Stakeholder Meeting 3
Cumulative Impacts of Development on Flood Risk

Presented by: Ben Thompson, Professional Engineer

November 13, 2023

Agenda

1. Housekeeping
   - Clair Davis in new role with City
   - New stakeholder members
2. Stakeholder group effort overview
3. Finalize Valley Storage Policy Recommendation
4. Shift focus to land use (specifically impervious cover)
5. Next Meeting Schedule & Topics

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!

Valley Storage

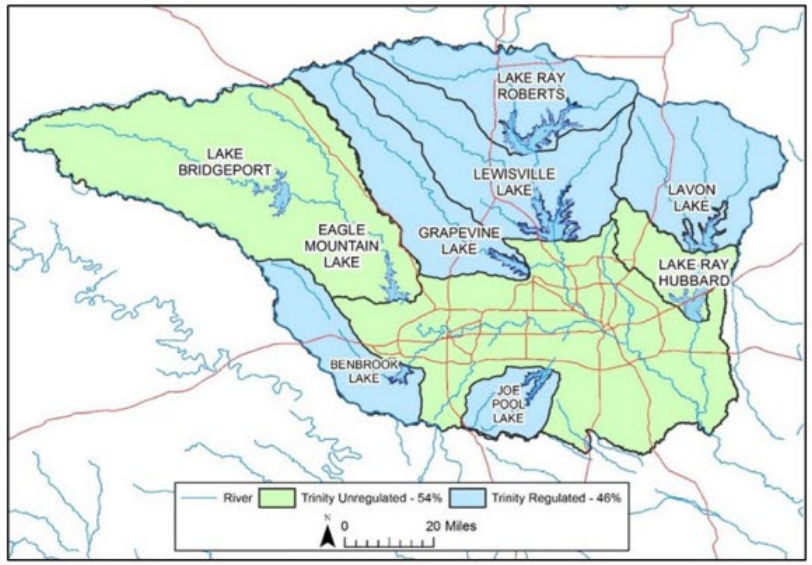
The water volume between the water surface and the ground surface that occupies a given reach of river during a flood event.

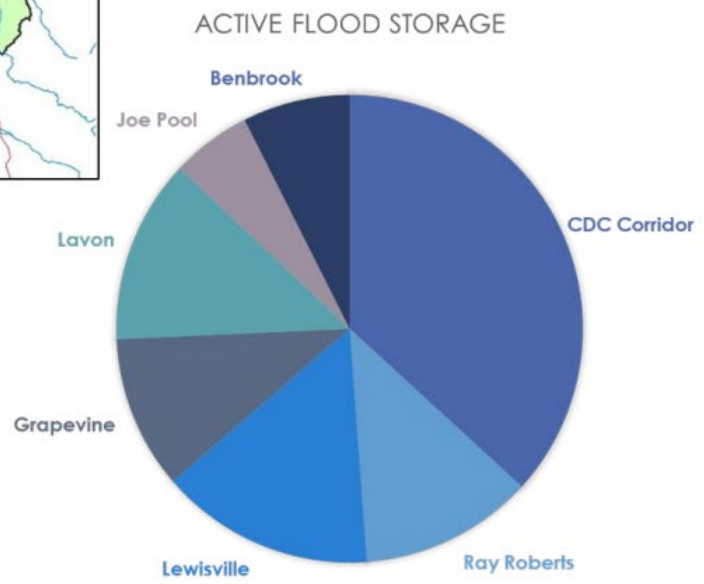
Before

During

Winooski River, Richmond Vermont, July 2023

Magnitude of Valley Storage





Trinity River Common Vision Plan
est. 1989

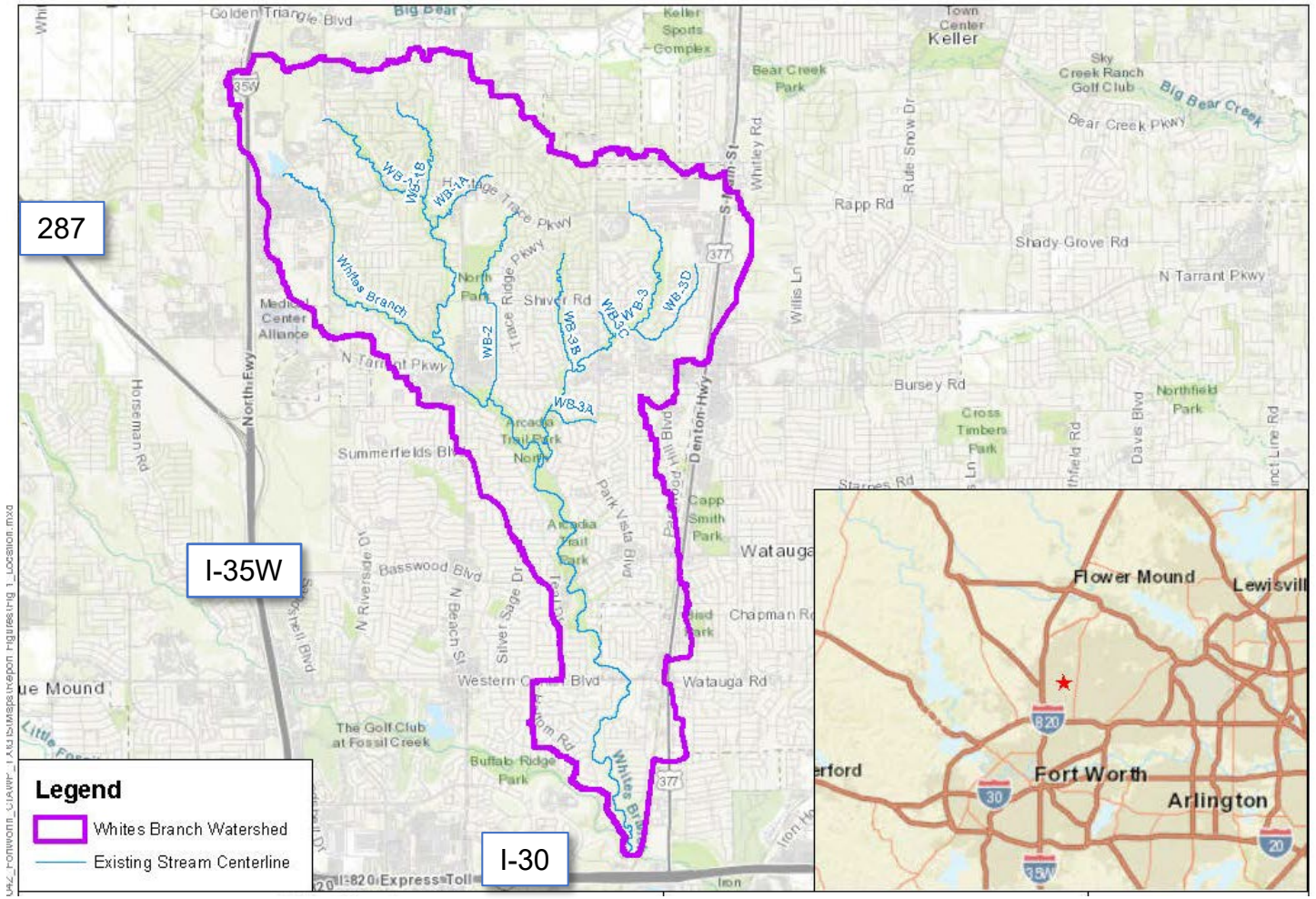
US Army Corps of Engineers

Why does it matter if valley storage is lost?

- For a single site, there may be no measurable impact but the cumulative impacts add up
- From EPR's White's Branch case study **"…loss of valley storage does create significant impacts to peak flows downstream of the assessment areas, and particularly with more frequent storm events."**
- Higher peak flows = higher velocities and potential erosion issues

Evaluate current City of Fort Worth iSWM design criteria effectiveness by:

- *Analyzing the cumulative impacts to peak flows & runoff volumes*
- *Focus on changes in land use and valley storage*
- *Consider Revisions to iSWM design criteria*

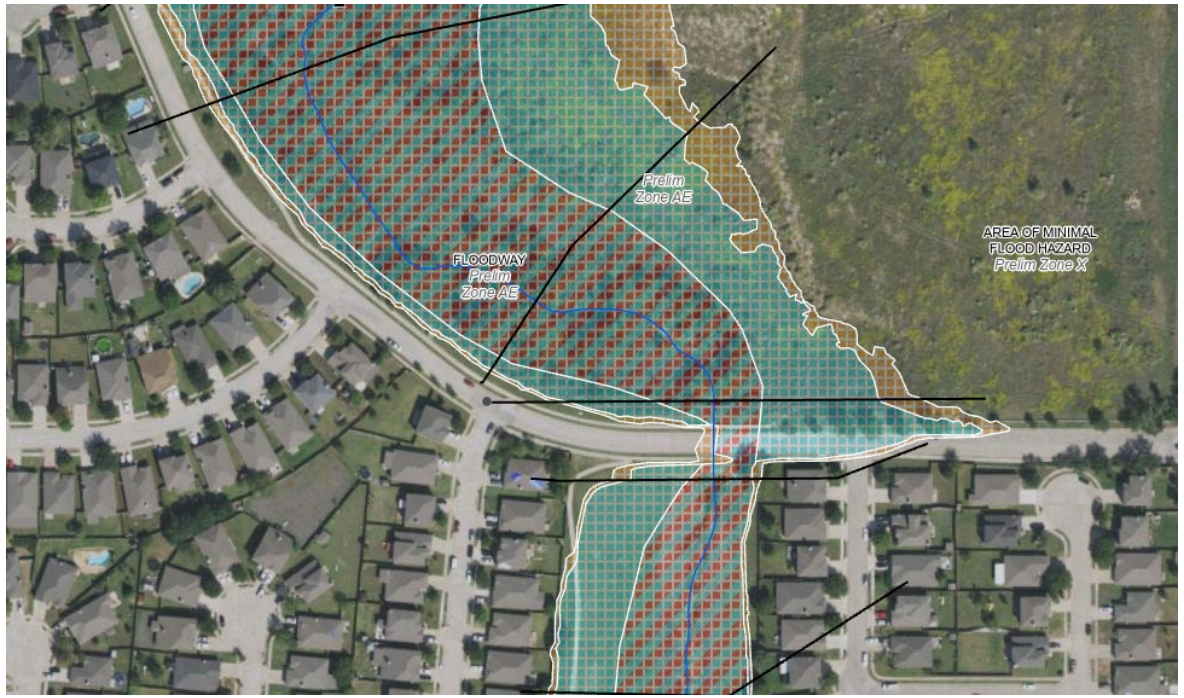


Heritage Glen Drive – Constructed around 2003

Current FEMA

Culverts designed to pass 100-yr storm

Preliminary FEMA



Would be overtopped by 25-yr storm today

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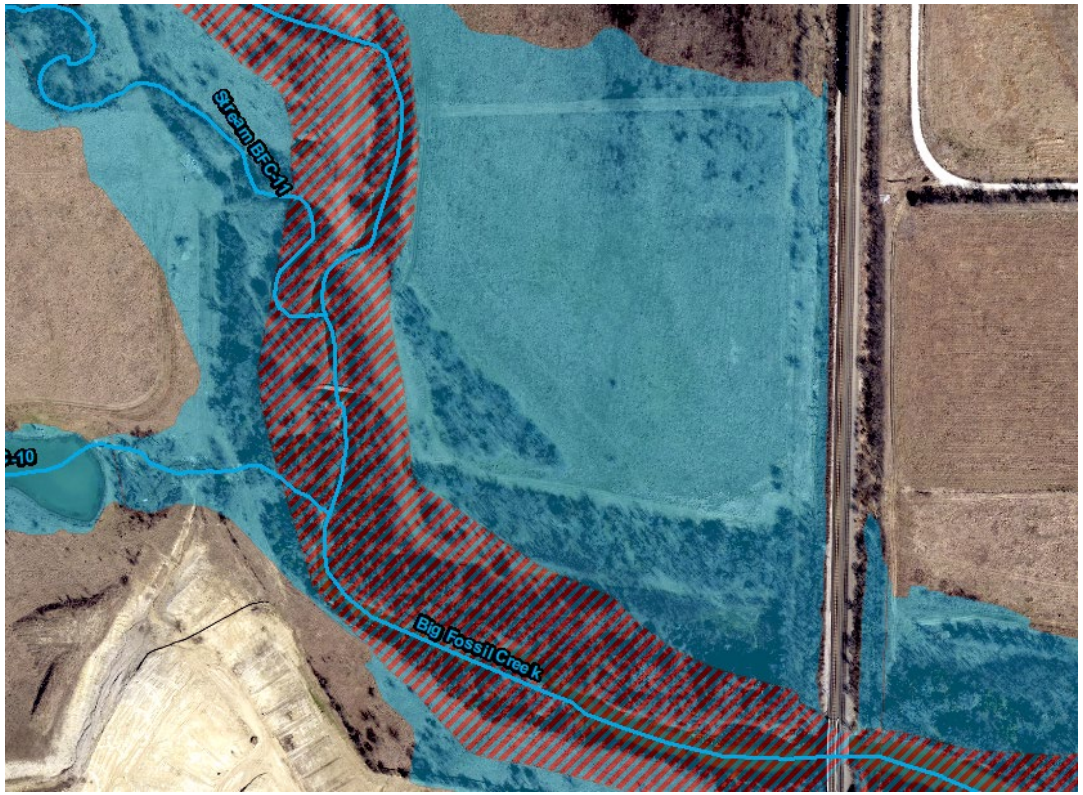
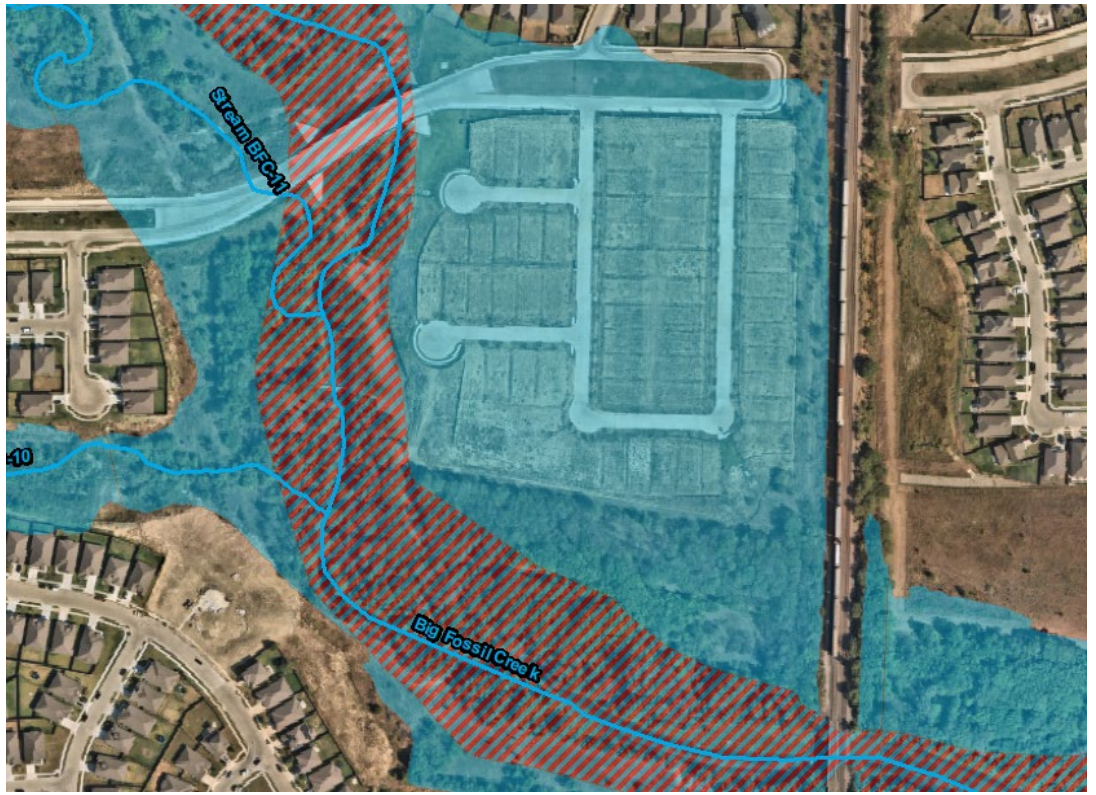
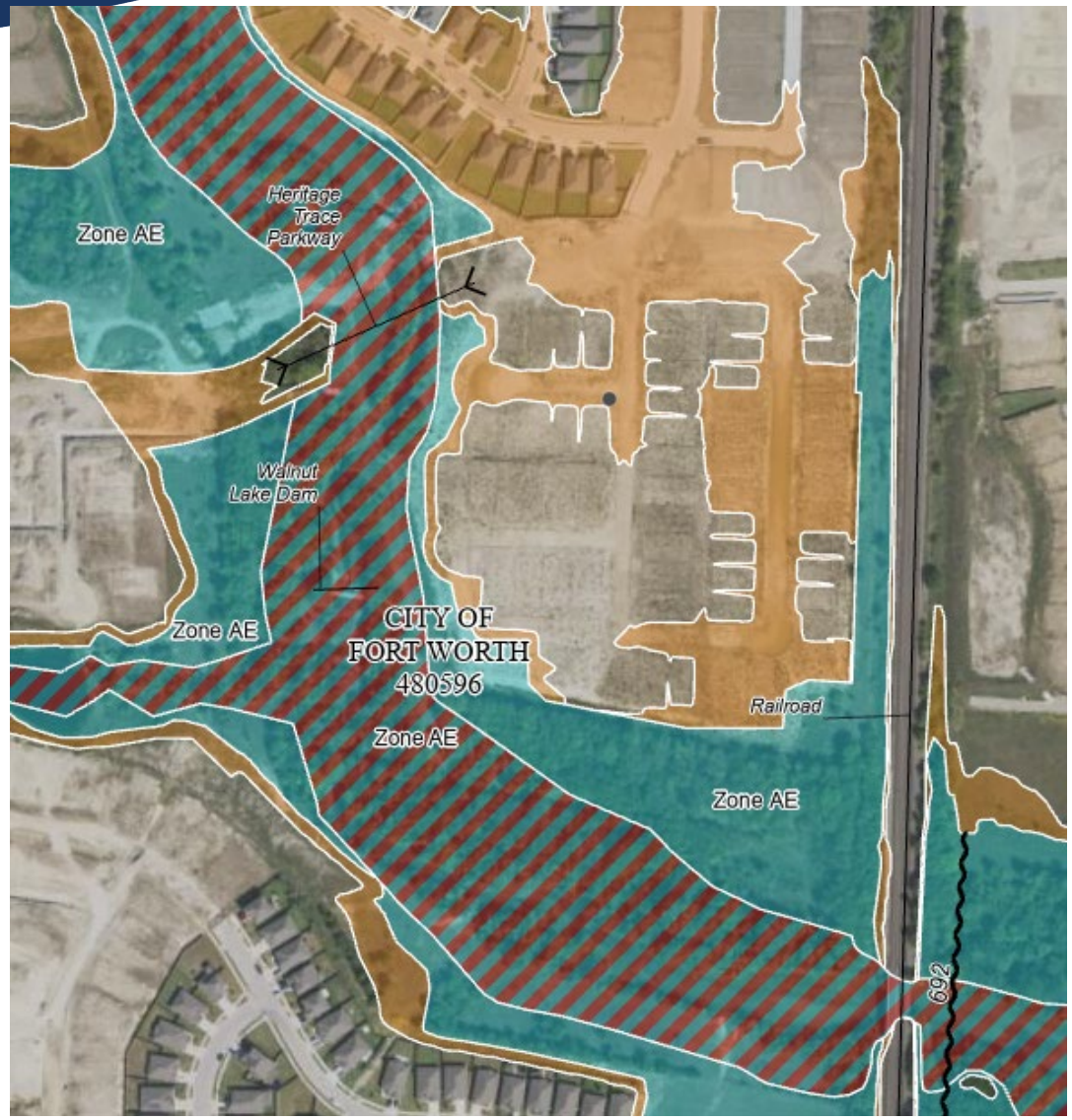
No valley storage regulations in Fort Worth outside of Clear Fork/West Fork Trinity River (not regulated by FEMA)



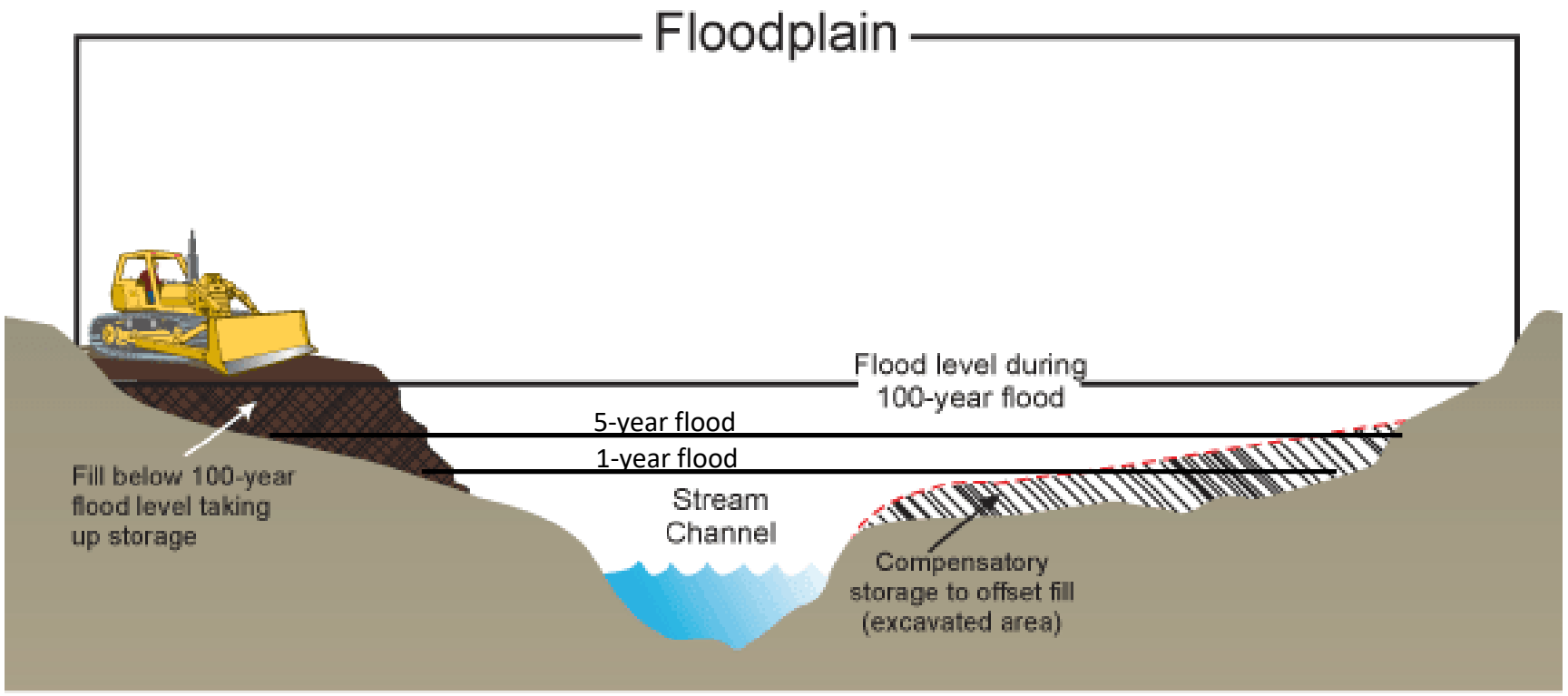



Heritage Trace Parkway
Zone AE
Walnut Lake Dam
Zone AE
CITY OF FORT WORTH 480596
Zone AE
Railroad
Zone AE
692

Cities in Texas and DFW with Valley Storage Regulations

- Austin
- Dallas
- Denton
- Frisco
- Garland
- Houston
- McKinney
- San Antonio
- Several more CDC communities along Trinity River Corridor

Proposed Policy



Recommendation Highlights

- No loss in storage for 1-, 5-, and 100-year floods (higher of FEMA or fully-developed)
  - Design storms consistent with current stormwater criteria manual
  - Analyze same areas where a LOMR and/or floodplain easement would be required
  - “No loss” consistent with City sump and CDC 100-yr requirements
- 64 acre drainage area threshold (everything downstream)
  - Addresses concerns about having to worry about small areas or “every puddle”
  - Aligns with current floodplain ordinance for floodplain easements and FEMA flood studies
- Affects projects adjacent to river/streams citywide
  - No change to sump or Trinity River (CDC) areas
- Policy would be implemented through floodplain ordinance and future version of stormwater criteria manual

Proposed Ordinance Language (DRAFT)

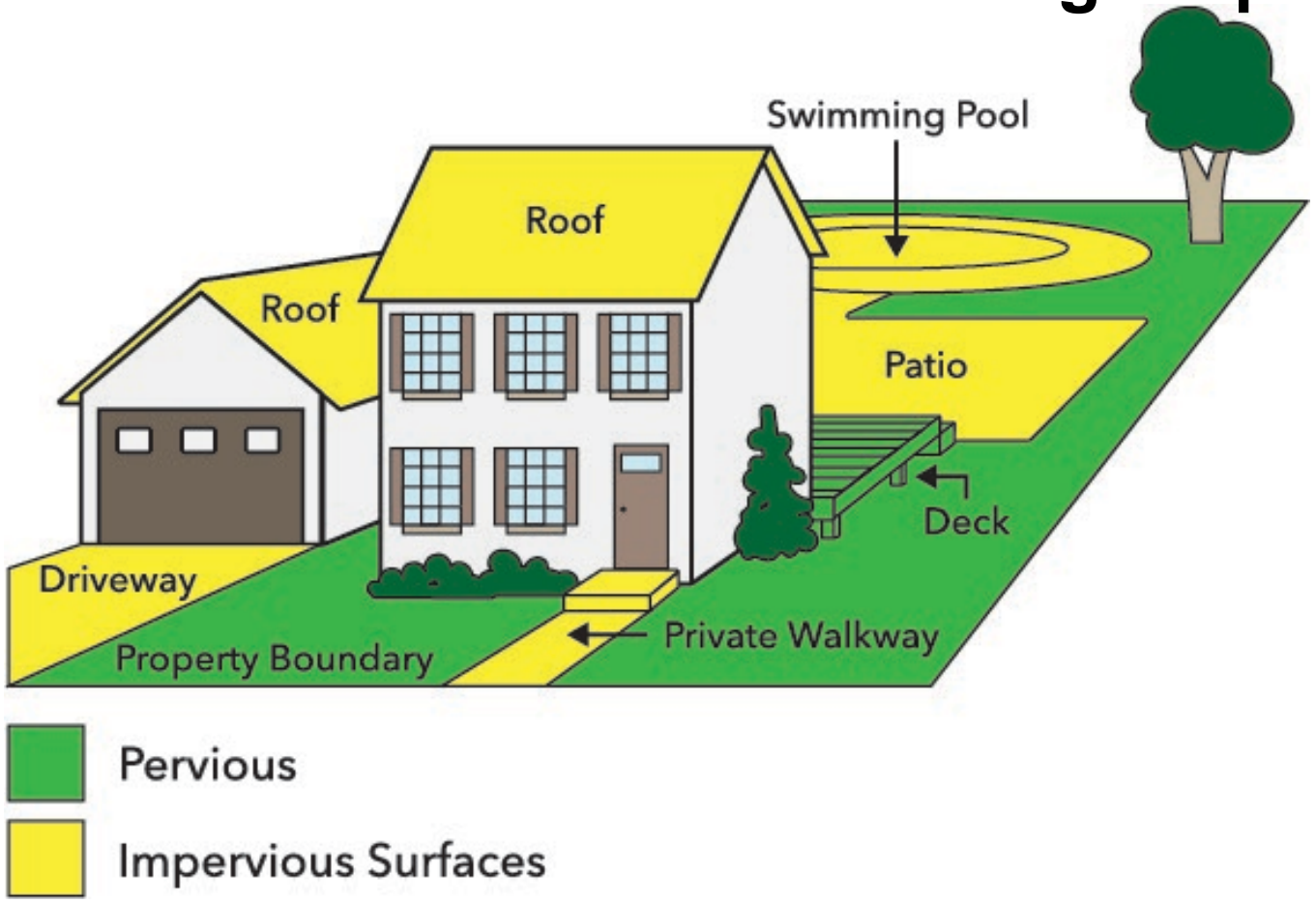
Valley storage analysis is required for sites located where current FEMA floodplain exists or where the fully developed floodplain must be mapped. The determination of valley storage impacts consists of a comparison of pre-project (existing) conditions and post-project conditions. The maximum allowable valley storage decreases for the 1-, 5-, and 100-year floods is 0.0%.

Impacts to Development Community and City Staff

- Will require more time and effort on the part of the engineers
- More grading required to offset fill
- Potentially less floodplain reclamation and fewer developable lots
- Possible increase in review time?
- Increased review fees?

Impervious Cover

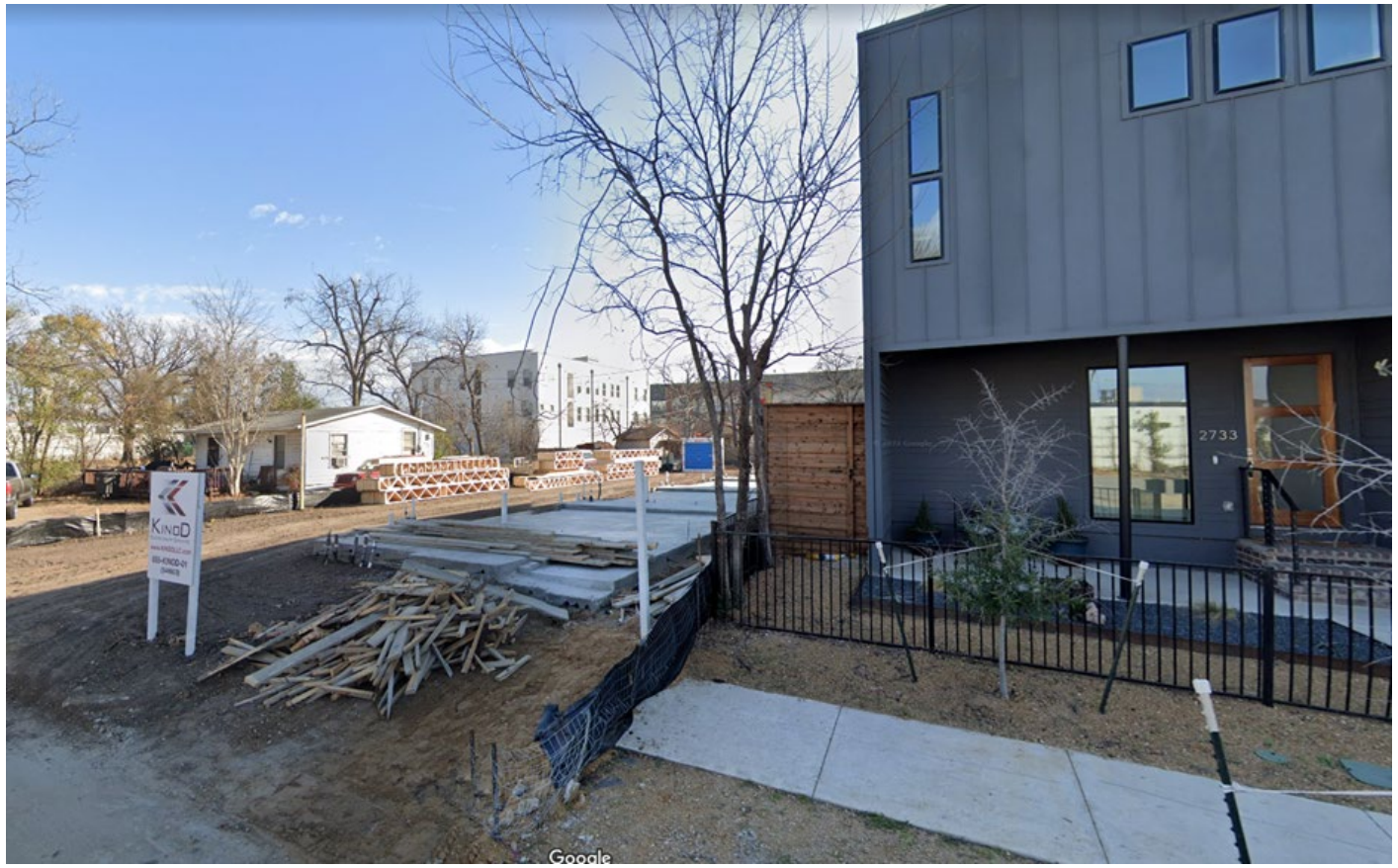
More cover = more flood volume and higher peak flows



Where we are now with respect to impervious cover?

- Stormwater stakeholders brought this up as a concern after seeing “stealth dorms” in existing flood-prone areas near TCU.
- 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)
- Design Criteria
  - Case study for CAH and Near Westside demonstrated that stormwater design criteria underestimates runoff compared to actual development in these urban areas.
  - Case study showed that stormwater criteria manual does not provide for certain zoning classes
  - Developments less than one acre are not required to do a drainage study
- Zoning impervious cover allowances do not align with stormwater design criteria
  - Single family allows for 50% impervious in front and 100% in back

Infill and redevelopment in areas where old stormwater infrastructure exists and no improvements anticipated



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

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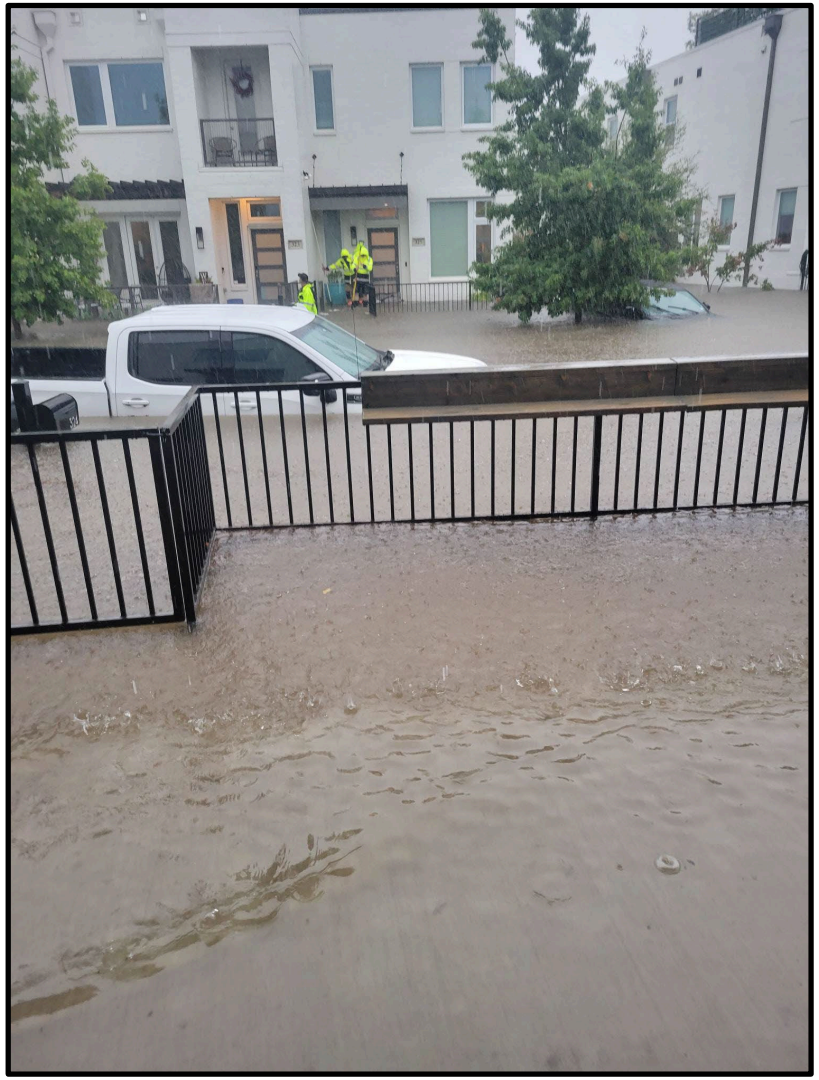
McCart/Berry, Central Arlington Heights, W. 7th

Linwood
August 2022



Impervious Cover
Potential Recommendations

- Adjust engineering & land use assumptions to reflect reality
- Prohibit impervious cover above a certain point
  - What would this look like?
  - How would it be enforced?
- Allow increased impervious cover with mitigation measures
- Determine if there is a reasonable threshold for review
- Impact fees for certain neighborhoods

Scheduling Next Meetings

- **Two more meetings – One more for impervious cover and one to finalize recommendations to City Council**
- **Doodle seemed to work well**
- **Thursday and Monday have been seemed most open**
- **Next likely meeting dates:**
  - December 11th, 18th, or 21st 10:00-11:00
  - December 14th 3:00-4:00
  - January 22nd or 29th, 10:00-11:00
  - January 25th or Feb 1st 3:00-4:00

- **Staff Coordination:** Council IR, City Plan Commission, Zoning BoA, and MITC

Next Steps

- Finalize Recommendations for Flood Storage Impact Mitigation
- Kick Off Impervious Cover Discussions
- Cumulative Impacts Web Page in Final Testing Now
- ? Other Topics ?