
City of Austin
WATERSHED
PROTECTION
Watershed Protection Ordinance (WPO):
Stakeholder Meeting
CREEK PROTECTION
September 9, 2011

Council Resolution 20110113-038

1. Creek Protection
2. Floodplain Protection
3. Development Patterns and Greenways
4. Improved Stormwater Controls
5. Mitigation Options
6. Simplify Regulations and Maintain Opportunity
7. Coordinate with Regional Partners

Stakeholder Input

Adoption Schedule

Stakeholder Meetings	Sep 2011 – April 2012 (Meetings approx. every two weeks)
1. Creek Protection:	Sep 9, 23, Oct 7
2. Floodplain Protection:	Oct - Nov
3. Development Patterns & Greenways:	Nov - Dec
4. Improved Stormwater Controls:	Dec - Jan
5. Simplify & Clarify Regs/Maintain Opportunity:	Jan - Feb
6. Mitigation Options (Desired Development Zone):	Feb - Mar
7. Draft Ordinance	Apr
Boards & Commissions	May – June 2012
City Council	August 2012
Travis County Commissioner's Court	Fall 2012

Work Session Summary: Creek Protection

Session No. 1 (Sep. 09)

- Introduction
- Riparian Zone Benefits
- Problems & Costs of Stream Encroachment
- Existing Stream Setbacks
- Case Studies

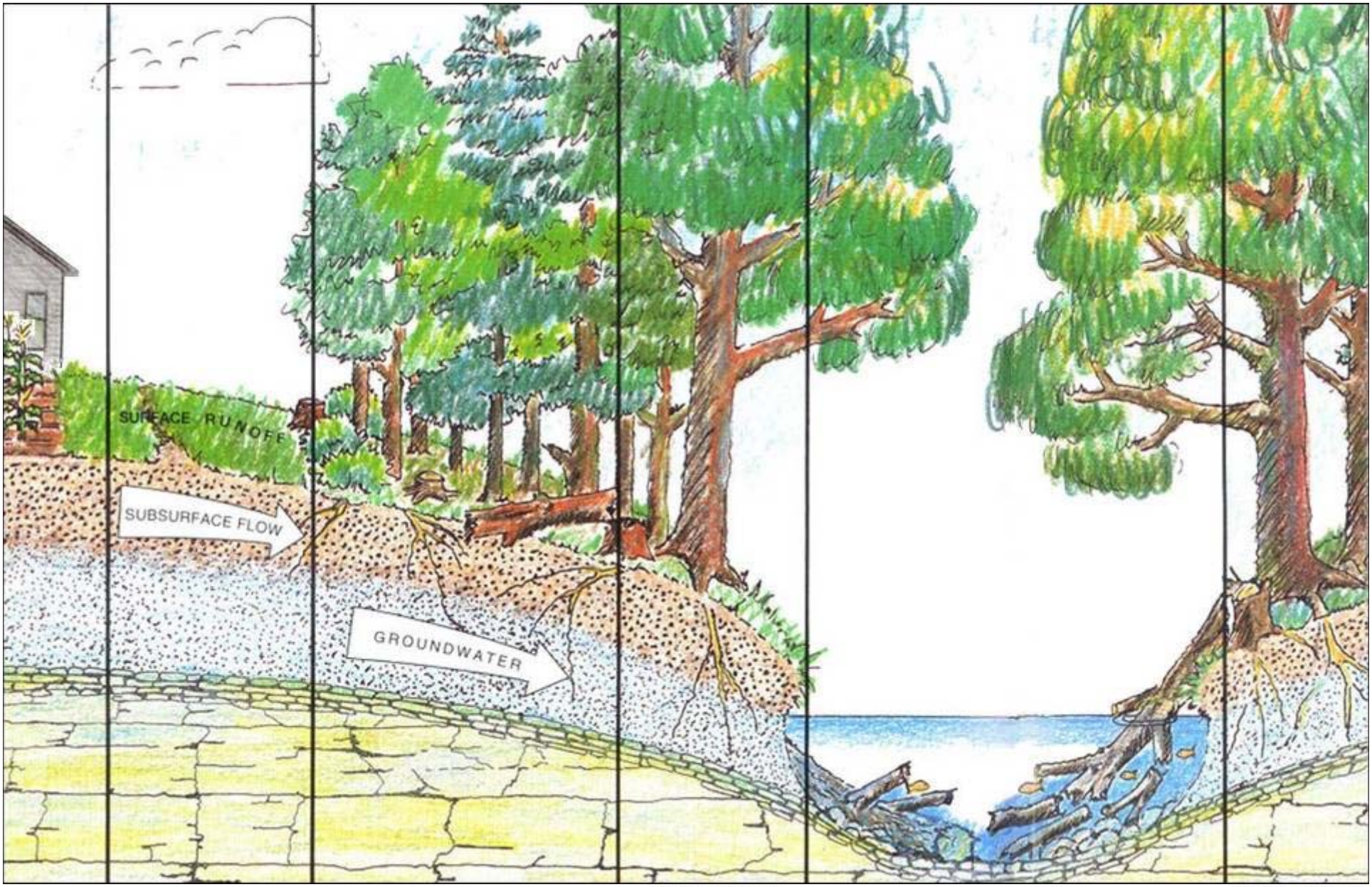
Session No. 2 (Sep. 23)

- Staff Recommendations
- Impact Analysis

Session No. 3 (Oct. 07)

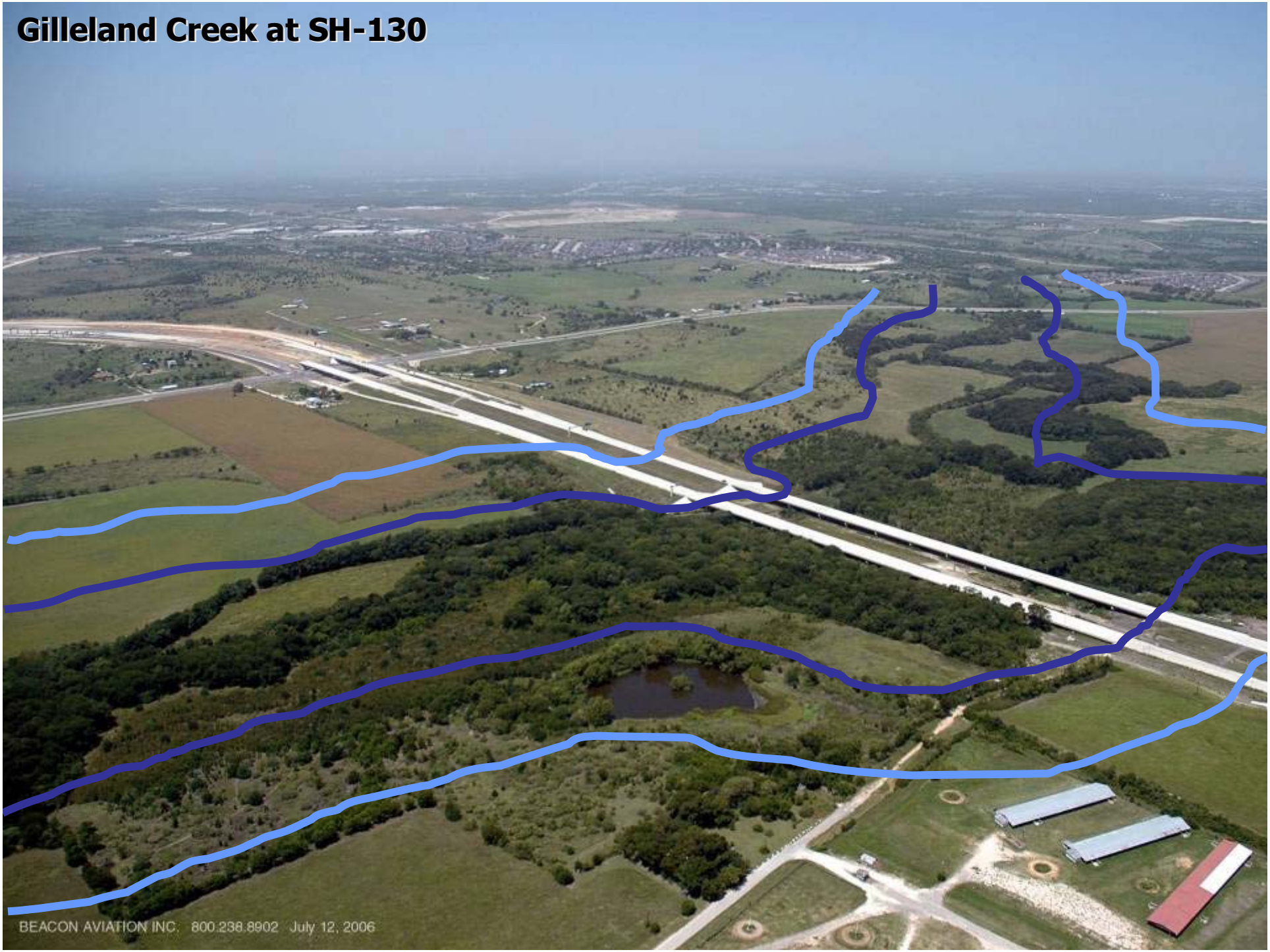
- Discussion & Stakeholder Feedback

Riparian Buffer Illustration

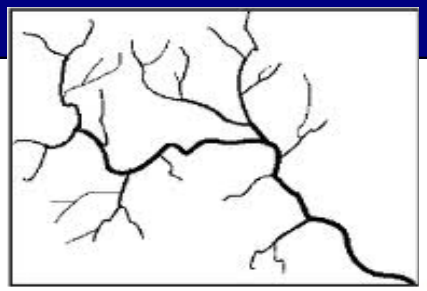


Source: http://www.cayugawatershed.org/Cayuga Lake/wetland/FIG7.JPG

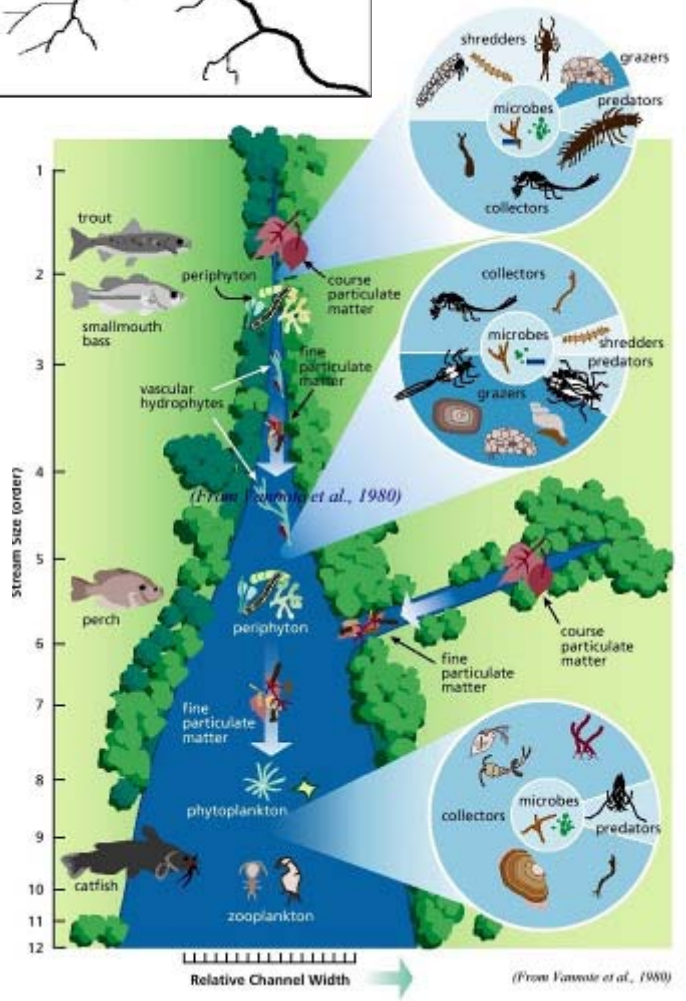
Gilleland Creek at SH-130



Headwater Streams Are Unique



- **Quantity**
  - **Capillaries: surface area, length**
  - **Baseflow, Flooding (slow and steady)**
  - **Nurseries of rivers**
- **Quality**
  - **Nutrient processing**
  - **Filtration (dissolved, solids)**
  - **Food source**



Benefits of Healthy Riparian Zones

- **Helps control flood impacts**
- **Reduces channel erosion & property loss**
- **Helps maintain good water quality**
- **Reduces operation & maintenance costs**
- **Provides multiple community benefits**

Stream Buffers & Flood Protection

- **“Sponge” effect with soils, vegetation, microtopography, overbank storage**
- **Slows "time-of-concentration" until peak flow occur (complex network/not oversimplified or accelerated)**
- **Allows natural adjustment of floodplain geometry over long periods of time to ensure right size**
- **Allows for margin for error**
- **Distances public from flash flooding**

Stream Buffers & Erosion Control

- Protect bank integrity with vegetation
- Prevent loss of property from erosion
- Provide space for future channel migration
- Provides self-maintenance if left in/allowed to recover to natural condition
- Minimizes channel modifications
  - Avoid storm drains, wastewater lines, artificial materials, straightening, etc.

Stream Buffers & Water Quality Protection

- **Filters & absorbs runoff for water quality**
- **Removes sediments, nutrients, metals, toxics, & other pollutants**
- **Slowly releases stored water/maintains creek baseflow**
- **Moderates water temperature**
- **Provides critical aquatic & terrestrial habitat**
- **Protects Critical Environmental Features**
  - **Springs, seeps, wetlands**

Stream Buffers & Operations & Maintenance

- **Reduced active maintenance (e.g., mowing)**
- **Reduced need for CIP projects to shore up failing banks and structures**
- **Reduced citizen complaints for erosion & flood problems**
- **Room for channel work and restoration/ retrofit projects when needed**

Stream Buffers & Community Benefits

- **Protects adjacent property**
- **Maintains lower drainage utility fees**
- **Increases surrounding property values**
  - **Quality of life/tax base**
- **Provides space for greenways & trails**
- **Provides opportunities for recreation & active lifestyles/improves community health**
- **Provides educational opportunities**
- **Provides space for community gardens, local food production**
- **Preserves/allows restoration of natural & historic character**

Edwards Plateau Streams


Turkey Creek (WS Rural)

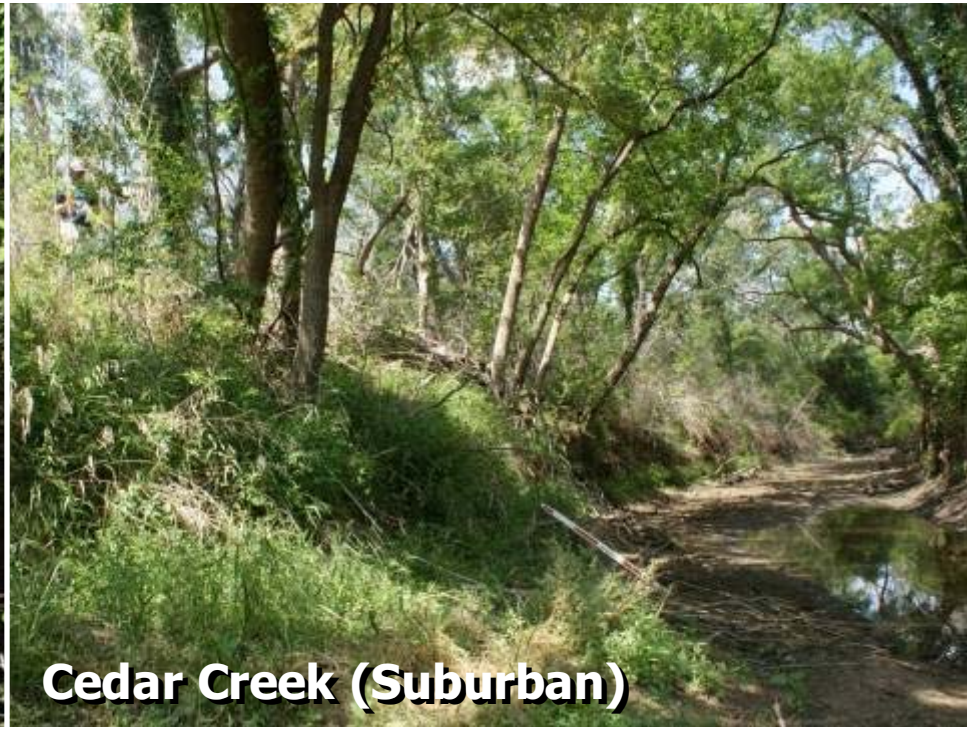

Barton Creek (BSZ)


Walnut Creek (Suburban)


Bull Creek (WS Suburban)

Blackland Prairie Streams


Gilleland Trib (Suburban)


Cedar Creek (Suburban)


Wilbarger Trib (Suburban)


Wilbarger Main (Suburban)


Pioneer Crossing (Suburban)


Stacy Park (Urban)

Water Quality Concerns

- **Headwaters creeks (esp. in east) being straightened, narrowed & channelized with hard armoring**
- **Ecological function degraded or eliminated**
- **Encroachment and design choices preclude establishment of healthy riparian zone**

Maintenance Concerns

- **Future, unsustainable maintenance burden created (cost, environmental impact)**
  - **$1.1 million budget for vegetation control program (VCP)**
  - **80 miles of creek mowed**
- **Increased, perpetual cost to ratepayers**
- **Limited space for maintenance or restoration**

Erosion Concerns

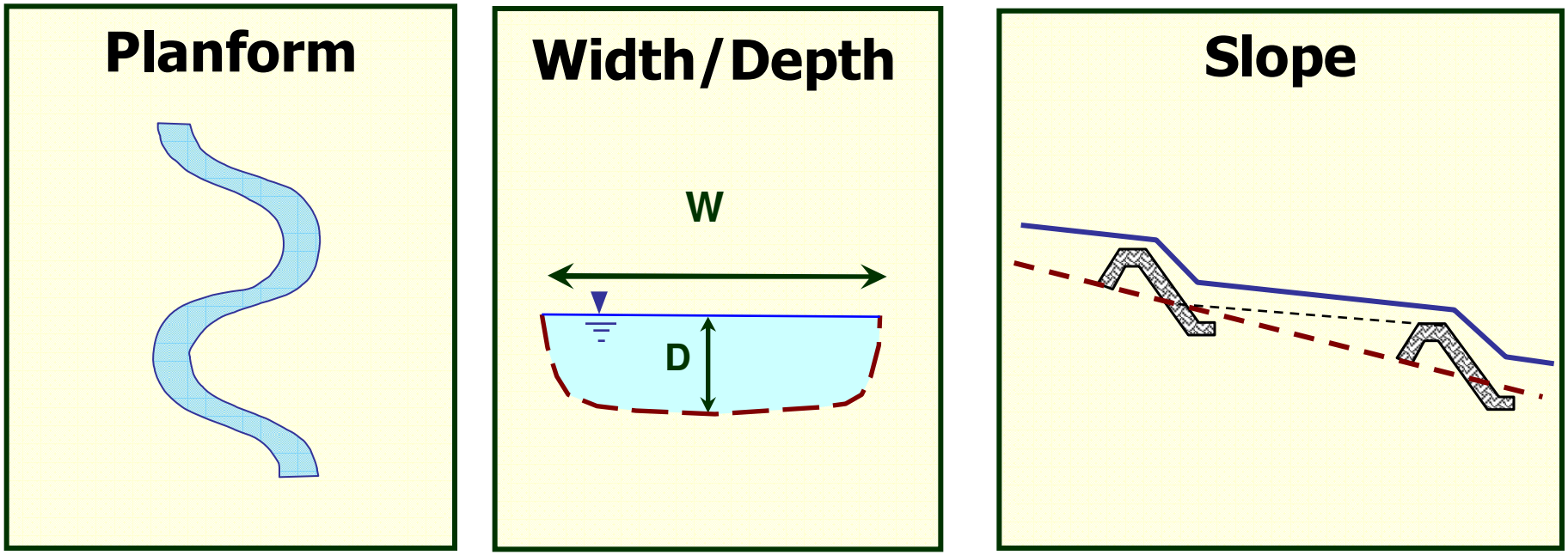
- **Streams dynamic: erode and move laterally & vertically over time**
- **Buildings & public infrastructure may be threatened by stream erosion when placed in "Erosion Hazard Zone"**
- **Repairs expensive: cannot afford to allow new problems to be created**
- **Most vulnerable areas in east (clay soils) have the lowest level of current buffer protection**

Urbanization and Stream Channels

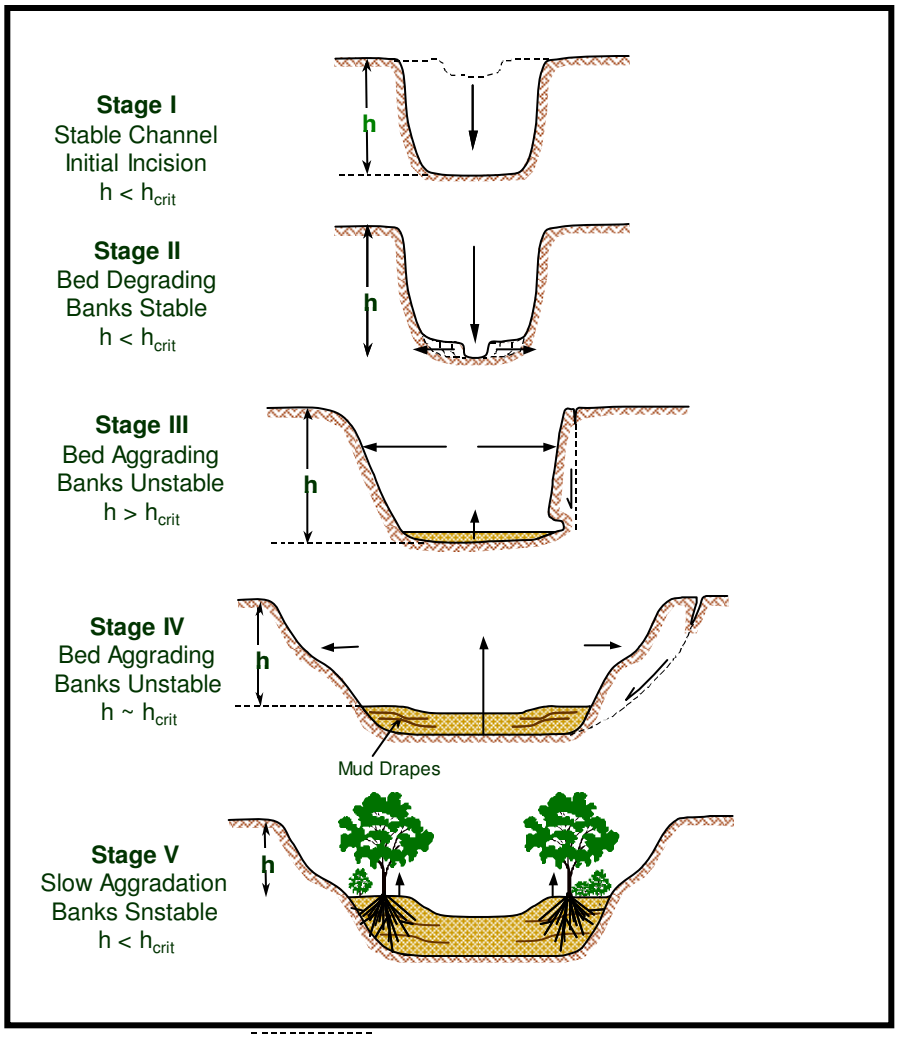
- **Enlargement occurs as downcutting (incision) and widening**
- **Incision migrates upstream, creates taller, exposed streambanks**
- **Deeper channels prevent overbank flow, create positive feedback loop**

Primary Modes of Channel Adjustment

Channel Adjustment Mechanisms



Channel Evolution Model



Rejuvenation

I. **Initial Channel Downcutting**

II. **Continued Downcutting Banks Near Critical Height**

III. **Downcutting Ceases/Slows Unstable Banks Fail Widening Occurs**

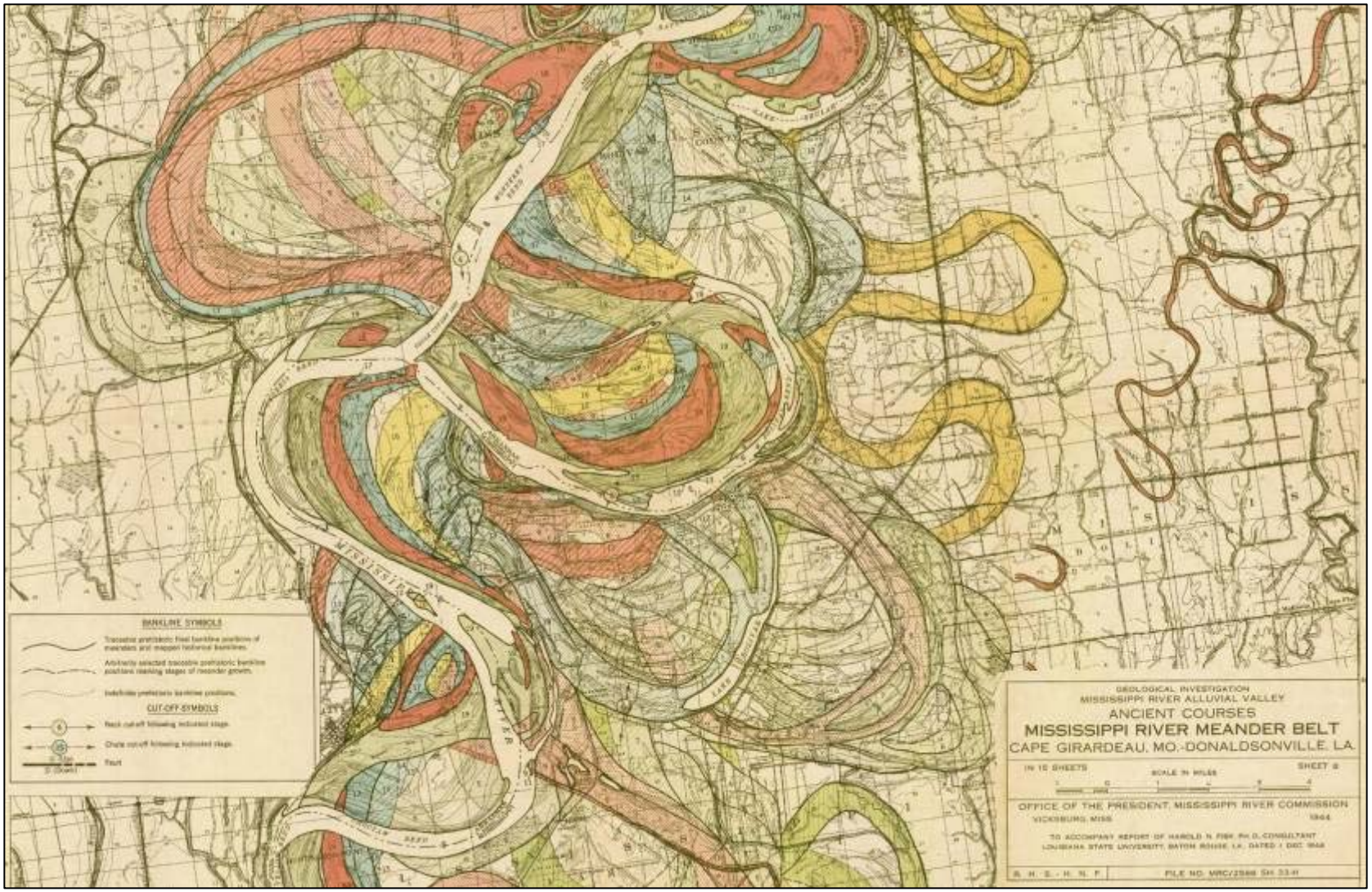
IV. **Aggradation Occurs Banks Unstable Widening Occurs**

I. **New Equilibrium**

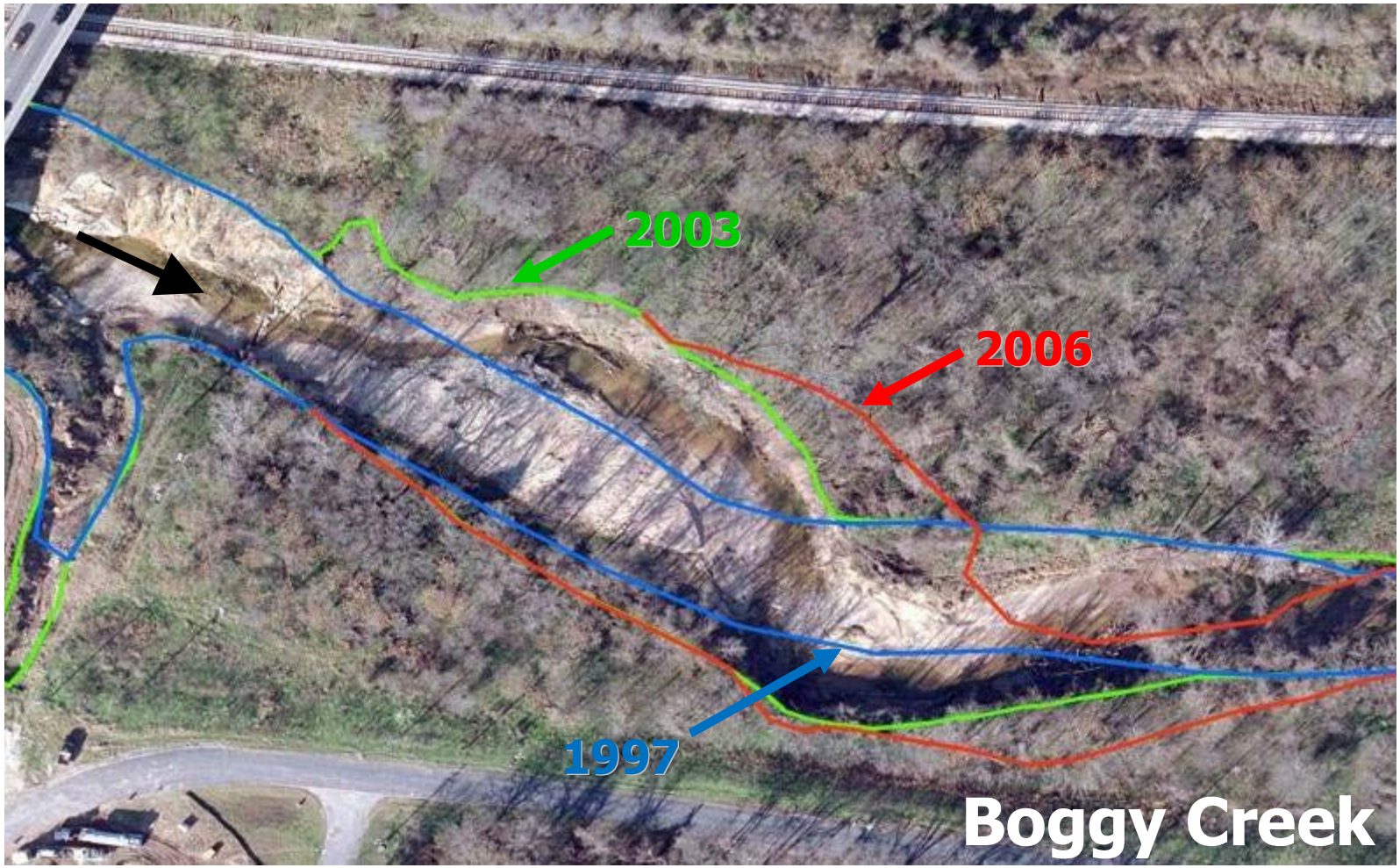
Channel Downcutting/Degradation

Channel Widening

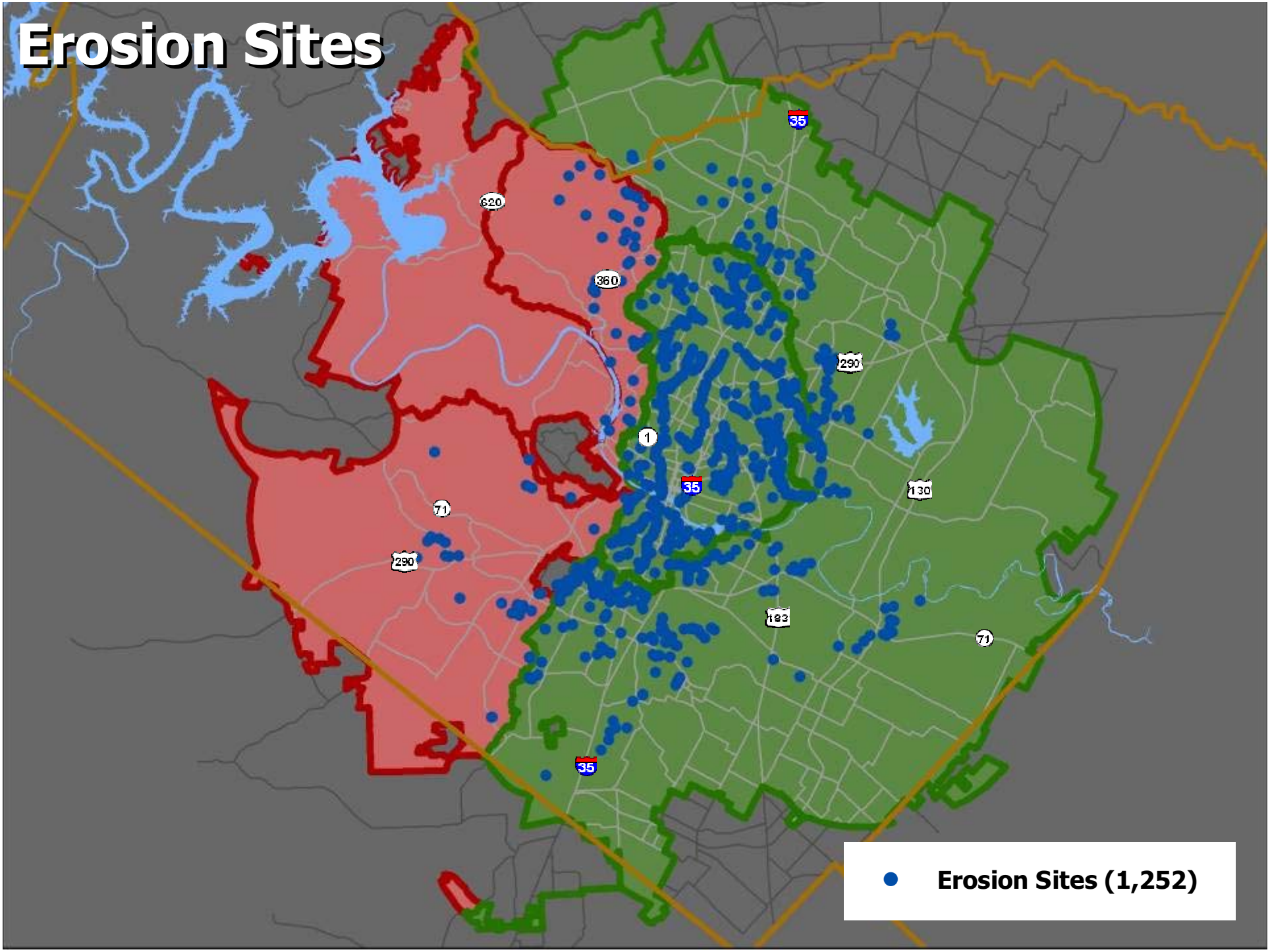
Planform Adjustment



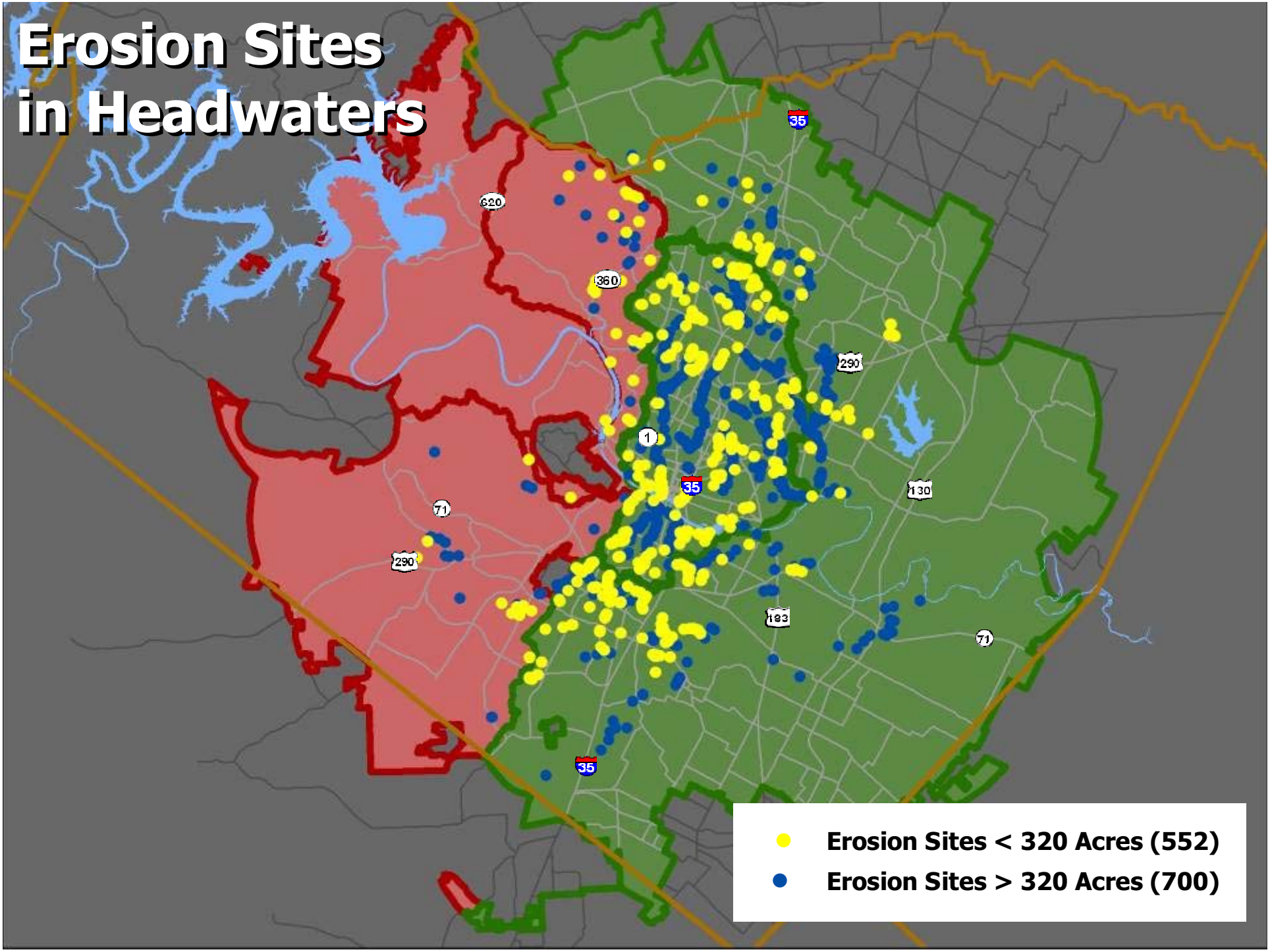
Planform Adjustment



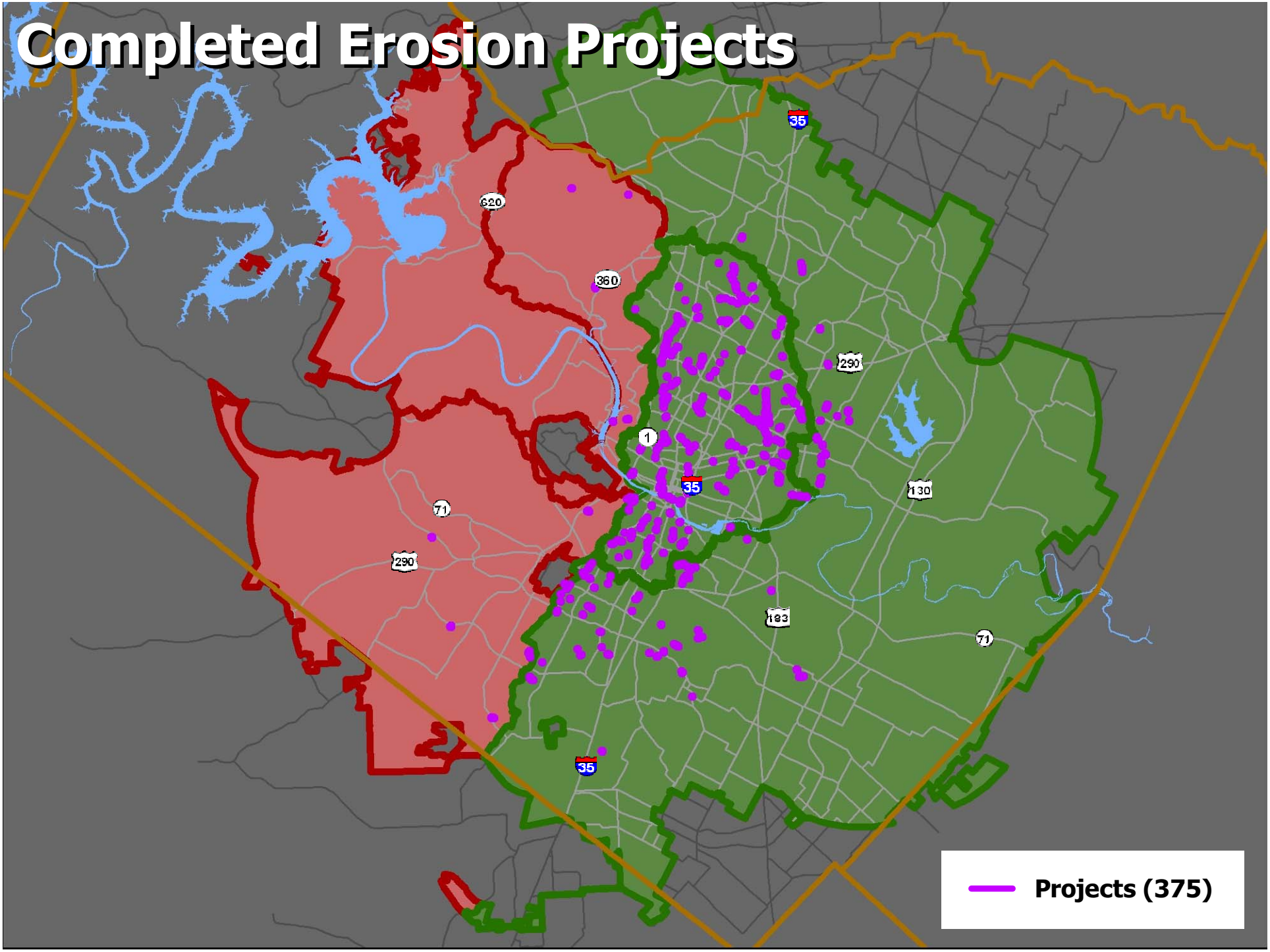
Erosion Sites



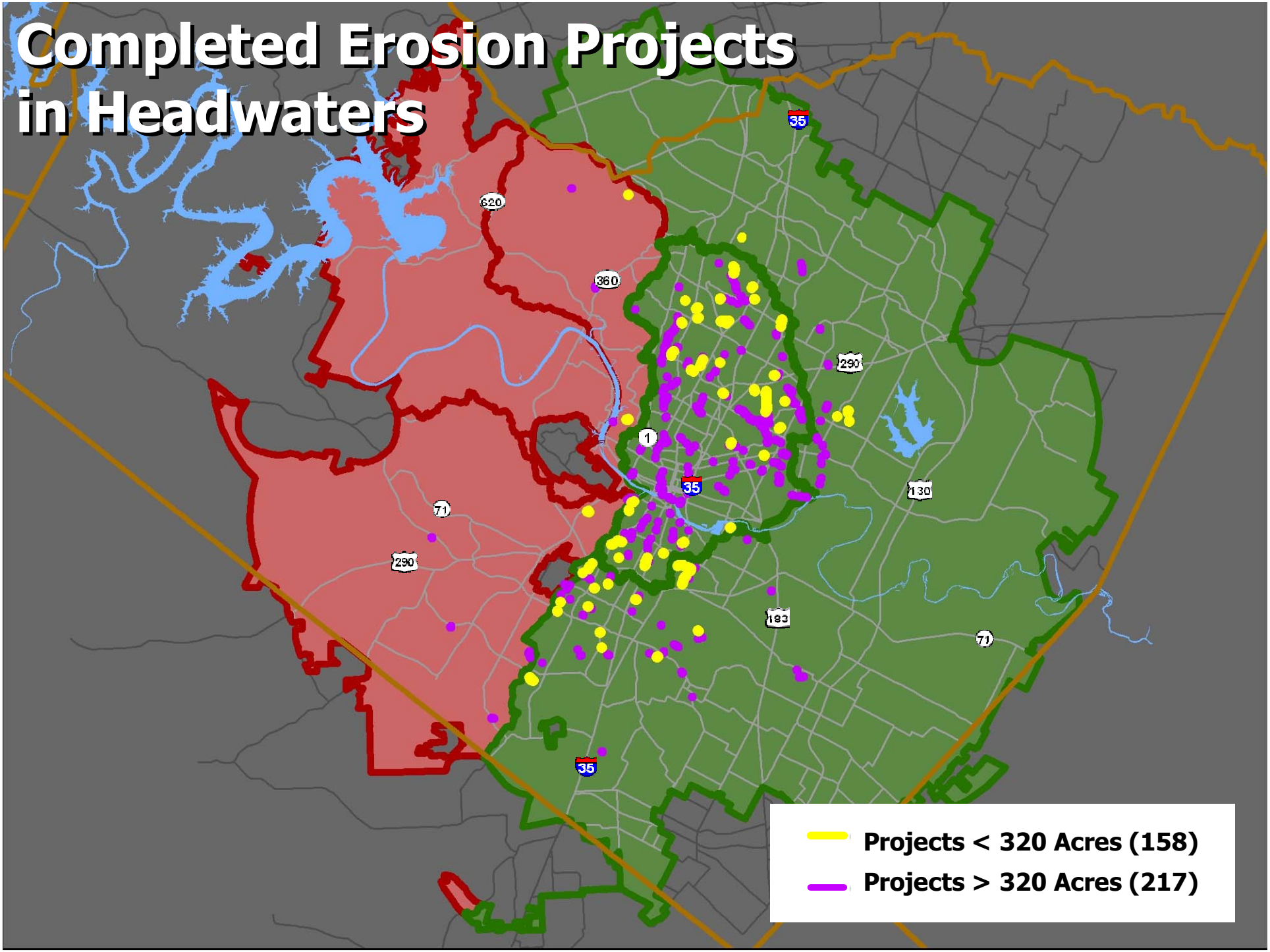
Erosion Sites in Headwaters

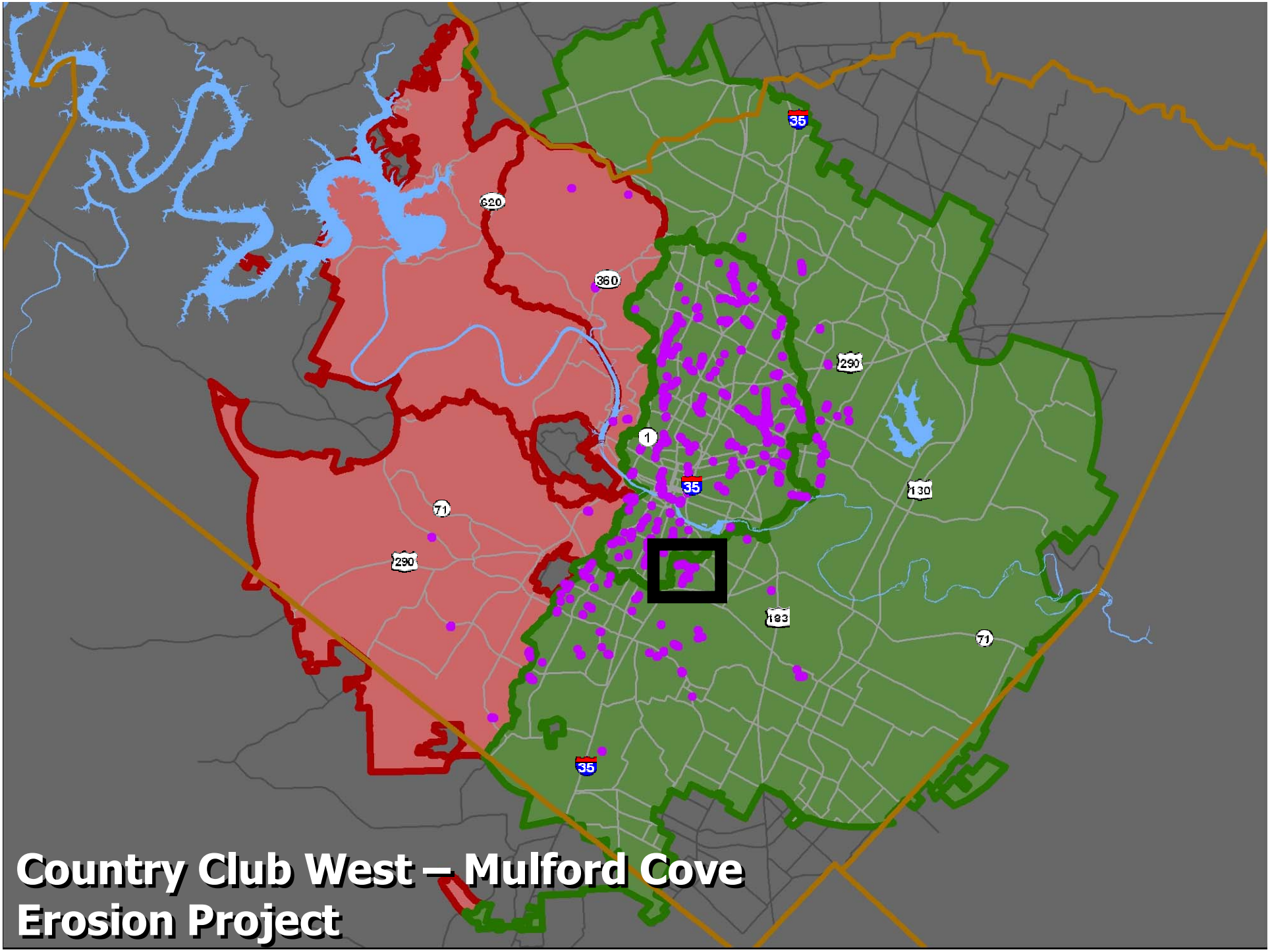


Completed Erosion Projects



Completed Erosion Projects in Headwaters



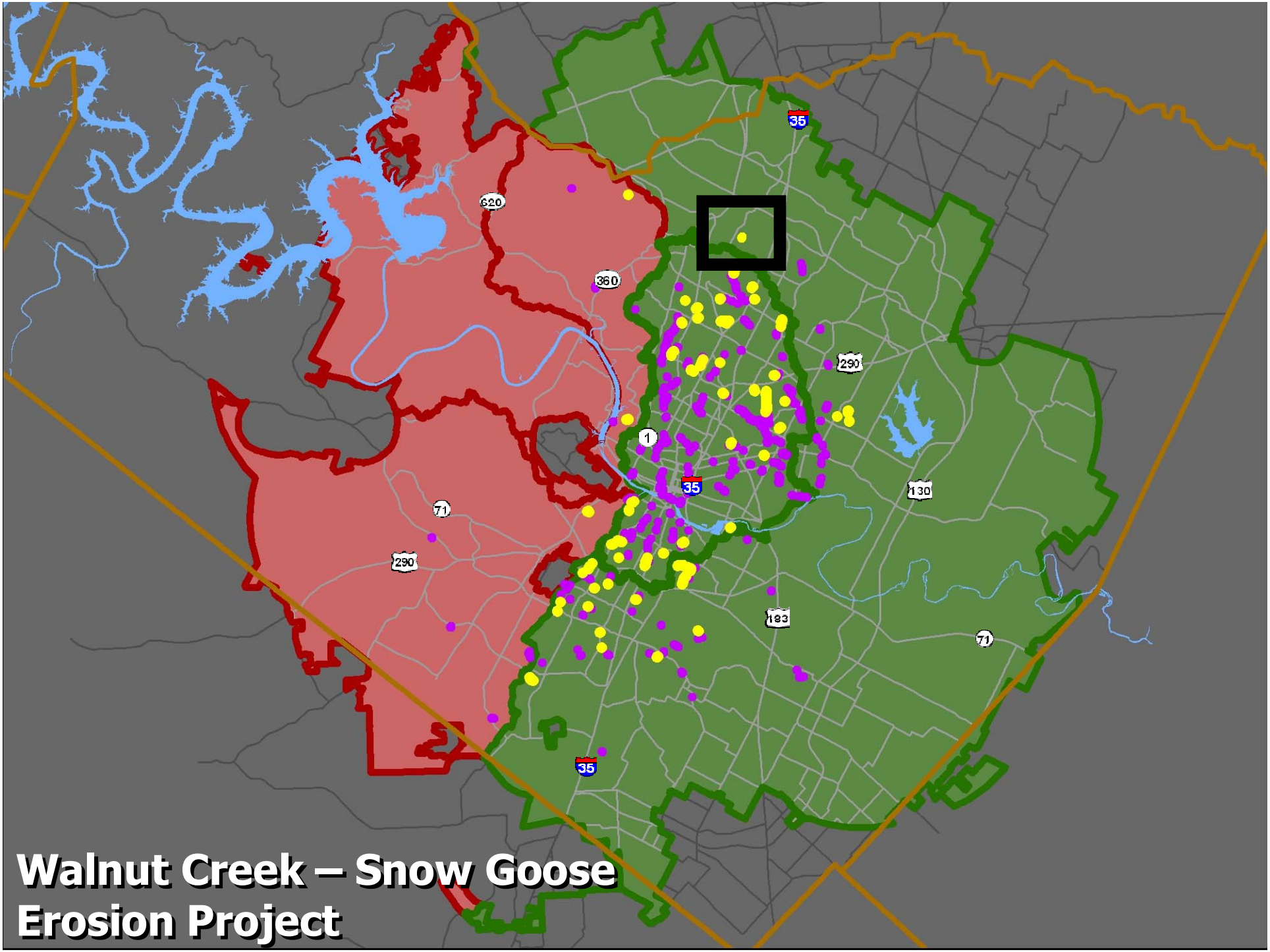


Country Club West – Mulford Cove Erosion Project


Alleghany Dr
Mulford Cv
Little Valley Cv
Country Club West Trib 4 - Mulford Cove


Before


After
~ $1,000/
linear foot



Walnut Creek – Snow Goose Erosion Project


Snow Goose Rd
Gracy Farms Ln
Snow Goose


Before


After
~ $1,000/
linear foot

Stream Restoration Demand Exceeds Available Resources

- **23 miles of stream erosion problems**
- **4.6 miles of "critical needs" (high priority) erosion problems**
- **~ 5 miles of streams restored since 1997 at cost of $22 million**
- **$6M to buy out 46 threatened properties**

Stream Restoration Demand Exceeds Available Resources

- **~ 4,000 feet is current average annual output of restored stream**
- **~ 5,000 feet = stream repair added annually as erosion continues & Austin grows**
- **At this rate, demand will continue to outpace our output**

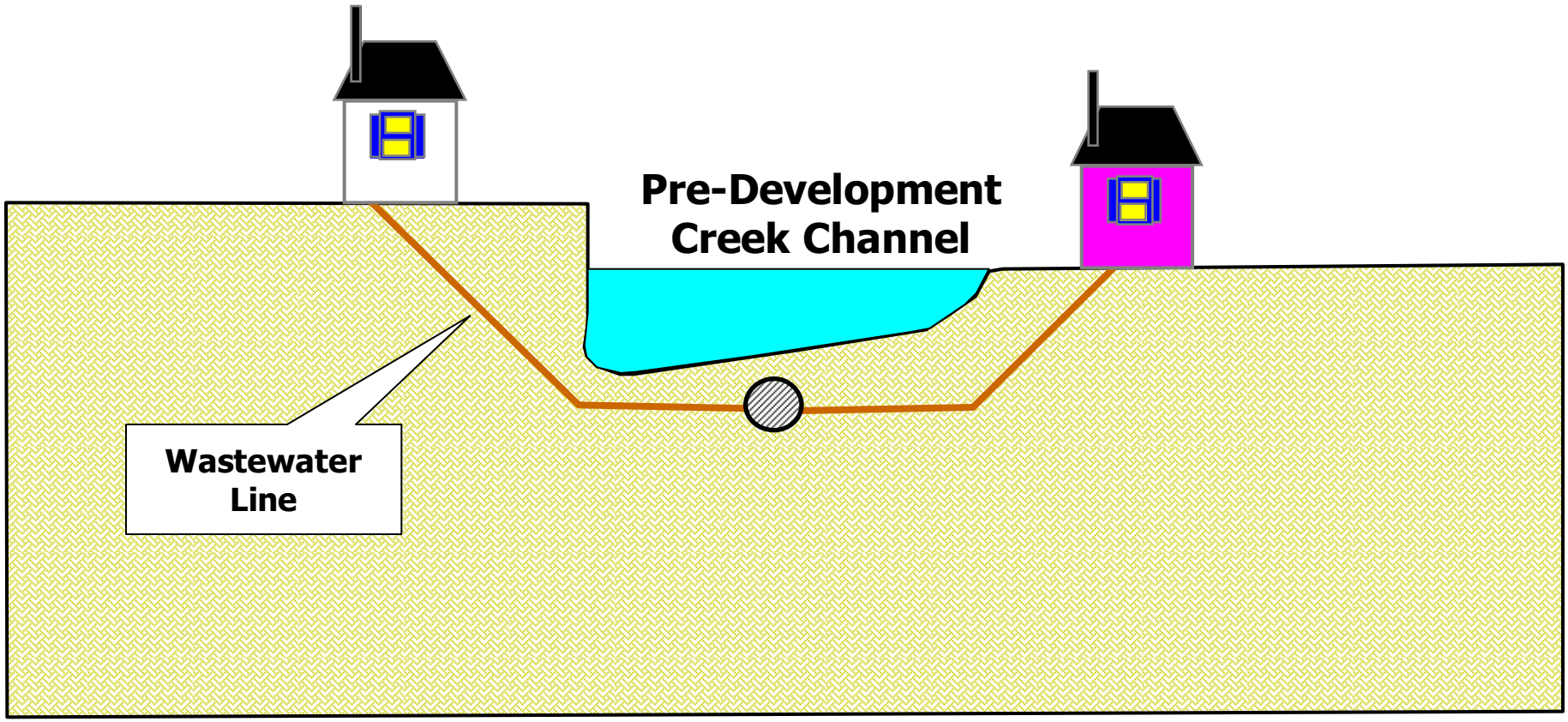
ACWP: Removing Active Pipes from Creeks & Streambank Restoration

Number of Projects	**63 (of 101 overall Program Projects)**
Pipe Rehab in CWQZ	**3.2 miles**
New Pipe in CWQZ	**17.7 miles**
Rehab. Manhole in CWQZ	**67**
Structural Streambank Restoration / Stabilization	**2.2 miles**
Approx. Cost of Total Streambank Restoration	**$6,000,000**

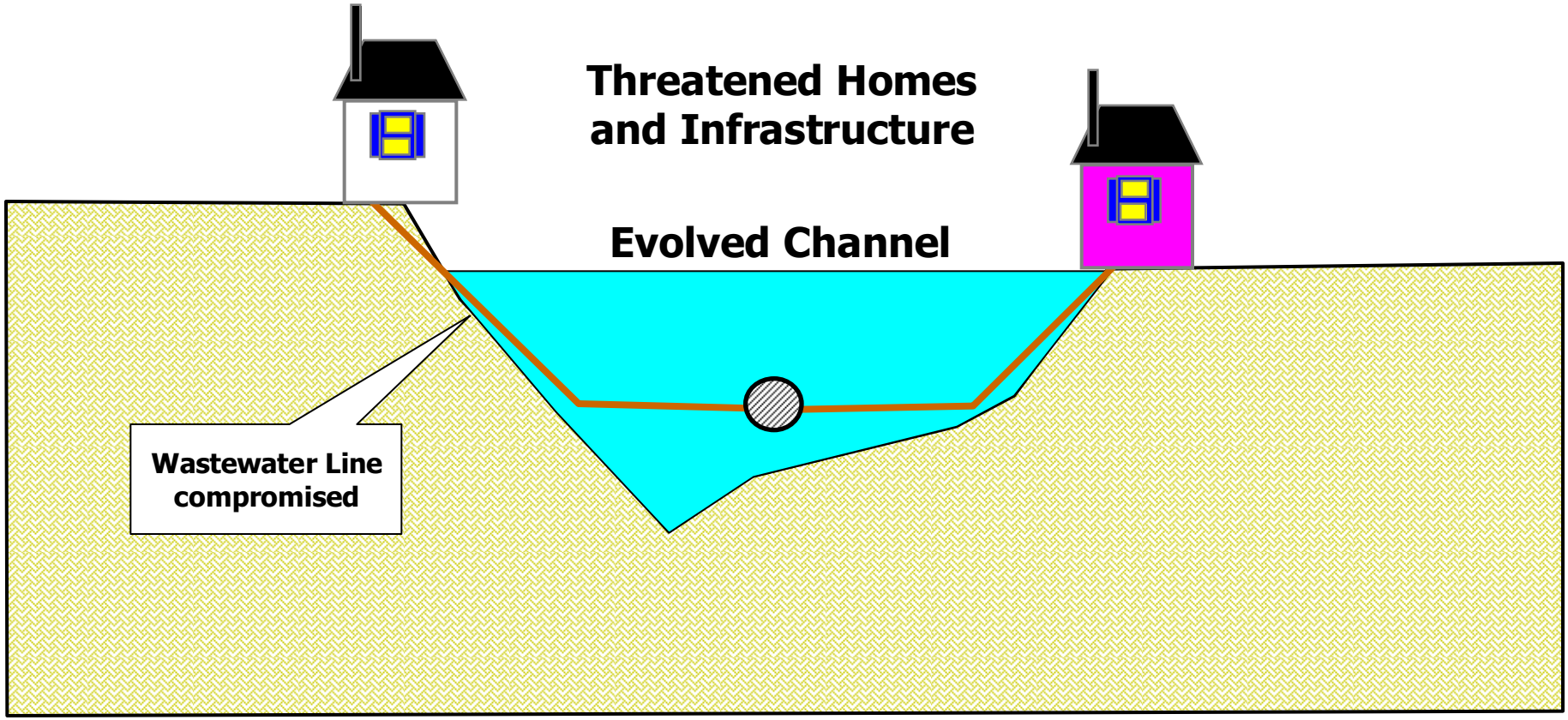
Wastewater Collection System Problems

Boggy Creek

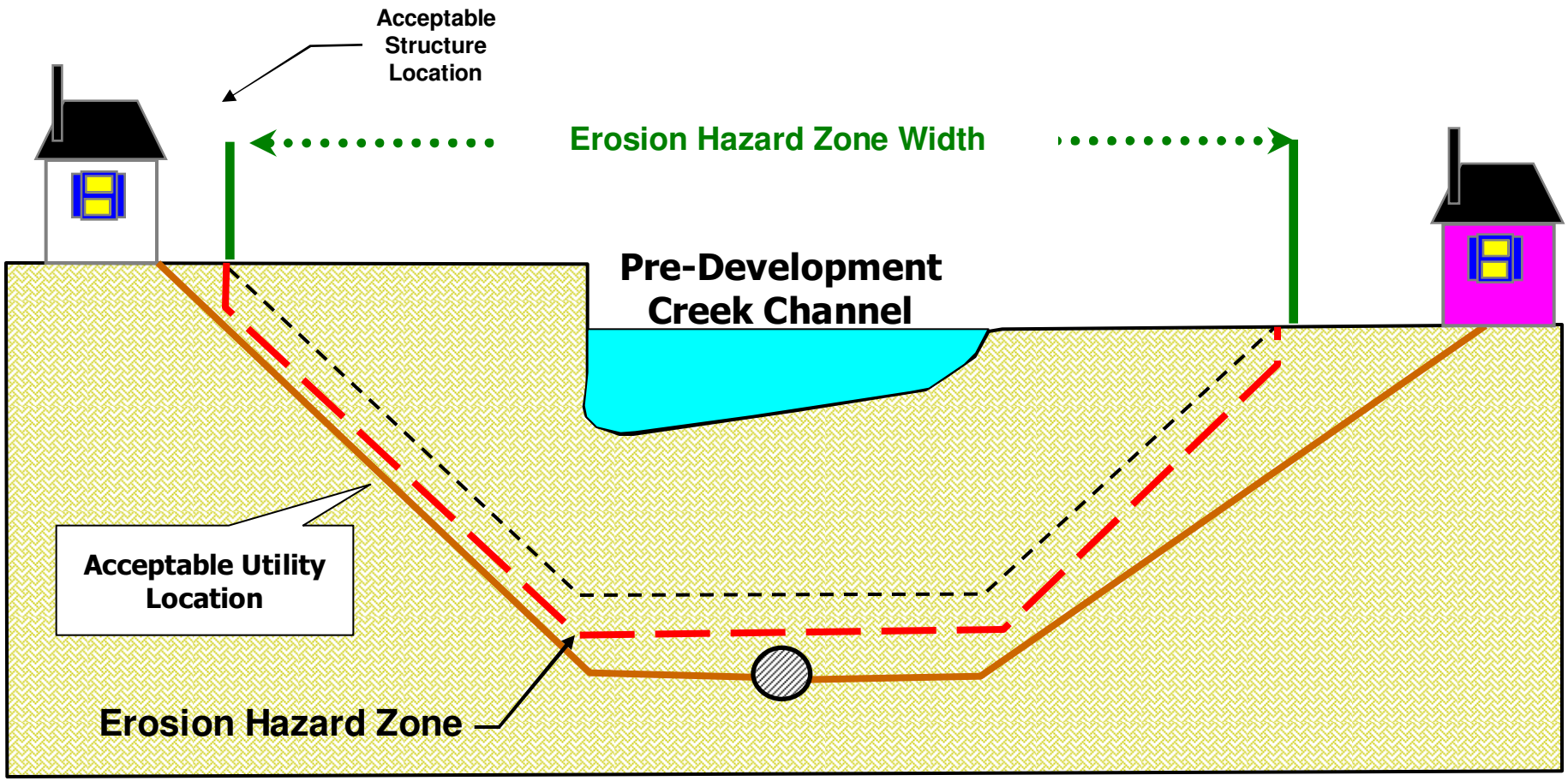
Erosion Hazard Zones: The Problem



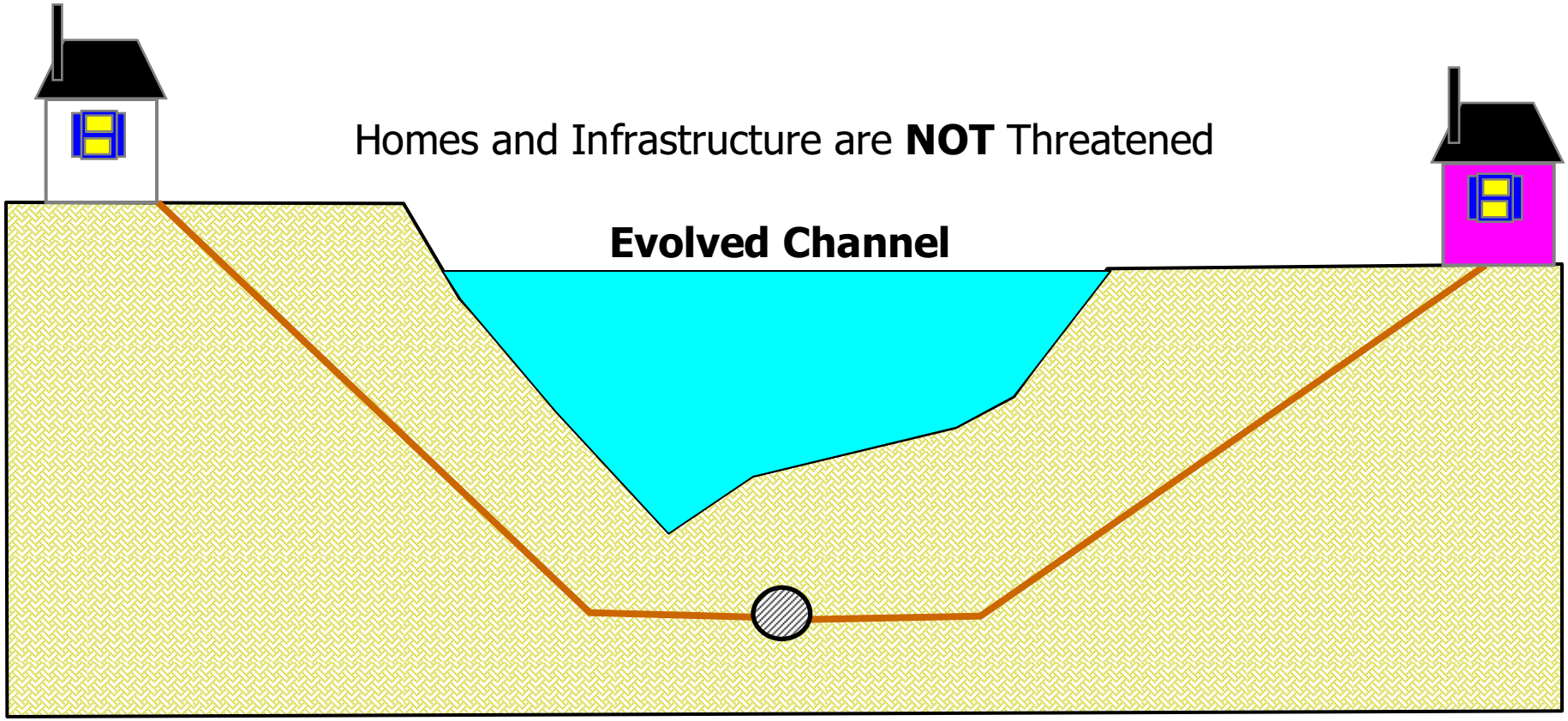
Erosion Hazard Zones: The Problem

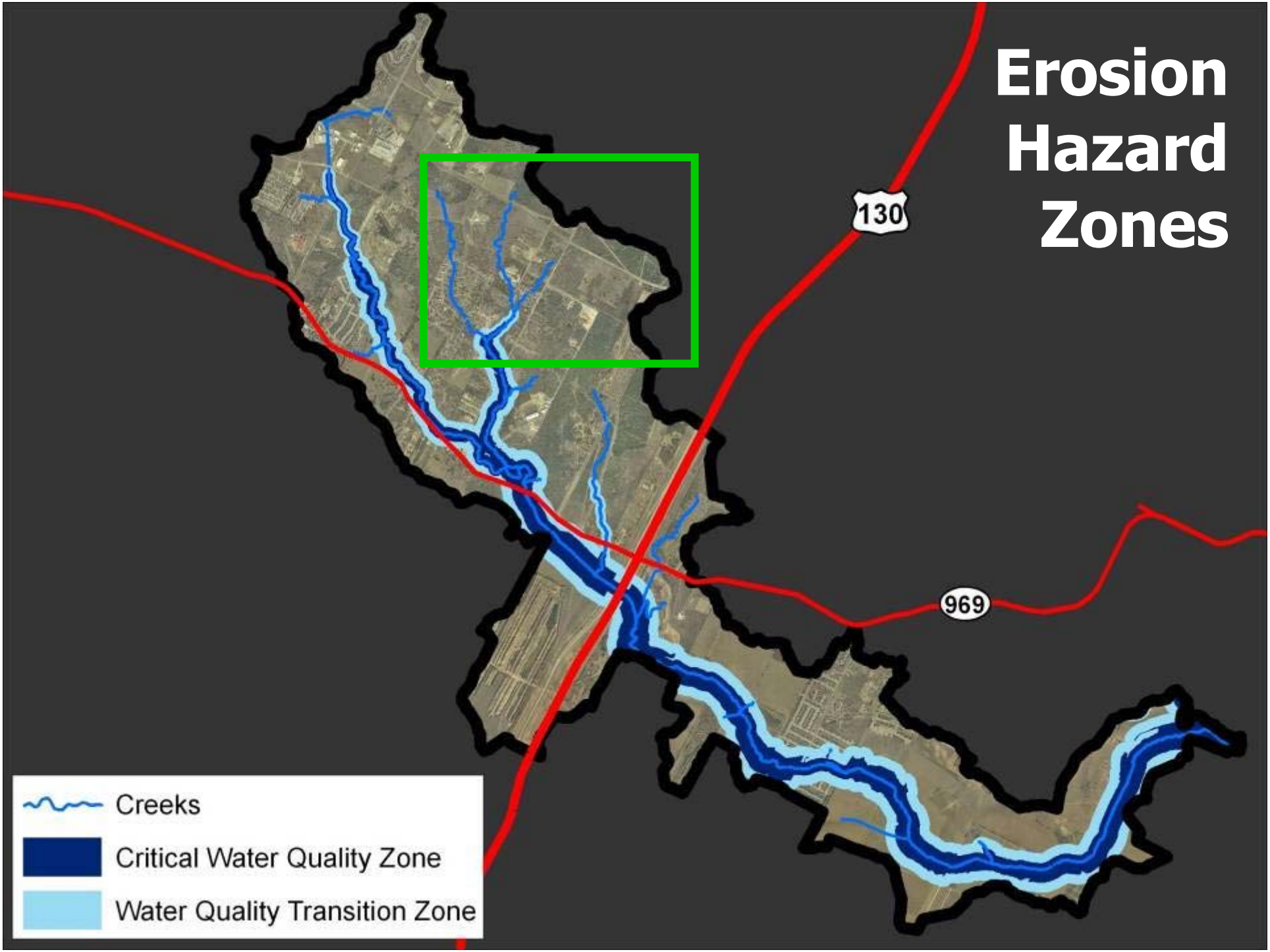


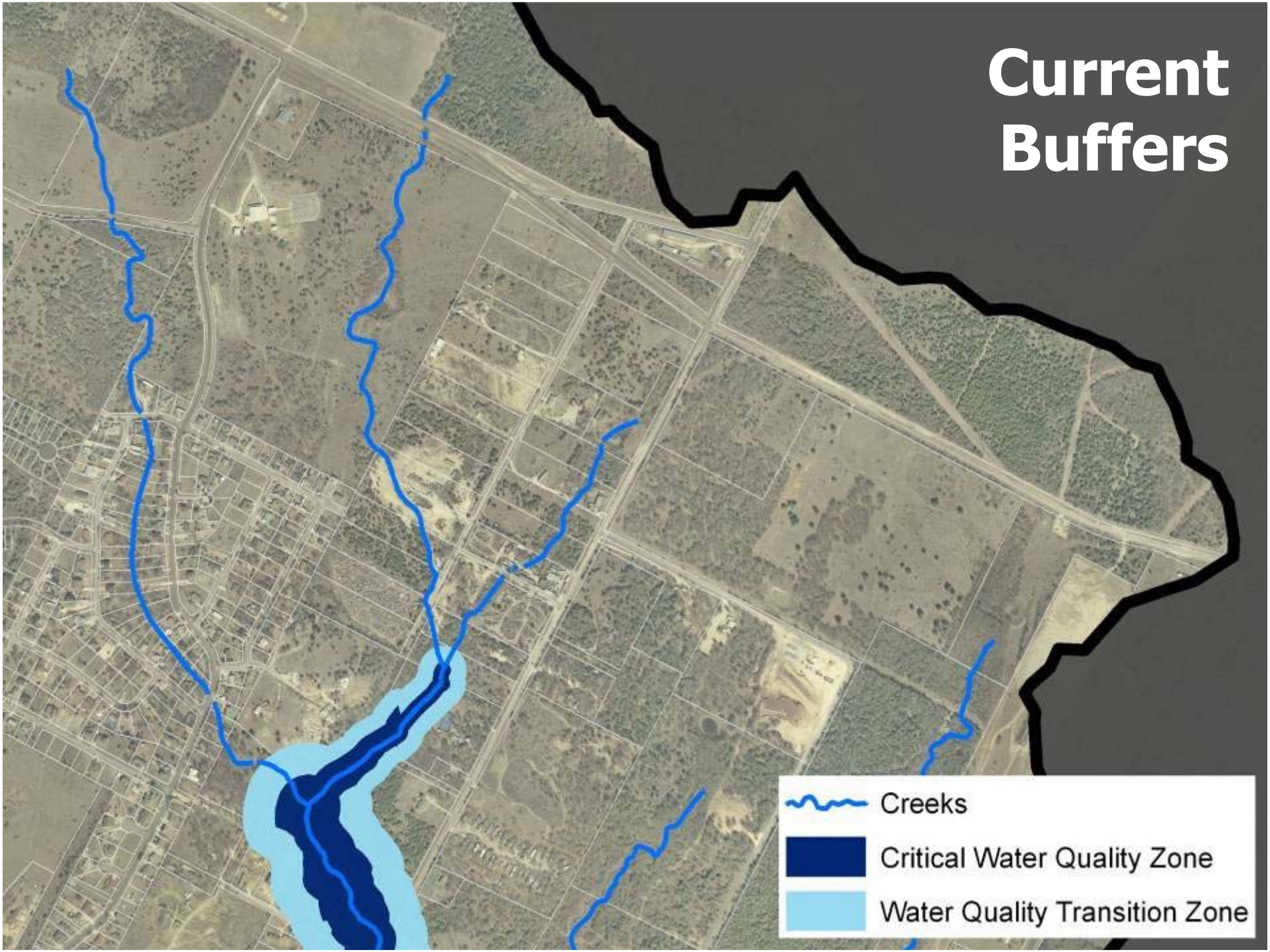
Erosion Hazard Zones: The Solution

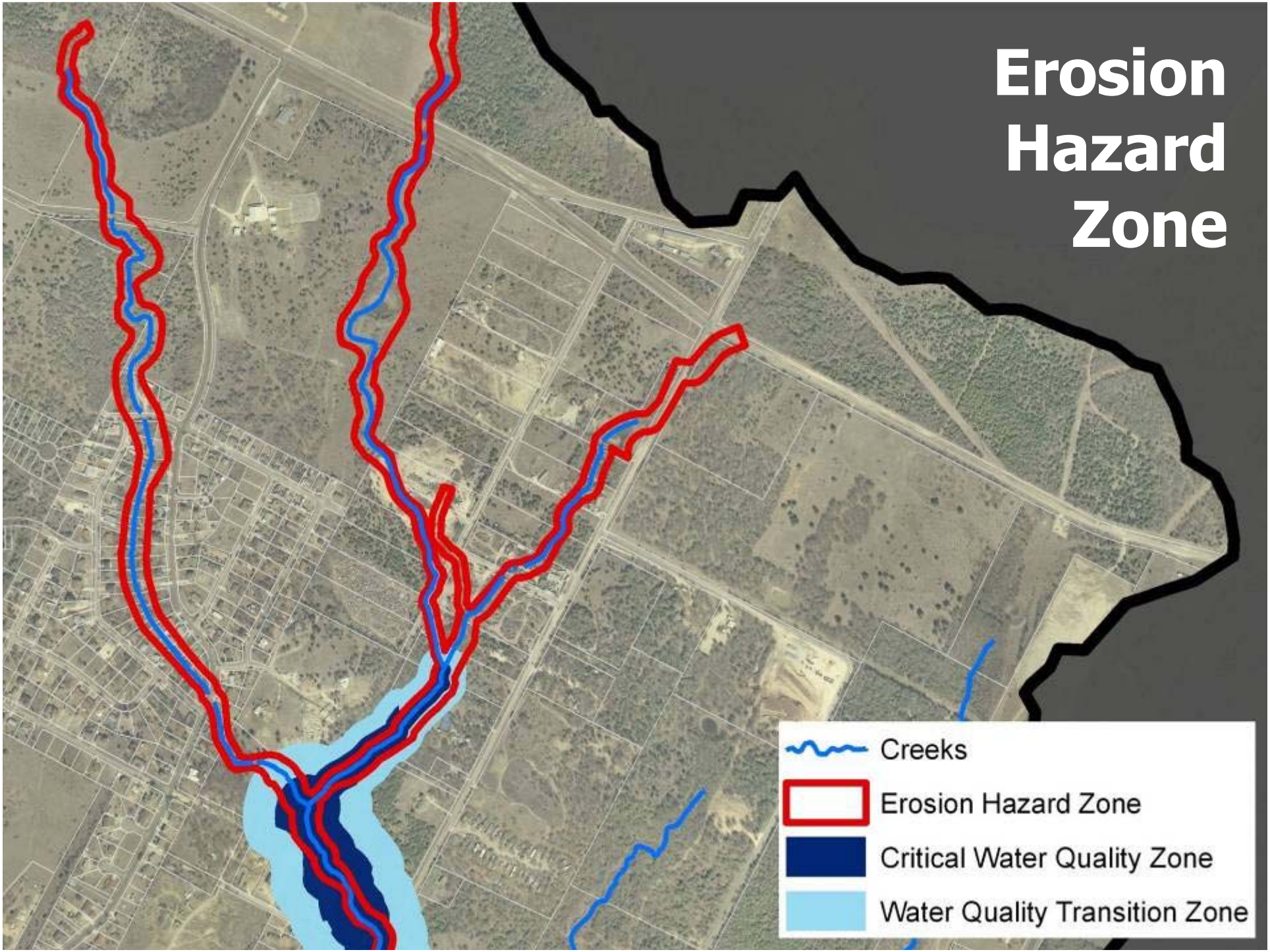


Erosion Hazard Zones: The Solution




Erosion Hazard Zones
130
969
Creeks
Critical Water Quality Zone
Water Quality Transition Zone


Current Buffers
Creeks
Critical Water Quality Zone
Water Quality Transition Zone


Erosion Hazard Zone
Creeks
Erosion Hazard Zone
Critical Water Quality Zone
Water Quality Transition Zone

City of Austin: Stream Buffer Milestones

1974 Waterway Ordinance

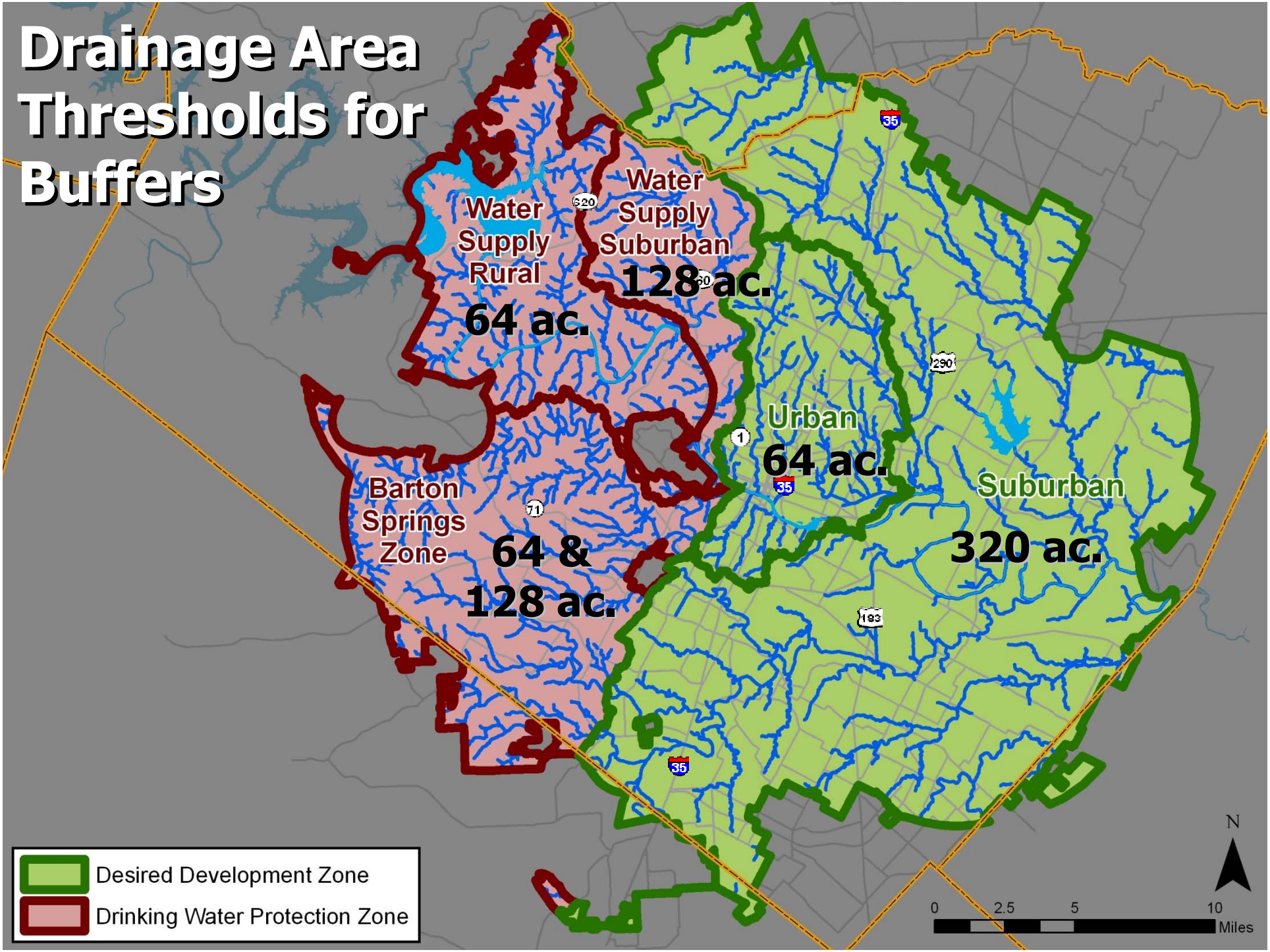
1980 Barton Creek Ordinance

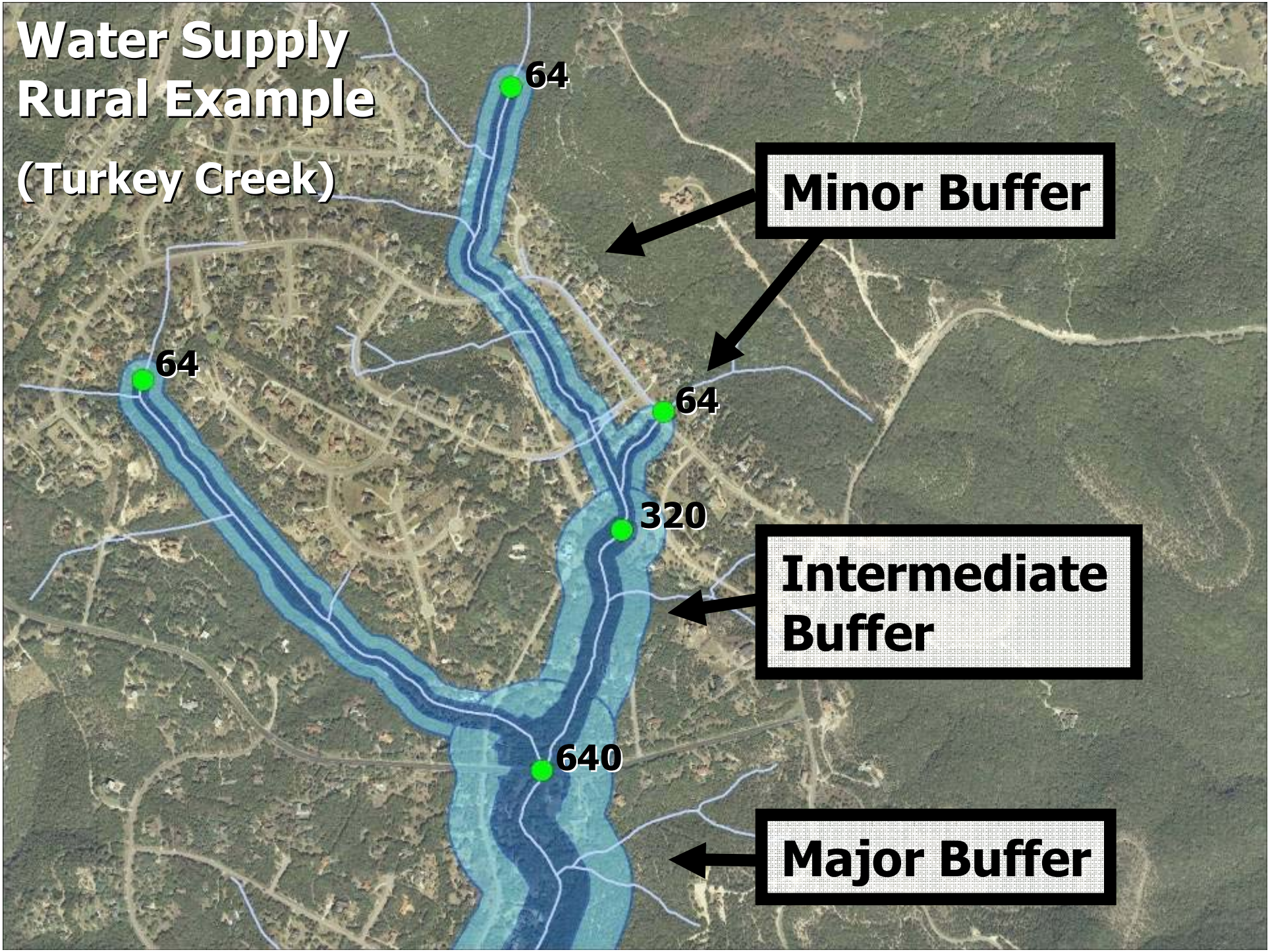
1986 Comprehensive Watershed Ordinance (CWO)

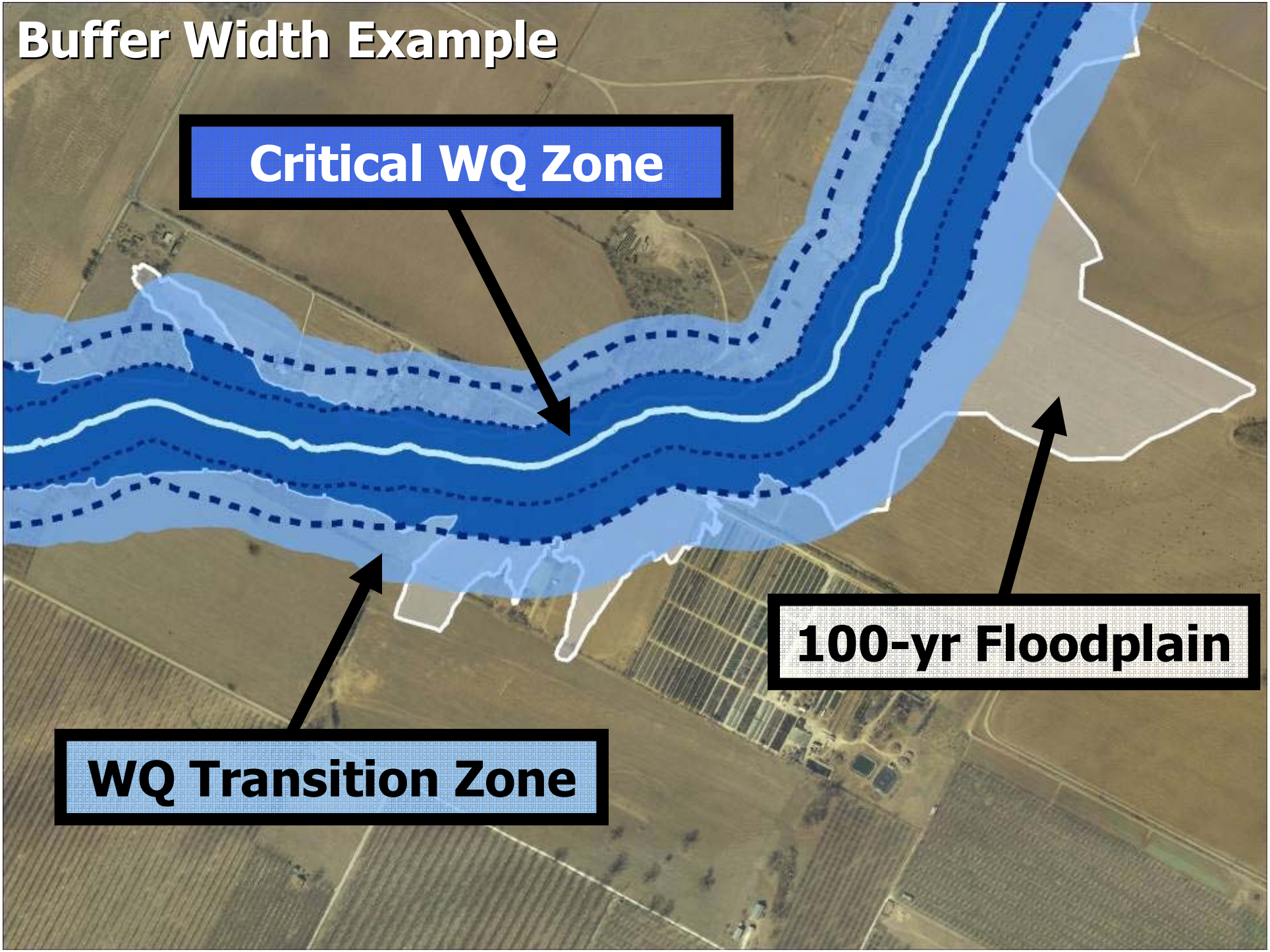
1991 Urban Watershed Ordinance (UWO)

2004 Robinson Ranch Development Agreement

2007 Colorado River Critical WQ Zone


Drainage Area Thresholds for Buffers
Water Supply Rural
64 ac.
Water Supply Suburban
128 ac.
Barton Springs Zone
64 & 128 ac.
Urban
64 ac.
Suburban
320 ac.
Desired Development Zone
Drinking Water Protection Zone
N
0
2.5
5
10
Miles


Water Supply
Rural Example
(Turkey Creek)
64
64
64
320
640
Minor Buffer
Intermediate Buffer
Major Buffer


Buffer Width Example
Critical WQ Zone
100-yr Floodplain
WQ Transition Zone

Austin's Buffers

Buffer Type

1. Critical Water Quality Zone
2. WQ Transition Zone

Watershed Classification

1. Barton Springs Zone
2. Water Supply Rural
3. Water Supply Suburban
4. Urban
5. Suburban

Waterway Class

1. Major
2. Intermediate
3. Minor

Exceptions

1. Lakes
2. Colorado River
3. Barton mainstem
4. Downtown

Austin's Watershed Classification Thresholds

Watershed Classification	Major (acres)	Inter-mediate (acres)	Minor (acres)
Barton Springs Zone	640	320	64
Water Supply Rural	640	320	64
Water Supply Suburb.	640	320	128
Urban	Floodplain Determines		64
Suburban	1,280	640	320

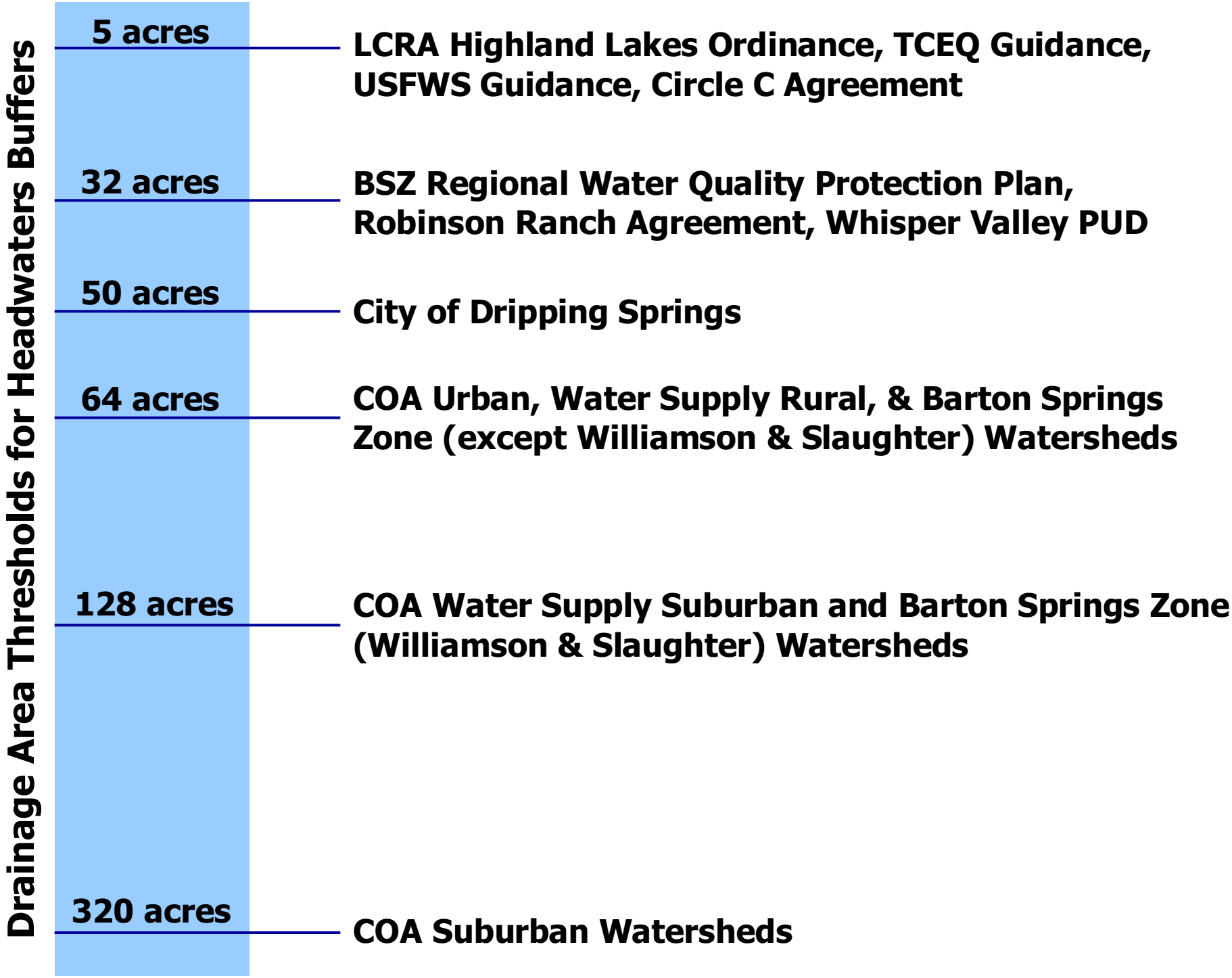
Austin's Waterway Class Widths

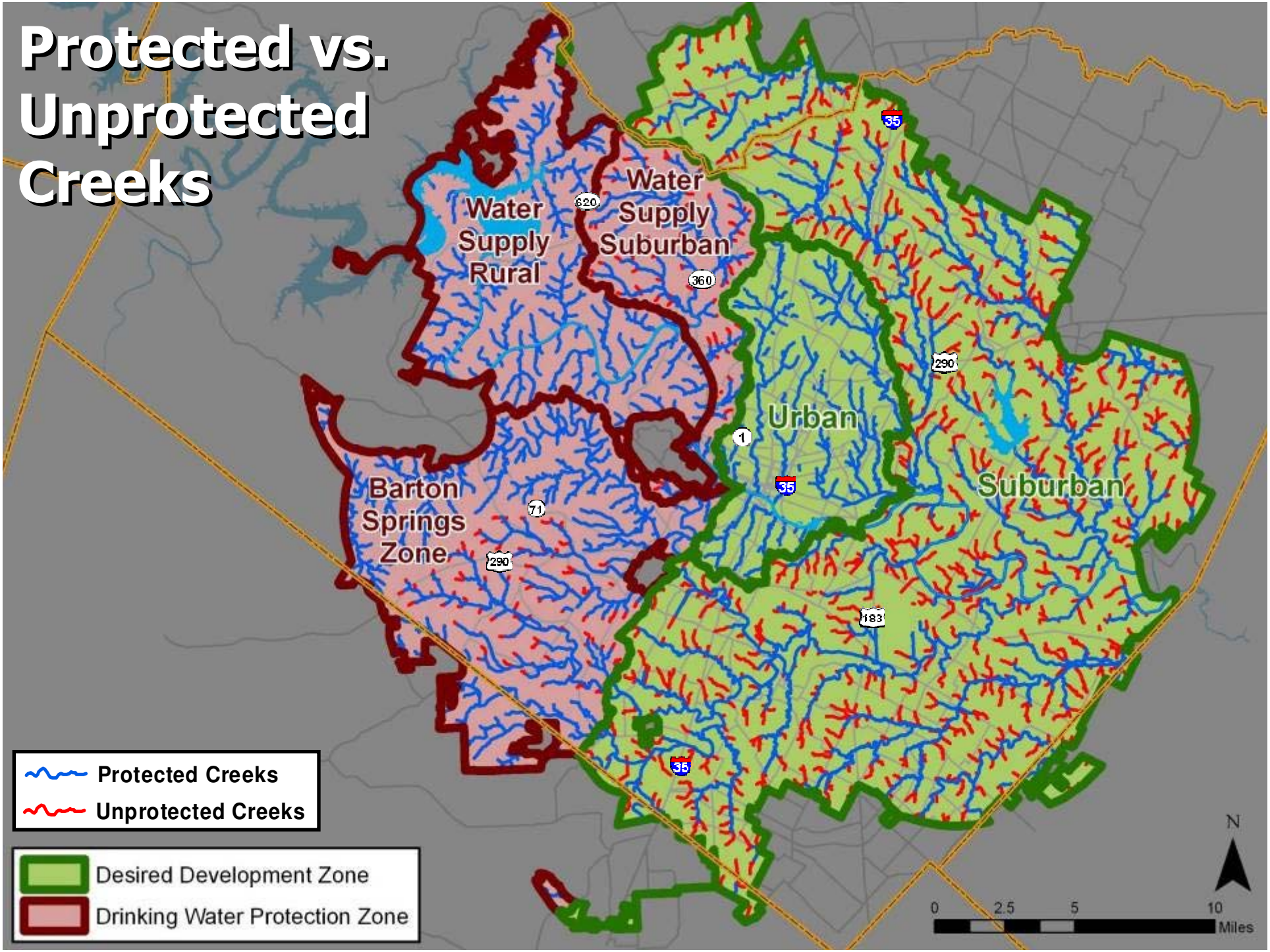
Waterway Class	Critical WQ Zone		WQ Transition Zone Width (feet)
	Minimum Width (feet)	Maximum Width (feet)	
Major	200	400	300
Intermediate	100	200	200
Minor	50	100	100

Final width varies depending upon 100-year floodplain.

Austin's Two Stream Buffer Types

1. **Critical Water Quality Zone**
   - No buildings or water quality controls
   - Flood detention facilities permitted
   - Limited road & utility crossings
   - Passive recreational facilities (trails, etc.)
2. **Water Quality Transition Zone**
   - Limited buildout (e.g., 30% maximum impervious cover in Suburban Watersheds)
   - Structural water quality controls permitted (with some exceptions)


Drainage Area Thresholds for Headwaters Buffers
5 acres
LCRA Highland Lakes Ordinance, TCEQ Guidance, USFWS Guidance, Circle C Agreement
32 acres
BSZ Regional Water Quality Protection Plan, Robinson Ranch Agreement, Whisper Valley PUD
50 acres
City of Dripping Springs
64 acres
COA Urban, Water Supply Rural, & Barton Springs Zone (except Williamson & Slaughter) Watersheds
128 acres
COA Water Supply Suburban and Barton Springs Zone (Williamson & Slaughter) Watersheds
320 acres
COA Suburban Watersheds


Protected vs. Unprotected Creeks
Water Supply Rural
Water Supply Suburban
Urban
Suburban
Barton Springs Zone
620
360
290
1
35
71
183
Protected Creeks
Unprotected Creeks
Desired Development Zone
Drinking Water Protection Zone
N
0
2.5
5
10
Miles

Summary

- **Riparian zones/stream buffers have multiple benefits**
  - **Small area with big impact**
  - **Headwaters especially important**
- **Significant problems & costs when riparian zone is not protected; prevention critical**
- **Austin an early pioneer with stream setbacks: since 1980, much experience**
- **Existing buffer system does not protect headwaters in eastern creeks**

Creek Protection: Potential Strategies

- **Extend creek buffers into headwaters areas citywide, not just in west**
- **Establish buffer widths to cover Erosion Hazard Zones & protect water quality**
- **Design for passive, affordable maintenance of channels**
- **Identify strategies to maintain existing development potential & increase flexibility**

Contact Information

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www.austintexas.gov/watershed/ordinances2.htm