



Sea Level Rise Response Planning



Utility Advisory Committee - Update
January 4, 2018



Sea Level Rise Response Planning

Olympia's Unique Situation

Advantages

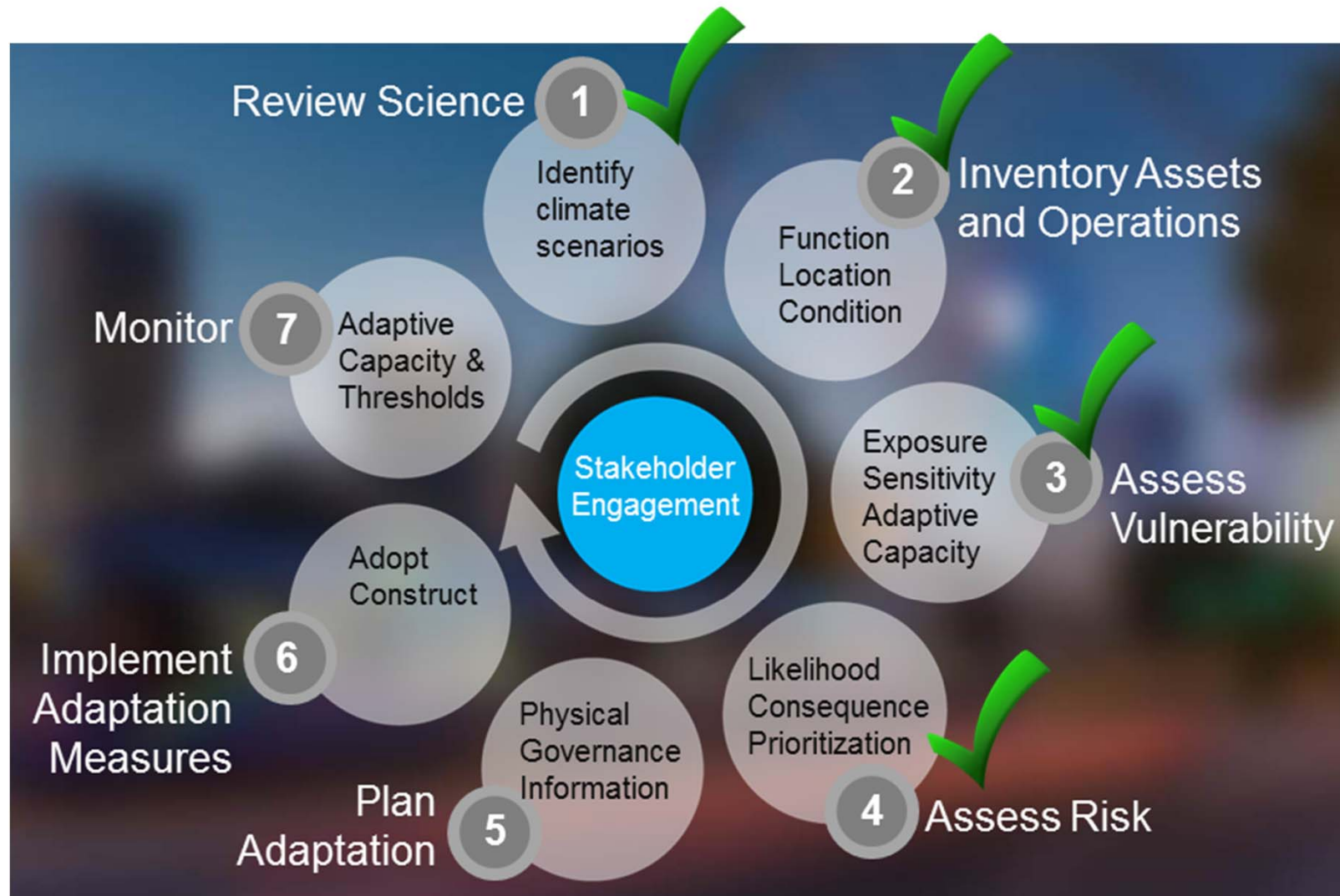
- Minimal storm surge and waves
- Relatively small vulnerable area and short length of shoreline (approx. 3 miles)
- Public ownership of shoreline
- Decades of data accumulation
- Engaged community

Disadvantages

- Extensive, downtown-wide impacts
- Urban environment with development close to shoreline or over water
- Subsidence

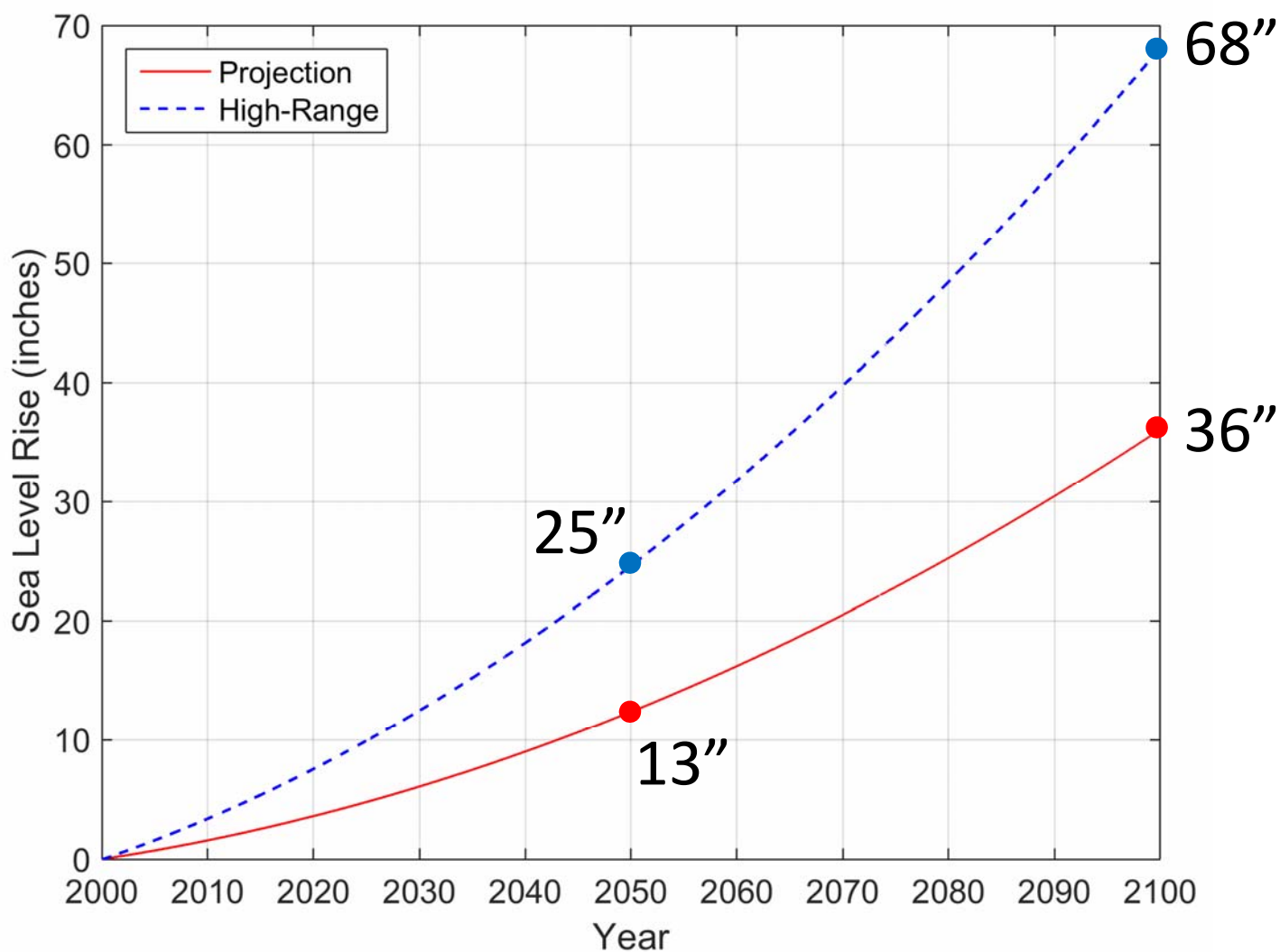
Sea Level Rise Response Planning

Refining An Established Planning Process



Sea Level Rise Response Planning

Sea Rise Science





Sea Level Rise Response Planning

Inventory Assets and Operations

- Economic, social, cultural, environmental features
 - Extensive data collection and review
 - Workshops and surveys
- Identifying critical assets
 - Organized by asset type
 - Over 100 assets identified
 - Both individual and group assets

Key Asset Categories

City Facilities

Emergency Corridors

County/State/Federal

LOTT

Port

Utilities

Social Services

Community Assets



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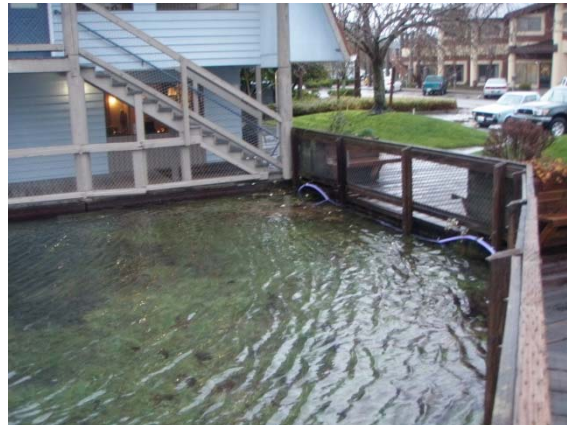
Additional Grouped Assets

Examples	
Parking Lots	Street Lights
City Trees	Historic Buildings
Public Art	Contaminated Sites
Traffic Signal Controls	Reclaimed Water Components
Fire Hydrants	Stormwater Components
Waste Pick-up	Sewer Components

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Next Step: Assessing Vulnerability and Risk

- What assets and services are exposed to flooding? And when?
- How are these assets affected by flooding?
- What are the consequences of flooding?



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What Makes An Asset Vulnerable?

Exposure

- When is an asset exposed to flooding?

Sensitivity

- How is an asset affected by flooding?

Adaptability

- Can an asset be adapted to flooding?



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Different Assets Have Different Vulnerabilities



Shoreline structures

- Some resistant to flood damage; some not



Building and facilities

- Materials damaged by water
- Sensitive electrical and mechanical equipment



Parking lots and roads

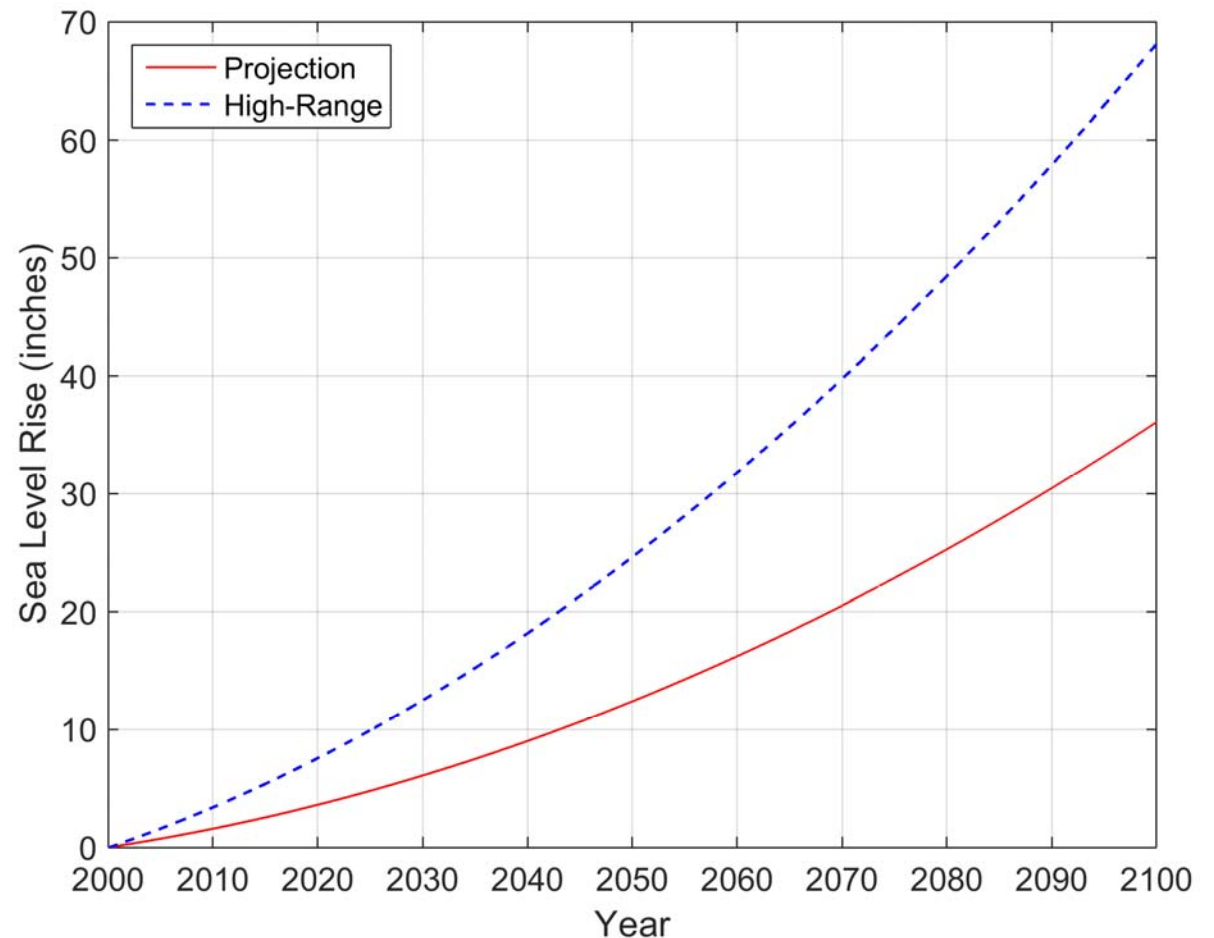
- Resistant to occasional flooding
- But damaged by frequent flooding

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A Progression Of Vulnerability

Sea Rise Scenarios

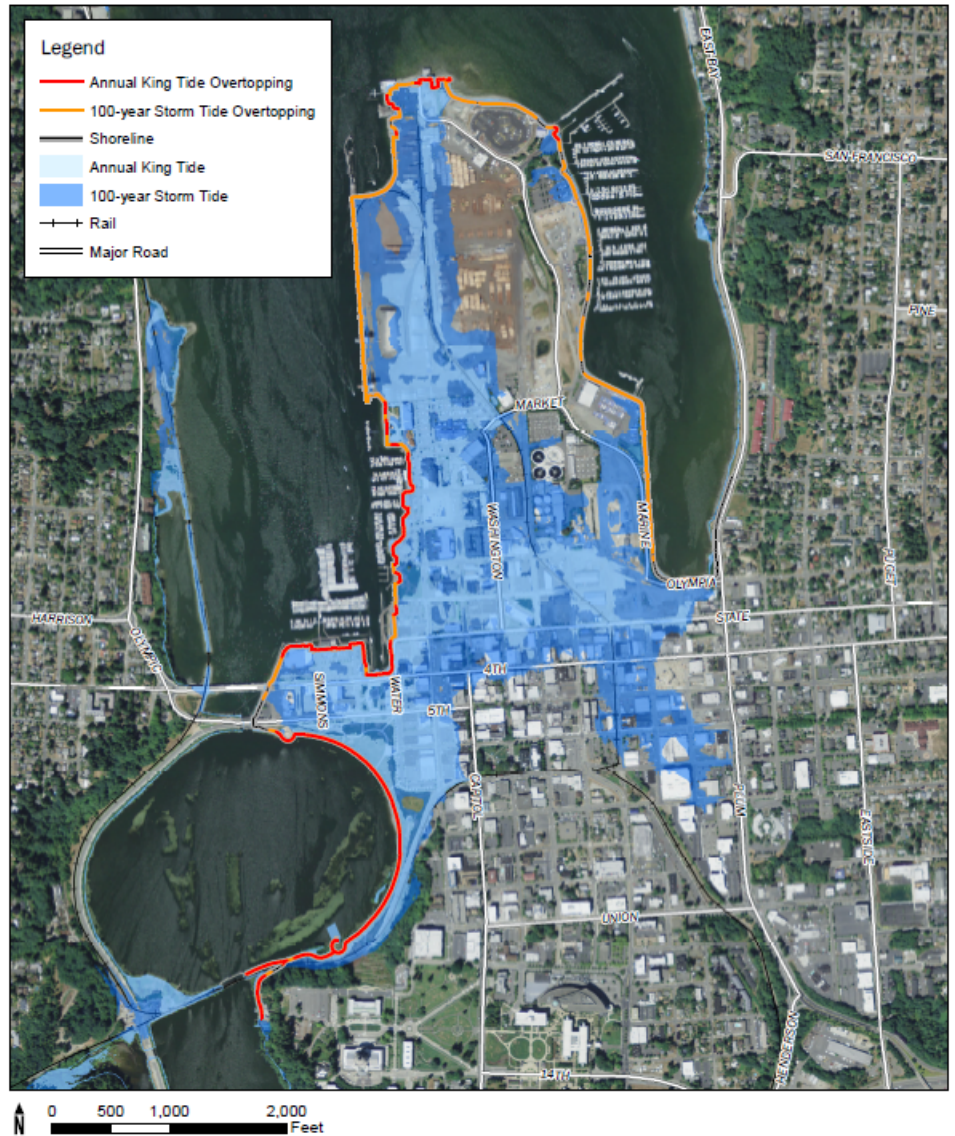
- 0 inches
- 6 inches
- 12 inches
- 18 inches
- 24 inches
- 68 inches



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Evaluating Our Potential To Flood

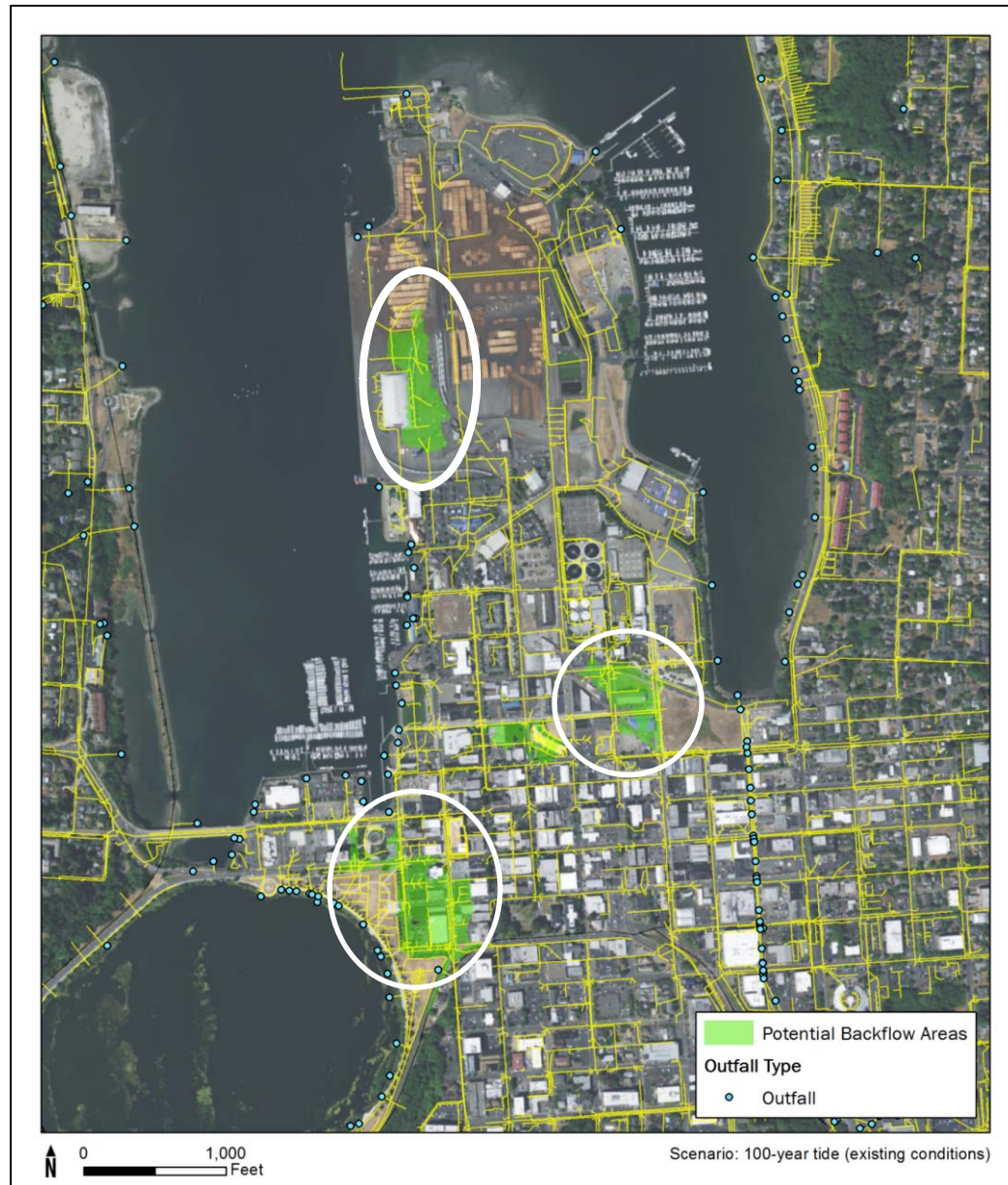
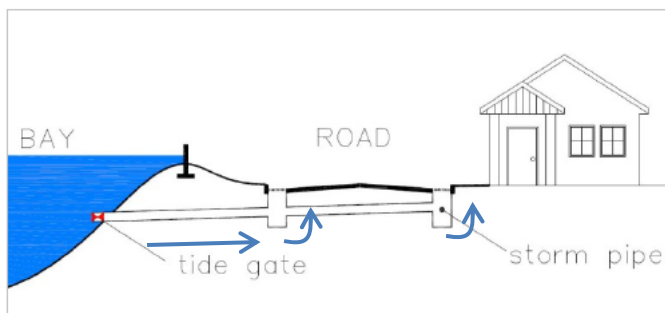
- SLR inundation maps
- High tides and storm surge
- King tides and 100-year tides
- Shoreline overtopping



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Current Potential Stormwater Flooding

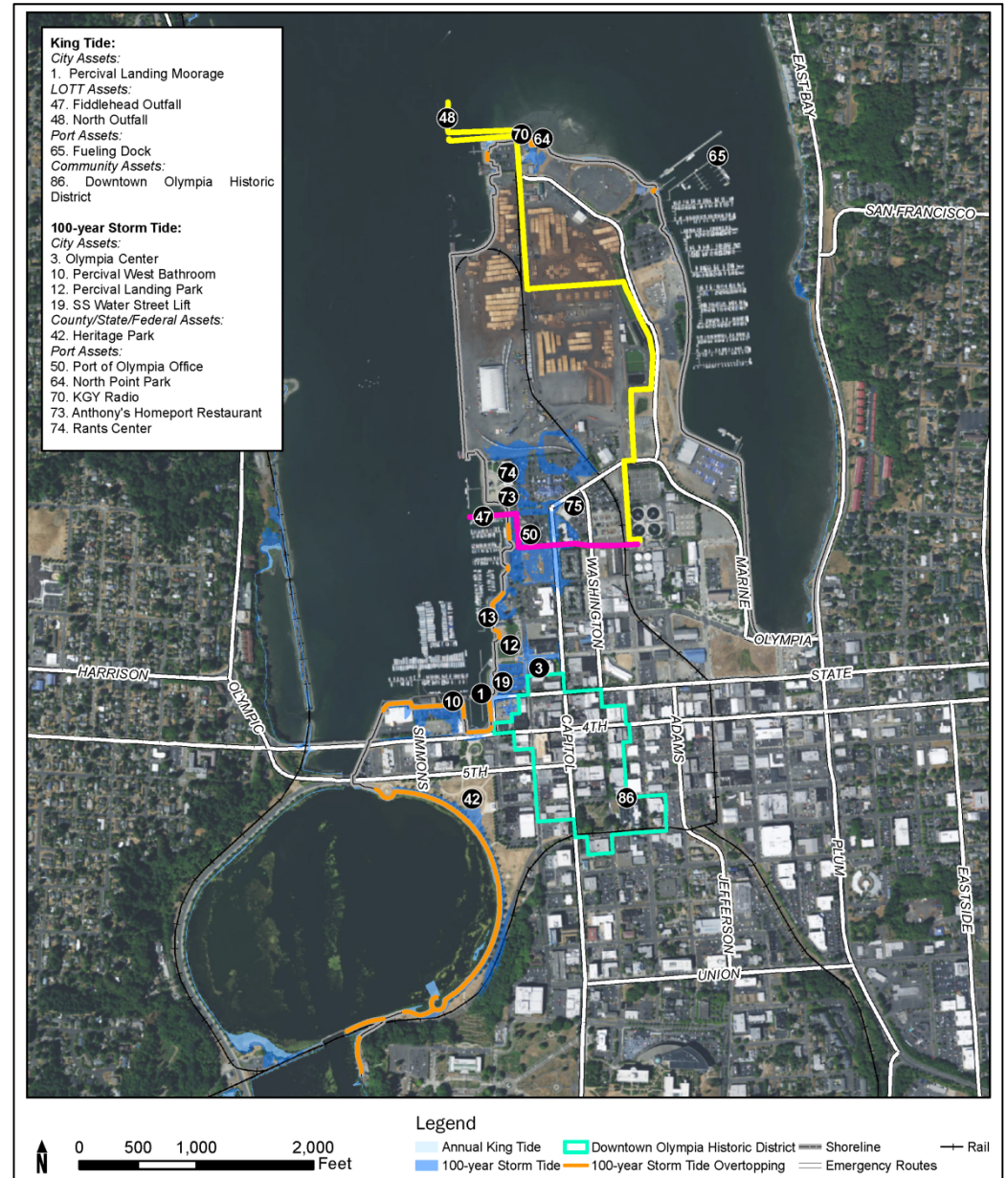
- Backflow flooding through stormwater system
 - Downtown, Capitol Lake, Port
- Need tide gates



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No Sea Level Rise with 100-year Storm

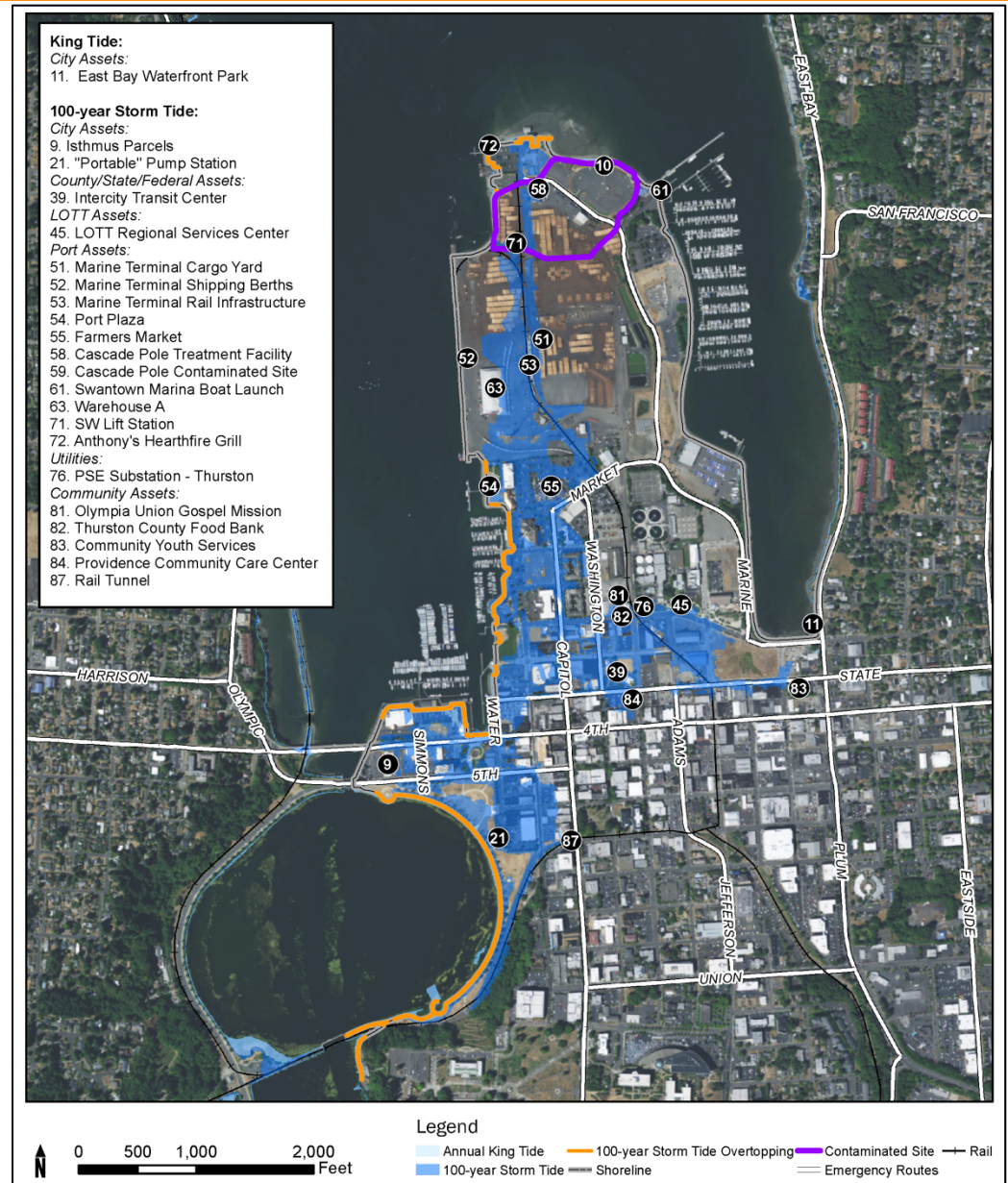
- Percival Landing area
 - Shoreline, streets, and parking lots
 - Adjacent buildings
- Emergency response



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6" SLR Flood Impacts

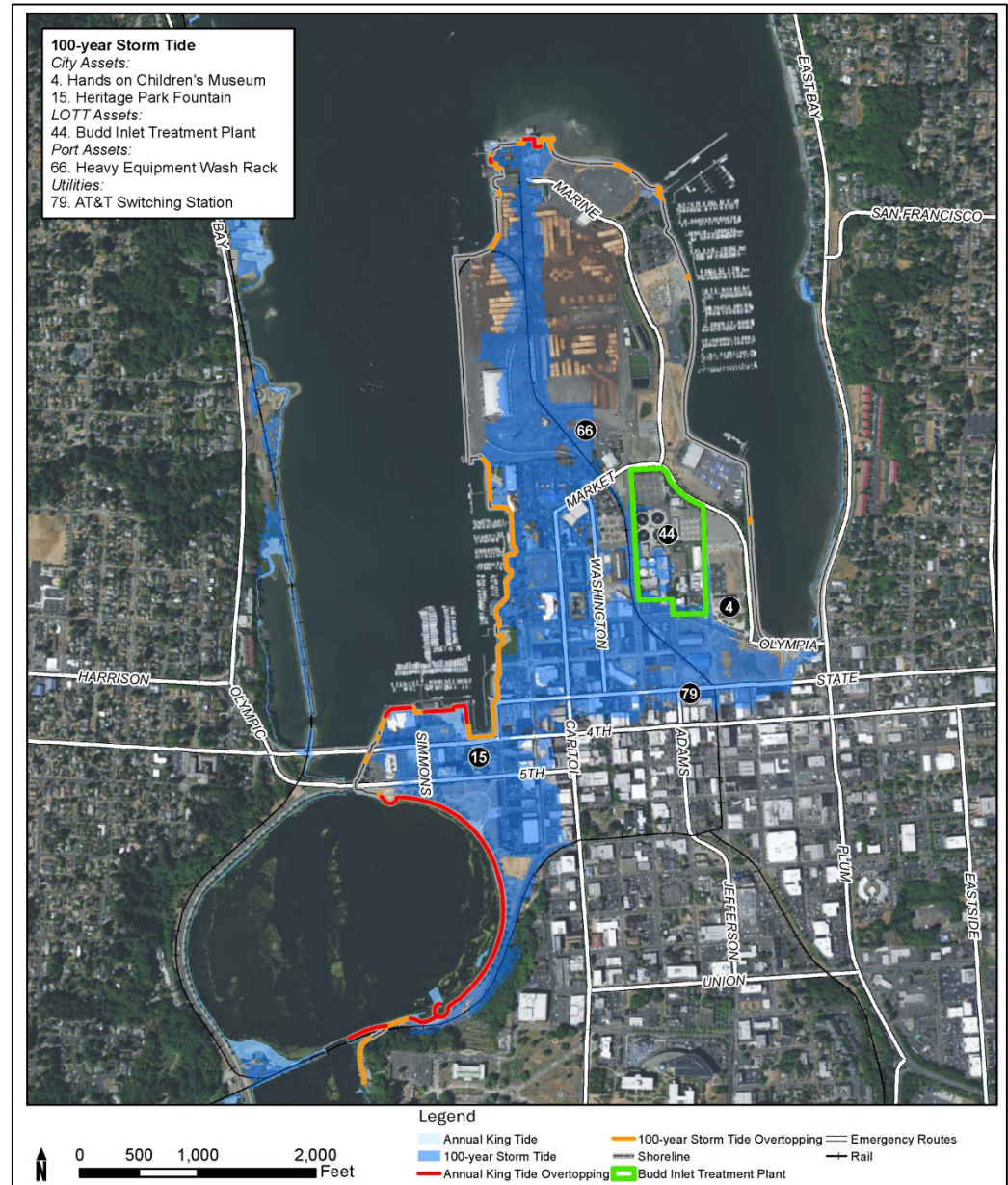
- Flooding increases appreciably
 - Capitol Lake
 - Isthmus
 - Percival Landing
 - Marine Terminal
 - Wastewater system
- Beyond emergency response capacity



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12" SLR Flood Impacts

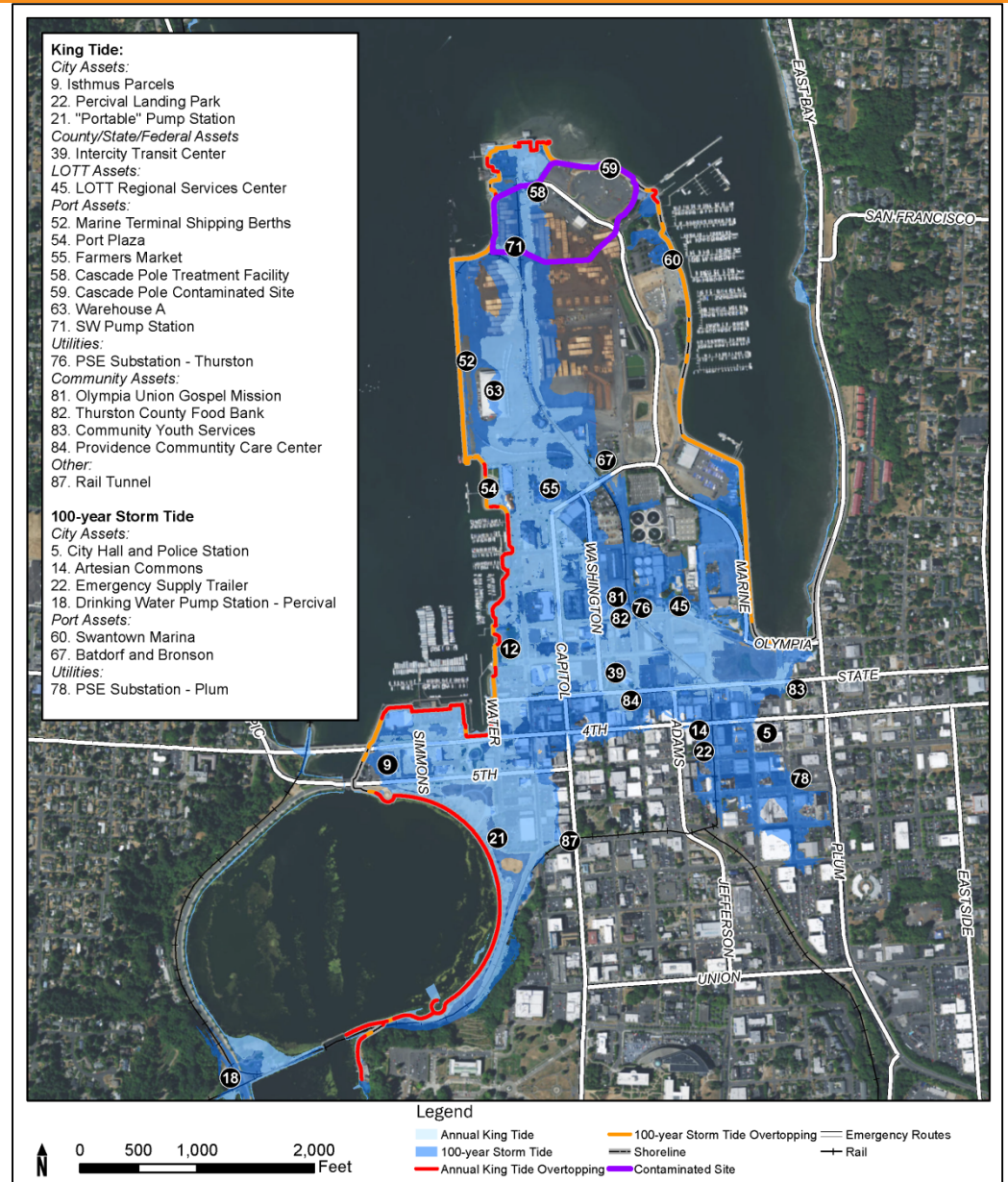
- Increasing frequency of flooding
- Plus extreme event flooding
 - King tide flooding along Isthmus shoreline
 - 100-yr event flooding stretches eastward across peninsula
- Impedes many downtown services



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24" SLR Flood Impacts

- Chokes essential roads
- Overtops East Bay shoreline
- Flooding frequently mimics natural, pre-fill shoreline
- Overwhelms downtown services



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Looking At The Consequences Of Flooding

Types of consequences

- **Economic** (building damage, disruption to business)
- **Environmental** (discharge of untreated wastewater)
- **Social** (emergency vehicle response, services interruption, cultural values)

Both direct and indirect consequences





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Defining Consequences

Asset	Consequence Type	Impact
Percival Landing moorage	Economic, social	Inaccessible docks
Bus service	Social	Commuter and social service disruption
Budd Inlet Treatment Plant	Environmental	Increased frequency of sewer bypass events
Stormwater outfalls	Economic, social	Backflow flooding impacts commuters and businesses.
Roads	Economic, social	Increased repair costs
Port marine terminal	Economic	Disruption of operations, damage to cargo

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Vulnerable Buildings In Olympia

		Buildings		
SLR	Population	Commercial	Government/ community services	Residential
0"	50	28	5	1
6"	170	143	19	5
12"	610	214	24	14
24"	820	303	113	19
68"	970	387	147	28

Impacts increase appreciably with just 6 inches of SLR

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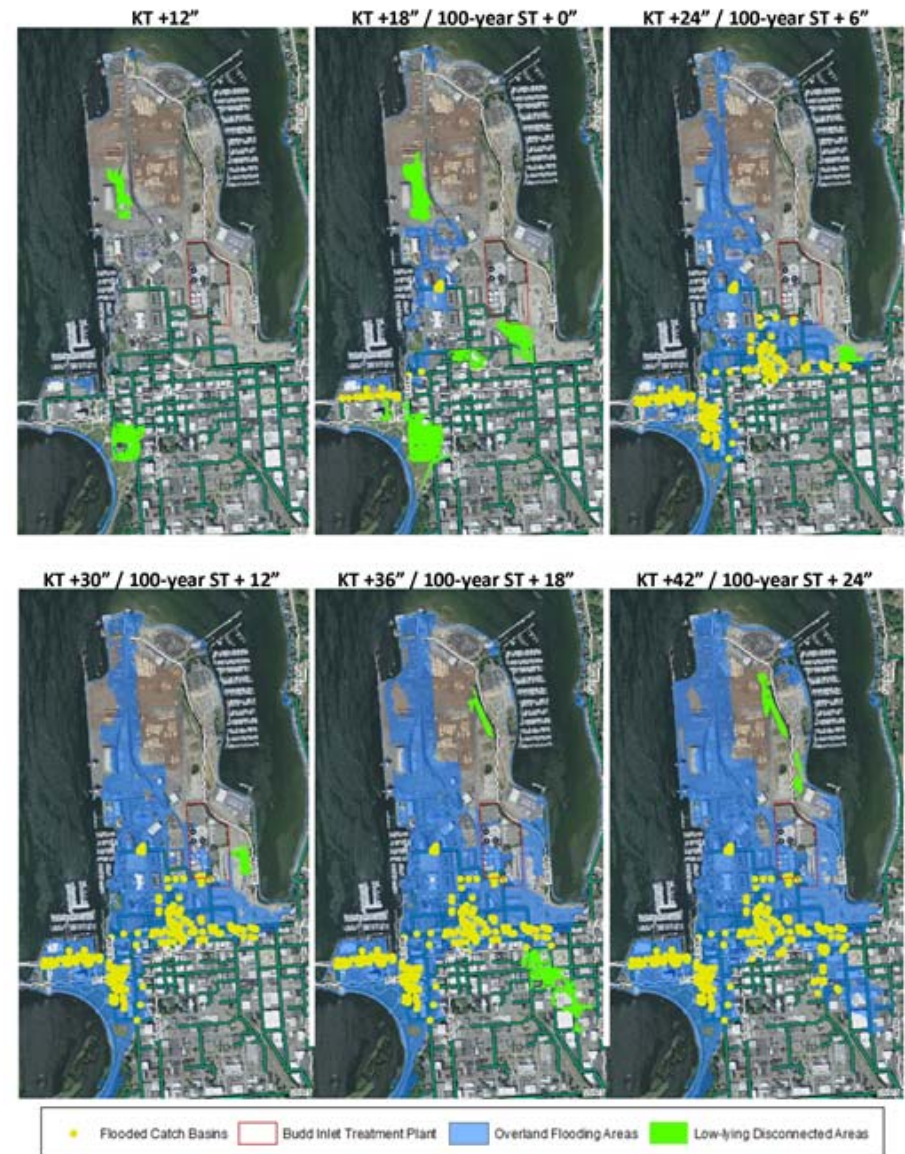
LOTT Clean Water Alliance

Near-term impacts

- Increased peak flow to the treatment plant
- Plant capacity exceeded
- Salt water damage to plant processes
- Discharge of untreated wastewater to Budd Inlet

Long-term impacts

- Flooding damage to structures
- Reduced pumping capacity
- Sustained discharges of untreated wastewater



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Port of Olympia

- Restricted rail and road access
- Damage to buildings, equipment, and cargo
- Inundation of groundwater treatment facility
- Lost revenue



A horizontal banner image showing a marina with several boats docked at a wooden pier. The water is calm, and the sky is clear. The title 'Sea Level Rise Response Planning' is overlaid in large, bold, white letters with a slight shadow effect.

Sea Level Rise Response Planning

Preliminary Survey Results



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Ranking Of Consequences

- Social Consequences
 - Highest concerns: Emergency response time, electricity service
 - Lowest: Access to parks and cultural amenities
- Environmental Consequences
 - Highest: Sewer back-ups, treatment plant discharges, contaminated sites
- Economic
 - Highest: Electricity service, building damage
 - Lowest: Loss of City/Port revenue, marine operations

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Decision-making Criteria



Socio-economic



Technical effectiveness



Environmental



Financial



Administrative



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Survey Responses

	Most Important	Least Important
Financial	Upfront cost	Lifespan of project
Environmental	Water quality	Shoreline habitat
Administrative	Leverage collaboration	Meet multiple citywide goals
Socio-economic	Protect public health	Enhance recreation and access
Technical effectiveness	Addresses high priority assets, adaptability	Addresses multiple assets or risks



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Written Comments

Offer specific planning suggestions	73
Support full or partial retreat	19
Suggest plan is unnecessary/premature	13

Common themes

- Costs and who pays
- Potential contamination
- Support for the plan
- Retreat
- Wait and see

Sea Level Rise Response Planning

Developing Strategies – February to May

Adaptation strategies

Structural measures

(relocation, raising structures, retrofit)



Non-structural measures

(policy changes, operational modifications)



Asset-specific

(focused on singular critical asset)



Regional

(multiple assets and/or stakeholders)

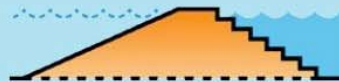


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TYPES OF COASTAL RESILIENCY INFRASTRUCTURE



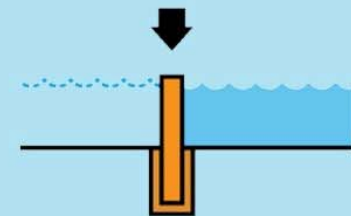
**EARTHEN
BERM**



**URBAN
BERM**



**FLOOD
WALL**



DEPLOYABLES



**ELEVATED
STREET**



**RAISED
MEDIAN**



**ELEVATED
PATHWAYS**



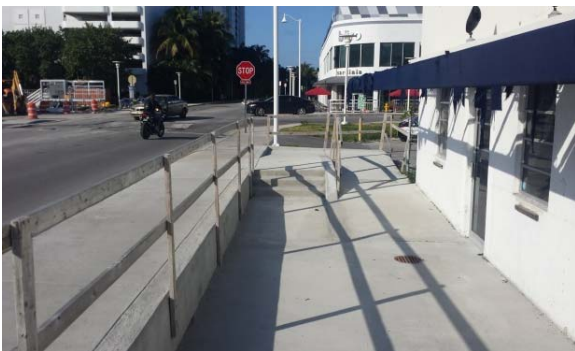
**RAISED
PLANTERS**

lower manhattan
COASTAL RESILIENCY

Sea Level Rise Response Planning

Strategies for Olympia

Raised Streets



Raised Landscaping



Flood Walls



Sea Level Rise Response Planning

Strategies for Olympia

Raised Buildings



Living Shorelines



Temporary



A banner image showing a marina with several boats docked at a pier. The boats have names like 'SAND MAN' and 'Callisto' visible. The text 'Sea Level Rise Response Planning' is overlaid in white on a blue background.

Sea Level Rise Response Planning

Next Steps

- Incorporate community feedback into study process
- Complete vulnerability and risk assessment
- Develop initial adaptation strategies and concepts
- Community meeting in early Spring 2018
- Another joint elected official meeting?

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Questions and Comments

