Stakeholder Meeting 4
Cumulative Impacts of Development on Flood Risk

Presented by: Ben Thompson, Professional Engineer

December 18, 2023

Agenda

1. Introductions
2. Stakeholder group effort overview
3. Valley Storage Policy Recommendation
4. Shift focus to land use (specifically impervious cover)
5. Next Steps

Introductions

External Stakeholders

Michael Whitson, Insurica, CD9
Bernie Malone - VP Monticello NA / CD7
Stacy Shores – Pres., Linwood NA
Travis Clegg – DAC Chair
Tom Davies – Hillwood / CD4
Mary Kelleher – Handley / CD5
Dawn Dean – Handley
Misty Christian – Kimley-Horn and Associates, Inc.
Anna Carrillo – Carrillo Engineering
Don Allen – Fort Worth Homebuilders Association
Larissa Knapp-Scott – LJA Engineering

Internal Stakeholders

LaShondra Stringfellow – Development Services
Leon Wilson – Development Services
Amy Connolly – Neighborhood Services
Michael Crenshaw – 360Clarus / CFW Contractor
Stephen Murray – Development Services
Stuart Campbell – Development Services
Eric Fladager – FW Lab
Clair Davis – FW Lab
Ben Thompson – TPW Stormwater Management
Royce Hansen – Legal

Stakeholder Group Effort:

- **Intended Outcome:** Recommend regulation updates to council for adoption (design criteria, zoning, etc.)
- **Case Studies:** Analyzed the resulting cumulative impacts of development on stormwater with respect to land use and valley storage changes over time in two representative watersheds:
  - Urban infill/redevelopment (Central Arlington Heights/Linwood Bailey) and
  - Suburban/Riverine (Whites Branch).
- **Two main topics:** valley storage and impervious cover

Featured on Stormwater Website

https://www.fortworthtexas.gov/departments/tpw/stormwater

Cumulative Impacts of Development

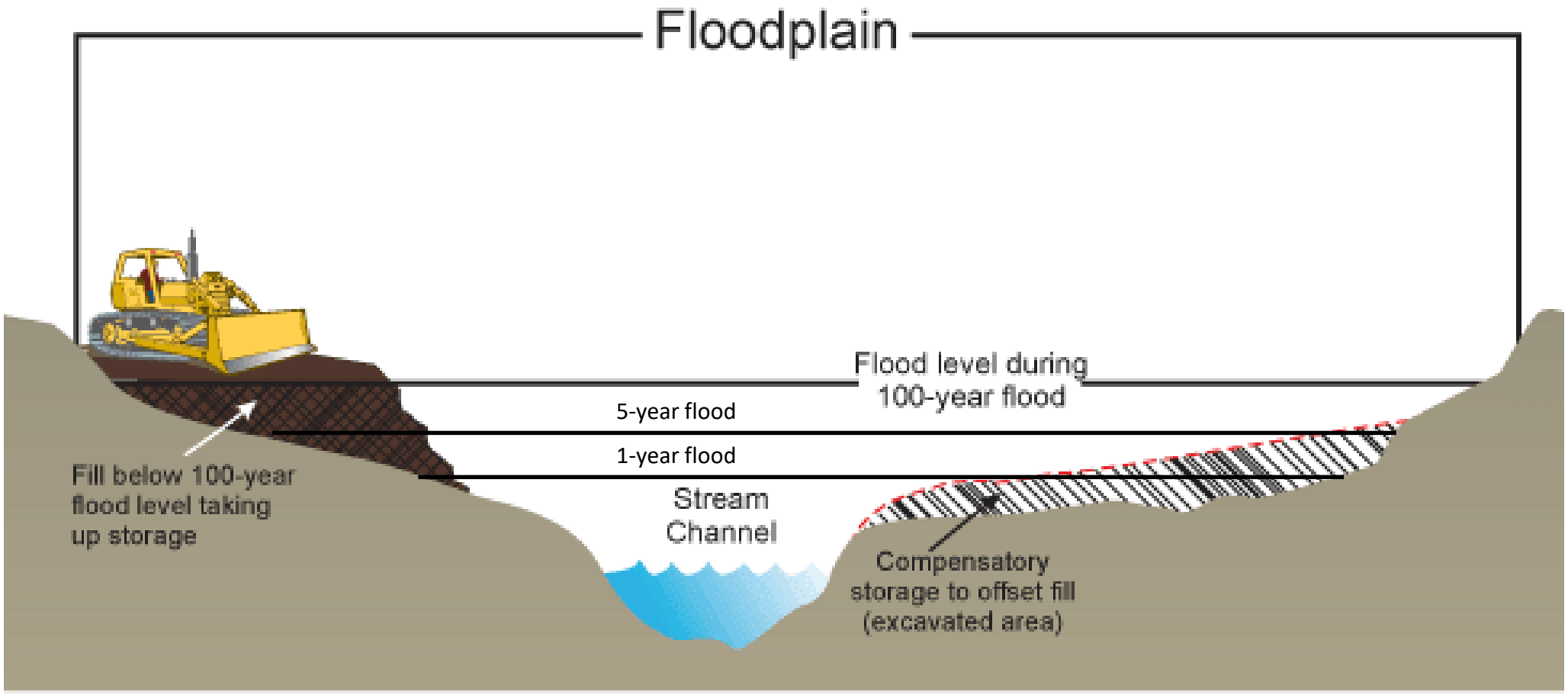
All development within the City of Fort Worth requires local and state permits. Contact the City of Fort Worth's Development Services Department at 817-392-2222 for advice before you build, fill, place a manufactured home or otherwise develop.

The zoning ordinance, Floodplain Provisions Ordinance and the International Building Codes have special provisions regulating construction and other developments within floodplains. Without these provisions, affordable flood insurance through the National Flood Insurance Program (NFIP) would not be available to property owners in the City of Fort Worth. Any development in the floodplain without a permit is illegal. Such activity can be reported to the City Call Center at 817-392-1234.

Video: Cumulative Impacts | Two Types of Cumulative Impacts

Have questions? Let's chat!

Recommending Valley Storage Preservation Policy

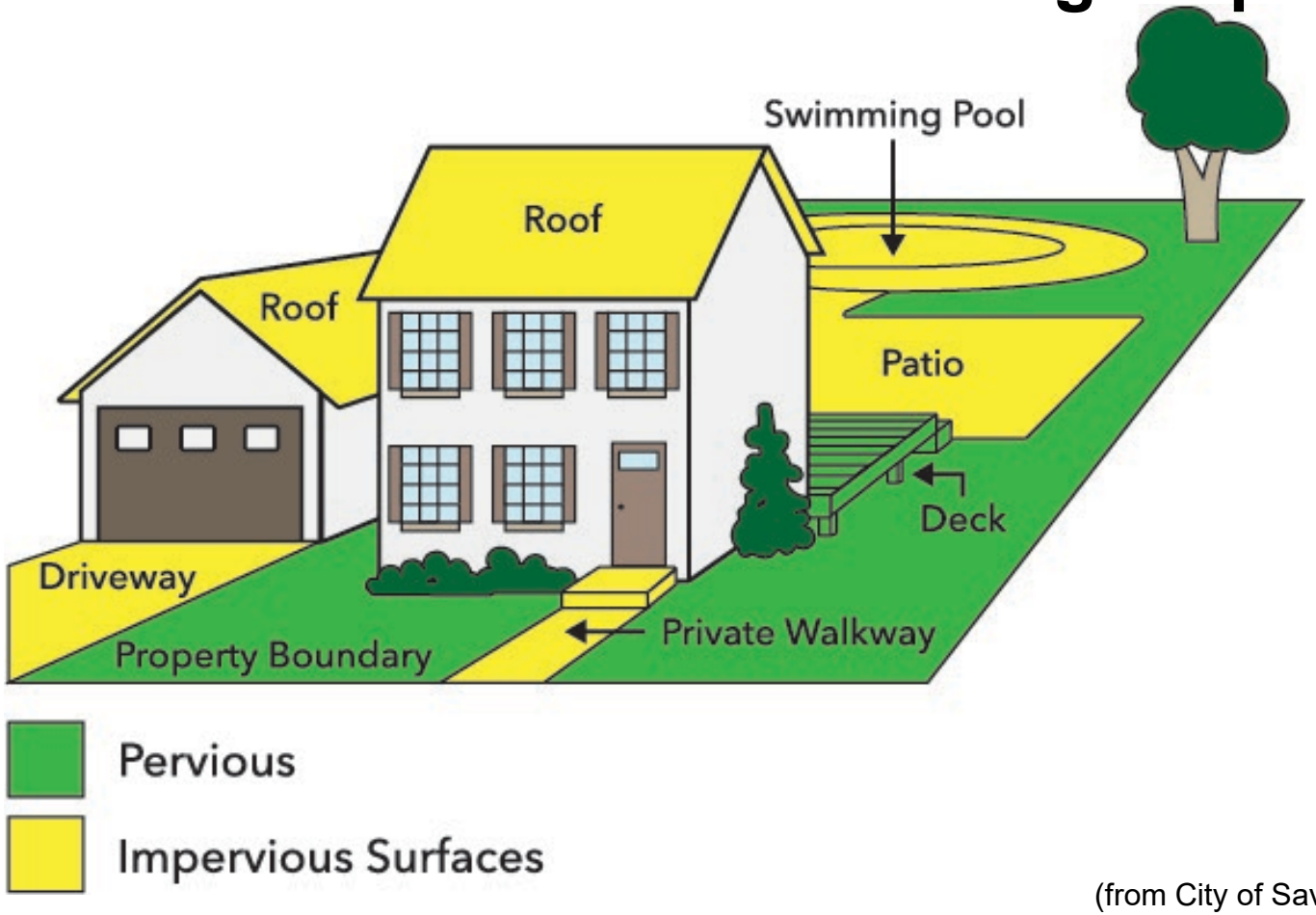


Recommendation Highlights

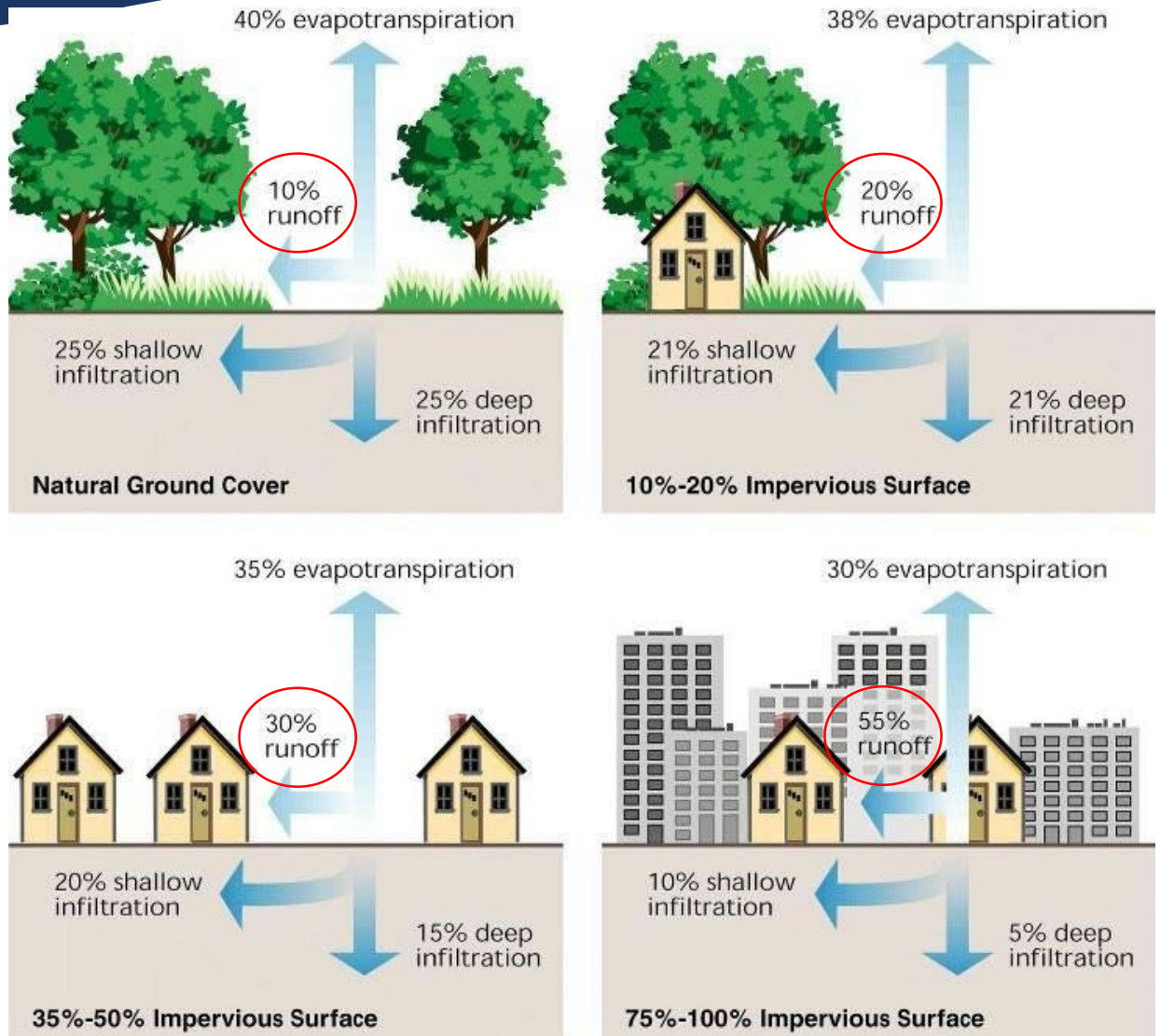
- No loss in storage for 1-, 5-, and 100-year floods (higher of FEMA or fully-developed)
- 64 acre drainage area threshold (everything downstream)
- Affects projects adjacent to river/streams citywide
- Policy would be implemented through floodplain ordinance and future version of stormwater criteria manual
- Recommendation details to be reviewed and refined prior to presenting to Council

Impervious Cover

More cover = more flood volume and higher peak flows

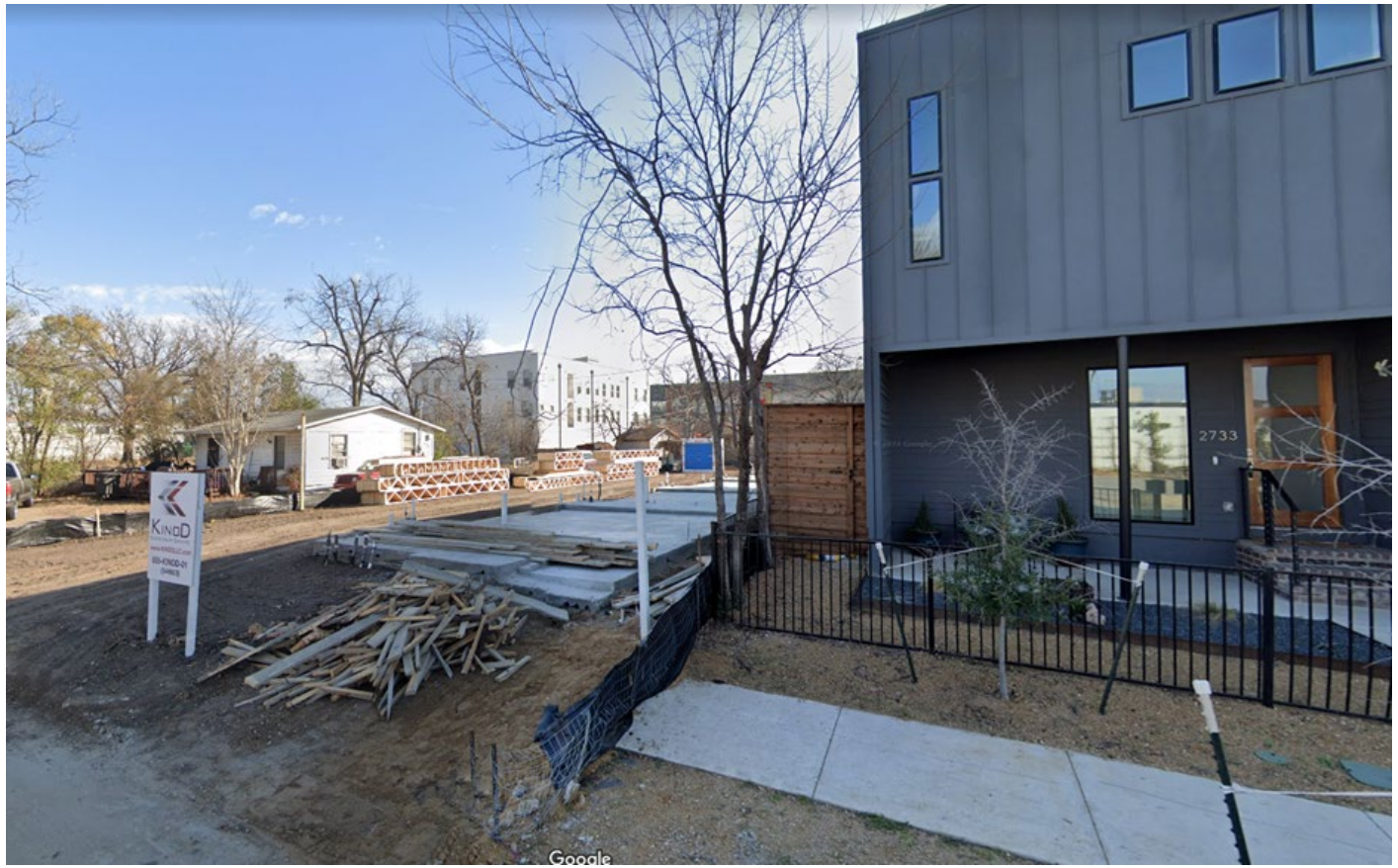


(from City of Savage, Minnesota)



[from "Stream Corridor Restoration: Principles, Processes, and Practices, 10/98, by the Federal Interagency Stream Restoration Working Group (FISRWG)]

Example: Urban infill/redevelopment



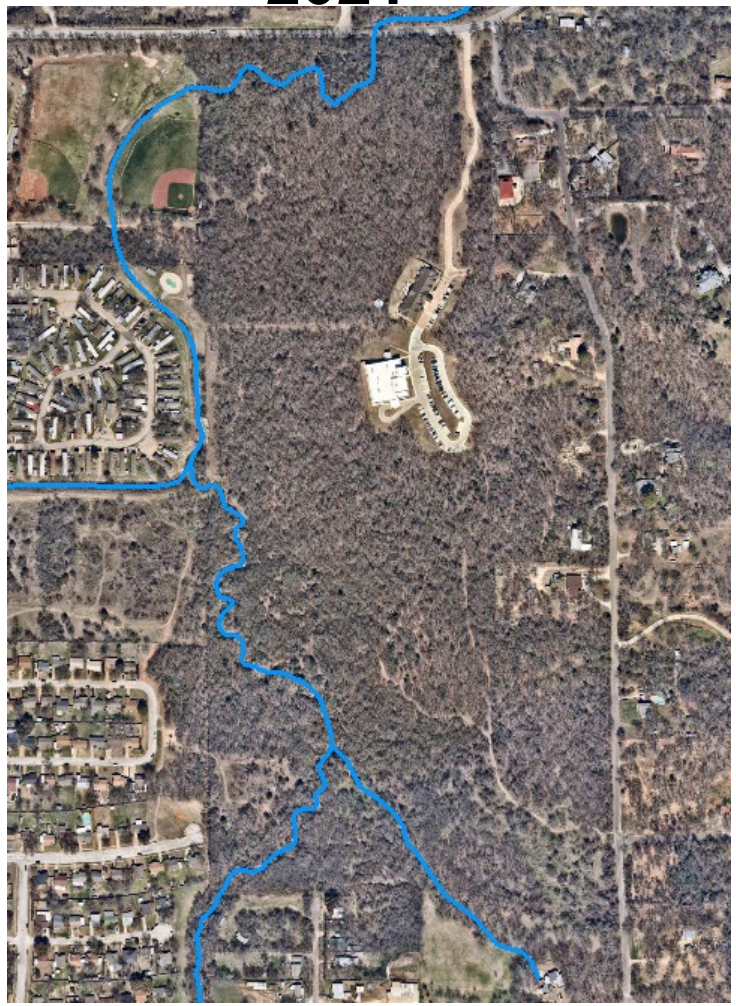
Example: residential redevelopment

2009

2023

Example: residential subdivision

2021



2023

How are increases in impervious cover managed?

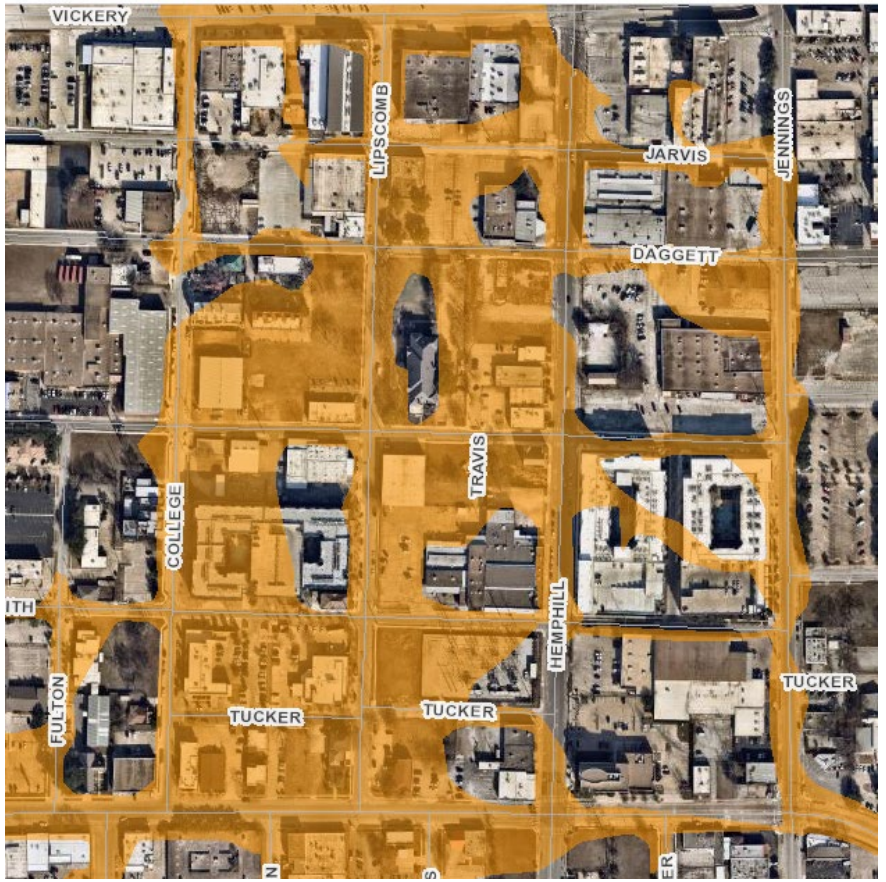
- >1 acre land disturbance or part of a Common Land Plan Development
  - Grading Permit and Stormwater Drainage Study
  - Peak discharge (not volume) is mitigated (usually by detention ponds). **This is standard engineering practice across most of the nation and world**

- < 1 acre not reviewed for stormwater impacts, except in City Flood Risk Areas (pending adoption by City Council in early 2024) and FEMA sumps (behind levees)

- City offers stormwater fee credits for water quality/volume BMPs but very few do this

Detention Pond for peak flow mitigation
Projects >1 acre

City Flood Risk Area
Projects of all sizes



Why are we taking a harder look at it now?

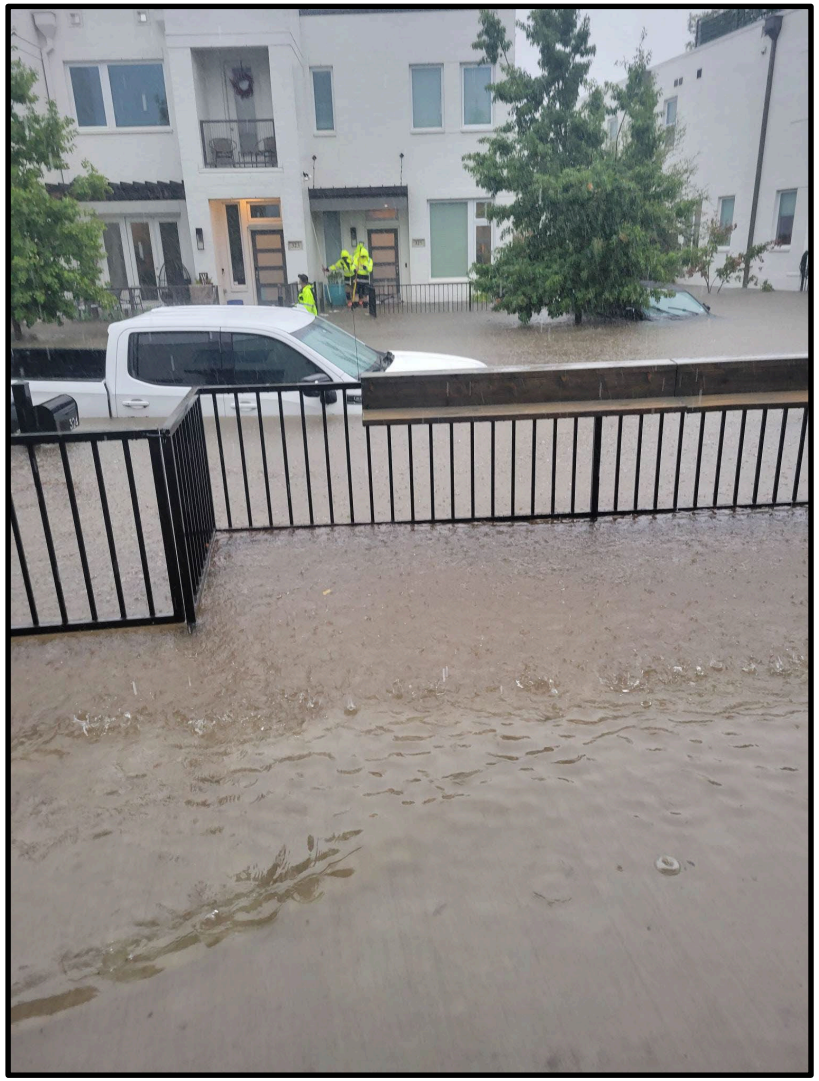
- Stormwater stakeholders were concerned with flooding near their homes/businesses in urban areas and wanted to know what could be done

- Case studies showed that allowable impervious by zoning/subdivision ordinance does not match stormwater criteria manual (underestimates runoff in urban areas)
  - Single family allows for 50% impervious in front and 100% in back
  - Not as much of an issue in areas with HOA/NA
  - Newer areas not seeing flooding issues but will see more water in small storms
  - Case study showed that stormwater criteria manual does not provide for certain zoning classes

- Rapid infill/redevelopment happening in areas where the cost to bring all of these areas up to current design standards far outweighs revenue (e.g. Linwood improvements estimated at $75 million, Berry/McCart at $45 million)

McCart/Berry, Central Arlington Heights, W. 7th

Linwood
August 2022



Stormwater Design Criteria

Current Design Manual

Table 3.5 Runoff Coefficients

Description of Land Use	% Impervious	Runoff Coefficient "C"
Residential "A-43" one-acre lots (1) (2)	35	0.51
Residential "A-21" half-acre lots	37	0.52
Residential "A-10" 10,000 SF lots	49	0.59
Residential "A-7.5" (3)	55	0.63
Residential "A-5" (3)	61	0.67
Residential "MH", "A-R", "B", "R-1", & "R-2" (3)	65	0.69
Multi-family		
"CR"	64	0.69
"C"	79	0.77
"D"	93	0.86
Commercial/Industrial/House of Worship/School		
4% Open Space (Default if no site plan)	96	0.88
10% Open Space (Site plan required)	90	0.84
20% Open Space (Site plan required)	80	0.78
Parks, Cemeteries	7	0.34
Railroad Yard Areas	29	0.47
Streets: Asphalt, Concrete and Brick	100	0.90
Drives, Walks, and Roofs	100	0.90
Gravel Areas	43	0.56
Unimproved Areas	0	0.30

Assumptions:

(1) For Residential Calculations:
- Current CFW development standards for minimum lot size and maximum lot coverage (structure) for each classification
- Assumed 10.5' Parkway and 18' driveway
- Assumed 29' B-B street dimension
- Calculated by applying 90% runoff from impervious areas and 30% runoff from pervious areas

(2) Calculated from designated set-backs

Zoning Classes not found in manual

Table 2. Assumed Impervious Percentages for Zoning Classes not Explicitly Identified in Table 3.5 of the Stormwater Criteria Manual.

Zoning Class and Description	% Impervious
UR - Urban Residential	90
MU-1 - Mixed Use, low intensity	90
MU-2 - Mixed Use, high intensity	90
CB - Camp Bowie	90
ER - Neighborhood Restricted, low intensity	70
E - Neighborhood, low intensity	80
F - General Commercial	90
FR - General Commercial, restricted, mod. intensity	90
FR - General Commercial, mod. intensity	90
G - Intensive Commercial, restricted	90
H - Central Business	95
I - Light Industrial	95
J - Medium Industrial	95
K - Heavy Industrial	95

Fort Worth Stormwater Criteria and Zoning Ordinance

Table 3.5

Assumptions:

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(2) Calculated from designated set-backs

LOT COVERAGE: The total lot area covered by the foundation of the main structure, attached and detached garages, carports, porte cocheres, accessory detached habitable areas, porches, patios and entry areas compared to the total site area. Any portion of the foundation not covered by roof is not considered in lot area calculations. Sheds, arbors, cantilevered (unsupported) upper story areas, eave overhangs and uncovered patios are not considered in lot coverage calculations.

Impervious Cover
Potential Recommendations

- Adjust engineering & land use assumptions to better reflect reality of impervious
- **Adjust Zoning Ordinance to include maximum impervious in place of or in addition to lot coverage**
- Prohibit impervious cover above a certain point (enforceable?)
- Create additional City Flood Risk Areas to regulate projects (<1 acre) in studied flood prone areas and/or expand to include entire watershed
- Require some amount of volume to be detained or retained (typically 1 to 2 inches)
- Allow increased impervious cover with mitigation measures
- Determine if there is a reasonable threshold for review
- Impact fees for certain neighborhoods (Fee In Lieu)
- Do nothing

Next Steps

- One more meeting needed to finalize recommendations prior to staff coordination and recommendation to Council?
- Draft memorandum summarizing group's recommendations
- **Staff Coordination:** Council IR, City Plan Commission, Zoning, BoA, and MITC