

# General Plan Advisory Committee Meeting

October 19, 2023

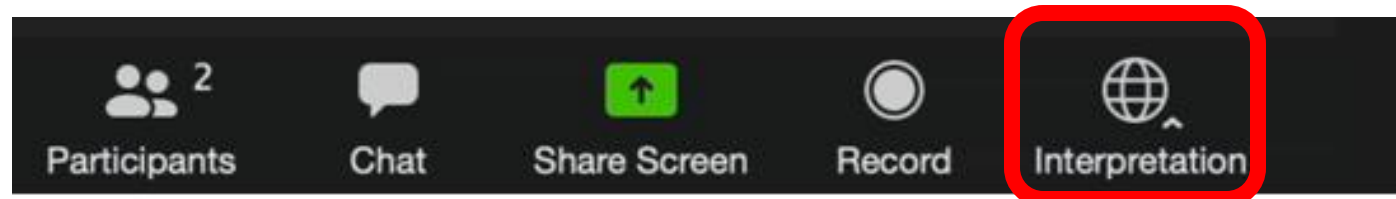
# Zoom – La interpretación

- Interpretation

**La interpretación en simultáneo para esta reunión se dará en los siguientes idiomas:**

Español ([Kathy Mejia](#)) – bajo la opción Español

Por favor haz clic en el icono INTERPRETATION en tu barra de herramientas para acceder al idioma deseado



# Note about Public Comment

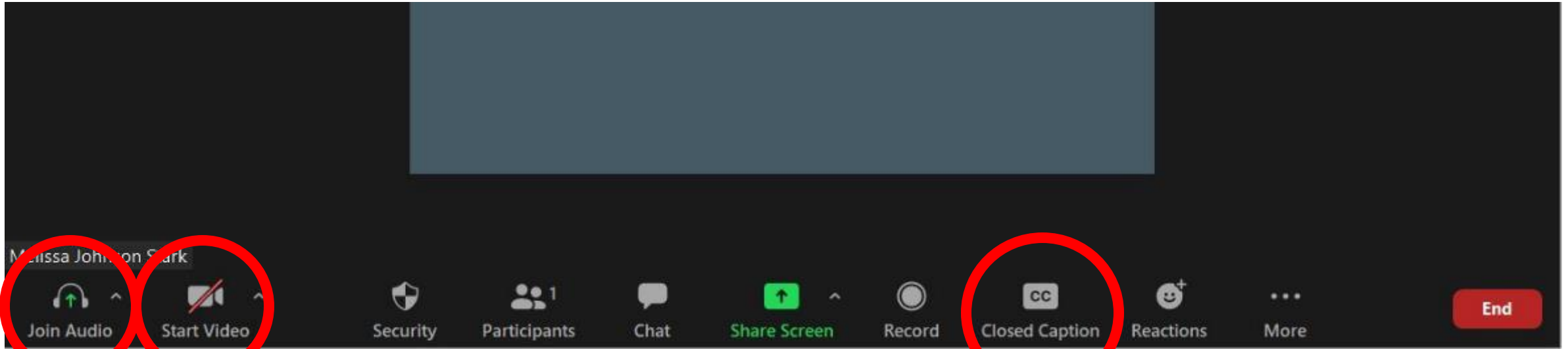
- In view of disruptions that have recently occurred at other local government public meetings, this is to remind members of the public that meetings for the City of Petaluma are limited public forums.
- Members of the public are asked to stay on topic on agenda items.
- Speakers not on topic may be muted.
- Speakers are welcome to speak on agenda items towards the end of the discussion of each topic.
- General Public Comment will be at the end of this meeting.

# GPAC Roll Call

1. Dave Alden
2. Stephanie Blake
3. Phil Boyle
4. Erin Chmielewski
5. Mary Dooley
6. Jessie Feller
7. Ali Gaylord
8. Yensi Jacobo
9. Sharon Kirk
10. Roger Leventhal
11. Iliana Inzunza Madrigal
12. Roberto Rosila Mares
13. Brent Newell
14. Kris Rebillot
15. Bill Rinehart
16. Joshua Riley Simmons
17. Elda Vazquez-Izaguirre
18. Lizzie Wallack
19. Bill Wolpert

# Logistics

# Zoom Instructions



***Join Audio***

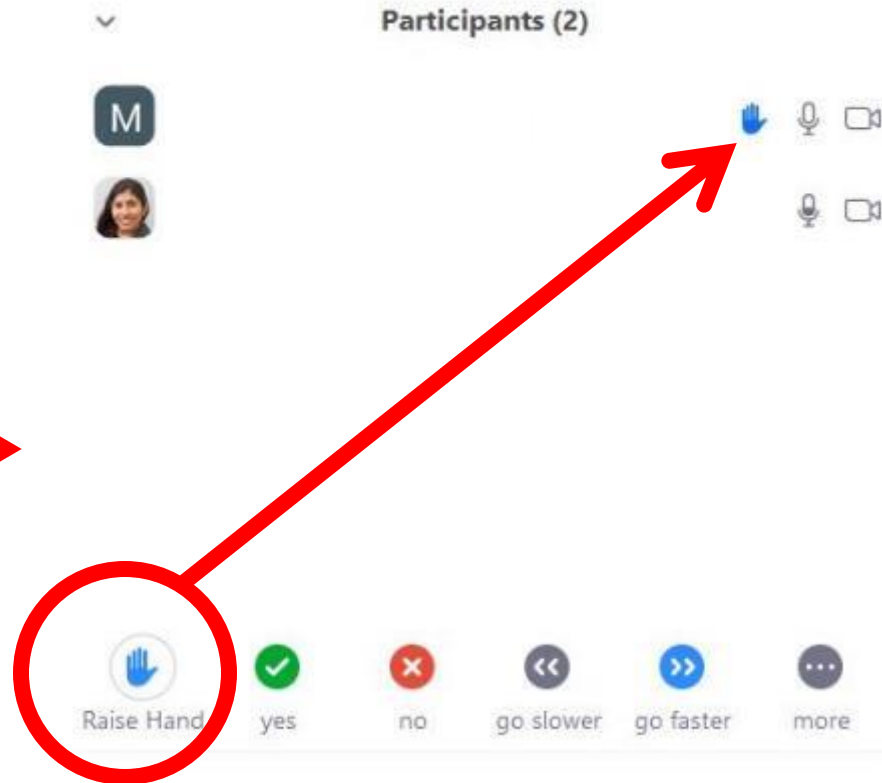
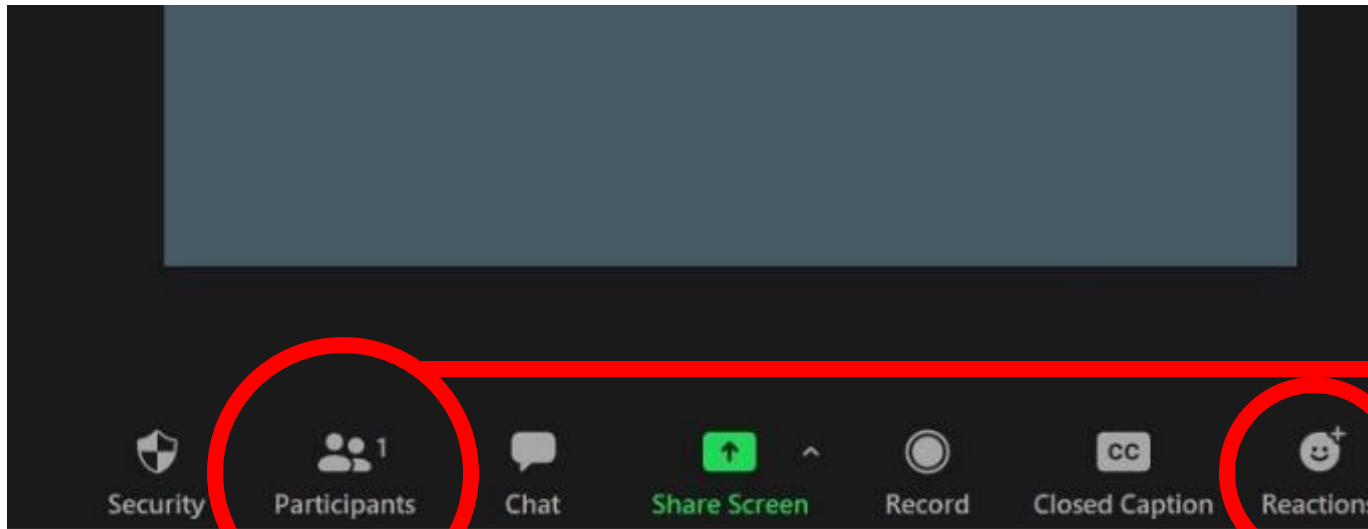
***Start Video***

***Closed Caption is available***

- Two options: 1) Use your device's audio. 2) Call in using a cell phone
- To un-mute, press the same button. If joining by phone, press \*6 to mute/unmute.



# Zoom Instructions



## *Raise your “Hand” to Speak*

- Please use the “Raise Hand” feature if you want to speak. By phone, press \*9.
- GPAC: The team will call on GPAC members individually. Please remain muted until called on.
- Public: Please only raise your hand during public comment.

# Zoom – What You Need To Know

**For any technical difficulties, please email**

**Daniel Harrison at**

**[dharrison@cityofpetaluma.org](mailto:dharrison@cityofpetaluma.org)**

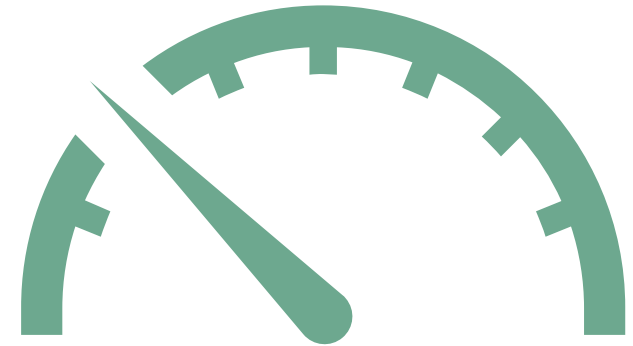
**Para cualquier dificultad técnica, envíe un correo electrónico a Kathy Mejia:**

**[kataplun99@yahoo.com](mailto:kataplun99@yahoo.com)**



# Supporting Access and Live Interpretation

- Please remember to speak slowly – our interpreters are working hard to translate accurately
- Reduce the use of acronyms and make sure to explain them when you do use them



# Meeting Overview

Roll Call and Logistics

Project & Staff Updates

Flood Resilience Strategy Ideas

- Presentation
- GPAC Clarifying Questions
- Public Comment
- GPAC discussion

GPAC Working Group Participation

Final GPAC Thoughts

General Public Comment

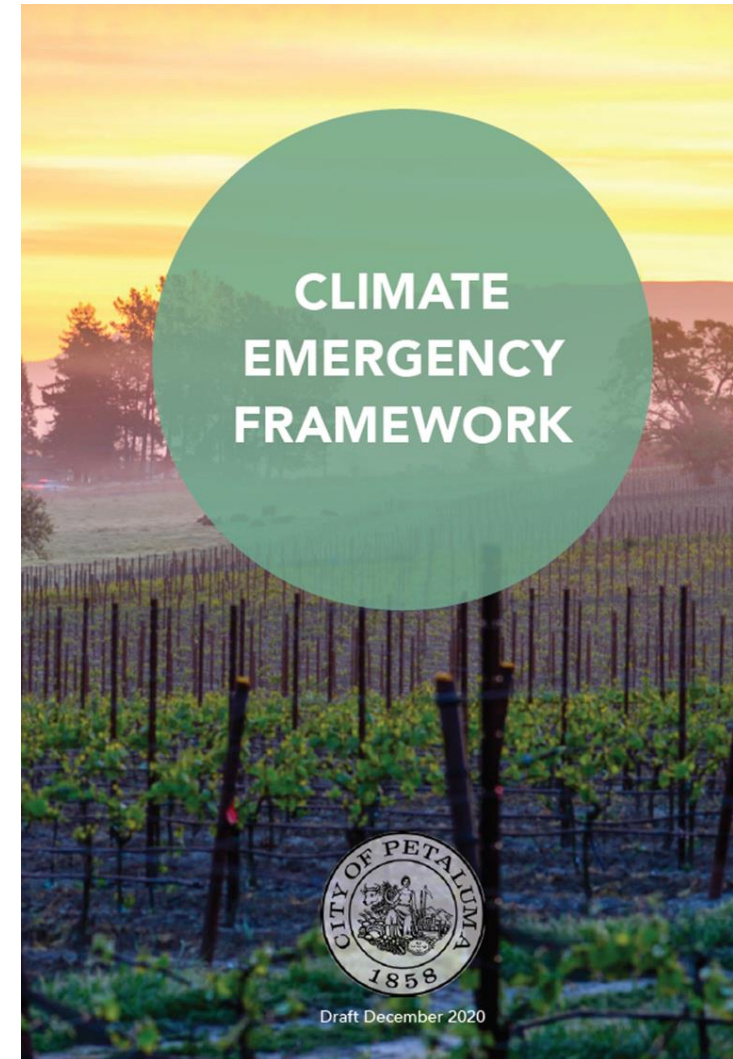


# Project & Staff Updates

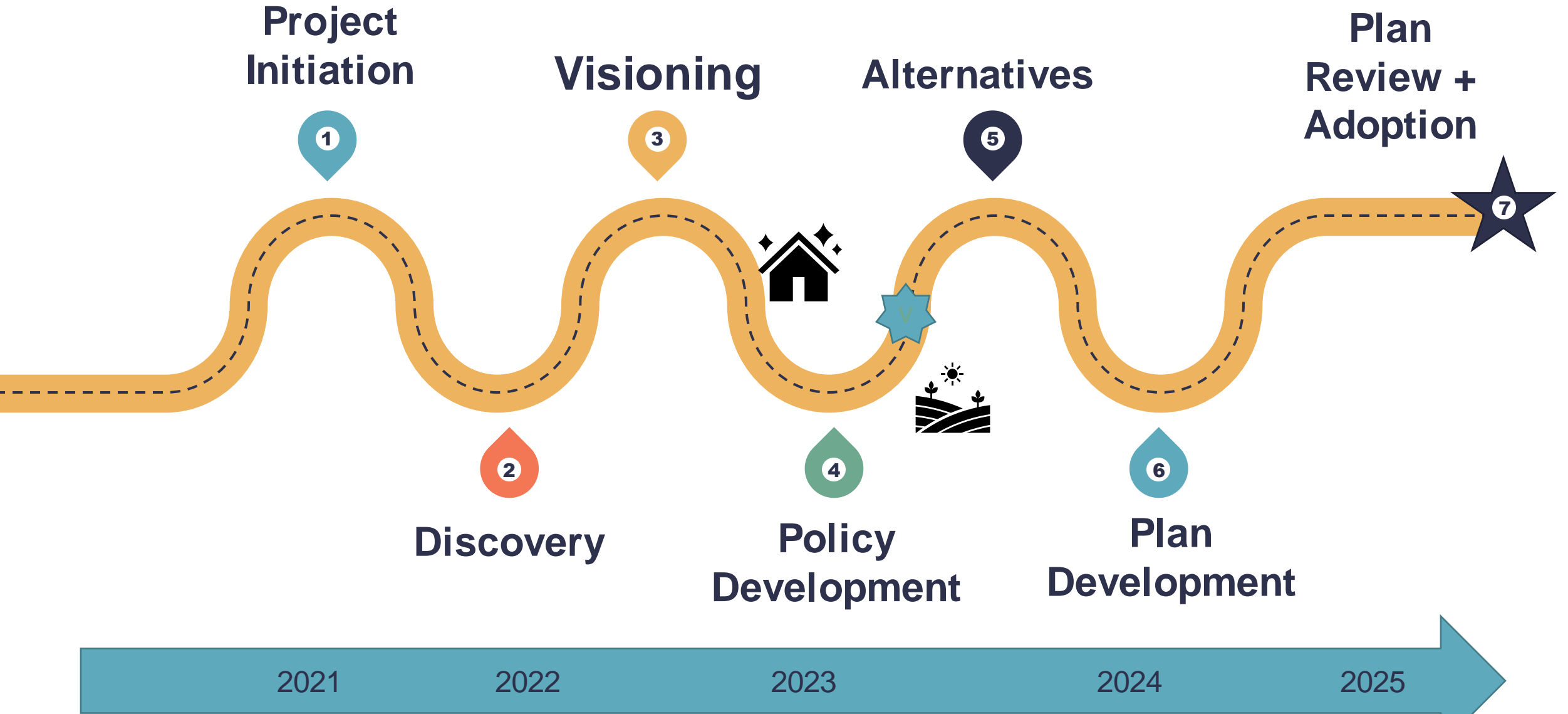
# Blueprint for Carbon Neutrality (2023)

## Public Draft Available!

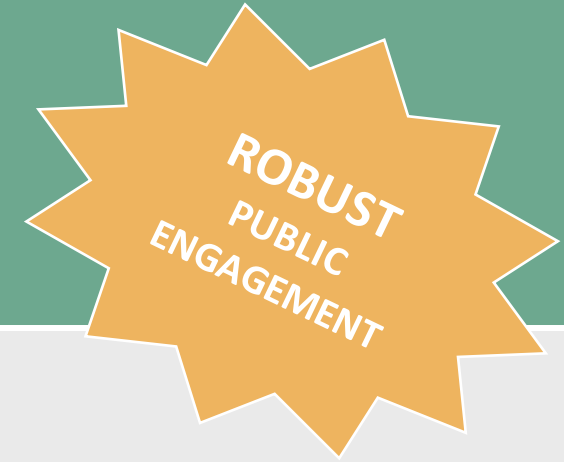
- Online feedback form:  
<https://www.planpetaluma.org/blueprint-for-carbon-neutrality>
- GPAC working group and CAC ad hoc reviewing draft
- 11/8 @ 4:30: Climate Action Commission Meeting
- 11/16: GPAC Meeting
- **Public review extended to November 17**



# Project Roadmap



# WORK COMPLETED TO DATE

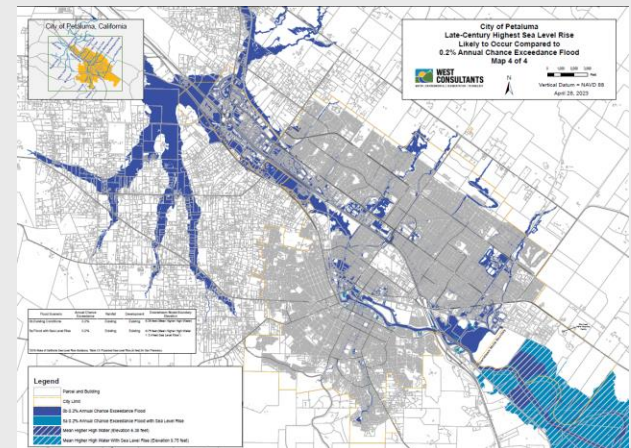
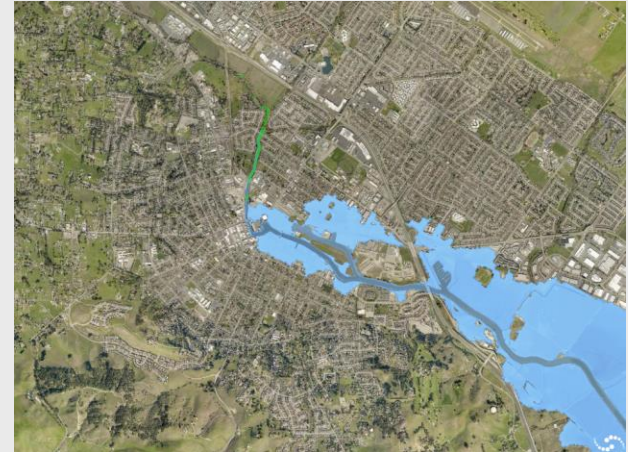


- Existing Conditions Report & White Papers
- Vision and Guiding Principles
- Housing Element Adoption and Certification
- Draft Climate Action Plan (Blueprint)
- Sea Level Rise and Flood Modeling/Mapping
- Admin Draft Policy Frameworks for:
  - Administration/Governance
  - Land Use
  - Arts, Culture, & Creativity
  - Natural Resources
  - Economic Development
  - Noise
  - Health, Equity, and Environmental Justice
  - Parks
  - Historic Resources
  - Public Facilities
  - Infrastructure and Utilities
  - Transportation



# WHERE WE ARE NOW

- Public Review of the Blueprint for Carbon Neutrality
- Working Group comments on Blueprint to inform final draft for consideration
- Flood Resilience Policy & Strategy Ideas





# IMMEDIATE NEXT STEPS



- Development and Initial Review of Land Use Discussion to inform Alternatives
- Complete and Release Public Draft Policy Frameworks
- Reengage Working Groups for review of Policy Frameworks



2023-2024



# THE ROAD AHEAD

EVEN MORE  
PUBLIC  
ENGAGEMENT

Summer 2025

Public Review  
of Alternatives

Development  
and Analysis  
of Preferred  
Alternative

Public and  
Council  
Review of  
Preferred  
Alternative

Admin Draft  
General Plan  
&  
Environmental  
Review

Public Draft  
General Plan  
& Admin Draft  
EIR

Final General  
Plan & Final  
EIR



2024-2025

# GPAC Meeting Sequencing – Timing Subject to Change

1. Introduction of Updated Flood & Sea Level Rise Modeling & Maps (September)
2. **Discussion of Flood Resilience Strategies (today!)**
3. Initial Discussion of Land Use (aiming for November 16)
4. No GPAC meeting in December (aiming to mobilize Working Groups)
5. Input on Land Use Alternatives (January GPAC meeting)



# GPAC Working Groups

- **Purpose:** Review policy recommendations in detail, provide feedback/input
- Voluntary participation
- At least two GPAC members each (coordinator and co-coordinator)
- Self-directed, -coordinated, and – facilitated
- May collaborate with community members outside of GPAC meetings to make topic-specific recommendations

## Focus to Date

- Launched first round of Working Groups in February 2022
- Spring-Summer 2022 meetings
- Mid-2022 recommendations that informed Policy Frameworks
- Active participation in Housing Element development and review of updated flood and SLR models and maps

# Proposed Reorganization

GPAC Members can sign up for new Working Groups

Original Working Groups	Proposed Working Groups	Policy Framework Topics
Open Space & Natural Resources (Mary, Bill R, <i>Janice</i> , <i>John</i> )	Open Space & Natural Resources	Natural Environment
Climate Action (Jessie, Roger)	Hazard Mitigation, Climate Change Adaptation, and Resilience	Safety Flood Resilience
Housing (Ali, Kris, Dave) Economic Development ( <i>Sierra</i> , <i>Delia</i> , Josh)	Land Use	Land Use Economic Development
Mobility (Dave, Ali, Jessie, Phil, <i>Janice</i> )	Mobility	Mobility
	Engineering	Infrastructure & Utilities Public Facilities Noise
Sense of Place & Quality of Life (Yensi, Stephanie, Iliana, Bill W, Bill R)	Culture & Community	Historic Resources Arts, Culture, & Creativity
Equity and Intersectional Justice (Iliana, Erin, Phil)	Equity and Intersectional Justice	Health, Equity, and Environmental Justice

# Poll

- Are you able to serve on a Working Group?
- Your preferred Working Group(s)
- Your preferred Working Group format
- Your preferred Working Group meeting frequency
- Your availability for the November 16 GPAC meeting, in-person or online



# Clarifying Questions from GPAC Members



The background of the image is a close-up, high-angle shot of water with several concentric ripples. The water is a deep, dark blue color, and the ripples create a complex, organic pattern of light and shadow. The text is overlaid on the left side of the image.

# **Flood Resilience Strategies**

# Related General Plan Elements and Topics

- **Safety**, with a focus on drought, wildfire, geologic hazards, resilient critical infrastructure, emergency response, evacuation, and disaster recovery
- **Natural Environment**, with a focus on ecosystems, watersheds, habitat, wildlife corridors, the Petaluma River, water resource management, open space, green infrastructure, and low-impact development
- **Land Use Policy and Alternatives**, with a focus on the open space network, hazard avoidance, river-adjacent development, the evolution of neighborhoods, 15-minute nodes, and future growth areas
- **Parks and Recreation**, with a focus on the Petaluma River and parks/open space that also play a flood resilience role
- **Mobility**, with a focus on trail networks integrated with waterways
- **Infrastructure & Utilities**, with a focus on public water and wastewater systems
- **Public Facilities**, with a focus on the marina, the investment in future facilities, and police, fire, and emergency services
- **Environmental Justice**, with a focus on the safety and well-being of vulnerable populations

4

## **CIVIL ENGINEERING FIRM**

- International, regional, Petaluma
- 110 + Staff

## **HYDROLOGY MODELING, STORM WATER MANAGEMENT, WATERSHED RESTORATION, INFRASTRUCTURE PLANNING**

- Recent SLR projects include multiple Bay Area Jurisdictions in the Bay Area

## **PROJECT MANAGER - SEBASTIAN BERTSCH**

# Presentation Overview



Flood Resilience  
Terminology



Foundations:  
Existing Conditions,  
Community Direction



Current Petaluma  
Flood Resilience  
Strategies



Updated Flood  
Modeling and Maps



Flood Resilience  
Goal and Policy  
Ideas

# **Flood Resilience Terminology**





# Key Terms

## Stakeholder Acronyms

**ASCE:** American Society of Civil Engineers.

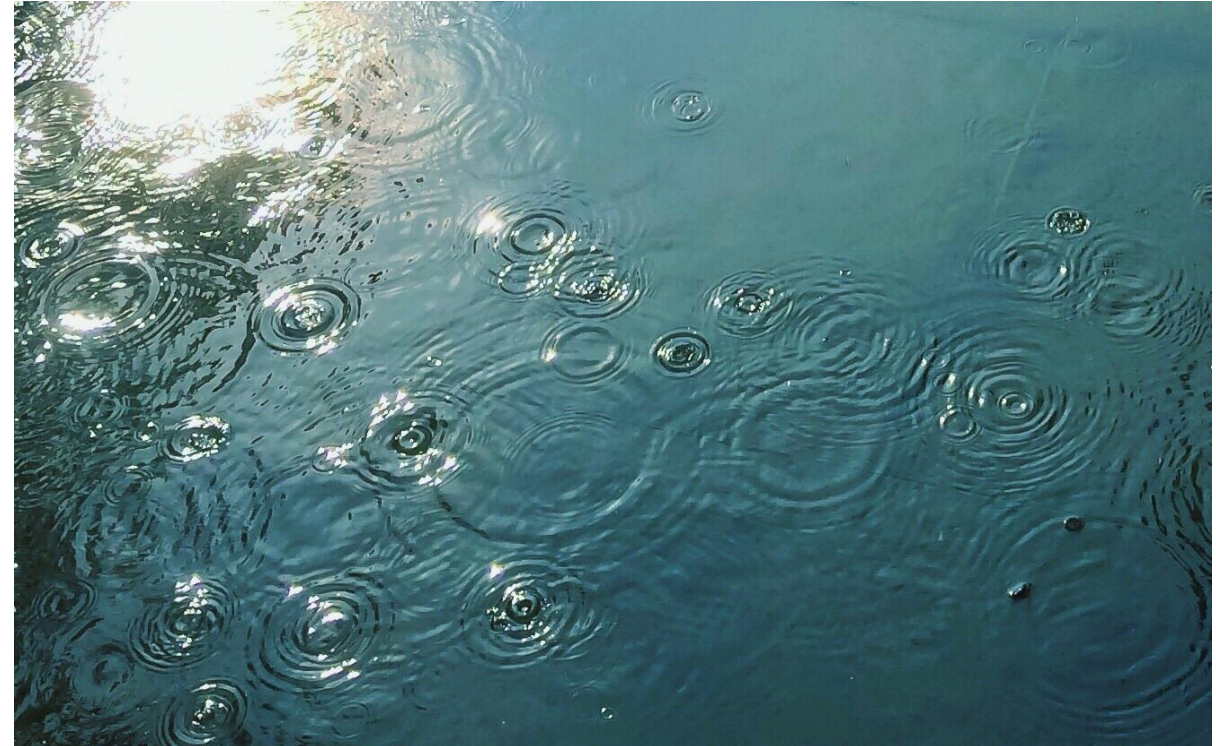
**FEMA:** Federal Emergency Management Agency.

## Hydrology and Meteorology

**Floodplain:** Any land area susceptible to being inundated by water from any source.

**Floodway:** The channel of a waterway and adjacent land areas that must be reserved to discharge the base flood.

**Sea Level Rise (SLR):** The increase in global ocean water elevation due to human activity.



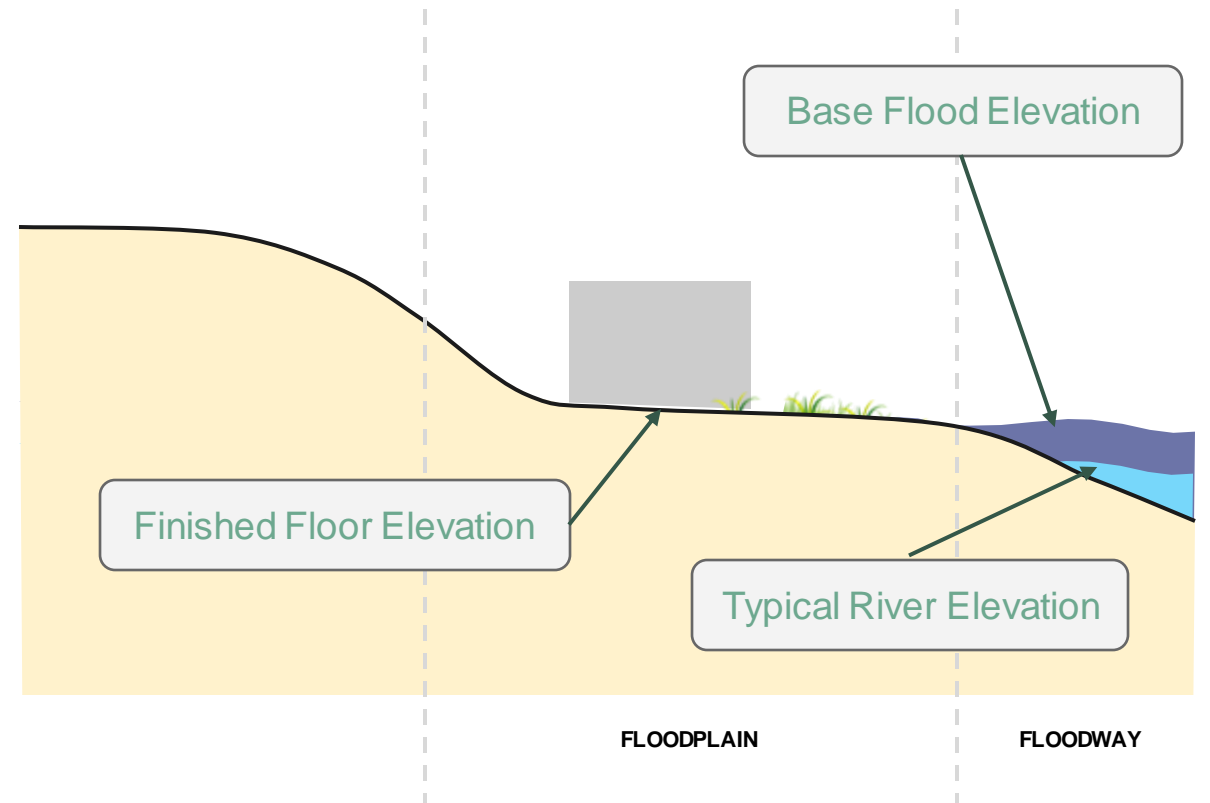
# Key Terms

## Flood Regulation Terms

**Base Flood Elevation (BFE):** the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that elevation in any given year, without taking into account sea level rise or changing climatic conditions as defined by FEMA.

**Finished Floor Elevation (FFE):** The elevation of the lowest finished enclosed area, including a basement and any machinery and equipment.

**Flood Insurance Rate Map (FIRM):** Official community maps displaying special flood hazard areas. Published by FEMA and available on the City's website.





# Key Terms

## Adaptation Terms

**Adaptation:** Actions that reduce the vulnerability of human and natural systems to, in this case, rising floods. Four adaptation strategies are proposed here: avoidance, protection, accommodation, and land use realignment.

**Adaptation Pathway:** A methodology to phase in adaptation based on external factors. As used here, an Adaptation Pathway has three basic components: a current requirement, a trigger condition, and a future, heightened requirement.

# Key Terms

## Project Regulation Terms

**Project Lifespan:** the time in which the project serves its purpose with no expected changes to the structure or its use.

**Risk Tolerance:** The level of comfort associated with the hazards and consequences of flooding.

# Existing Conditions

*Key Findings*

# Existing Conditions

The City has published updated flooding modeling taking into account SLR and other climatic changes.

The 2020 Local Hazard Mitigation Plan found:

- Significant residential, commercial, and industrial lands at risk from flooding
- 2 electrical substations and 3 water facilities, all of which are critical utilities, are at risk from flooding
- SLR makes that worse over the next 80 years



## City of Petaluma Local Hazard Mitigation Plan



Final Plan Update | November 2020

**wood.**

Prepared for:  
City of Petaluma  
Public Works & Utilities Department  
202 North McDowell Boulevard  
Petaluma, California 94954

Prepared by:  
Wood Environment &  
Infrastructure Solutions, Inc.  
10940 White Rock Road, Suite 190  
Rancho Cordova, California 95670

# Community Direction

# Vision, Pillars, Principles (GPAC)

## Vision

**We are prosperous...** Our City Infrastructure and facilities are sustainably financed, resilient, and well-maintained.

**We are forward-thinking leaders...** We have adapted to climate change with a community-driven, whole systems, and nature-based approach to development.

## Pillars

### **Climate Action, Resilience, and Sustainability:**

Petaluma is committed to bold action to achieve carbon neutrality by 2030 and to building resilience to climate change impacts, including sea level rise, increasing temperatures, drought, and wildfire intensity. The General Plan must build climate-ready communities using science, technology, and bold ways of thinking to advance change in our relationship with the natural environment and to plan for current and future impacts.

# Vision, Pillars, Principles (GPAC)

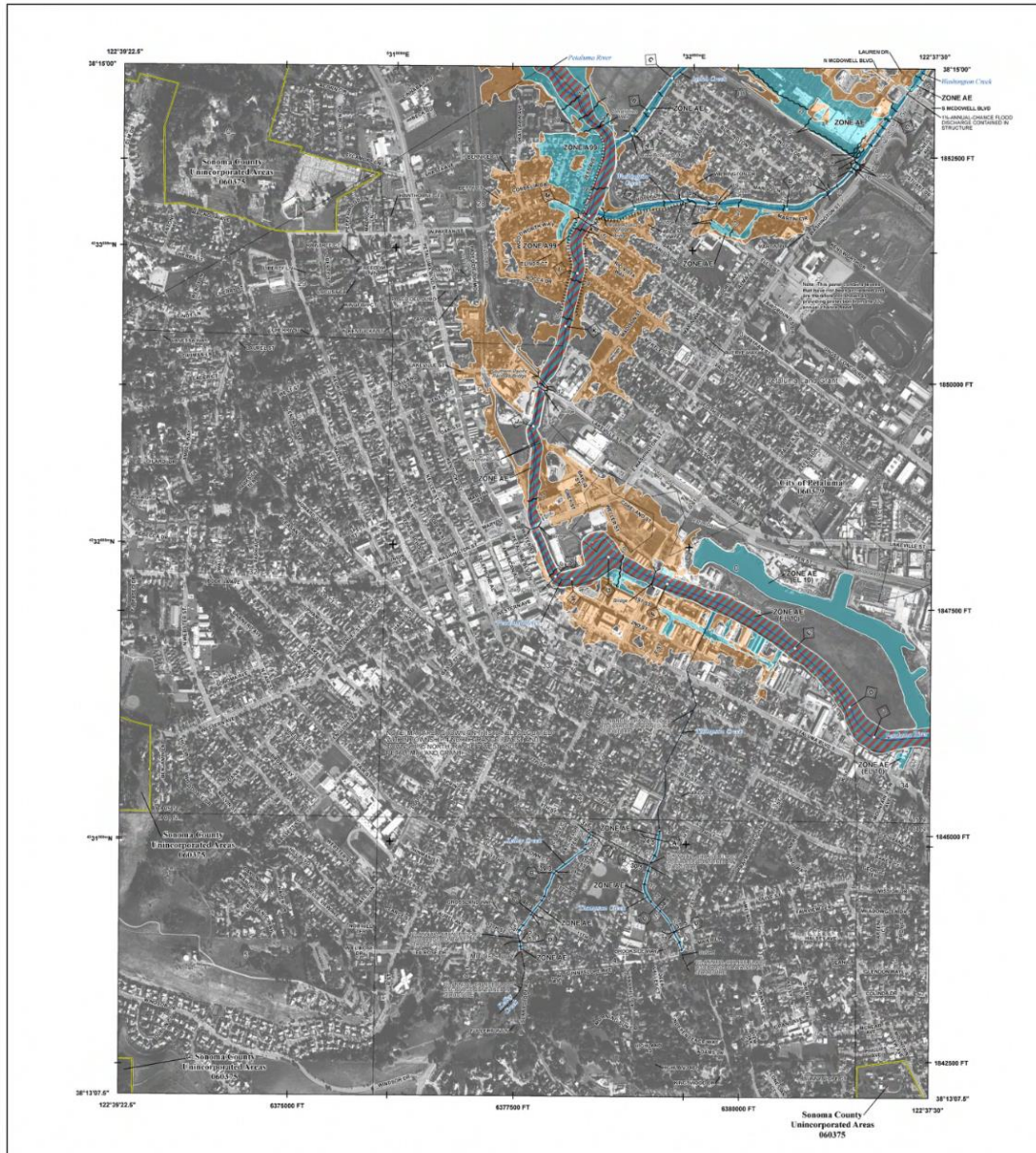
## Principles

1. Achieve carbon neutrality by 2030 and equitably foster **a sustainable and resilient community** in which today's needs do not compromise the ability of the community to meet its future needs.
3. **Protect and restore the natural function** of the Petaluma River and its tributaries while expanding complementary recreational, entertainment, and civic opportunities.
13. Ensure infrastructure supports infill development and **addresses the impacts of climate change.**
16. **Be a leader** in advancing these guiding principles within the region and beyond.



# Current Flood Resilience Strategies

# Understand the Problem: FEMA



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
**THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MISC.FEMA.GOV](http://MISC.FEMA.GOV)**

	Without Base Flood Elevation (BFE) Zone X, V, VE
	With BFE or Depth Zone AE, AO, AH, VE, AR Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes Zone X
	NO SCREEN Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike or Floodwall
	Non-accredited Levee, Dike or Floodwall
	Cross Sections with 1% Annual Chance
	Water Surface Elevation (WSE)
	Roads
	Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Features
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRIM including historic versions of this FIRIM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-366-2627) or visit the FEMA Map Service Center website at [www.fema.gov](http://www.fema.gov). Available products may include previously issued editions of Map Change or Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRIM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

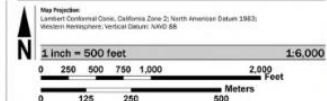
Communities appearing listed on adjacent FIRIM panels must obtain a current copy of the adjacent panel as well as the current FIRIM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

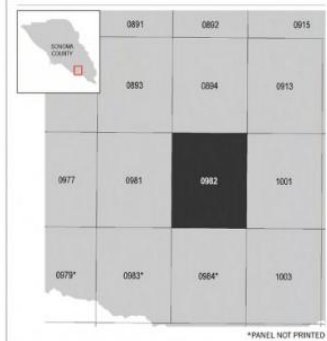
No guarantee of flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6625.

Base map information shown on this FIRIM was derived from Coastal California LCMR dated 2010 and Coastal California digital imagery dated 2011. USGS NAIP 2010 imagery is used in areas not covered by the Coastal California digital imagery.

## SCALE



## PANEL LOCATOR



**NATIONAL FLOOD INSURANCE PROGRAM**  
**FLOOD INSURANCE RATE MAP**  
**SONOMA COUNTY,**  
**CALIFORNIA**  
 and Incorporated Areas  
**PANEL 982 of 1150**

Panel Contains:	COMMUNITY	NUMBER	PANEL	SUFFIX
	PETALUMA CITY OF SONOMA COUNTY	0982	982	0

VERSION NUMBER  
**2.3.2.0**  
 MAP NUMBER  
**06097C0982C**  
 MAP REVISION  
**OCTOBER 2, 2015**

# Regulation: Zoning Ordinance Ch. 6

## **Floodway District (FW) 6.050**

A. Encroachments in Floodway. *Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, no encroachments within Floodway lands are permitted; including fill, new construction, intensification of existing use, change to more intensive use, substantial improvements, and other development, except as specified herein as permitted or conditional land uses, and provided that a certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.*

## **Flood Plain / Flood Prone Area (FP-C) 6.040**

A. Effect of Zone. *Areas zoned Flood Plain-Combining District (F-C): the regulations of the underlying zoning district shall be combined with and apply in addition to the provisions of this article. Where any conflict may exist between the requirements of this ordinance and other zoning districts, the provisions of this article shall apply.*

B. Restrictions in Zone. *Any permitted principal use, accessory use, or conditional use in any underlying zoning district shall require a development permit in the FP-C District per Section 6.070(B) and may be permitted only in accordance with the provisions of this article.*

## **Zero Net Fill Area 6.070**

F. Zero Net Fill. *A zero net fill policy covers the area along the Petaluma River west of the freeway, upstream of the Payran Street Bridge and including the area along Willowbrook Creek east of the freeway downstream of Old Redwood Highway (this area known generally as Redwood Business Park II). In this area, clearance above base 100 year flood elevation for finished floors shall be a minimum of two feet, and zero net fill as defined shall apply to any proposed development activity.*



# Reduce Flood Risk

**Payran Reach:** Designed to protect homes and business from flooding, which included widening of the River and constructing flood walls and a public path along the River to increase the carrying capacity of the river channel and to improve public access to the River environment and better link existing neighborhoods.

**Denman Reach:** Designed to decrease flooding along Industrial Avenue. This project included the purchase of 5 parcels along the river, then widening and deepening the water's floodplain to allow it to spread in open space rather than homes and businesses in the event of a flood.

**Capri Creek:** Designed to reduce out-of-bank flooding during larger storms east of North McDowell Boulevard to Maria Drive.

[cityofpetaluma.org/flood-management/](https://cityofpetaluma.org/flood-management/)



*Denman Reach Floodplain Improvements in November 2022*

# Stakeholders and Awareness

## California Gov. Code § 8589.3-.45 (2017 AB 646): Property Disclosure

Any real estate transaction (buying or renting) must include information on the property's flood hazard status.

[cityofpetaluma.org/flooding/](http://cityofpetaluma.org/flooding/)

### AWARENESS AND MONITORING

Following heavy rains, certain areas of the City of Petaluma are vulnerable to flooding where waters can cover low roads and fill underpasses, viaducts, parking structures and basements. Protocols are in place within the City to mitigate a flooding emergency and manage the area's floodplain. The City of Petaluma also maintains remote automatic sensors to gauge stream and river levels throughout the year. Check out the links on this page for additional information about flooding protocols, safety tips for prevention and keeping up-to-date with alerts.

[CLICK HERE](#) to view a guide that contains important flooding information ([en español](#)).

### FEMA FLOOD INSURANCE MAPS

[CLICK HERE](#) to view the FEMA Flood Insurance Rate Map for Petaluma.

SIGN UP FOR ALERTS!

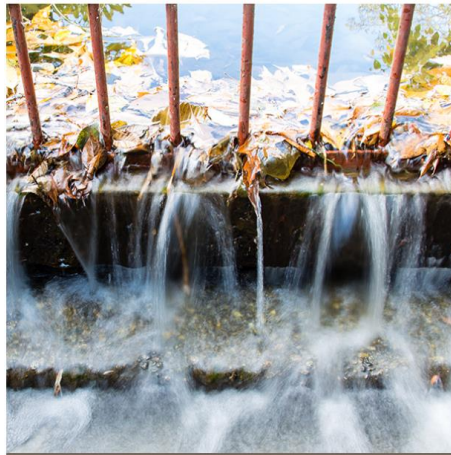
EVACUATION MAP



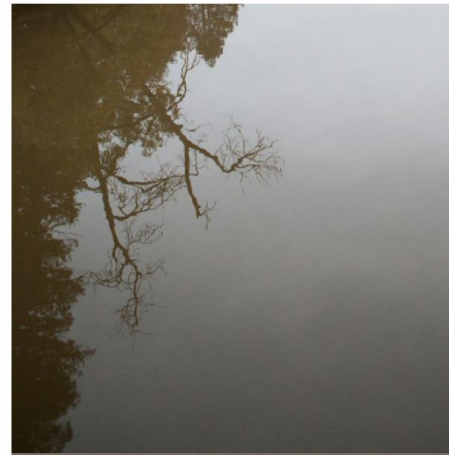
CURRENT UPDATES



FLOODING FAQs



CURRENT FLOODING NEWS



FLOOD ALERT INFO



FLOOD SAFETY



FLOODPLAIN MANAGEMENT

# Clarifying Questions from GPAC Members



# Using SLR in flood maps

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- The Sea Level Rise predictions most relevant for long term planning are:
  - 1.9' of SLR in Mid-Century
  - 3.4' in the End-of-Century



# 3 Flood Types to Consider

- King Tide
  - The highest tides of the year
  - Happen every year
  - Tide gauges tell us this water level
- Rainfall
  - Rain falling on the city and watershed, trying to move down river
  - 1% chance of happening every year
  - Flood models tell us what floods
- Storm Surge
  - Extreme high water in the river due to atmospheric events, separate from rain
  - 1% chance of happening every year
  - Tide gauges/the US Army Corp of Engineers tells us this water level



# What did we model?

- What are flood risks at mid-century 1.9' SLR (around 2050)
  - Rain and storm surge (Map 1)
  - King tides (Map 2)
- What are flood risks at the end of the century 3.4' SLR (around 2100)
  - Rain and storm surge (Map 3)
  - King tides (Map 4)

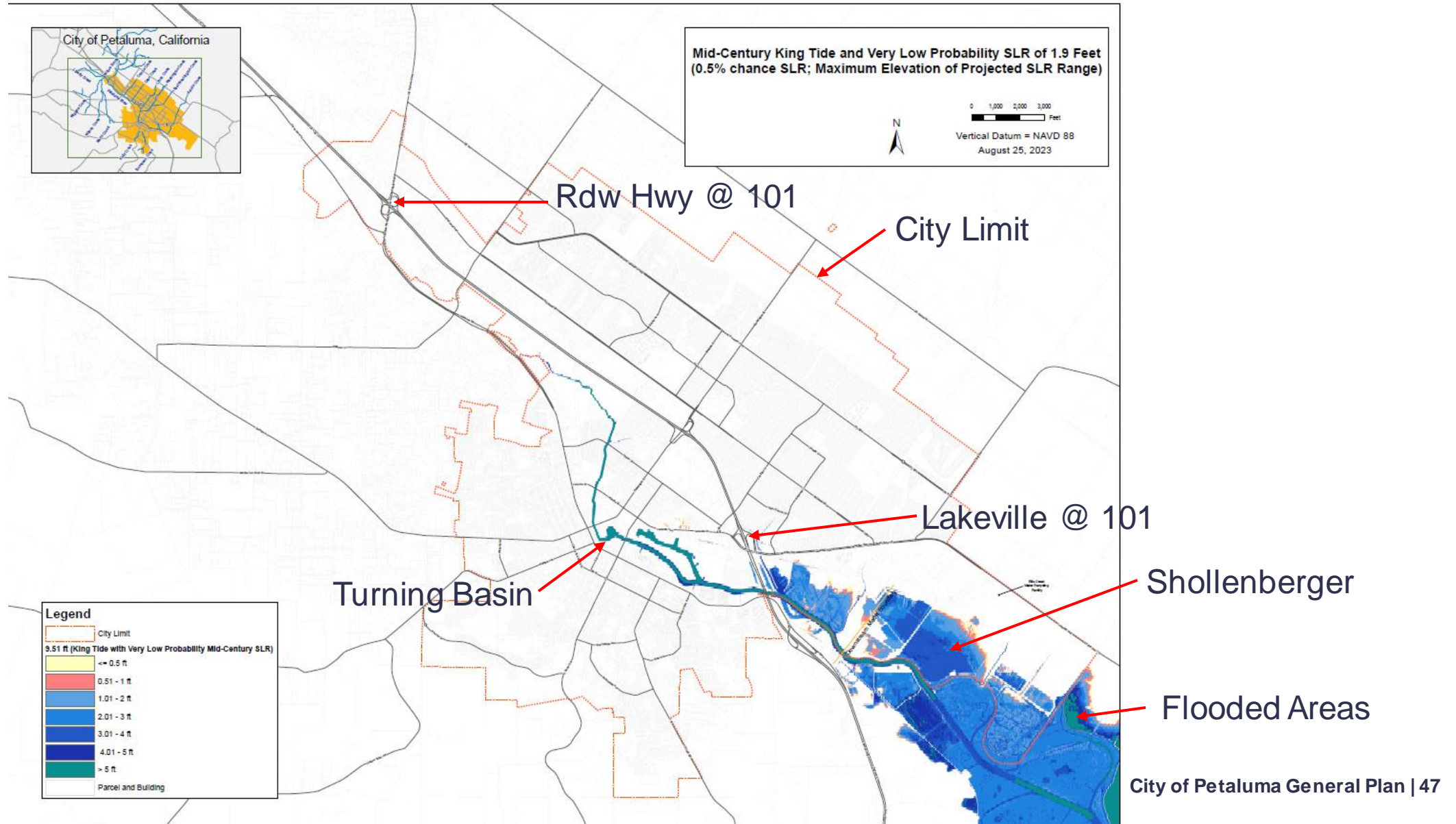
# Where does SLR affect the City in the Future

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Mid Century



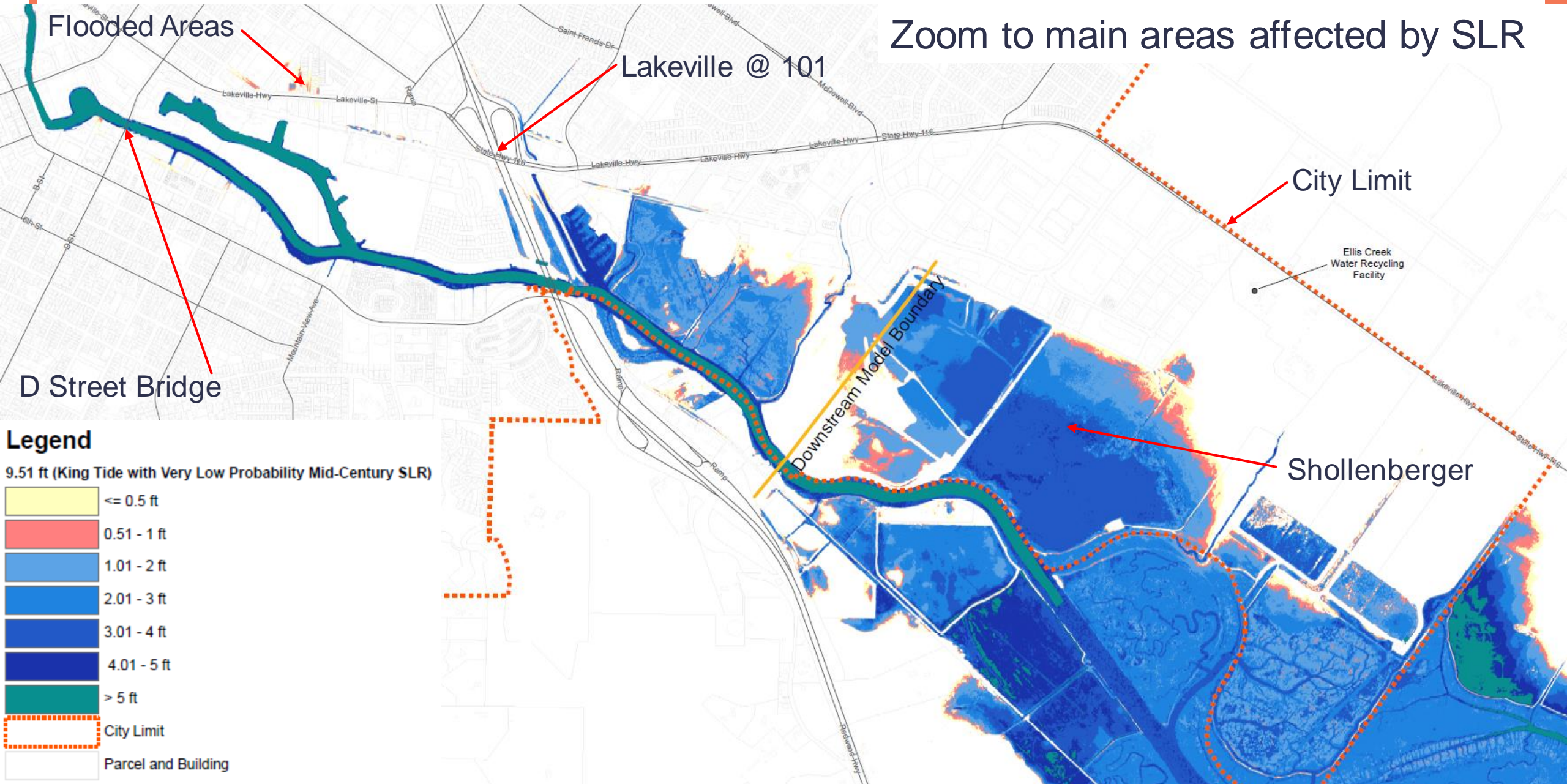
# Mid-Century SLR (1.9 feet), King Tide





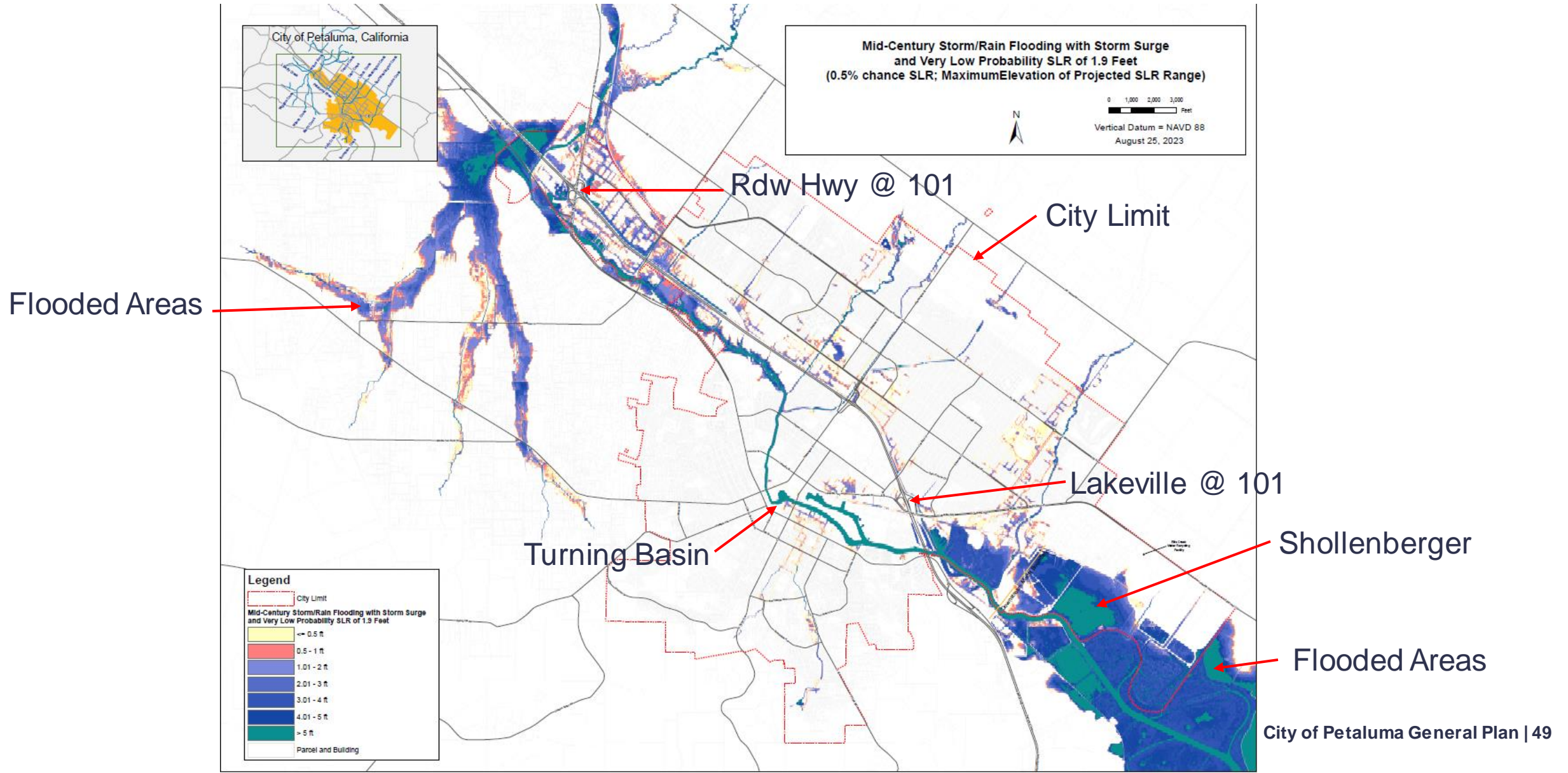
# Mid-Century SLR (1.9 feet), King Tide

Zoom to main areas affected by SLR





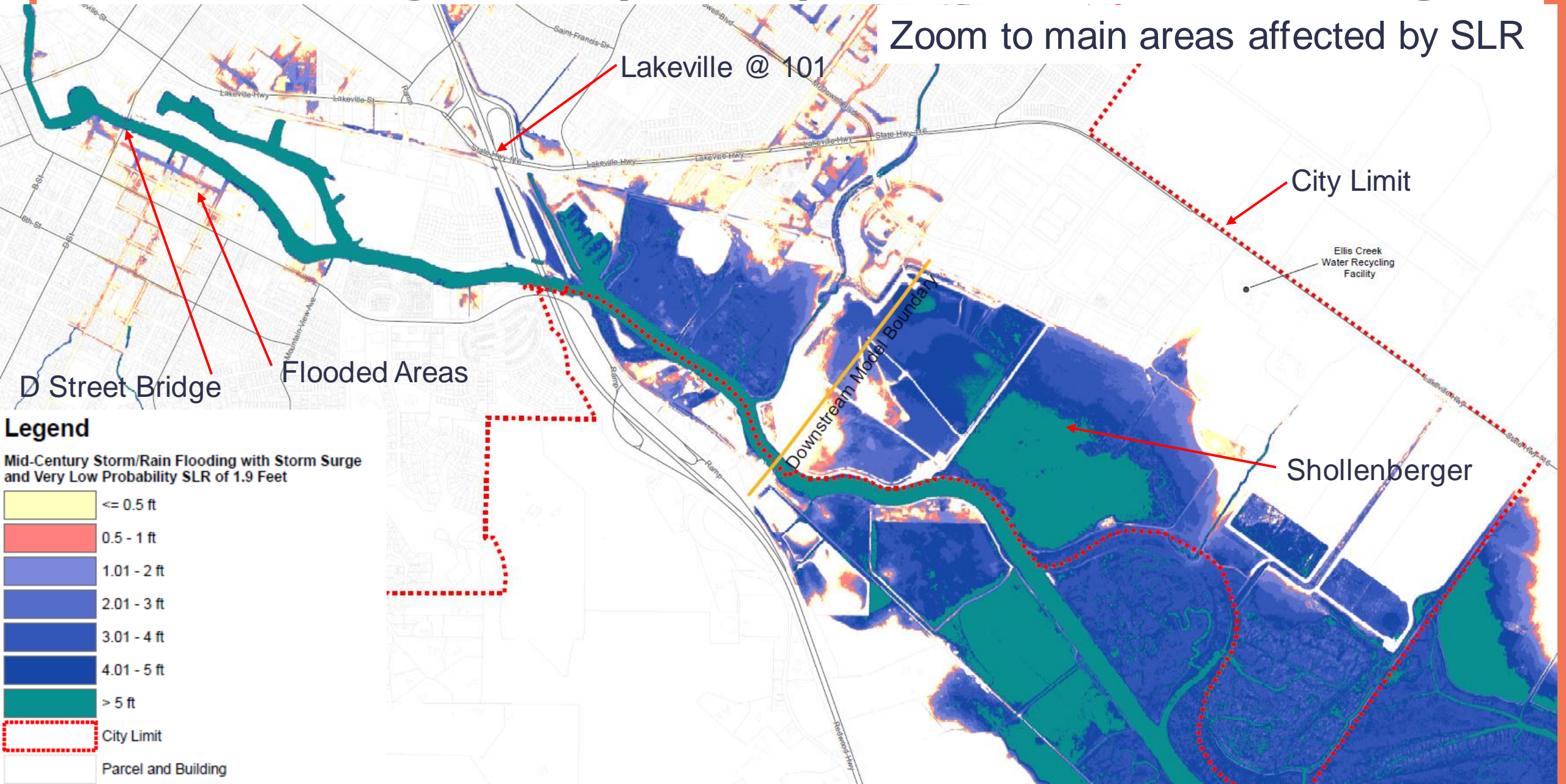
# Mid-Century SLR (1.9 feet), Rain and Storm Surge





# Mid-Century SLR (1.9 ft), Rain + Storm Surge

Zoom to main areas affected by SLR



**Legend**  
Mid-Century Storm/Rain Flooding with Storm Surge and Very Low Probability SLR of 1.9 Feet

- <= 0.5 ft
- 0.5 - 1 ft
- 1.01 - 2 ft
- 2.01 - 3 ft
- 3.01 - 4 ft
- 4.01 - 5 ft
- > 5 ft
- City Limit
- Parcel and Building



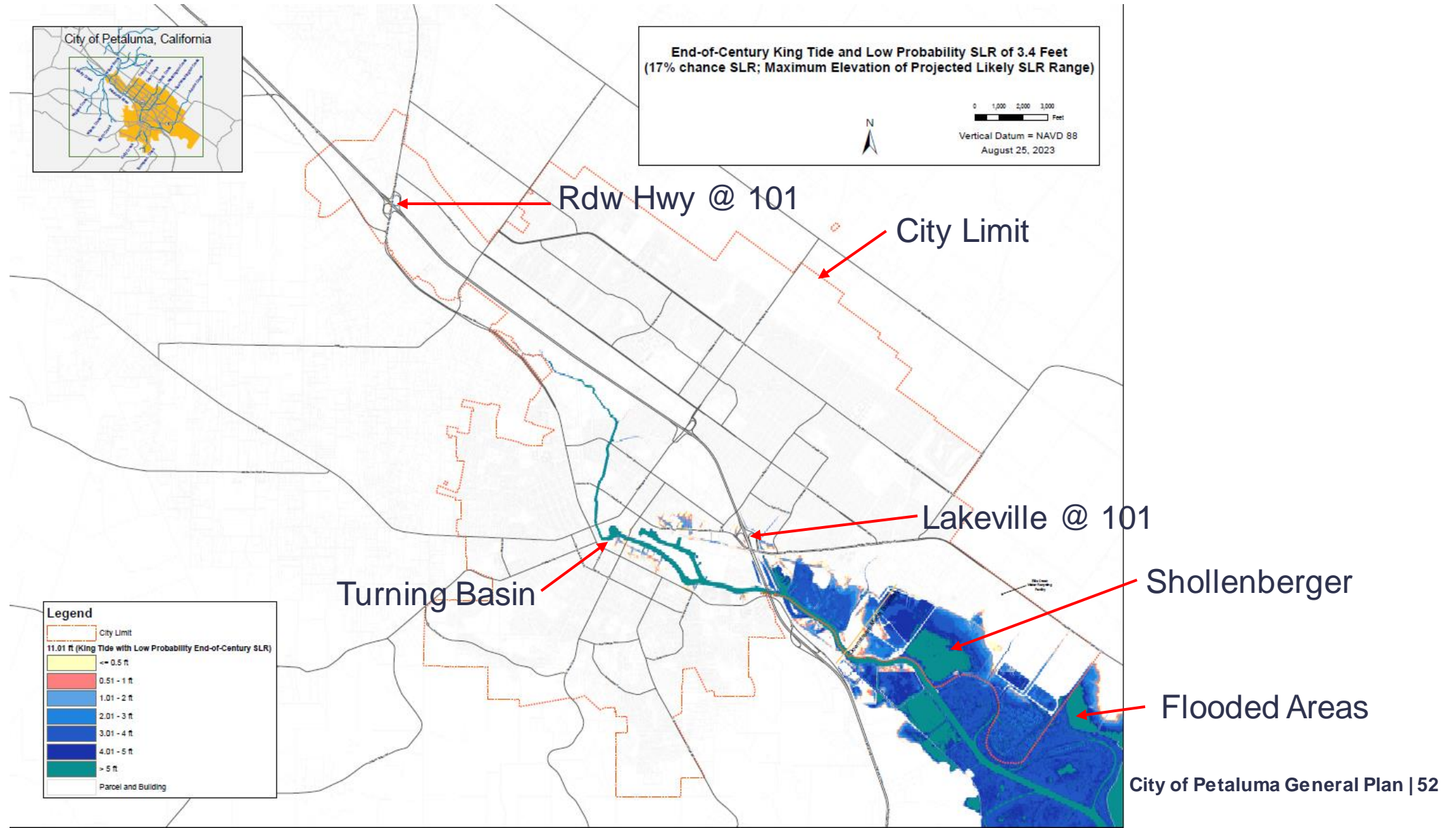
# Where does SLR affect the City in the Future

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End of Century



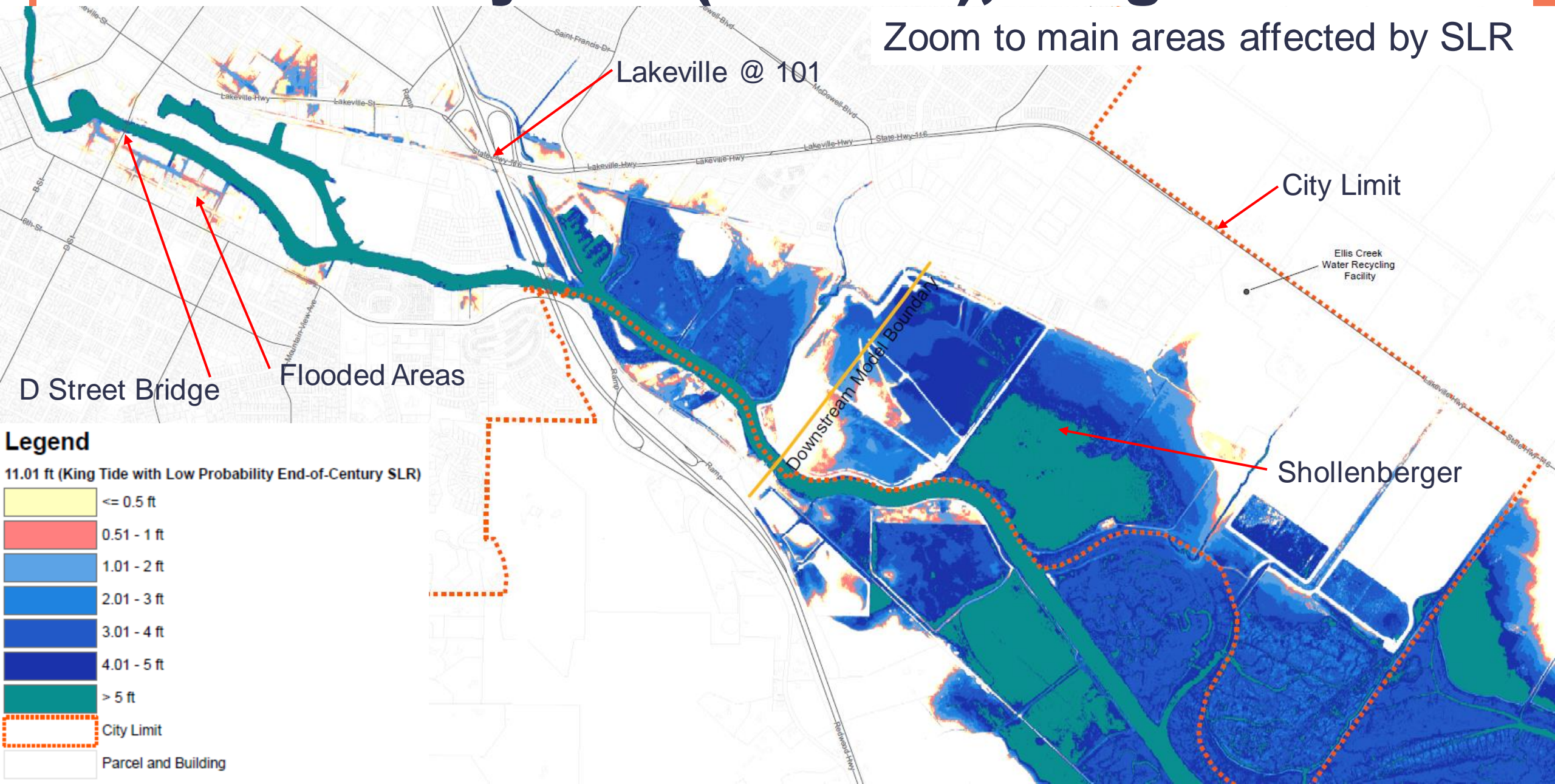
# End-of-Century SLR (3.4 feet), King Tide





# End-of-Century SLR (3.4 feet), King Tide

Zoom to main areas affected by SLR



Lakeville @ 101

City Limit

Ellis Creek Water Recycling Facility

D Street Bridge

Flooded Areas

Downstream Model Boundary

Shollenberger

## Legend

11.01 ft (King Tide with Low Probability End-of-Century SLR)

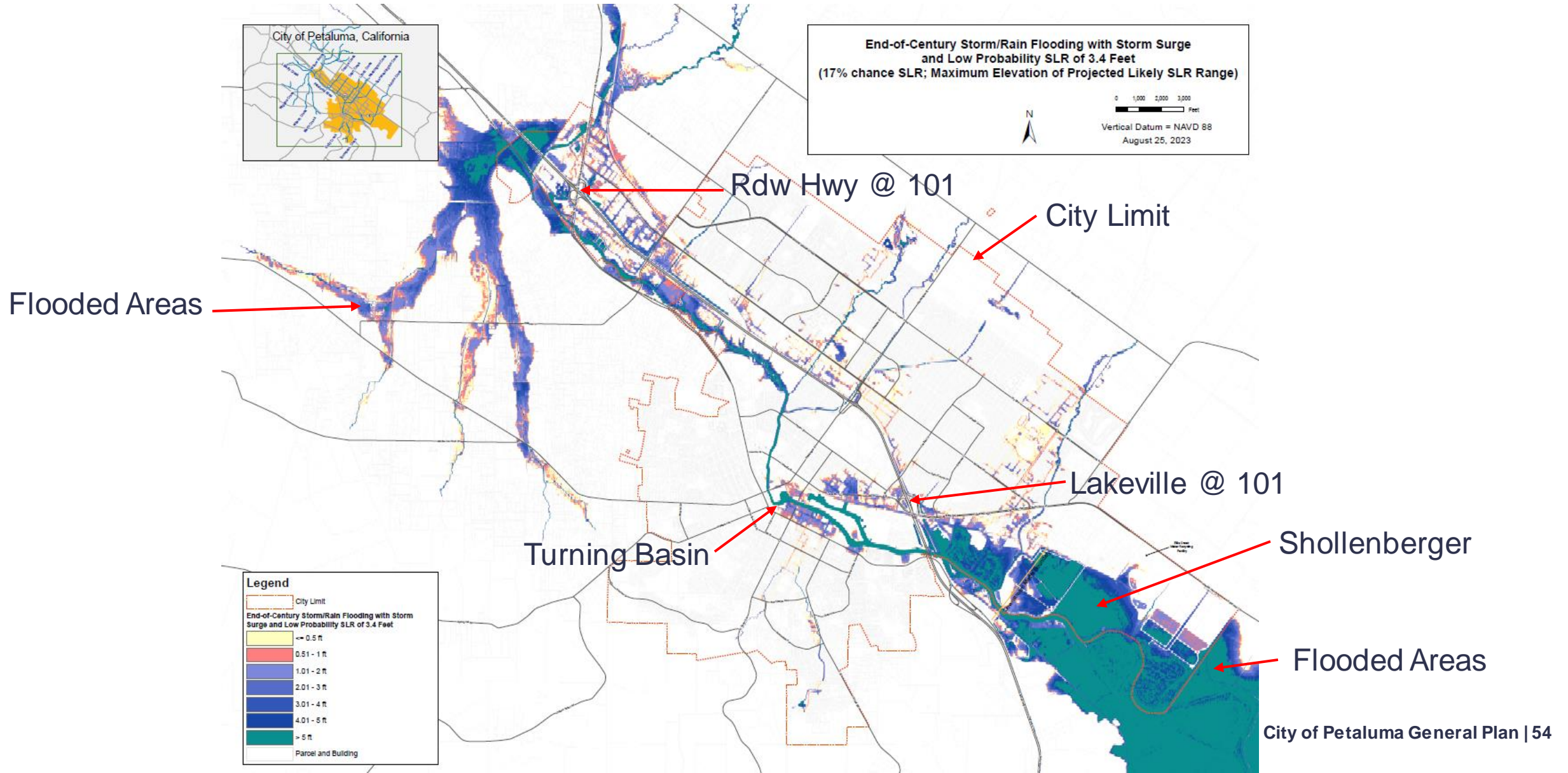
- <= 0.5 ft
- 0.51 - 1 ft
- 1.01 - 2 ft
- 2.01 - 3 ft
- 3.01 - 4 ft
- 4.01 - 5 ft
- > 5 ft

City Limit

Parcel and Building



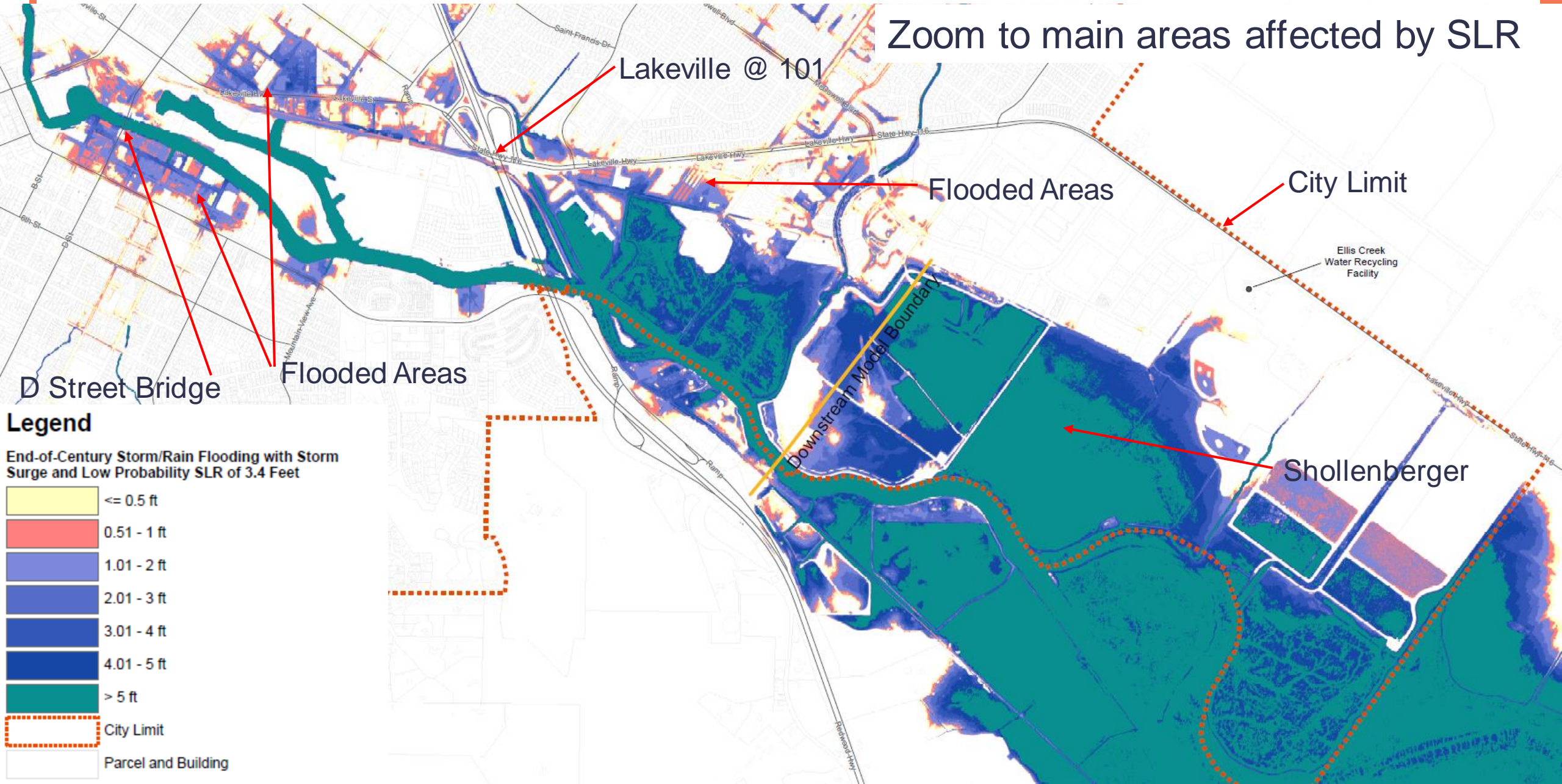
# End-of-Century SLR (3.4 feet), Rain and Storm Surge





# End-of-Century SLR (3.4 ft), Rain + Storm Surge

Zoom to main areas affected by SLR



# Clarifying Questions from GPAC Members

# Goal & Policy Ideas

# Goal & Policy Ideas: Caveat



All of the ideas in this presentation are preliminary ideas. This initial GPAC review will be followed by iterative refinement including additional staff review, review with GPAC Working Groups, decision maker discussion and community meetings.

# Overview

**Goal FR-1: Understand changing potential flood impacts**

**Goal FR-2: Develop plans and regulations to reduce vulnerability to flooding**

**Goal FR-3: Reduce future flood risk with flood protections and other adaptation strategies**

# Goals and Policies: FR-1

## Goal FR-1: Understand changing potential flood impacts

**Policy Areas FR-1A & FR-1B:**  
Model and map flood projections  
(e.g., WEST Modeling Products)

**Policy Area FR-1C:** Use  
modeling products to develop  
and adopt **Flood Hazard  
Overlays**

*Goal FR-2: Develop plans and regulations to  
reduce vulnerability to flooding*

*Goal FR-3: Reduce future flood  
risk with flood protections and  
other adaptation strategies*



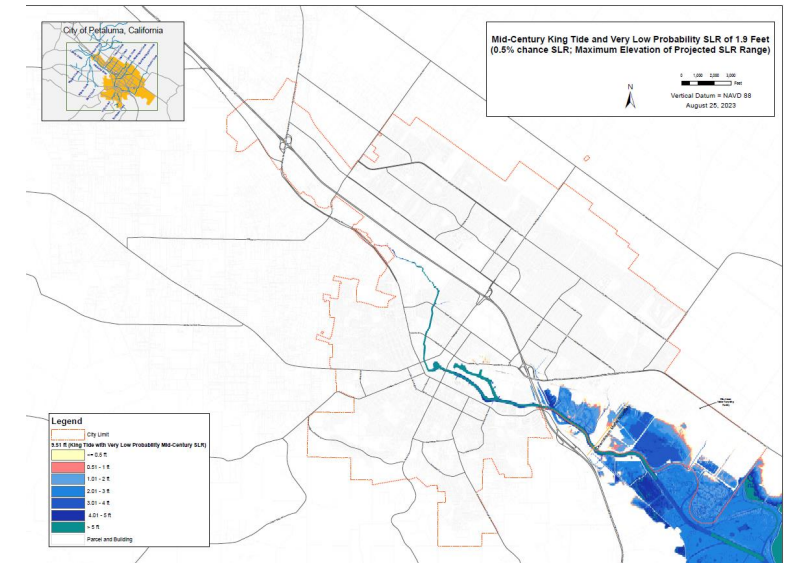
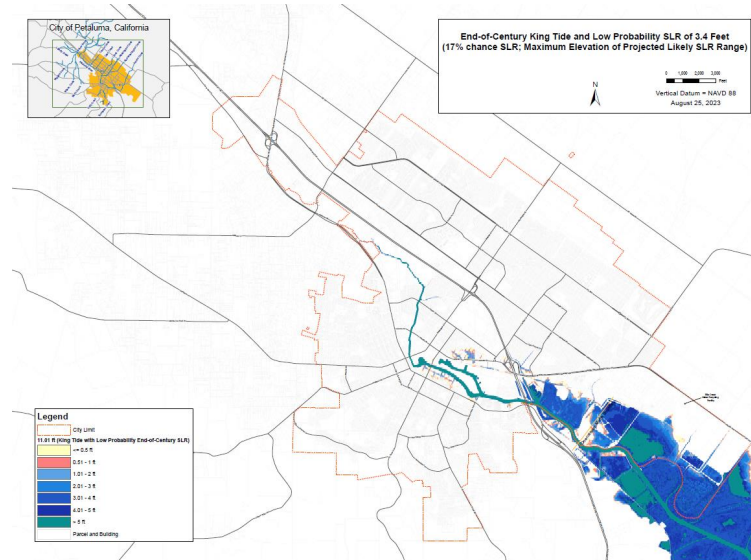
**Goal FR-1:** The City uses the **best available science and data** to understand the potential impacts of the climate crisis on flooding.

**Policy FR-1A:** Use best available sea level rise projections, precipitation models, and policy guidance to **predict future flood conditions.**

**Policy FR-1B:** Continuously improve the City's understanding of **watershed-flood dynamics**, including flood protection capacity, as necessitated by changes to policy, climate conditions, and planning needs.

**Goal FR-1:** The City uses the **best available science and data** to understand the potential impacts of the climate crisis on flooding.

**Policy FR-1C:** To complement the existing Petaluma River Corridor Overlay, develop and update **Flood Hazard Overlays** that delineate the various areas of the City that will be subject to development and building standards appropriate to different types of land uses and project lifespans.



**Goal FR-1:** The City uses the **best available science and data** to understand the potential impacts of the climate crisis on flooding.

**Policy FR-1D:** Evaluate and respond to the **demographics and severity of short- and long-term impacts** in different areas of Petaluma from changing flood conditions.

# Goals and Policies: FR-1

## Goal FR-1: Understand changing potential flood impacts

**Policy Areas FR-1A & FR-1B:**  
Model and map flood projections  
(e.g., WEST Modeling Products)

**Policy Area FR-1C:** Use  
modeling products to develop  
and adopt **Flood Hazard  
Overlays**

*Goal FR-2: Develop plans and regulations to  
reduce vulnerability to flooding*

*Goal FR-3: Reduce future flood  
risk with flood protections and  
other adaptation strategies*

# Goals and Policies: FR-2

*Goal FR-1: Understand changing potential flood impacts*

*Policy Areas FR-1A & FR-1B:  
Model and map flood projections  
(e.g., WEST Modeling Products)*

*Policy Area FR-1C: Use modeling  
products to develop and adopt  
Flood Hazard Overlays*

**Goal FR-2: Develop plans and regulations to  
reduce vulnerability to flooding**

**Policy Areas FR-2A & FR-2B:**  
Prepare a **City Flood  
Adaptation Master Plan**

**Policy Area FR-2C:** Update  
**Resilience Building Standards**  
using Flood Hazard Overlays

*Goal FR-3: Reduce future flood  
risk with flood protections and  
other adaptation strategies*

**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

**Policy FR-2A:** Develop **land use planning** that incorporates the Flood Hazard Overlays, other map products, and mitigation-adaptation strategies without increasing the number of residents at risk.

Develop a Flood Adaptation Master Plan, to include:

- Refine which adaptation strategy is best for each part of the City
- Which do you protect with floodwalls, which do you realign the land use, etc
  - How do we fund those adaptations?
    - Refine building standards
    - Plan future flood control projects
- Establish triggers for future adaptation

**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

### **Adaptation Pathway:**

A methodology to phase in adaptation based on external factors. As used here, an Adaptation Pathway has three basic components:





**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

## Example Adaptation Pathway

To address future flood risk downtown, the Flood Adaptation Master Plan might lay out the following Adaptation Pathway:



**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

**Policy FR-2B:** By 2030, prepare **regulatory standards and post-disaster recovery overlays** for flood-affected properties which are in alignment with long term planning documents, adaptation standards, and equity goals.

**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

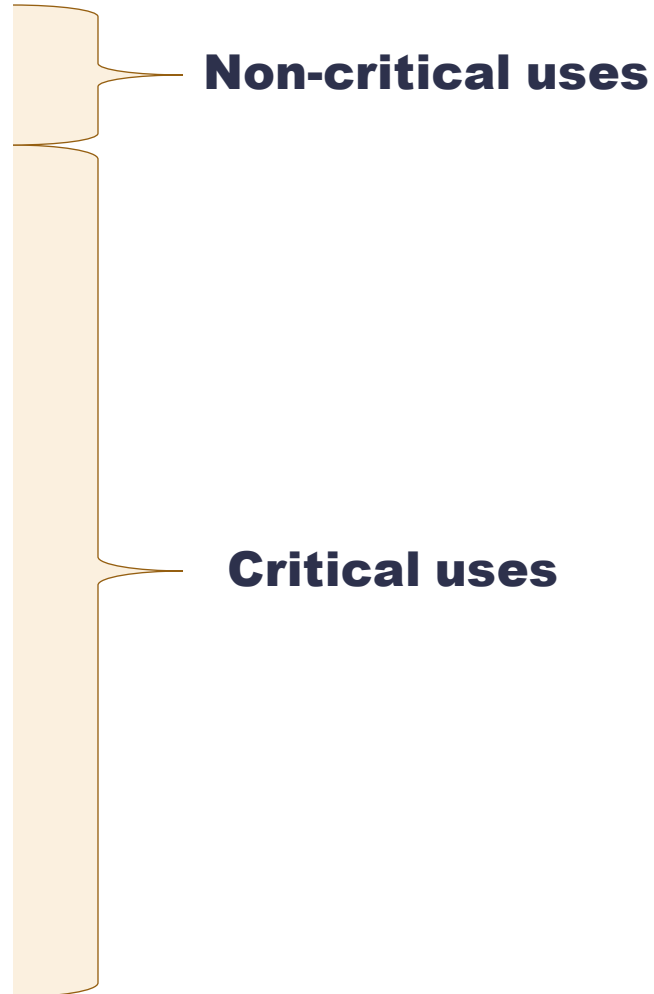
**Policy FR-2C:** Develop **planning and building code standards** that lay out **adaptation pathways** that require development and significant remodels to reduce individual and collective risk from flooding while still providing for a vibrant City. Require regulatory standards that will prevent increased risk from flood unless those areas are otherwise protected by flood protection systems.

**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

### **Policy FR-2C**

This Flood Hazard Overlay is called...	Is based on an SLR projection of...	And would require adaptation measures for...
Mid-Century Very Low Probability	1.9 feet by 2050	Any use with a lifespan ending before 2050
End-of-Century Low Probability	3.4 feet by 2100	Non-critical uses
End-of-Century Very Low Probability	6.9 feet by 2100	Critical uses

<b>ASCE 24-14 Table 1-1 Flood Design Class of Buildings and Structures</b>	
<b>Use or Occupancy of Buildings and Structures</b>	<b>Flood Design Class</b>
Buildings and structures that normally are unoccupied and pose minimal risk to the public or minimal disruption to the community should they be damaged or fail due to flooding. Flood Design Class 1 includes (1) temporary structures that are in place for less than 180 days, (2) accessory storage buildings and minor storage facilities (does not include commercial storage facilities), (3) small structures used for parking of vehicles, and (4) certain agricultural structures. [Note (a)]	1
Buildings and structures that pose a moderate risk to the public or moderate disruption to the community should they be damaged or fail due to flooding, except those listed as Flood Design Classes 1, 3, and 4. Flood Design Class 2 includes the vast majority of buildings and structures that are not specifically assigned another Flood Design Class, including most residential, commercial, and industrial buildings.	2
Buildings and structures that pose a high risk to the public or significant disruption to the community should they be damaged, be unable to perform their intended functions after flooding, or fail due to flooding. Flood Design Class 3 includes (1) buildings and structures in which a large number of persons may assemble in one place, such as theaters, lecture halls, concert halls, and religious institutions with large areas used for worship; (2) museums; (3) community centers and other recreational facilities; (4) athletic facilities with seating for spectators; (5) elementary schools, secondary schools, and buildings with college or adult education classrooms; (6) jails, correctional facilities, and detention facilities; (7) healthcare facilities not having surgery or emergency treatment capabilities; (8) care facilities where residents have limited mobility or ability, including nursing homes but not including care facilities for five or fewer persons; (9) preschool and child care facilities not located in one- and two-family dwellings; (10) buildings and structures associated with power generating stations, water and sewage treatment plants, telecommunication facilities, and other utilities which, if their operations were interrupted by a flood, would cause significant disruption in day-to-day life or significant economic losses in a community; and (11) buildings and other structures not included in Flood Design Class 4 (including but not limited to facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, hazardous waste, or explosives) containing toxic or explosive substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released. [Note (b)]	3
Buildings and structures that contain essential facilities and services necessary for emergency response and recovery, or that pose a substantial risk to the community at large in the event of failure, disruption of function, or damage by flooding. Flood Design Class 4 includes (1) hospitals and health care facilities having surgery or emergency treatment facilities; (2) fire, rescue, ambulance, and police stations and emergency vehicle garages; (3) designated emergency shelters; (4) designated emergency preparedness, communication, and operation centers and other facilities required for emergency response; (5) power generating stations and other public utility facilities required in emergencies; (6) critical aviation facilities such as control towers, air traffic control centers, and hangars for aircraft used in emergency response; (7) ancillary structures such as communication towers, electrical substations, fuel or water storage tanks, or other structures necessary to allow continued functioning of a Flood Design Class 4 facility during and after an emergency; and (8) buildings and other structures (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste) containing sufficient quantities of highly toxic substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released. [Note (b)]	4
<p>[Note (a)] Certain agricultural structures may be exempt from some of the provisions of this standard; see ASCE 24-14 Section C1.4.3.</p> <p>[Note (b)] Buildings and other structures containing toxic, highly toxic, or explosive substances shall be eligible for assignment to a lower Flood Design Class if it can be demonstrated to the satisfaction of the authority having jurisdiction by a hazard assessment as described in ASCE 7-10 Section 1.5.3 of <i>Minimum Design Loads for Buildings and Other Structures</i> that a release of the substances is commensurate with the risk associated with that Flood Design Class.</p>	

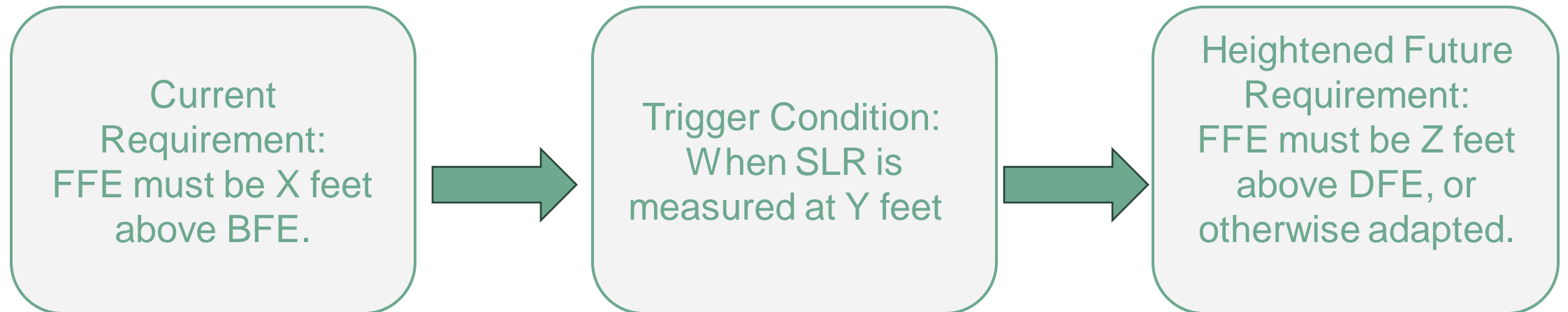


**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

**Design Flood Elevation (DFE):** the elevation of surface water shown on the relevant Flood Hazard Overlay. Defined by the City, and always to exceed BFE.

## Example Adaptation Pathway

A non-critical use in the End-of-Century Low Probability Overlay might be required to document each of the following:





**Goal FR-2:** The City implements land use planning and regulatory standards to **reduce vulnerability** from climate-induced flooding, particularly for disadvantaged communities.

There are many adaptation strategies at the building scale, like **raising floors, floodable ground floors, barriers, etc.**

GP will address some, more detail in building standards

- **Mid-Century Very Low Probability Flood Hazard Overlay** (applicable to any short-lived uses)
  - + Specify a Required Finish Floor Elevation X feet above the FIRM Base Flood Elevation.
  - + Establish an Adaptability Standard that is triggered when observed sea level rise reaches Y feet below the sea level assumed in the overlay (as of 9/23, the trigger would be 1.9' minus Y).
- **End-of-Century Low Probability Flood Hazard Overlay** (applicable to any non-critical uses (retail, residential, etc.))
  - + Specify a Required Finish Floor Elevation X feet above the FIRM Base Flood Elevation (and required King Tide Design Flood Elevation when impacted by the King Tide)
  - + Establish an Adaptability Standard that is triggered when observed sea level rise reaches Y feet below the sea level assumed in the overlay (as of 9/23, the trigger would be 3.4' minus Y) OR require that the building be adapted to future flood risks at construction.
- **End-of-Century Very Low Probability Flood Hazard Overlay** (applicable to any critical uses (hospital, emergency shelter, etc.))
  - + Specify a Required Finish Floor Elevation X feet above the FIRM Base Flood Elevation (and required King Tide Design Flood Elevation when impacted by the King Tide)
  - + Establish an Adaptability Standard that is triggered when observed sea level rise reaches Y feet below the sea level assumed in the overlay (as of 9/23, the trigger would be 6.9' minus Y) OR require that the building be adapted to future flood risks at construction
- When City flood resilience standards differ from FIRM or other regulatory standards, the higher standards will apply.



# Goals and Policies: FR-2

*Goal FR-1: Understand changing potential flood impacts*

*Policy Areas FR-1A & FR-1B:  
Model and map flood projections  
(e.g., WEST Modeling Products)*

*Policy Area FR-1C: Use modeling  
products to develop and adopt  
Flood Hazard Overlays*

**Goal FR-2: Develop plans and regulations to  
reduce vulnerability to flooding**

**Policy Areas FR-2A & FR-2B:**  
Prepare a **City Flood  
Adaptation Master Plan**

**Policy Area FR-2C:** Update  
**Resilience Building Standards**  
using Flood Hazard Overlays

*Goal FR-3: Reduce future flood  
risk with flood protections and  
other adaptation strategies*

# Goals and Policies: FR-3

*Goal FR-1: Understand changing potential flood impacts*

*Policy Areas FR-1A & FR-1B:  
Model and map flood projections  
(e.g., WEST Modeling Products)*

*Policy Area FR-1C: Use modeling  
products to develop and adopt  
Flood Hazard Overlays*

*Goal FR-2: Develop plans and regulations to  
reduce vulnerability to flooding*

*Policy Areas FR-2A & FR-2B:  
Prepare a City Flood Adaptation  
Master Plan*

*Policy Area FR-2C: Update  
Resilience Building Standards  
using Flood Hazard Overlays*

**Goal FR-3: Reduce future flood  
risk with flood protections and  
other adaptation strategies**

**Policy Area FR-3A:** Design  
and implement **Capital  
Improvements** for  
resilience

**Policy Area FR-3B:**  
Develop **Flood Protection  
Projects**, with focus on  
nature-based solutions

**Goal FR-3:** The City implements avoidance, protection, accommodation, and land use realignment projects that **reduce the risk** from future flood scenarios, emphasizing nature-based solutions and a watershed restoration strategy.

**Policy FR-3A:** Design **all City capital improvements**

(buildings, infrastructure, roads, parks, etc.) for resilience against the flood scenario appropriate to its risk tolerance and project lifespan.



**Goal FR-3:** The City implements avoidance, protection, accommodation, and land use realignment projects that **reduce the risk** from future flood scenarios, emphasizing nature-based solutions and a watershed restoration strategy.

**Policy FR-3B:** Develop **flood protection strategies and projects** that prioritize multi-benefit nature-based solutions and prevent a disproportionate adverse impact on disadvantaged communities.



**Goal FR-3:** The City implements avoidance, protection, accommodation, and land use realignment projects that **reduce the risk** from future flood scenarios, emphasizing nature-based solutions and a watershed restoration strategy.

**Policy FR-3C:** Identify **sustainable funding streams** to facilitate both public and private flood protection strategies and stormwater network maintenance from parcel to regional scales.

# Goals and Policies: FR-3

*Goal FR-1: Understand changing potential flood impacts*

*Policy Areas FR-1A & FR-1B:  
Model and map flood projections  
(e.g., WEST Modeling Products)*

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Projects**, with focus on  
nature-based solutions



**Goal FR-4:** The City **empowers stakeholders** to collaborate on solutions to climate-induced flooding, which in turn creates a more resilient City.

**Policy FR-4A:** Provide **public education** on the growing risks from climate-induced flooding and support access to adaptation guidance.

**Policy FR-4B:** Partner with public and quasi-public agencies in the region to **collaboratively pursue** larger-scale adaptation measures.

**Goal FR-4:** The City **empowers stakeholders** to collaborate on solutions to climate-induced flooding, which in turn creates a more resilient City.

**Policy FR-4C:** Encourage new and existing development to **proactively adopt adaptation** measures.

**Policy FR-4D:** Support **neighborhood-scale adaptation plans** and projects.

# Overview

## Goal FR-1: Understand changing potential flood impacts

**Policy Areas FR-1A & FR-1B:**  
Model and map flood projections  
(e.g., WEST Modeling Products)

**Policy Area FR-1C:** Use  
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**Policy Area FR-2C:** Update  
**Resilience Building Standards**  
using Flood Hazard Overlays

## Goal FR-3: Reduce future flood risk with flood protections and other adaptation strategies

**Policy Area FR-3A:** Design  
and implement **Capital  
Improvements** for  
resilience

**Policy Area FR-3B:**  
Develop **Flood Protection  
Projects**, with focus on  
nature-based solutions

# Summary: Current and Proposed

Goal	Current Approach	Proposed Approach
1: Understand the problem	Understand the <b>current</b> problem	Understand the <b>future</b> problem
2: Reduce vulnerability	Reduce <b>current</b> vulnerability	Reduce some of <b>future</b> vulnerability now, have plan for <b>more future</b> vulnerability
3: Reduce risk	Reduce <b>current</b> risk	Reduce some <b>future</b> risk now, have plan for <b>more future</b> risk
4: Empower stakeholders		

# Questions

What are examples of **successful flood protection and adaptation** efforts within the City?

How do you think landowners will want to **prepare** through 2050 for flooding that is forecasted by the end of the century?

How can the City **support** residents and businesses in adapting to changing flood conditions? Are there options to provide funding for, and legally require, future adaptation of private property (e.g., deed restrictions)?

To what extent should the City consider **land use realignment**, including managed retreat, as a flood resilience strategy?

# Public Comments



# **GPAC Discussion: Flood Resilience Policy & Strategy Ideas**

# Questions

What are examples of **successful flood protection and adaptation** efforts within the City?

How do you think landowners will want to **prepare** through 2050 for flooding that is forecasted by the end of the century?

How can the City **support** residents and businesses in adapting to changing flood conditions? Are there options to provide funding for, and legally require, future adaptation of private property (e.g., deed restrictions)?

To what extent should the City consider **land use realignment**, including managed retreat, as a flood resilience strategy?

# GPAC Working Group Participation

# Working Group Reorganization

- Next Steps
  - Poll will stay open for GPAC members not present
  - Confirm Working Group participation
  - Share results and meeting preferences with Working Group members

# Final GPAC Thoughts

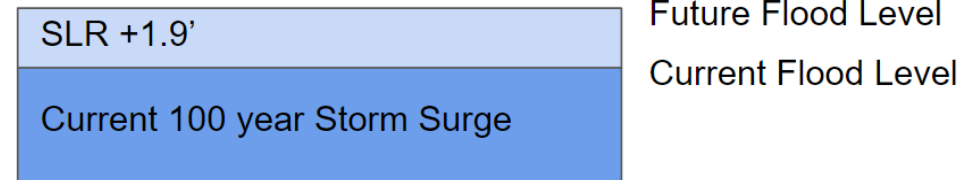
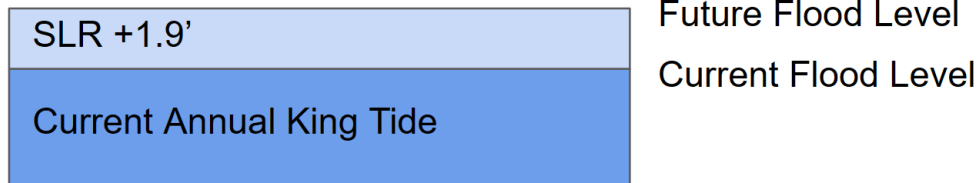


# General Public Comment

# Reference Slides

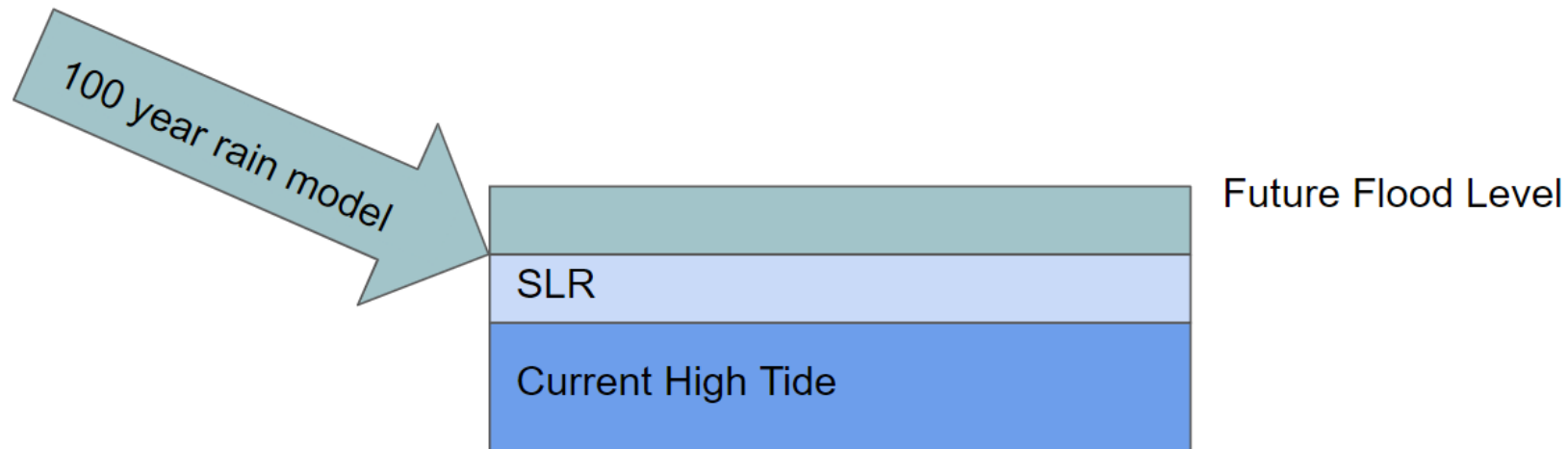
# King Tide and Storm Surge

- Current King Tide and Storm Surge patterns are layered on top of Sea Level Rise to predict what will flood in the future



# SLR effects on Rainfall flooding

- Considering how SLR impacts rainfall flooding requires updated rain model
  - Model Method
    - 1: Add SLR amount to current MHHW tide level
    - 2: Run the rain flood model, now with rainfall needing to "fight" the higher river elevation
    - 3: Model results may show extra flooded areas



# Sea Level Rise (SLR) Selections

- Mid-Century
  - Roughly 2050
  - Very low probability SLR
  - 0.5% chance
  - **1.9 feet**
  
- Short planning horizon, so the worst case was selected

Mid Century SLR

Likelihood	Elevation	PETGP Definition
0.5%	1.9'	Very Low Probability
5%	1.4'	
17%	1.1'	Low Probability
50%	0.9'	
83%	0.6'	

Likely Range



# Sea Level Rise (SLR) Selections

- End-of-Century
  - Roughly 2100
  - Low probability SLR
  - 17% chance
  - **3.4 feet**
- Longer planning horizon gives us more time to prepare
- Appropriate for most planning efforts

## End of Century SLR

Likelihood	Elevation	PETGP Definition
0.5%	6.9'	Very Low Probability
5%	4.4'	
17%	3.4'	Low Probability
50%	2.5'	
83%	1.6'	
96%	1.0'	

Likely Range



# Sea Level Rise (SLR) Selections

- End-of-Century
  - Roughly 2100
  - Very Low probability SLR
  - 0.5% chance
  - **6.9 feet**
- Longer planning horizon gives us more time to prepare
- Appropriate for uses that are critical to safety and emergency response

End of Century SLR		
Likelihood	Elevation	PETGP Definition
0.5%	6.9'	Very Low Probability
5%	4.4'	
17%	3.4'	Low Probability
50%	2.5'	
83%	1.6'	
96%	1.0'	

*Likely Range* (indicated by a red double-headed arrow spanning from 1.6' to 6.9')

