

City of Pelham Drainage Study

July 10, 2023

Agenda

- Evaluation Goals
- Study Limits
- Project Identification Process
- Bishop and Buck Creek Analysis
- Priority Area Analysis
 - Cedar Cove
 - Carl Nichols
 - Cross Creek/North Chandalar
 - Holland Lakes
- Ordinance Recommendations

Evaluation Goals

Evaluate Potential Floodplain Mitigation Strategies along Bishop and Buck Creeks

Modeling to Support Engineering Solutions

Reduce Flooding Impacts in Priority Areas

Reduce Probability of Flooding

Review Existing Standards

Develop Benchmarking Recommendations

Definition of Flooding

24-hour Storm Event	Annual Exceedance Probability
1-year	100%
10-year	10%
25-year	4%
100-year	1%

A 1-year flood event is statistically likely to occur in a given year

Flooding from 100-year event is used to establish the 100-year floodplain

The 24-hour design storm durations were used for modeling purposes; however, storm events of shorter durations do occur and can be equated to a 24-hour design storm

Pelham Major Rainfall Events

Date	Pelham WWTP Gage (in)	Duration (hr)	Equated Event
5/4/2021	5	24	5-10 yr
10/6/2021	12	24	200-500 yr
11/29/2022	4.8	24	5-10 yr



NOAA Atlas 14, Volume 9, Version 2
 Location name: Pelham, Alabama, USA*
 Latitude: 33.2852°, Longitude: -86.8102°
 Elevation: 492.99 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Penca, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yokta, Geoffrey Bonnin

NOAA National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

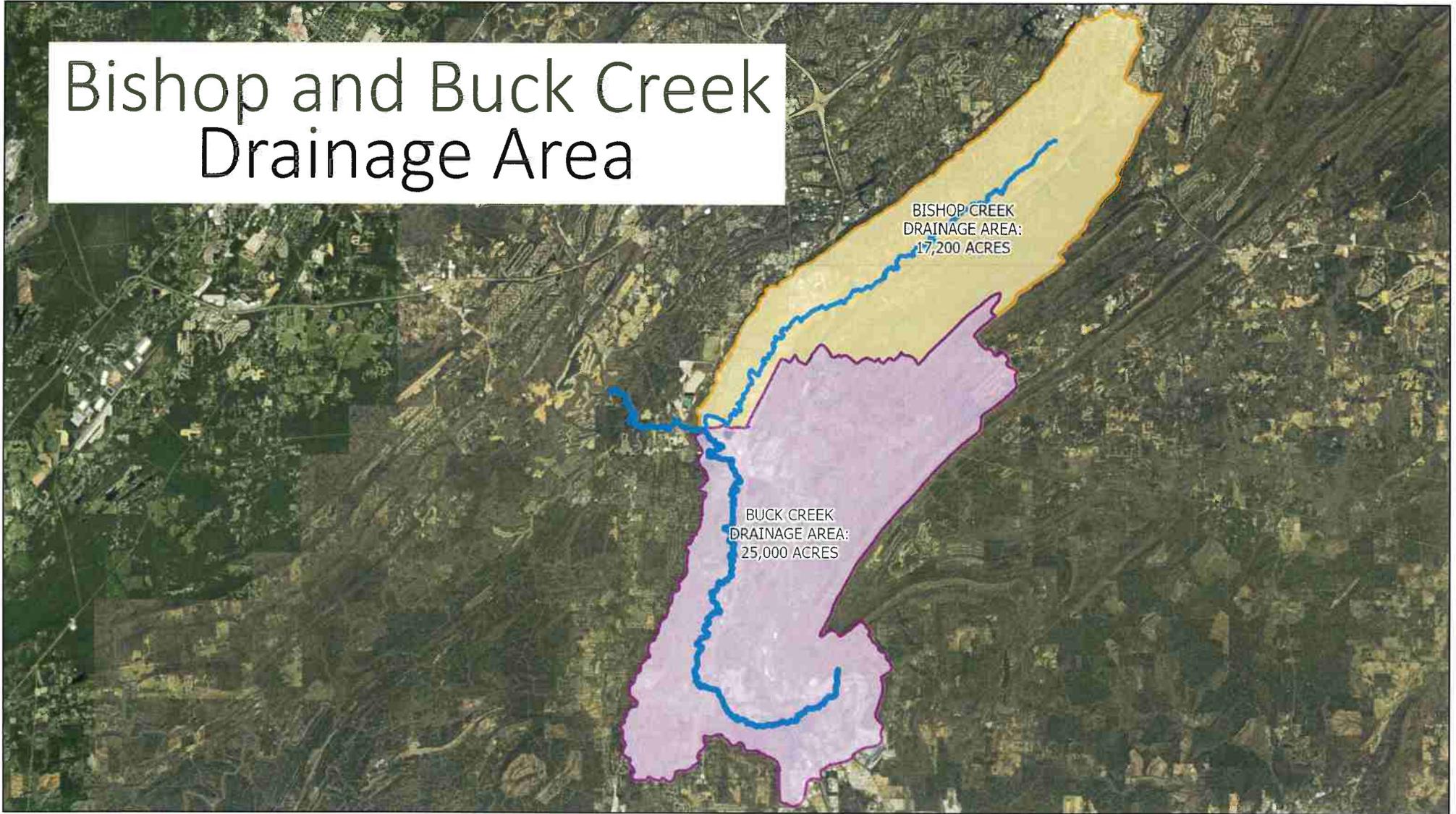
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.436 (0.341-0.557)	0.500 (0.391-0.640)	0.606 (0.473-0.777)	0.695 (0.539-0.893)	0.818 (0.612-1.07)	0.914 (0.668-1.21)	1.01 (0.713-1.36)	1.11 (0.750-1.53)	1.24 (0.807-1.74)	1.34 (0.849-1.90)
10-min	0.638 (0.500-0.816)	0.732 (0.573-0.937)	0.888 (0.692-1.14)	1.02 (0.789-1.31)	1.20 (0.897-1.57)	1.34 (0.978-1.77)	1.48 (1.04-2.00)	1.62 (1.10-2.23)	1.82 (1.18-2.55)	1.96 (1.24-2.79)
15-min	0.778 (0.609-0.995)	0.893 (0.699-1.14)	1.08 (0.844-1.39)	1.24 (0.962-1.60)	1.46 (1.09-1.92)	1.63 (1.19-2.16)	1.80 (1.27-2.43)	1.98 (1.34-2.72)	2.22 (1.44-3.11)	2.39 (1.52-3.40)
30-min	1.13 (0.888-1.45)	1.30 (1.02-1.67)	1.59 (1.24-2.03)	1.82 (1.41-2.34)	2.15 (1.61-2.83)	2.41 (1.76-3.20)	2.67 (1.89-3.60)	2.94 (1.99-4.04)	3.29 (2.14-4.62)	3.57 (2.26-5.06)
60-min	1.49 (1.17-1.91)	1.71 (1.34-2.19)	2.08 (1.62-2.66)	2.39 (1.86-3.08)	2.84 (2.13-3.75)	3.20 (2.35-4.26)	3.57 (2.53-4.84)	3.96 (2.68-5.46)	4.49 (2.92-6.31)	4.90 (3.10-6.96)
2-hr	1.85 (1.47-2.34)	2.12 (1.67-2.68)	2.57 (2.02-3.26)	2.96 (2.32-3.77)	3.53 (2.69-4.63)	4.00 (2.96-5.28)	4.48 (3.20-6.02)	4.98 (3.42-6.83)	5.68 (3.74-7.95)	6.24 (3.99-8.79)
3-hr	2.08 (1.66-2.62)	2.37 (1.88-2.99)	2.87 (2.28-3.63)	3.32 (2.61-4.20)	3.98 (3.05-5.21)	4.53 (3.38-5.96)	5.10 (3.68-6.84)	5.72 (3.95-7.82)	6.58 (4.37-9.18)	7.27 (4.68-10.2)
6-hr	2.53 (2.04-3.16)	2.86 (2.30-3.57)	3.46 (2.77-4.32)	4.01 (3.19-5.03)	4.86 (3.78-6.34)	5.58 (4.22-7.33)	6.36 (4.64-8.50)	7.21 (5.04-9.82)	8.43 (5.66-11.7)	9.42 (6.13-13.1)
12-hr	3.06 (2.49-3.78)	3.45 (2.80-4.26)	4.18 (3.38-5.17)	4.87 (3.91-6.04)	5.95 (4.69-7.72)	6.89 (5.27-8.99)	7.92 (5.85-10.5)	9.06 (6.41-12.3)	10.7 (7.27-14.8)	12.1 (7.92-16.7)
24-hr	3.63 (2.98-4.43)	4.11 (3.37-5.03)	5.03 (4.11-6.16)	5.90 (4.79-7.25)	7.26 (5.78-8.34)	8.44 (6.53-10.9)	9.74 (7.27-12.8)	11.2 (7.99-15.0)	13.3 (9.10-18.2)	15.0 (9.94-20.6)
2-day	4.21 (3.49-5.09)	4.83 (4.00-5.85)	5.98 (4.93-7.25)	7.05 (5.78-8.57)	8.70 (6.99-11.1)	10.1 (7.90-12.9)	11.6 (8.78-15.2)	13.3 (9.63-17.8)	15.8 (10.9-21.4)	17.7 (11.9-24.2)
3-day	4.62 (3.85-5.55)	5.29 (4.41-6.36)	6.52 (5.41-7.86)	7.66 (6.33-9.27)	9.43 (7.61-11.9)	10.9 (8.59-13.9)	12.6 (9.53-16.3)	14.4 (10.4-19.0)	16.9 (11.8-22.9)	19.0 (12.9-25.9)

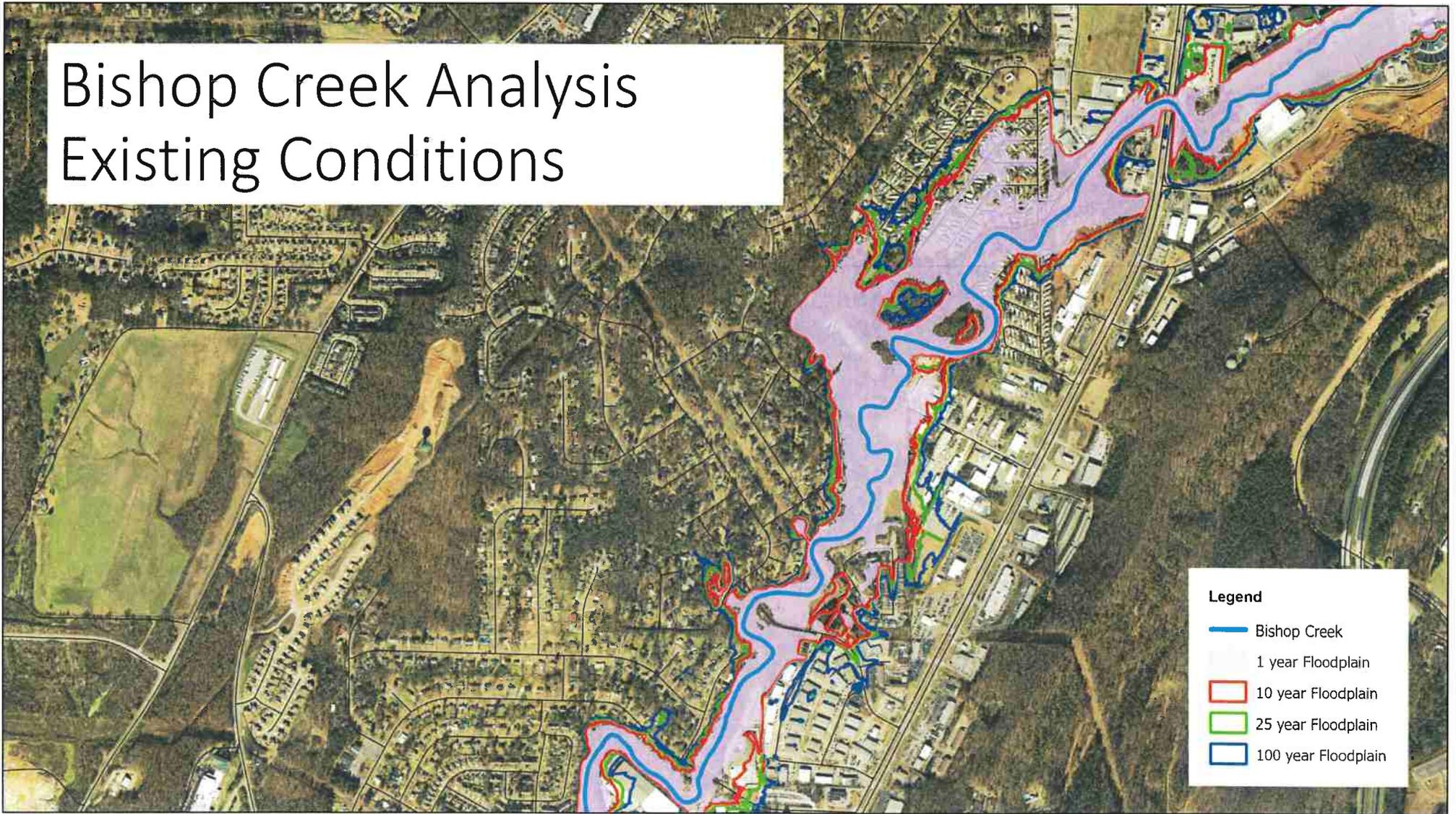
Bishop and Buck Creek Drainage Area

BISHOP CREEK
DRAINAGE AREA:
17,200 ACRES

BUCK CREEK
DRAINAGE AREA:
25,000 ACRES



Bishop Creek Analysis Existing Conditions



Bishop Floodplain Reduction

- Total Reduction of 0.5-1.5' requires 84 million CF of storage during 100-Year/hr

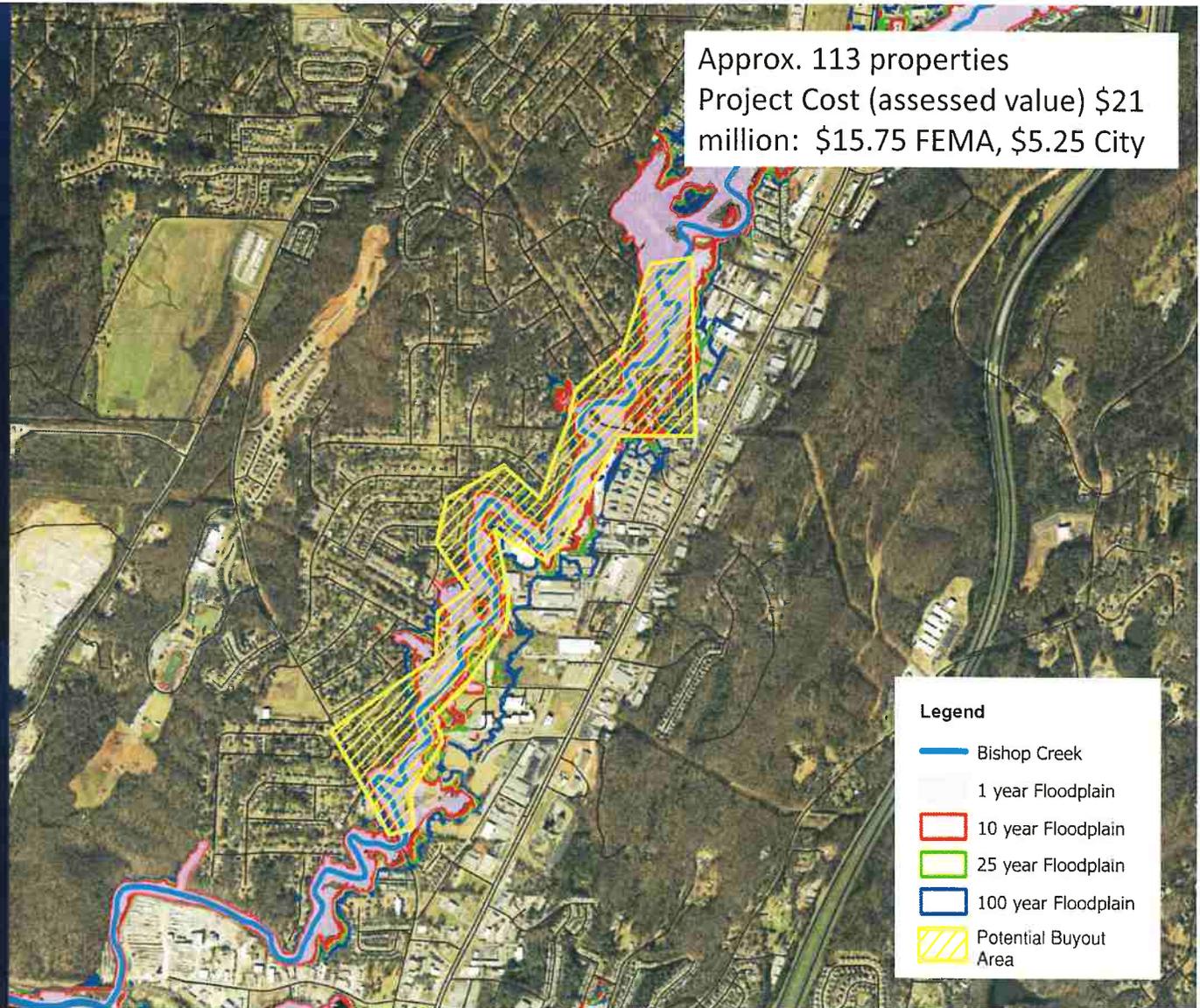
- Bishop Creek Storage (36 million CF)
- Buck Creek Storage (45 million CF)

Bishop Creek Floodplain Reduction				
	100-Year/24 hr	50-Year/24 hr	25-Year/24 hr	10-Year/ 24 hr
Reduction	1.4 ft	1.65 ft	2.05 ft	2.44 ft
Storage	36 million CF = 827 acre-ft	35 million CF = 804 acre-ft	33 million CF = 758 acre-ft	32 million CF = 735 acre-ft

Buck Creek Floodplain Reduction				
	100-Year/24 hr	50-Year/ 24 hr	25-Year/24 hr	10-Year/24 hr
Reduction	1.4 ft	1.78 ft	1.64 ft	1.38 ft
Storage	49 million CF = 1,125 acre-ft	44 million CF = 1,010 acre-ft	44 million CF = 1,010 acre-ft	42 million CF = 965 acre-ft

Potential Voluntary Buyout Area

– No Engineered
Solution



Priority Area Evaluation Process



Priority Area Analysis- within Pelham

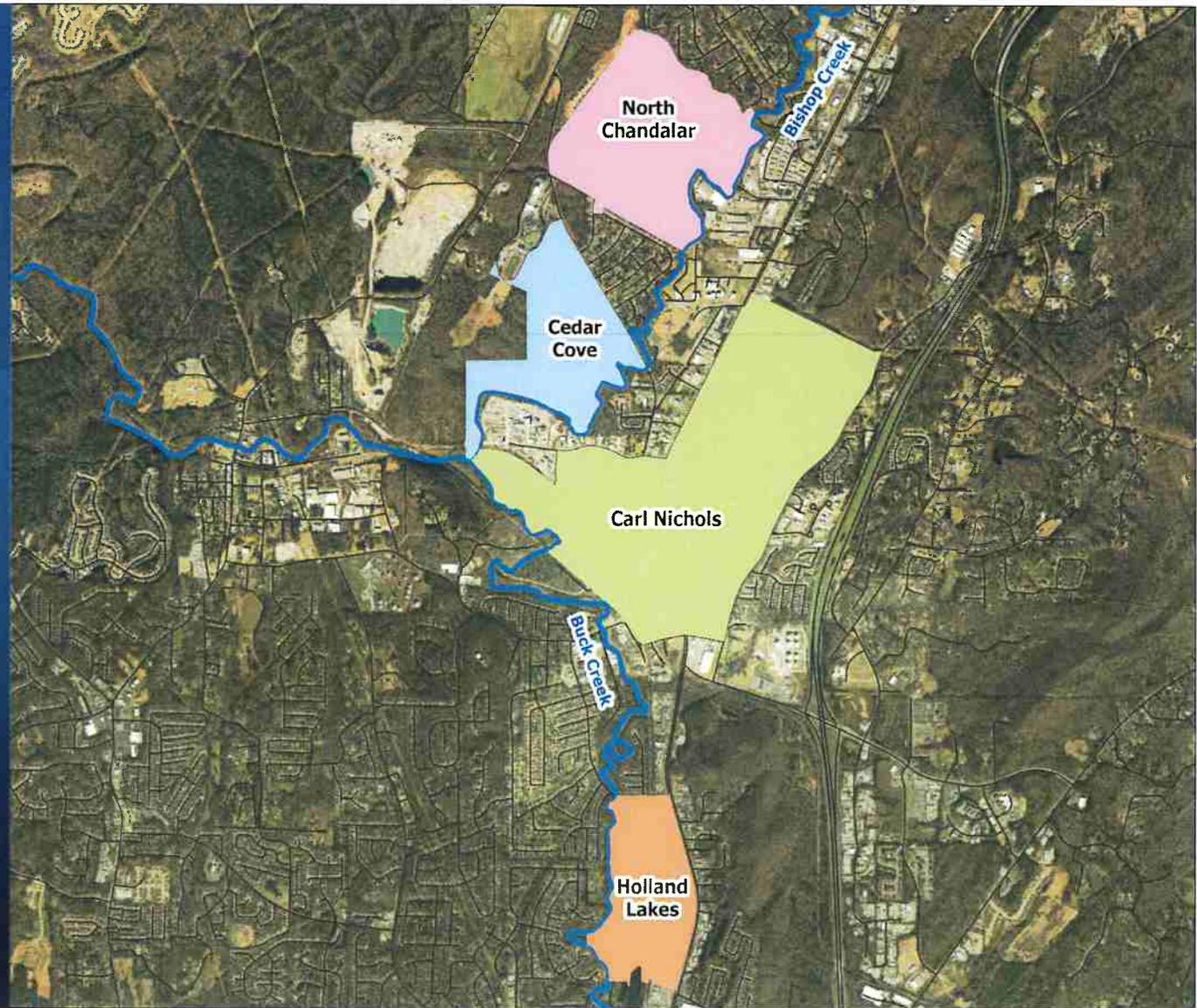
4 Priority Areas

Cedar Cove

Crosscreek/ North Chandalar

Yeagar Parkway/Carl Nichols

Holland Lakes



Recommended Project Selection

How were projects recommendations developed?

Step 1: Project Score

Point based system

Preliminary Selection Criteria and Project Performance Criteria

Step 2: Project Rank

Considered project score and cost estimate



Recommended Project

Cedar Cove Existing Conditions

Known flooding issues

- 6 at risk properties during less than the 1 year/24 hr event
- 8 at risk properties during the 25 year/24 hr event

2 projects considered to reduce probability of flooding

1 Year POF event and 25 Year POF event

Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- Impacted Structures (1yr)
- Impacted Structures (25yr)
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 100 year Floodplain



Cedar Cove – 1-year POF Solution

Install inlet at Philipians Blvd and increase system capacity

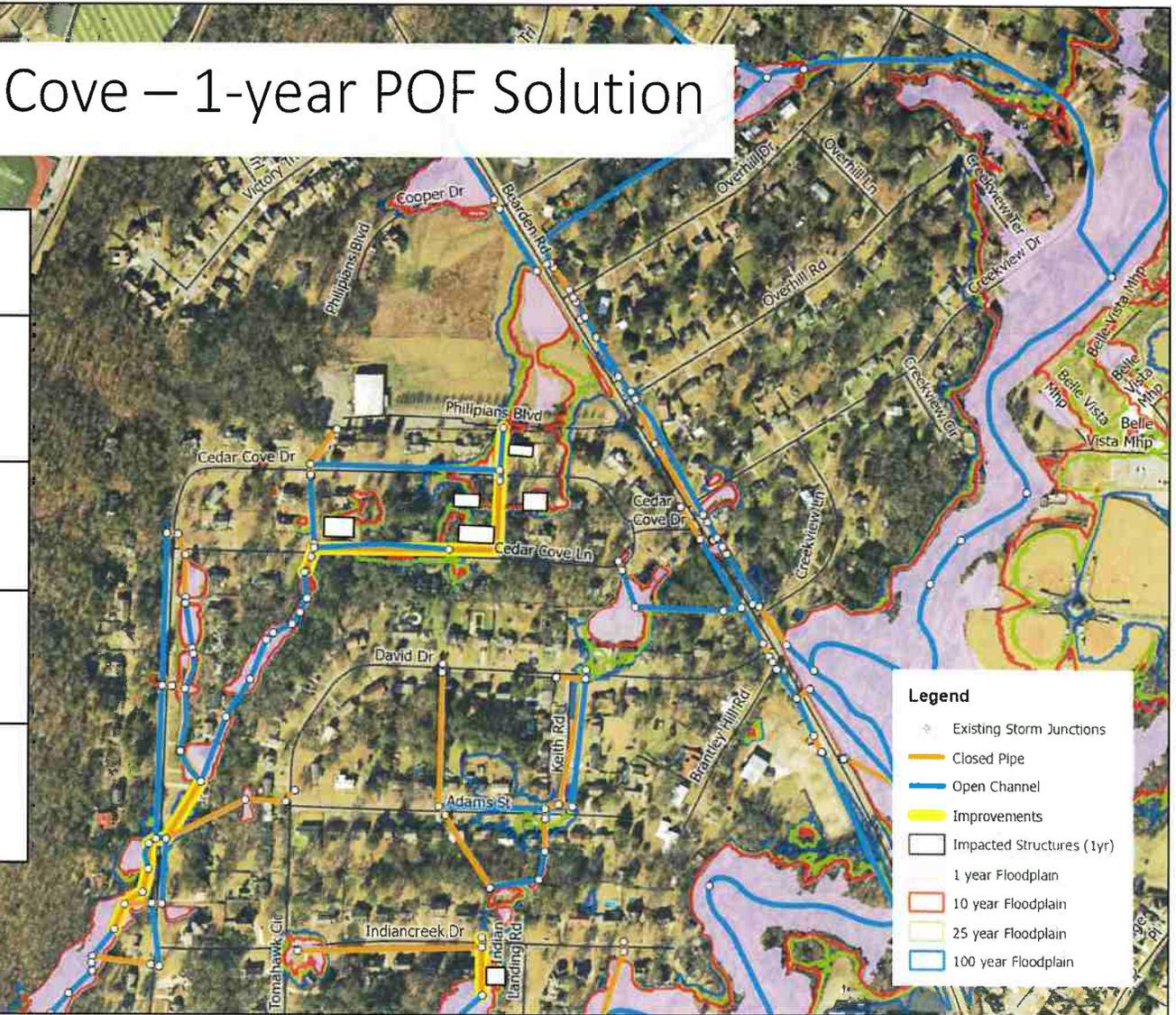
New POF	1 year event/24 hr
At Risk Properties	0
Project Rating	13.2 out of 20
Estimated Project Cost	\$2.7 million 35% on Public ROW 65% on Private Property



Cedar Cove – 1-year POF Solution

Install inlet at Philipians Blvd and increase system capacity

New Level of Service	1 year event/24 hr
At Risk Properties	0
Project Rating	13.2 out of 20
Estimated Project Cost	\$2.7 million 35% on Public ROW 65% on Private Property



Cedar Cove – 25-year POF Solution

Install inlet at Philipians Blvd and increase system capacity

New POF	25-year event/24 hr
At Risk Properties	0
Project Rating	14.3 out of 20
Estimated Project Cost	\$3.3 million 35% on Public ROW 65% on Private Property



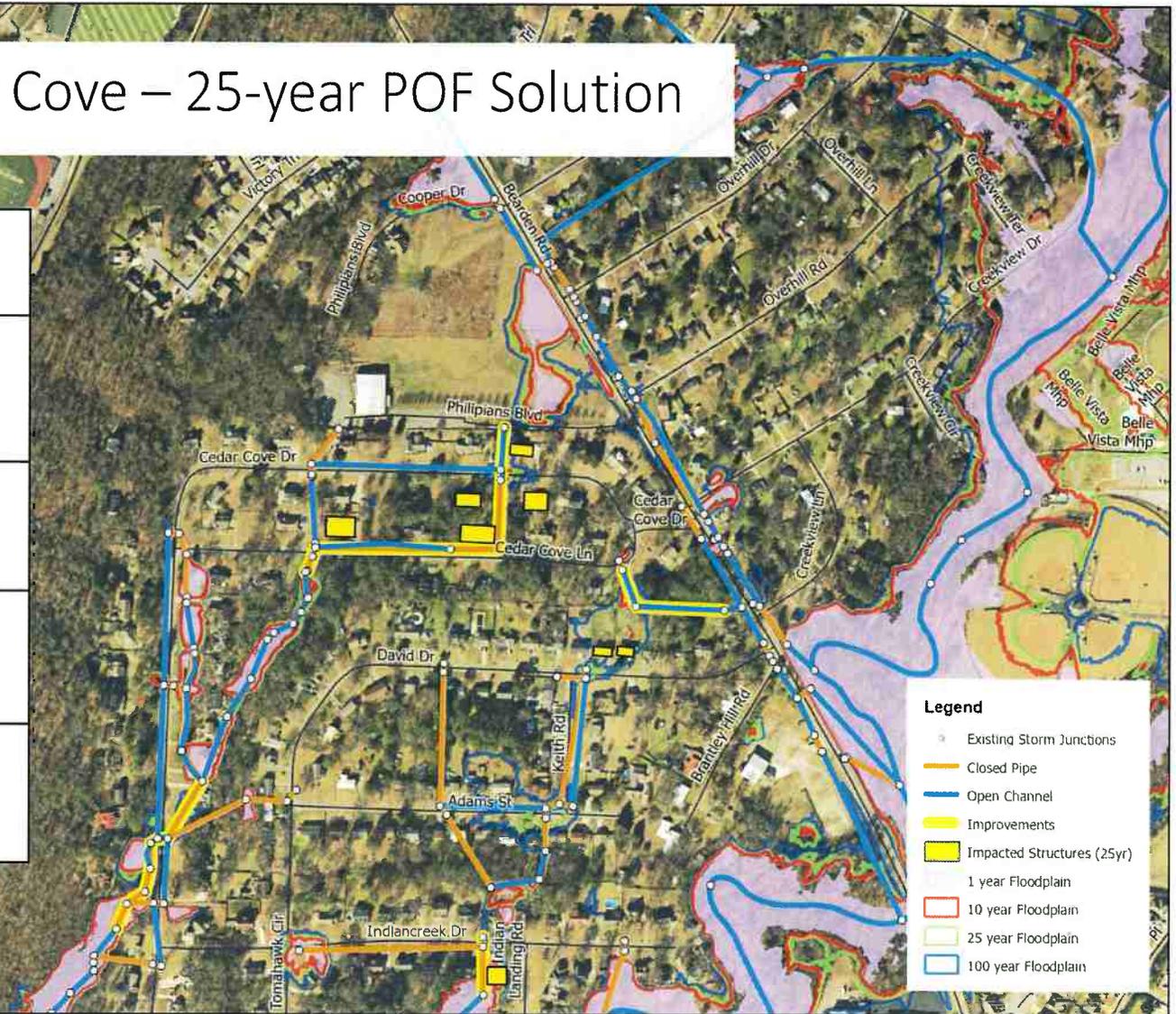
Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- Improvements
- Impacted Structures (25yr)

Cedar Cove – 25-year POF Solution

Install inlet at Philipians Blvd and increase system capacity

New POF	25 year event/ 24 hr
At Risk Properties	0
Project Rating	14.3 out of 20
Estimated Project Cost	\$3.3 million 35% on Public ROW 65% on Private Property



Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- Improvements
- Impacted Structures (25yr)
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 100 year Floodplain

PRELIMINARY SELECTION CRITERIA (PSC)
 PELHAM STORMWATER EVALUATION
 CEDAR COVE - ALT 1: UPSIZE PIPES

CRITERIA	DEFINITION	SCORING SCALE DESCRIPTIONS			WEIGHT	SCORE	W*S	NOTES
		0-3	4-7	8-10				
Permitting and Compliance								
Residential Community Disruption								
Non-Residential Community Disruption								
Operation and Maintenance								
Land Acquisition/ Available Easements								
Grant/Funding Opportunities								
TOTAL PSC SCORE								


What score does this project get?
Weighting Factor →
← 6 Preliminary Selection Criteria
← Project Score
← Weight x Score

Total Project Selection Criteria (PSC) Score **7.4/10**

City of Pelham



**PROJECT PERFORMANCE CRITERIA (PPC)
PELHAM STORMWATER EVALUATION
CEDAR COVE - ALT 1: UPSIZE PIPES TO 1-YEAR EVENT**

CRITERIA	DEFINITION	SCORING SCALE DESCRIPTIONS	WEIGHT	SCORE	W*S	NOTES
CIVIC IMPACT			20%		1.6	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	If the project resolves flood complaints, it receives up to 10 points. If the project does not resolve any flood reports, it receives 0 points.	20%	8	2	Resolves flooding complaint in 1yr event along Cedar Cove Dr
HISTORIC IMPACT			10%		1.0	
Historic Rain Data	Degree to which project addresses historic rainfall exhibited within area in the past 5 years. (10-year, 6-hour event)	If the project addresses historic rainfall event with minimal additional capacity, it receives 10 points. If the project provides significant additional capacity, it receives 0 points.	10%	10	1	Project addresses 1-year 24 hour event which is equivalent to rainfall depth in the 10-year 6 hour event.
FLOOD MITIGATION			70%		3.2	
Non-Structural	Reduction in non-structural flooding experienced on private property. This will include flooding experienced by agricultural fields.	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	5%	8	0.4	Resolves flooding reported in backyard by properties
Habitable Structure	Reduction in flooding experienced by habitable structures in the 25 year event	Each project will receive 1 point per structure experiencing reduction in flooding in the 25 year event up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	40%	2	0.8	Resolves flooding for 6 habitable structures in the 1yr event and reduces flooding of 2 structures in the 25 year event
Streets	Reduction in flooding experienced by public streets	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	15%	10	1.5	Reduces flooding along Philipians Dr., Cedar Cove Dr. and Cedar Cove Ln
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	5%	0	0.0	
Floodplain	Location of property relative to floodplain	If the project does not fall within the floodplain for the 100-year event it receives 10 points. Otherwise it receives 0 points.	5%	10	0.5	Cedar Cove Suidivision is not within floodplain
Minor Impacts	Additional flooding greater than existing upstream or downstream of project area.	If the project causes additional minor non-structural flooding upstream or downstream it receives a -1. If the project causes additional minor structural flooding it receives a -3.			0	

Total Project Performance Criteria Score (PPC)

5.8/10

Total Project Score= PSC + PPC = 13.2

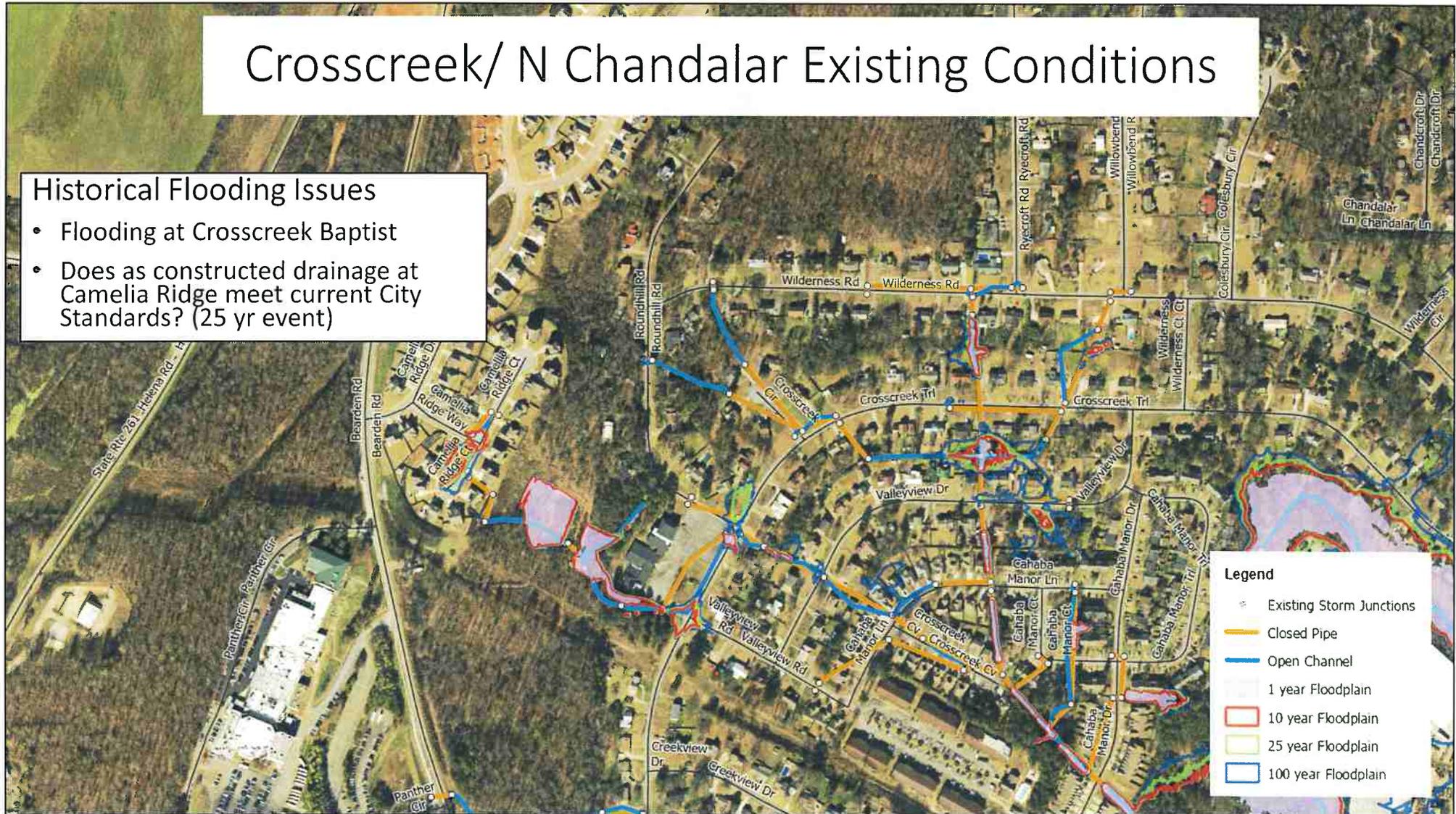
Project Ranking- Cedar Cove

Priority Area	Alternative Project #	New POF	Description	Project Performance	Project Selection	Total Score	Total Estimated Cost	Rank
			Cedar Cove Recommended Project					

Crosscreek/ N Chandalar Existing Conditions

Historical Flooding Issues

- Flooding at Crosscreek Baptist
- Does as constructed drainage at Camelia Ridge meet current City Standards? (25 yr event)



Yeager Parkway /Carl Nichols Existing Conditions

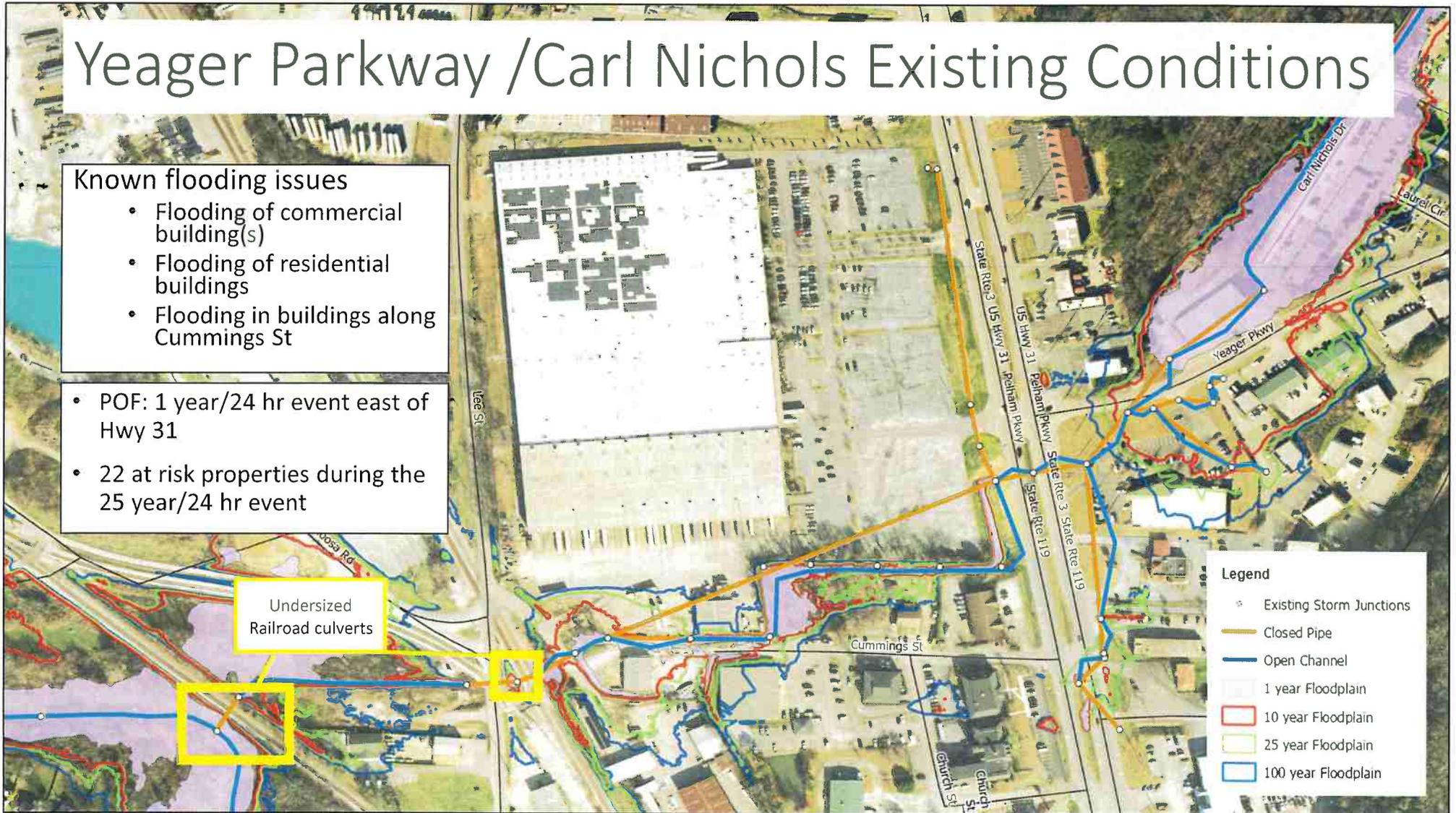
Known flooding issues

- Flooding of commercial building(s)
 - Flooding of residential buildings
 - Flooding in buildings along Cummings St
-
- POF: 1 year/24 hr event east of Hwy 31
 - 22 at risk properties during the 25 year/24 hr event

Undersized
Railroad culverts

Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 100 year Floodplain



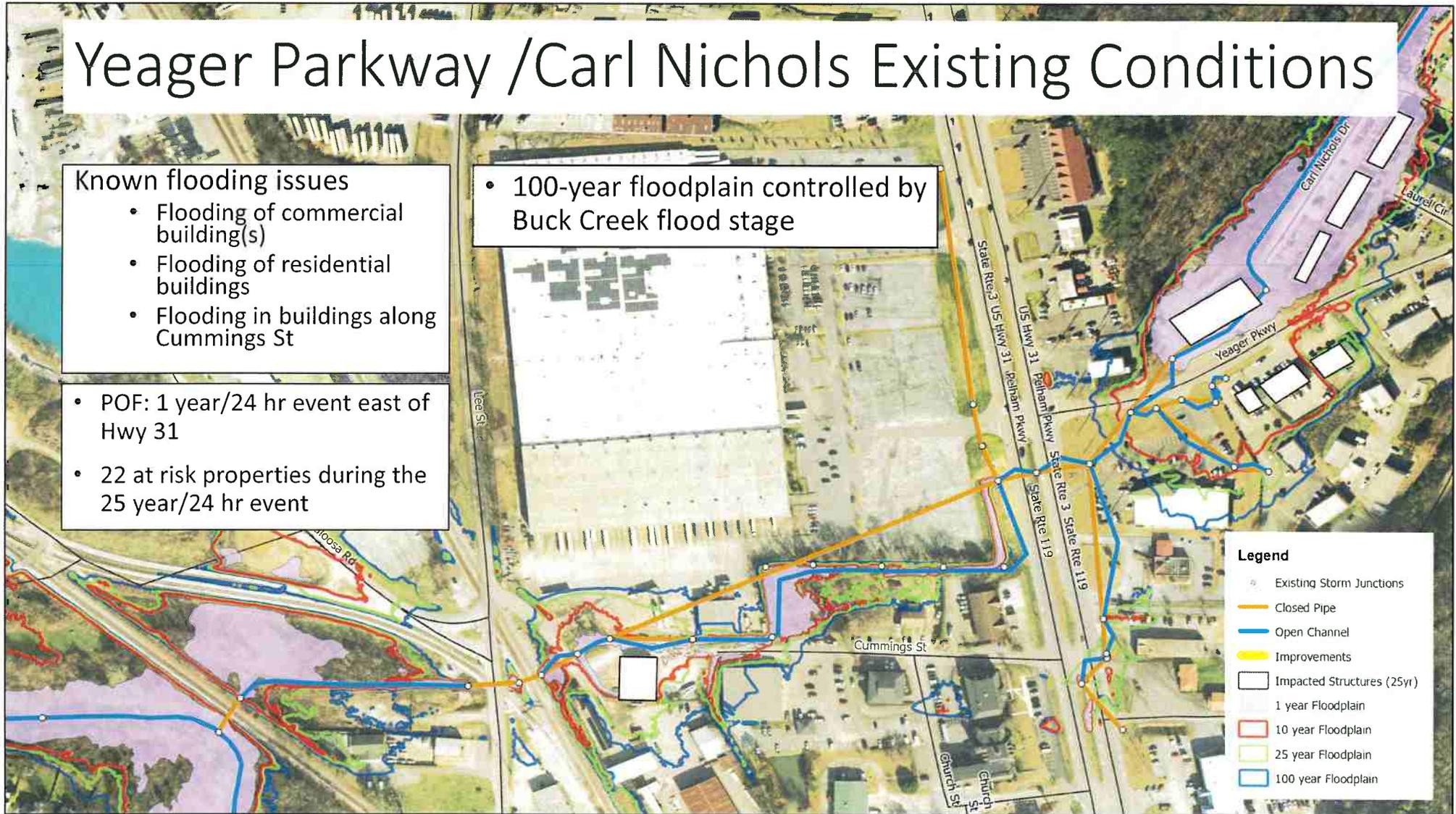
Yeager Parkway /Carl Nichols Existing Conditions

Known flooding issues

- Flooding of commercial building(s)
- Flooding of residential buildings
- Flooding in buildings along Cummings St

- POF: 1 year/24 hr event east of Hwy 31
- 22 at risk properties during the 25 year/24 hr event

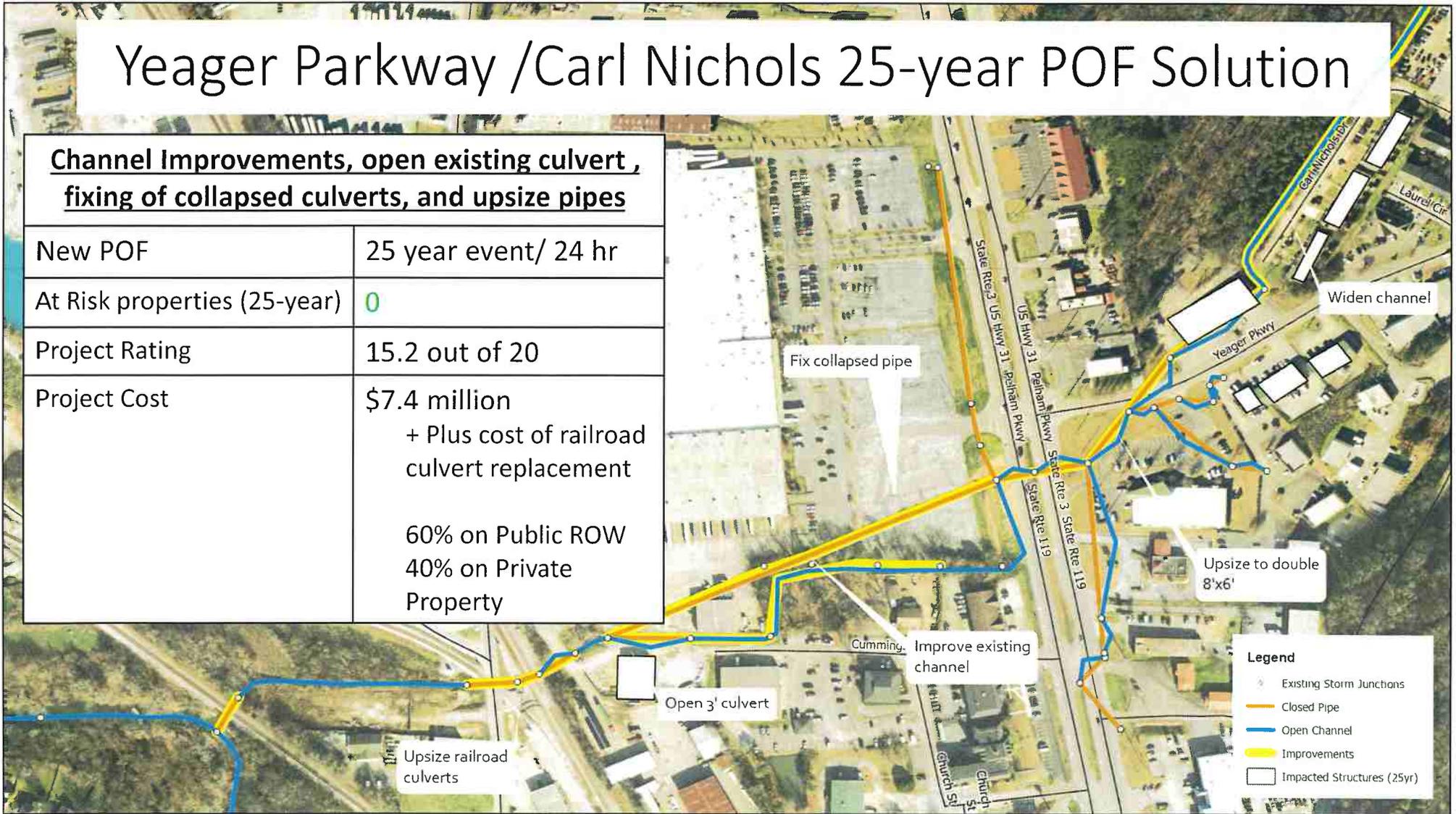
- 100-year floodplain controlled by Buck Creek flood stage



Yeager Parkway /Carl Nichols 25-year POF Solution

Channel Improvements, open existing culvert, fixing of collapsed culverts, and upsize pipes

New POF	25 year event/ 24 hr
At Risk properties (25-year)	0
Project Rating	15.2 out of 20
Project Cost	<p>\$7.4 million + Plus cost of railroad culvert replacement</p> <p>60% on Public ROW 40% on Private Property</p>

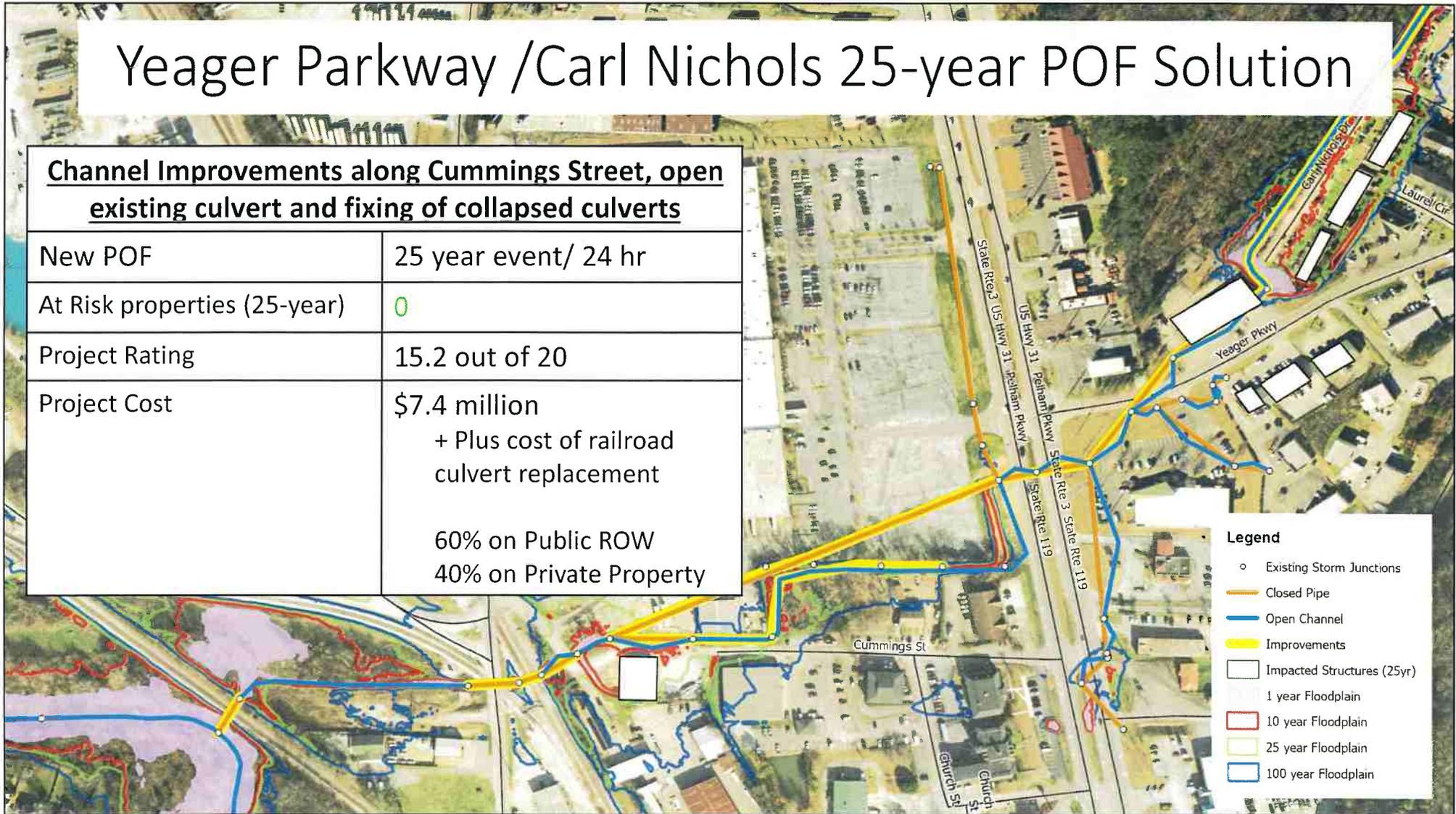


- Legend**
- Existing Storm Junctions
 - Closed Pipe
 - Open Channel
 - Improvements
 - Impacted Structures (25Yr)

Yeager Parkway /Carl Nichols 25-year POF Solution

Channel Improvements along Cummings Street, open existing culvert and fixing of collapsed culverts

New POF	25 year event/ 24 hr
At Risk properties (25-year)	0
Project Rating	15.2 out of 20
Project Cost	<p>\$7.4 million + Plus cost of railroad culvert replacement</p> <p>60% on Public ROW 40% on Private Property</p>



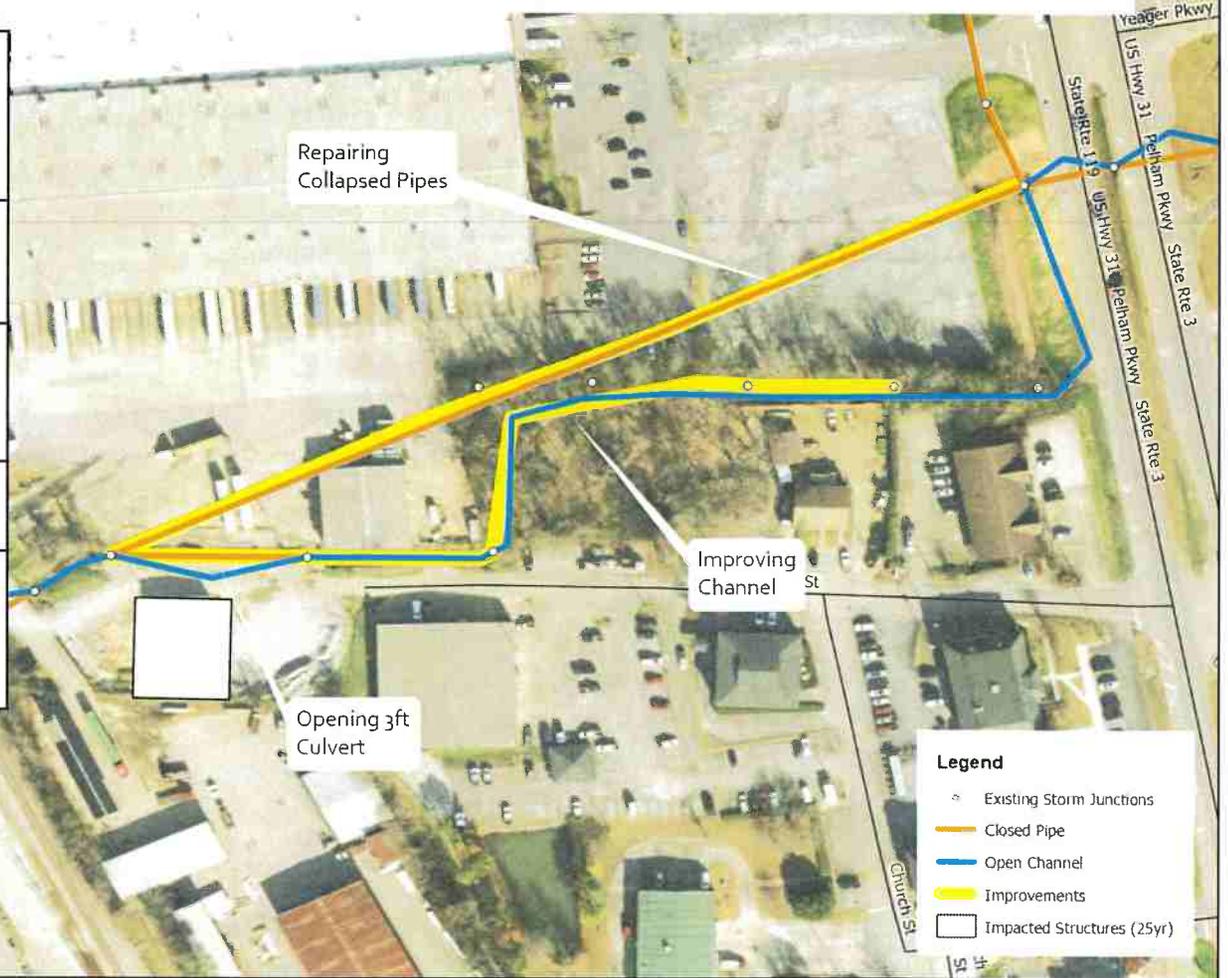
Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- Improvements
- Impacted Structures (25yr)
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 100 year Floodplain

Cummings Street 25-year POF Solution

Channel Improvements along Cummings Street, open existing culvert and fixing of collapsed culverts

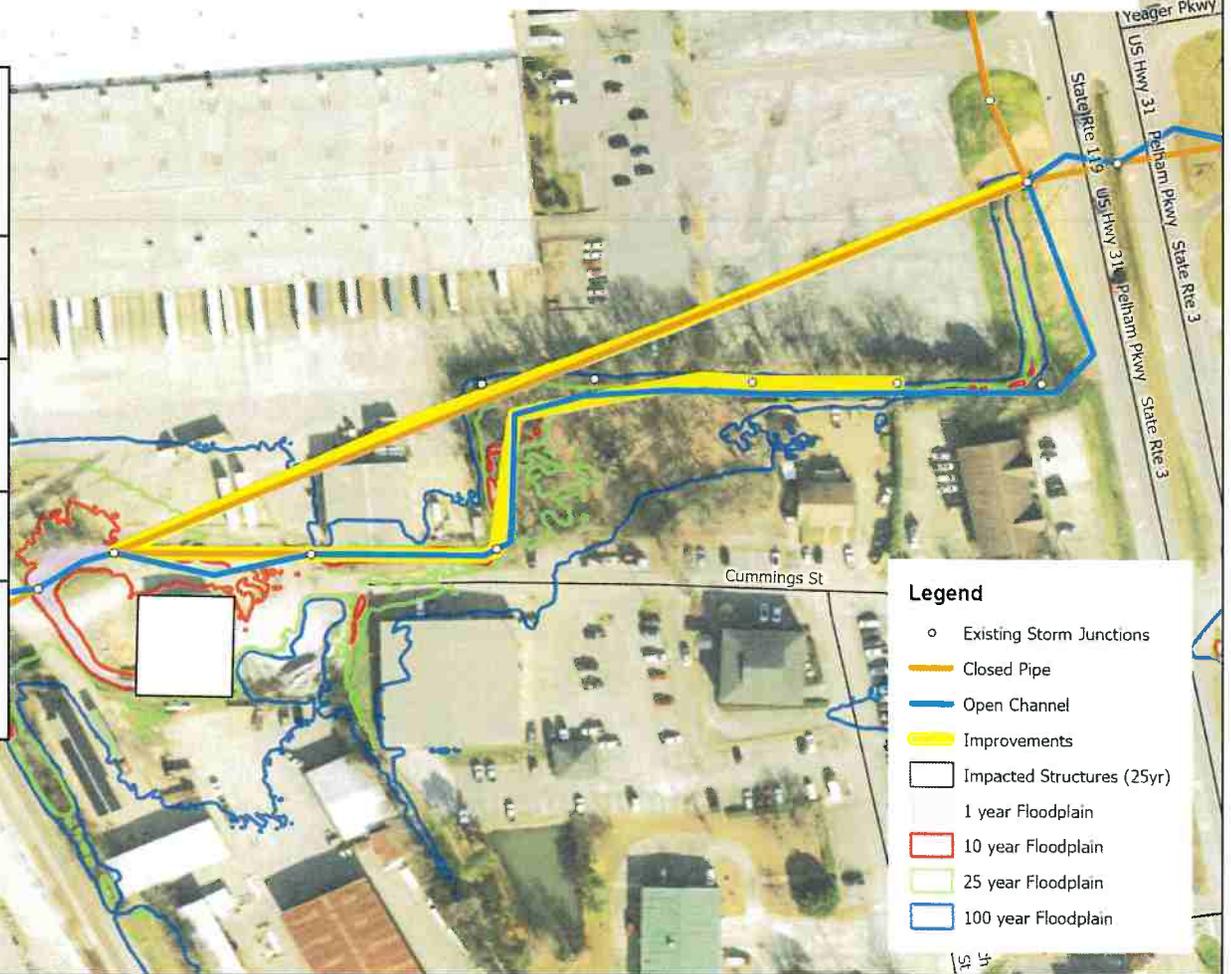
New Level of Service	25 year event/24 hr
At Risk properties	0
Project Rating	10.2 out of 20
Project Cost	\$2.6 million 50% on Public ROW 50% on Private Property



Cummings Street 25-year POF Solution

Channel Improvements along Cummings Street, open existing culvert and fixing of collapsed culverts

New Level of Service	25 year event/24 hr
At Risk properties	0
Project Rating	10.2 out of 20
Project Cost	\$2.6 million 50% on Public ROW 50% on Private Property



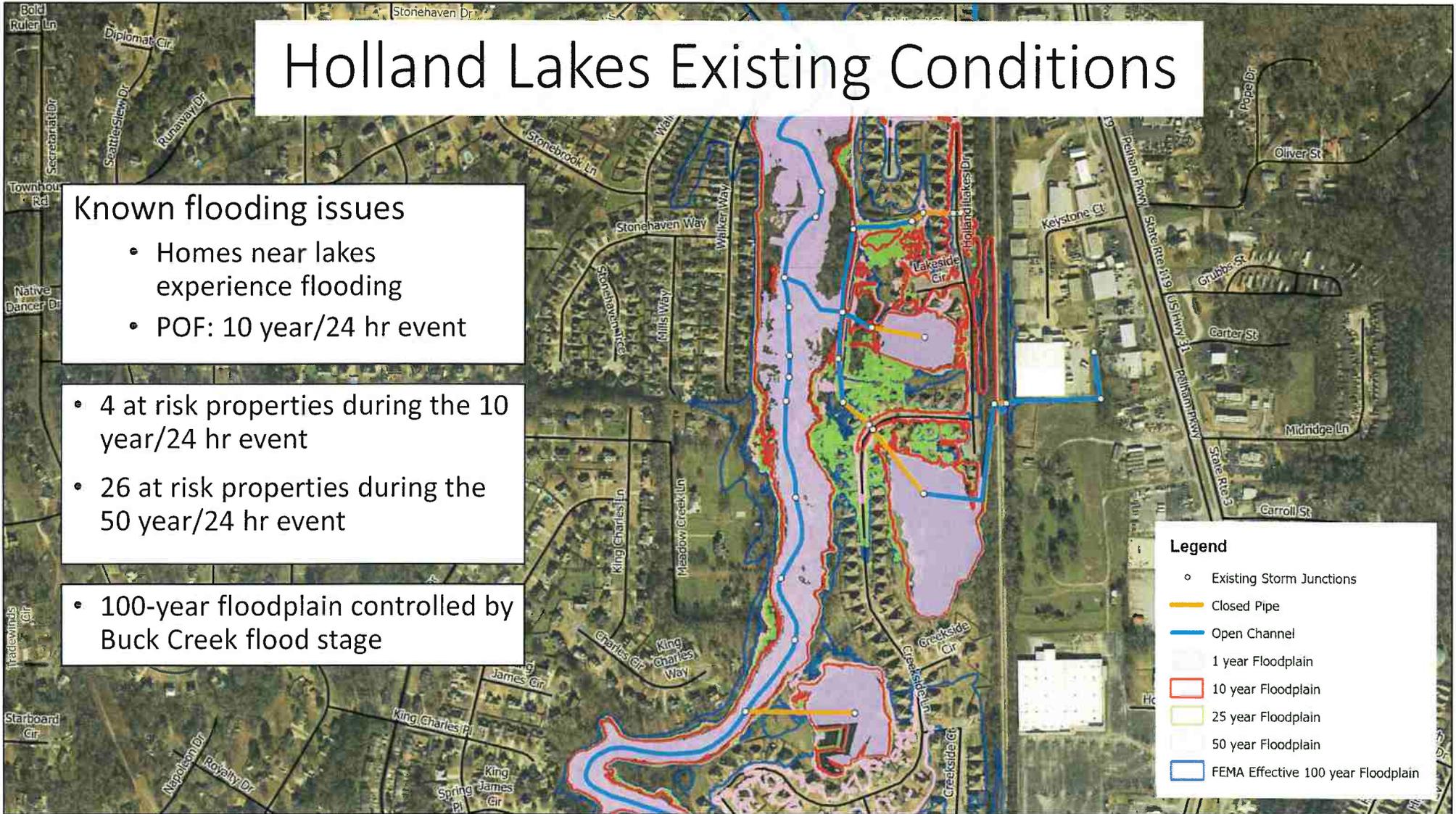
Holland Lakes Existing Conditions

Known flooding issues

- Homes near lakes experience flooding
- POF: 10 year/24 hr event
- 4 at risk properties during the 10 year/24 hr event
- 26 at risk properties during the 50 year/24 hr event
- 100-year floodplain controlled by Buck Creek flood stage

Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 50 year Floodplain
- FEMA Effective 100 year Floodplain



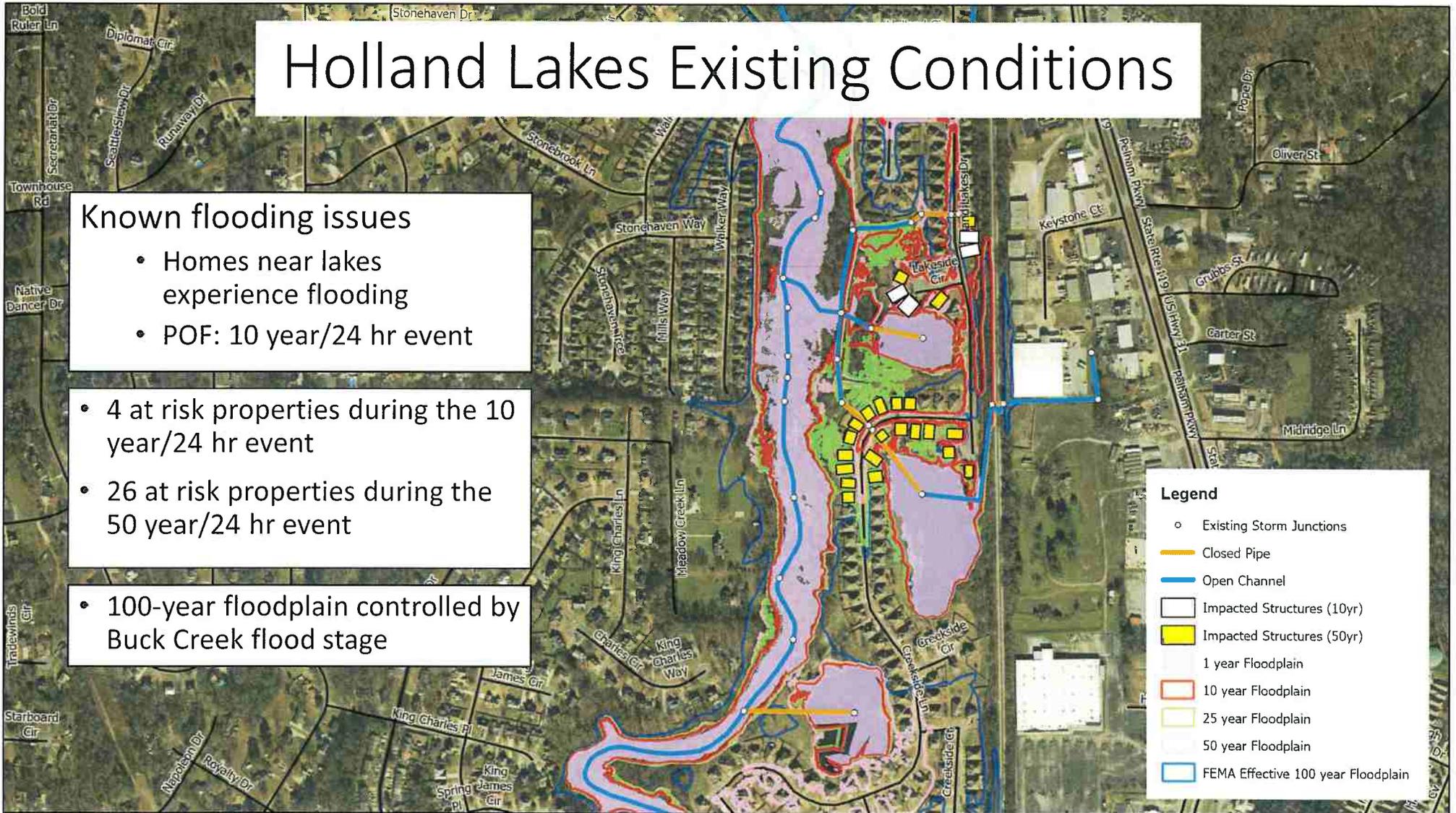
Holland Lakes Existing Conditions

Known flooding issues

- Homes near lakes experience flooding
 - POF: 10 year/24 hr event
-
- 4 at risk properties during the 10 year/24 hr event
 - 26 at risk properties during the 50 year/24 hr event
-
- 100-year floodplain controlled by Buck Creek flood stage

Legend

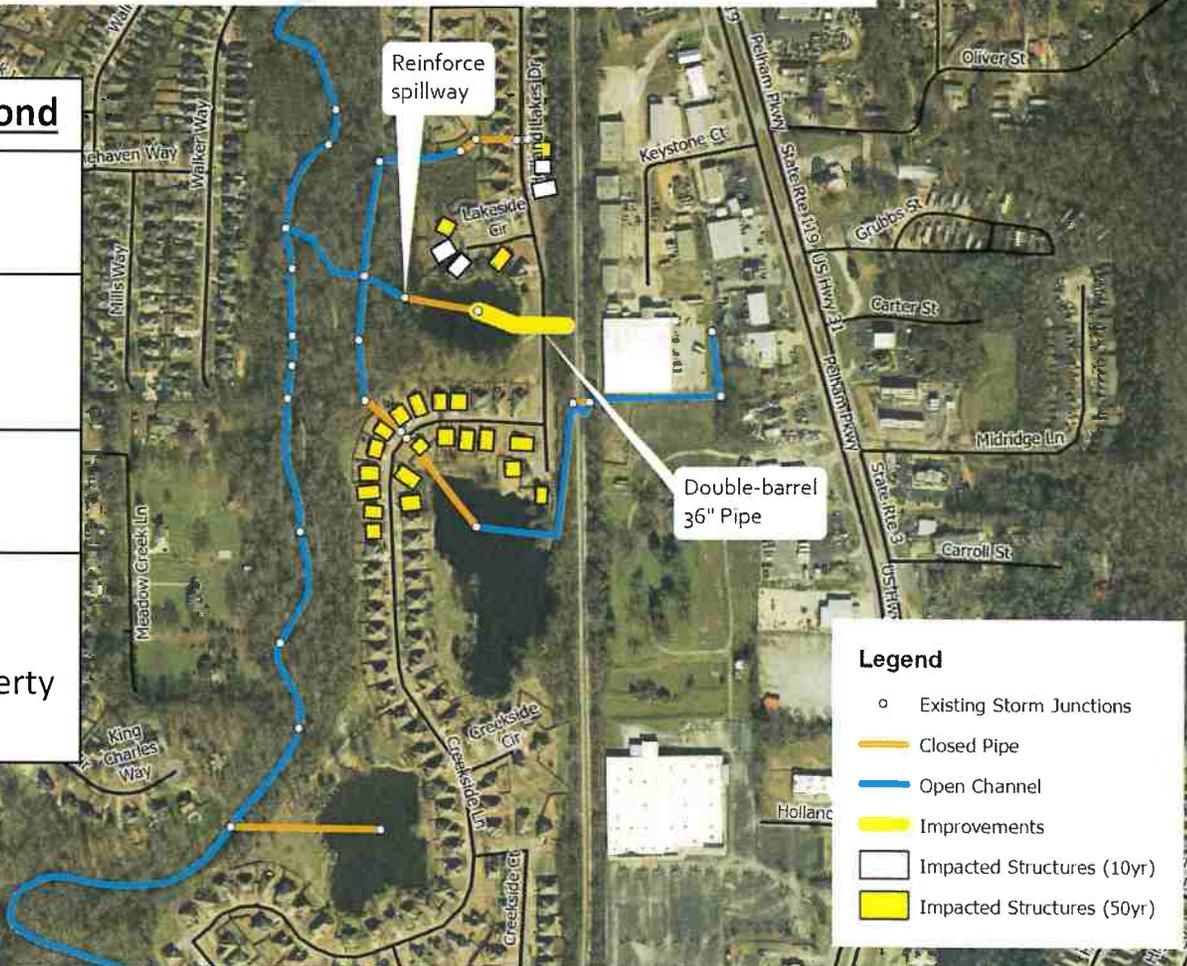
- Existing Storm Junctions
- Closed Pipe
- Open Channel
- Impacted Structures (10yr)
- Impacted Structures (50yr)
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 50 year Floodplain
- FEMA Effective 100 year Floodplain



Holland Lakes 50-year POF Solution

Divert flow from middle pond to north pond

New POF	50 year event/24 hr
At Risk properties (50-year event)	0
Project Rating	17.6 out of 20
Project Cost	\$375,000 40% on Public ROW 60% on Private Property



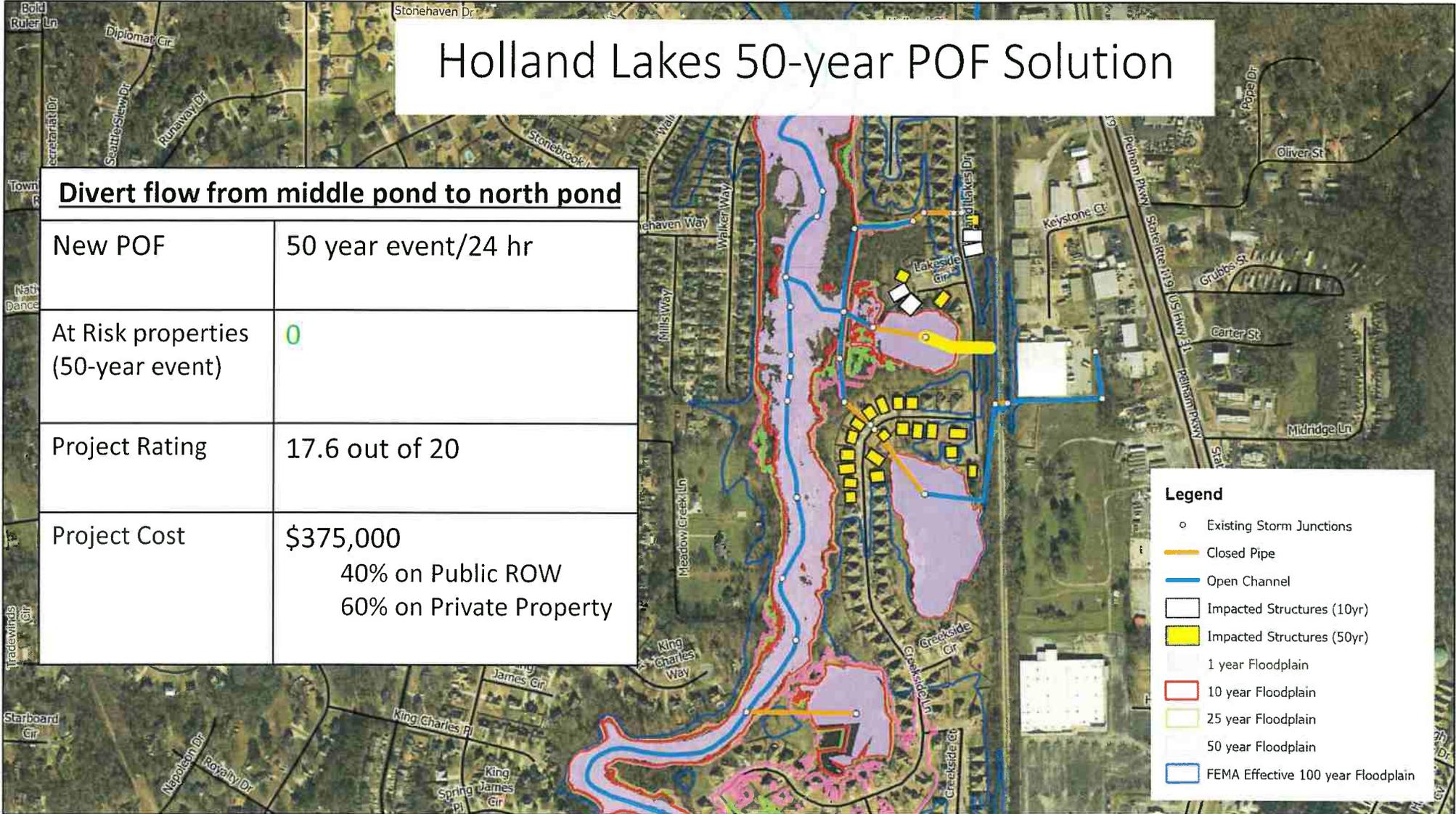
Holland Lakes 50-year POF Solution

Divert flow from middle pond to north pond

New POF	50 year event/24 hr
At Risk properties (50-year event)	0
Project Rating	17.6 out of 20
Project Cost	\$375,000 40% on Public ROW 60% on Private Property

Legend

- Existing Storm Junctions
- Closed Pipe
- Open Channel
- Impacted Structures (10yr)
- Impacted Structures (50yr)
- 1 year Floodplain
- 10 year Floodplain
- 25 year Floodplain
- 50 year Floodplain
- FEMA Effective 100 year Floodplain



Evaluation Summary

		Tier 1 Engineered Solution				Tier 2 Engineered Solution			
Area	Existing POF	Proposed POF	Estimated Cost*	Total Project Score	Grant Eligible	Proposed POF	Estimated Cost*	Total Project Score	Grant Eligible
Cedar Cove	<1-year	1-year	\$2.7 million	14.3/20	No	25-year	\$3.3 million	13.2/20	No
Yeager Parkway/ Carl Nichols & Cummings St	< 1-year	--	--	--	--	25-year	\$7.4 million+ railroad culverts	16.0/20	Yes
Cummings St	<1-year	25-year	\$2.6 million	10.2/20	No	25-year	\$2.6 million + railroad culverts	10.2/20	Yes
Holland Lakes	10-year	--	--	--	--	50-year	\$375,000	17.6/20	Yes

All POF events are 24-hour duration storm events

*Estimated Costs are Preliminary

Ordinance Revisions

14 Total Recommendations

4 Categories

Downstream
Analysis
Implementation

Future
Development
Restrictions

Benchmarking
Additions

Ordinance and
Regulation
Strengthening

Design Specifications	Pelham	Birmingham	Homewood	Hoover	Jefferson County	Mountain Brook	Northport	Tuscaloosa	Vestavia Hills	Atlanta	Gwinnett County
Population	24,000	200,000	26,000	85,000	660,000	21,000	31,000	100,000	34,000	500,000	950,000
"Qpost cannot be significantly higher than Qpre"	X	✓	✓	X	C	X	X	X	X	X	X
"Qpost mimics Qpre to the maximum extent practicable"	✓	X	X	X	X	✓	X	✓	✓	✓	✓
PCSM City Concept Consultation	X	✓	X	X	✓	X	X	X	X	✓	✓
Water Quality Volume Event	1.1-in, 24-hr storm	1.1-in, 24-hr storm	1.1-in, 24-hr storm	1.1-in, 24-hr storm	1.1-in, 24-hr storm	1.1-in, 24-hr storm	X	1.1-in, 24-hr storm	1.1-in, 24-hr storm	1.2-in, 24-hr storm	1.2-in, 24-hr storm
Rv ≤ 0.22	X	✓	X	X	✓	X	X	X	X	X	X
If runoff reduction infeasible, treat WQv	X	✓	X	X	✓	X	X	X	X	✓	✓
O&M responsibility requires explicit written transfer	✓	✓	X	X	✓	X	X	X	□	X	X
O&M responsibility transferred with land ownership	X	X	✓	✓	X	✓	X	✓	X	✓	✓
BMP Enforcement Timeframe	30 days to resolve	30 days to resolve	14 days to resolve	X	14 days to resolve	14 days to resolve	10 days to resolve	X	14 days to resolve	30 days to resolve	X
BMP Inspection Frequency	≥ 1/year	≥ 1/year	≥ 1/year	≥ 1/year	≥ 1/year	≥ 1/year	X	≥ 1/year	≥ 1/year	≥ 1/year	≥ 1/year
BMP Inspection Responsibility	City	Owner		Owner	Owner	Owner	X	Owner	Owner	Owner	Local Agency & Property Owner
Local government has authority to resolve chronic & severe issues and bill owner for cost	✓	✓	X	✓	X	✓	X	X	✓	✓	✓
Pre-Development Curve Number Limit	X	X	X	X	X	X	X	X	X	X	✓
Post-Development Land Use Specification	"Future probable development"	X	X	"Future probable development"	X	City land use plan	"Allowance for future development"	X	X	50-year trends	Anticipate future development
PCSM trigger	Any non single-residence land disturbance	Disturb ≥ 1 acre	New construction or adding ≥ 10% increase in impervious area	X	Disturb ≥ 1 acre	Disturb ≥ 1 acre	X	Disturb ≥ 1 acre or 5000 SF impervious	Disturb ≥ 1 acre or 5000 SF impervious	Disturb ≥ 1 acre or 5000 SF impervious	Disturb ≥ 1 acre or 5000 SF impervious
Q100post ≤ Q100pre	X	X	X	X	X	✓	X	X	X	✓	✓
Qpost ≤ Qpre for the 2-, 10-, and 25-year storm	X	✓	X	X	✓	✓	X	X	✓	X	✓
Overbank Flood Peak Discharge Rate Reduction up to the 25-year storm	X	X	X	X	X	X	X	X	X	✓	X
Energy dissipation at outlets required	X	✓	X	X	✓	✓	✓	✓	✓	✓	✓
Detention Pond Volume	25-year, 24-hour	1-, 25-, and 100-year, 24-hour	25-year, 24-hour	25-year, 1-hour	X	100-year, 24-hour	1-, 10-, 25-, and 100-year, 24-hour	2-, 10-, and 100-year, 24-hour	X	1-, 25-, and 100-year, 24-hour	1-, 25-, and 100-year, 24-hour
Detention Pond Freeboard	12 in	12 in	X	X	12 in	12 in	X	12 in	X	X	18 in
Channel Protection (1-year, 24-hour storm)	X	✓	X	X	✓	✓	✓	X	X	✓	✓
Channel Protection Trigger	X	All projects	X	X	All projects	X	X	X	X	Disturbs ≥ 5000 SF impervious or does not supply RRV and WQv	Disturb ≥ 1 acre or 5000 SF impervious
Defined Rainfall Depths	X	✓	Latest available data	X	✓	✓	X	X	X	X	✓
Velocity Calculation Storm Frequency	X	X	X	C	X	2-year, 24-hour	25-year	X	X	25-year	25-year
Max Velocity for Vegetative Protection	X	5 ft/s	5 ft/s	5 ft/s	X	6 ft/s	6 ft/s	6 ft/s	X	✓	10 ft/s
				Disturb ≥ 1	Disturb ≥ 1	Disturb ≥ 1					

Design Specifications		Pelham	Birmingham	Homewood	Hoover	Jefferson County	Mountain Brook	Northport	Tuscaloosa	Vestavia Hills	Atlanta	Gwinnett County
Population		24,000	200,000	26,000	85,000	660,000	21,000	31,000	100,000	34,000	500,000	950,000
Downstream Analysis (DSA)	DSA at 10% point	X	✓	X	X	✓	□	X	X	✓	✓	✓
	DSA at site outfalls onto adjacent property	X	✓	X	X	✓	X	X	X	X	✓	X
	Qpost ≤ Qpre for the 2-year to 25-year storm	X	✓	X	X	✓	X	X	X	X	✓	✓
Linear Feasibility Policy	Cost (15%)	X	X	X	X	X	X	X	X	X	✓	X
	Historic Significance	X	X	X	X	X	X	X	X	X	✓	X
	Bedrock	X	X	X	X	X	X	X	X	X	✓	X
	Groundwater	X	X	X	X	X	X	X	X	X	✓	X
	Cost (15%)	X	✓	X	X	✓	X	X	X	X	✓	X
General Feasibility Policy	Historic Significance	X	✓	X	X	✓	X	X	X	X	✓	X
	Bedrock	X	✓	X	X	✓	X	X	X	X	✓	X
	Groundwater	X	✓	X	X	✓	X	X	X	X	✓	X
	No impairment from proposed plans	X	X	X	X	X	✓	X	X	X	✓	X
	Alternative minimum requirements approved by City	X	X	X	X	X	✓	✓	X	X	✓	X
	Offsite facility treatment	X	X	X	X	X	✓	X	X	X	✓	X
	Unsuitable onsite physical characteristics	X	X	X	X	X	✓	X	X	X	✓	X
	Pipes and inlets must pass the XX-year storm	25-year, "except for major drainageways"	25-year	X	25-year	25-year	2-year	X	X	2-year	10- to 25-year	25-year
	Open Channel Freeboard	X	24 in	X	X	X	X	X	X	X	0.2 ft	X
	Enhanced Swale Freeboard	X	6 in	X	X	X	X	X	X	X	6 in	6 in
Misc	Culverts must pass the XX-year storm	25-year, "except for major drainageways"	100	X	X	X	X	25-year	X	X	10- to 25-year	100-year
	Min Culvert Velocity	X	X	X	X	X	X	X	2 ft/s	X	X	2.5 ft/s (2-year)
	Min Pipe/Culvert size	18 in	18 in	18 in	18 in	X	18 in	15 in	18 in	18 in	X	18 in
	Min Culvert Slope	0.25 in/ft	X	X	X	X	0.25 in/ft	X	0.25 in/ft	0.25 in/ft	X	10%
	Min Culvert length is crossing width, including side slopes	✓	✓	X	X	X	✓	X	✓	✓	X	X
	Streambank Max Side Slope	X	2:1	X	3:1	X	2:1	X	2:1	2:1	2:1	2:1
	Drainage Easement Max Side Slope	4:1	<15%	X	3:2	X	X	X	2:1	X	2:1	15%
Max Detention Pond Depth for Design Storm	X	10 feet	4 feet	4 feet	X	X	X	X	X	X	8 feet	
Min Culvert Soil Cover depth	0.5 culvert diameter or 24 in (whichever is greater)	Refer to Manufacturer	X	X	X	0.5 culvert diameter or 24 in (whichever is greater)	X	X	0.5 culvert diameter or 24 in (whichever is greater)	X	X	

Ordinance Revisions

1. Include downstream analysis requirements for all proposed development that increases impervious area by more than 10%.
2. Include analysis at all "choke points" or conveyances between site outfall and downstream analysis point.
3. Place limits on pre-development curve numbers within certain districts.
4. Impose a reduction factor for peak discharges based on the percentage of proposed impervious cover on the site.
5. Reduce the maximum lot development for residential properties.
6. Require energy dissipation measures at outlets.
7. Require the 100-year storm to be detained in certain circumstances.

Ordinance Revisions

8. Require the extended detention of the 1-year, 24-hour storm, or the Channel Protection Volume (CPv).
9. Define the circumstances under which CPv treatment is required.
10. Implement a feasibility policy for proposed developments.
11. Define “major drainageways” as it is included as an exception in structure conveyance requirements.
12. Define a maximum velocity at outfalls where vegetative protection must be implemented.
13. Require a conceptual consultation meeting with the City prior to the final design of a proposed development.
14. Create stormwater management site plan review checklists for internal use by reviewers and external use by development permit applicants to submit