projected Flooding
12 inches of SLR

Most-likely 2050 projection

High-range 2030 projection



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OLYMPIA SLR RESPONSE PLAN

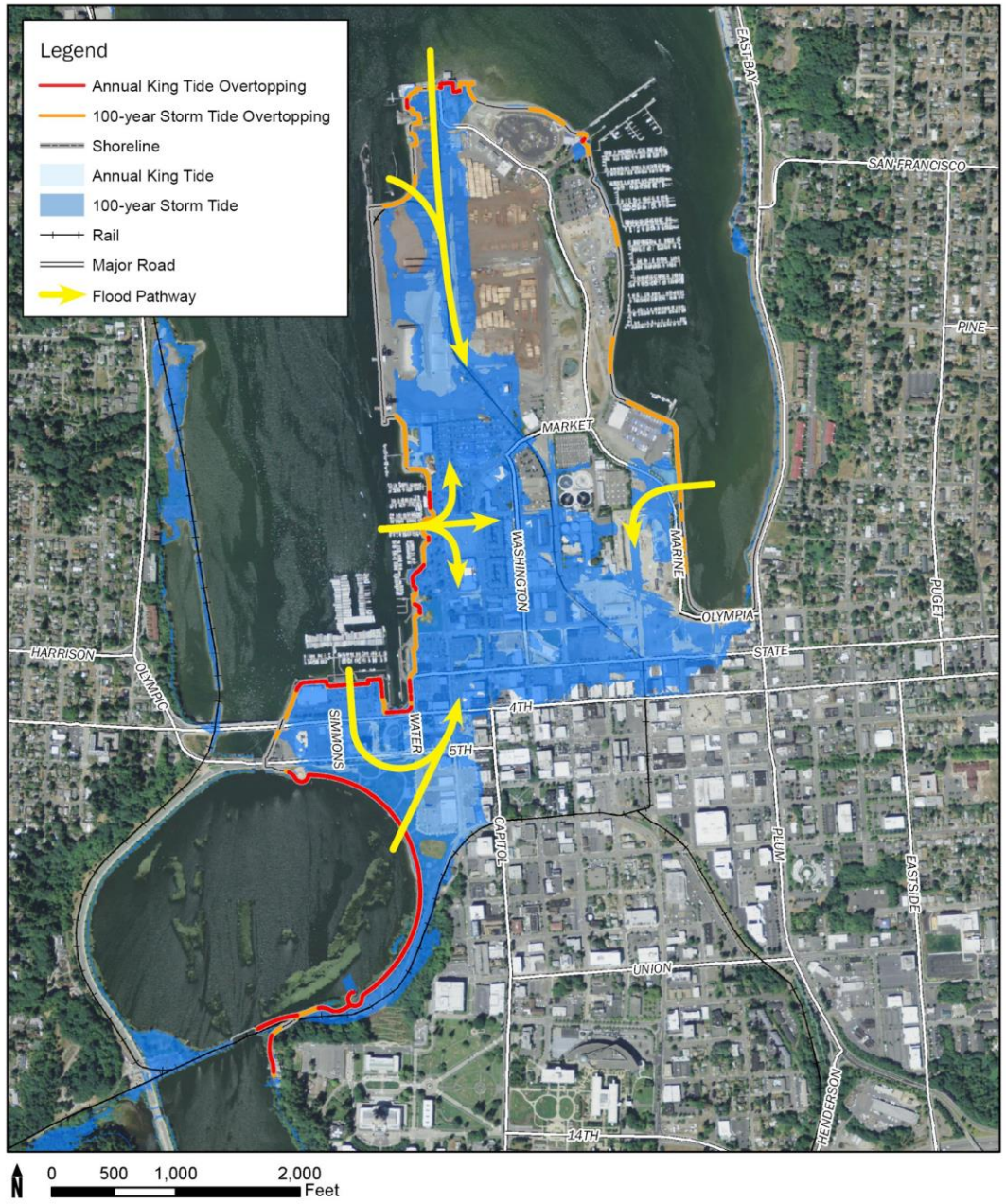
Projected Flooding 12" Sea Level Rise

AECOM

Projected Flooding
18 inches of SLR

Most-likely 2060 projection

High-range 2040 projection



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OLYMPIA SLR RESPONSE PLAN

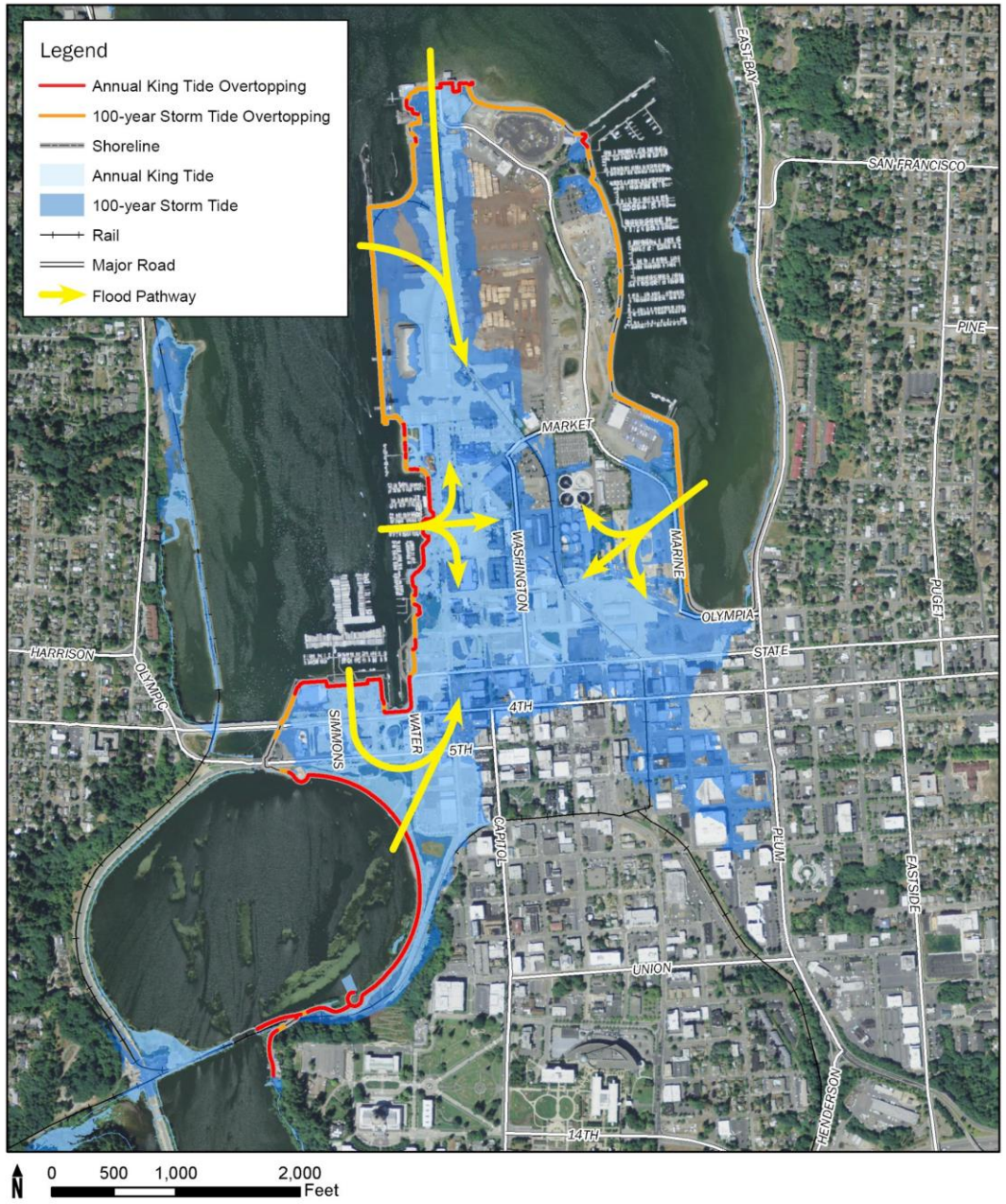
Projected Flooding 18" Sea Level Rise

AECOM

Projected Flooding 24 inches of SLR

Most-likely 2080 projection

High-range 2050 projection



December 27, 2022 Flood Event

Olympia, December 27, 2022

Olympia, December 27, 2022

Olympia, December 27, 2022

Olympia, December 27, 2022

Olympia, December 27, 2022

Olympia, December 27, 2022

Adaptation Approach

Chapter 5

Key Assumptions

- An incremental approach to protecting downtown is appropriate: near-term, mid-term and long-term actions are provided.
- Given the extensive infrastructure and investments made in our downtown, wholesale retreat is not a pragmatic strategy to pursue during the planning horizon.
- Physical adaptation strategies are envisioned for construction on public rather than private property.
- Coordination and collaboration across governmental entities, non-profit organizations, and private property owners will be needed.

Phased Approach

- **Near-term actions:** to be implemented between 2019 and 2024 to address existing flood vulnerabilities and low sea level rise (less than 6 inches)
- **Mid-term actions**: to be implemented between 2025 and 2050 to address flood vulnerabilities through mid-century and moderate sea level rise (up to 24 inches)
- **Long-term actions**: to be implemented beyond 2050 to address flood vulnerabilities through end-of-century (up to 68 inches)

Response Strategies

Chapter 6-7

Governance Strategies

- **Collaboration** - Develop governance structure
- **Policy** – Update planning documents, flood ordinance and development codes
- **Finance** - Investigate and implement long-term public financing mechanisms
- **Education and outreach –** Community and regional strategies

Informational Strategies

- Refine sea level rise and flood monitoring – local tide gage
- Monitor land subsidence
- Initiate groundwater study
- Understand future precipitation projections
- Model flow rates for stormwater outfalls and combined sewer system

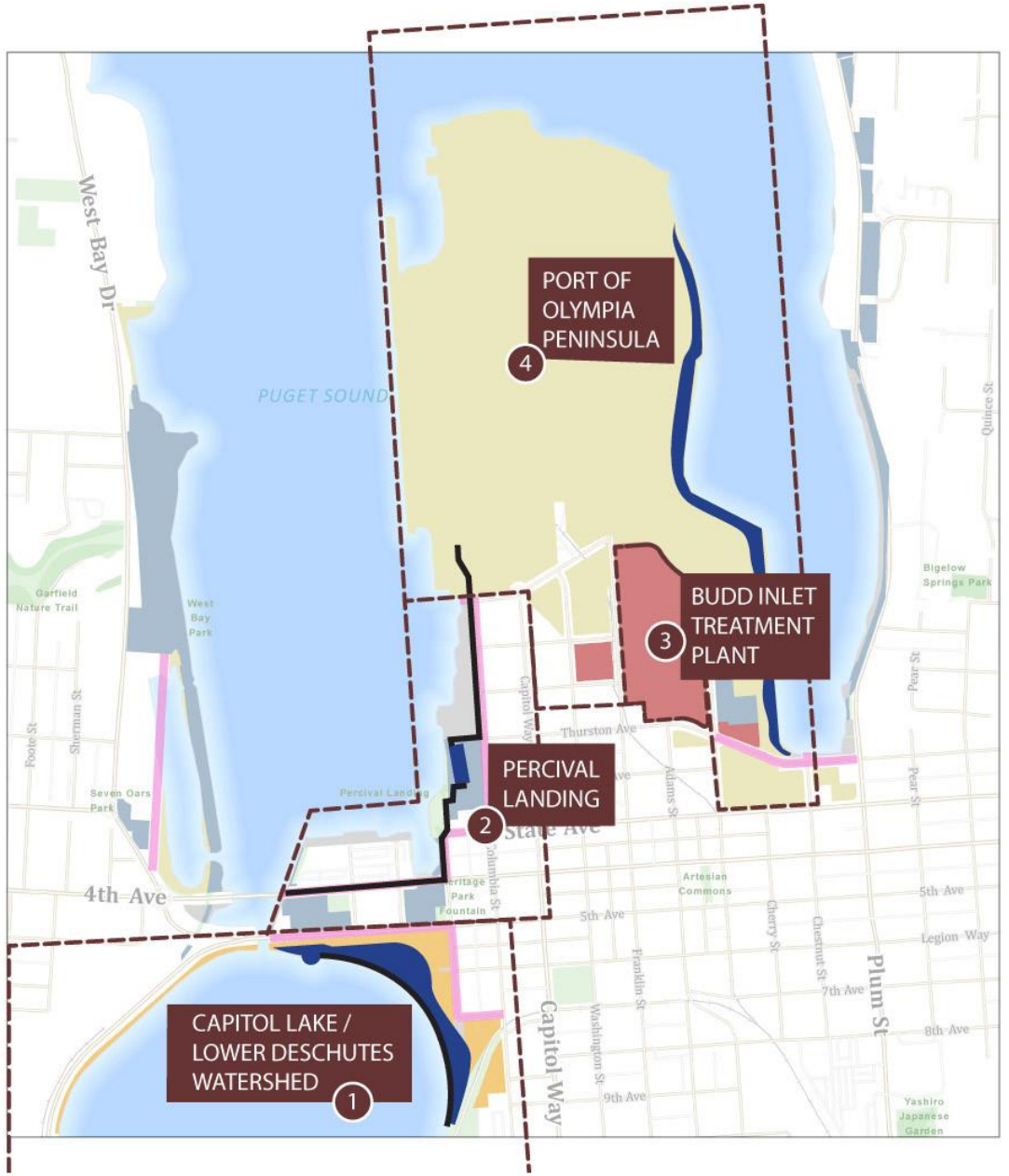
Operational Strategies

- Operations and maintenance
- Coordinated emergency response

Physical Strategies

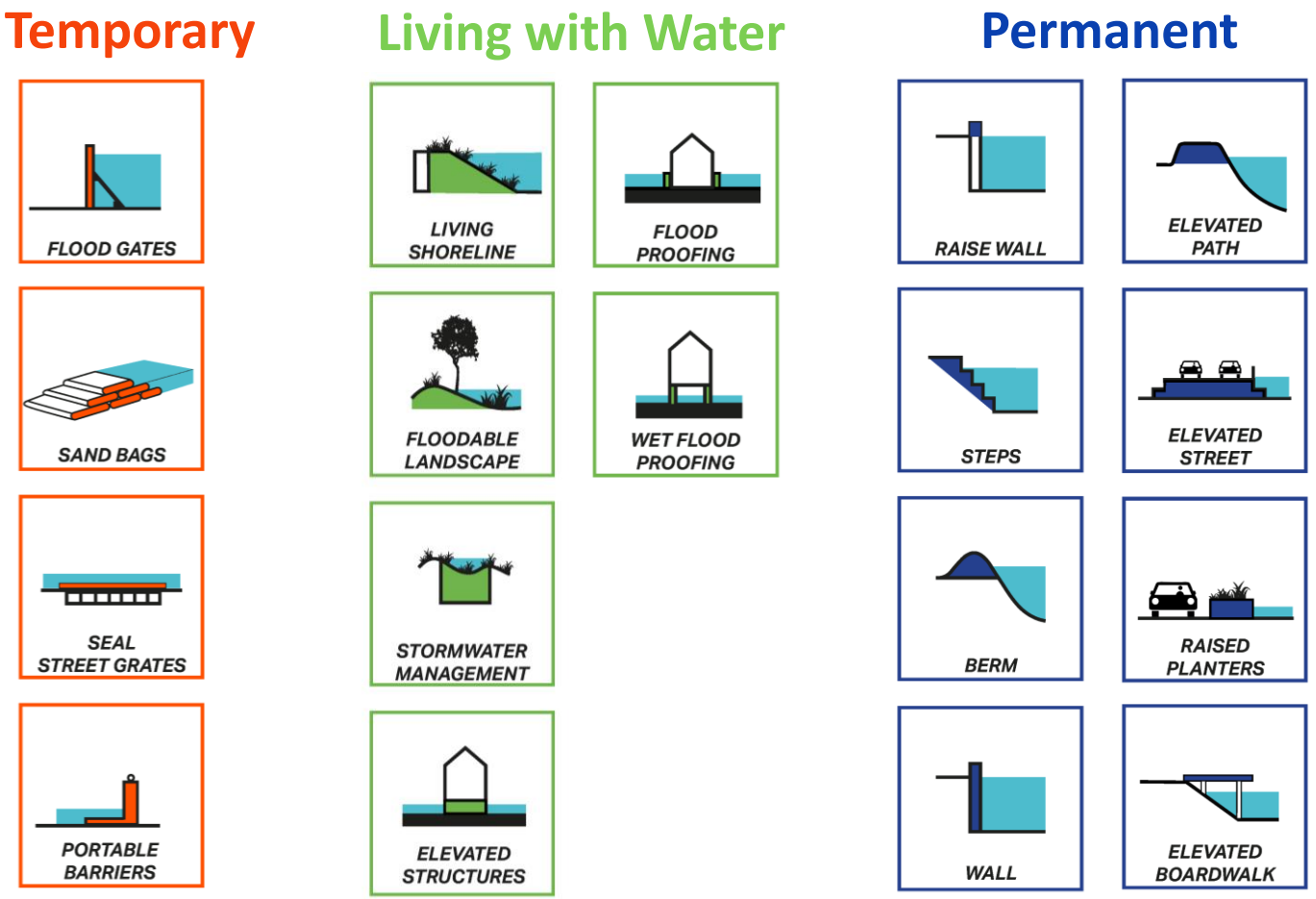
Tailored to focus areas:

- Capitol Lake / Lower Deschutes Watershed
- Percival Landing and Isthmus
- Port of Olympia Peninsula
- Budd Inlet Treatment Plant and Combined Sewer System



Menu of Physical Strategies

- **Temporary Flood Protection**: to address infrequent, short-duration flooding events.
- **Living with Water**: accommodate floodwaters to lessen their impact.
- **Permanent Flood Protection**: protect low-lying inland areas.



Menu of Physical Strategies

Raised Buildings

Living Shorelines

Temporary

Menu of Physical Strategies

Raised Streets

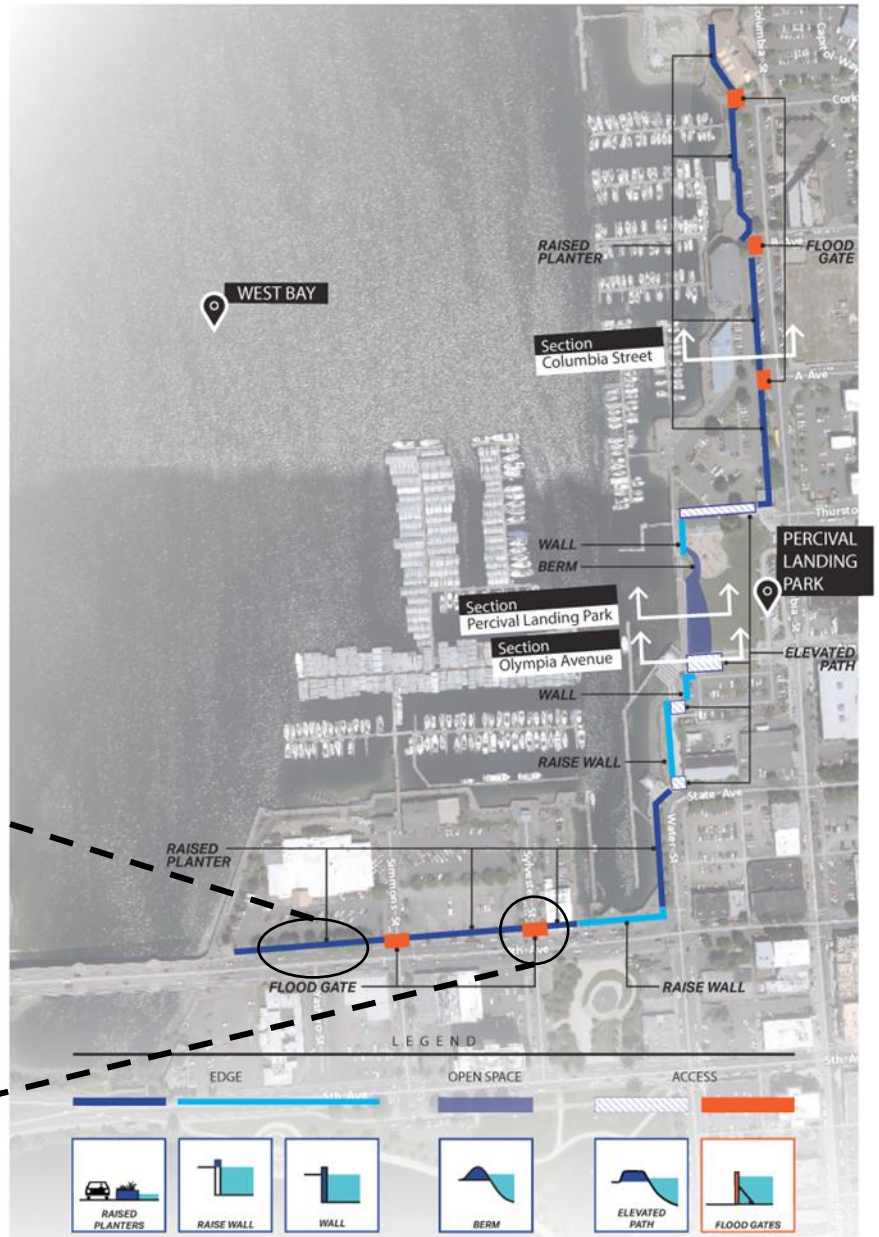
Raised Landscaping

Flood Walls

Percival Landing

Raised Planter

Flood Gate



POTENTIAL STRATEGY PLAN
PERCIVAL LANDING - 24" SLR

POTENTIAL STRATEGY PLAN
PERCIVAL LANDING - 68" SLR

Cost of Adaptation

Table 9: Estimated Costs of Sea Level Rise Adaptation in Olympia

Area / Strategy	Near-Term (0-5 years) Sea Level Rise: up to 6 inches	Mid-Term (5-30 years) Sea Level Rise: up to 24 inches	Long-term (30+ years) Sea Level Rise: up to 68 inches
Capitol Lake / Lower Deschutes Watershed	$0.2M	$3M to $6M	$3M to $118M
Percival Landing and Isthmus	-	$11M to $13.5M	$85M to $105M
Budd Inlet Treatment Plant	-	$1 to $6M	$12.5M to $15M
Port of Olympia Peninsula	$20K	$0.5M to $1M	$8M to $9.5M
Stormwater System	$1M	-	$82.5M to $100.5M
Total	$1.25M	$16M to $26M	$190M to $350M

Lessons Learned

- Build interjurisdictional relationships – take a phased approach
- It takes time to build community support – we started in the 1990's!
- Have a lead agency (but make assignments)
- Consider separate elected officials' joint briefings
- Leverage your comprehensive plan (& new Climate Chapter requirements)
- Get creative with your outreach - lots of visuals
- Find an elected official project champion
- Have a clear vision "why" protecting an area

Thank you!
Questions?

Pamela Braff
pbraff@ci.olympia.wa.us

Susan Clark
sclark@ci.olympia.wa.us

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