An aerial photograph showing a wide, muddy river curving through an industrial and residential area. The river is the central focus, with various buildings, parking lots, and roads visible on both sides. The background shows a hazy, overcast sky and distant hills.

**Green River System
Wide Improvement
Framework
Level of Protection from
Flooding Goals**

**Presentation to:
Technical Advisory
Committee
March 19, 2014**

PRESENTATION OUTCOMES

- Improved understanding regarding Level of Protection from flooding goals and goal setting process for Lower Green River facilities
- Timeline/process for Level of Protection goal setting



What is Level of Protection?

DEFINITION

- Level of Protection (LOP) is the amount of flow, expressed as cubic feet per second (cfs), that is expected to be contained within a specific portion of the river channel
- LOP goals will be established by the Flood Control District for the Lower Green River shoreline, at a reach scale
- SWIF advisors will inform Lower Green River LOP goal setting



Desimone Levee, 2009



Galli Levee, 2013

Why are Level of Protection Goals Needed?

- Current Level of Protection varies along the Lower Green River
- There is a lack of agreement on the desired or necessary LOP to protect current land uses from flooding
- Level of Protection goals will inform future:
 - Budget decisions
 - Investment options
 - Rate of Capital program implementation



How will Level of Protection Goals Inform the Green River SWIF?

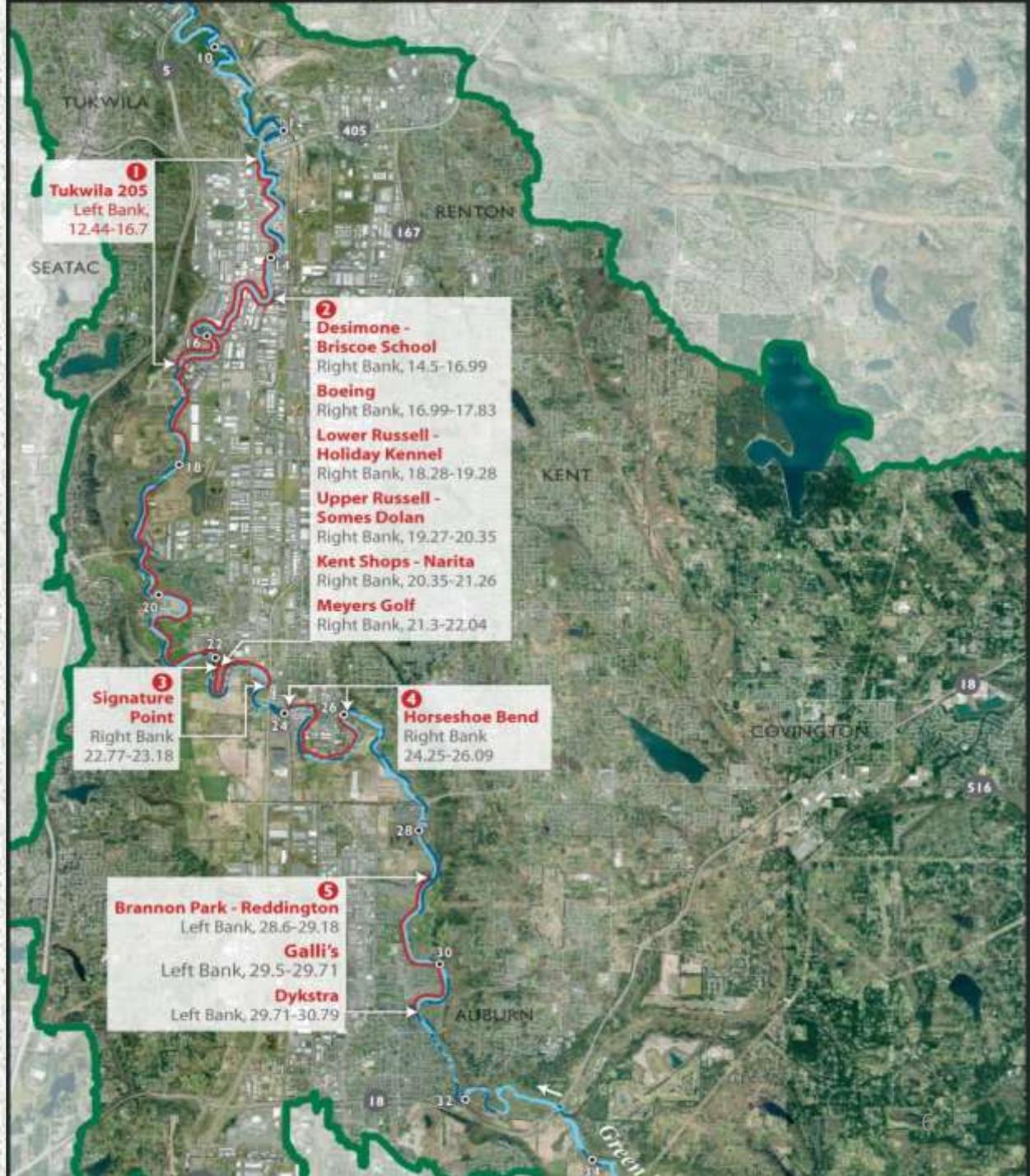
- **Alternatives analysis** – SWIF alternatives to meet LOP goals
- **Capital projects** – Priority SWIF projects will be designed to achieve LOP goals
- **SWIF implementation** – LOP goals will guide SWIF implementation over time



Lower Green River Shoreline Statistics

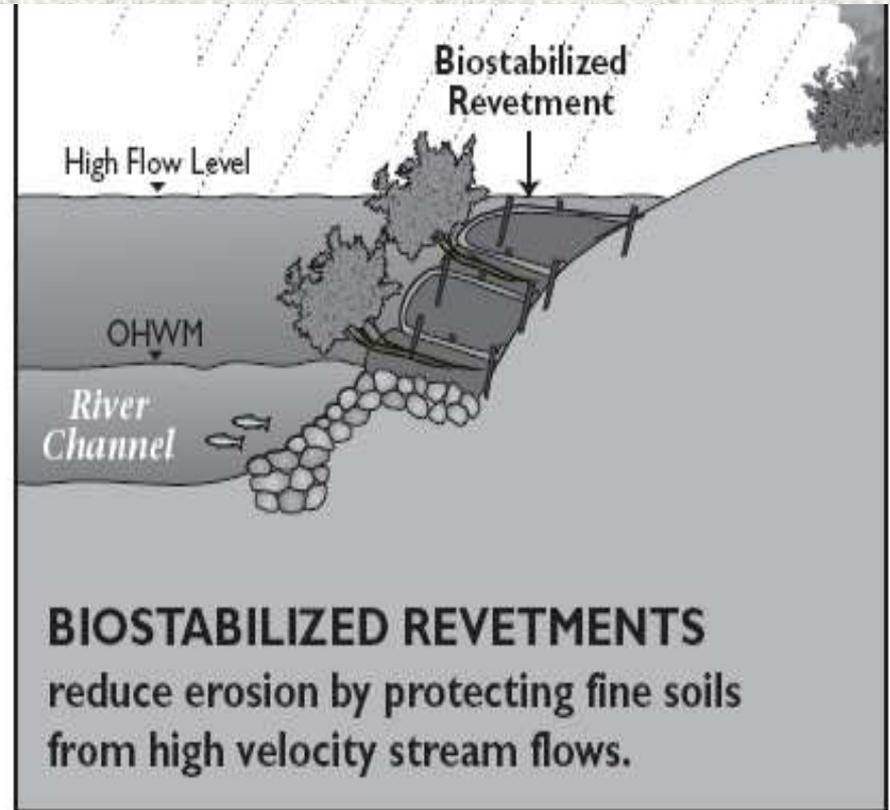
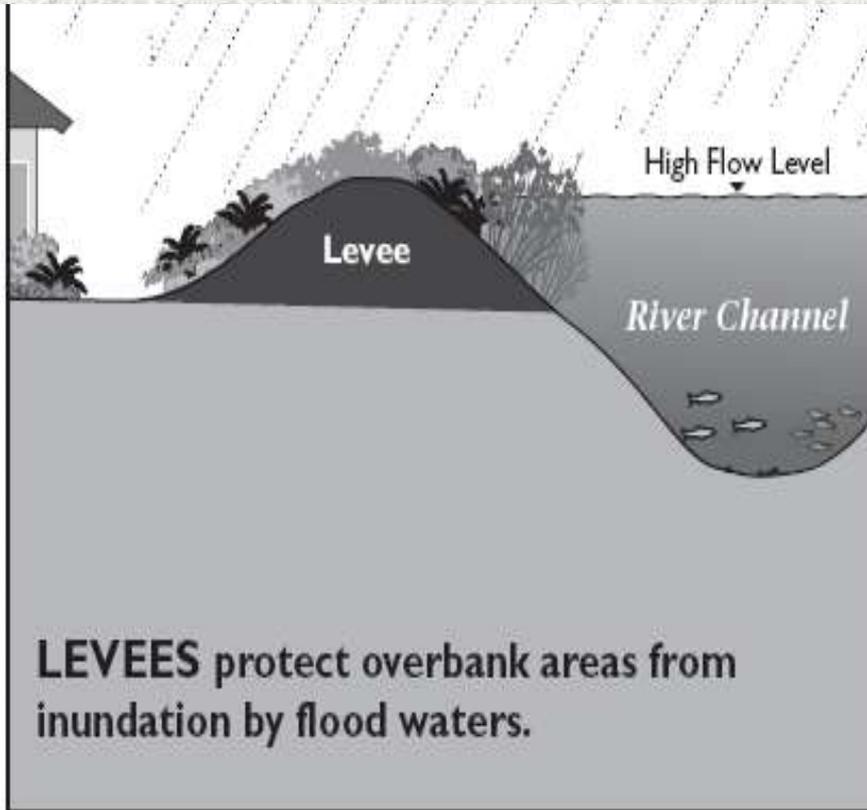
42 miles total of Lower Green River shoreline

- 16 miles of levees, enrolled in PL84-99
- 12 miles of non-PL84-99 levees/ revetments
- 14 miles of shoreline with no facilities



Lower Green River Flood Facility Types

Levees and Revetments



Lower Green River

Level of Protection Goal Options

Three LOP goal options to be applied to the Lower Green River shoreline:

- A. Maintain current condition or Level of Protection (LOP)
- B. Increase LOP
- C. Achieve maximum LOP of **X** cubic feet per second (cfs),
(where $X = 15,000 - 18,800$ cfs?? - TBD)



Lower Green River Level of Protection Goal Maps

Three LOP maps* will be prepared for the Lower Green River to inform goal setting discussions:

Map 1. Mix of LOP options 'A', 'B', and 'C'

Map 2. Mix of LOP options 'A' and 'C' only

Map 3. LOP option 'C' everywhere

* Each LOP map will be accompanied by a rough cost estimate

What Will Inform Level of Protection Goals?

- Flood risk assessment (forthcoming April/May 2014) and evaluation of other technical information
 - Evaluation of variable flow rates (12,000; 15,000; 18,800 and 26,000 cfs – as directed by FCD)
 - Levee Overtopping and breaching risks, and levee failure scenarios
 - Floodplain inundation and depth maps
 - Expected annual damages and present value tables
- SWIF TAC and Advisory Council
- Flood Control District approval
 - June 2014

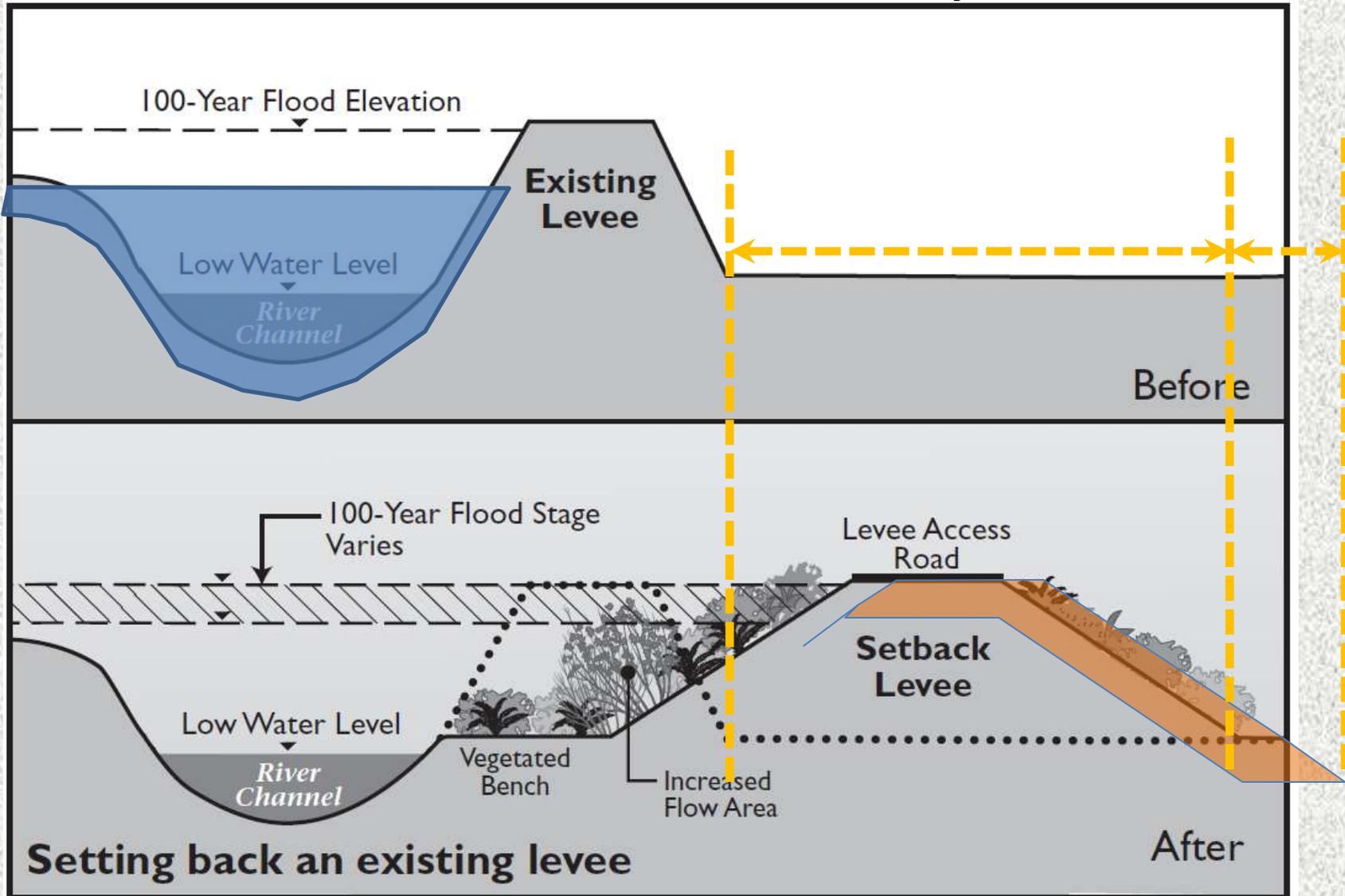
Green River System Wide Improvement Framework

Level of Protection Goal Setting Timeline

Task	Date
✓ FCD approves provisional range of 12,000 cfs to 26,800 cfs – to guide flood risk assessment	January 2014
✓ KC FCD Executive Committee informational briefing	March 5, 2014
Introduce LOP goal setting to SWIF Technical Advisory Committee	March 19, 2014
Current Conditions Symposium for TAC and AC, including flood risk assessment results	April 16, 2014
Technical Advisory Committee recommends maximum LOP and preferred LOP goals (map) to AC	May 2014
Advisory Council recommends maximum LOP and preferred LOP goals (map) to FCD	Early June 2014
FCD Executive Committee establishes LOP goals (map)	Late June 2014
Prepare SWIF alternatives analysis to reflect LOP goals	Summer/Fall 2014
Generate prioritized CIPs needed to achieve LOP goals	Late Fall 2014

Questions?

Level of Protection – “500-yr” Levees



Lower Green Flood Flow Frequencies

Teeing up “Level of Protection” Issue

Location	Discharge (cubic feet per second)			
	10-year (10% annual chance)	50-year (2% annual chance)	100-year (1% annual chance)	500-year (0.2% annual chance)
USGS Auburn Gage (2005 Flood Insurance Study)	12,000	12,000	12,000	12,000
Reach 3 (near Auburn gage) (2010 pDFIRM)	11,230	12,420	12,810	13,460
Reddington Levee Setback (Tetra Tech et al., 2011)	11,200	12,300	12,500	14,900
USGS gage (USACE 2012, Assembly of Design Flood Hydrographs) - Median	12,000	12,000	12,000	18,800
Lower Confidence Limit (95%)	11,900	12,000	12,000	12,000
Upper Confidence Limit (5%)	12,000	12,000	15,100	26,800

Flood Risk Tolerance

What is the probability of exceeding a design flow over different timeframes?
Green SWIF will be tackling this challenging question.....

	30 Years	50 Years	75 Years	100 Years
1:100 (aka 'the 100-year flood)	26%	39%	53%	63%
1:140 (current USACE estimate of Green River flood control)	19%	30%	42%	51%
1:200	14%	22%	31%	39%
1:300	10%	15%	22%	28%
1:500	6%	10%	14%	18%