



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 <i>(Meetings approx. every two weeks)</i>
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)

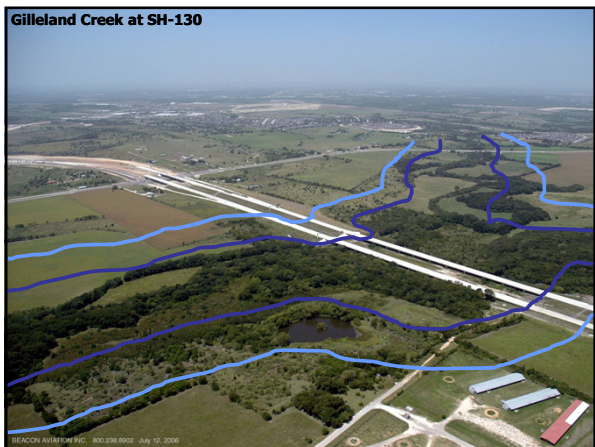
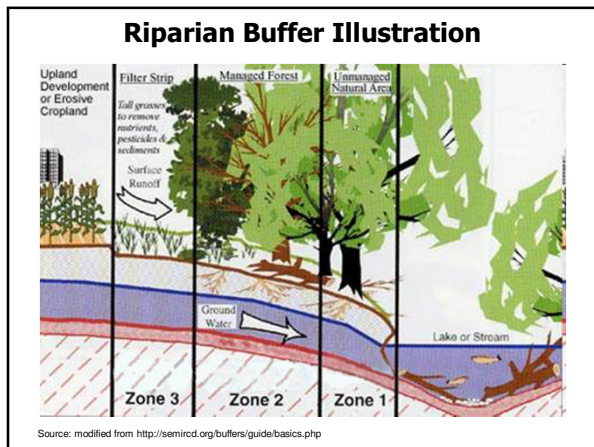
- Introduction
- Riparian Zone Benefits
- Problems & Costs of Stream Encroachment
- Existing Stream Setbacks
- Case Studies

Session No. 2 (Sep. 23)

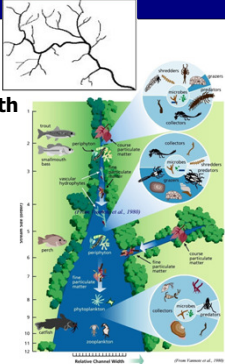
- Staff Recommendations
- Impact Analysis

Session No. 3 (Oct. 07)

- Discussion & Stakeholder Feedback



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



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

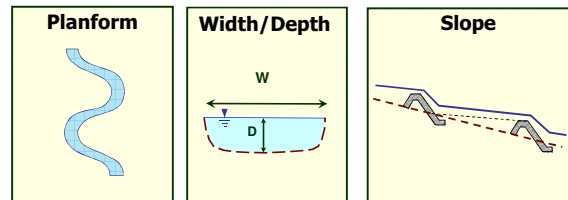
- Streams dynamic: erode and move laterally & vertically over time
- Buildings & public infrastructure may be threatened by stream erosion when placed in "Erosion Hazard Zone"
- Repairs expensive: cannot afford to allow new problems to be created
- Most vulnerable areas in east (clay soils) have the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

Urbanization and Stream Channels

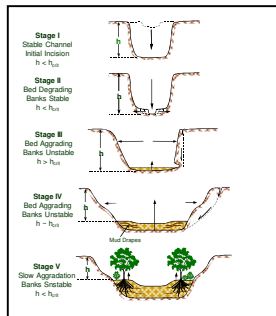
- Enlargement occurs as downcutting (incision) and widening
- Incision migrates upstream, creates taller, exposed streambanks
- Deeper channels prevent overbank flow, create positive feedback loop

Primary Modes of Channel Adjustment

Channel Adjustment Mechanisms



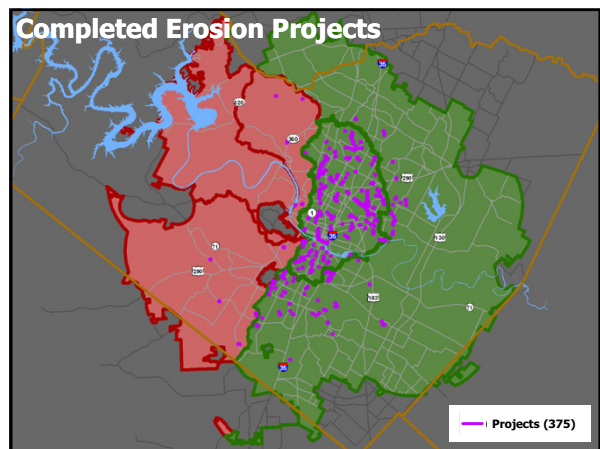
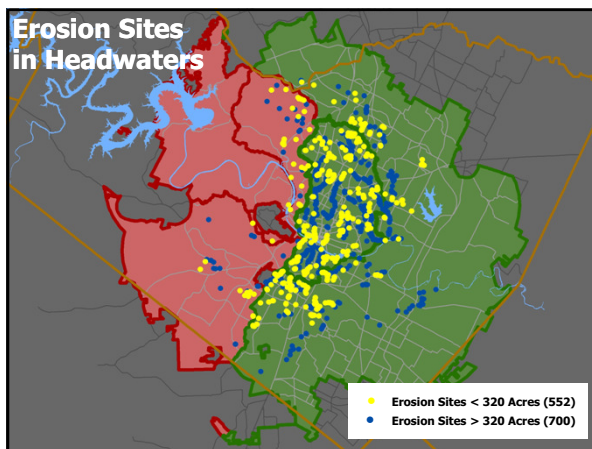
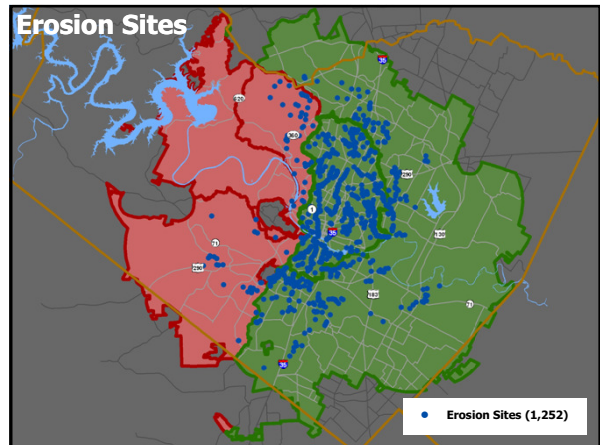
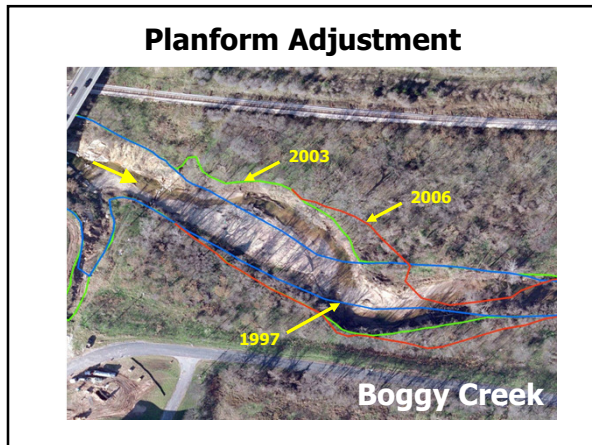
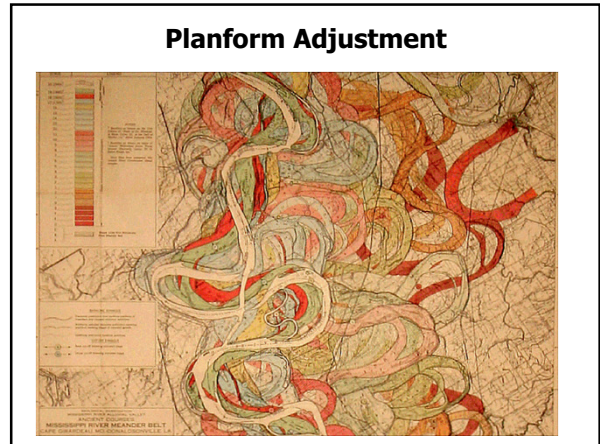
Channel Evolution Model

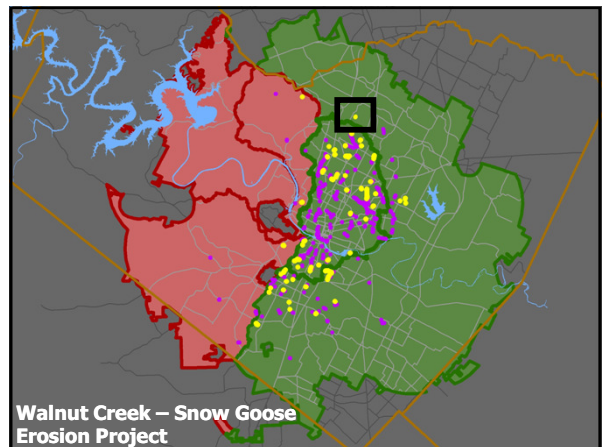
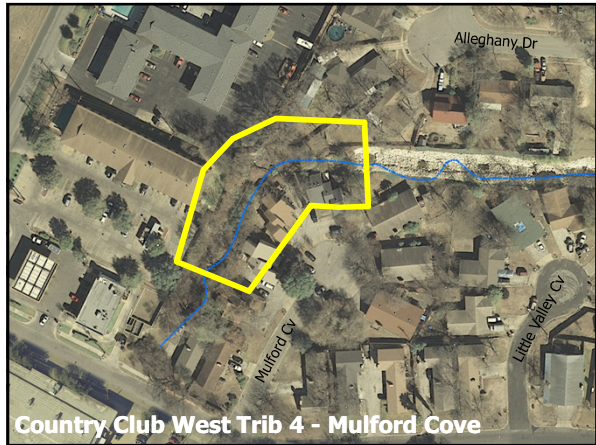
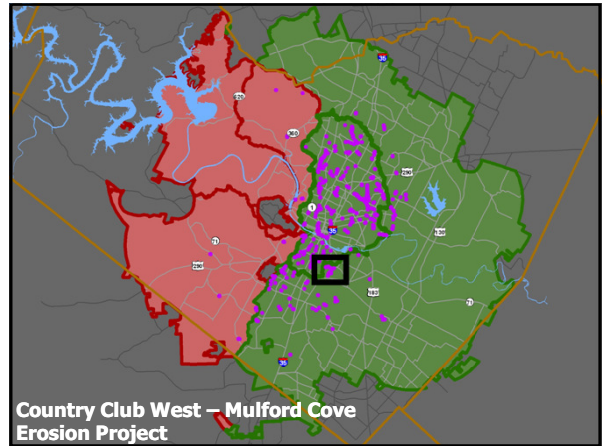
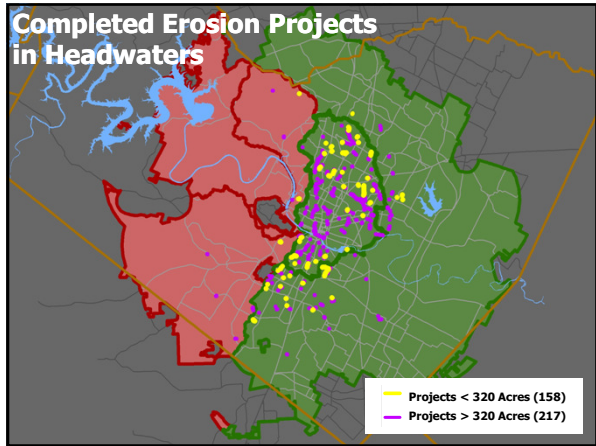


- Rejuvenation
- I. Initial Channel Downcutting
 - II. Continued Downcutting
Banks Near Critical Height
 - III. Downcutting Ceases/Slows
Unstable Banks Fail
Widening Occurs
 - IV. Aggradation Occurs
Banks Unstable
Widening Occurs
 - I. New Equilibrium

Channel Downcutting/Degradation









Before



After

~ \$1,000/
linear foot

Stream Restoration Demand Exceeds Available Resources

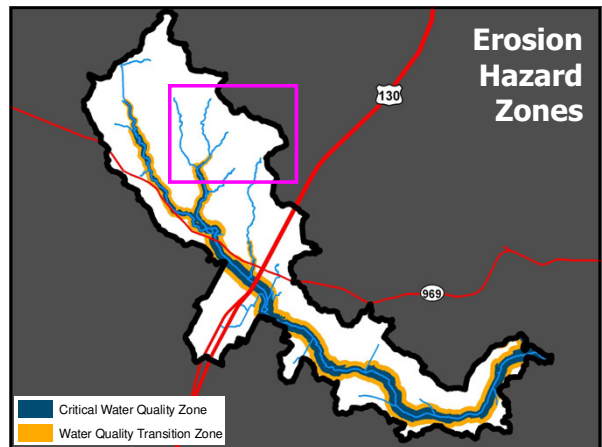
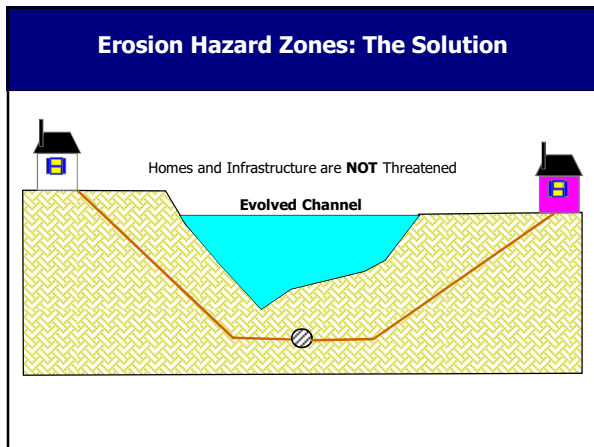
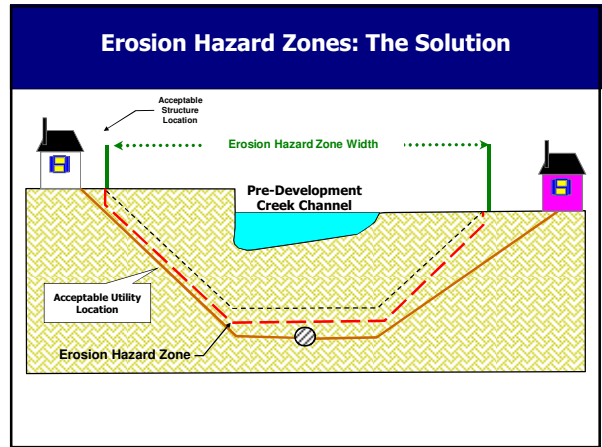
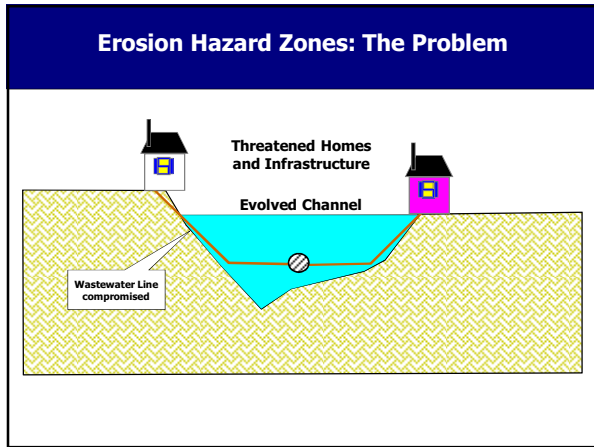
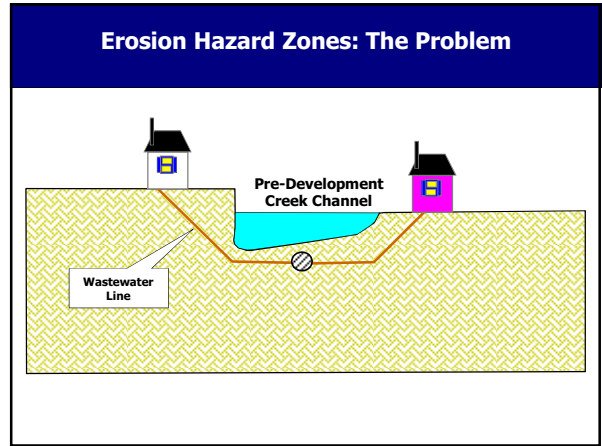
- 23 miles of stream erosion problems
- 4.6 miles of "critical needs" (high priority) erosion problems
- ~ 5 miles of streams restored since 1997 at cost of \$22 million
- \$6M to buy out 46 threatened properties

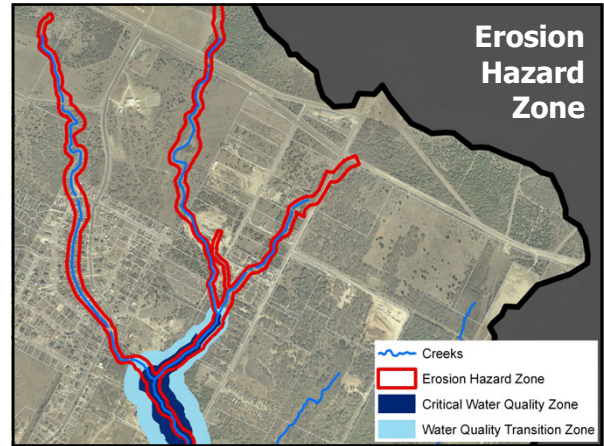
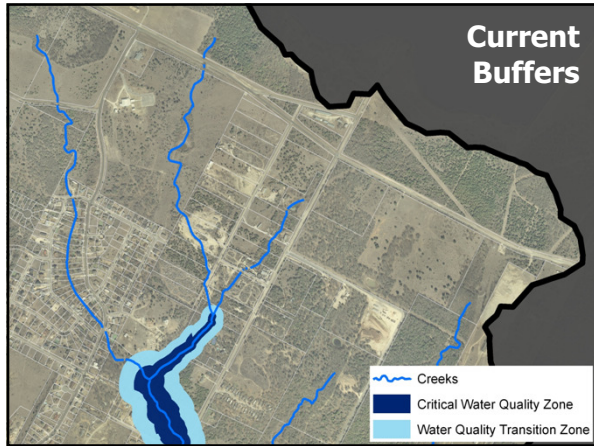
Stream Restoration Demand Exceeds Available Resources

- ~ 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

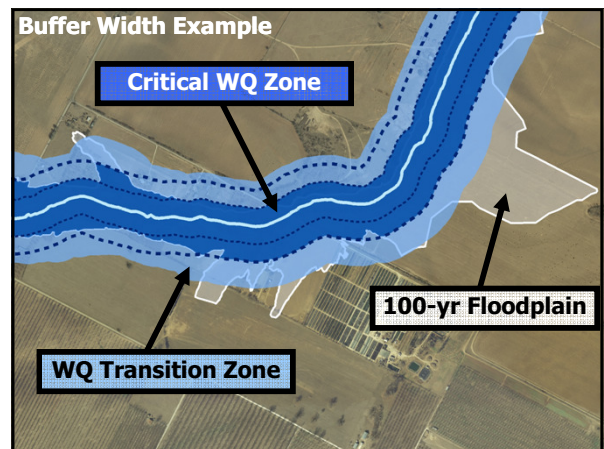
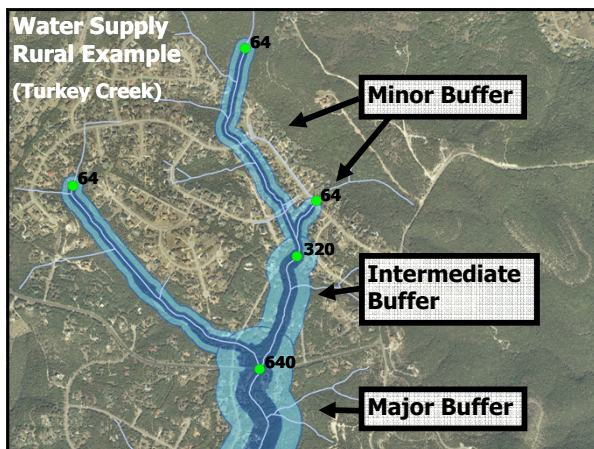
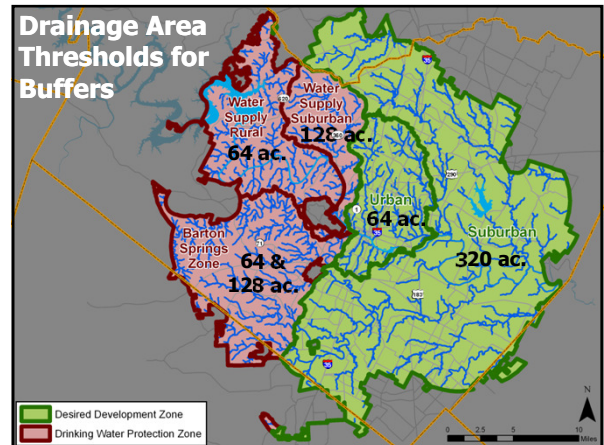
ACWP: Removing Active Pipes from Creeks & Streambank Restoration

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





- 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**



Austin's Buffers	
Buffer Type	Waterway Class
1. Critical Water Quality Zone	1. Major
2. WQ Transition Zone	2. Intermediate
	3. Minor
Watershed Classification	Exceptions
1. Barton Springs Zone	1. Lakes
2. Water Supply Rural	2. Colorado River
3. Water Supply Suburban	3. Barton mainstem
4. Urban	4. Downtown
5. Suburban	

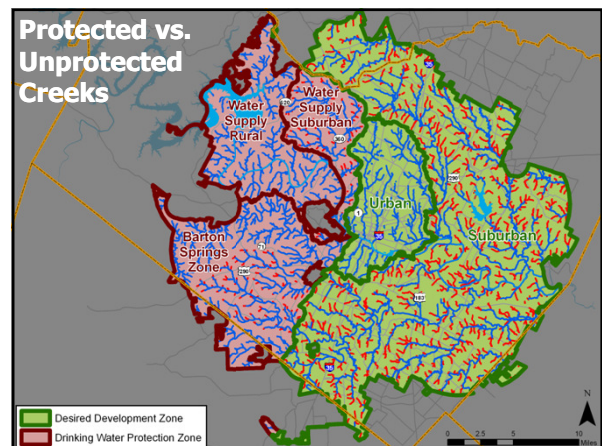
Austin's Watershed Classification Thresholds			
Watershed Classification	Major (acres)	Intermediate (acres)	Minor (acres)
Barton Springs Zone	640	320	64
Water Supply Rural	640	320	64
Water Supply Suburb.	640	320	128
Urban	Floodplain Determines		64
Suburban	1,280	640	320

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 | <ul style="list-style-type: none"> No buildings or water quality controls Flood detention facilities permitted Limited road & utility crossings Passive recreational facilities (trails, etc.) |
| 2. Water Quality Transition Zone | <ul style="list-style-type: none"> 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	Regulatory Reference
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



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