

**Drainage Planning,
Design, Operation
and Maintenance
in Fairview**

Outline for Meeting

- Drainage Regulation in Fairview
- Drainage Infrastructure in Fairview
- Drainage Planning in Fairview
- Drainage System Operation
- Development Engineering Process
- Development in Fairview
- Regional Issues

Drainage Regulation in Fairview

- Town incorporated in 1958
- First FEMA flood study and flood hazard ordinance - 1979 (First flood management ordinance – 1991(updated in 2009))
- Town creates drainage utility – 2003
- Town hires first in-house civil engineer - 2004
- Town adopts first drainage ordinance – 2004
- FEMA approves updated flood hazard mapping - 2019

1979 FEMA FLOOD STUDY

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Fairview. The area of study is shown on the Vicinity Map (Figure 1).

The stream studied in detail is Sloan Creek, which flows in a southeasterly direction and drains an area of 9.1 square miles, an unnamed tributary of Sloan Creek, and Wilson Creek. The detailed studies were terminated where the 100-year flood plain width is equal to or less than: (1) 200 feet in urban and developing areas; (2) 400 feet in areas with a low development potential; or (3) where the drainage area of the water course is less than one square mile. The areas studied by approximate methods were the segments of water course with less than one square mile of drainage area.

2.2 Community Description

The Town of Fairview is located in south central Collin County, Texas. Fairview is located 30 miles northeast of Dallas. The community is composed primarily of residential housing. Most of the residents commute to work each day in Dallas and Richardson. The town has no businesses except a mobile home park in the westernmost part of the town.

The central to western parts of the town are sparsely populated and are still rural in nature. The central to eastern parts of the town are experiencing the most significant residential growth. The upper end of Sloan Creek is characterized by a very deep and wide channel of Chiliche rock. In the lower end of the watershed the deep channel disappears to the point that Sloan and Wilson Creek share a common flood plain.

The climate of the study area is warm and temperate. Summers are hot, winters are short and mild. Extremes of temperature and rainfall are of relatively short duration. The annual mean rainfall is about 38 inches.

2.3 Principal Flood Problems

At present there is no stream gaging station in the Sloan Creek Watershed. Therefore, historical flood information was obtained from information received from local residents. High velocities have been observed in Sloan Creek and residents report seeing water flow over the bridge at Highway 1378. Some residents in the eastern end of the watershed have had the water come into their homes. The areas of the town above station section H should not have any problems with flooding from Sloan Creek. It should be noted that in some cases the relative magnitudes of the experienced floods may vary from one reach of the stream to the other, due primarily to differences in rainfall intensity and volume at different points in the watershed.

CHAPTER 54: STORMWATER ORDINANCE

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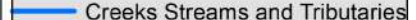

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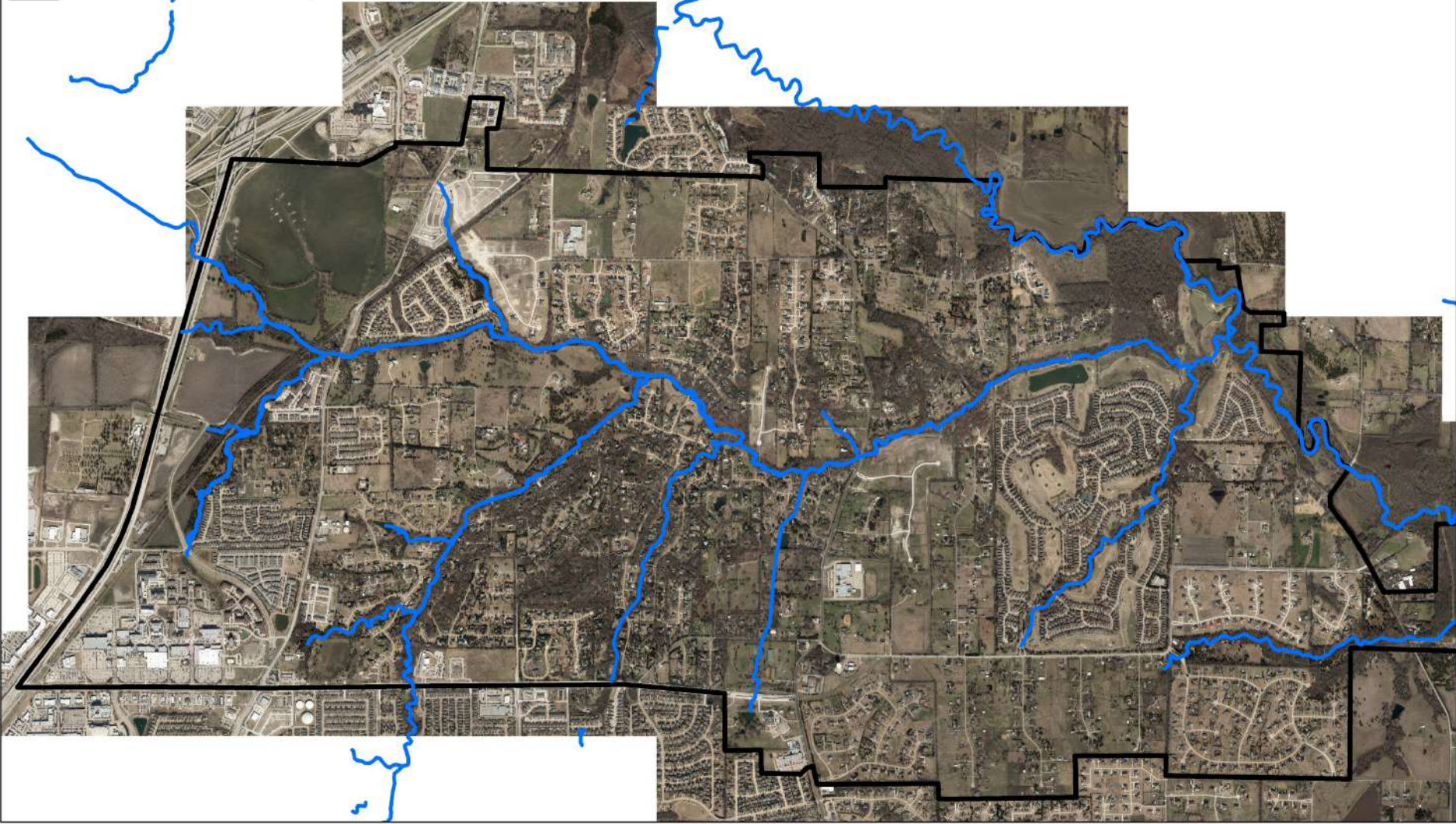
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Drainage Infrastructure in Fairview




- Drainage methods in Fairview – low density areas of town are primarily open drainage design
 - Established by Town policy with initial development
 - Creeks and streams
 - Natural channels
 - Designed open channels

Fairview Drainage

-  Creeks Streams and Tributaries
-  Town Limits



Fairview Drainage

-  Natural Drainage
-  Creeks Streams and Tributaries
-  Town Limits



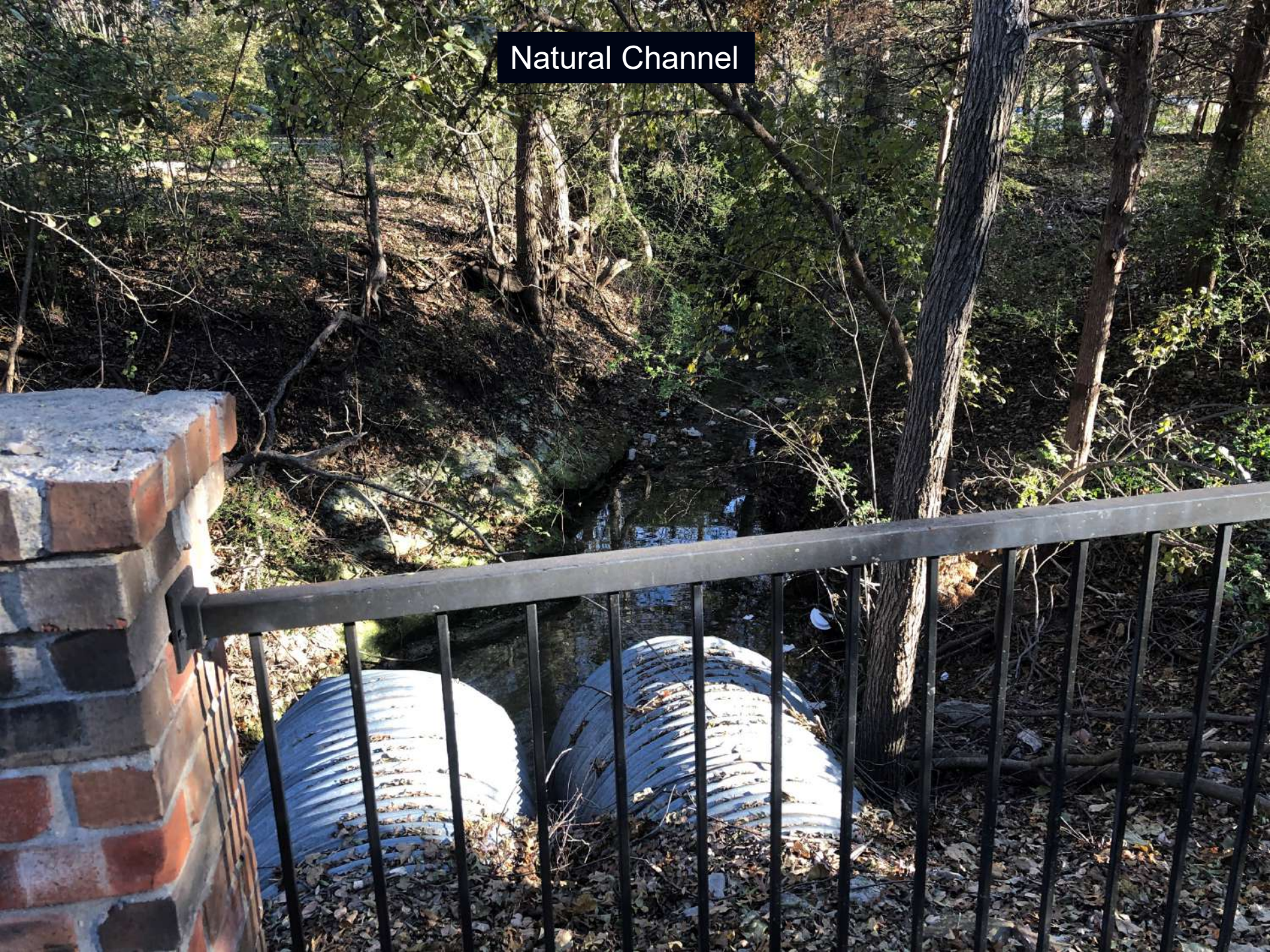
Natural Channel



Natural Channel



Natural Channel

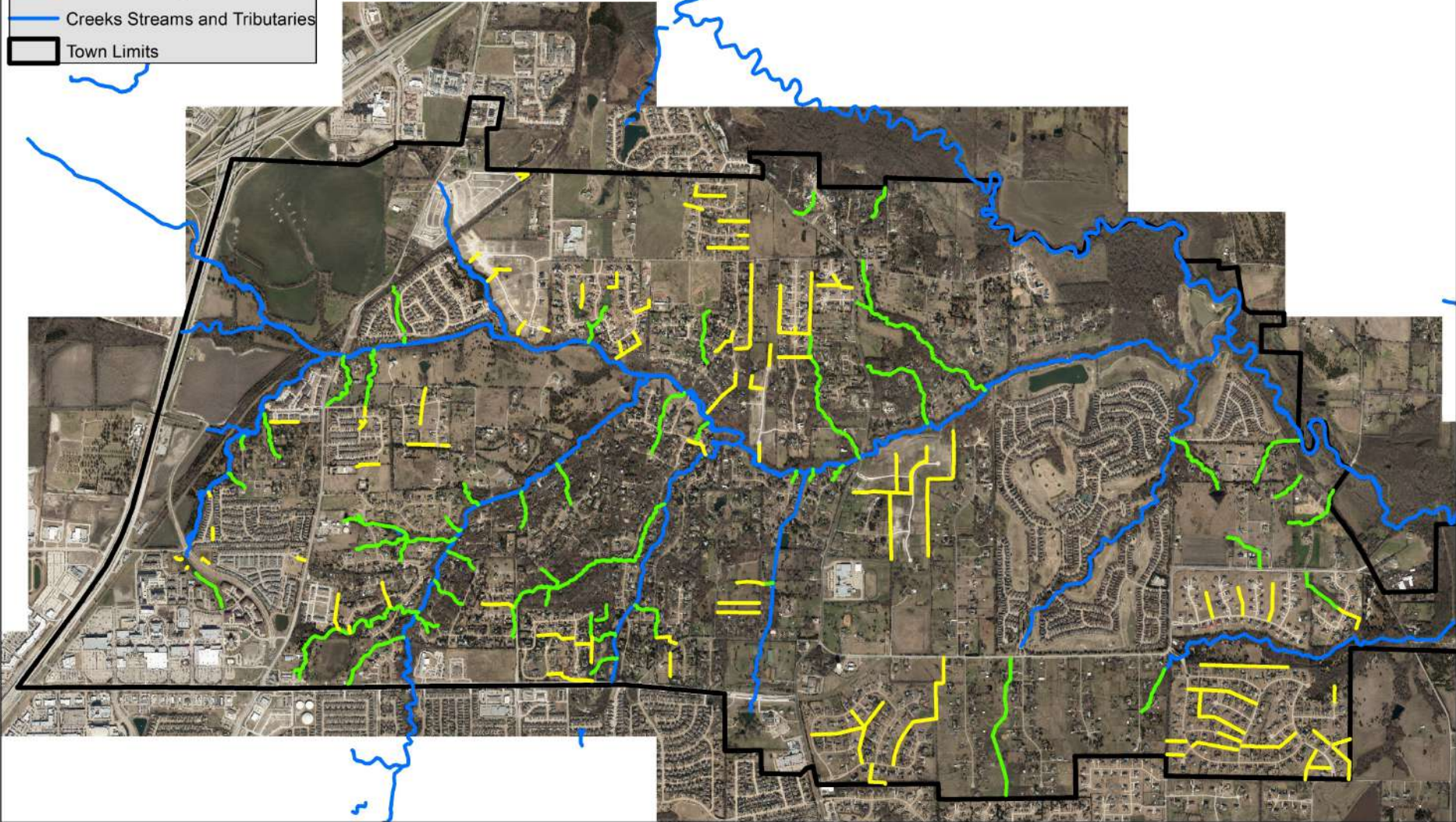


Natural Channel



Fairview Drainage

- Open Channel Flow
- Natural Drainage
- Creeks Streams and Tributaries
- Town Limits



Designed Channel



Designed Channel



Designed Channel

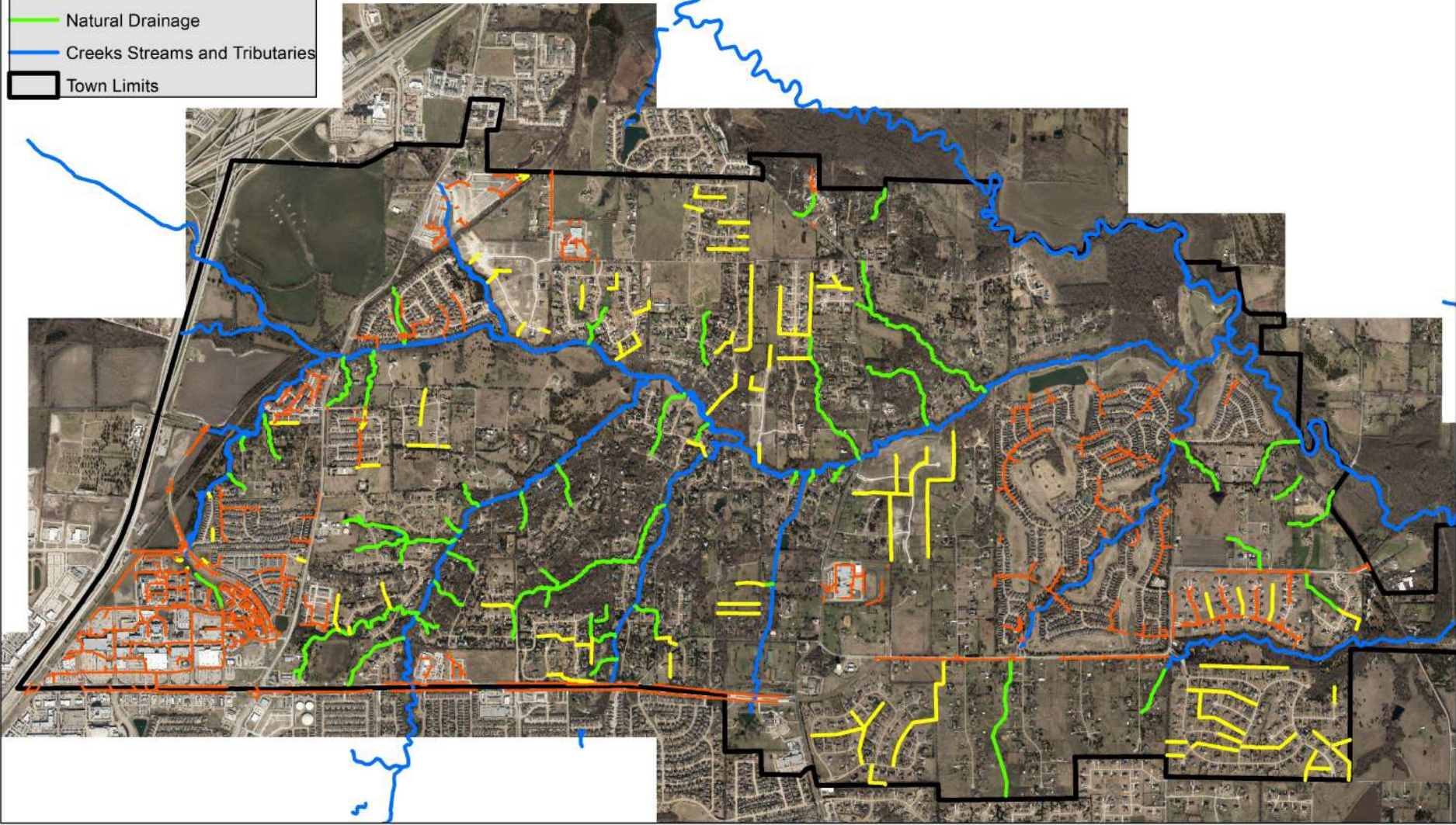


Drainage Infrastructure in Fairview

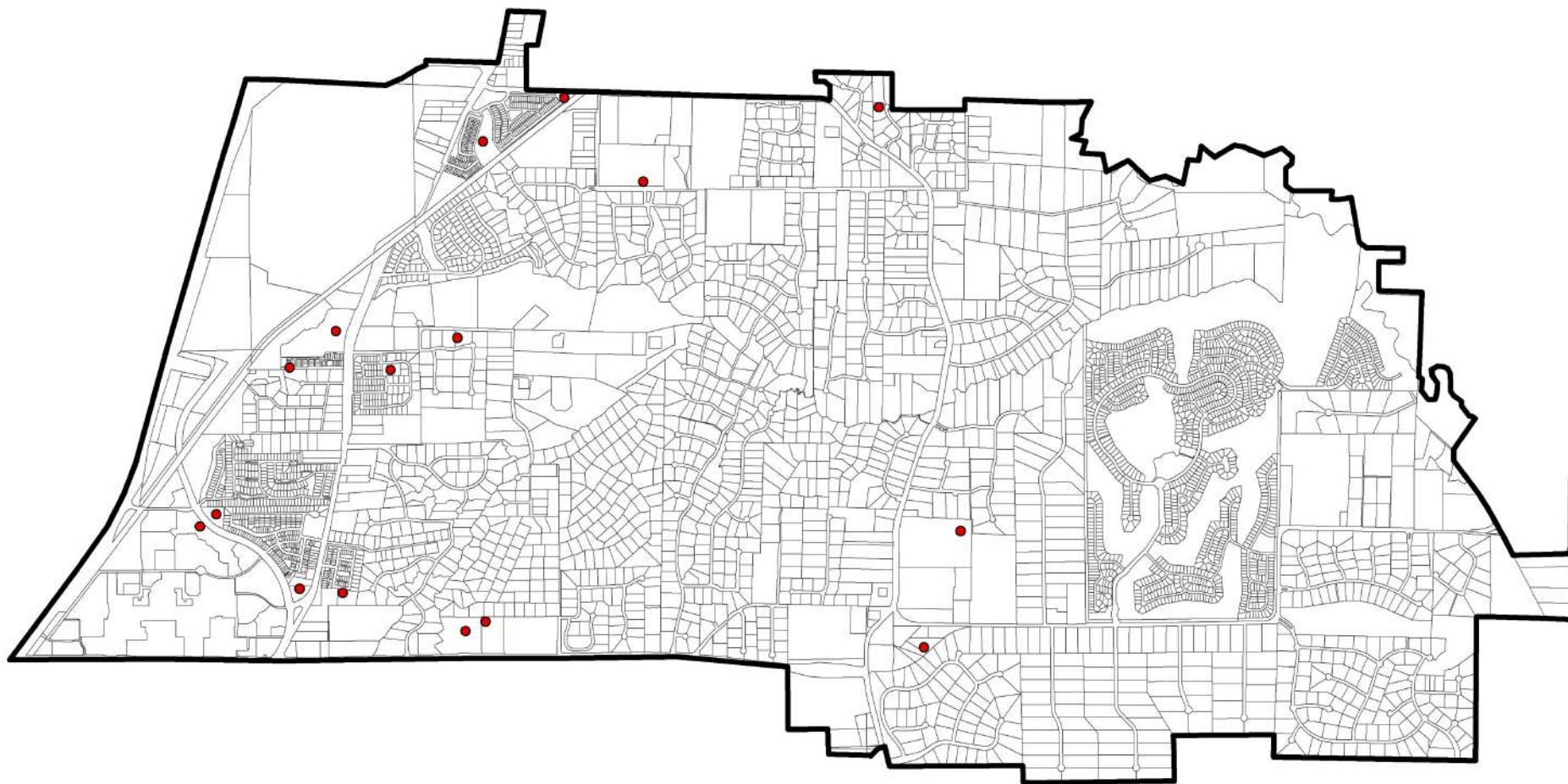
- Drainage methods in Fairview – CPDD, Heritage Ranch, public roads designed with curb and gutter
 - Primarily enclosed and engineered drainage improvements
 - Enclosed storm sewer
 - Detention/retention required in CPDD

Fairview Drainage

- Storm Sewer
- Open Channel Flow
- Natural Drainage
- Creeks Streams and Tributaries
- Town Limits



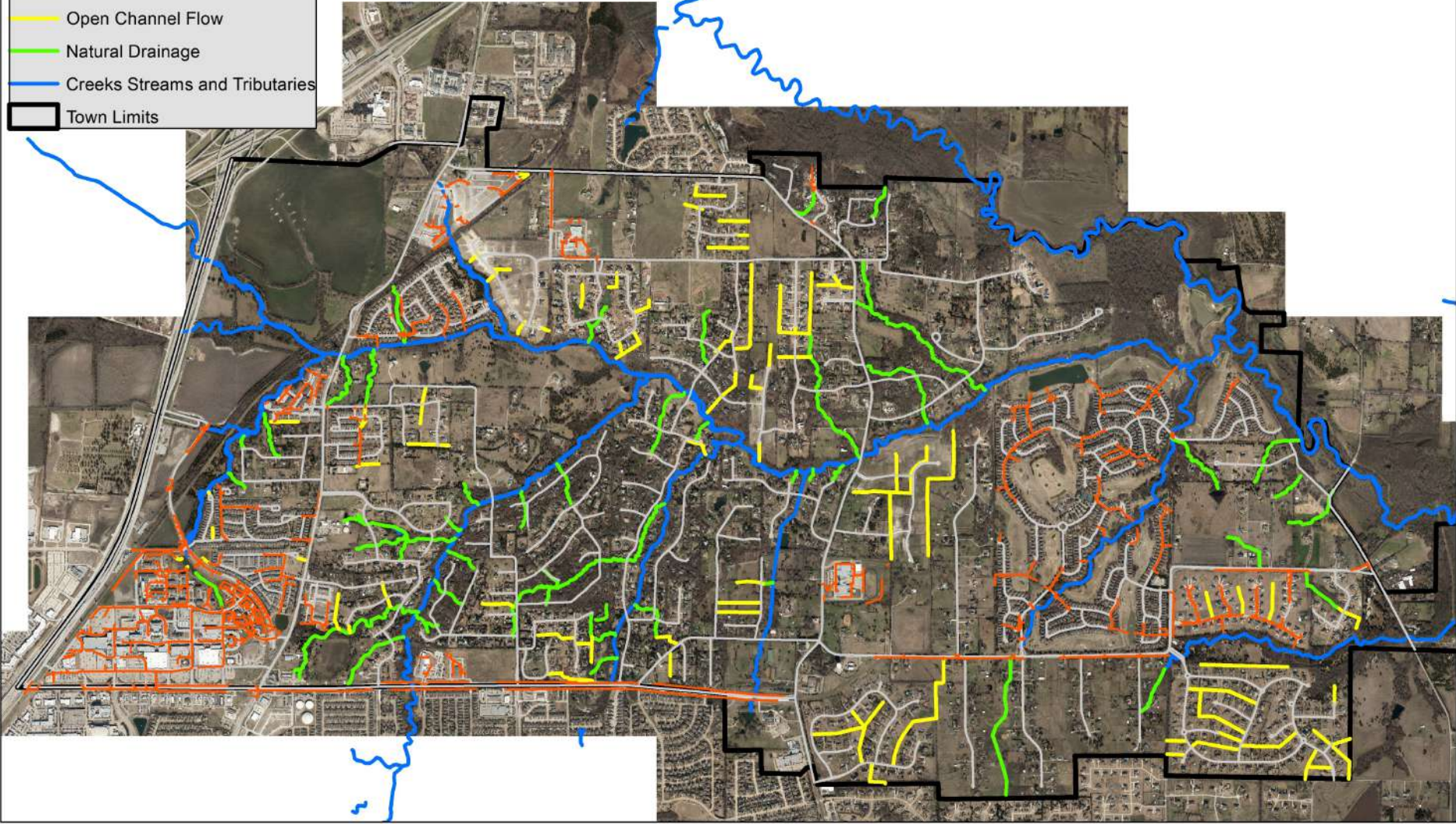
DETENTION POND LOCATIONS





Fairview Drainage

- Storm Sewer
- Roads
- Open Channel Flow
- Natural Drainage
- Creeks Streams and Tributaries
- Town Limits



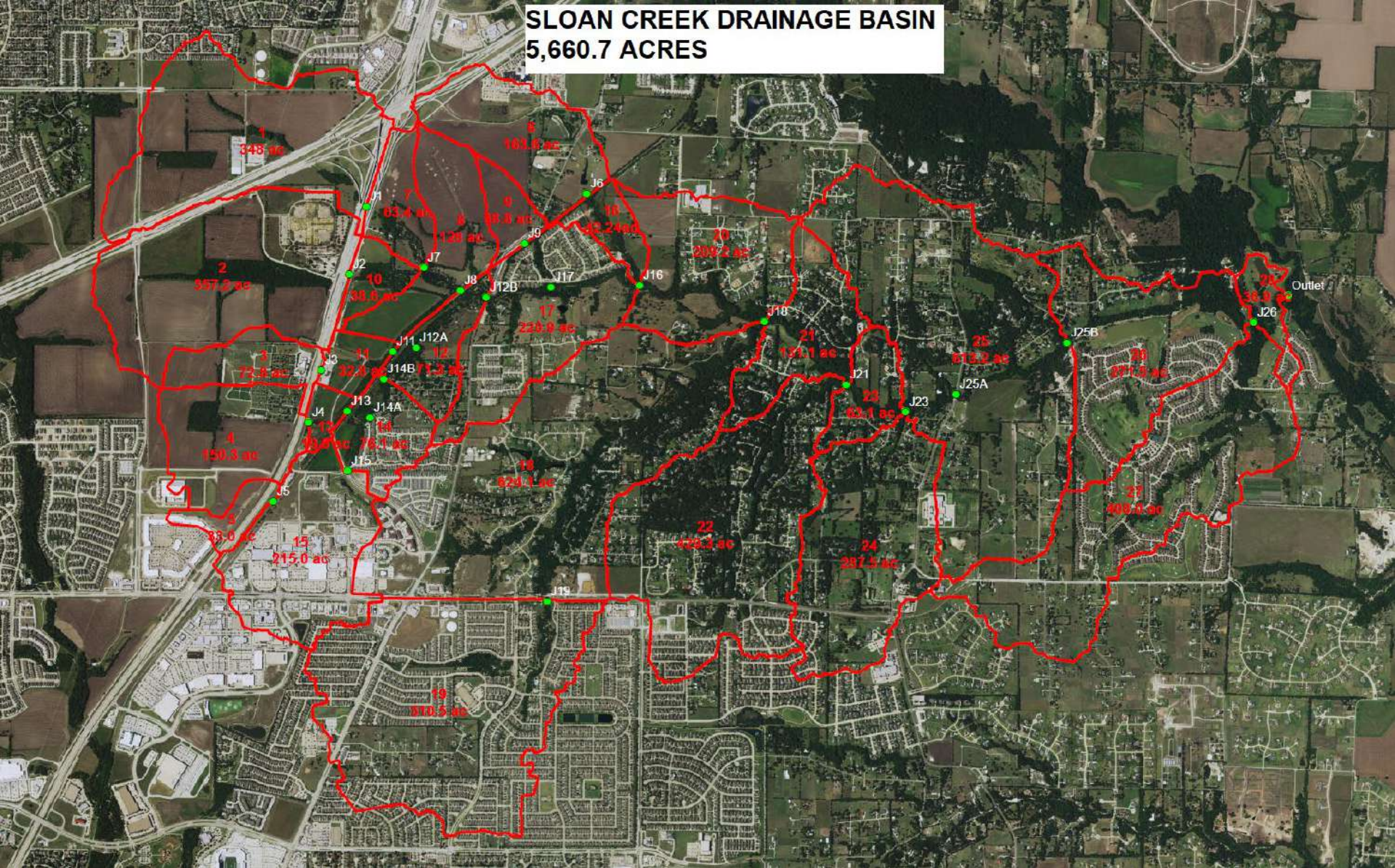
Drainage Infrastructure in Fairview

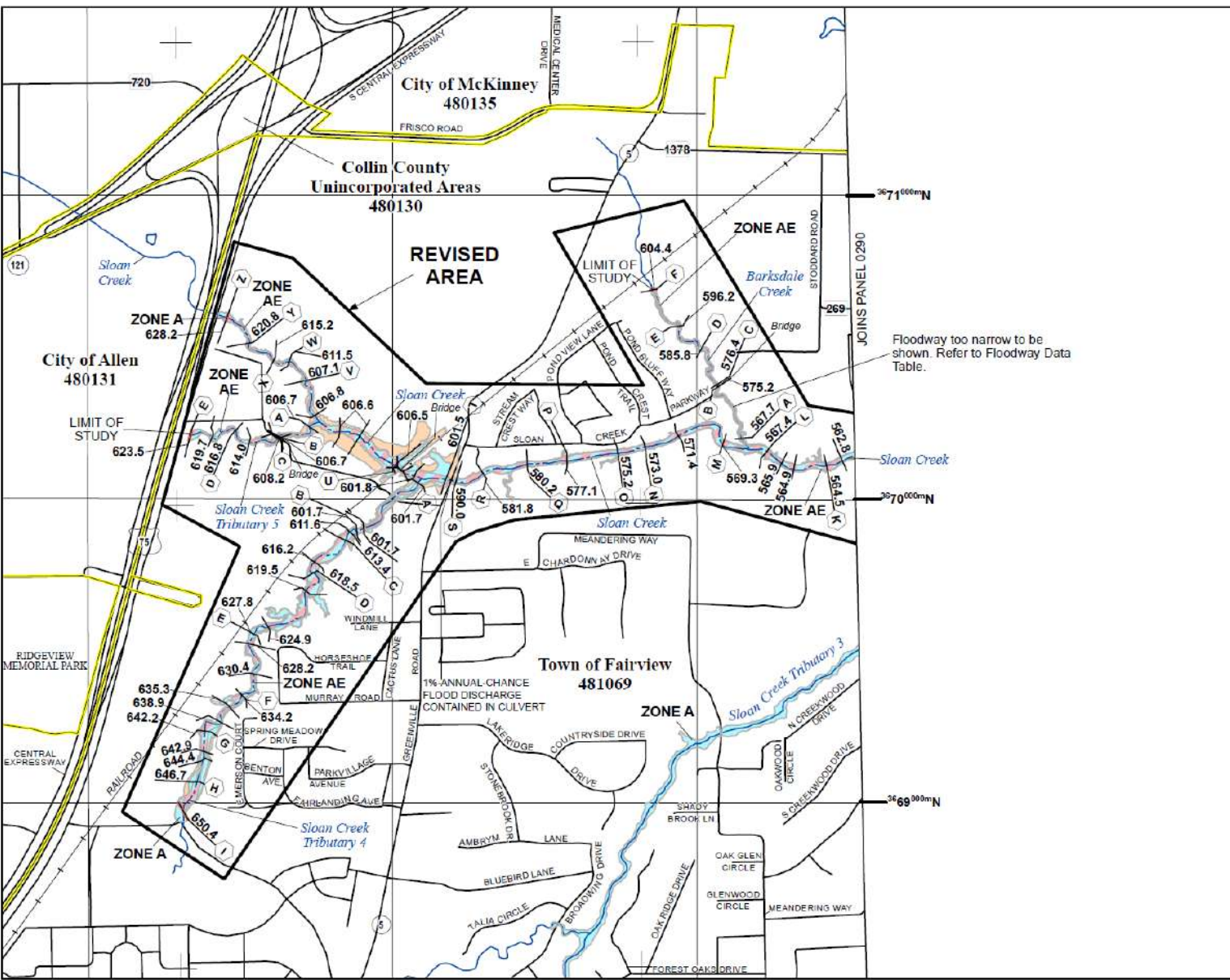
- Where can the town LEGALLY spend drainage fees (taxes) on drainage issues:
 - Street Rights of Way
 - Street Easements
 - Drainage Easements
- It is not legal to spend funds to improve private property
- Many drainage projects are combined Town and homeowner efforts

Drainage Planning in Fairview

- Town has undertaken two major studies of Sloan Creek to evaluate conditions on the entire creek, and to outline mitigation measures related to impacts of commercial urban development in CPDD
- Both initiated in 2016
- Sloan Creek full length drainage study
 - Purpose – conduct detailed analysis of flood area for Sloan Creek – never been done to this detail
 - Outcome – updated flood maps

SLOAN CREEK DRAINAGE BASIN 5,660.7 ACRES





Floodway too narrow to be shown. Refer to Floodway Data Table.

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) Zone X, ZONE
- With BFE or Depth Zone AE, AG, AH, VE, AH
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard. Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile. Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X

SCALE

Map Projection: NAD 83 (83) Zone 14N
 Position Hemisphere: Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,600

0 500 1,000 2,000 Feet
 0 100 300 600 Meters

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

COLLIN COUNTY, TEXAS
 and incorporated Areas
PANEL 270 of 600

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALLEN, CITY OF	480135	0270	K
COLLIN COUNTY	480130	0270	K
FAIRVIEW, TOWN OF	481069	0270	K
MCKINNEY, CITY OF	480135	0270	K

REVISED TO REFLECT LOMR EFFECTIVE: July 8, 2019

VERSION NUMBER 2.13.0
 MAP NUMBER 4805C0270K
 MAP REVISED JUNE 7, 2017

Collin County
Unincorporated Areas
480130

City of McKinney
480135

Collin County
Unincorporated Areas
480130

City of McKinney
480135

AREA REVISED BY
LOMR EFFECTIVE
NOVEMBER 24, 2009

Town of Fairview
481069

REVISED AREA
AREA REVISED BY
LOMR EFFECTIVE
NOVEMBER 23, 2009

Town of Fairview
481069

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) Zone A, AE, AH
- With BFE or Depth Zone AE, A2, AH, VE, XH
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile (Zone X)
- Future Conditions 1% Annual Chance Flood Hazard (Zone X)
- Area with Reduced Flood Risk due to Levee See Notes, Zone 1

OTHER AREAS OF FLOOD HAZARD

SCALE

Map Projection: NAD 2011 UTM Zone 14N
Wilson Hemisphere, North Datum: NAD 83

1 inch = 1,000 feet 1:120,000

FEMA National Flood Insurance Program FLOOD INSURANCE RATE MAP

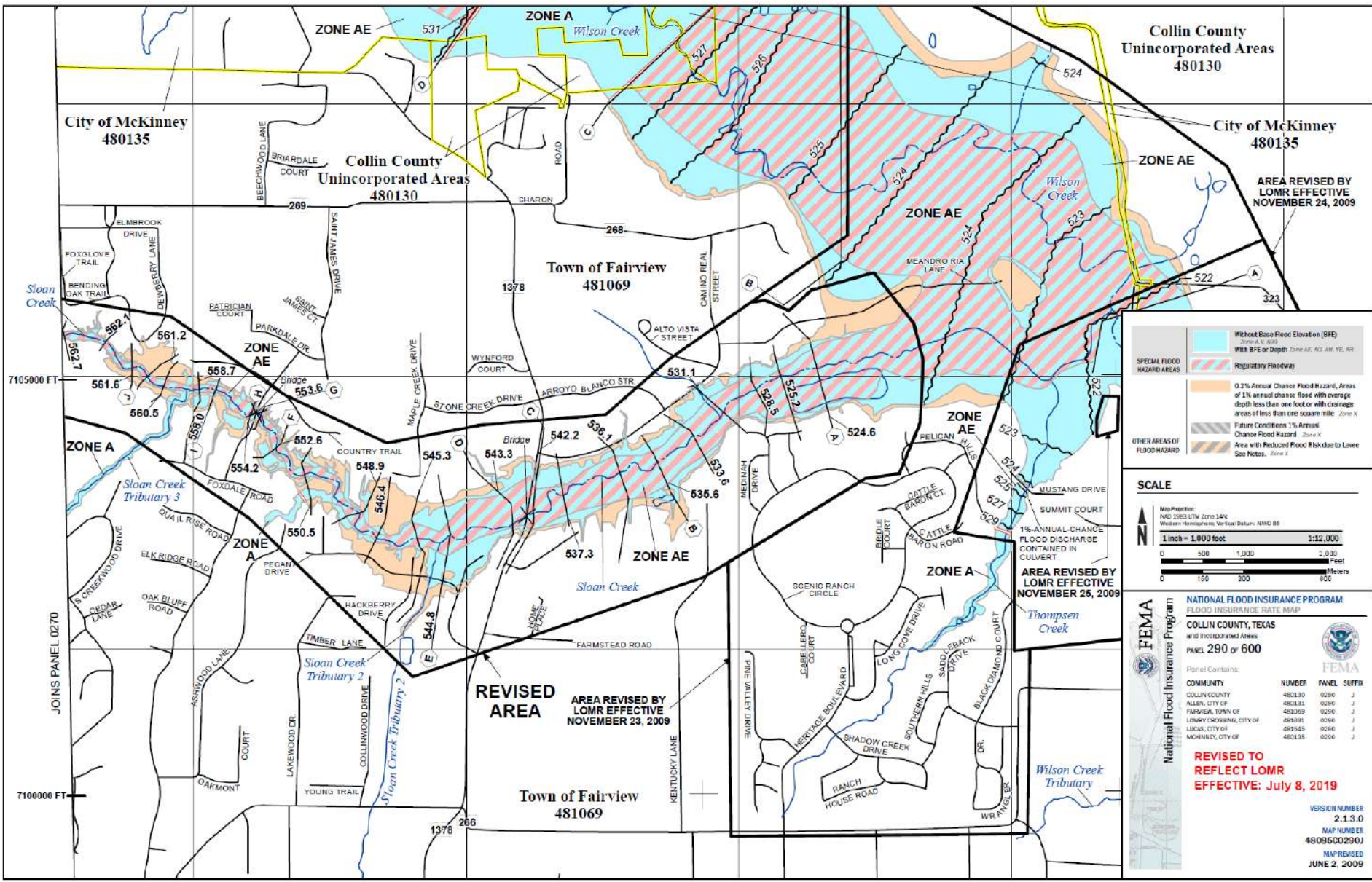
COLLIN COUNTY, TEXAS and Incorporated Areas
PANEL 290 of 600

Panel Contains:

COMMUNITY	NUMBER	FEMA PANEL	SUFFIX
COLLIN COUNTY	480130	0290	J
ALLEN, CITY OF	480131	0290	J
FAIRVIEW, TOWN OF	480169	0290	J
LUNNEY CROOKING, CITY OF	480191	0290	J
LUICKS, CITY OF	480145	0290	J
McKINNEY, CITY OF	480135	0290	J

REVISED TO REFLECT LOMR EFFECTIVE: July 8, 2019

VERSION NUMBER
2.1.3.0
MAP NUMBER
4808600290J
MAP REVISED
JUNE 2, 2009



JOINS PANEL 0270

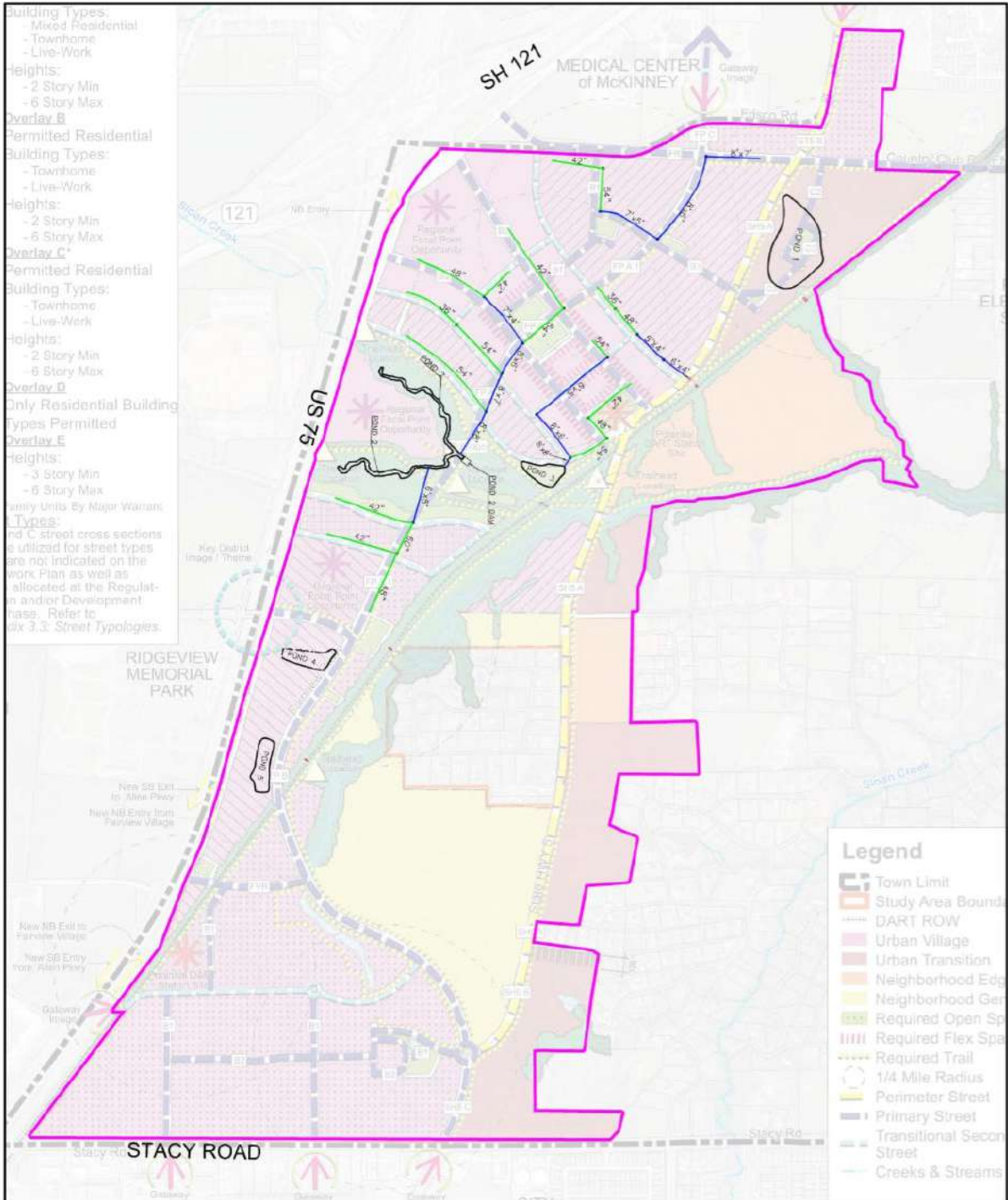
710000 FT

7105000 FT

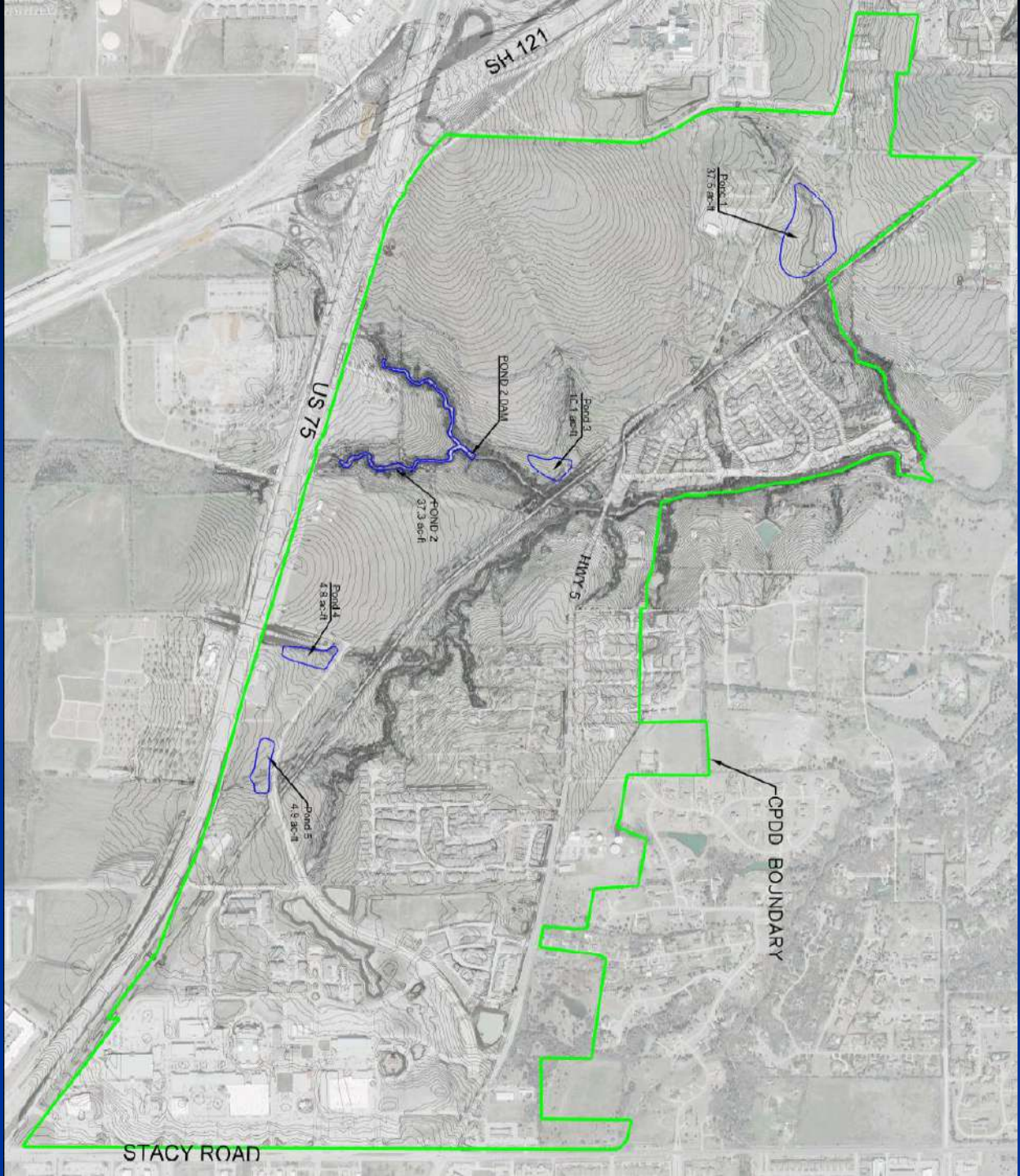
Drainage Planning in Fairview

- CPDD master drainage study
 - Purpose – evaluate detailed drainage and detention needs to ensure future downstream impacts are mitigated by future upstream development
 - Outcome – detailed planning and provision for regional detention within the full CPDD
 - Previous drainage design in Center development also incorporated regional detention

- Building Types:
 - Mixed Residential
 - Townhome
 - Live-Work
- Heights:
 - 2 Story Min
 - 6 Story Max
- Overlay B
- Permitted Residential Building Types:
 - Townhome
 - Live-Work
- Heights:
 - 2 Story Min
 - 6 Story Max
- Overlay C*
- Permitted Residential Building Types:
 - Townhome
 - Live-Work
- Heights:
 - 2 Story Min
 - 6 Story Max
- Overlay D
- Only Residential Building Types Permitted
- Overlay E
- Heights:
 - 3 Story Min
 - 6 Story Max
- Entry Units By Major Warrant
- Types:
 - No C street cross sections
 - utilized for street types
 - are not indicated on the work Plan as well as
 - allocated at the Regulatory and Development
 - phase. Refer to
 - Annex 3.2: Street Typologies.



- Legend**
- Town Limit
 - Study Area Bound
 - DART ROW
 - Urban Village
 - Urban Transition
 - Neighborhood Edge
 - Neighborhood Gen
 - Required Open Sp
 - Required Flex Spa
 - Required Trail
 - 1/4 Mile Radius
 - Perimeter Street
 - Primary Street
 - Transitional Second Street
 - Creeks & Streams



STACY ROAD

CPDD BOUNDARY

SH 121

US 75

FOND 2 DAM

HWY 5

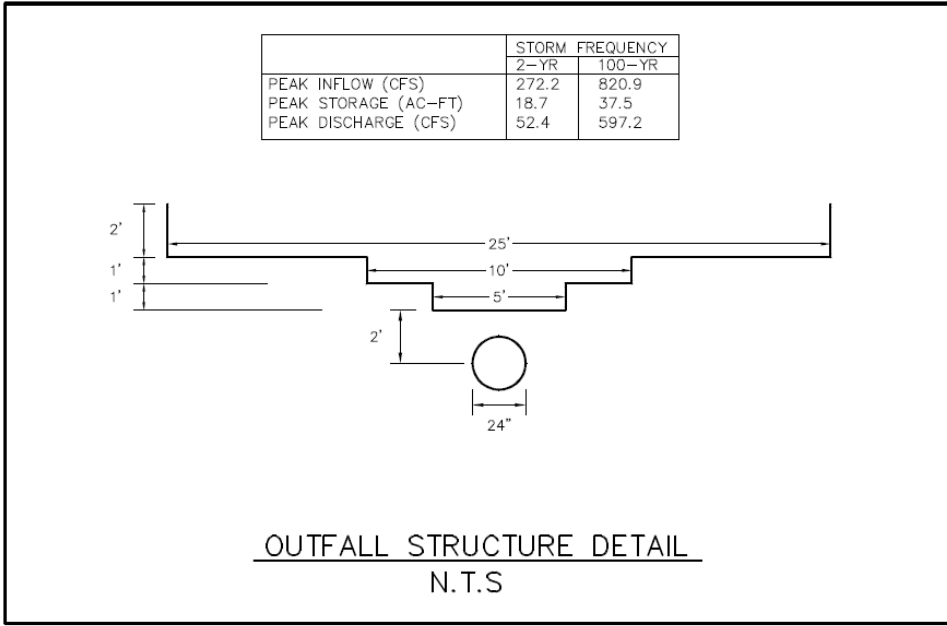
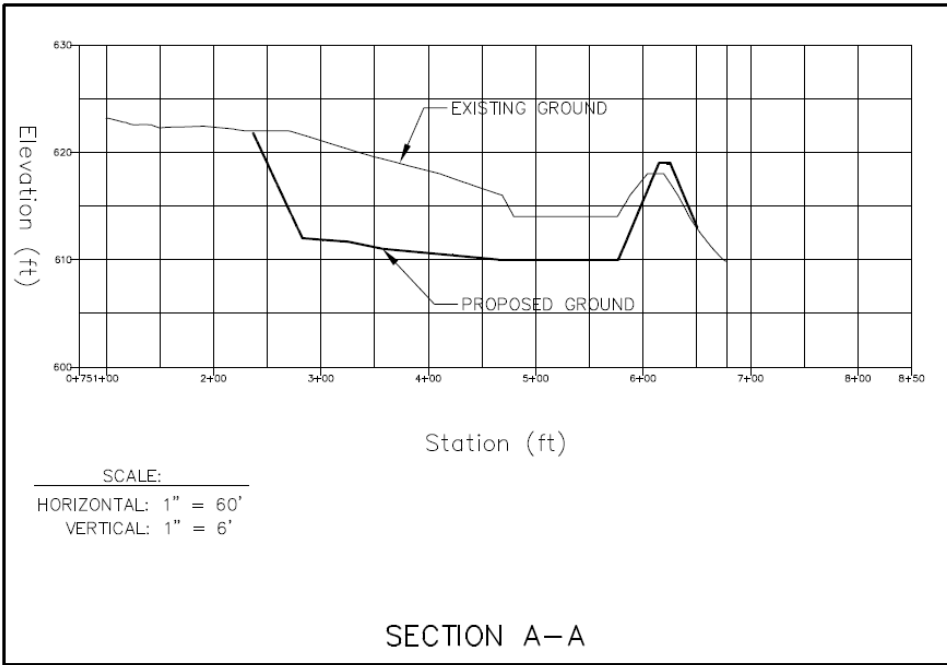
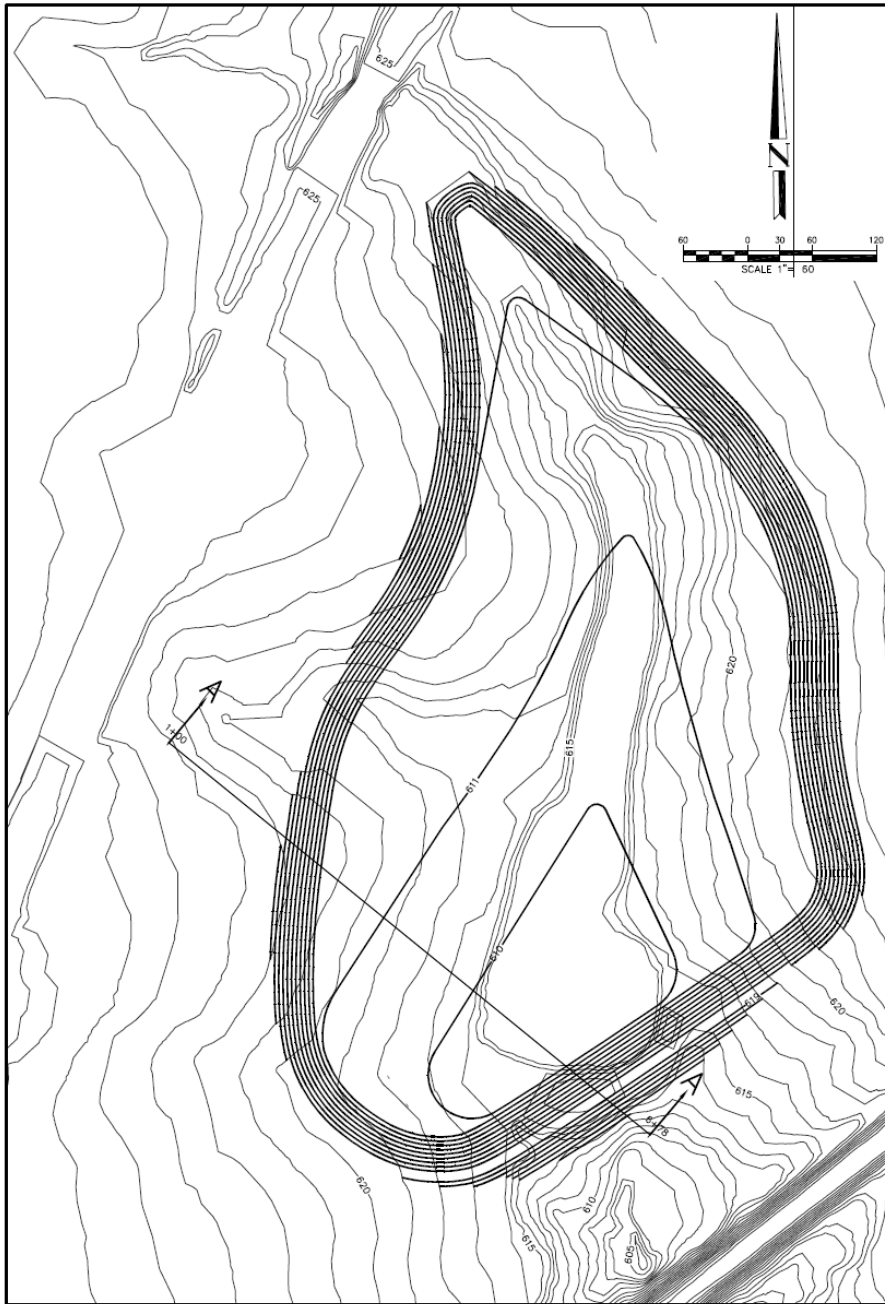
Pond 1
37.5 ac-ft

POND 2
37.3 ac-ft

Pond 3
1.1 ac-ft

Pond 4
3.8 ac-ft

Pond 5
4.9 ac-ft



Drainage System Maintenance and Operation

- Levels of drainage review and actions
 - Local drainage issues -
 - Lot to lot drainage, adjacent construction
 - Clogged culverts, erosion, standing water
 - Neighbor affecting neighbor, berms, flower beds, pools
 - Maintenance issues, mowing, weeds
 - Ground water

Drainage System Maintenance and Operation

- Levels of drainage review and actions
 - Area issues
 - Older subdivisions and needed improvements in a larger area
 - Channels affecting multiple lots needing maintenance or improvements



Roadside ditch
designed/excavated
(original too small for
flows)







Drainage System Maintenance and Operation

- Levels of drainage review and actions
 - Prioritizing drainage issues as high, medium and low to make best use of limited funds
 - High (water in a home, septic system not functioning during heavy rains, traffic safety impacted on roadways)
 - Medium (erosion and silt deposits, difficulty maintaining channel on property, culverts partially clogged)
 - Low (standing water, lawn mower vs. weed eater)









Resident built rock lined channel





**Resident built
berm**







ACTIVE CASE

SILT COMING OUT
OF FORESTED
RUNOFF



TOWN TO
REMOVE SILT
DEPOSITS IN ROW

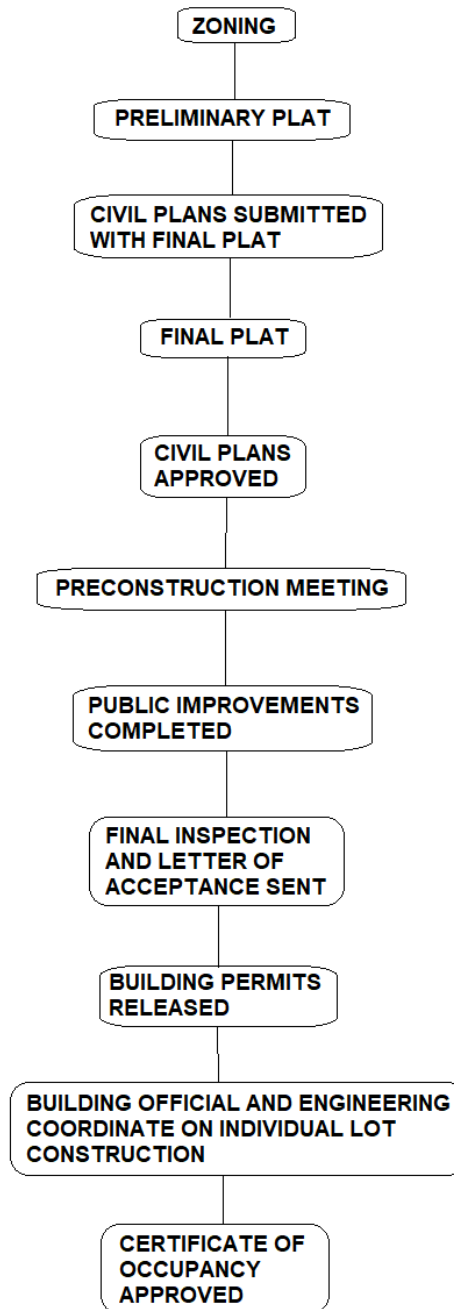


TOWN TO REMOVE SILT
DEPOSITS IN ROW



Development Engineering Review Process

ENGINEERING DEVELOPMENT REVIEW PROCESS

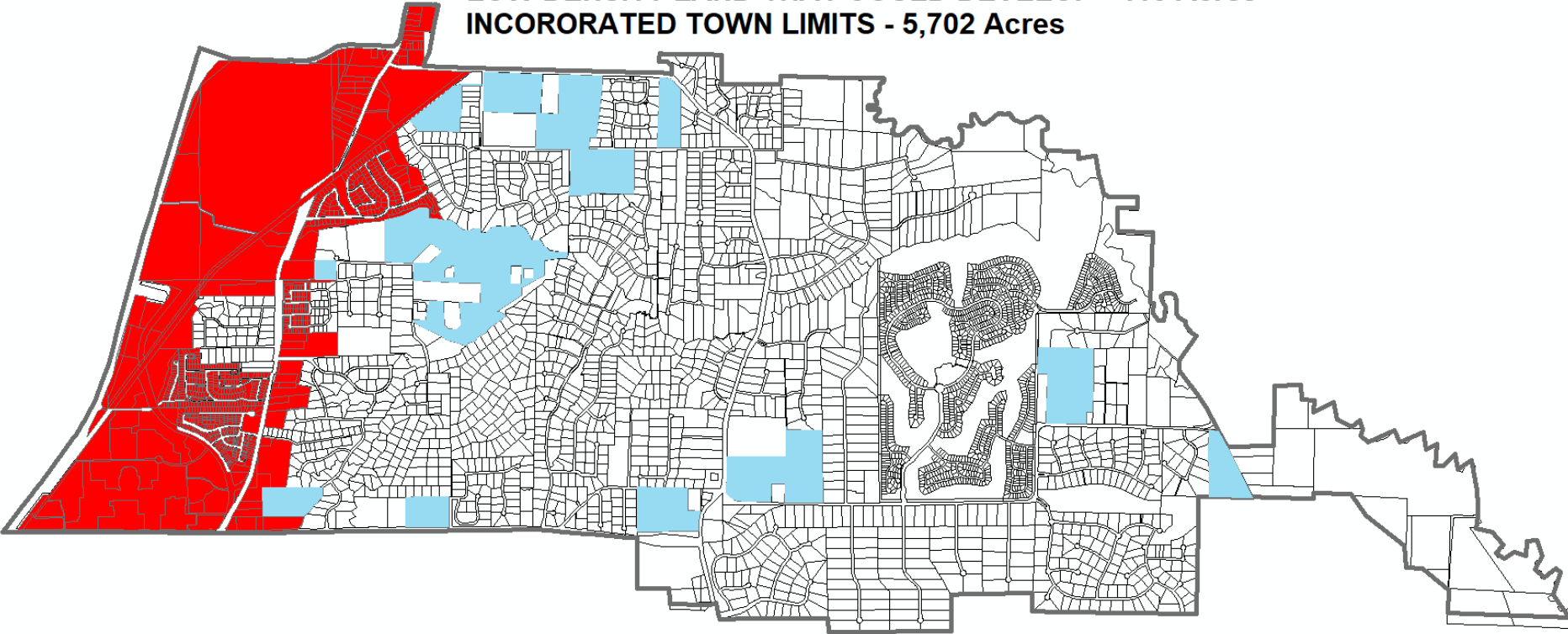


Development in Fairview

- ➔ ■ Status of development in low density area
- Status of development in CPDD
 - Implementation of drainage plan (show pictures of Apple Crossing pond and pipe)

Development in Fairview

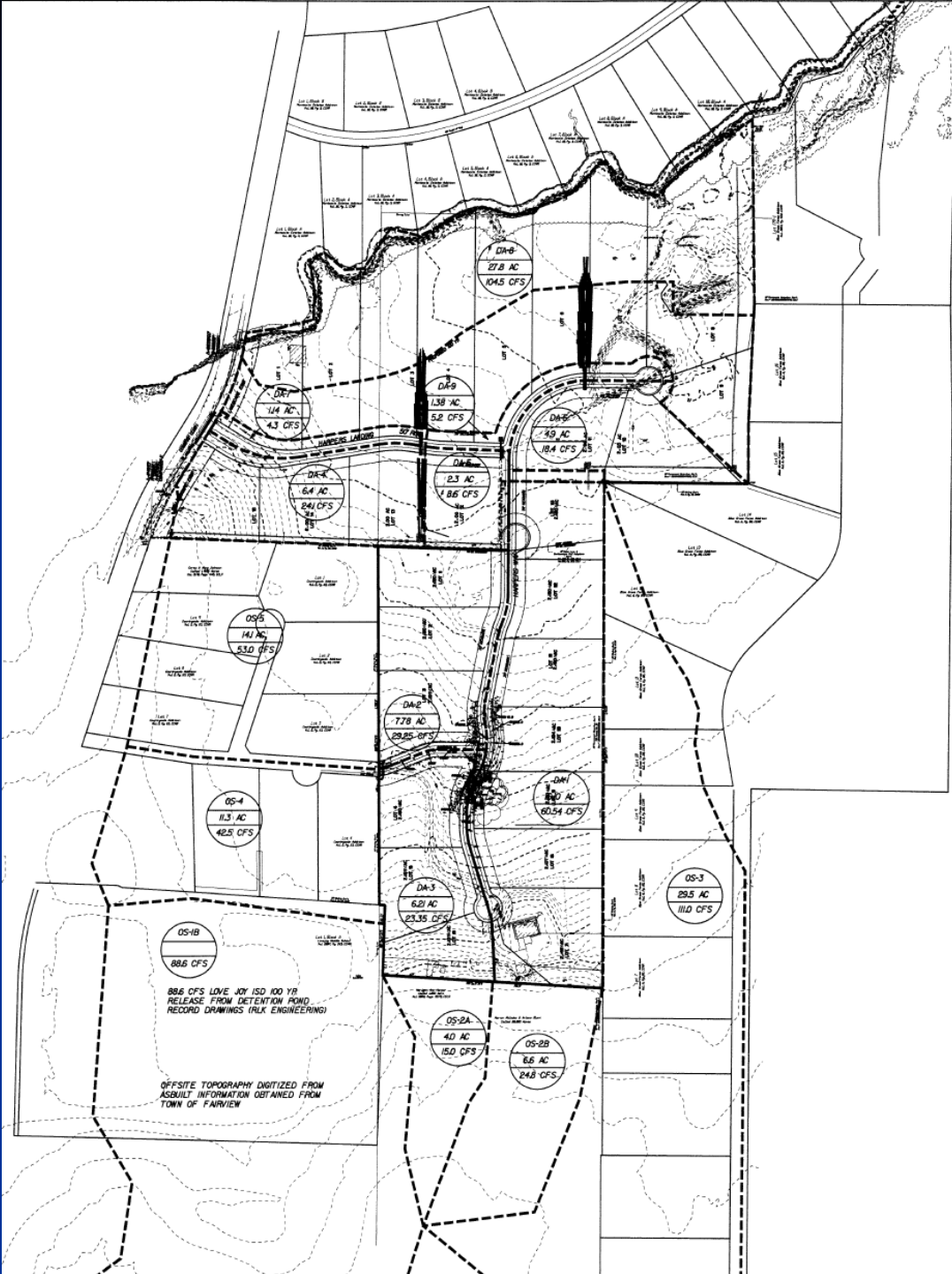
LOW DENSITY LAND THAT COULD DEVELOP - 413 Acres
INCORPORATED TOWN LIMITS - 5,702 Acres



Development in Fairview

- Status of development in low density area
 - Total acres in Fairview - 5,702
 - Total potential acres for future development in low density area - 413
 - Percentage of possible future development in low density area- 7.2%

- Total water volume in Sloan Creek at 100 year storm - 12,979 cfs
- Potential impact of additional low density development to Sloan Creek - 454 cfs
- Percentage of possible future impact of low density development to Sloan Creek - 3.5%



JWA & ASSOC'S
VOL. 2006-015724
11/17/06

WAIN HILLS
COUNTRYSIDE ADDITION
D.B. 0, PG. 03
LOT 2

CAB. 0, PG. 03
LOT 3

CAB. 0, PG. 03
LOT 4



MARLYNN TWIFER
VOL. 03, 14381

MARLYNN TWIFER
VOL. 01, 014229



PROPOSED DRAINAGE CRITERIA

- $C = 0.15$
- $D = 0.61$ (Composite)
- $V_{30} = 0.78$ in/hr
- $V_{60} = 26$ mph



COMPOSITE C VALUE

- C = 0.25 for Urban
- C = 0.25 for Urban
- A = 15.7 acres for Urban
- A = 15.7 acres for Urban
- $V_{30} = 0.78$ in/hr
- $V_{60} = 26$ mph
- $C = 0.15$
- Composite C = 0.61



MICHAEL & DAWN FUDA
VOL. 5592, PG. 39

MERION & ELEN FACKER
VOL. 2007-017187

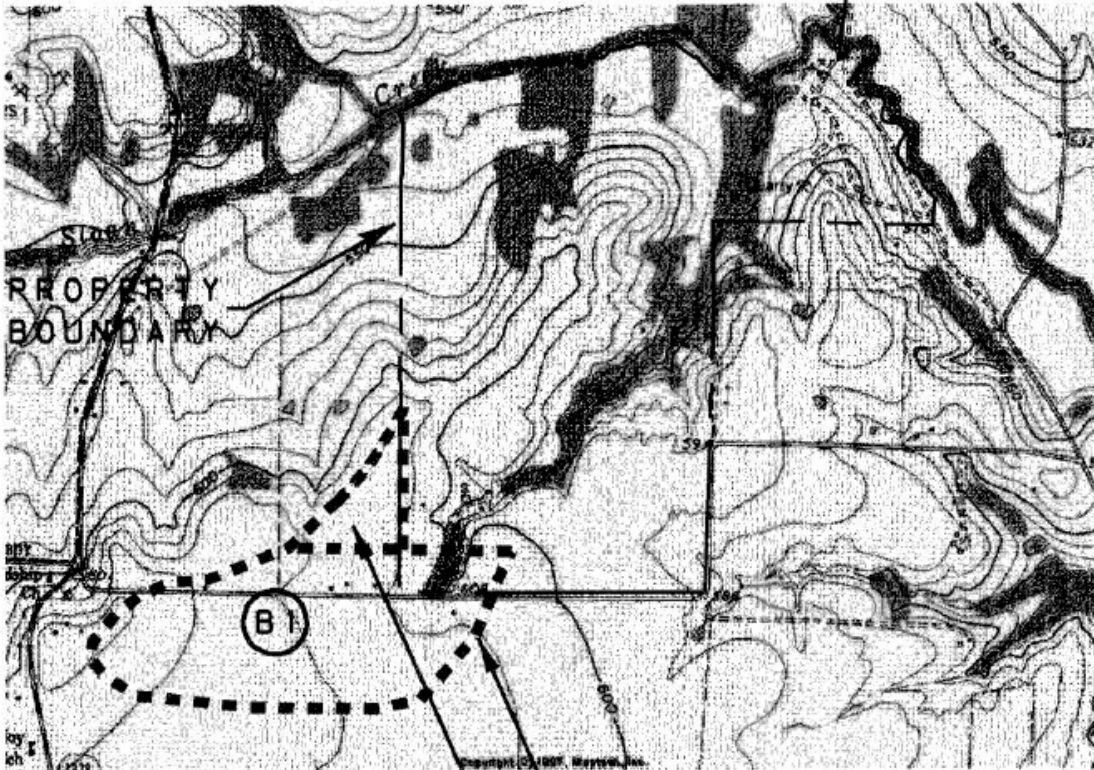
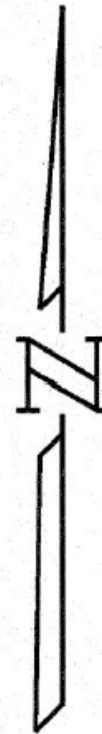
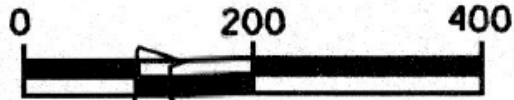
DRAINAGE AREA CALC

Drainage Area No.	Drainage Area (Acres)	C	V ₃₀ (in/hr)	V ₆₀ (mph)
2	1.88	0.5	6	7.52
3	0.21	0.5	6	7.52
E	0.44	0.5	6	7.52
F	1.07	0.5	6	7.52
G	1.25	0.5	6	7.52
H	13.24	0.5	15	7.52
I	4.89	0.5	15	7.52
J	2.93	0.5	15	7.52

RECORD DRAWING

REVISED 10/10/06 FOR CONSTRUCTION RECORDS

David K. Campbell, P.E.



HYDROLOGIC DATA

SIN 1 (B1)

EA=180 ACRES
 TIME OF CONCENTRATION=25 MIN
 0.6 (ASSUME MED. DENSITY)

OFFSITE AREA
 DRAINING INTO SD-1

OFFSITE AREAS KK & LL

OFFSITE INFORMATION FROM
 APPENDIX 2:
 HYDROLOGY WORK MAP



Development in Fairview

- Status of development in low density area

- ➡ ■ Status of development in CPDD

- Implementation of master drainage plan in northern CPDD

Apples Crossing Regional Detention Pond



100 YEAR
ELEVATION
OVERFLOW



NORMAL POOL
ELEVATION
OVERFLOW

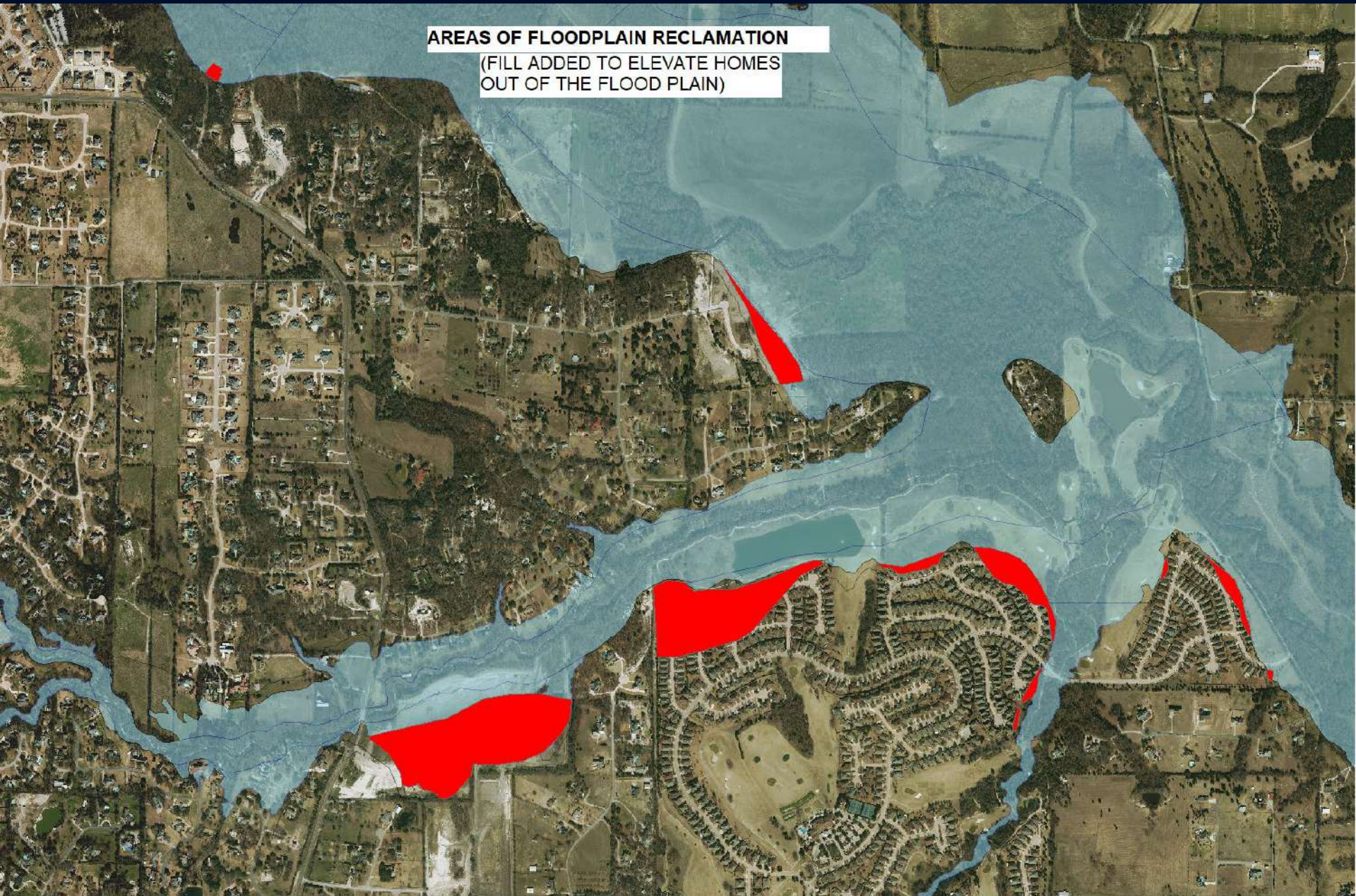


Development in Fairview

- Flood plain reclamation in Fairview
 - Reclamation permitted under current Town ordinances
 - Town establishes engineering standards for any reclamation
 - Examples of previous reclamation projects
 - Heritage Ranch
 - Harper Landing
 - Others
 - Potential future reclamation areas

AREAS OF FLOODPLAIN RECLAMATION

(FILL ADDED TO ELEVATE HOMES
OUT OF THE FLOOD PLAIN)

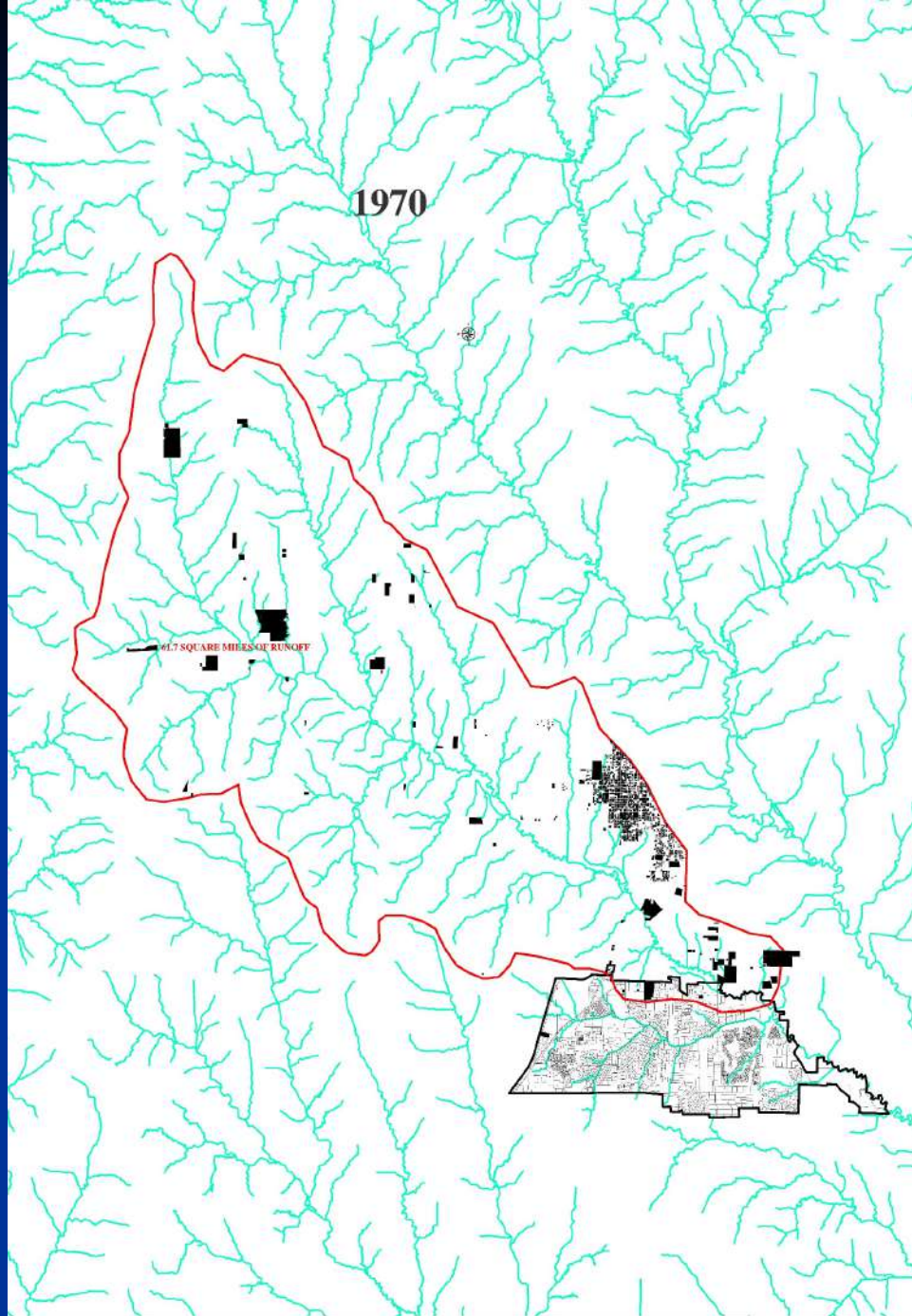


Regional Issues

- Wilson Creek

1970

61.7 SQUARE MILES OF RUNOFF



2015

