



Study for Flood Management and Water Quality Funding



City Council Agenda Session

May 25, 2021



**Develop a flood resilient community
consisting of sustainable development
patterns, robust stormwater operation and
maintenance and appropriate capital
expenditures to reduce property damage
and improve water quality**

Background

- Flood Management and Water Quality Study (2018-present)
 - Identified expectations of citizens and elected officials related to stormwater services
 - Identified existing weaknesses in city codes related to stormwater-focus of today's meeting

Why do we need ordinance revisions?

Much of this recent growth is characterized as “infill” which inherently occurs next to, and upstream of, existing homes and businesses.

Many of these infill developments are also exempt from the City’s stormwater and tree preservation regulations under the current UDC.



166.01 (B) (1) Lot Split Review Process

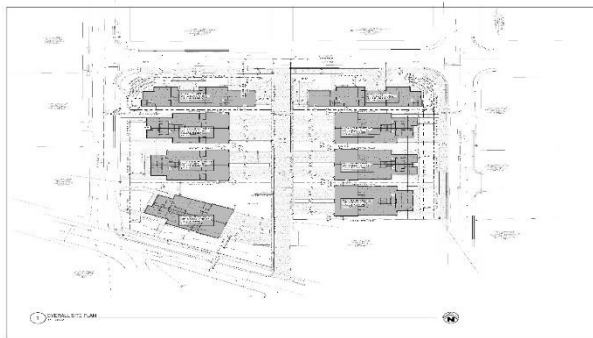
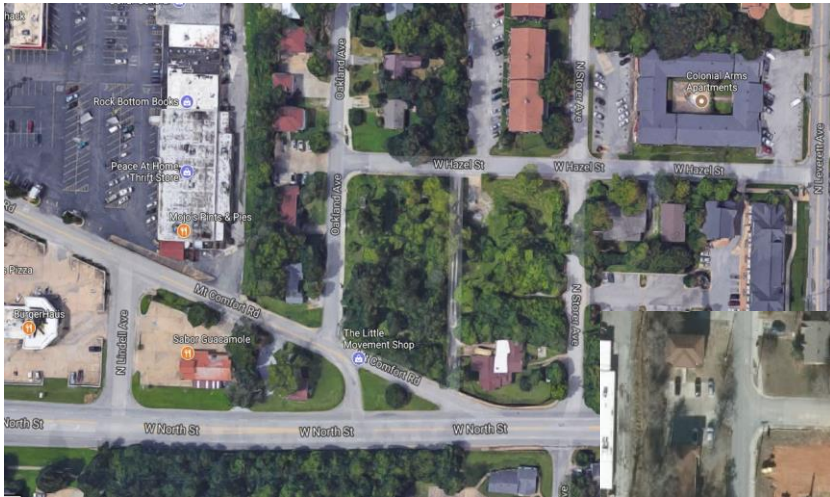
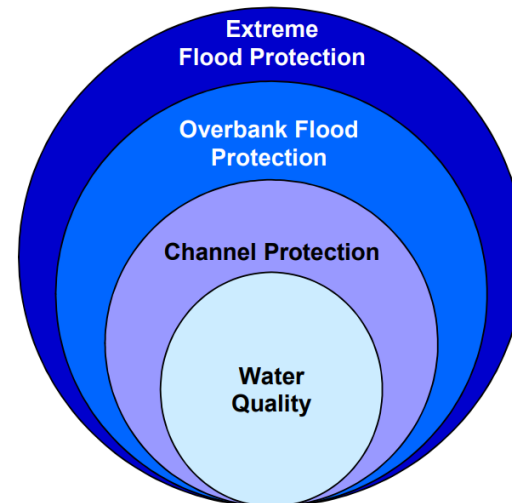


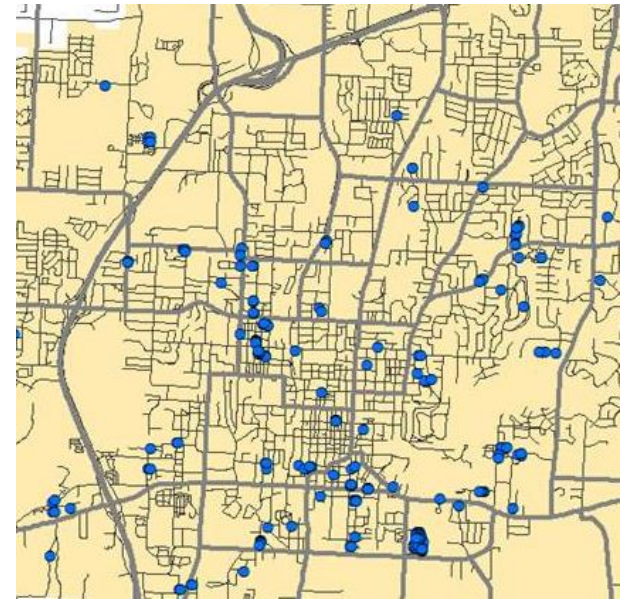
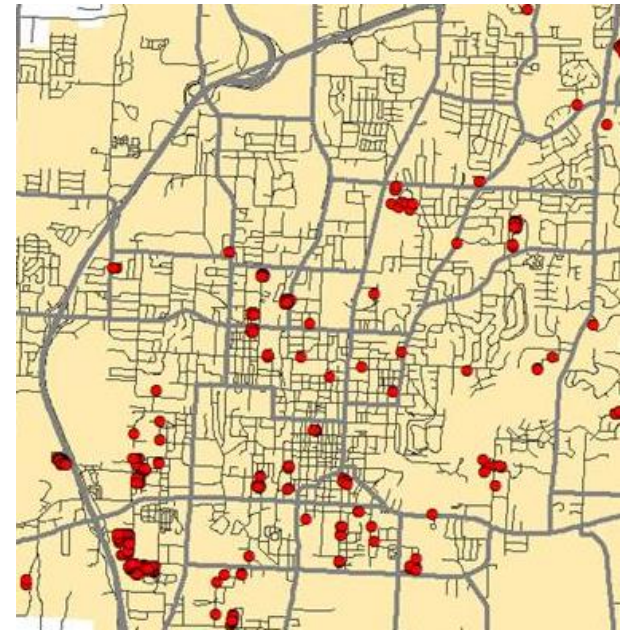
Table 2.1. Summary of the stormwater sizing criteria for stormwater control and mitigation.	
Sizing Criteria	Description
Water Quality	<ol style="list-style-type: none"> 1. <u>TSS Reduction Method</u> - Provide water quality treatment for the runoff resulting from a rainfall depth of 1.2 inches (where practicable) (Chapter 4), or 2. <u>Runoff Reduction Method</u> - Capture 1.0 inch of rainfall using Low Impact Development strategies. (Chapter 5). <p>Methods are intended to reduce the average annual post-development total suspended solids loadings by 80% from increased impervious areas.</p>
Channel Protection	Provide extended detention of the increased volume of the 1-year storm event released over a period of 40 hours to reduce flows and protect downstream channels from erosive velocities and unstable conditions. Post-development flows shall not exceed the predevelopment flows.
Overbank Flood Protection	Provide peak discharge control of the 2-year, 5-year, 10-year, and 25-year storm event such that the post-development peak rate does not exceed the predevelopment rate.
Extreme Flood Protection	Provide peak discharge control of the 100-year storm event such that the post-development peak rate does not exceed the predevelopment rate.

Current code is “all or nothing”-single/2 family homes are exempt; all other types of development must fully comply with drainage code



Current UDC Exemptions

- Developments of up to 2 single-family residences or duplex on a single lot are exempt from water quality, flood mitigation and tree preservation requirements (Chapters 167, 168, 169 and 170).
- Use of this exemption is increasing.
- City staff have no recourse if these exempted properties impact others since the developments are in compliance with current UDC.



UDC Revisions

- Ordinance Revisions Presented to
 - Stakeholder Meeting 3/6/20
 - Long Range Planning Committee 7/23/20, 8/20/20, 9/24/20 and 12/10/20
 - Technical Advisory Committee 10/28/20 and 11/19/20
 - Planning Commission 4/12/21

Proposed Development Thresholds

Table 1. Proposed Development Thresholds

Development Threshold	City-wide Standard	Grading and Drainage / Stormwater Documentation	Water Quality, Flood, and Tree Mitigation Measures
Level 1	< or = 1,200 sf of IA	<ul style="list-style-type: none"> Exempt from Grading and Drainage provisions except for those still associated with the Building Permit process such as HHOD. 	<ul style="list-style-type: none"> Exempt
Level 2	1,201 - 6,000 sf of IA	<ul style="list-style-type: none"> Completed Green Stormwater Practice (GSP) Worksheet, demonstrating Runoff Reduction via Better Site Design. GSP Operation & Maintenance (O & M) Agreement to ensure the long-term functionality of these practices. 	<ul style="list-style-type: none"> 2 or more measures from Step 1 of Table 2 that Reduce Runoff via Better Site Design 1 or more Green Stormwater Practice (GSP) measures from Step 2 of Table 2 as required to treat 100% of the developed portion of the site
Level 3	6,001 – 10,000 sf of IA	<ul style="list-style-type: none"> Same as Level 2. 	<ul style="list-style-type: none"> Same as Level 2 As needed GSP measures from Step 3 to further reduce runoff Abbreviated Tree Preservation Plan

****Would not impact residential or commercial subdivisions as the subdivision will account for their impact with improvements as required by the drainage criteria manual.**

Framework

Levels 2 and 3 are required to select two of these measures to implement while designing the site

Table 2. Water Quality, Flood, and Tree Mitigation Measures by Step

Mitigation Steps	Mitigation Measures
Step 1	Reduce Runoff via Better Site Design.
	Conservation of Natural Features and Resources (if they exist on property):
	<ul style="list-style-type: none"> • Preserve Riparian Buffers (i.e. no variances from streamside protection). • Avoid Developing in Floodplains and on Steep Slopes (greater 15%)
	Tree Preservation:
	<ul style="list-style-type: none"> • Preserve Natural Areas with at least one significant tree. The removal, relocation, destruction or abuse in any manner of a significant tree(s) to be preserved is prohibited. • Protection of Street Trees. The removal, relocation, destruction or abuse in any manner of a street tree(s) to be preserved is prohibited.
	Lower Impact Site Design Techniques:
	<ul style="list-style-type: none"> • Reduce Limits of Clearing and Grading to preserve at least 10% of the open space of the site
	Reduction of Impervious Cover:
	<ul style="list-style-type: none"> • Use multi-story buildings to reduce building footprints • Create Parking Lot Stormwater "Islands" • Use pervious surfaces for parking, sidewalks and trails, where feasible.
	Utilization of Natural Features for Stormwater Management:
	<ul style="list-style-type: none"> • Use soil restoration practices to improve native soils and reduce over compaction • Use native plants and naturalistic landscapes (yards that do not have to be mowed and are planted with perennials, etc) and rain gardens.

Framework

Levels 2 and 3 are required to select at least one of these measures sized appropriately by the GSP worksheet that will be provided by the City

Step 2	Reduce Runoff via Green Stormwater Practices (GSPs)
GSP-02	Urban Bioretention
GSP-03	Permeable Pavement
GSP-04	Infiltration Trench
GSP-12	Green Roof

Level 3 is required to include this measure

Step 3	Capture and Treat Remaining Runoff via Green Stormwater Practices (GSPs)
GSP-06	Extended Detention

Green Stormwater Practice (GSP) Worksheet

Fill in only those areas highlighted in green

How big is your site overall?

4,500 Square Feet (SF)

Existing Site

How much of the existing site is impervious (roof, driveway, concrete, etc...)?

0 SF

How much of the existing site is gravel?

325 SF

How much of the existing site is tree canopy?

4,175 SF

How much of the existing site is lawn area?

0 SF

4,500 Total SF (must match overall site SF)

PASS

Proposed Site

How much of the proposed site is impervious (roof, driveway, concrete, etc...)?

3,900 SF

How much of the proposed site is gravel?

0 SF

How much of the proposed site is tree canopy?

30 SF

How much of the proposed site is lawn area?

570 SF

4,500 Total SF (must match overall site SF)

PASS

Primary GSP

Developed area draining to primary GSP

3,900 SF New Gravel and Impervious

100%

GSP Options

Surface Area Required (SF)

Bioretention	308
Permeable Pavement	462
Infiltration Trench	308
Green Roof	652

Secondary GSP

Developed area draining to the secondary GSP? (when required)

0 SF New Gravel and Impervious

0%

GSP Options

Surface Area Required (SF)

Bioretention	0
Permeable Pavement	0
Infiltration Trench	0
Green Roof	0

100%

100% of new gravel and impervious must be treated

PASS

Extended Detention

Trapezoidal Shape, all others provide supporting volume calculations

NOT REQUIRED

Bottom Length 0 FT
Bottom Width 0 FT
Side Slope (3:1 or flatter) 3 Z:1
*Ponding Depth 1 FT

PASS

*Include ponding depth even when providing separate volume calculations

Extended Detention Volume Required (CF)	1,100
Extended Detention Volume Provided (CF)	12
Required Outlet Orifice Diameter (in)**	2.76

**Round to nearest quarter inch

Providing Separate Volume Calculations NO

Volume provided must exceed volume required

NOT REQUIRED





Green Stormwater Practice (GSP) Worksheet

Fill in only those areas highlighted in green

How big is your site overall?

40,541 Square Feet (SF)

Existing Site

How much of the existing site is impervious (roof, driveway, concrete, etc...)?

10,292 SF

How much of the existing site is gravel?

2,243 SF

How much of the existing site is tree canopy?

12,320 SF

How much of the existing site is lawn area?

15,686 SF

40,541 Total SF (must match overall site SF)

PASS

Proposed Site

How much of the proposed site is impervious (roof, driveway, concrete, etc...)?

14,191 SF

How much of the proposed site is gravel?

5,678 SF

How much of the proposed site is tree canopy?

11,420 SF

How much of the proposed site is lawn area?

9,252 SF

40,541 Total SF (must match overall site SF)

PASS

Primary GSP

Developed area draining to primary GSP

7,334 SF New Gravel and Impervious

GSP Options

Surface Area Required (SF)

Bioretention	361
Permeable Pavement	542
Infiltration Trench	361
Green Roof	765

Secondary GSP

Developed area draining to the secondary GSP? (when required)

0 SF New Gravel and Impervious

GSP Options

Surface Area Required (SF)

Bioretention	0
Permeable Pavement	0
Infiltration Trench	0
Green Roof	0

100% of new gravel and impervious must be treated

100%

Extended Detention

REQUIRED

Trapezoidal Shape, all others provide supporting volume calculations

Bottom Length	238	FT
Bottom Width	8	FT
Side Slope (3:1 or flatter)	4	Z:1
*Ponding Depth	1	FT

PASS

*Include ponding depth even when providing separate volume calculations

Extended Detention Volume Required (CF)	2,236
Extended Detention Volume Provided (CF)	2,909
Required Outlet Orifice Diameter (in)	11.00

Providing Separate Volume Calculations

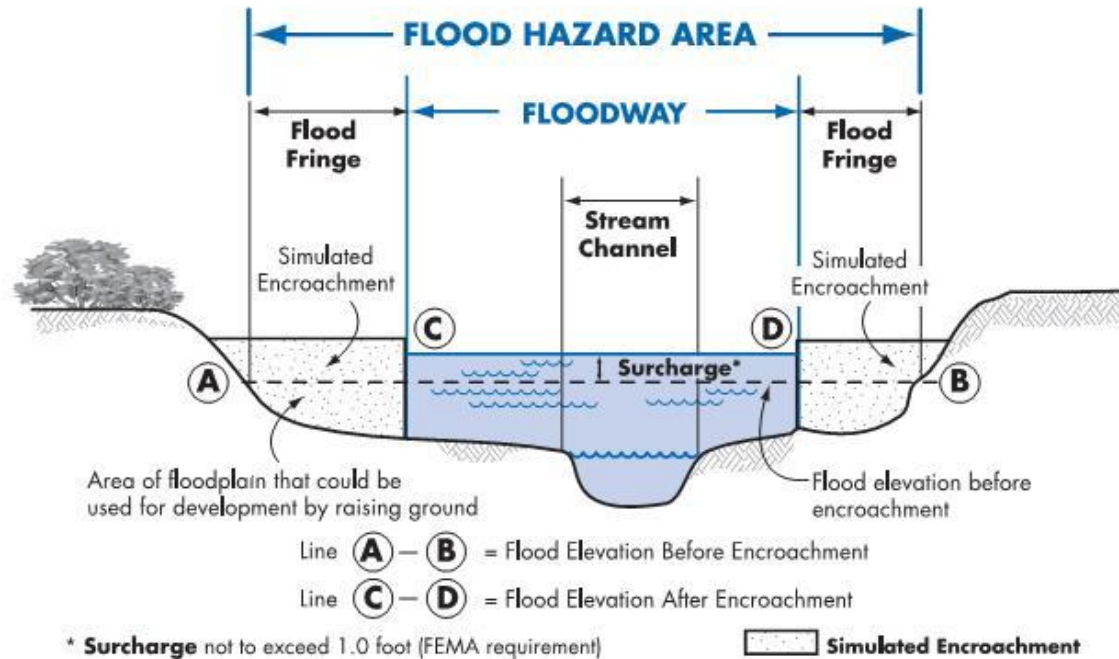
NO

Volume provided must exceed volume required

PASS

**Develop a flood resilient community
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Understanding the Floodway



Terms and Definitions

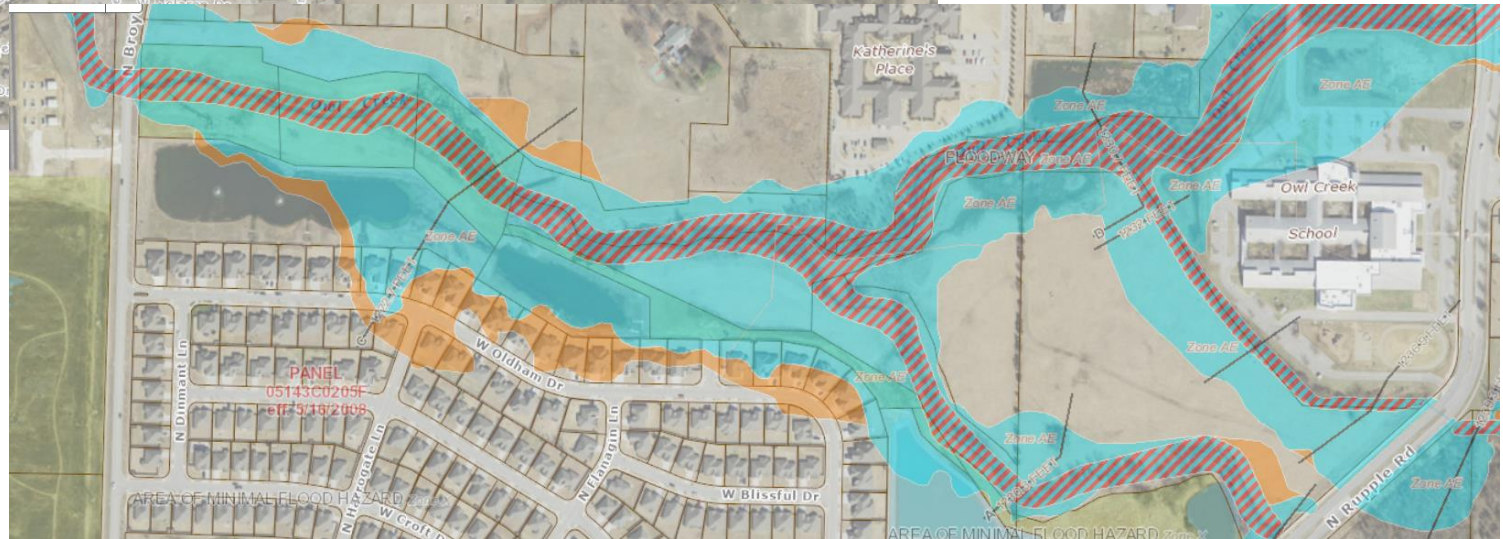
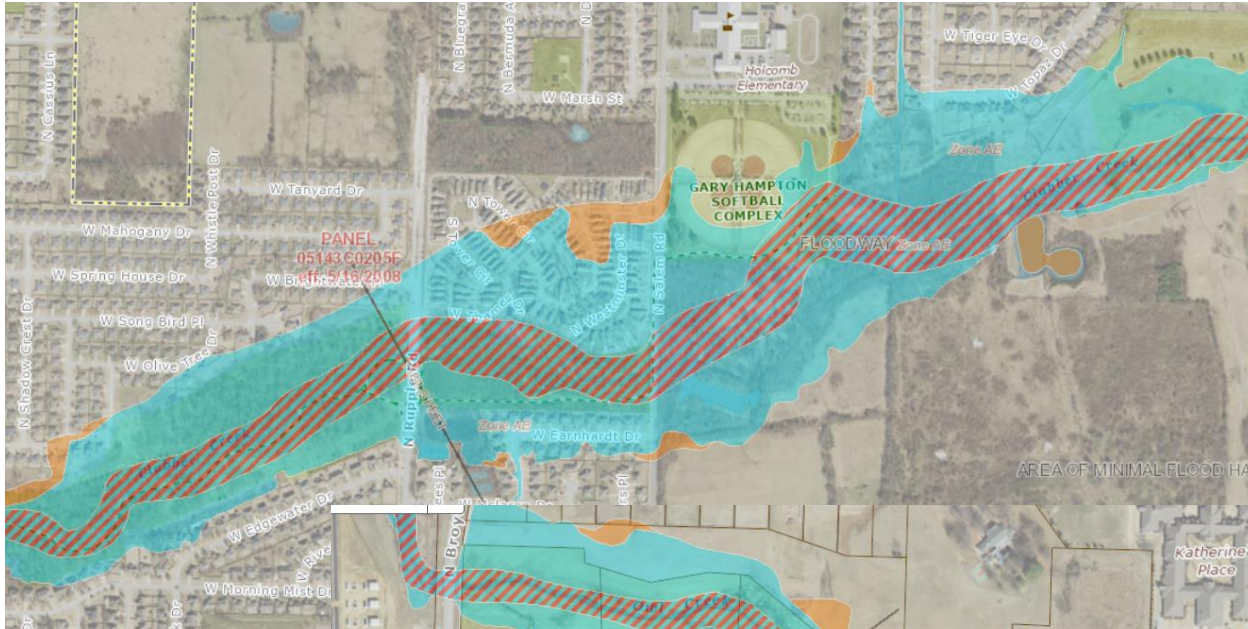
The **Floodway** is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to pass the base flood discharge without increasing flood depths.

Computer models of the floodplain are used to simulate "encroachment" or fill in the flood fringe in order to predict where and how much the base flood elevation would increase if the floodplain is allowed to be filled.

For any proposed floodway development, before a state or local floodplain permit can be issued, the applicant must provide evidence that "no impact" will occur (see page 33).

You will need an experienced registered professional engineer to make sure your proposed project won't increase flooding on other properties.

Chapter 168; Floodplain Encroachment



Flood Damage Prevention

Chapter 168

- No Adverse Impact
- Development would not be allowed to
 - Increase flood heights on other properties
 - Increase flood velocities on other properties
 - Fill floodplain without creating additional storage elsewhere (compensatory storage)

Ordinance Quick Reference

- Chapter 151: move definitions, minor clarifications, additions and eliminations
- Chapter 153: Clarification of stop work order
- Chapter 159: Clarification of fees
- Chapter 166: Revise order of approval process; include framework
- Chapter 167: Abbreviated tree plan requirements

Ordinance Quick Reference

- Chapter 168: Moved definitions to 151; No Adverse Impact
- Chapter 169: Grading review versus grading permit
- Chapter 170: Revise order of requirements; include framework; address comments from ADEQ Audit

Stormwater Chapter 170

Additional Revision

- Legacy Drainage Plans
 - Current code has no expiration on approved drainage plans
 - Some plans on file were approved in early to mid 2000's
 - Propose that these plans sunset and a new plan approved if/when development is proposed
 - If council agrees then clause will be drafted and included in this revision

Questions?