## **Flood Management Plan**

#### Systemwide Evaluation Update to Zone 7 Board

21 May 2025





# Agenda

- 01 Recap of FMP Phase 1
- 02 Estimate Existing and Future Risk Defined
- 03 How We Estimated Existing and Future Risk
- 04 Risk Assessment Results
- 05 How We Will Develop and Evaluate Proposed Solutions
- 06 Next Steps
- **07** Questions, comments





### Flood Management Plan Phase 1

- Two initiatives in Zone 7's 5-Year Strategic Plan (2025):
  - #12: Complete the Flood Management Plan
  - #13: Continue to Repair and Maintain the Flood Protection Facilities



# Flood Management Plan Phase 1

**Goals and Objectives** 

- Goal #1
  - Develop the framework to provide flood protection to a level as high as reasonably practicable using a risk-informed process.
- Supporting Objective
  - Conduct a risk-informed, watershed-based evaluation of the flood control channel system.





# Flood Management Plan process ....and where we are in it



02 Estimate Existing and Future Risk Defined Estimate Existing & Future Risk

Develop & Evaluate Proposed Solutions

#### Formulate Detailed Plan



Estimate Existing & Future Risk

**Develop & Evaluate Proposed Solutions** 

Formulate Detailed Plan



#### Formulate Detailed Plan

#### What is the 100-year flood?

Time	Chance of Occurring
Any given year	1%
30-year mortgage	26%
5-year capital cycle	5%

 Can occur more than once within 100-years and can even occur multiple times in the same year!

#### What is the 10-year flood?

Time	Chance of Occurring
Any given year	10%
30-year mortgage	96%
5-year capital cycle	41%

 Can occur more than once within 10-years and can even occur multiple times in the same year!!



If an area is exposed to the 10-year flood, it is also exposed to all larger floods

#### Estimate Existing & Future Risk

**Develop & Evaluate Proposed Solutions** 

**Formulate Detailed Plan** 





Damage (\$)

**03** How We Estimated Existing and Future Risk

# **Flood Risk Assessment**

#### **Current and Future Without-Project Condition**

- Study area
- Analysis period
  - Planning horizon for flood risk
    management typically 50 years



#### **Input Data Development**



# **Flood Risk Assessment**

How do we quantify flood risk?

- US Army Corps of Engineers' Flood Damage Reduction Analysis HEC-FDA software
- Integrates hydrologic and hydraulic engineering, economic analysis, and plan formulation during flood risk management planning
- HEC-FDA computes expected annual damage (EAD)





**04** Risk Assessment Results

### **Risk Assessment Results Include:**

#### Flood damage in floodplain



\*Non-Zone 7 property Photo source: ScienceFriday

#### Channel composition damage



\* Zone 7 property

#### **25-year Current Conditions Floodplain**



#### **50-year Current Conditions Floodplain**



### **Flood Risk Results**

	Damaged Structure Count		Total Damage* (\$M) (Structures & Contents)	
Return Period	Current	Future	Current	Future
10-yr	10	20	40	55
25-yr	210	340	100	120
50-yr	460	1,040	190	340
100-yr	1,180	2,650	330	660
200-yr	2,390	3,820	700	1,320
500-yr	3,620	5,980	1,520	2,380

\*Damage to non-Zone 7 property

## **Frequency-Damage Relationship**



\*Damage to non-Zone 7 property

## **Flood Risk Results**

#### **Expected Annual Damage\***

Structure Type	Current Condition (\$M)	Future Condition (\$M)
Commercial	1.2	2.7
Industrial	0.2	0.5
Public	1.0	2.0
Residential	1.6	3.6
Total	4.0	8.8

\*Damage to non-Zone 7 property

Net Present Value over 50-year planning horizon = \$155M

## **Geomorphic Risk Assessment**

**Erosion Vulnerability** 

#### 2 1 3 Geomorphic Mediating Final Risk Assessment Factors Vulnerability Assessment Infrastructure Adjacency **Bank Failure Risk** Erosion Vulnerability Score Incision (Bed **Mobilization)** Risk

#### **Sedimentation Vulnerability**



### **Erosion Vulnerability**



# **Sedimentation Vulnerability**



### Next Step: Quantifying and Monetizing In-channel Damages

For reference, recent past damages have been:

Design and Construction Costs		
2017 Storm Damages	\$33 Million	
2023 Storm Damages	\$82 Million	

# **Key Takeaways from Risk Results**

- Risk and cost of damages will continue to increase into the future with no-action
- Risk results help focus areas of priority
- Flood risk is generally not life threatening
- Need to balance benefits, project costs, and residual risk
- Consider "other" benefits



**05** How We Will Develop and Evaluate Proposed Solutions Estimate Existing & Future Risk Develop & Evaluate Proposed Solutions

#### Formulate Detailed Plan



# **Examples Risk Mitigation Measures**

#### Structural Measures

- Levees or berms
- Floodwalls
- Rock protection
- Detention/sediment basins

#### Maintenance Measures

- Sediment removal
- Vegetation management

#### Non-Structural Measures

- Flood warning system
- Structural elevation or relocation
- Floodproofing
- Floodplain restoration

#### Nature-Based Measures

- Wetlands
- Rain garden
- Vegetative barrier

- Policy Measures
  - Future development
  - First floor elevation requirements
  - Zoning

#### **Examples of Risk Mitigation Measures**













Estimate Existing & Future Risk

Develop & Evaluate Proposed Solutions

Formulate Detailed Plan







# **Next Steps**

- Develop conceptual structural and non-structural solutions w/ Z7 staff
- Engage with partner agencies
- Engage with public

**07** Questions, Comments