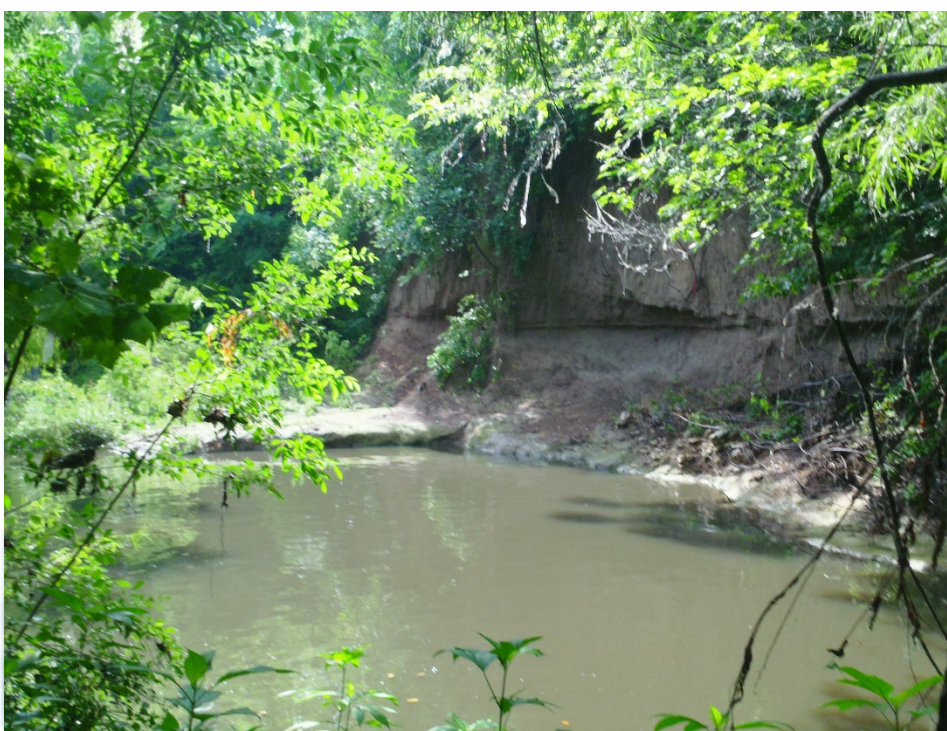


REINTEGRATING NATURE IN A DENSE URBAN ENVIRONMENT: RESTORATION OF WALLER CREEK (Austin, TX)

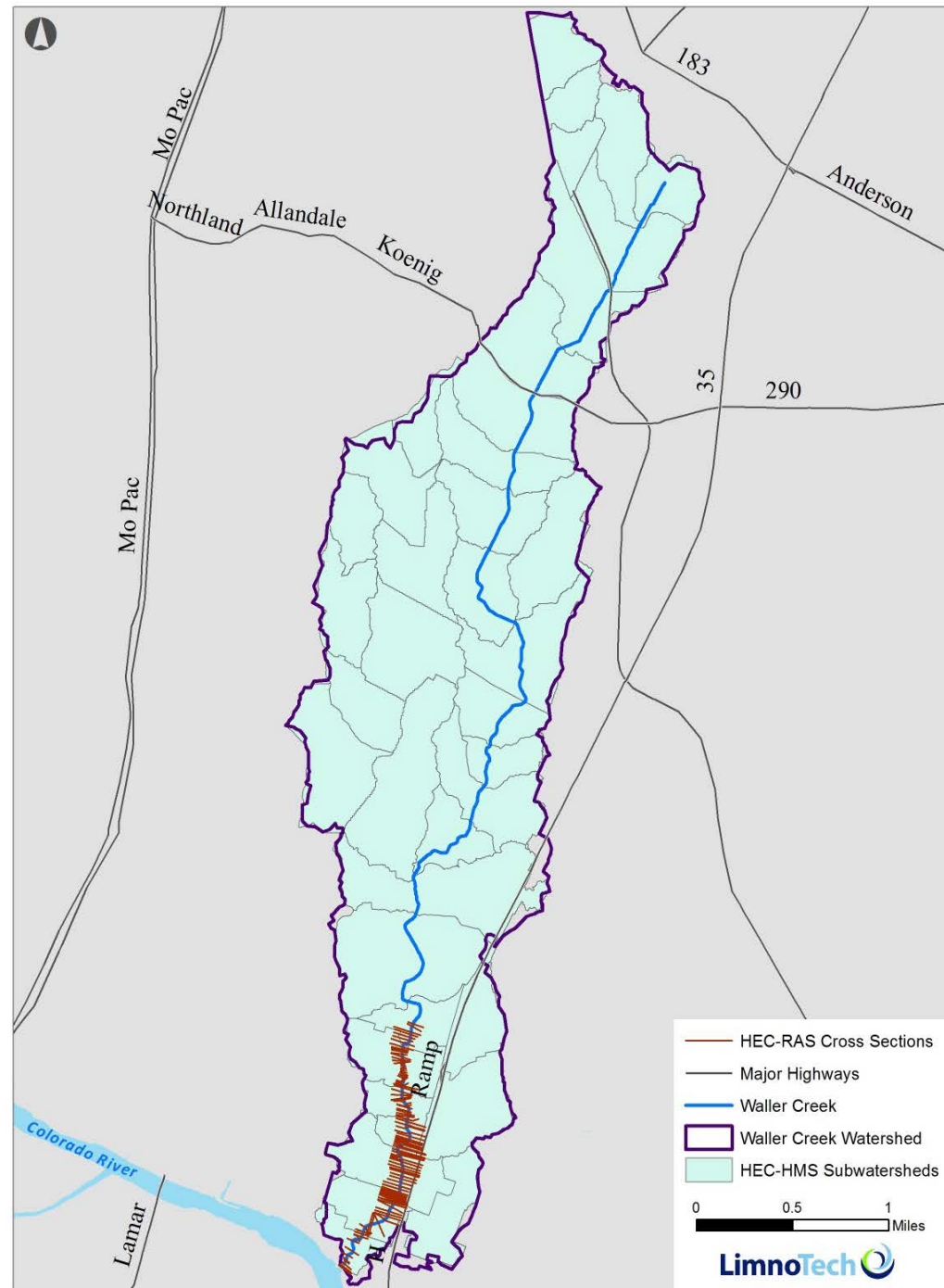
Dendy Lofton, PhD, Craig Taylor & Tim Dekker, PhD (*LimnoTech*);
Mateo Scoggins (*City of Austin*)

National Conference on Ecosystem Restoration
Coral Springs, FL
19 April 2016

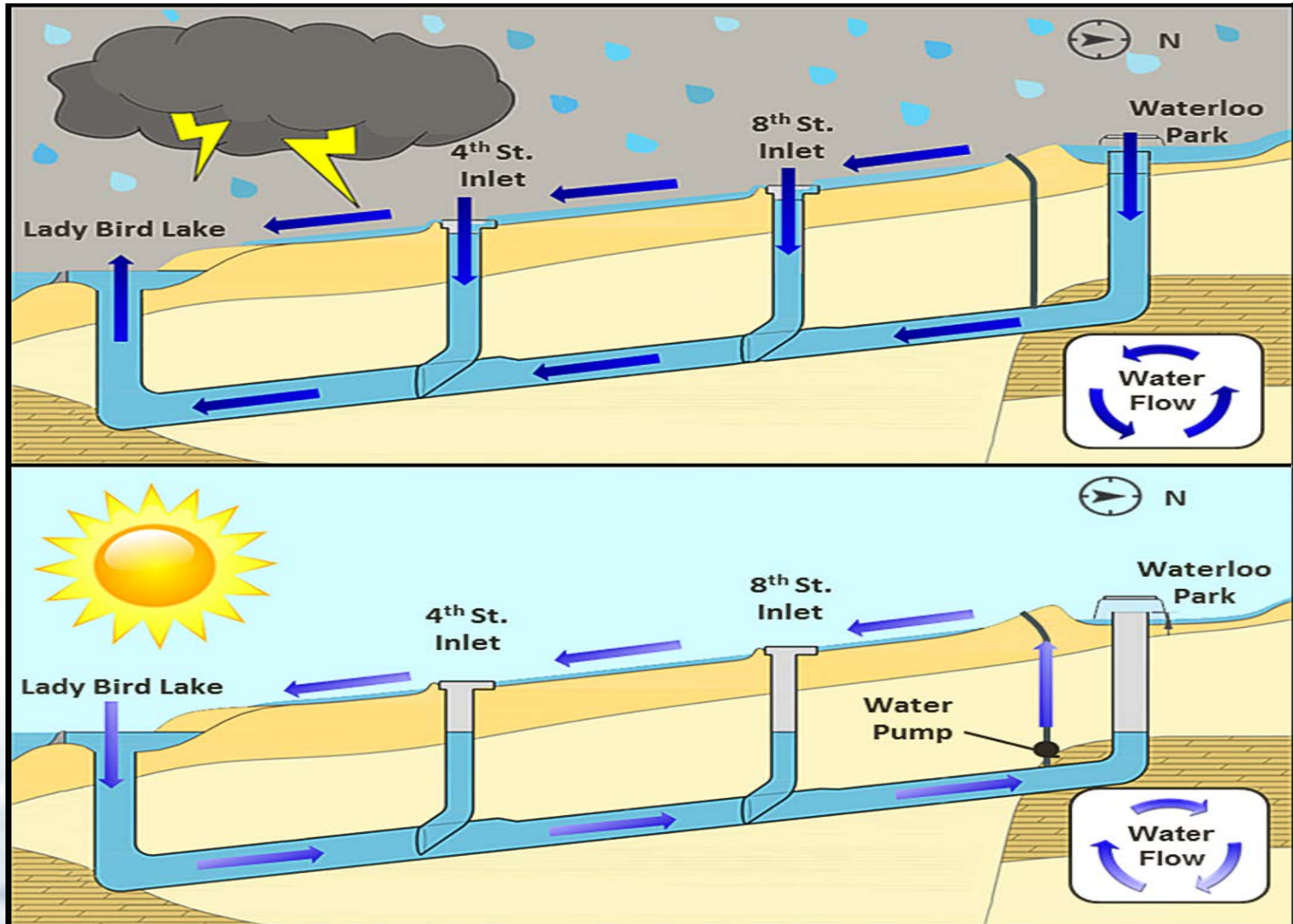


Waller Creek (Austin, TX)

- Highly urbanized
- Catchment:
 - Area = 6 mi²
 - Length = 7 mi
- Project Area:
 - ~1.5 mi
 - UT-Austin to Lady Bird Lake
 - ~ 97% developed
 - ~80-90% imperviousness



Waller Creek Flood Control Tunnel

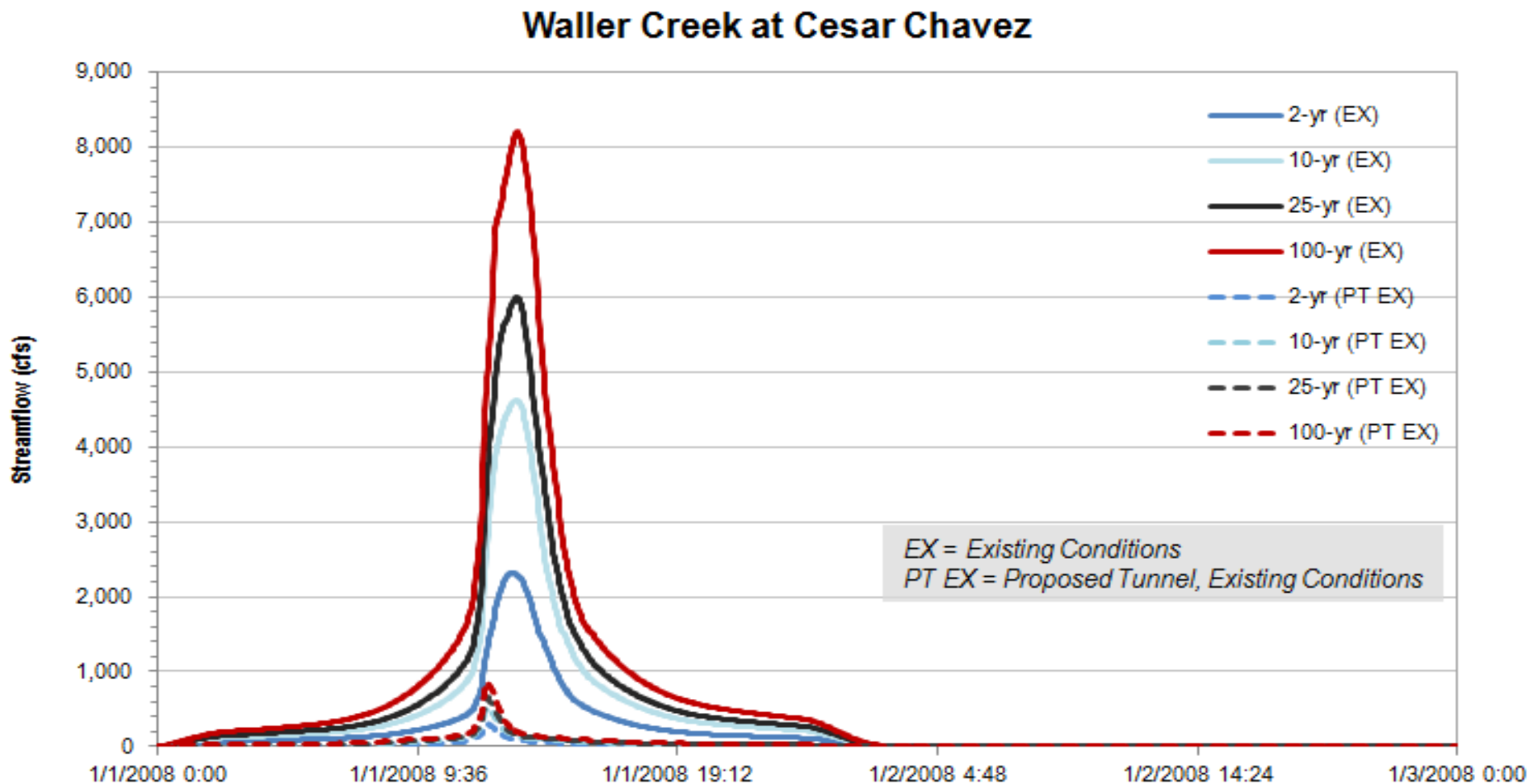


<http://www.austintexas.gov/department/waller-creek-tunnel>



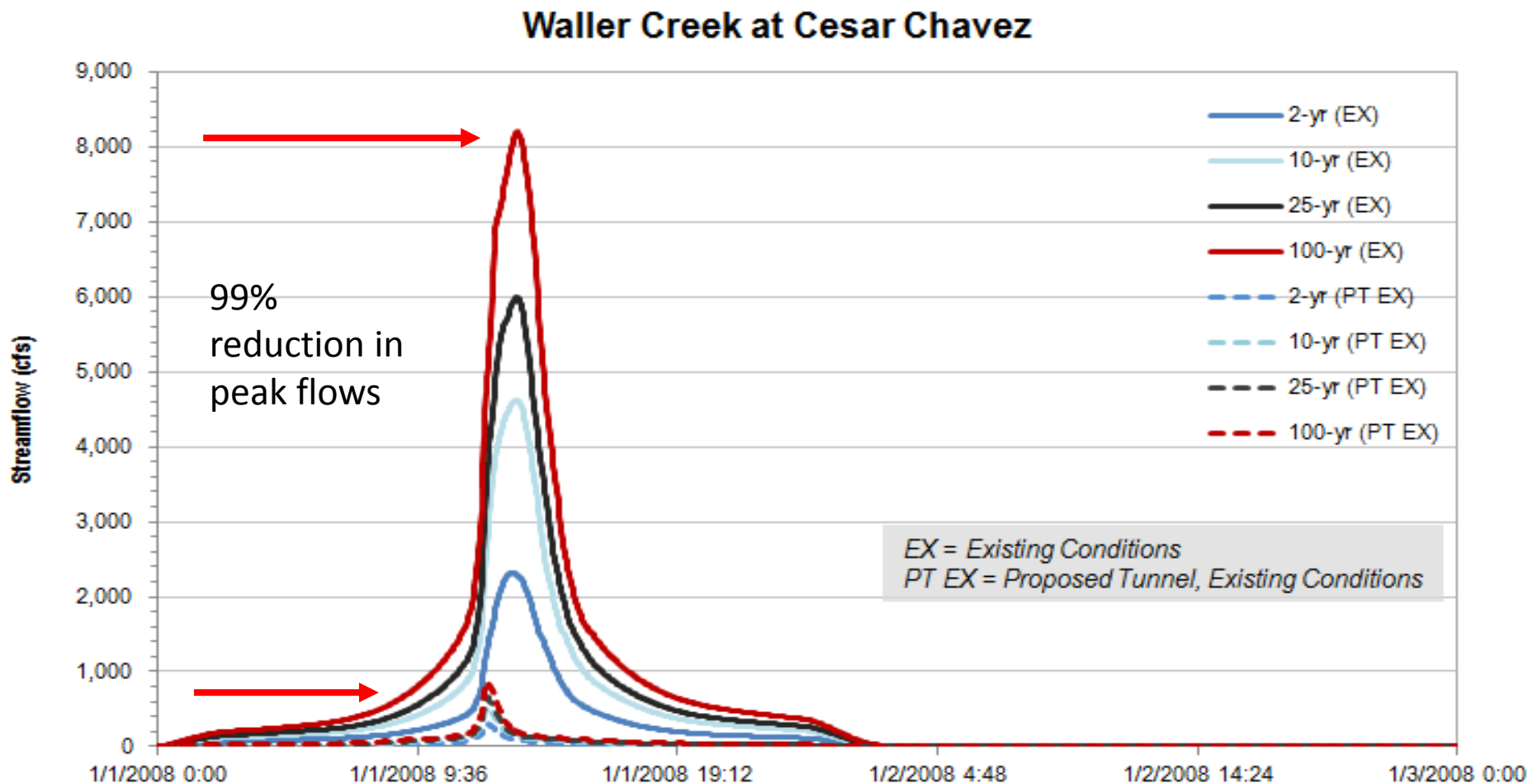
Effect on Event Flows: Hydrographs at Cesar Chavez Street

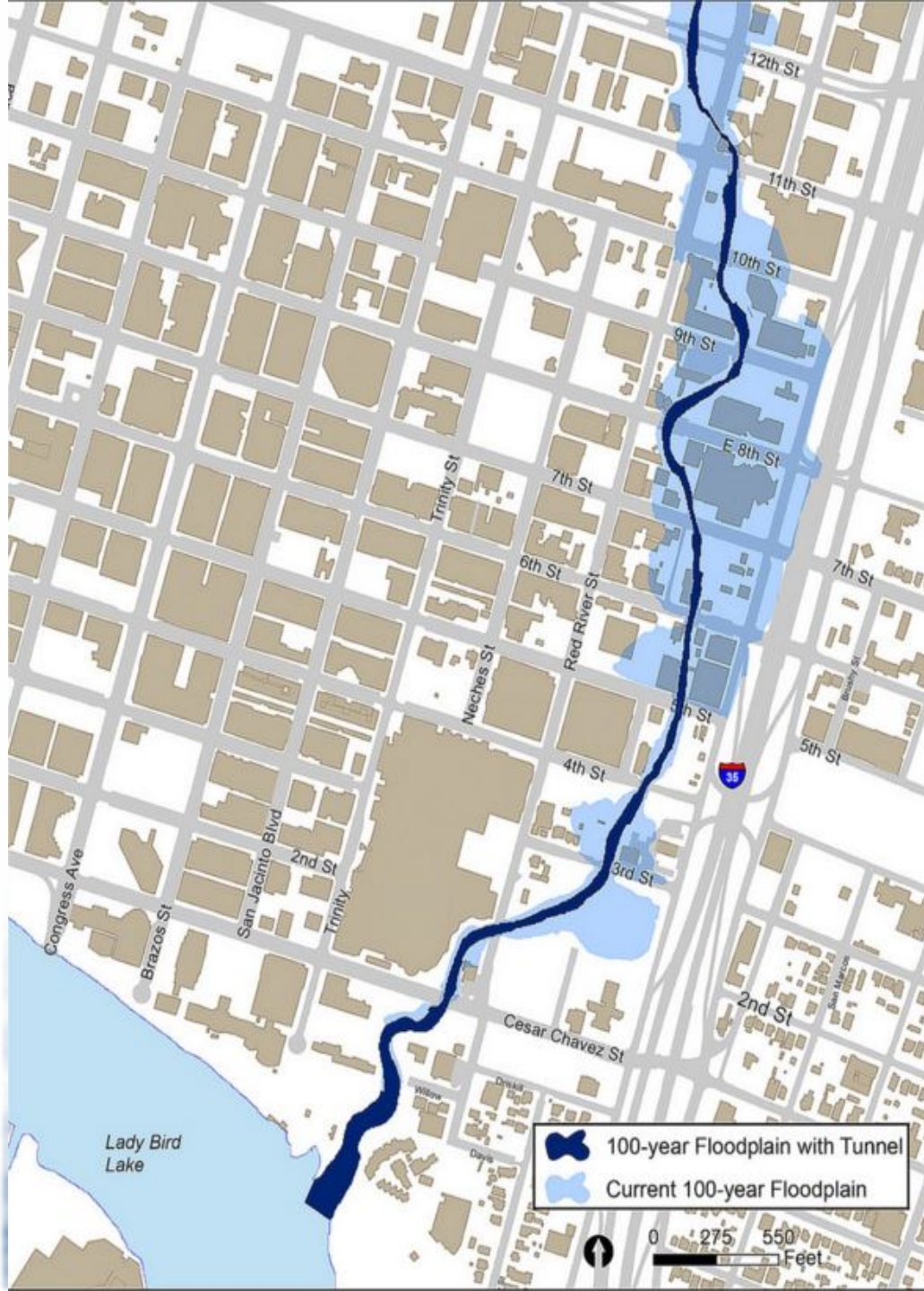
Range of storms for pre- and post- tunnel conditions



Effect on Event Flows: Hydrographs at Cesar Chavez Street

Hydrographs for a range of storms for pre- and post-tunnel conditions





Effects of Tunnel:

- “New” hydrology
- Removes ~ 28 acres 100-yr floodplain
- Unique opportunity
 - Urban revitalization
 - Ecological restoration



Waller Creek Design Team

Interdisciplinary team led by Michael Van Valkenburgh and Associates in partnership with the City of Austin and the Waller Creek Conservancy

- Landscape Architects, Civil & Structural Engineers, Hydrologists, Ecologists, Urban Planners, Soil Scientists



LimnoTech's Primary Role

- **Hydrology & Hydraulics**
 - Existing & post-tunnel conditions
 - Water surface elevations with trail & park design elements
- **Models utilized**
 - HEC-HMS
 - HEC-RAS
- **Stormwater Retrofit Opportunities**



Stream Channel Design/Channel Form

- Bank and trail focus: high flows
- Fine channel focus: low flows



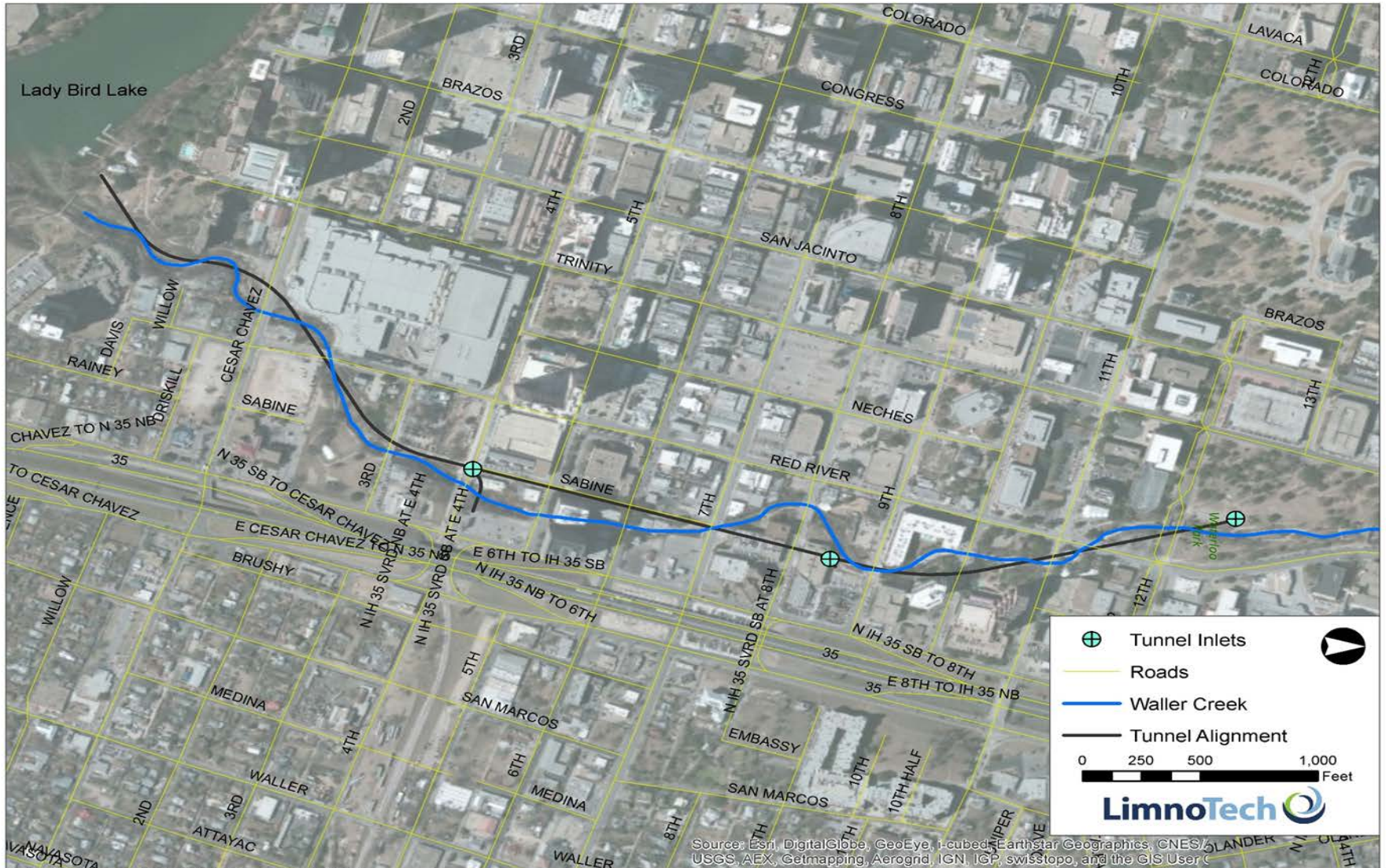
Phase 1: Waller Creek Framework Plan

Overarching Project Goals:

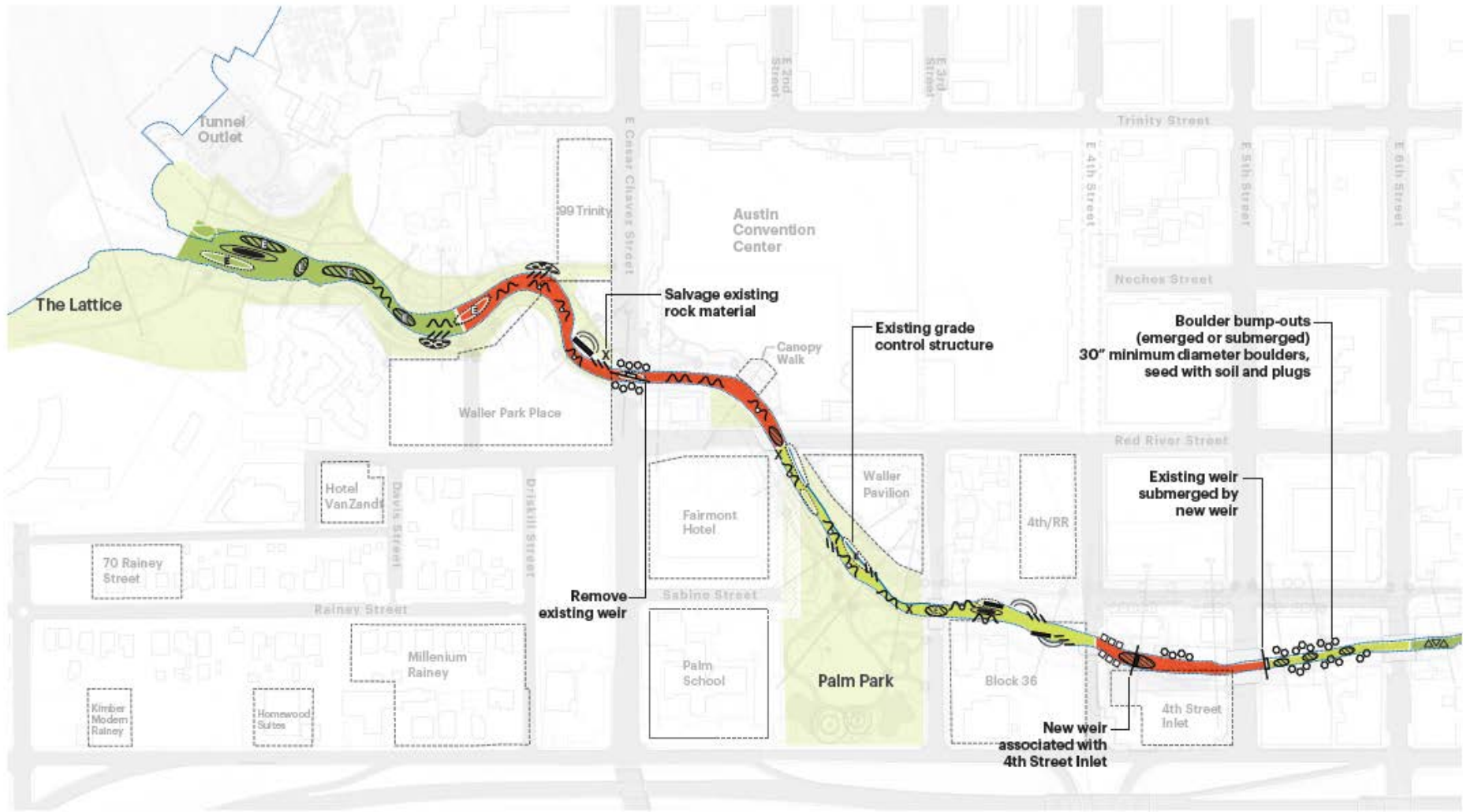
- Restore & reconnect the existing trail system
- Transform corridor into an inviting, safe public space with connected, but unique chain of parks
- Protect and enrich ecology



Block-by-block Framework



AQUATIC HABITATS



MAP KEY

PROJECT TYPE

- Do Nothing
- Preservation
- Restoration
- Reconstruction

IN-CHANNEL FEATURES E = Existing (If not otherwise noted)

Pool Features

- Deep Pool
- Cooling Pool
- Wetland Bench

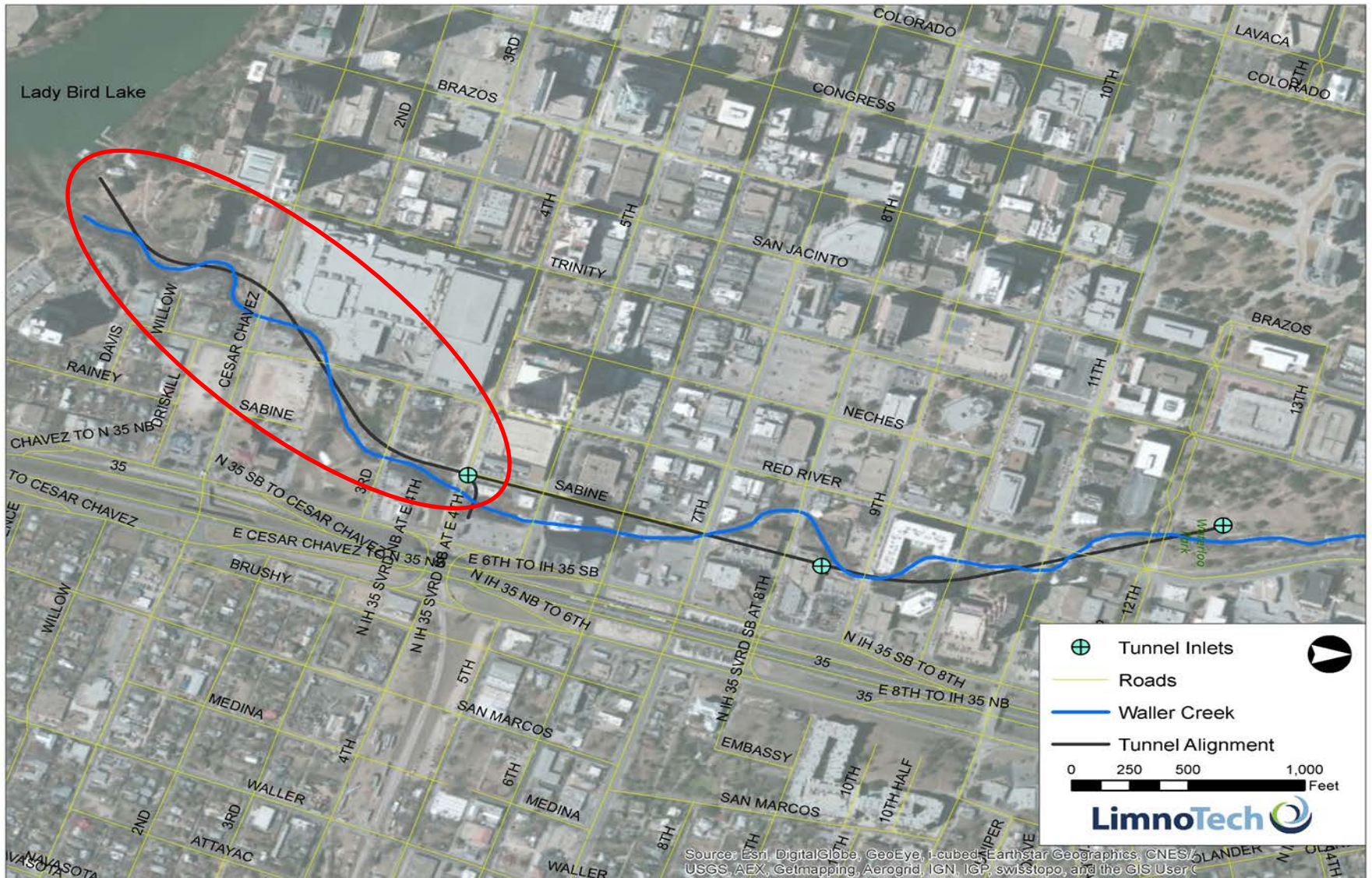
Rock/Gravel/Concrete Features

- Proposed Boulder Cluster
- Existing Riffle
- Proposed Riffle
- Proposed Cross Vane
- Proposed Bank Lunker
- Existing Perm. Island (to protect)
- Existing Gravel Bar (to protect)
- Existing Exposed Bedrock (to maintain)
- Existing Weir
- Proposed Weir

Log/Woody Debris Features

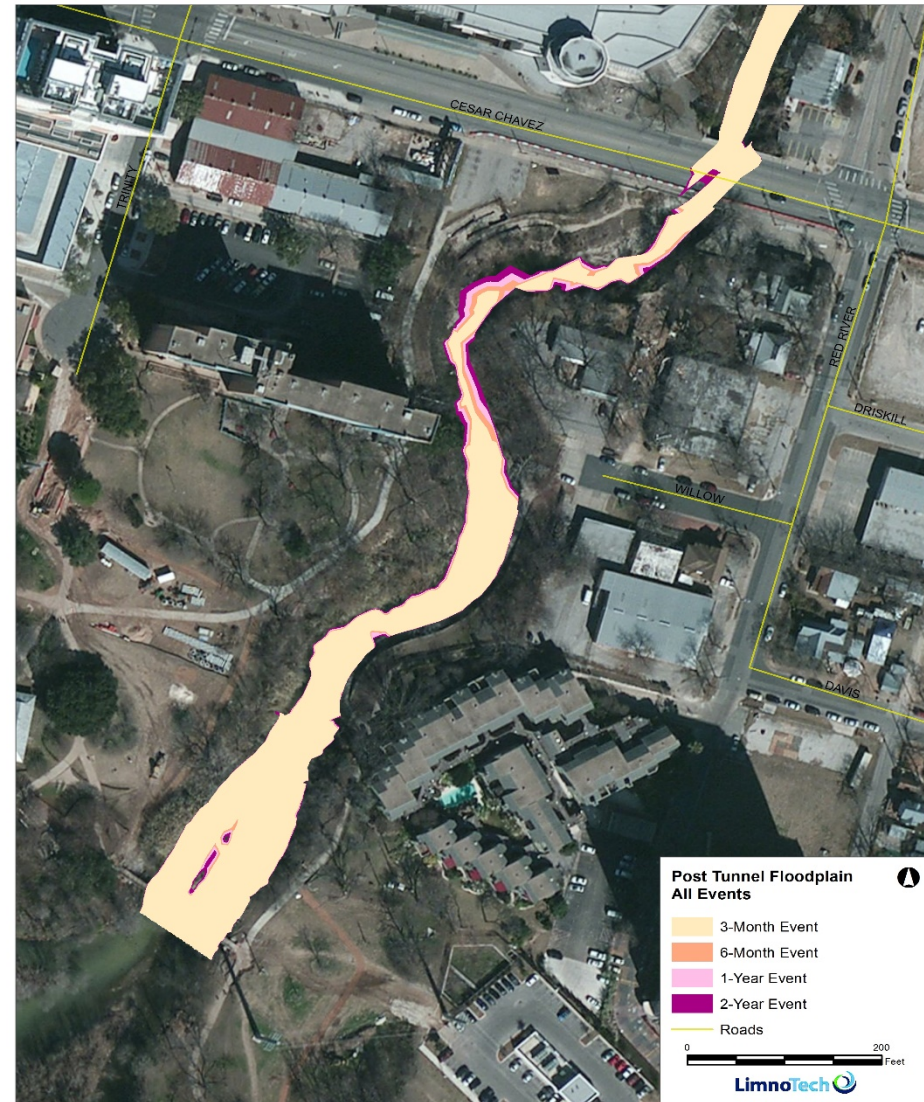
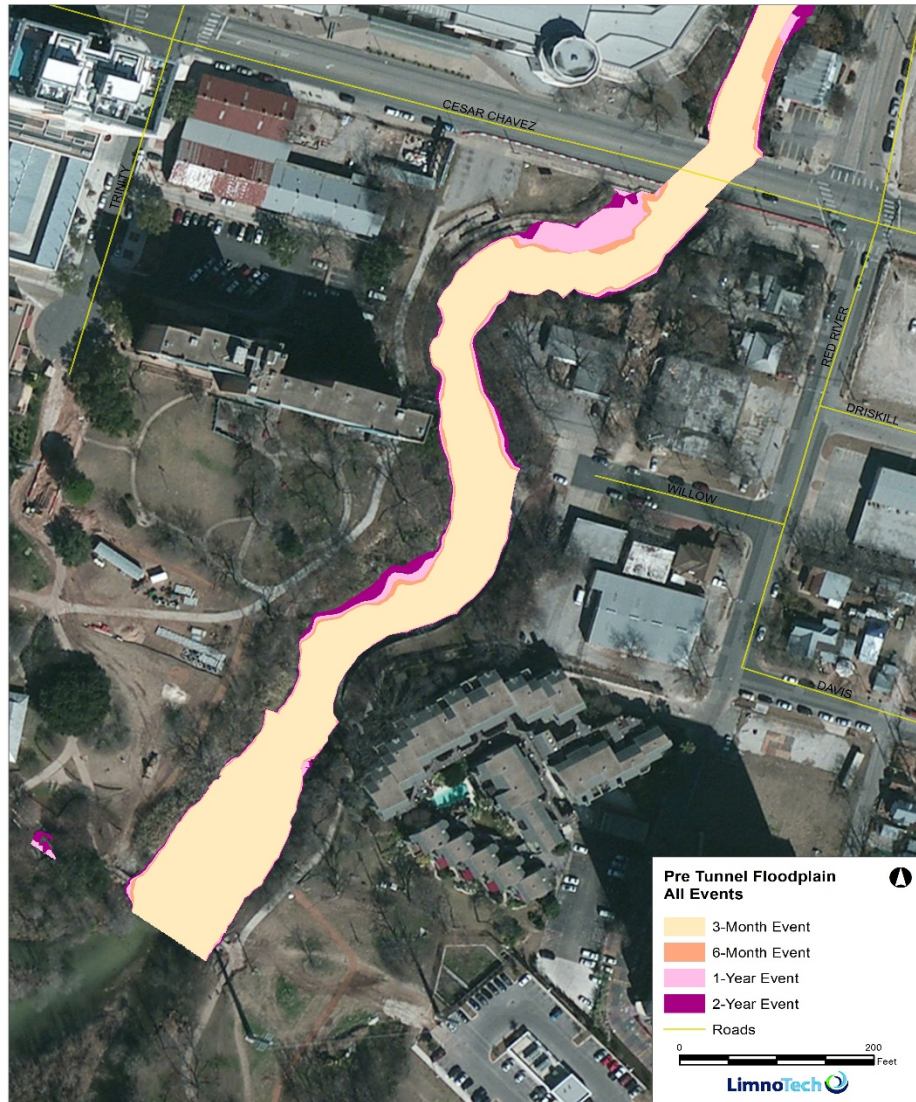
- Proposed Emergent Log
- Proposed Removal of Major Debris

Phase 2: Creek Mouth Schematic Design



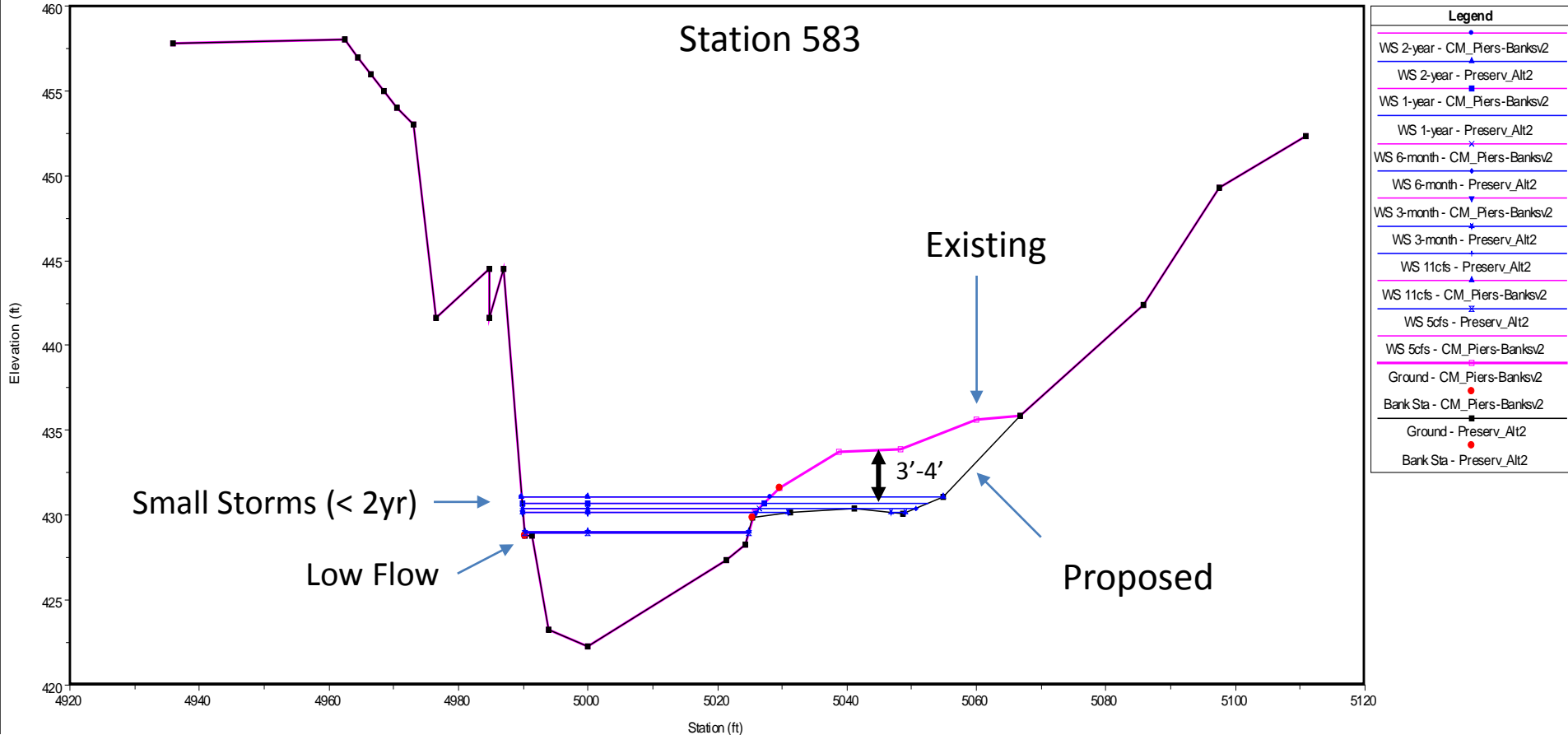
Lady Bird Lake to 4th Street

Pre-tunnel vs. Post-tunnel Floodplain



Design Alternative – Excavate Riparian Bench

WLR_Creek_Mouth Plan: 1) Preserv_Alt2 2) CM_Piers-Banksv2
 Geom: CM_Walkway_Piers_Banks_v2_Preserv_Alt2
 River = WLR Reach = Reach-01 RS = 583 2015 FIELD SURVEY

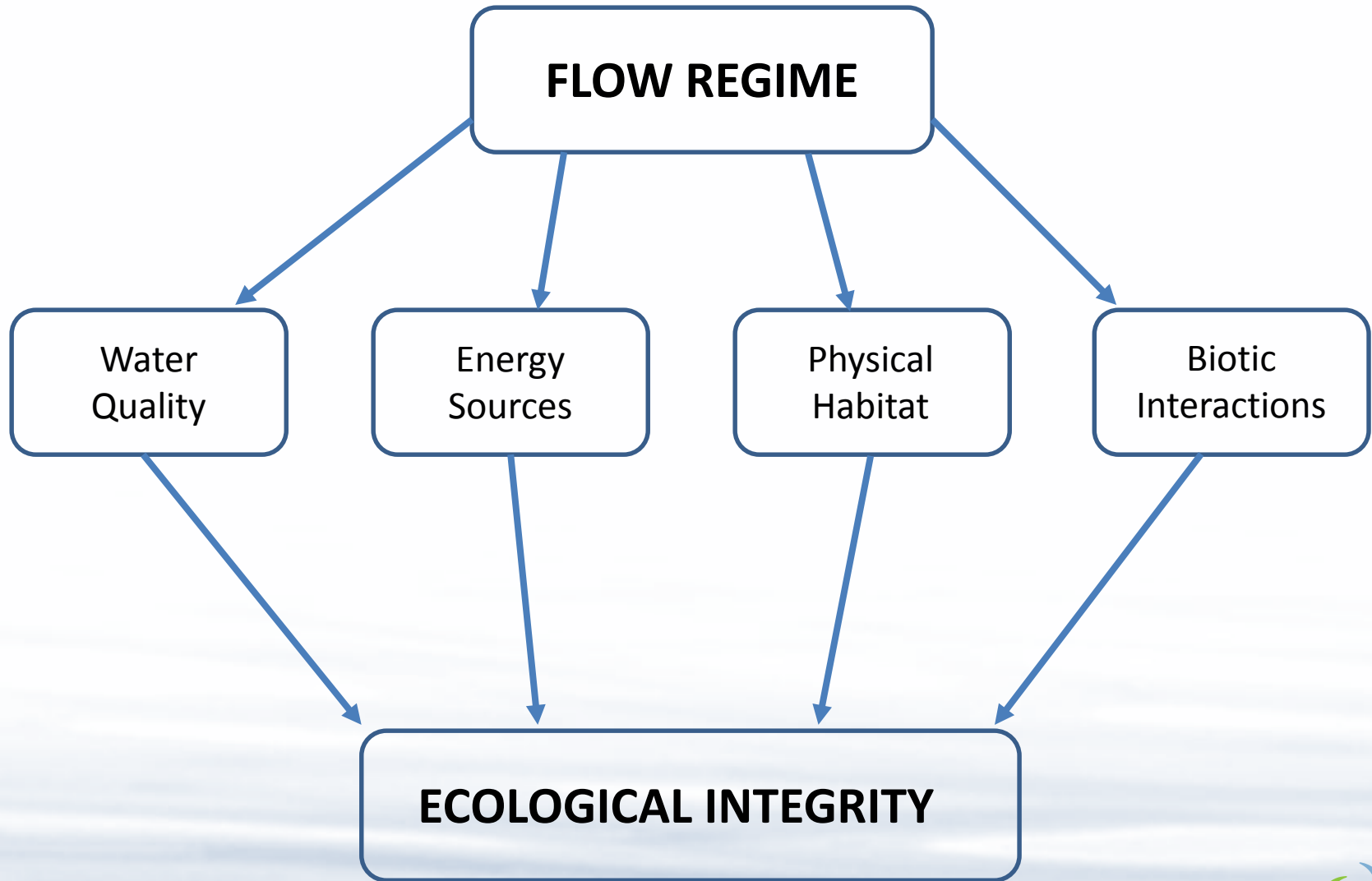


Functional Lift Pyramid



Flow regime regulates biodiversity and ecological function.





Functional Lift Pyramid



Using ecological requirements to drive hydrology.



Flow Regime Components & Ecological Functions

- **Magnitude & Frequency**

- Sediment transport
- Export nutrients, organics, detritus, waste products

- **Duration**

- Influences persistence and coexistence
- Increases biodiversity; can limit non-native success

- **Timing**

- Life cycle cues (e.g., reproduction, egg hatching)
- Lateral & longitudinal species migration

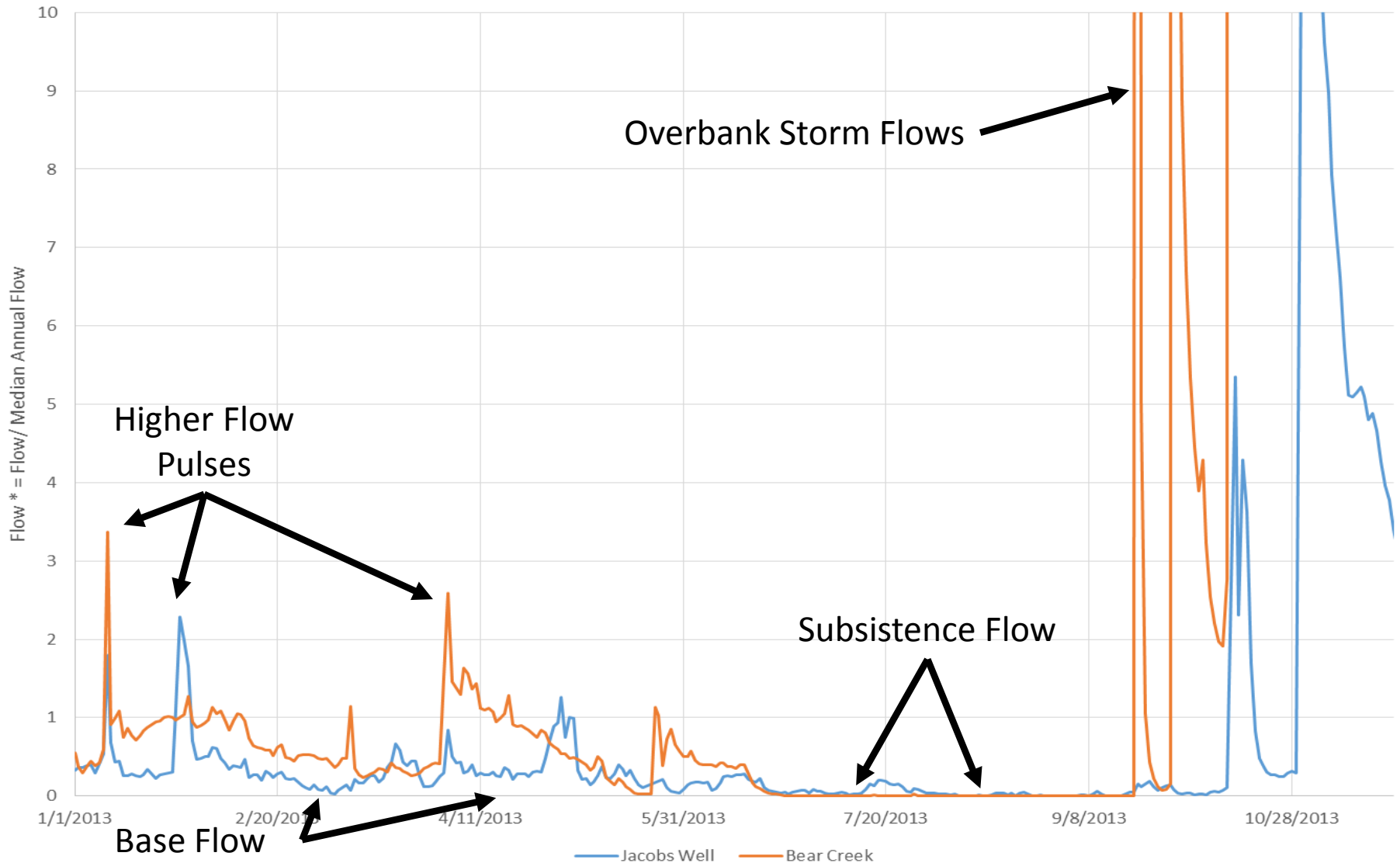
- **Rate of change or flashiness**

- Influences persistence and coexistence
- Increases biodiversity; can limit non-native success



Flow Variability

Normalized Time Series Flow Data for Reference Streams



AUSTIN'S EXISTING URBAN PARKS



DOWNTOWN
AUSTIN

WATERLOO PARK

PALM PARK

EAST
AUSTIN

MICHAEL
VAN
VALKENBURGH
ASSOCIATES
INC

WALLER CREEK = WALKABLE CITY



DOWNTOWN
AUSTIN

WATERLOO PARK

THE REFUGE

PALM PARK

EAST
AUSTIN

THE LATTICE

5 minute walk

MICHAEL
VAN
VALKENBURGH
ASSOCIATES
INC



Questions?

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