



TWIN LAKES STAKEHOLDERS
GROUP MEETING
MAY 19, 2016



TWIN LAKES ACTION GROUP

Charter

To protect the zoned rural-residential *look and feel* of our neighborhoods, and adjacent land.

Is ANY development appropriate on these parcels?

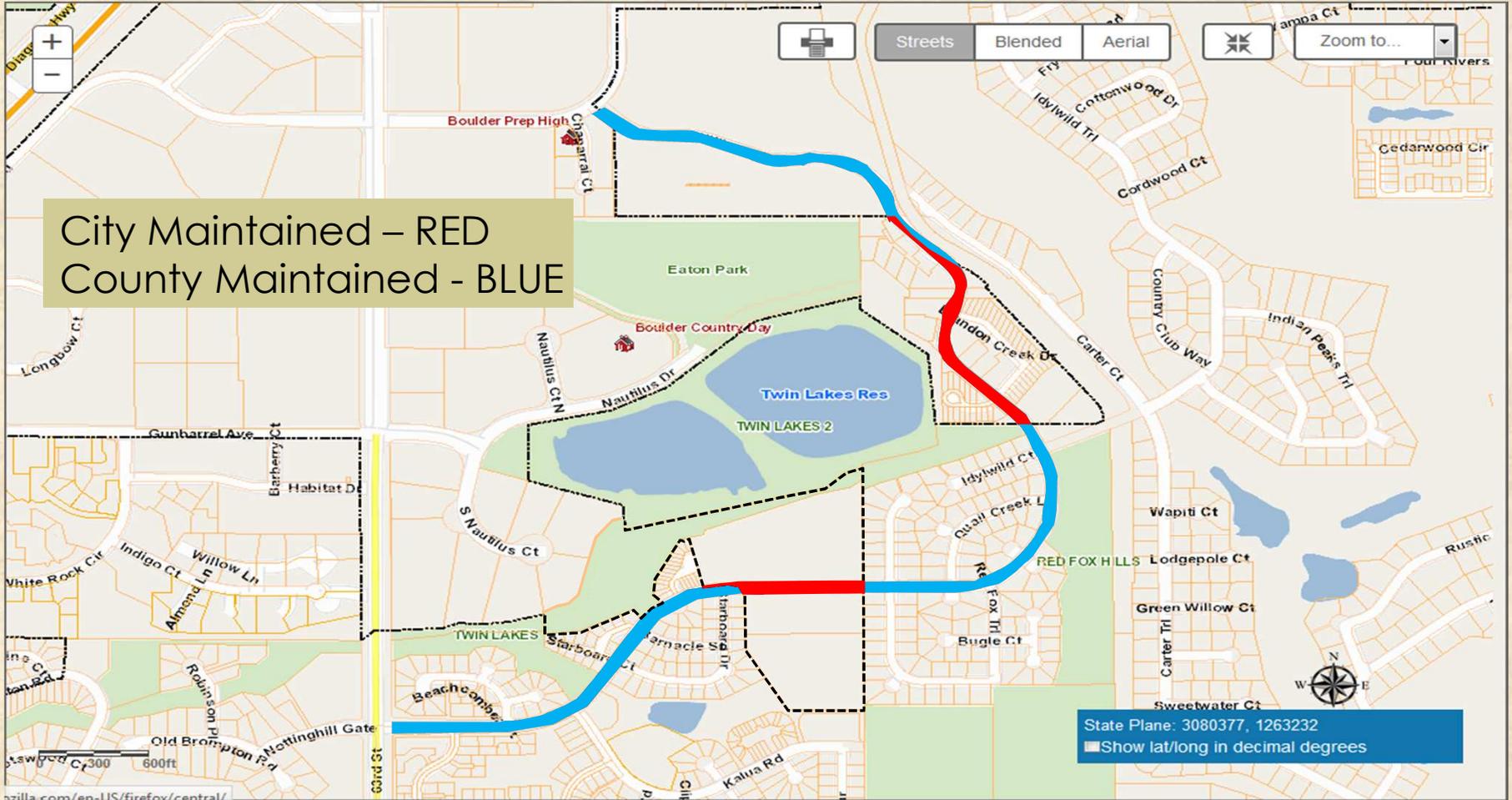
OVERVIEW – TLAG HYDROLOGY

- Infrastructure Concerns
- BVCP and City Codes
- Hydrologic Setting – Dr. Gordon McCurry, P.G.
 - Site Hydrology background
 - Wetlands
 - Storm Water System in Red Fox Hills
 - TLAG Concerns w. Higher-density Development
- RFPs
- Next Steps

INFRASTRUCTURE

- 10 water main breaks in RFH
- Questions on repairing water pipes vs. paving the roads?
- Who “owns” what infrastructure
 - How is multi-jurisdictional maintenance going improve?
- What’s the liability for issues and who pays?

INFRASTRUCTURE



INFRASTRUCTURE



CONFORMITY TO BVCP

- The change to MXR contradicts 19 specific aspects of the BVCP, but specifically:
- 3.28 Surface and Ground Water
 - Surface and groundwater resources will be managed to prevent their degradation and to protect and enhance aquatic, wetland and riparian ecosystems. Land use and development planning and public land management practices will consider the interdependency of surface and groundwater and potential impacts to these resources from pollutant sources, changes in hydrology, and dewatering activities.

CODES ON HYDROLOGY

- Code: Storm Water Design - Chapter 7:
 - 7.02-7.05 Details the Studies and Designs Required for any consideration
 - 7.12 Storm Water Detention
 - 7.13 Storm Water Quality and Monitoring
- City Code Section 9-3-9
 - Sub-Section 9-3-9(c)(5), mitigation plans, regulated areas (see section 9-3-9(b)), and riparian areas.



HYDROLOGY PRESENTATION
DR. GORDON McCURRY, P.G.



PRESENTATION OUTLINE

- Speaker Introduction
- Site Hydrologic Setting
- Stormwater System in Red Fox Hills
- TLAG Concerns w. Higher-density Development
- Next Steps

1. SITE HYDROLOGIC SETTING

- Topography and Hydrology
- Local Hydrologic Features
- Hydrologic Properties of Site Soils



SITE TOPOGRAPHY AND HYDROLOGY

- BCHA property slopes gently to the SE, away from Twin Lakes and towards RFH neighborhood
- Precipitation is about 18 inches/year, with much coming in Spring in intense storms
- The site hydrology is highly influenced by infiltration from nearby lakes and ditches



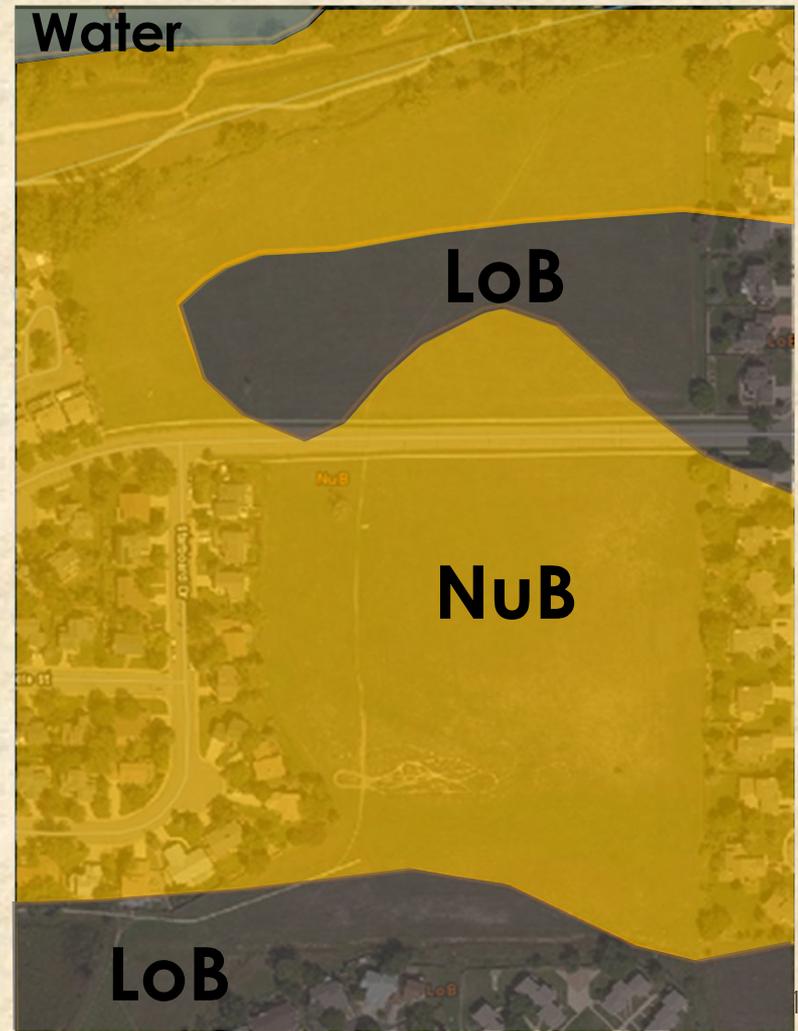
LOCAL HYDROLOGIC FEATURES

- Twin Lakes
- Irrigation Ditches
- Boulder Feeder Canal
- Wetlands
- Ephemeral stream
- Water flow to the SE



HYDROLOGIC PROPERTIES OF SOILS

- Site soils are Nunn clay loam (NuB) and Longmont clay (LoB)
- Are poorly draining, low-permeability soils
- Have high shrink-swell capacity when wetted then dried
- Have shallow water table, seen by nearby wetlands



POOR SOIL DRAINAGE – MARCH 2016

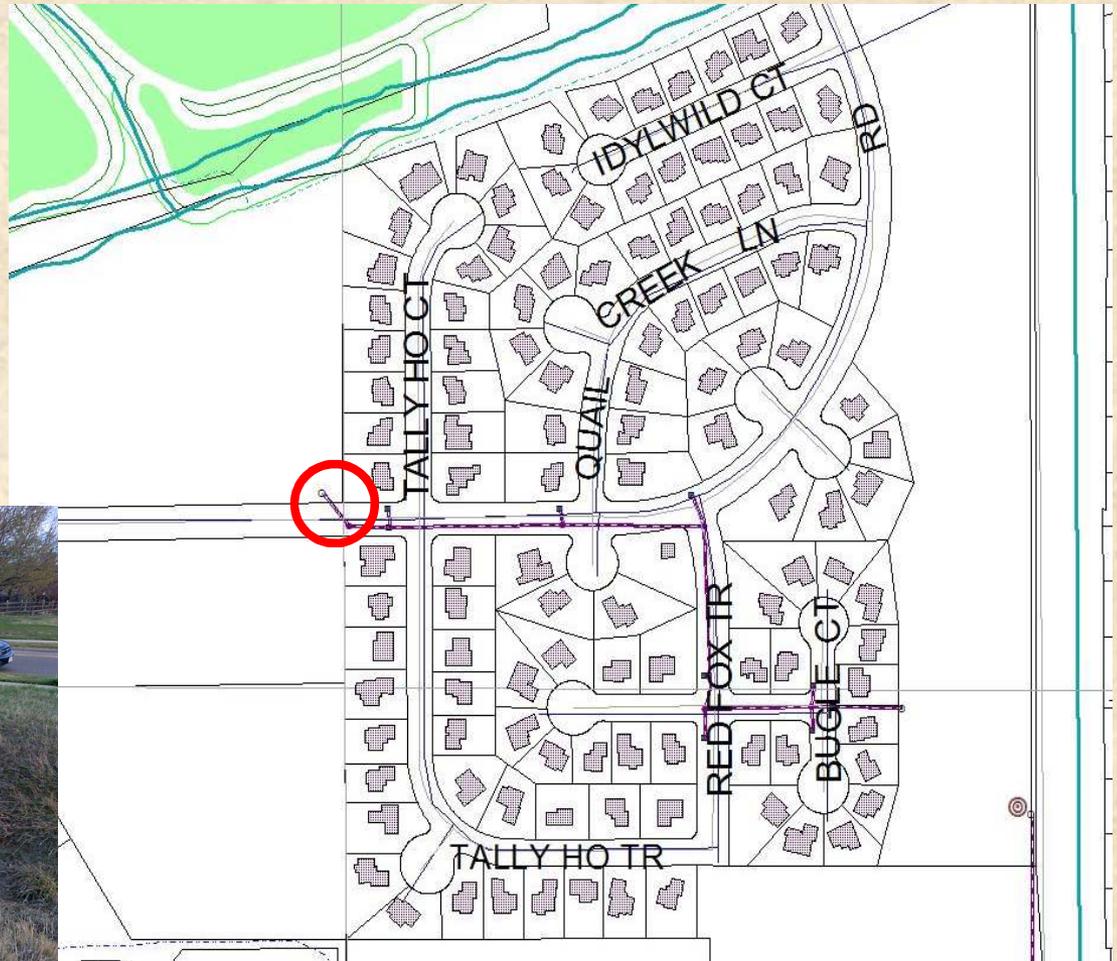


2. RFH STORMWATER SYSTEM

- Developed to collect and route runoff to reduce the risk of flooding
- Assumes an upstream drainage area of 15 acres, including BCHA property
- System designed to handle runoff from a 100-yr rainfall event
- Runoff from 100-yr event designed to overtop curbs in SE side of RFH neighborhood (Red Fox Trail and Bugle Ct) and encroach 18 ft onto private properties
- Design calculations for runoff timing are for current undeveloped conditions in the upstream area; development will affect timing
- Design allows for no more than the historic runoff to leave the RFH neighborhood

RFH STORMWATER SYSTEM

- Stormwater system in purple, center of streets
- Note upstream inlet on BCHA property



3. TLAG CONCERNS FOR HIGH-DENSITY DEVELOPMENT OF BCHA PROPERTY

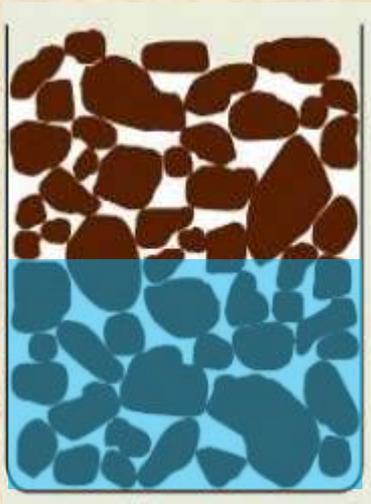
- Increased risk of home flooding due to higher water table
- Increased risk of surface flooding due to new stormwater runoff conditions
- Adverse impacts to wetlands due to altered groundwater levels, runoff and water quality

TLAG CONCERNS - INCREASED RISK OF HOME FLOODING

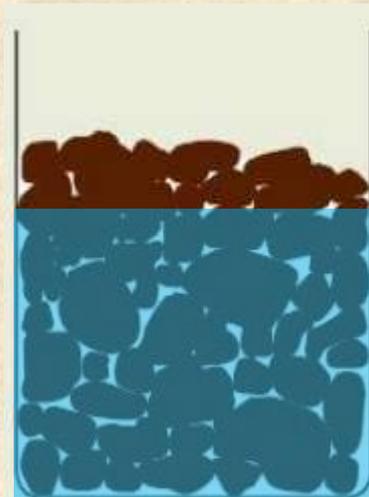
- Rise in water table
 - Compression of soils, reduction in soil water storage
 - Foundation footers reduces soil water storage
 - New localized groundwater flow directions
 - Increased recharge from landscape irrigation
- Increased risk of home flooding due to higher water table
 - Cost of increased sump pump use (existing & new pumps)
 - Increased load on existing stormwater system
 - Cost to install new or upgraded home drainage systems

EFFECT OF SOIL COMPACTION ON GROUNDWATER LEVELS

Uncompacted soil



Compacted soil



- Structures such as buildings and roads compact the soil
- Compacted soil has a reduced porosity
- When saturated, the compacted soil water levels rise since there is less pore space to store the water

EXAMPLE HIGH-DENSITY LAYOUT (BCHA, 2013)



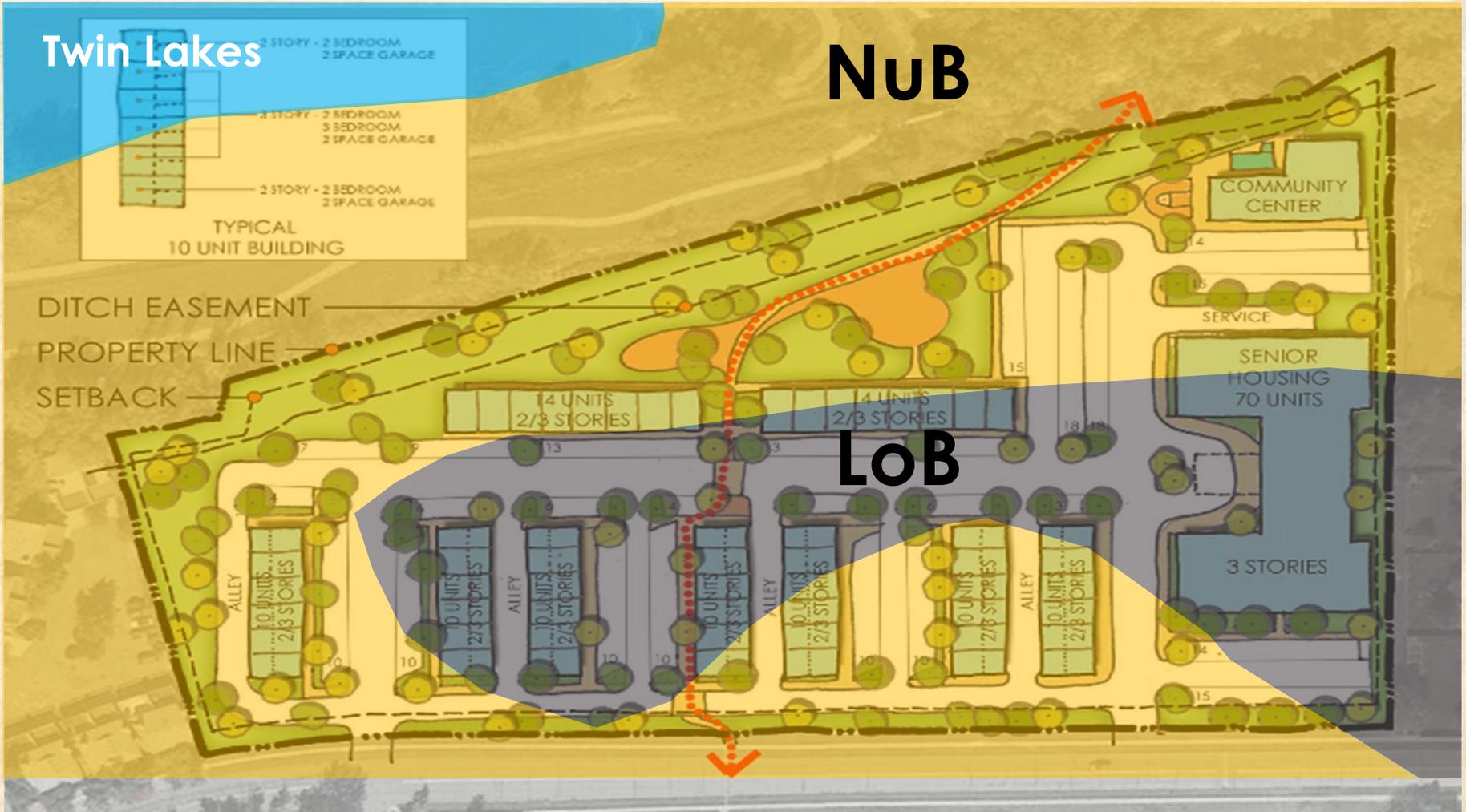
MANY STRUCTURES LOCATED OVER MOST EASILY COMPACTED SOILS

Twin Lakes

NuB

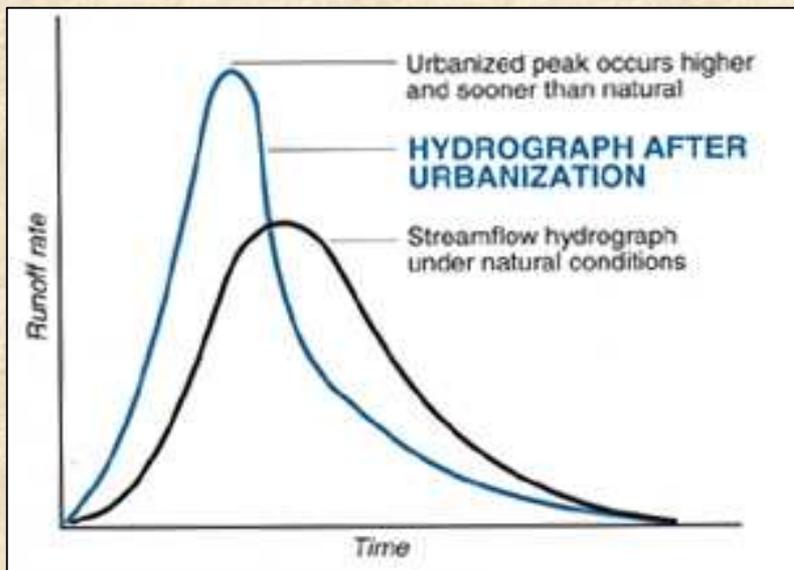
DITCH EASEMENT
PROPERTY LINE
SETBACK

LoB



TLAG CONCERNS - INCREASED RISK OF SURFACE FLOODING

- High-density construction will lead to a high percentage of paved and impervious surfaces
- The impervious surfaces will cause stormwater to runoff more quickly and at higher peak rates due to reduced infiltration and natural surface storage

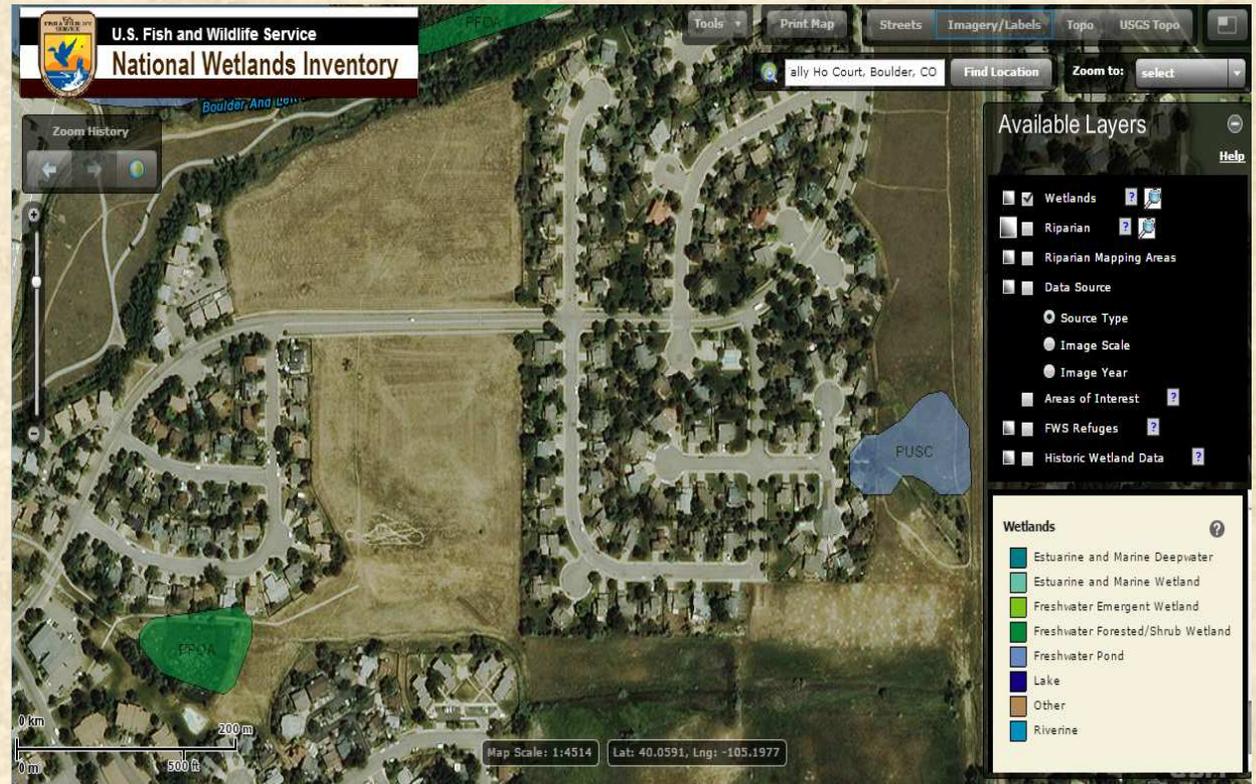


- The result is higher risk of flooding in downstream areas (RFH neighborhood) unless an appropriate stormwater system is built

TLAG CONCERNS – WETLANDS IMPACTS

Impacts due to:

- Altered GW levels
- Changes in runoff (timing & amount)
- Changes in water quality (car oil, trash)



4. NEXT STEPS



HYDROLOGY

- Any additional technical questions?

LIABILITY FOR DAMAGES

- 90 years of legal precedent
- City and County could be liable in perpetuity
- Who pays?!? We all do! The taxpayer
- City has set precedent to pay for damages related to infrastructure failures.
- A change to MXR changes entire neighborhood hydrology

REQUEST FOR PROPOSALS

- We've presented our EXPERT voices
- How do we move forward to:
 - “**Jointly formulate recommendations** for areas of expertise and selection of experts to inform the desired land use patterns for the area. The areas for study should include the suitability for urban development, desired land use patterns, and environmental constraints”
 - “**Jointly recommend the appropriate range** of potential housing units with consideration given to intensity and community benefit, regardless of who holds title to the property”

RFP COMPARISONS – WELL TESTS

Firm	On-site slug tests	Standard Penetration Testing
TLAG Proposal	Y	Y
GroundEngineering	Y	Y
CTL / Thompson	N	N
Ninyo&Moore	N	N
SCA	Y	N
Cesare	N	Y
RMG	N	N
Martinez	N	N
New Fields	N	Y
Tabbara	N	N

RFP COMPARISONS – SOIL TESTS

Firm	Number of Samples	Moisture / Density	Swell / Consolidation	water soluble sulfates	Grain Size	Compressive Strength	Atterberg limits	Other
TLAG Proposal	12-20	Y	Y	Y	Y	Y	Y	
GroundEngineering	6	Y	Y	Y	Y	Y	Y	Proctor, R-value, pH, K
CTL / Thompson	11	Y	Y	N	N	Y	N	
Ninyo&Moore	10	Y	Y	Y	Y	N	Y	
SCA	10	N	Y	N	N	N	N	
Cesare	10-12	Y	Y	Y	N	N	N	
RMG	10	Y	Y	Y	N	N	N	
Martinez	6	N	Y	N	N	N	N	?
New Fields	10	Y	Y	N	Y	N	Y	
Tabbara	5	Y	Y	N	N	N	N	CBR, liquefaction potential

RFP COMPARISONS – COSTS

Firm	Cost
TLAG Proposal	?
GroundEngineering	67,725
CTL / Thompson	14,600
Ninyo&Moore	19,850
SCA	69,000
Cesare	39,210
RMG	30,210
Martinez	15,150
New Fields	58,159
Tabbara	71,080



NEXT STEPS

- Discussion on presented material
- Let's address the elephant in the room!

Density

NEXT STEPS



SUMMARY

- Keep to our TLAG mission
- Density and Hydrology largest concerns
- Infrastructure and jurisdiction issues
- Impacts on Wildlife and Ecology important to many, not just in Gunbarrel
- Land use changes are long term and follow the properties
 - Up-Zoning and spot zoning are hard to remove
 - Just like the town Center – when developer changed, so did the design!