City of Austin
Watershed Protection Ordinance (WPO)
Phase 1 Overview

Urban Riparian Symposium

February 13, 2015

Conference Topics of Interest include:

Education and Outreach

1. Stakeholder Interface
2. Monitoring Success
3. Expectations
4. Non-profits/Volunteers
5. Building Skill Level in Your Area
6. Multiple Benefits from Restoration

Riparian Area Management

7. Invasive Species
8. Endangered Species
9. Function vs Form
10. Ecological Services
11. Pollution Abatement Measures
12. Fire
13. Maintenance
14. Large Woody Debris
15. Long-term

Case Studies and Lessons Learned

16. Watershed or Reach Scale
17. Process
18. Bidding/Contractor Issues

Restoration & Best Management Practices

19. Tools in our Tool belt
20. Re-vegetation Methods
21. Green Stormwater Infrastructure
22. Watershed Scale Restoration
23. Passive versus Active
24. Assessment
25. Ecology/Biology
26. Plants
27. Urban Wildlife
28. Functional Ecology
29. Ecological Function
30. Habitat
31. Stream Substrate
32. Source versus Symptom
33. Novel Ecosystems

Hydrology

34. Riparian Influence on Water Quality
35. Repairing Hydrology, small scale
36. Floods
37. Improving stormwater connection to the creek

Regulation

38. Policy
39. Mission Conflicts
40. Funding
41. Restoration Drivers (Goals)
42. Contractual and Regulatory Limitations
43. Watershed Protection Ordinances

Key Themes

- **Importance of protecting riparian areas & floodplains**
- **Lessons learned in Austin & beyond: need best science**
- **Prevention is affordable; repairs are not**
- **Simplicity and complexity**
- **A sustainable future: green infrastructure; compact development; connectivity; health; water**
- **Balance environmental protection & development opportunity**
- **Stakeholder participation crucial**

Ordinance Highlights

- **Over 220 code changes, including:**
  - **Headwaters Stream Buffers**
  - **Erosion Hazard Zone protections**
  - **Floodplain Modification Requirements**
  - **Trails facilitation and provisions**
- **Adopted October 17, 2013**
- **162-page ordinance**

Web Training Series

Detailed videos now available for the following topics:

1. WPO Redevelopment Exceptions
2. Impervious Cover
3. Overview of Functional Assessment of Floodplain Health
4. Functional Assessment of Zones 1 & 2
5. Functional Assessment of Zone 3
6. Erosion Hazard Zone – What and Why
7. Erosion Hazard Zone – Where
8. Erosion Hazard Zone Level 1 Analysis
9. Stream Buffers
10. Development Allowed within Stream Buffers

Council Resolution

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

(Resolution #20110113-038)

Austin's Riparian Protection Milestones

1974 Waterway Ordinance

1980 Barton Creek Ordinance

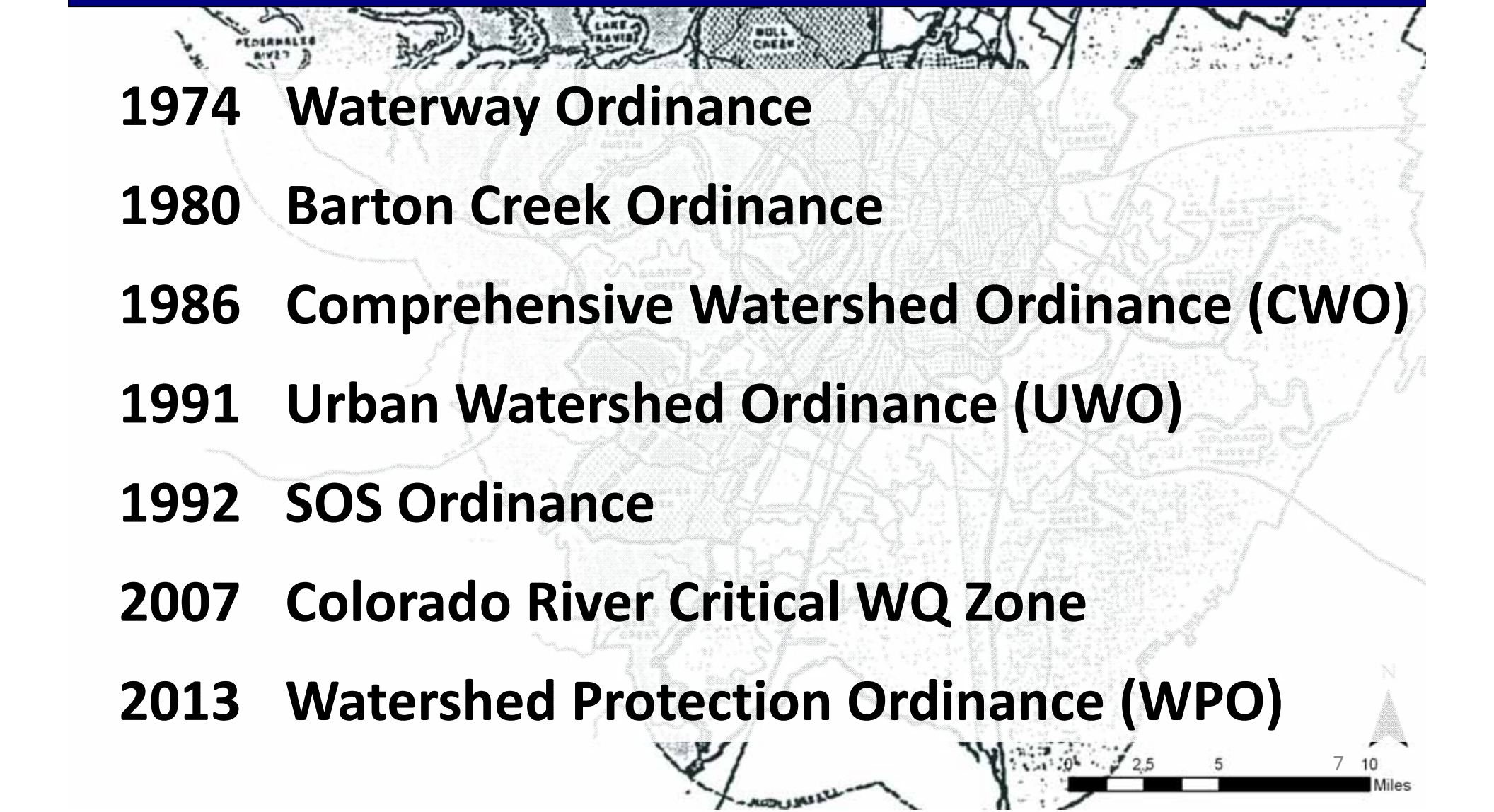
1986 Comprehensive Watershed Ordinance (CWO)

1991 Urban Watershed Ordinance (UWO)

1992 SOS Ordinance

2007 Colorado River Critical WQ Zone

2013 Watershed Protection Ordinance (WPO)



Stakeholder Input

15 Information Gathering Meetings

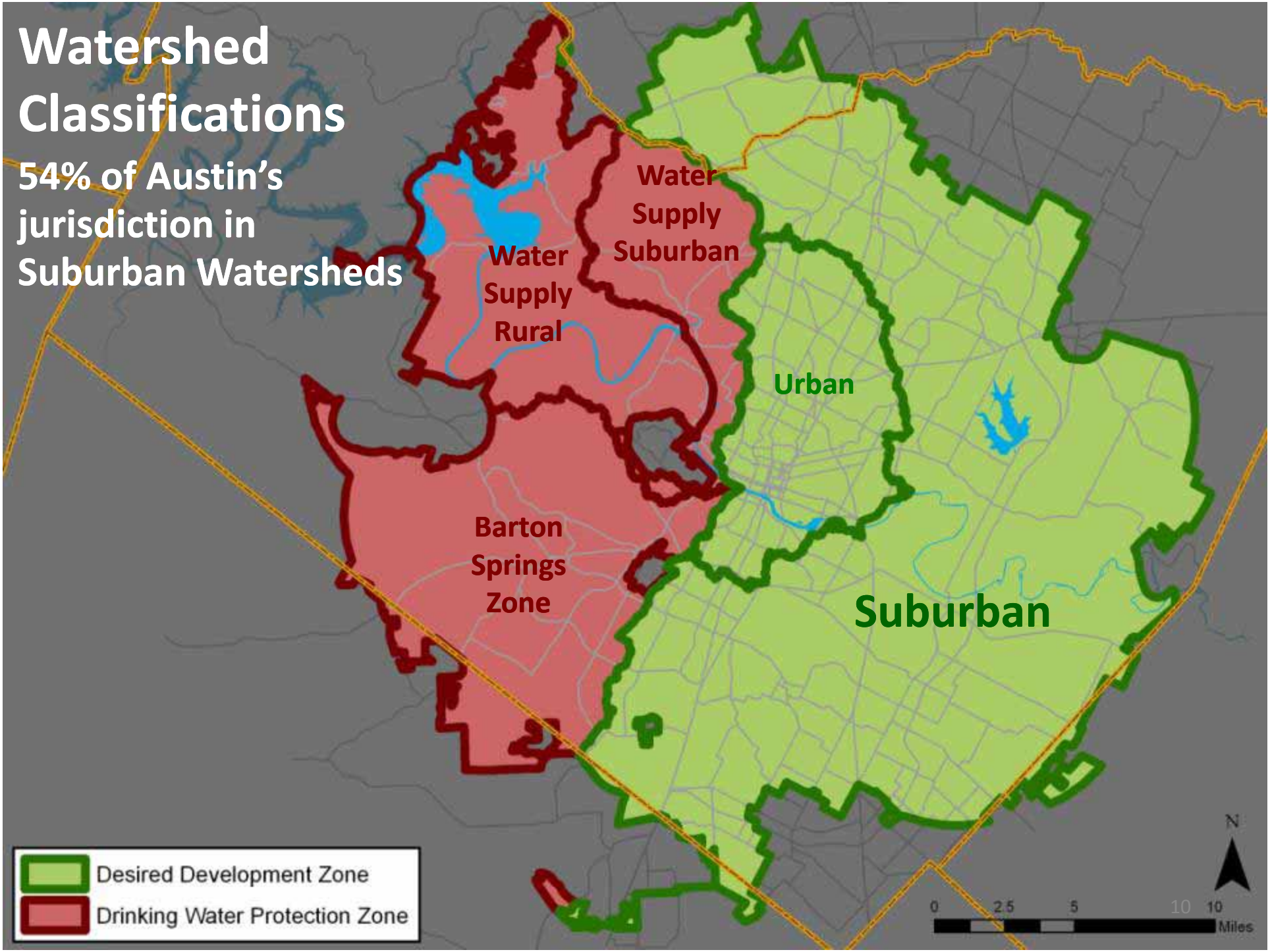
11 Ordinance Review Meetings

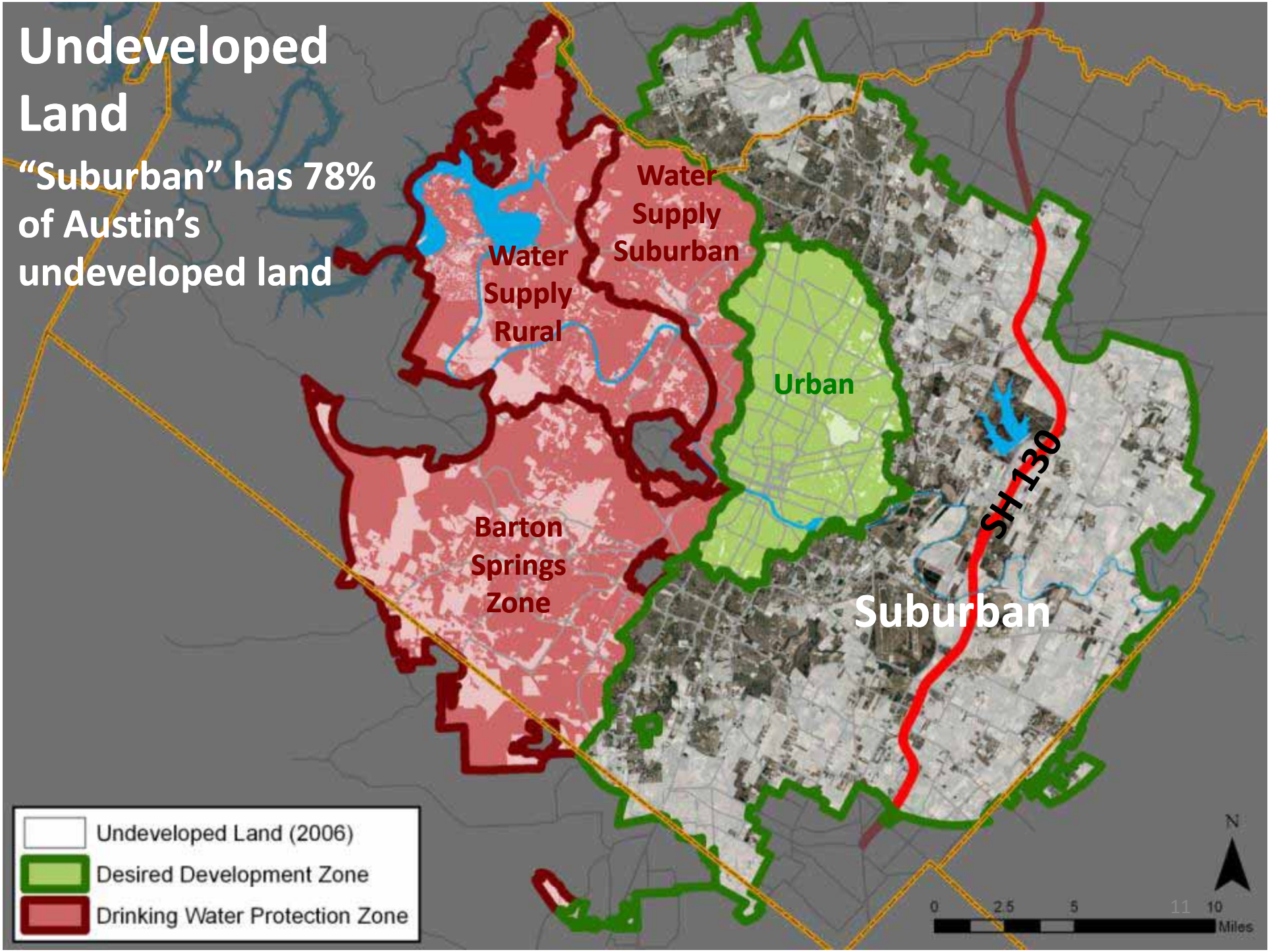
8 Board, Commission & Council Meetings

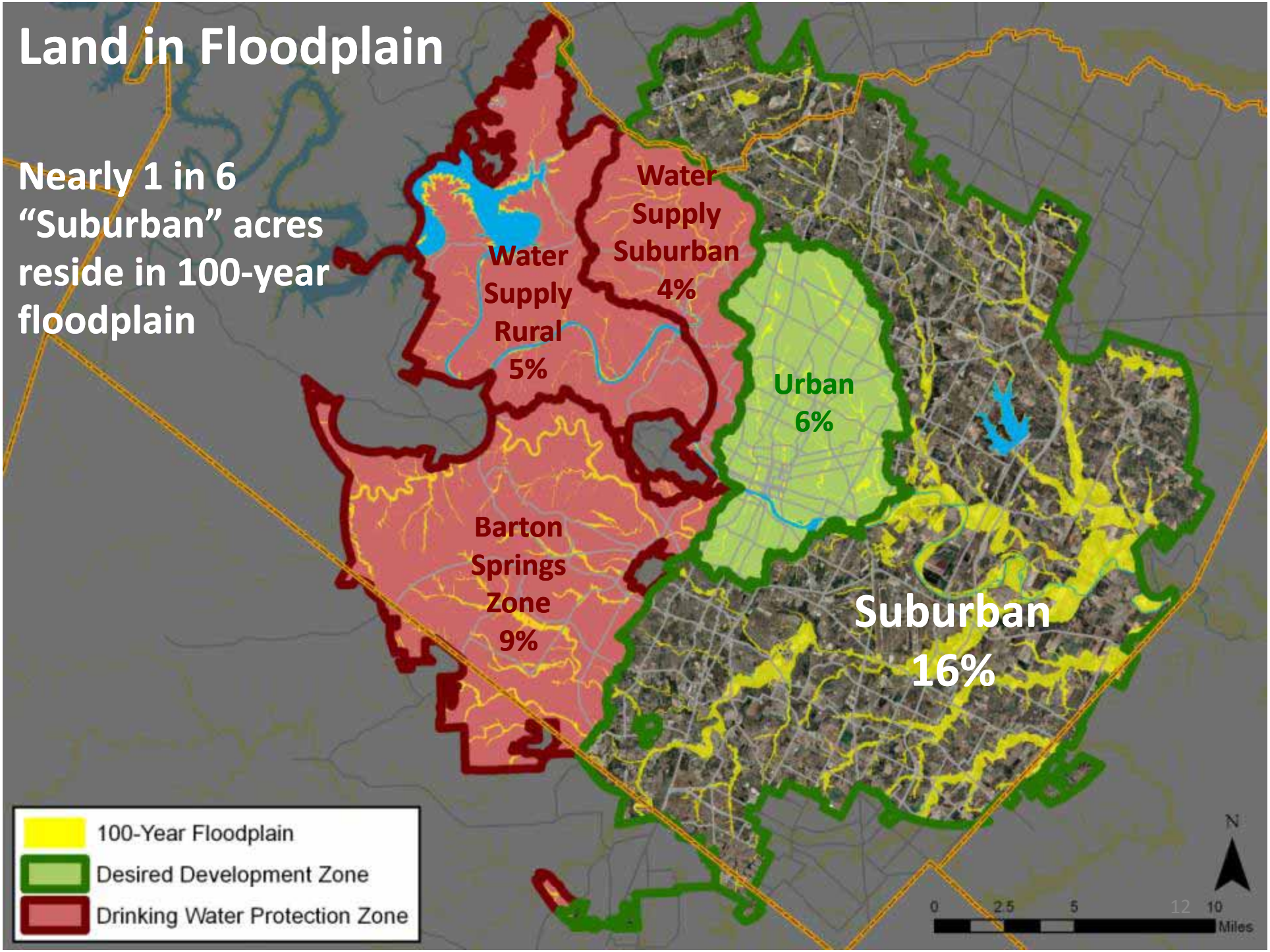
250+ stakeholders involved

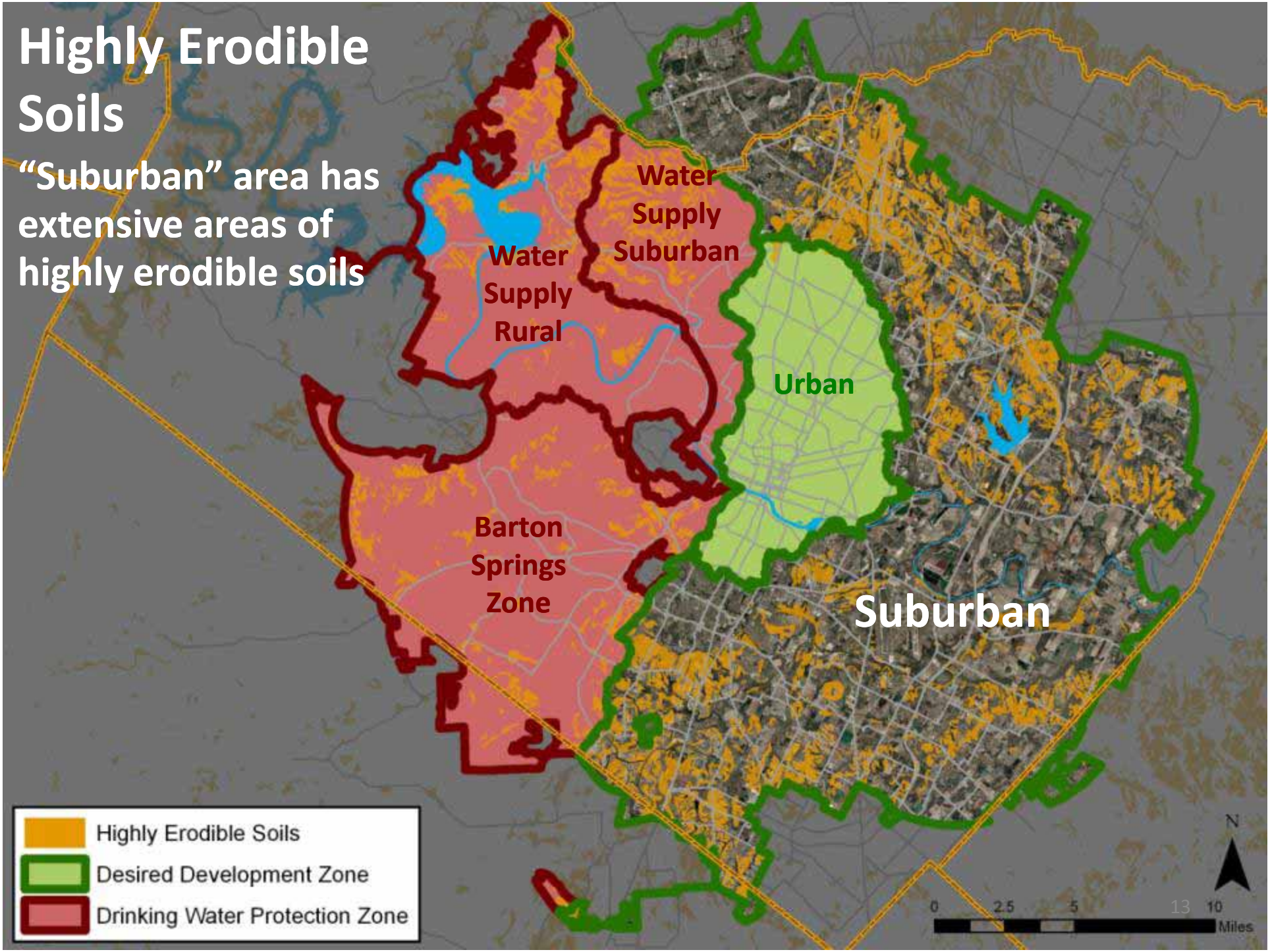
Benefits of Healthy Riparian Zones

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


Watershed Classifications
54% of Austin's jurisdiction in Suburban Watersheds
Water Supply Suburban
Water Supply Rural
Urban
Barton Springs Zone
Suburban
Desired Development Zone
Drinking Water Protection Zone
N
0 2.5 5 10
Miles


Undeveloped Land
"Suburban" has 78% of Austin's undeveloped land
Water Supply Suburban
Water Supply Rural
Urban
SH 130
Barton Springs Zone
Suburban
Undeveloped Land (2006)
Desired Development Zone
Drinking Water Protection Zone
N
0 2.5 5 10
Miles


Land in Floodplain
Nearly 1 in 6 "Suburban" acres reside in 100-year floodplain
Water Supply Rural 5%
Water Supply Suburban 4%
Urban 6%
Barton Springs Zone 9%
Suburban 16%
100-Year Floodplain
Desired Development Zone
Drinking Water Protection Zone
N
0 2.5 5 10
Miles


Highly Erodible Soils
"Suburban" area has extensive areas of highly erodible soils
Water Supply Suburban
Water Supply Rural
Urban
Barton Springs Zone
Suburban
Highly Erodible Soils
Desired Development Zone
Drinking Water Protection Zone
N
0
2.5
5
10
Miles

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)

Colorado River below Longhorn Dam

Photo: Kevin M. Anderson, Ph.D

Creek Protection

"Improve stream buffer requirements, including critical headwater areas, to protect water quality and reduce erosion, flooding, and long-range costs for infrastructure maintenance."

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

Austin's Eastern Headwaters Creeks

Austin's Eastern Headwaters Creeks

Austin's Eastern Headwaters Creeks

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**

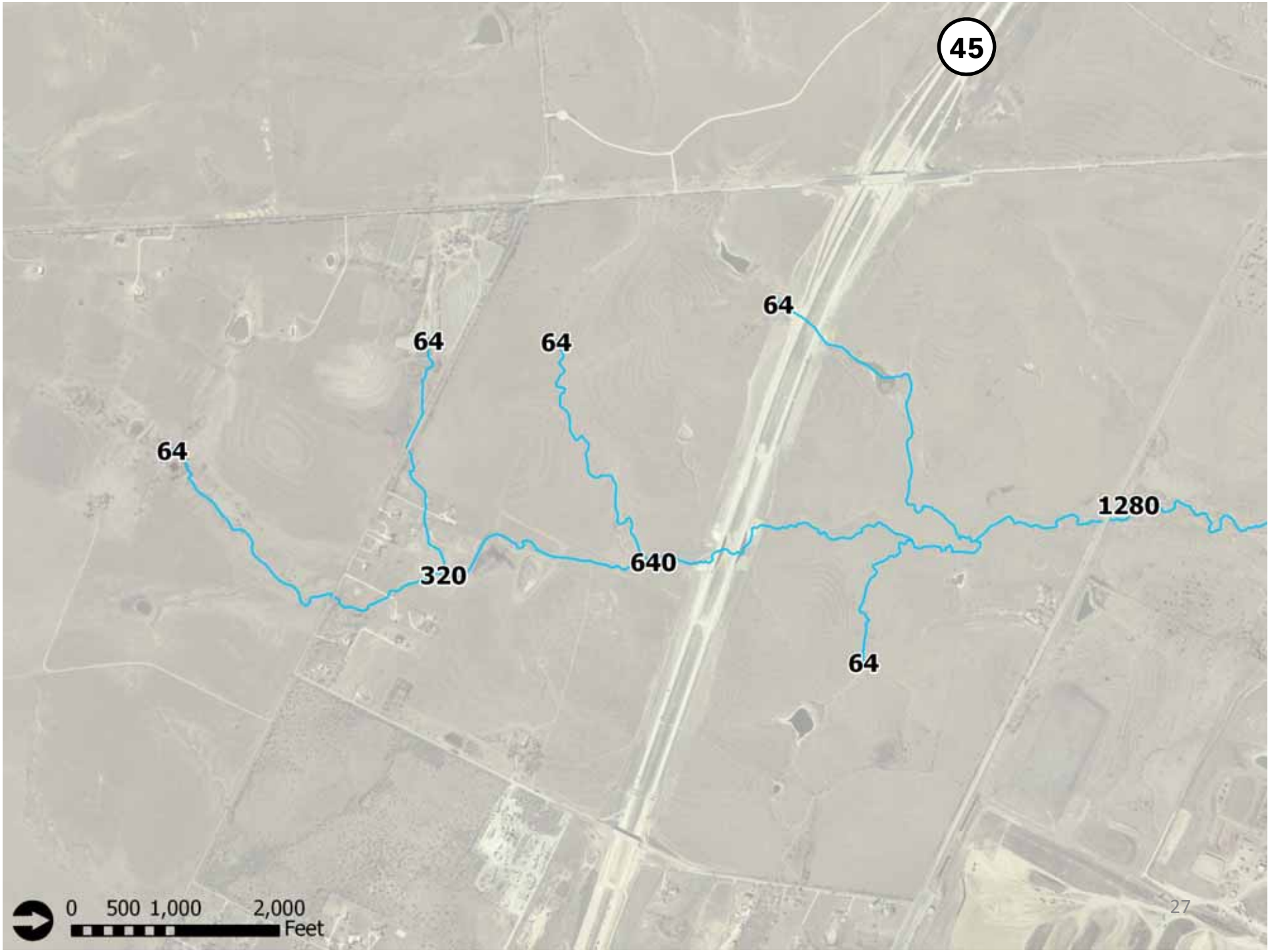
Perpetual Mowing, Perpetual Expense

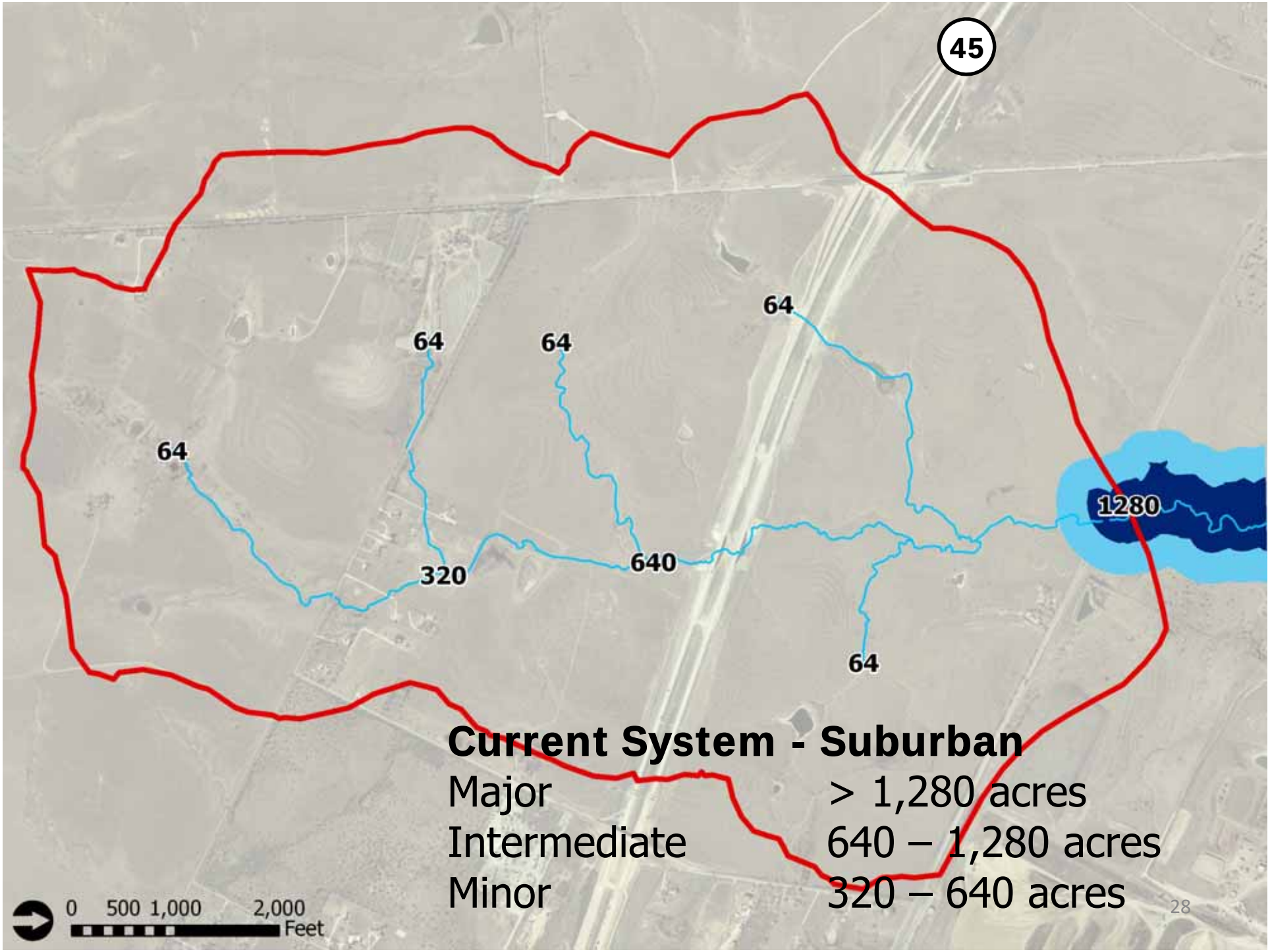
Perpetual Mowing, Perpetual Expense

Stream Buffer Provisions

- Extend minor **"headwaters" stream buffers** to 64 acres of drainage citywide
- Standardize drainage area thresholds citywide:
  - **64 acres** for minor ("headwaters") waterways
  - **320 acres** for intermediate waterways
  - **640 acres** for major waterways
- Simplify buffer widths for Suburban watersheds:
  - **100 ft.** for minor ("headwaters") waterways
  - **200 ft.** for intermediate waterways
  - **300 ft.** for major waterways

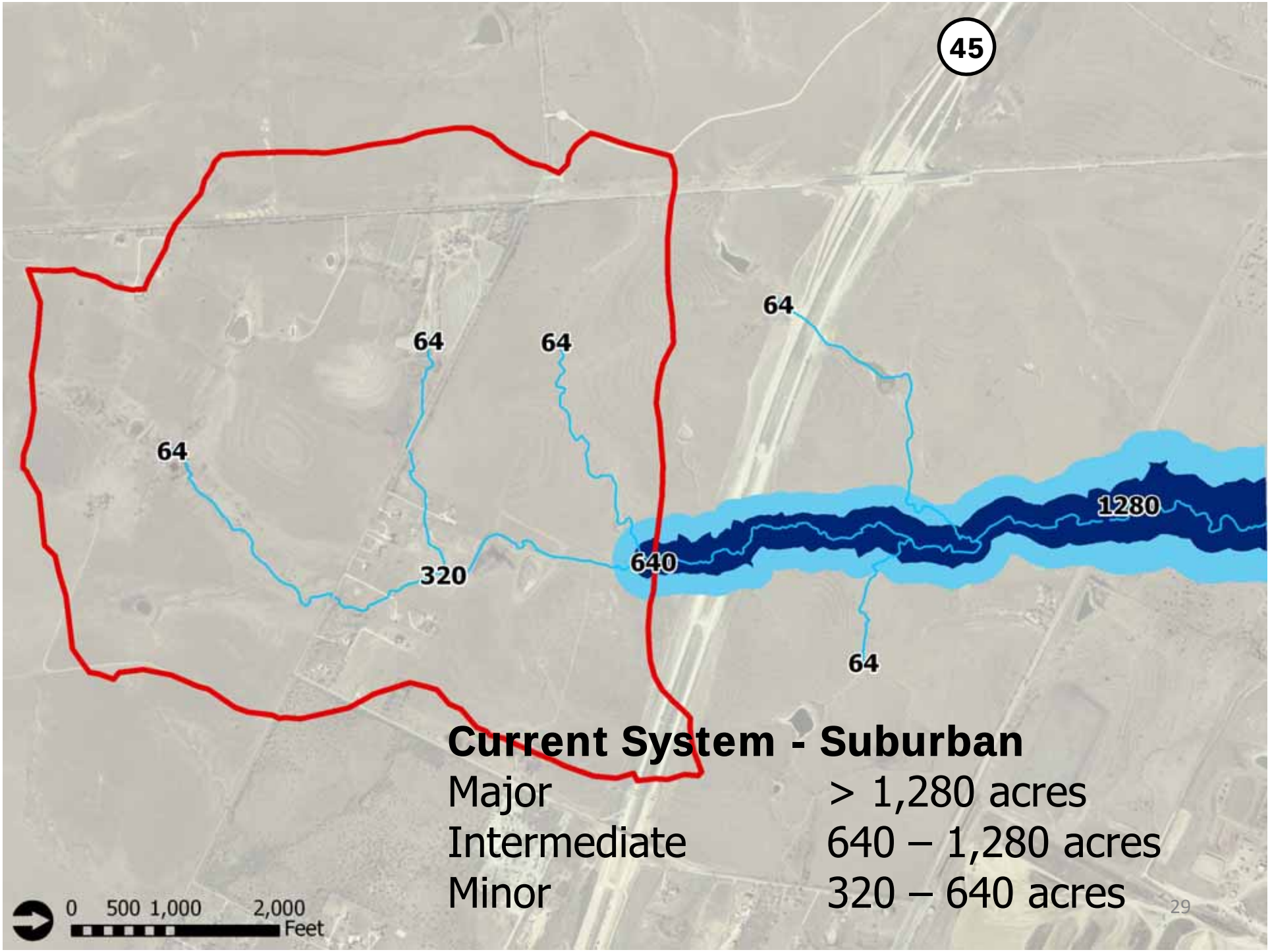

45
0 500 1,000 2,000
Feet


45
64
64
64
64
64
1280
320
640
64
0 500 1,000 2,000
Feet



Current System - Suburban

Major	> 1,280 acres
Intermediate	640 – 1,280 acres
Minor	320 – 640 acres



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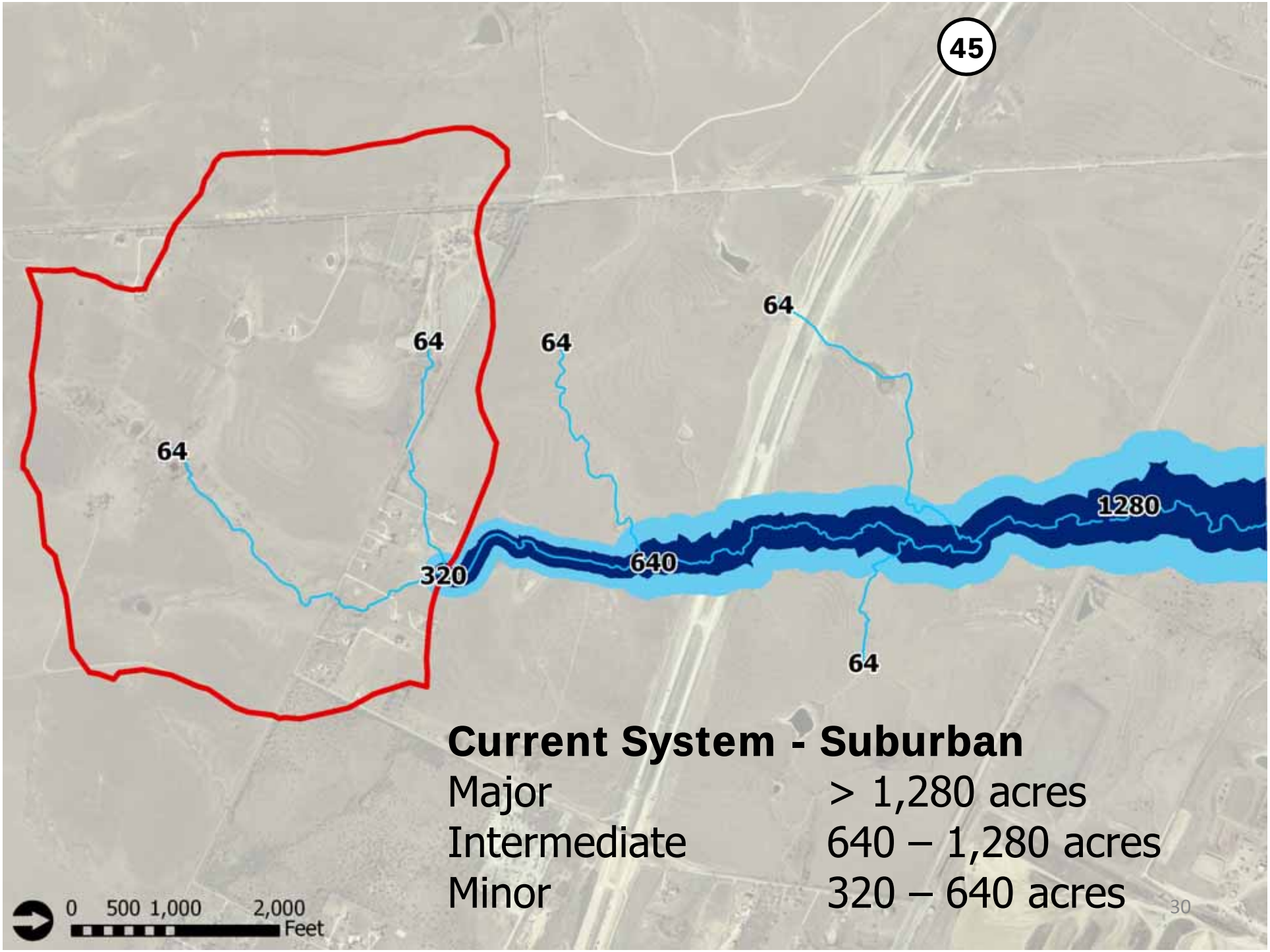

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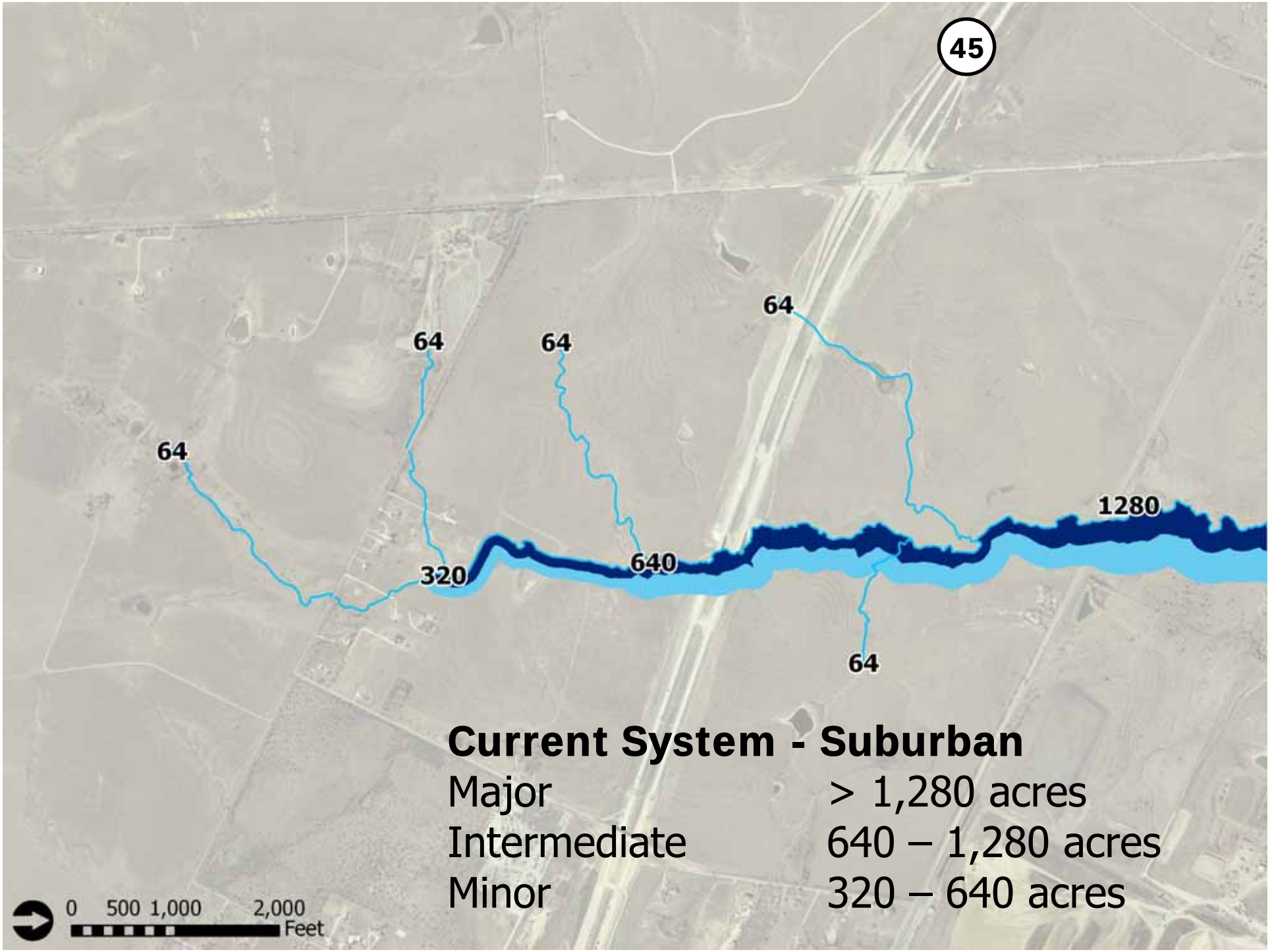

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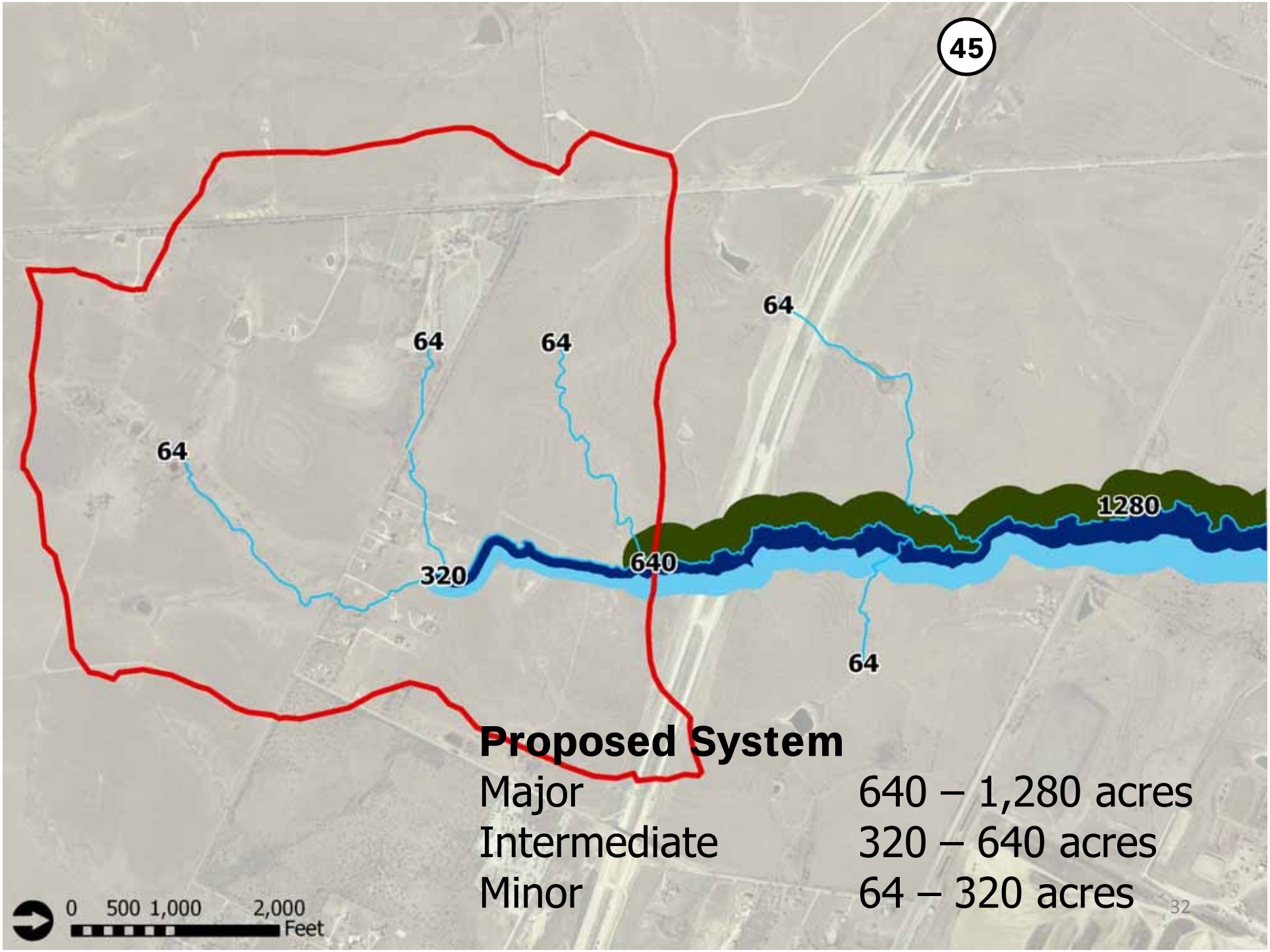

Proposed System

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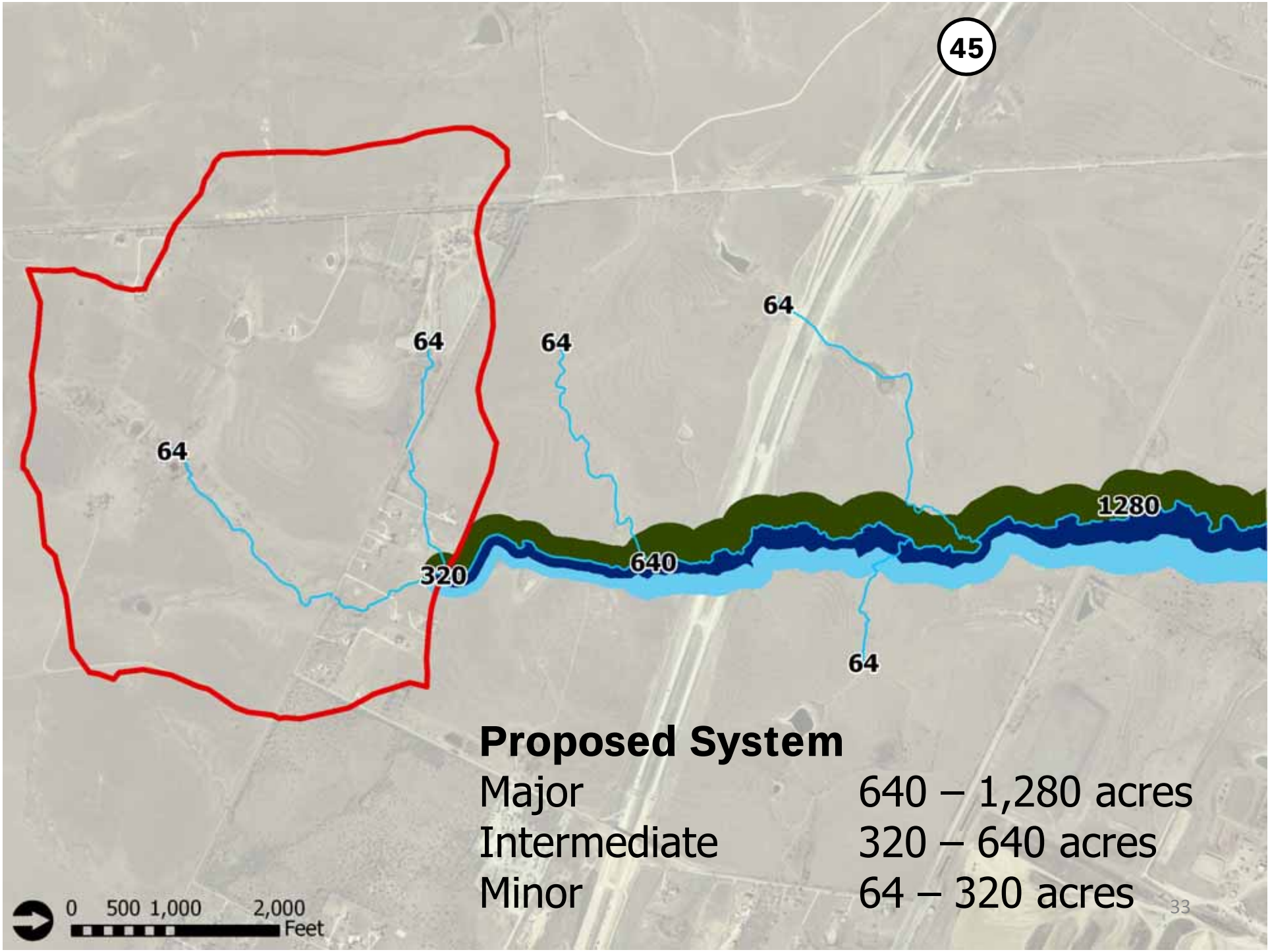

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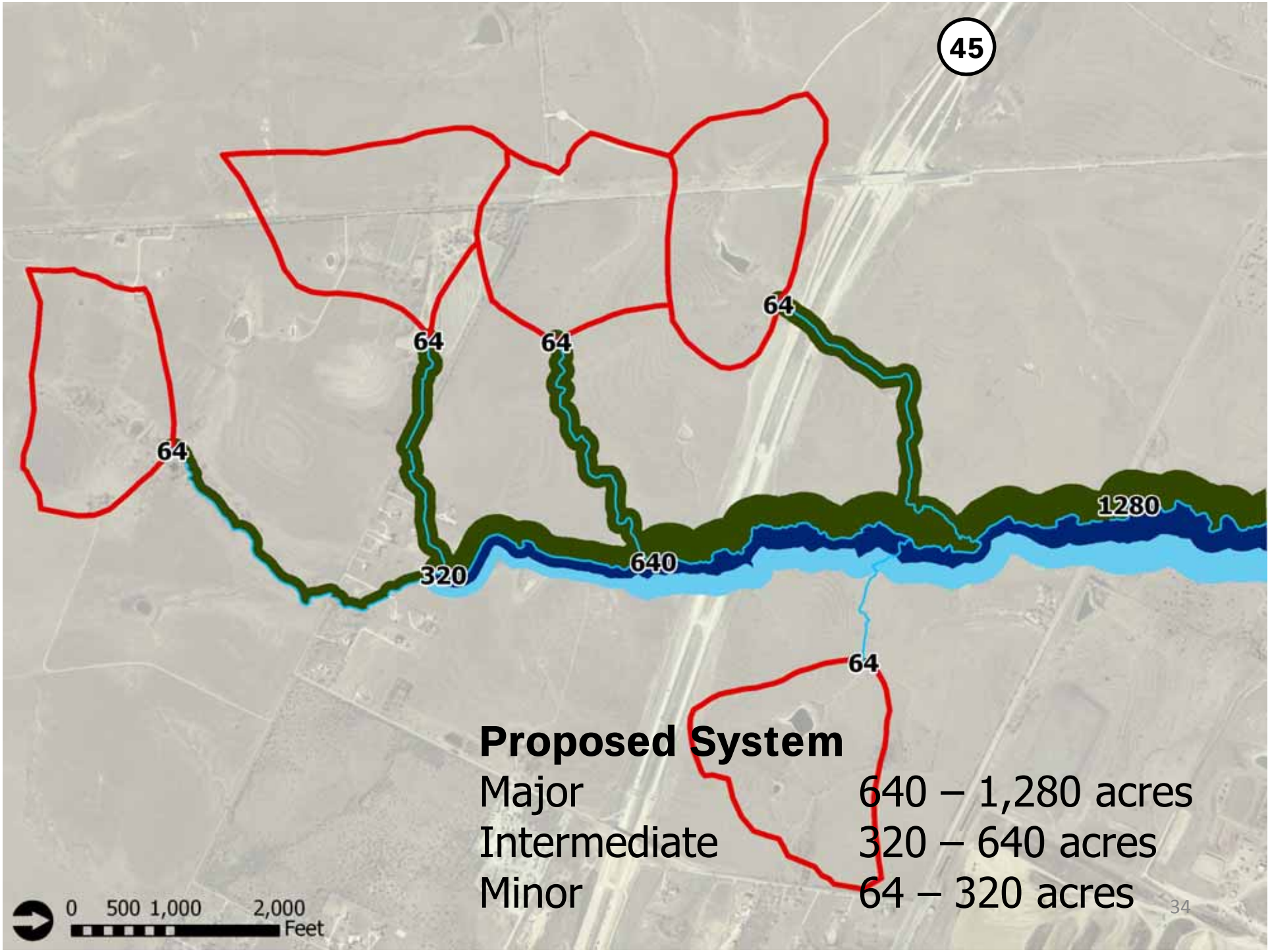

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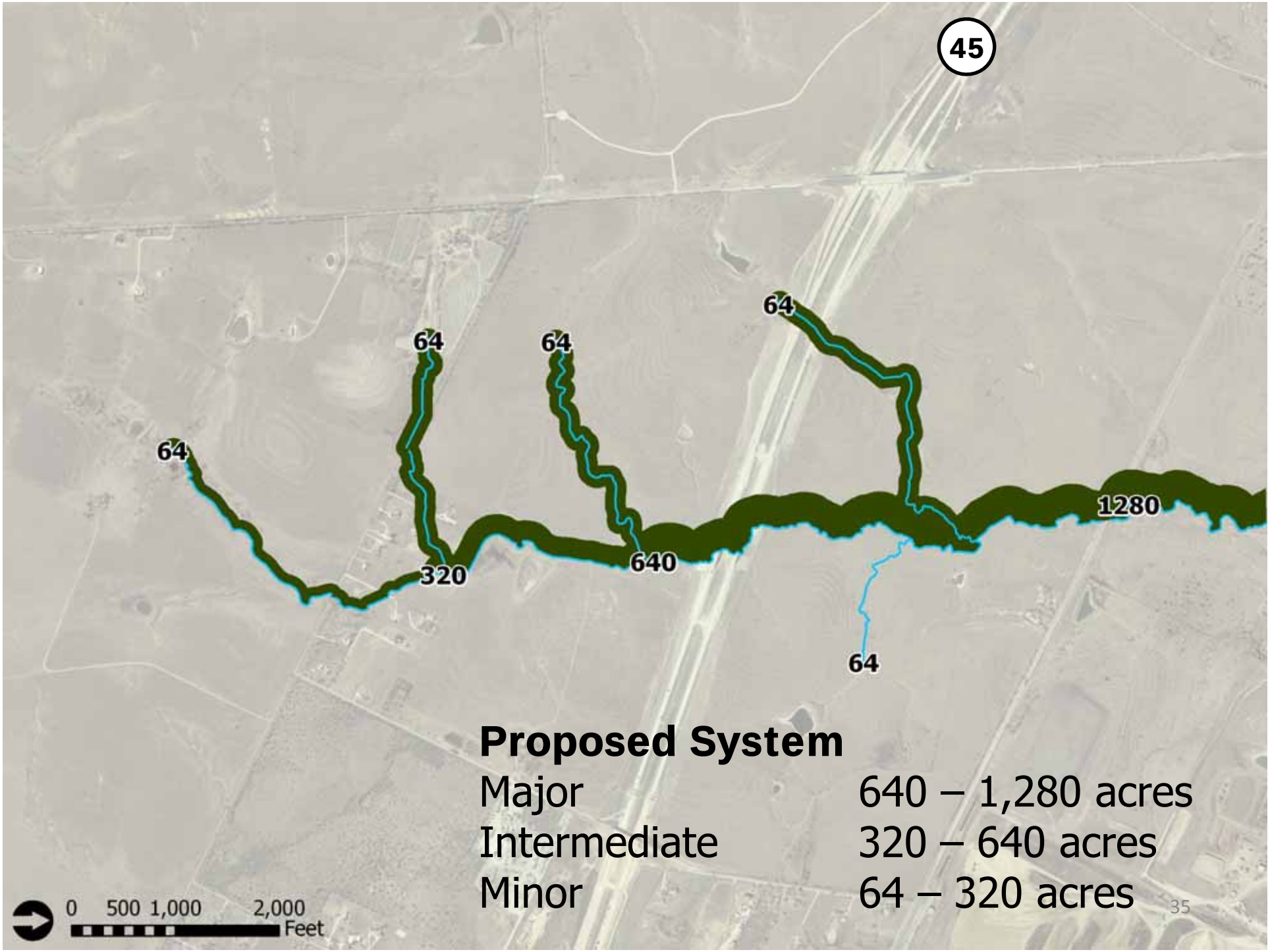

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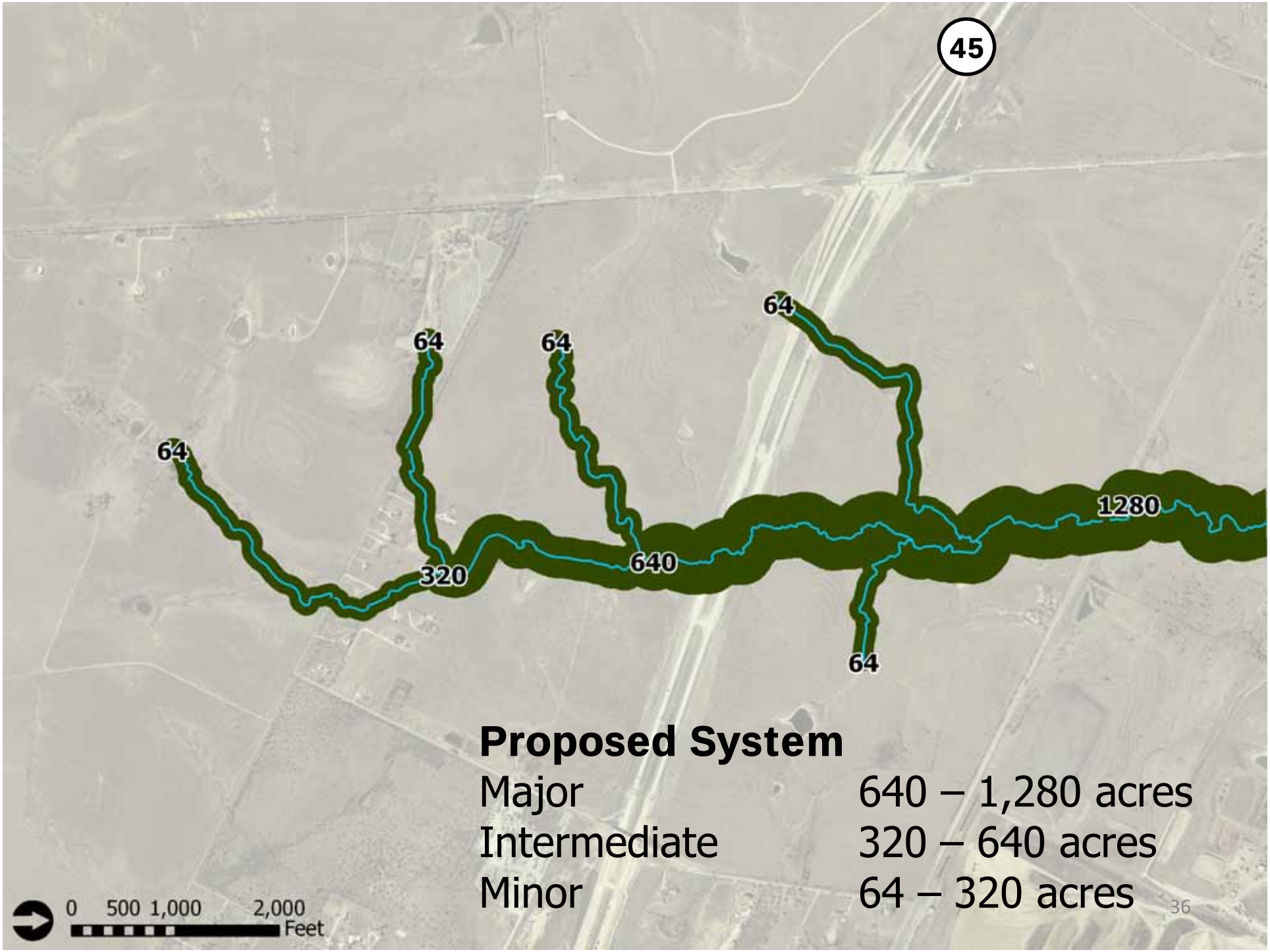

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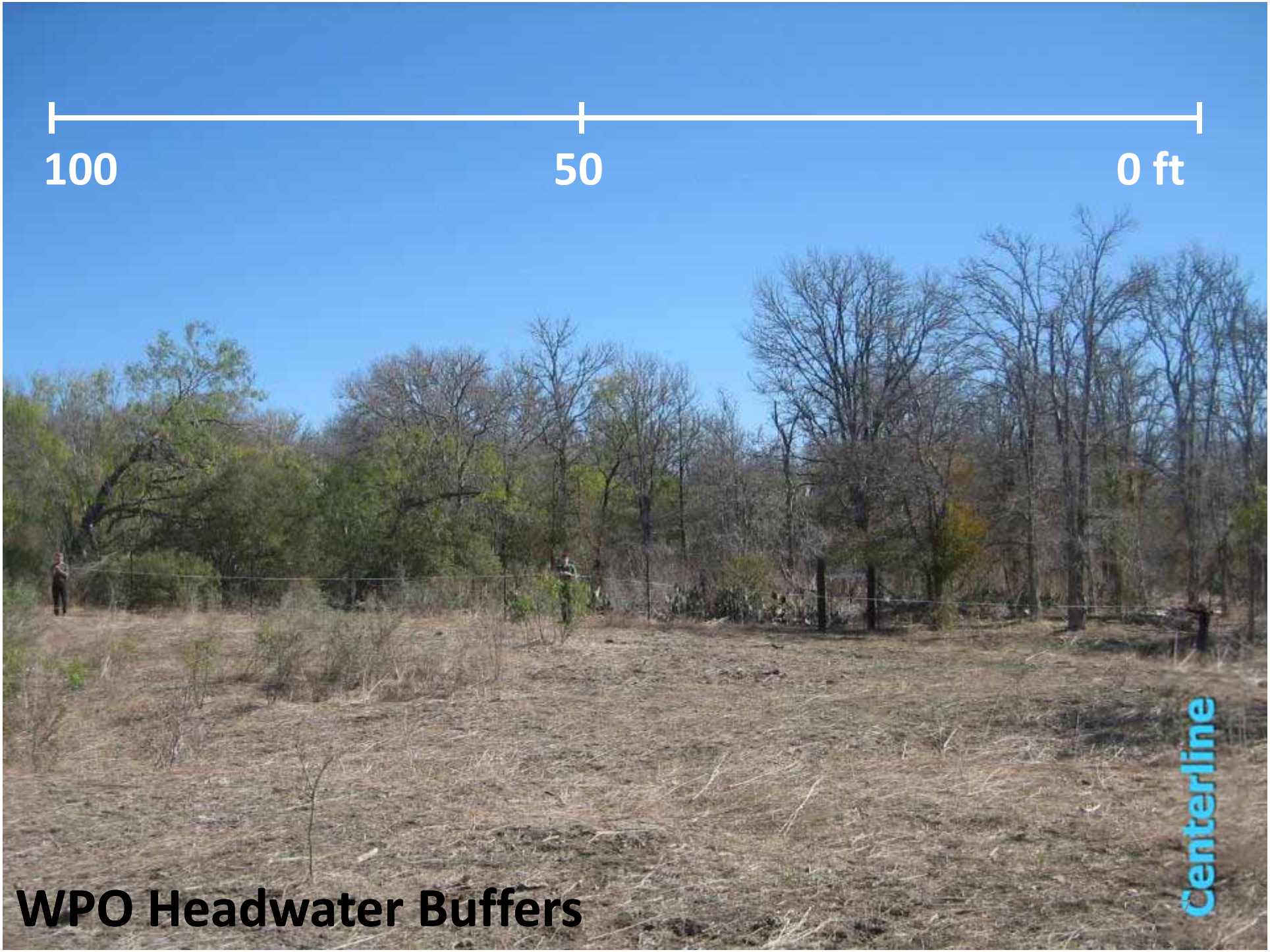
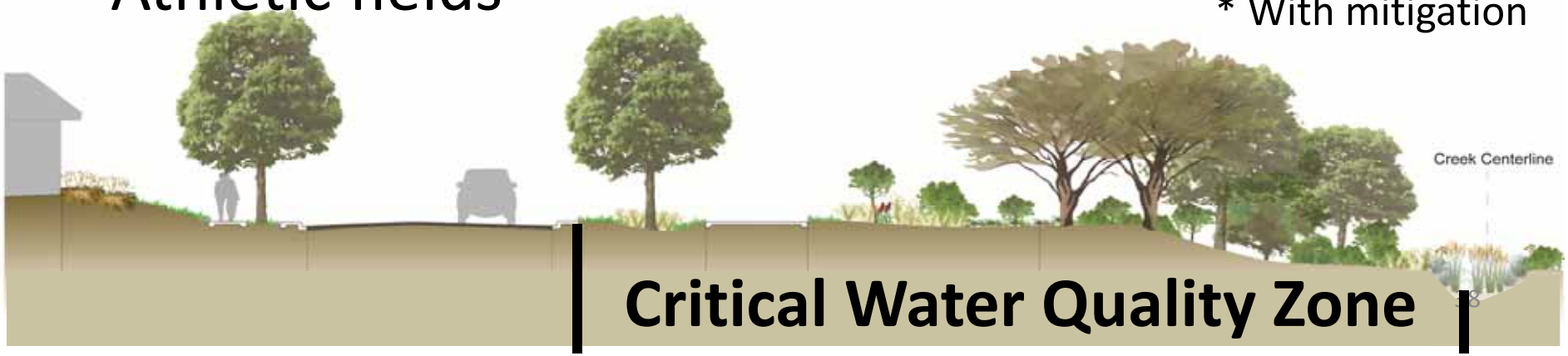


WPO Headwater Buffers

Revised uses allowed in the Critical Water Quality Zone

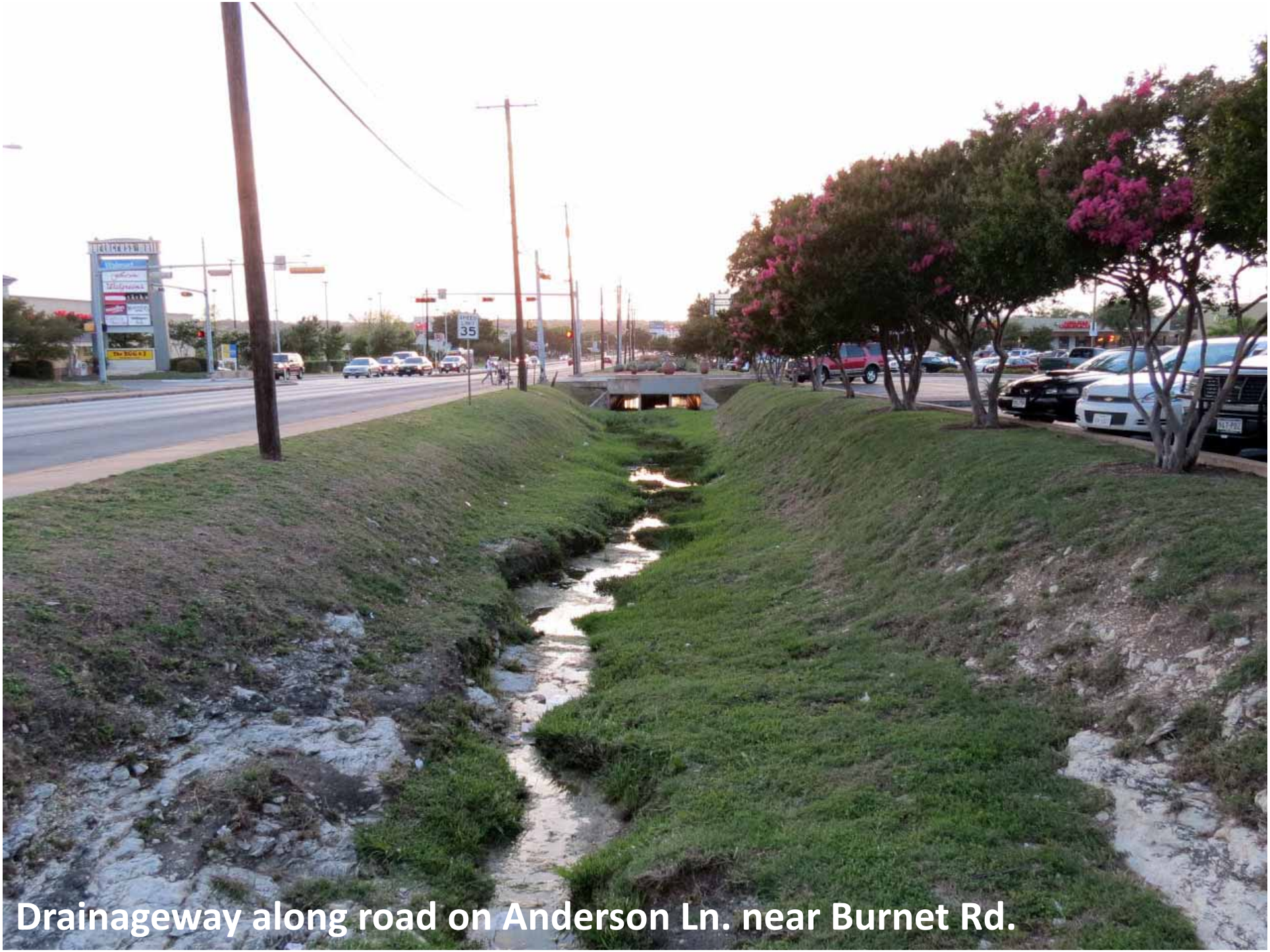
- Roadway crossings for centers & corridors
- Trails
- Urban agriculture / community gardens
- Utility lines (wastewater, gas, cable, etc.)*
- Green water quality controls
- Athletic fields

* With mitigation

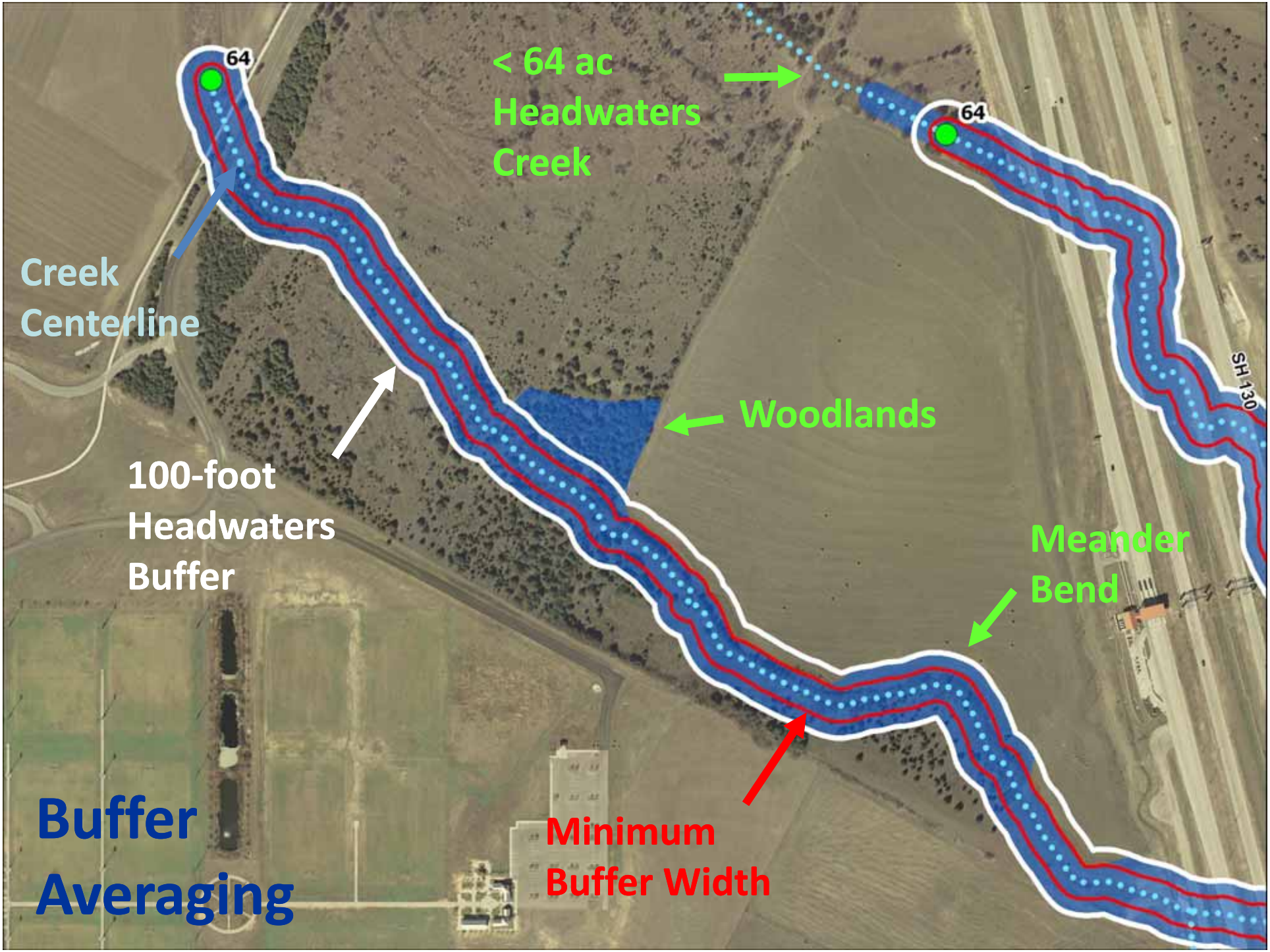


More Creek Buffer Changes

- Clarify that irrevocably **altered roadside ditches** do not create a Critical Water Quality Zone (CWQZ)
- To **offset impacts in <u>Suburban</u> Watersheds:**
  - Eliminate **Water Quality Transition Zone (WQTZ)** buffers
  - Use **Gross Site Area** basis for impervious cover (instead of net site area)
  - Allow **"buffer averaging"** to reduce the width of buffers by up to one-half if the overall amount of area protected remains the same



Drainageway along road on Anderson Ln. near Burnet Rd.


64
64
< 64 ac
Headwaters
Creek
Creek
Centerline
Woodlands
100-foot
Headwaters
Buffer
Meander
Bend
SH 130
Buffer
Averaging
Minimum
Buffer Width

Buffers: Old Days vs. WPO New Days

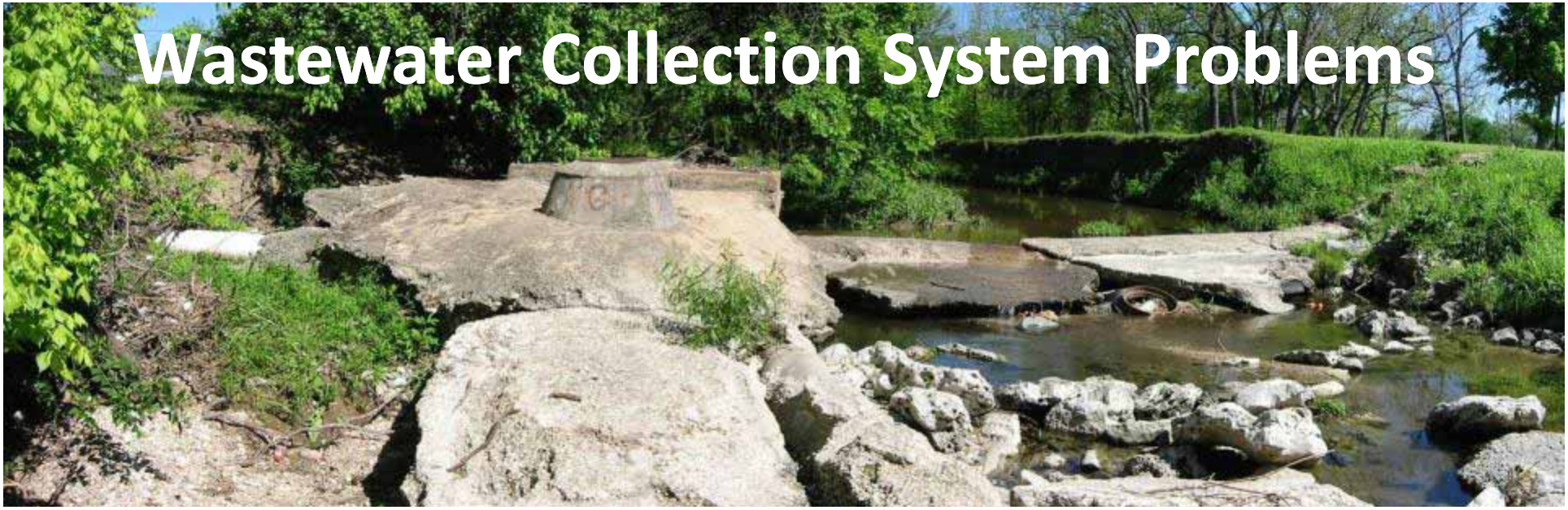
Watershed Class	Buffer Length (miles)			Pct. Increase
	Existing	Proposed	Net New	
Barton Springs Zone	215	235	21	10%
Suburban	393	755	362	**92%**
Urban	94	94	0	0%
Water Supply Rural	118	118	0	0%
Water Supply Suburban	59	76	17	29%
Totals	878	1,278	400	46%

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) had the lowest level of buffer protection
- 995 documented erosion problem locations

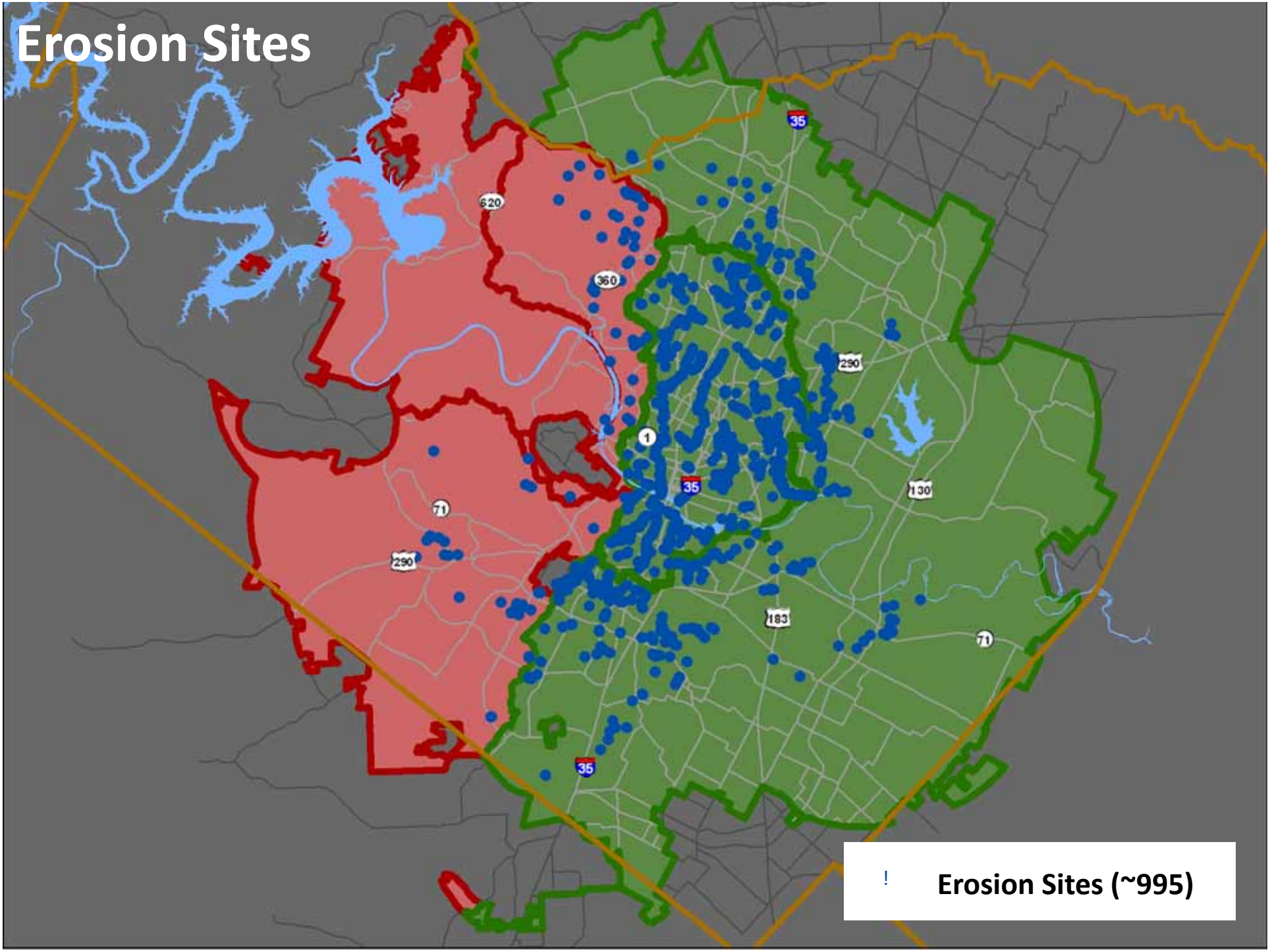
Urbanization: Channel Erosion & Repair

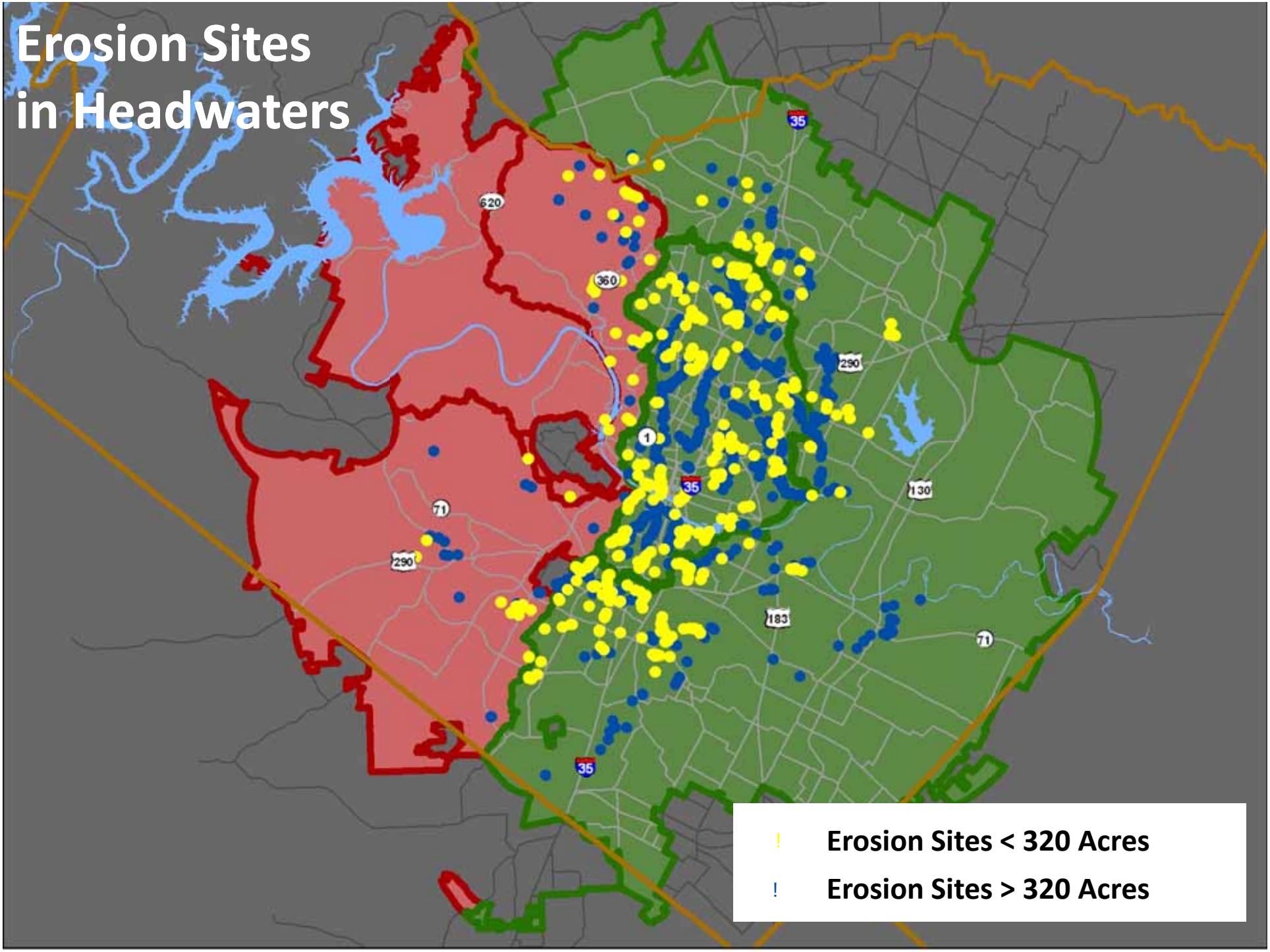
Wastewater Collection System Problems



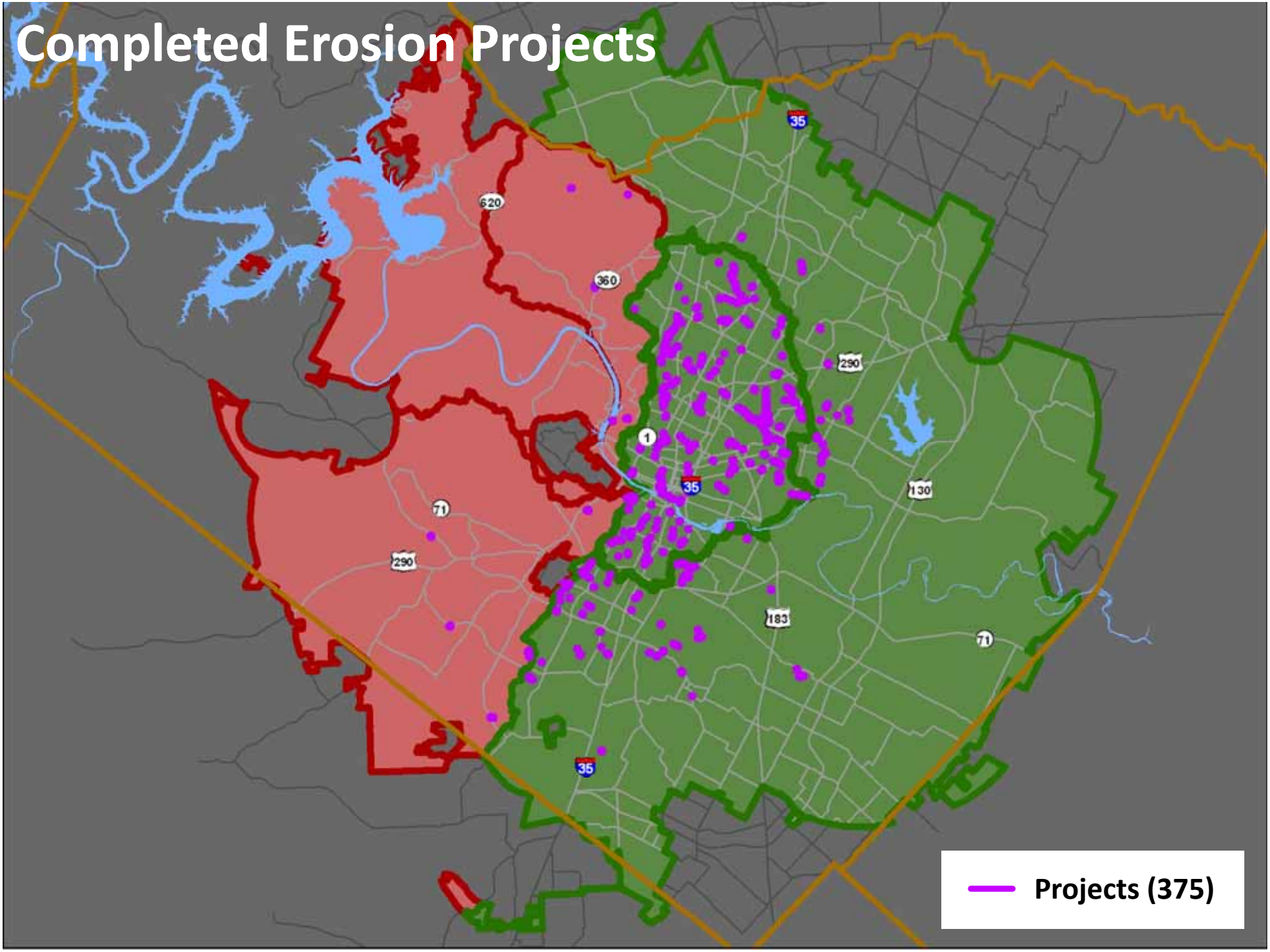
Boggy Creek

Erosion Sites

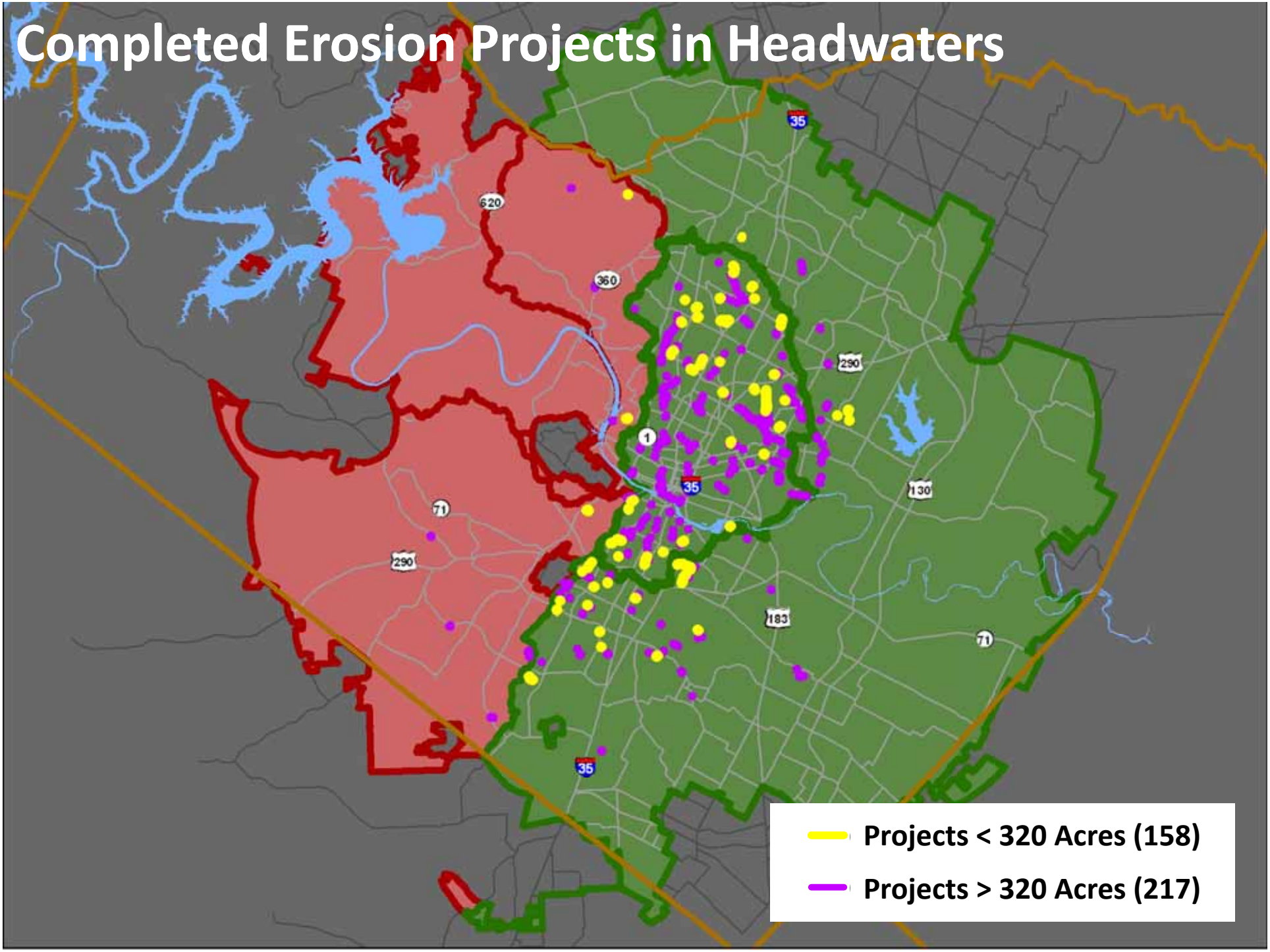



Erosion Sites
in Headwaters
620
360
35
290
1
71
130
183
Erosion Sites < 320 Acres
Erosion Sites > 320 Acres

Completed Erosion Projects



Completed Erosion Projects in Headwaters



Erosion Hazard Zone (EHZ) Protections

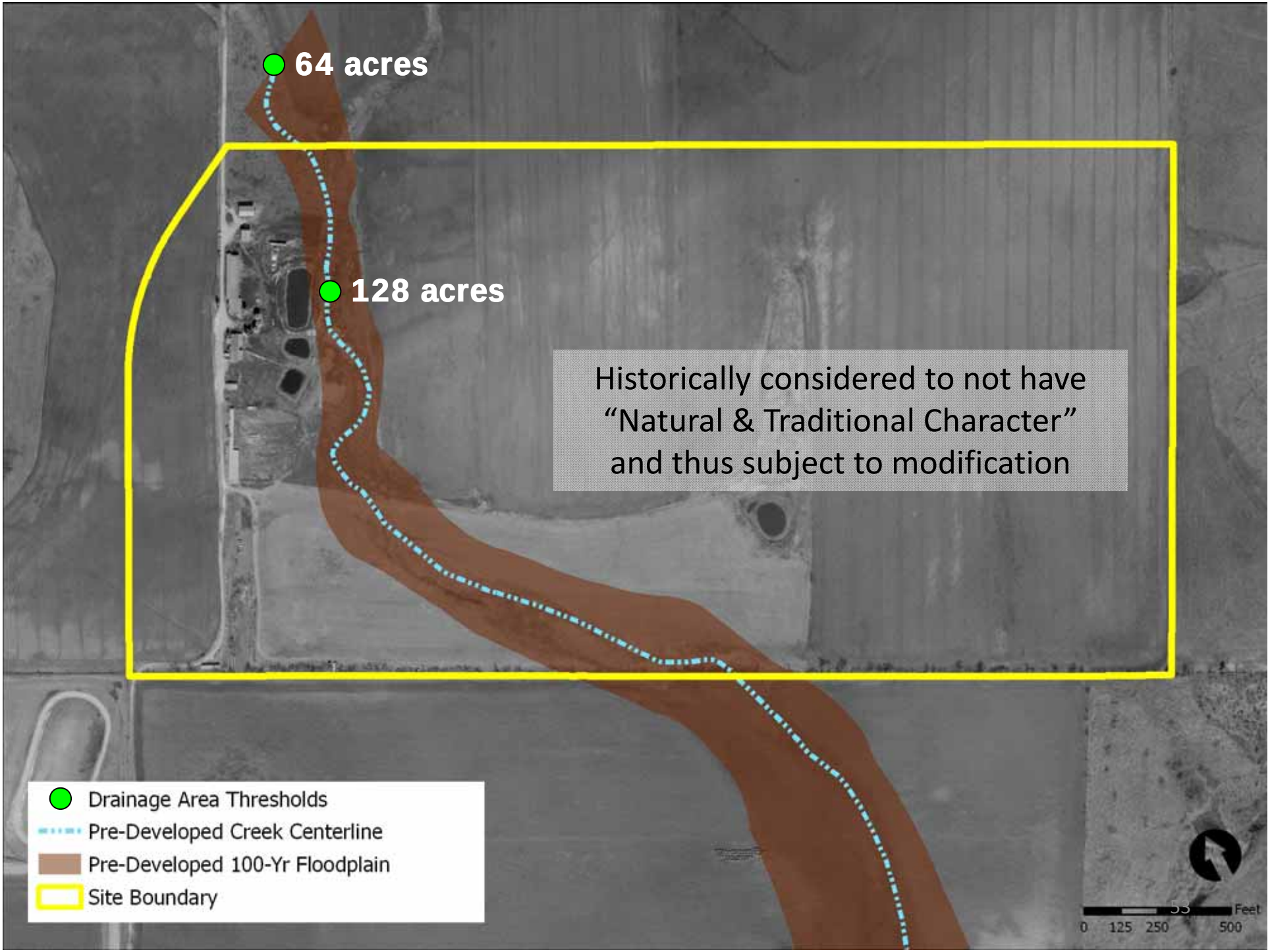
- No improvements (including utility lines) are allowed within the erosion hazard zone unless **protective works** are provided
- Development must not result in additional erosion impacts to other properties
- Especially key for redevelopment & infill projects

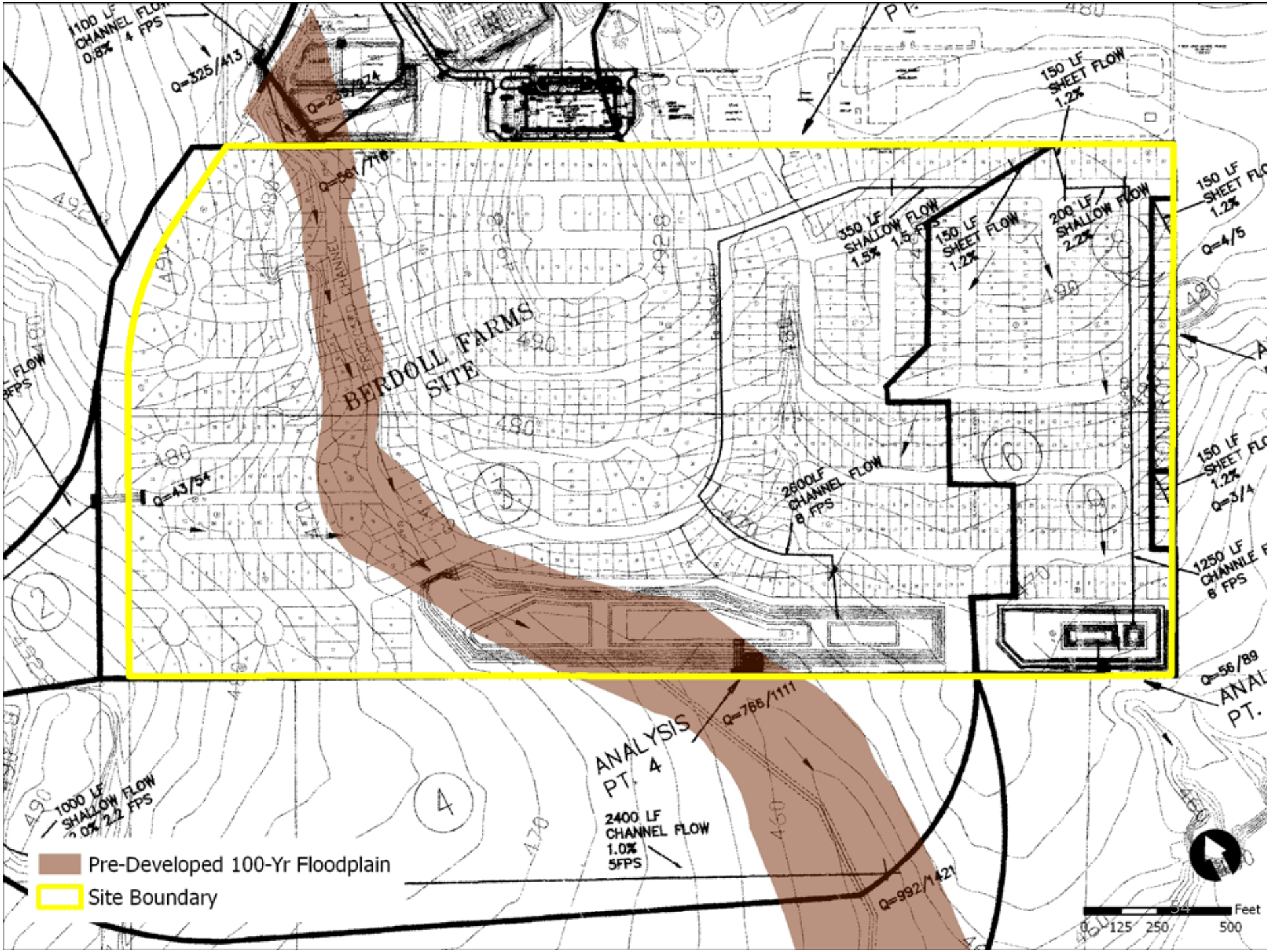
Note: EHZ analysis required for Site Plans, Subdivisions and Building Permits within 100 feet of classified waterways.

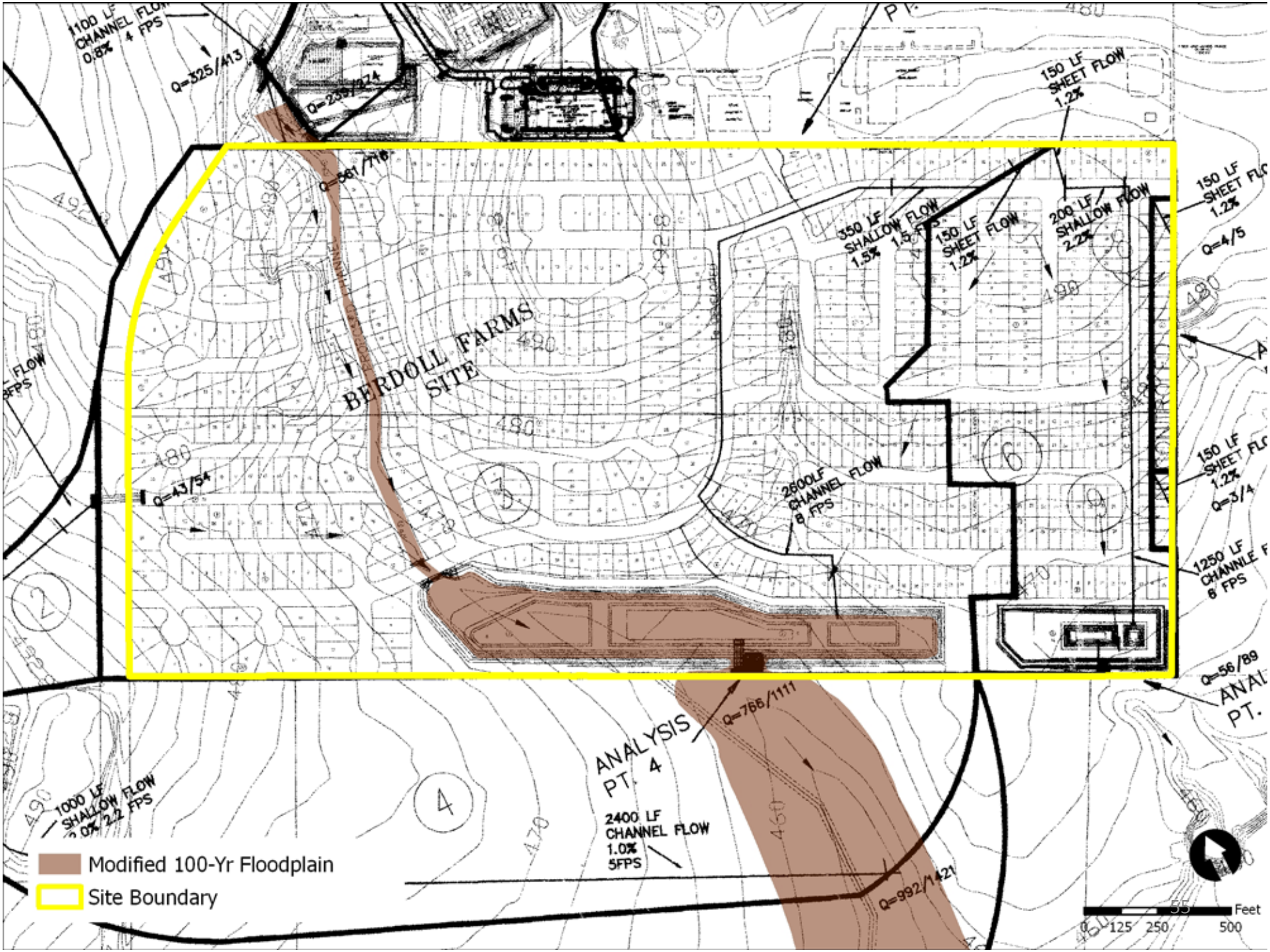
Floodplain Protection

"Promote, encourage and/or require the preservation and restoration of floodplains and stream buffers as well as the beneficial re-purposing of mining quarries."


Pre-Developed Creek Centerline
Site Boundary
0 125 250 500
Feet


64 acres
128 acres
Historically considered to not have "Natural & Traditional Character" and thus subject to modification
Drainage Area Thresholds
Pre-Developed Creek Centerline
Pre-Developed 100-Yr Floodplain
Site Boundary
0 125 250 500
Feet


BERDOLL FARMS SITE
1100 LF CHANNEL FLOW 0.8% 4 FPS
Q=325/413
Q=561/716
150 LF SHEET FLOW 1.2%
350 LF SHALLOW FLOW 1.5%
150 LF SHEET FLOW 1.2%
200 LF SHALLOW FLOW 2.2%
150 LF SHEET FLOW 1.2%
Q=4/5
150 LF SHEET FLOW 1.2%
Q=3/4
1250 LF CHANNLE F 8 FPS
Q=43/54
2600LF CHANNEL FLOW 8 FPS
Q=56/89
ANALYSIS PT.
Q=766/1111
ANALYSIS PT. 4
2400 LF CHANNEL FLOW 1.0% 5FPS
Q=992/1421
1000 LF SHALLOW FLOW 2.2 FPS
Pre-Developed 100-Yr Floodplain
Site Boundary
0 125 250 500 Feet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1100 LF CHANNEL FLOW 0.8% 4 FPS
Q=325/413
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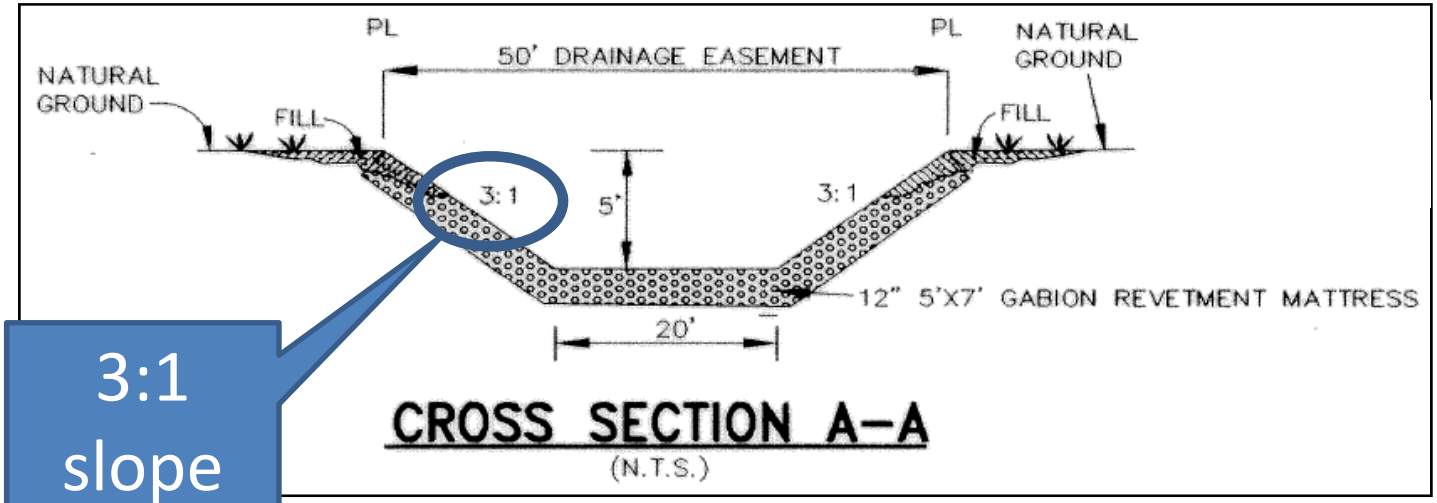
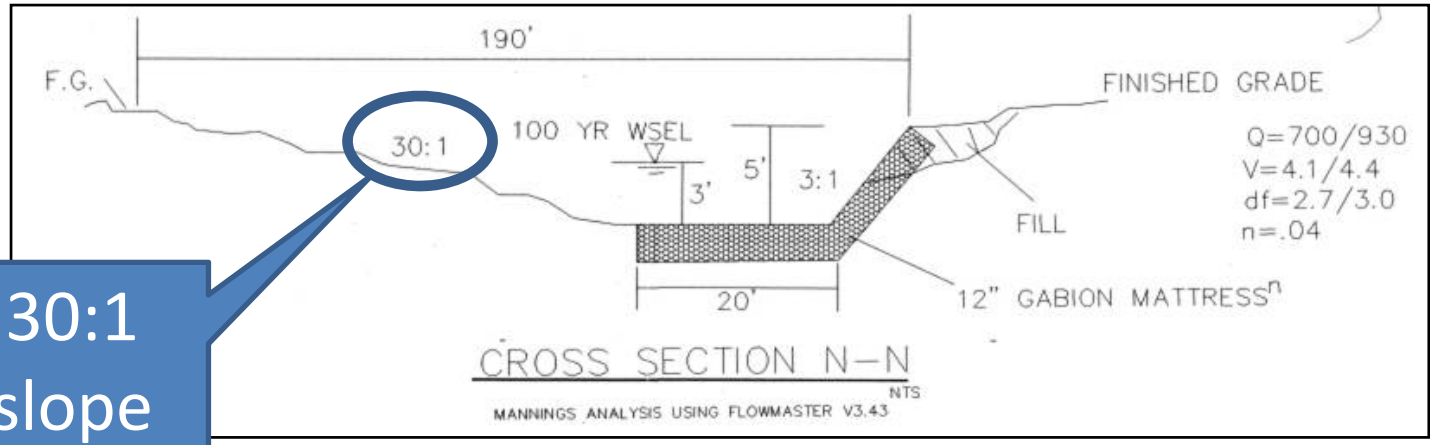
200 LF SHALLOW FLOW 2.2%
Q=4/5
Q=43/54
2600LF CHANNEL FLOW 8 FPS
Q=3/4
1250 LF CHANNLE F 8 FPS
Q=56/89
Q=766/1111
1000 LF SHALLOW FLOW
2400 LF CHANNEL FLOW 1.0% 5FPS
Q=992/1421
Modified 100-Yr Floodplain
Site Boundary
0 125 250 500 Feet


Modified 100-Yr Floodplain
Site Boundary
0 125 250 500
Feet

Channel Design



3:1 slope



30:1 slope


Marthra
25 feet
46 feet
Bahan


100-ft. WPO Critical Buffer
64 acres
School
128 acres
Rec. Center
Drainage Area Thresholds
Pre-Developed Creek Centerline
Pre-Developed Headwaters Buffer (100 ft)
Site Boundary
0 125 250 500
Feet

Floodplain Modification

Floodplain modification prohibited unless:

- Necessary to protect the public health and safety;
- Necessary for development allowed in the Critical Water Quality Zone by Code (e.g., trails, parks, etc.);
- Provide a significant, demonstrable environmental benefit, as determined by a functional assessment of floodplain health; or
- Located in an area outside of the Critical Water Quality Zone and determined to be in “poor” or “fair” condition by a functional assessment of floodplain health.

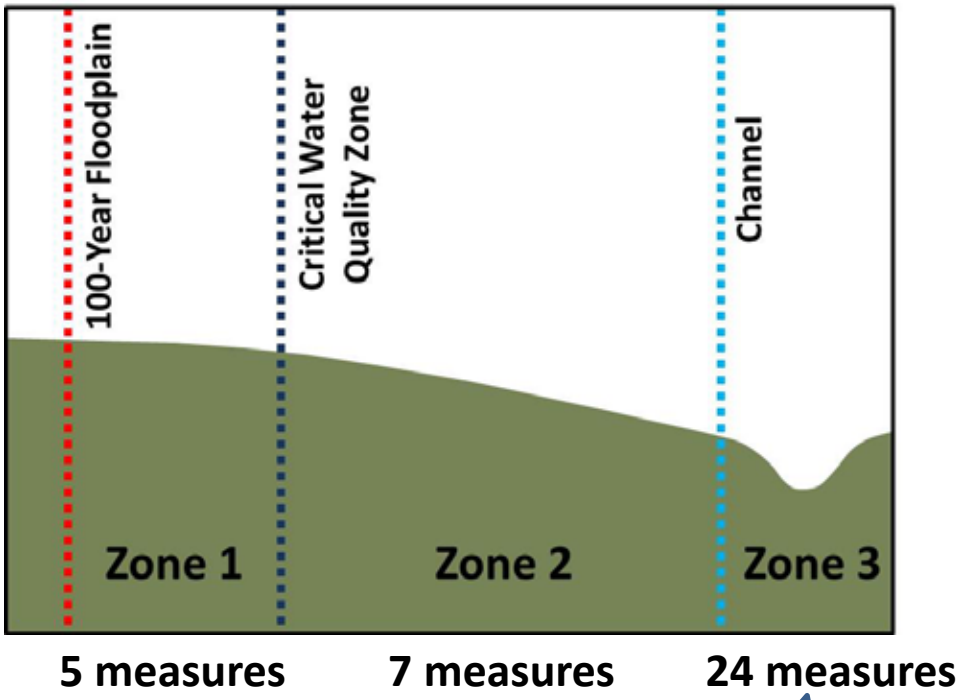
➢ No subjective “natural & traditional character” standard

Floodplain Modification

- Must be designed to accommodate existing and fully-vegetated conditions
- Require restoration of floodplain health on-site
- Provide off-site mitigation options where on-site restoration is infeasible
  - pay into Riparian Mitigation Fund
  - dedicate/restrict land off-site
- Support passive approaches that promote managed succession, minimal need for ongoing management

Functional Assessment of Floodplain Health

- Quantitative tool designed to measure the health of the floodplain
- Score calculated to determine condition of poor, fair, or good



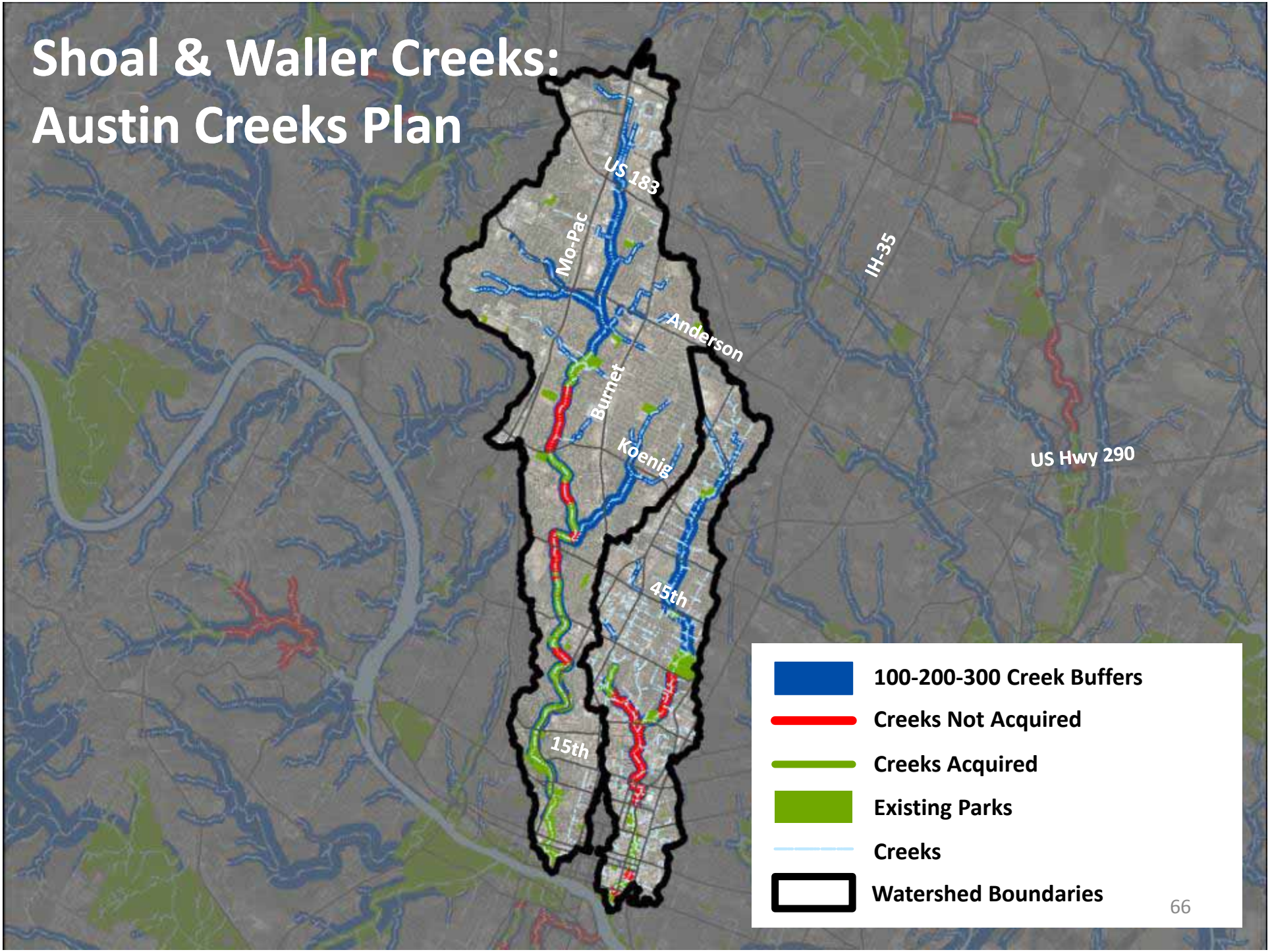
- Three zones that potentially will be assessed, depending on the type of proposal
- Staff support & assistance

Geomorphic & Habitat (in addition to Riparian)

Development Patterns & Greenways

"Explore opportunities to encourage a development pattern that better protects public and private property, preserves floodplains, creeks and open spaces, and provides access and connectivity with greenways and trails."

Shoal & Waller Creeks: Austin Creeks Plan



Trails in Critical Water Quality Zone Buffers

- Allow hard-surface multi-use (hard-surfaced) trails in stream buffers
- Must be in outer half of Critical Water Quality Zone buffer
  - unless space is not available
  - always out of Erosion Hazard Zone
  - administrative variance provided
- Trail width max. 12 ft or per Urban Trails Master Plan
- Must be built per Environmental Criteria Manual (with provisions for runoff mitigation, tree protections, etc.)
  - Future Trails Criteria Manual

Improved Stormwater Controls

"Improve permanent stormwater controls to better moderate runoff and help reduce streambank erosion."

Improved Stormwater Controls

- Require **water quality controls** for development exceeding 8,000 square feet of impervious cover (rather than 20 percent of net site area)
- Allow potential for **combining ("stacking")** water quality and flood controls
- Require all water quality controls be **accessible** for maintenance and inspection
- Require maintenance plan and annual reports by registered engineer for all **subsurface controls**

➢ **Continued in "Phase 2"/ Green Infra Working Group**

Simplicity; Development Impacts

"Simplify development regulations where possible and minimize the impact of any changes on individual and collective abilities to develop land."

ELEMENT	DESIRED DEVELOPMENT ZONE			DRINKING WATER PROTECTION ZONE		
	Urban	Suburban City Limits	Suburban N. Edwards/ ETJ	Water Supply Suburban	Water Supply Rural	Barton Springs Zone
Watershed Classification						
Minor	64 ac.	320 - 640 ac.	320 - 640 ac.	128 - 320 ac.	64 - 320 ac.	64/128 - 320 ac.
Intermediate	64 ac.	640 - 1280 ac.	640 - 1280 ac.	320 - 640 ac.	320 - 640 ac.	320 - 640 ac.
Major	64 ac.	over 1,280 ac.	over 1,280 ac.	over 640 ac.	over 640 ac.	over 640 ac.
Critical Water Quality Zone						
Minor	50 - 400 ft.	50 - 100 ft.	50 - 100 ft.	50 - 100 ft.	50 - 100 ft.	50 - 100 ft.
Intermediate	50 - 400 ft.	100 - 200 ft.	100 - 200 ft.	100 - 200 ft.	100 - 200 ft.	100 - 200 ft.
Major	50 - 400 ft.	200 - 400 ft.	200 - 400 ft.	200 - 400 ft.	200 - 400 ft.	200 - 400 ft.
Water Quality Transition Zone						
Minor	None	100 ft.	100 ft.	100 ft.	100 ft.	100 ft.
Intermediate	None	200 ft.	200 ft.	200 ft.	200 ft.	200 ft.
Major	None	300 ft.	300 ft.	300 ft.	300 ft.	300 ft.

Simplify Regulations

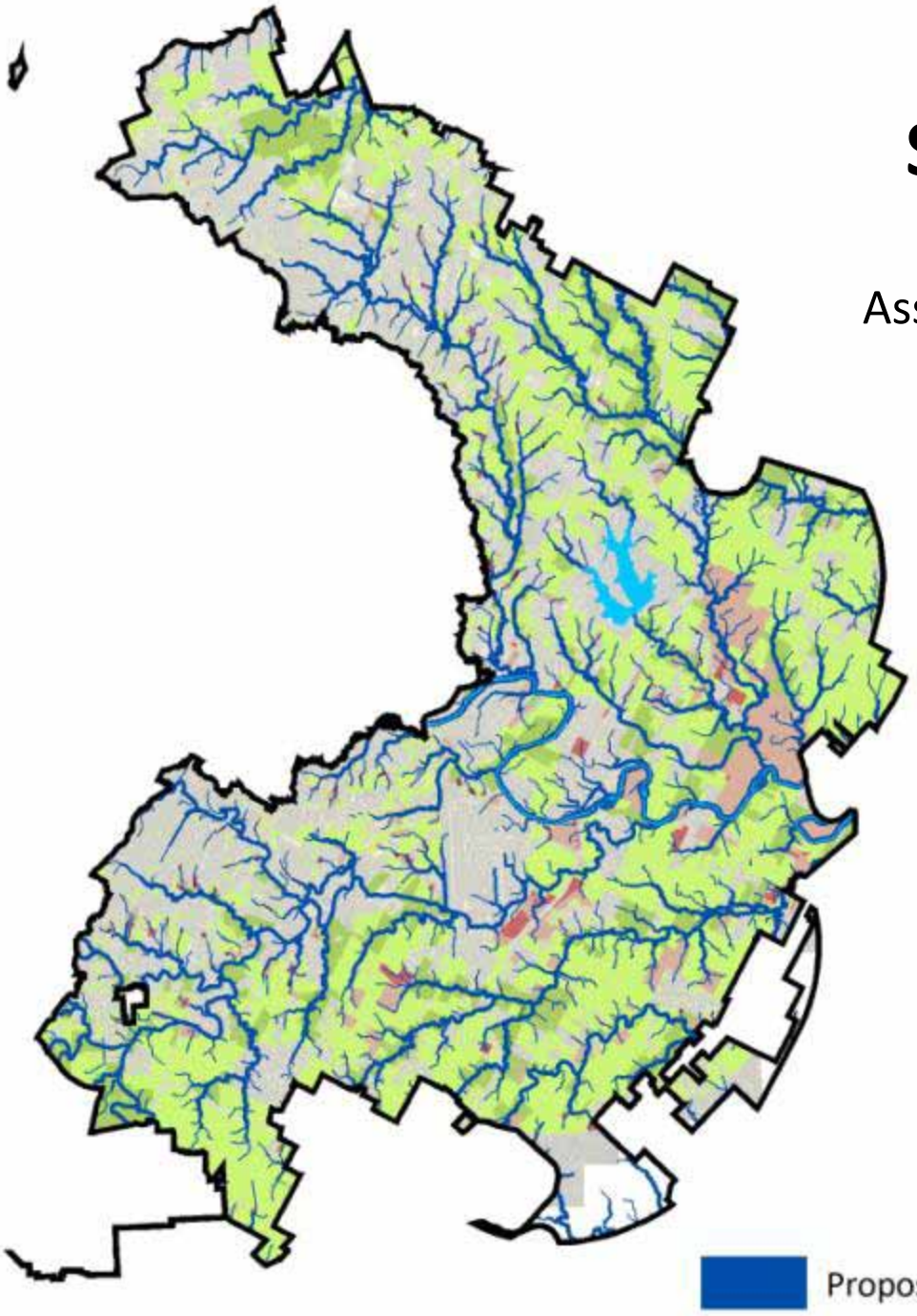
- Provisions were included to **minimize impacts** on the ability to develop, especially in Suburban watersheds
  - e.g., eliminating the WQTZ, gross site area, buffer averaging
- Eliminate the **Boundary Street Deduction**
- Numerous **clarifications & corrections** of existing code

➢ Lesson: **Watershed protection is complex, multifaceted**

  - Solutions cannot be “one-size-fits-all”

Impact Analysis: Suburban Watersheds

- Analysis for undeveloped properties shows:
  - Minor gain (**4-5%**) in average impervious cover
  - Majority of properties (**70%**) are not affected
  - Majority of affected sites (**80%**) are within a range of +/-25 percent for impervious cover impact
  - Site-specific factors will affect each site differently
- Affordability Impact Statement assessment



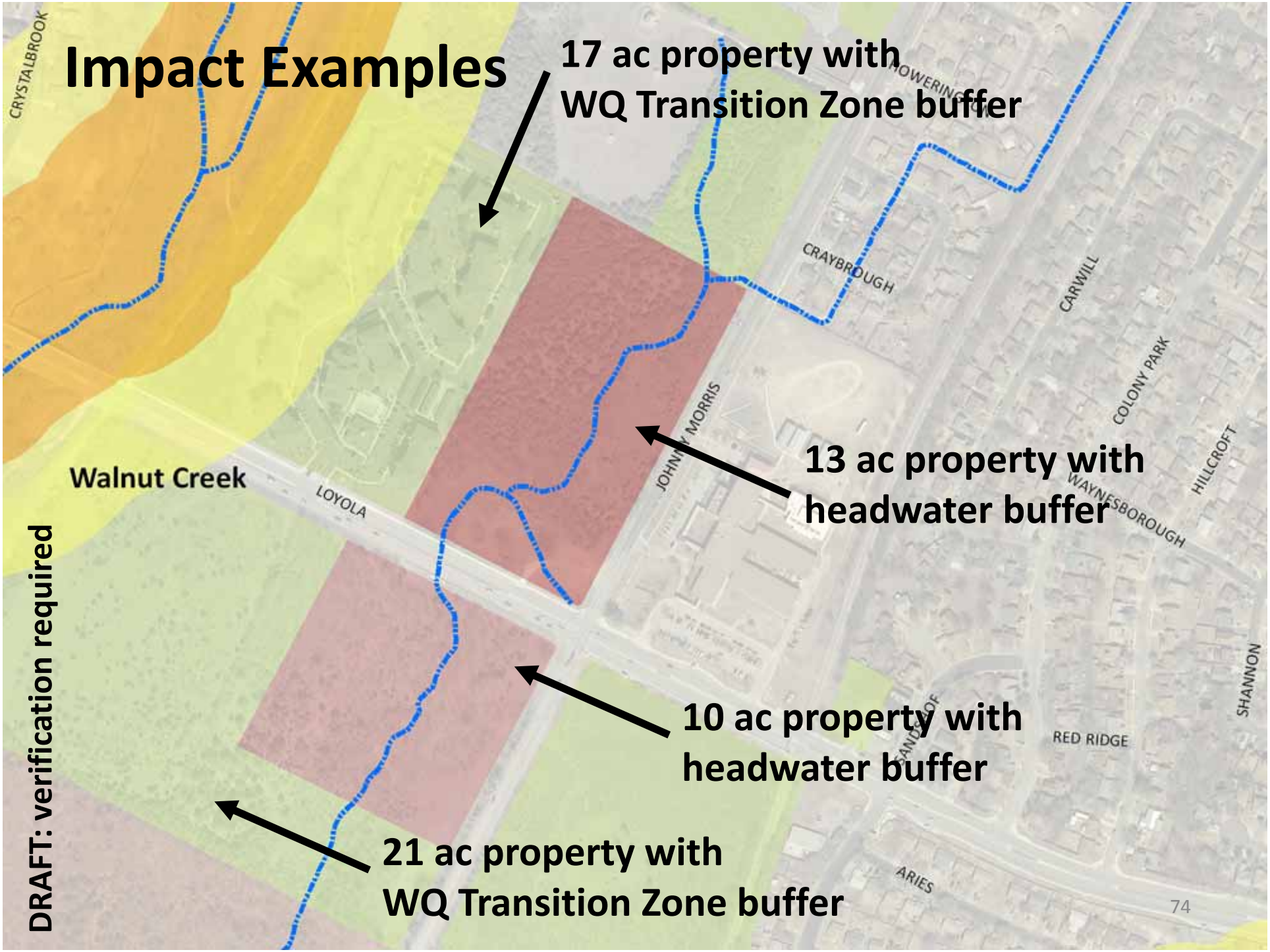
Impact Analysis: Suburban Watersheds

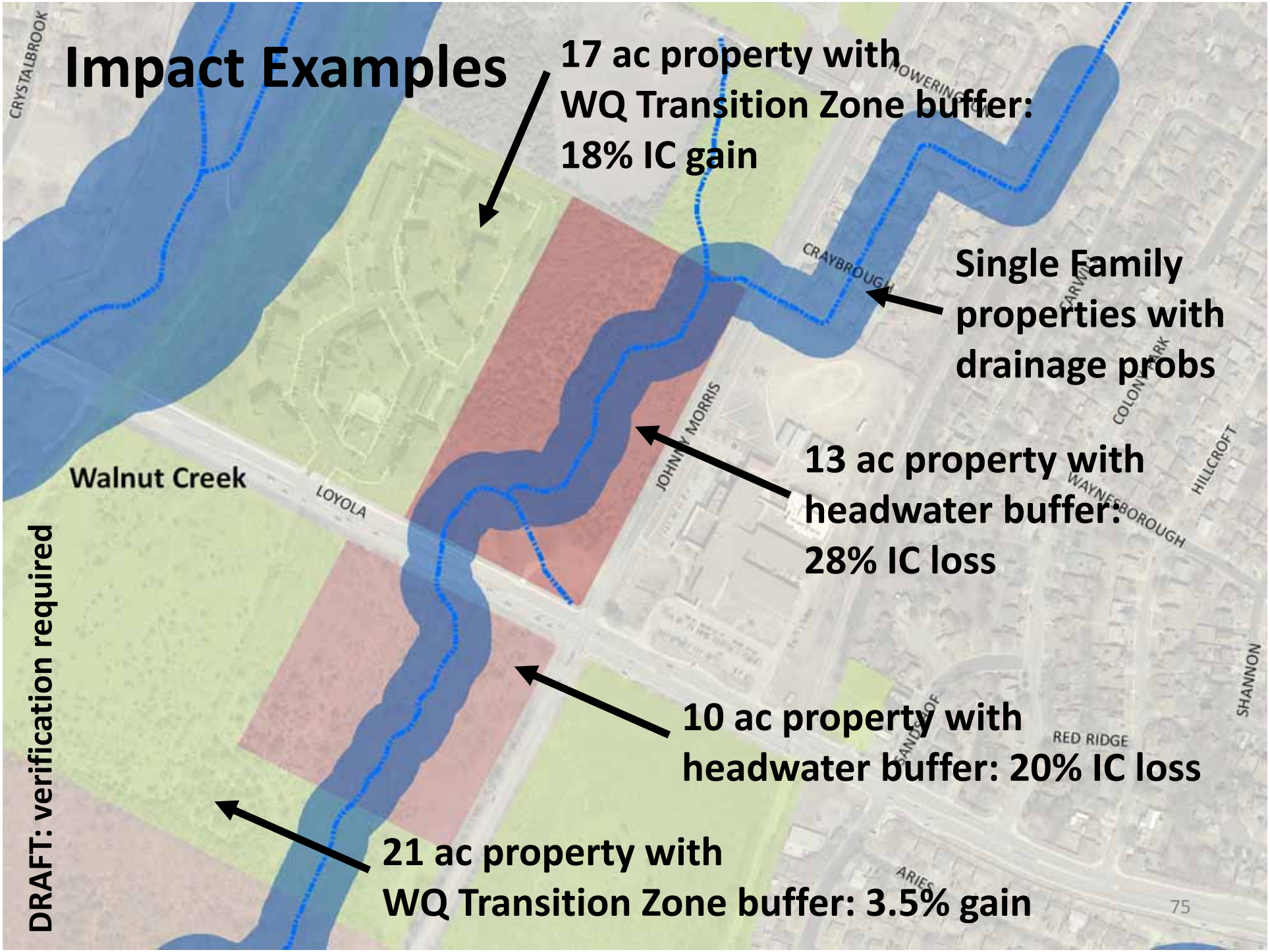
All undeveloped properties
Assume reduced floodplain modification

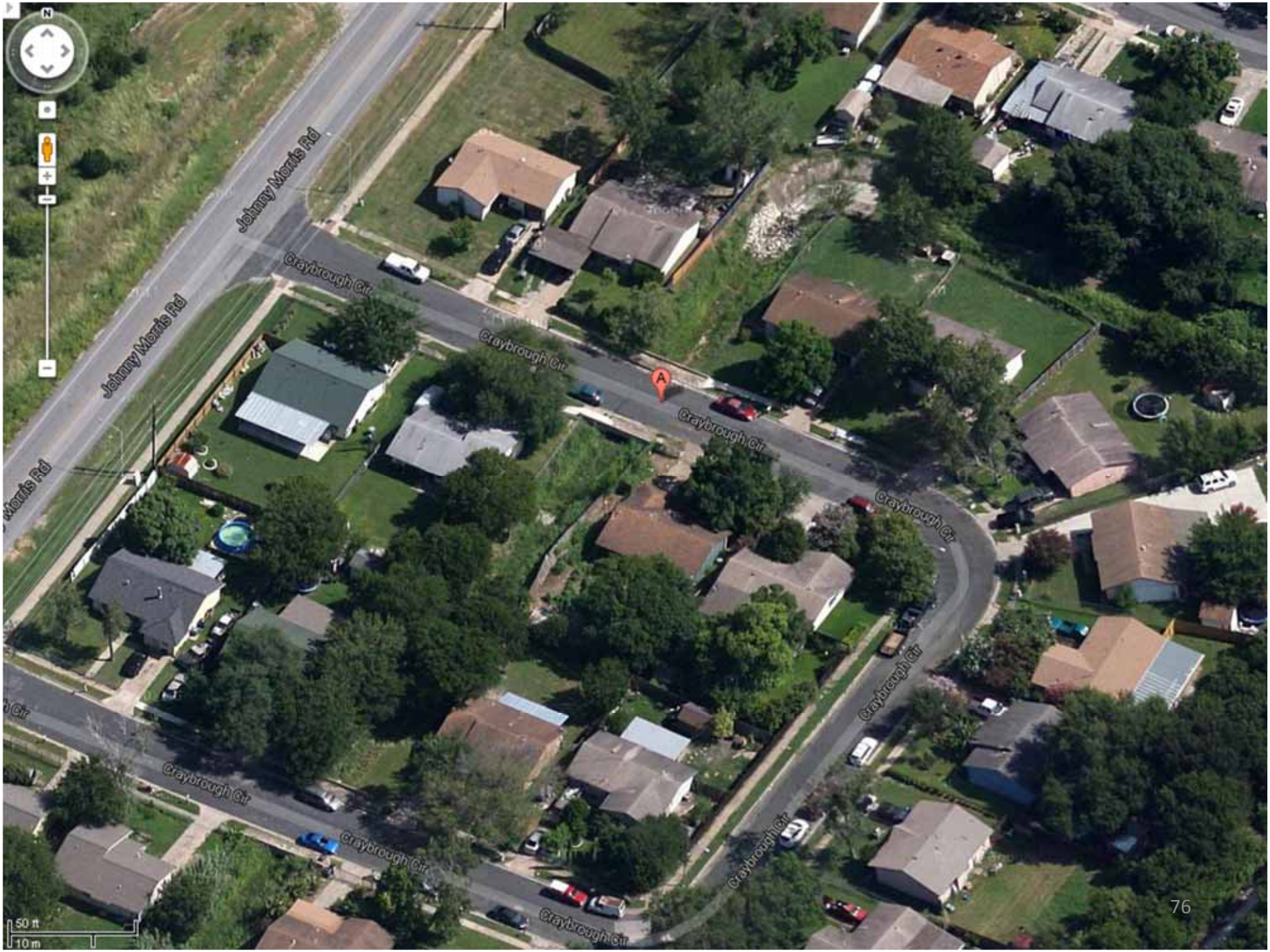
1,989 properties gain IC
(54% of land area)
7,308 see no change
(34% of land area)
1,186 properties lose IC
(12% of land area)

Impervious Cover Impact

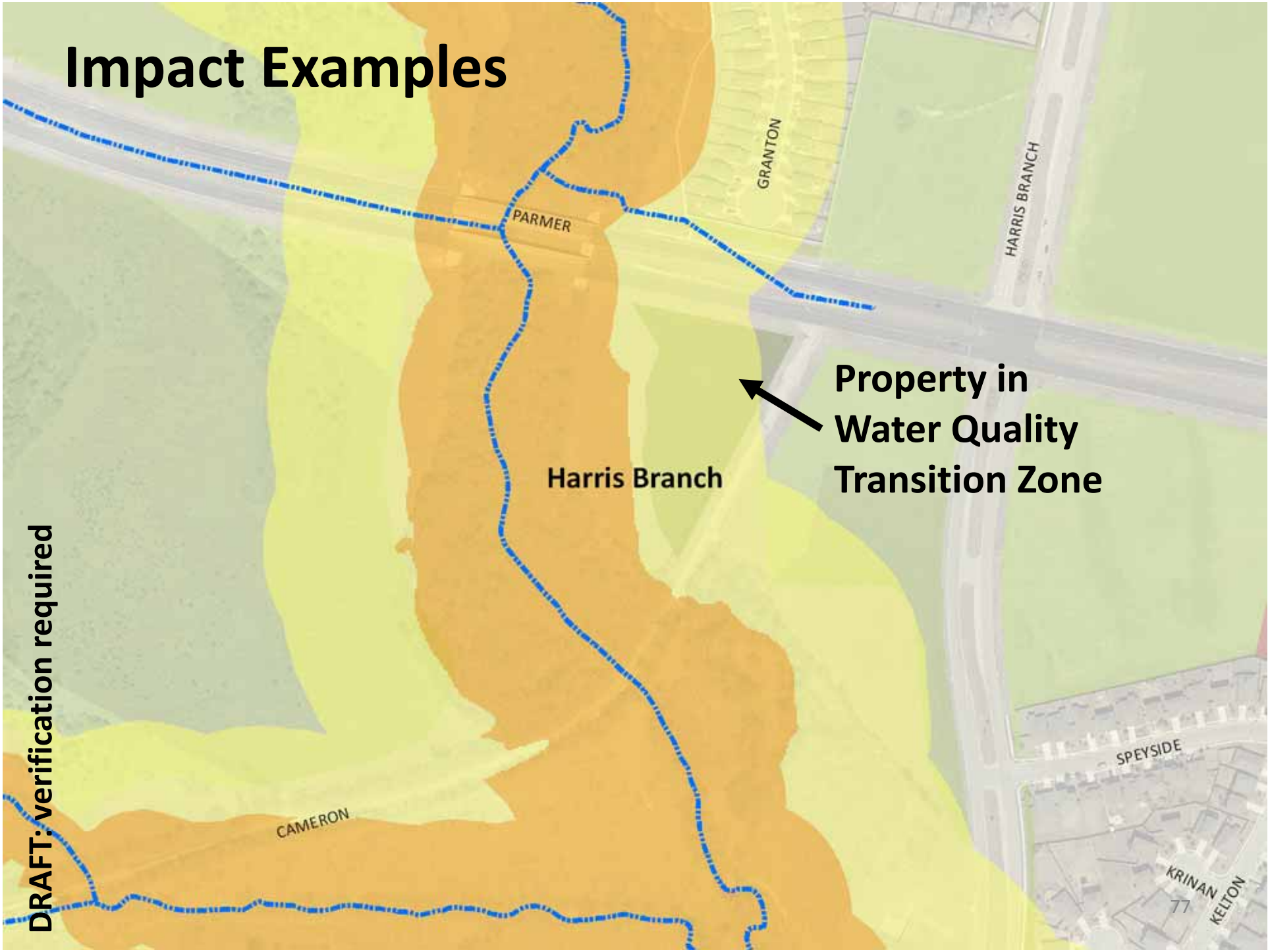
- >25% Loss
- 10 to 25% Loss
- <10% Loss
- <10% Gain
- 10 to 25% Gain
- >25% Gain


Impact Examples
17 ac property with
WQ Transition Zone buffer
13 ac property with
headwater buffer
10 ac property with
headwater buffer
21 ac property with
WQ Transition Zone buffer
Walnut Creek
LOYOLA
CRAYBROUGH
CARWILL
COLONY PARK
HILLCROFT
WAYNESBOROUGH
RED RIDGE
SHANNON
ARIES
DRAFT: verification required


Impact Examples
17 ac property with WQ Transition Zone buffer: 18% IC gain
Single Family properties with drainage probs
13 ac property with headwater buffer: 28% IC loss
10 ac property with headwater buffer: 20% IC loss
21 ac property with WQ Transition Zone buffer: 3.5% gain
DRAFT: verification required
Walnut Creek
LOYOLA
CRAYBROUGH
JOHNNY MORRIS
WAYNESBOROUGH
HILLCROFT
RED RIDGE
SHANNON
ARIES
CRYSTALBROOK


Johnny Morris Rd
Johnny Morris Rd
Johnny Morris Rd
Craybrough Cir
Craybrough Cir
Craybrough Cir
Craybrough Cir
Craybrough Cir
Craybrough Cir
Craybrough Cir
Craybrough Cir
Craybrough Cir
50 ft
10 m

Impact Examples



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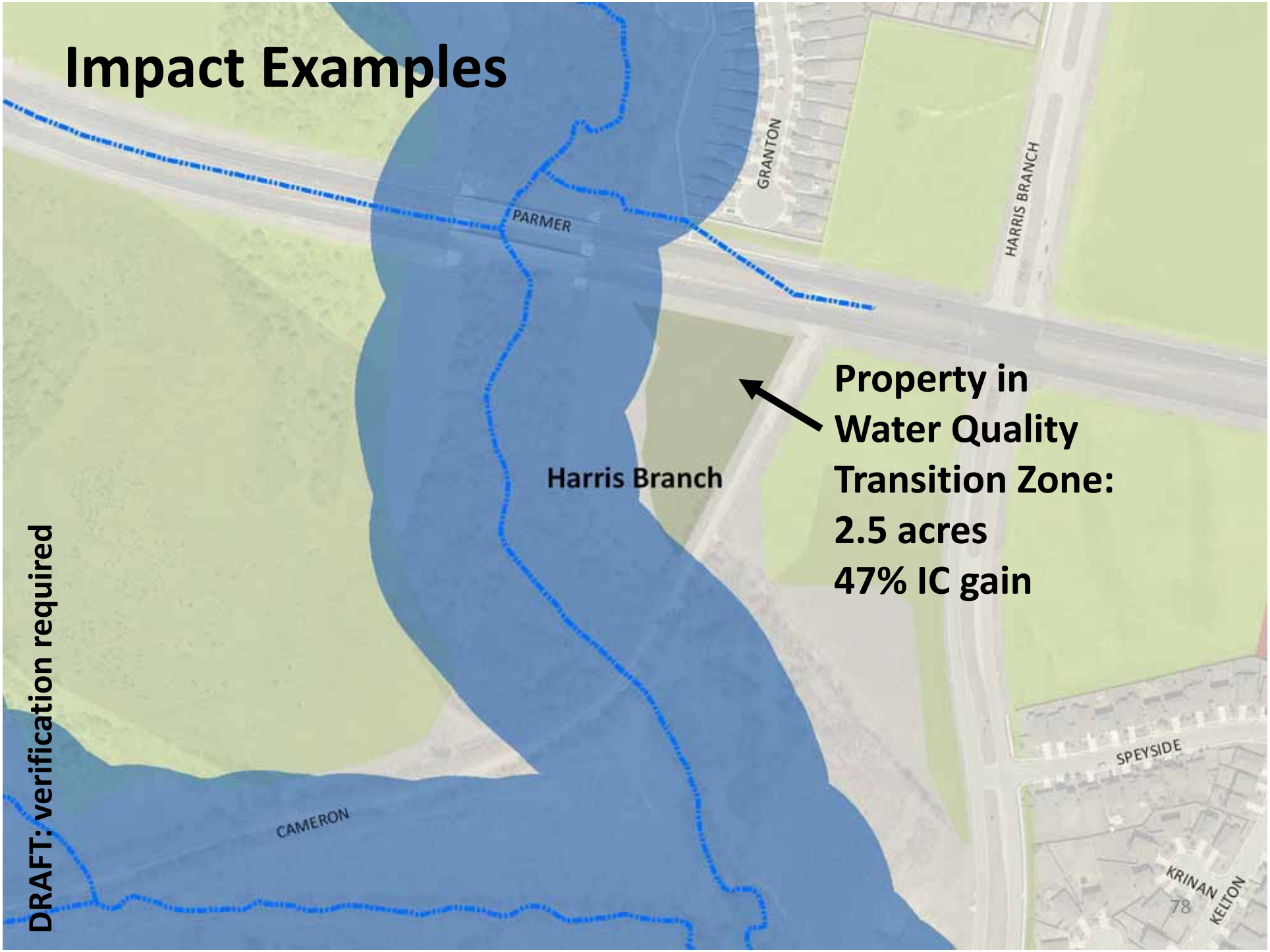
Impact Examples



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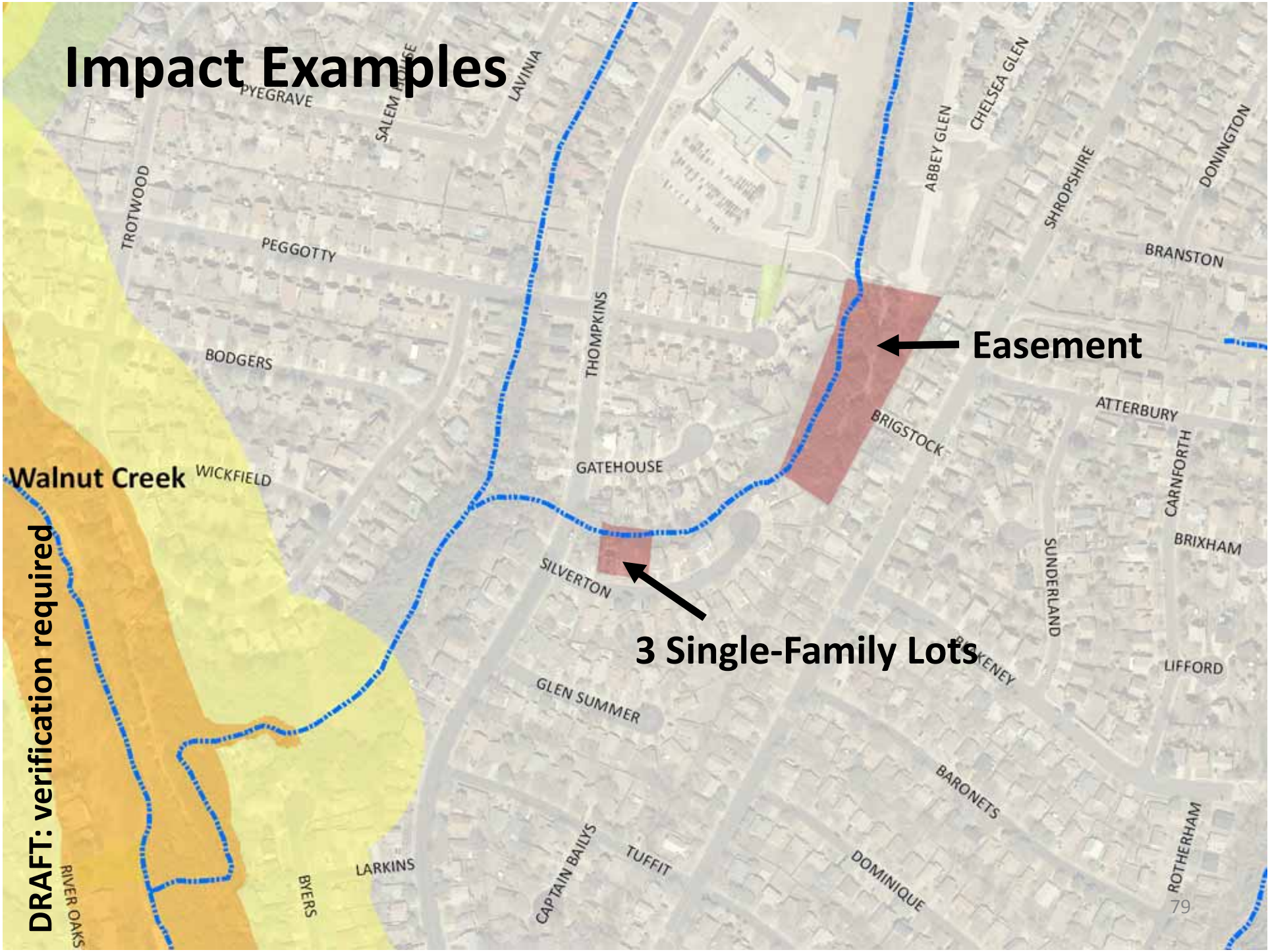
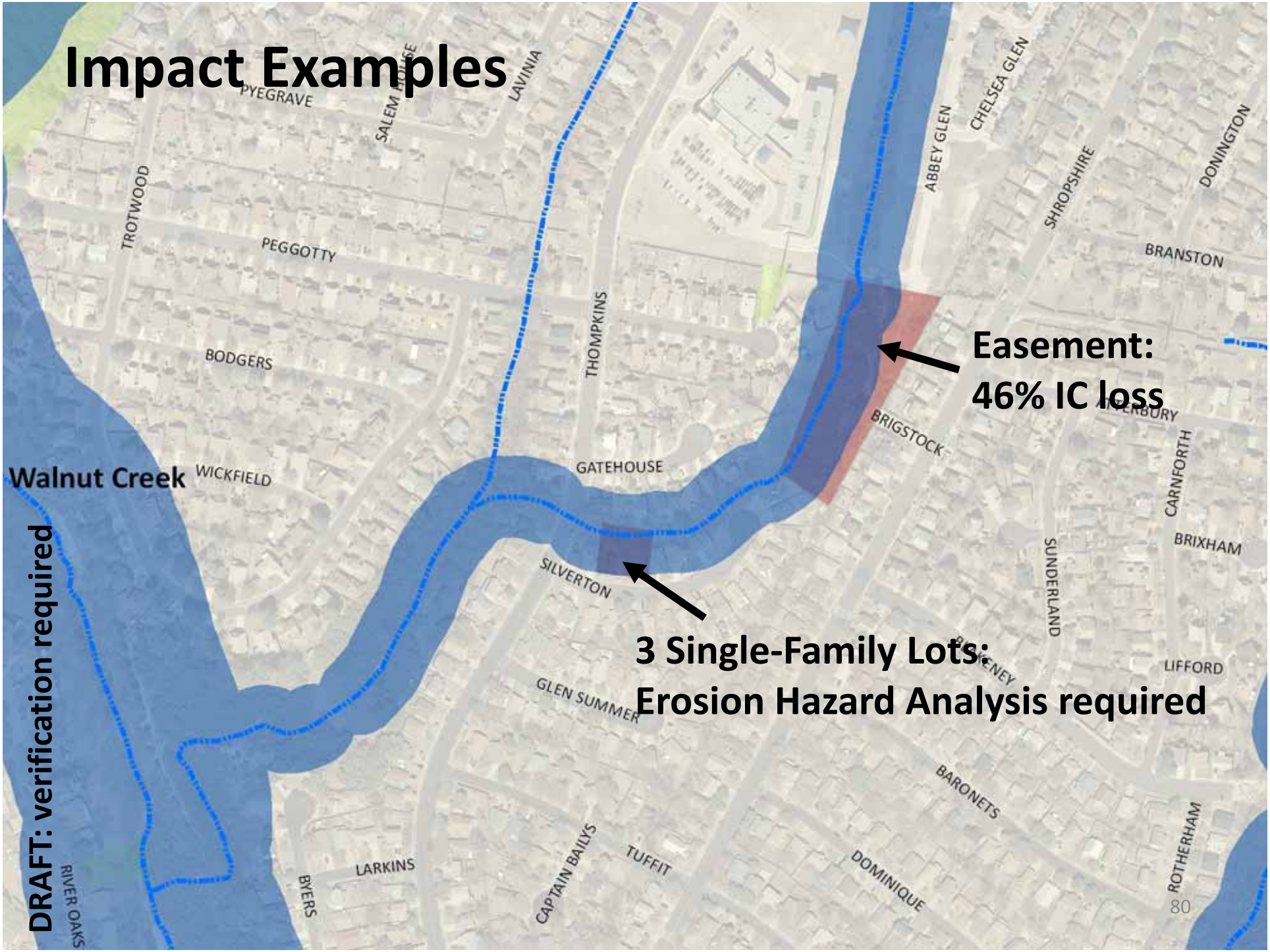

Impact Examples
PYEGRAVE
SALEM MOORE
LAVINIA
TROTWOOD
PEGGOTTY
BODGERS
THOMPKINS
ABBEY GLEN
CHELSEA GLEN
SHROPSHIRE
DONINGTON
BRANSTON
Easement
ATTERBURY
BRIGSTOCK
CARNFORTH
BRIXHAM
Walnut Creek
WICKFIELD
GATEHOUSE
SILVERTON
3 Single-Family Lots
SUNDERLAND
LIFFORD
GLEN SUMMER
BARONETS
ROTHERHAM
DOMINIQUE
TUFFIT
CAPTAIN BAILYS
LARKINS
BYERS
RIVER OAKS
DRAFT: verification required

Impact Examples



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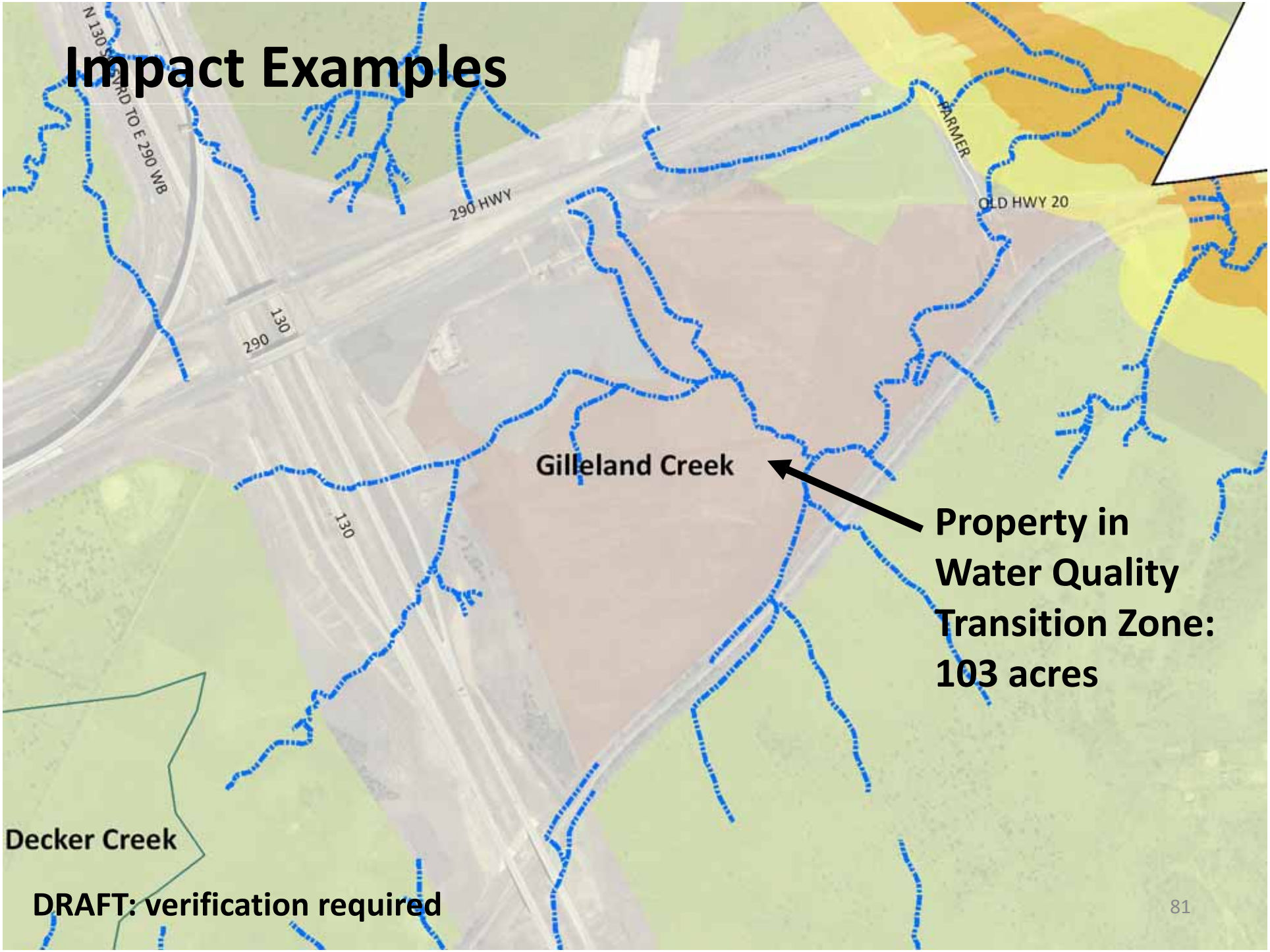

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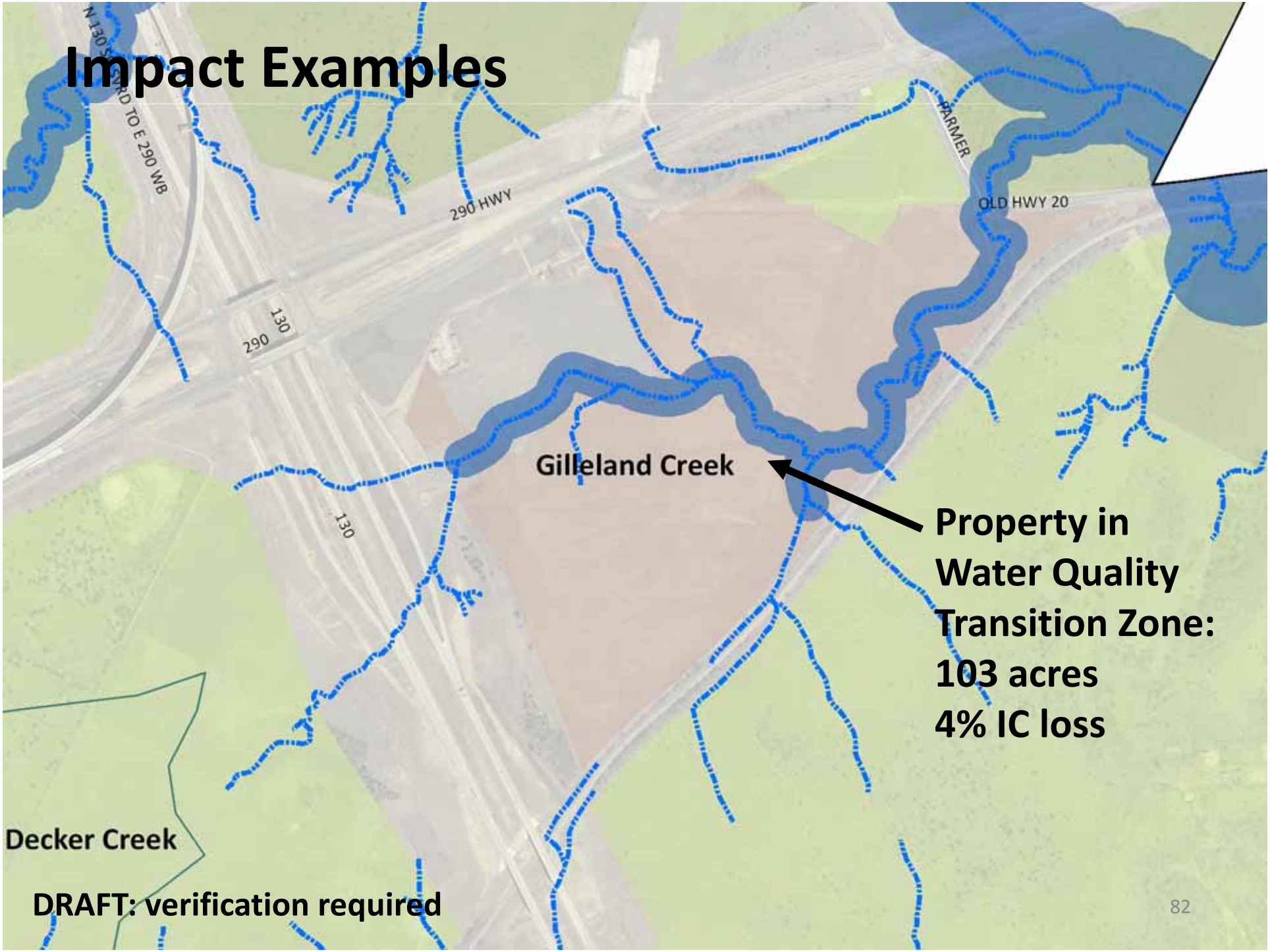
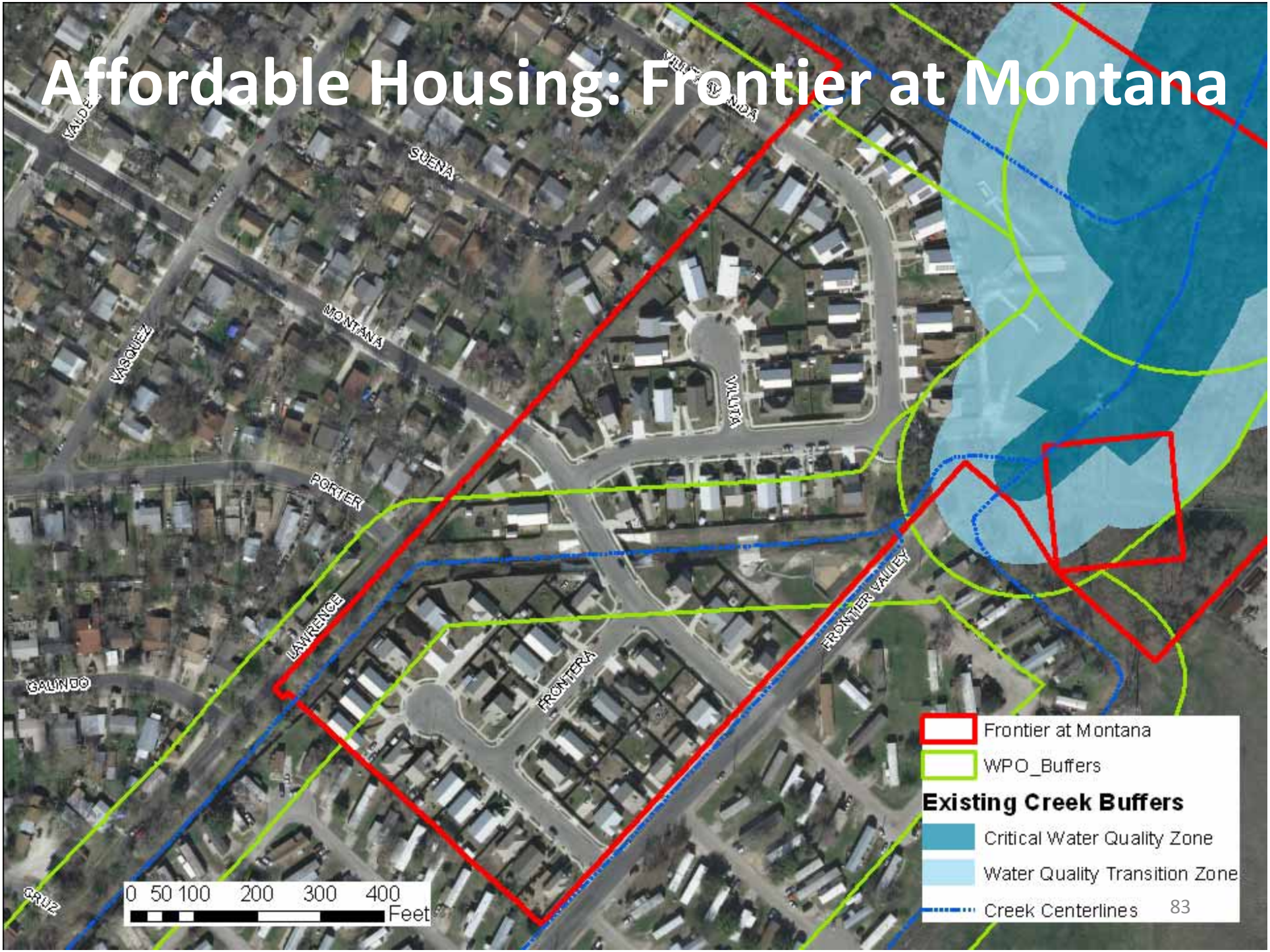
Impact Examples



Property in Water Quality Transition Zone:
103 acres
4% IC loss

DRAFT: verification required

Affordable Housing: Frontier at Montana



Affordable Housing: Frontier at Montana (close-up of channel)

Frontier at Montana: AIS Excerpt*

"An analysis of AHFC's Frontier at Montana Subdivision showed that at least 25 of 81 lots would have been within the proposed buffer. Therefore, a different layout, housing product, or entire site would have had to have been selected to maintain an equivalent number of affordable units.

"On the other hand, the project's design placed fences and homes in very close proximity to the creek banks, left little room for stabilizing riparian vegetation, and did not provide trail connectivity, community open space, and other features afforded by more generous creek buffers. This case study underscores the complexity of the decisions to be made about short and long-term costs and benefits."

* AIS = Affordability Impact Statement

The Beat Goes On…

- Buffer impacts on developability
- Buffer averaging methodology
- Public road drainageways (exempt or no)
- Floodplain Assessment & staff role
- Trail impacts on waterways & wildlife
- More code cleanup items → CodeNEXT

WPO Phase 2 / CodeNEXT Green Infrastructure Working Group: Schedule

Kickoff	Jan. 30
Land Cover & Natural Function	Feb. 20
Landscaping & Green Transitions	Mar. 13
Beneficial Use of Stormwater	Apr. 03
Stormwater Options for Redevelopment & Infill	Apr. 24
Wrap Up	May 15

Come join the conversation!
Sign up for our email list.

Contact/Additional Information

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austintexas.gov/department/watershed-protection-ordinance

austintexas.gov/page/green-infrastructure-working-group