

King County Flood Hazard Management Plan Update

Green River Basin

Presentation for Public Meetings

December, 2012

Protecting public safety, the regional economy and critical infrastructure.

Green River Presentation

- Existing Flood Risks
- Draft Plan Proposal
- Accomplishments since 2006
- Strategic Approaches **Not** Proposed

Green River Basin Team

Tom Bean – Supervising Engineer

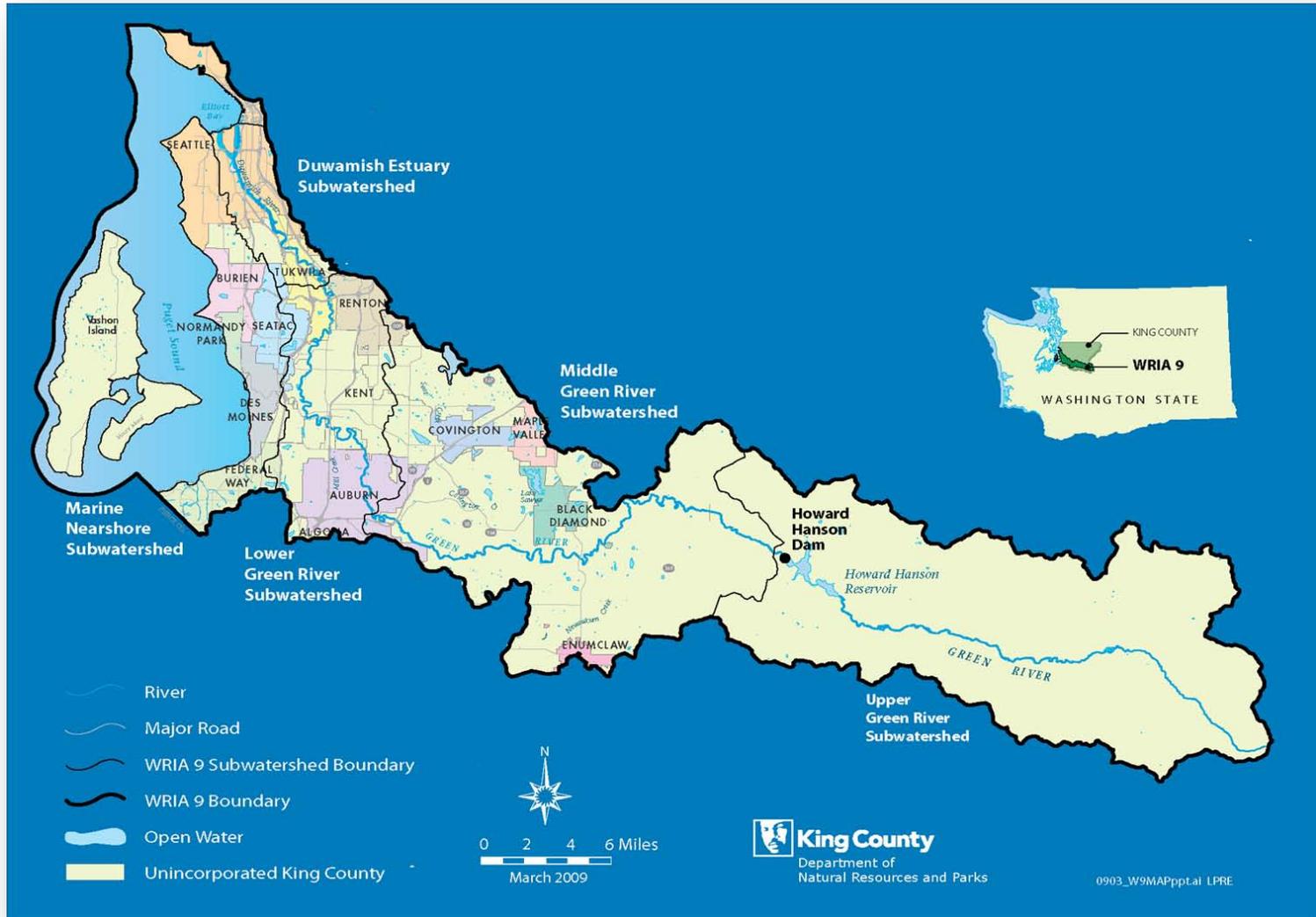
Andy Levesque – Senior Engineer

Erik Peters – Senior Engineer

Sarah McCarthy – Senior Ecologist

Jen Rice – Project/Program Manager

Green River Basin



Upper Green River Basin



Howard Hanson Dam – earth fill structure 235 feet tall

Middle Green River Basin



Discontinuous levees, frequent flooding, significant agricultural land use

Lower Green River Basin



Near-continuous levee system, flooding contained, extensive urban land uses

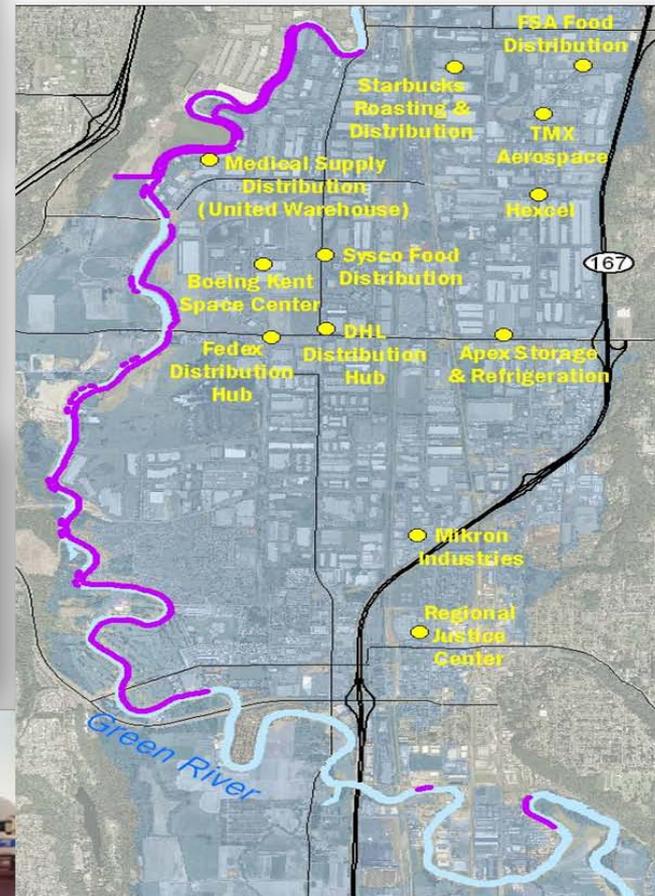
Existing Flood Risks

\$7.3 billion in floodplain structures and contents

81% of estimated damage potential in mapped floodplains of King County

Green River Flood Risks

- over 100,000 jobs
- includes 100 million square feet of warehousing and distribution space (the 2nd largest complex on the West Coast; 4th-largest in the nation)
- an annual payroll of \$2.8 Billion
- comprises fully 1/8th of the entire Gross Domestic Product of the State of Washington,
- annual taxable revenue of \$8 billion.



Lower Green River Strategy

Improve Urban Levee System

Design and construct new levee facilities to meet or exceed all applicable stability and resilience standards.

Provide 500-year levee protection, to match historic understanding of flow control at Howard Hanson Dam (now understood to provide less protection than previously thought).

Levee stability requires flatter slopes, wider levees, more land. This brings opportunity to improve floodplain and riparian functions.

Urban acquisitions will be very expensive. Some flood repairs may be necessary in short term before setbacks are achieved.



Middle Green River Strategy

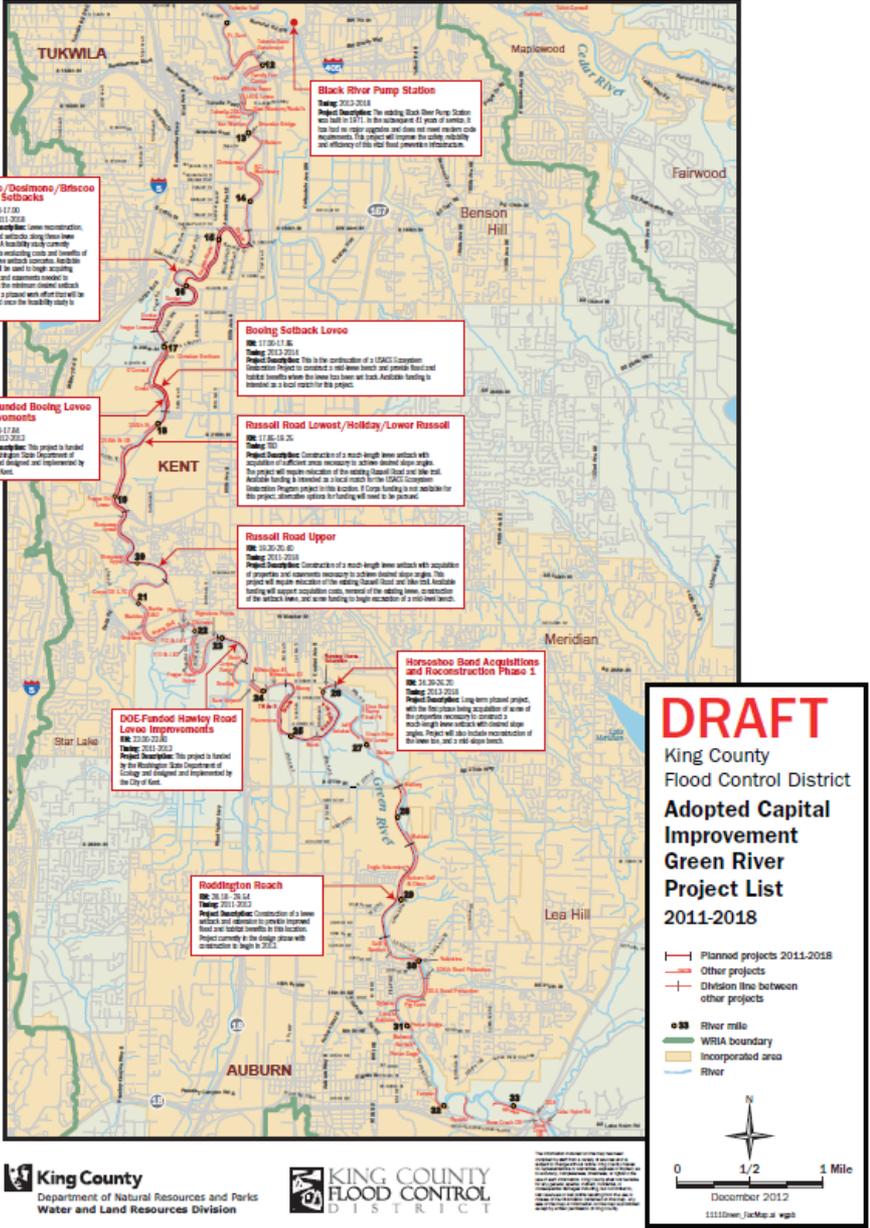
Rural Flood Hazard Reduction

Risk-based priorities generally do not favor investment in discontinuous agricultural levee system improvements.

Evaluate the need to acquire or elevate at-risk structures in coordination with other King County plans and programs.



Green River Proposed Actions



Projects in the Plan Update will continue to be focused on the Lower Green River.

Primarily consist of levee reconstruction, repairs and setbacks with the inclusion of benches to accommodate habitat.

First project to be initiated is the Reddington Levee Setback and Extension.

- Design & Acquisition 2009-2012
- Construction in 2013
- Length of the project: 1.3 Miles
- Received \$1.03 million in State funding to help with the project.

Evaluate need for elevation or acquisition of at risk structures in the Middle Green River Basin. Implement accordingly.

Green River Accomplishments Since 2006

Capital Projects and Levee Repairs:

- Over 15,400 linear feet of levee rebuilt in critical repairs to protect public infrastructure and commercial and industrial land uses

Engineering and Design

- Flood Insurance Study
- Green River External Advisory Review Panel Report
- Reddington Levee Setback and Extension Feasibility
- 180-200th Street Levee Setback Feasibility

Land and ROW Acquisitions

- Purchased 36.6 acre Teufel Nursery Site for project mitigation and habitat restoration.
- Acquired ROW for the 6,600 foot Reddington levee setback and extension project.
- Acquired first 3 commercial buildings for Briscoe levee setback project

Regional Response to 2009 Problems at HHD

- 26 miles of sandbags and HESCO barriers (installation and removal)
- Pump station improvements
- Patrol training, coordination, and improved communication equipment.



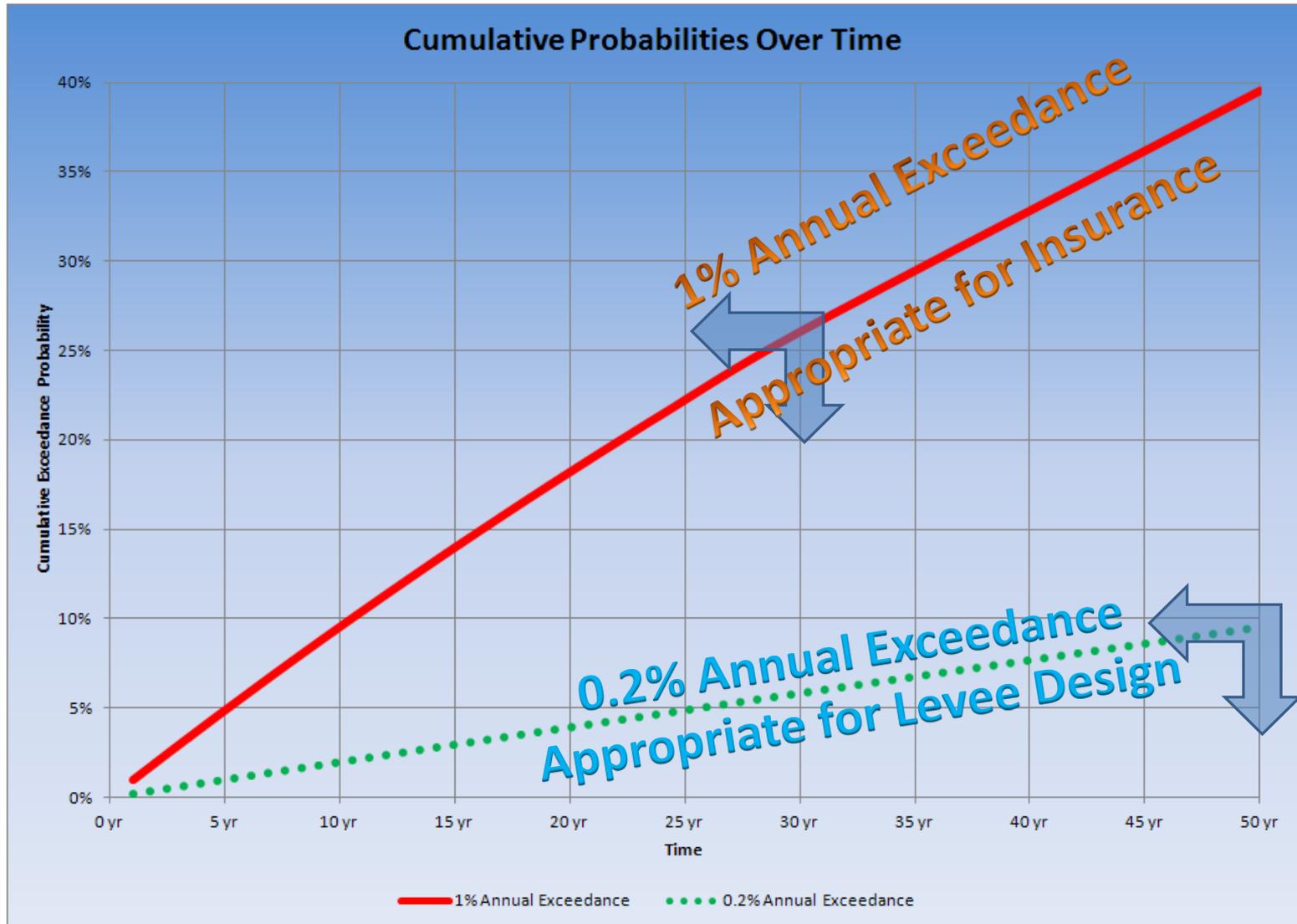
Strategic Approaches Not Proposed

1. Reduce Level of Protection
(rebuild levees but design for less than 500-year flood conditions)
2. Improve Flood Control Capability at the Howard Hanson Dam
(instead of improving the levee system downstream)

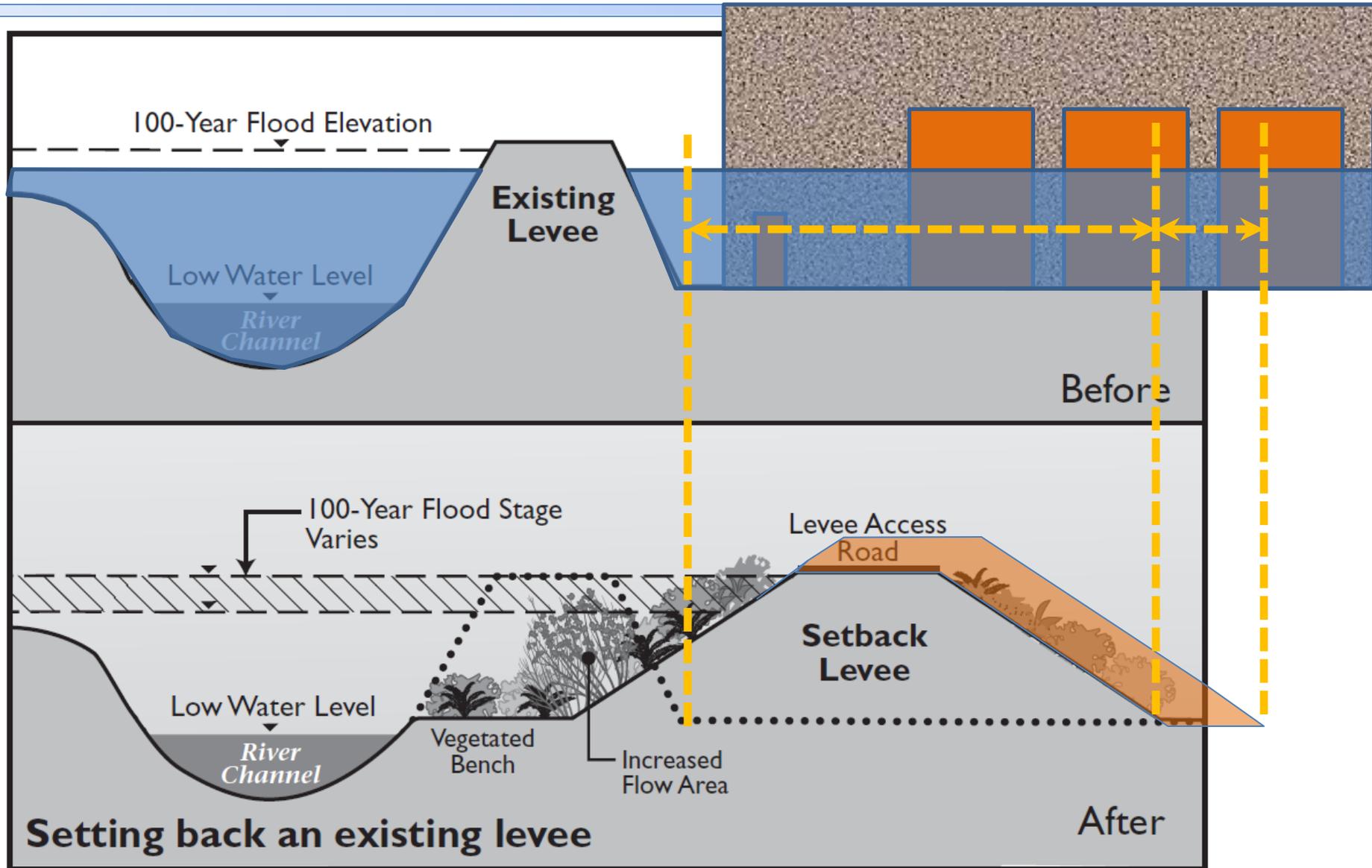
Not Proposed: Reduce Level of Protection

- Flood mapping standards
 - Based on 1% annual chance (100-year) conditions
 - Levee accreditation issues
 - Land use regulations and limitations
 - Flood insurance requirements
- Flood hazard reduction design standards
 - Dam design expectation exceeded 500-year protection
 - More than \$7 billion at risk on valley floor
 - Single-event damage estimates for 100-year flood without levee containment (FEMA 2009):
 - \$1.97 billion in economic losses
 - 21,000 people displaced
 - 100 buildings substantially damaged
 - Long-term success is important
 - Probabilities accumulate year by year

Level of Protection – Confidence in Benefit



Level of Protection – Cost of 500-yr Levees



Strategic Approaches Not Proposed

Considered:

Reduce Level of Protection (rebuild levees but design for less than 500-year flood conditions)

Recommended:

Provide 500-year levee protection, to match historic understanding of flow control at Howard Hanson Dam (now understood to provide less protection than previously thought).

Existing Flood Risks

Improved Understanding of Flow Control at Howard Hanson Dam

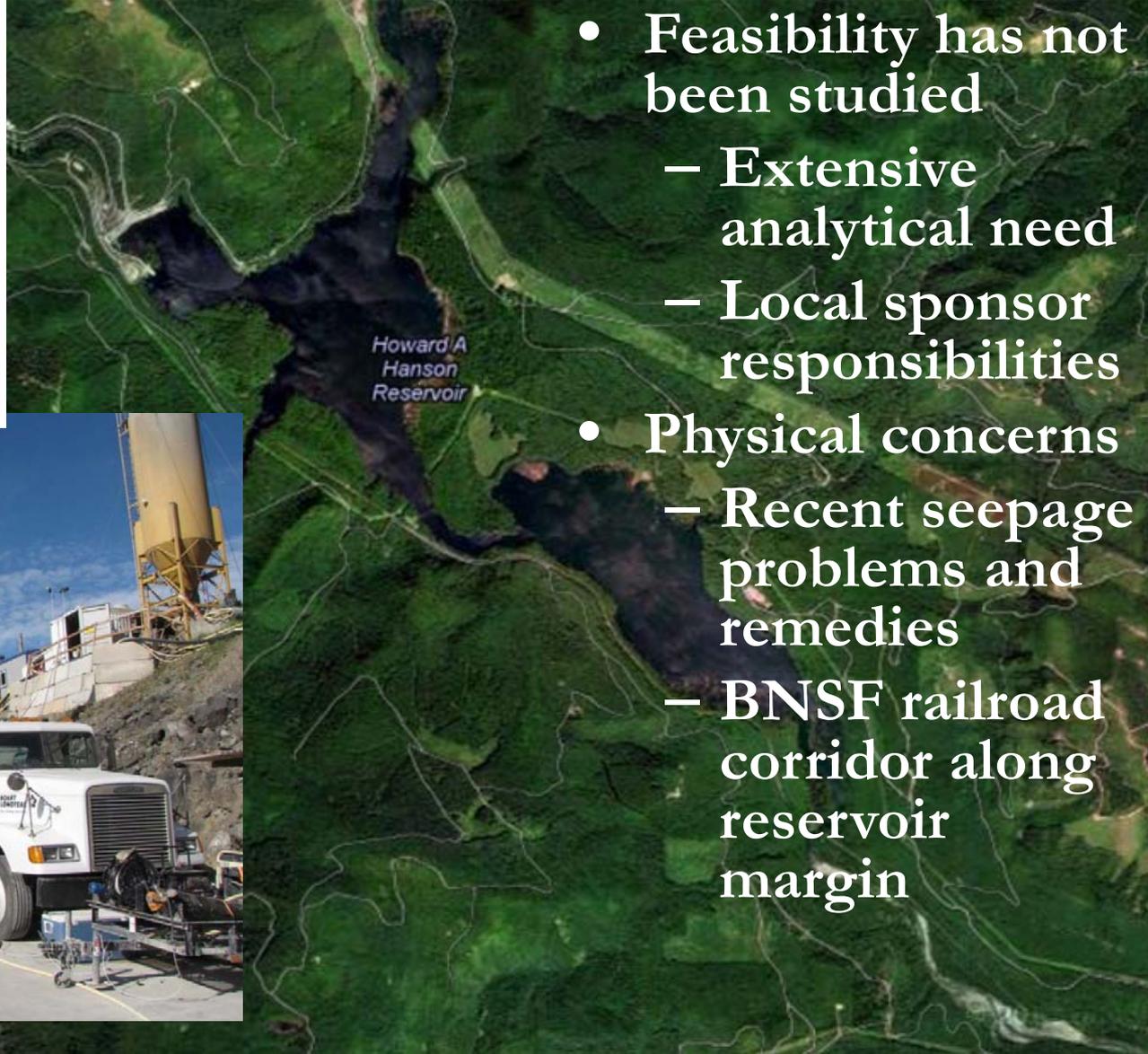
Annual Exceedance Probability	Recurrence Interval	Existing Effective Flood Insurance Study (FEMA 1995)	Preliminary Flood Insurance Study (FEMA Jan. 2011)	Reddington Feasibility Study (NHC Nov. 2011)	Simulated Regulated Flow in Green River at Auburn (USACE Sep. 2012)
0.100	10-year	12,000 cfs	11,230 cfs	11,200 cfs	12,000 cfs
0.020	50-year	12,000	12,420	12,300	12,000
0.010	100-year	12,000	12,810	12,500	12,000
0.002	500-year	12,000	13,460	14,900	18,800

Not Proposed: Expand Howard Hanson Dam

Howard Hanson Dam to operate at full capacity this season



Credit: KING



- Feasibility has not been studied
 - Extensive analytical need
 - Local sponsor responsibilities
- Physical concerns
 - Recent seepage problems and remedies
 - BNSF railroad corridor along reservoir margin



Strategic Approaches Not Proposed

Considered:

Improve Flood Control Capability at the Howard Hanson Dam (instead of improving the levee system downstream)

Recommended:

Design and construct new levee facilities to provide 500-year levee protection, given the best available information about flood flow probabilities on the Green River below Howard Hanson Dam.

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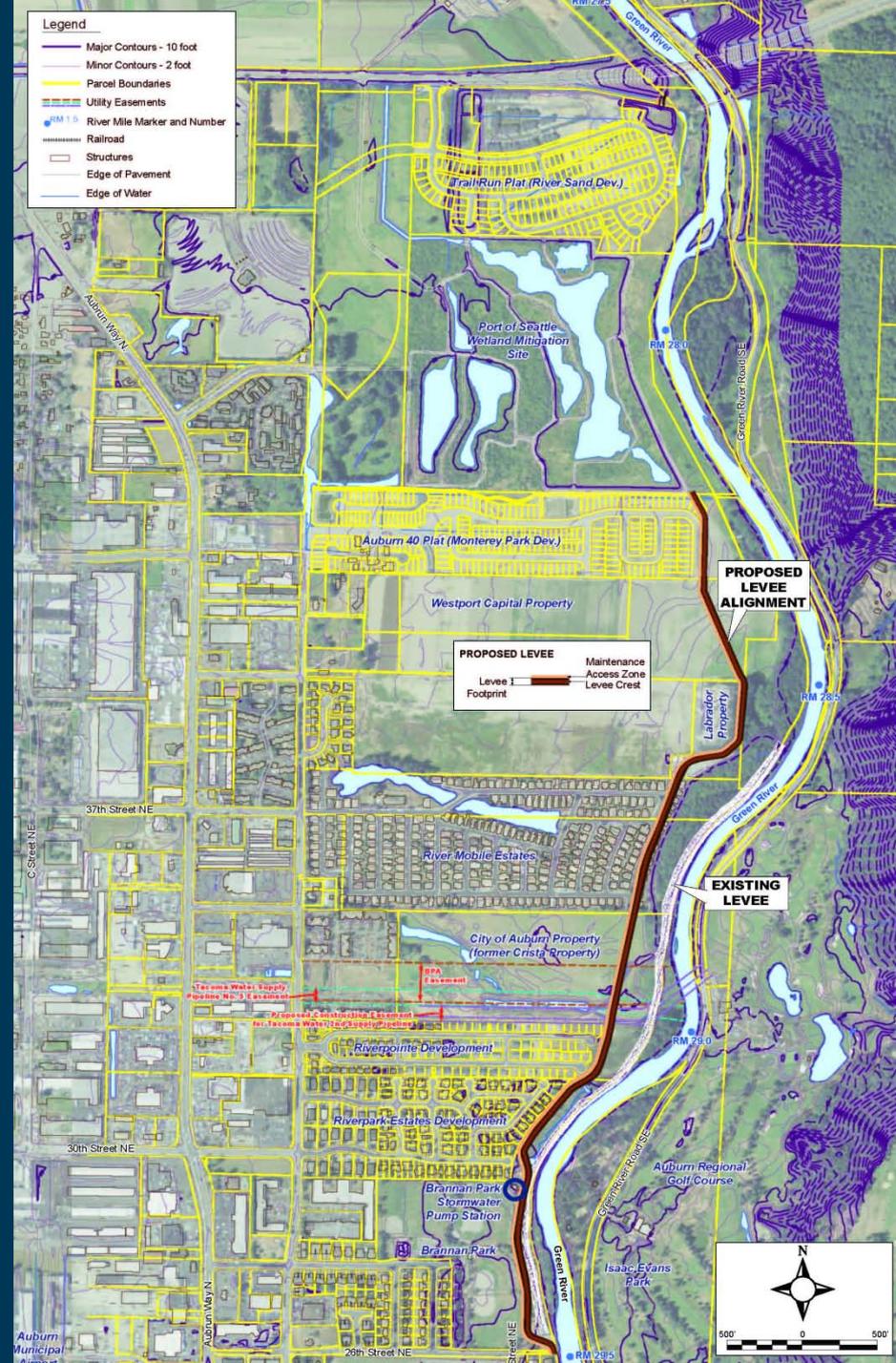
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Reddington Levee Setback and Extension Project

- 6,600 feet of new levee construction
- 4,750 feet of existing levee to be removed
- \$12 million project cost estimate
- \$1 million state grant (terms require construction in 2013)



Reddington Levee Protects:

596 parcels

- 321 residential

- 275 commercial

Total assessed value:

\$680 million

Inundated Areas

Governing Scenario

- All Levees Intact
- Reddington
- Reddington + Mill Cr/Mullen St.
- Horseshoe Bend
- East Valley
- Midway/Johnson Creek
- Fail All Levees

FLO-2D Model Domain

Levee Extension (future phase)

Reddington Levee Setback & Extension (Phase 1) project length