City of Bloomington

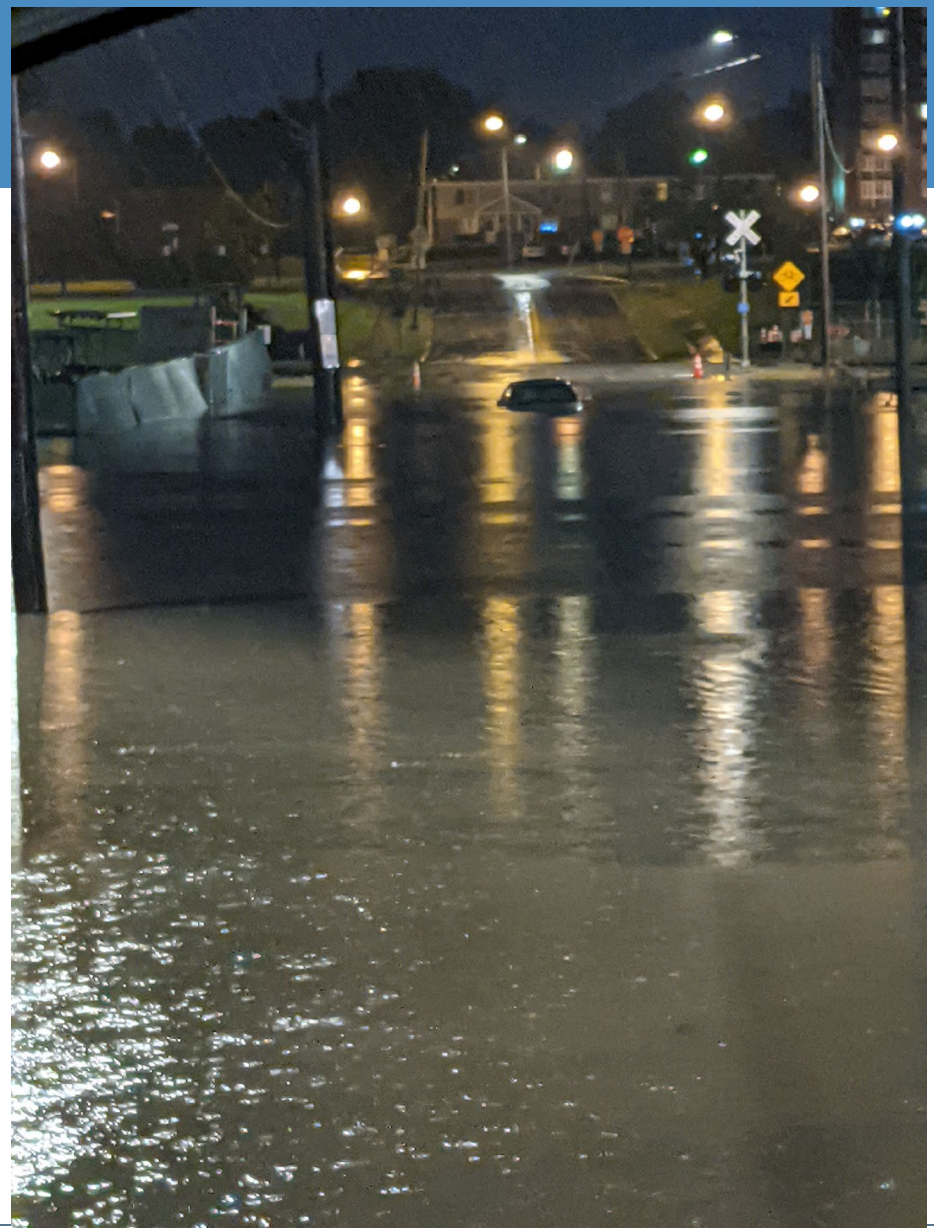
Hydraulic Modeling: East Street Detention Basin & Related Sewer Improvements

BAXTER & WOODMAN Consulting Engineers

June 2021 Flooding

Historic rain event on June 25-26, 2021

- **Citywide flooding**
- **Greater than 500-year storm**



East Street

Flooding Along East Street, June 1935

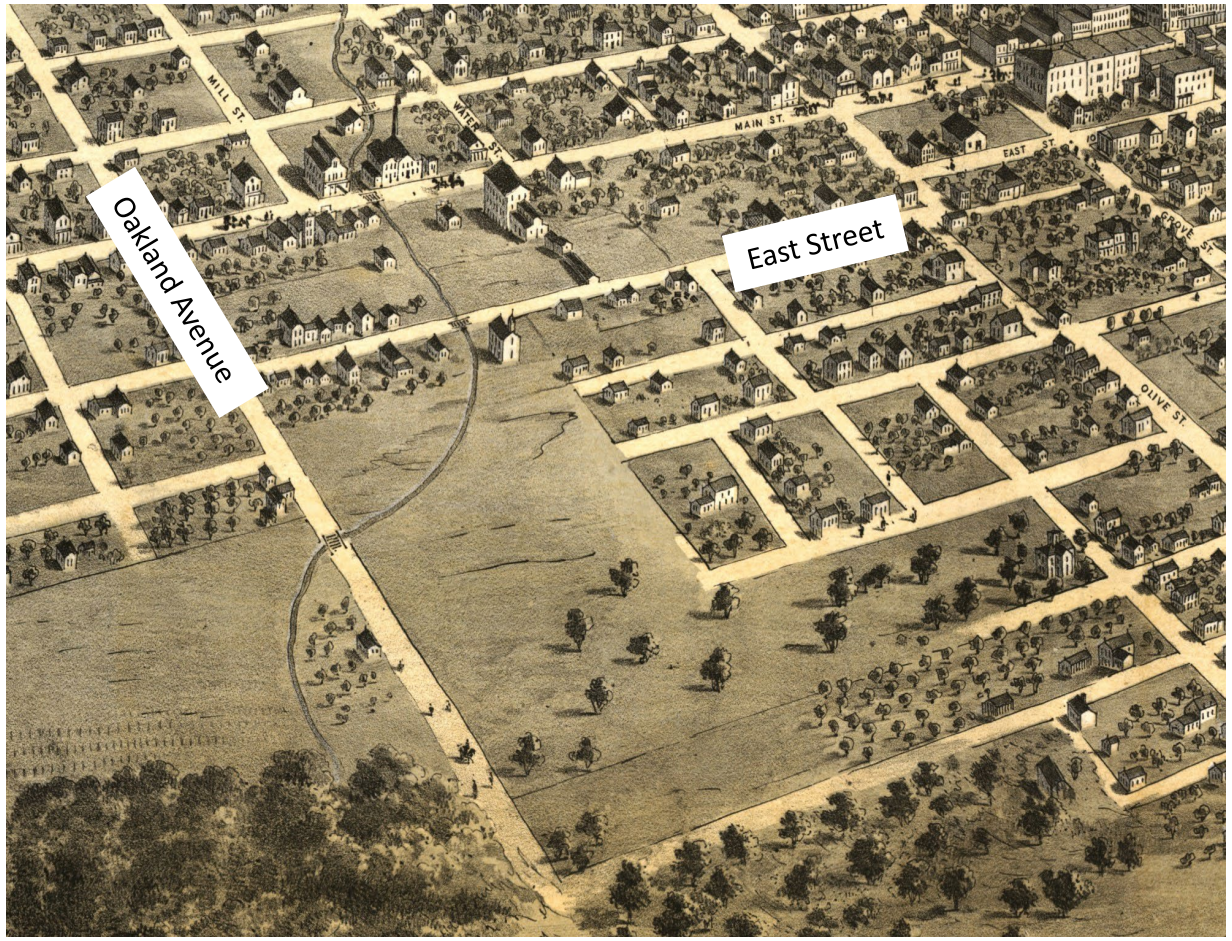
- June 16, 1935, flood event
- Current East Street Basin Alternatives site

East Street

McLean County Historical Society

Oakland Avenue (formerly Clay St) Circa 1867

- Stream crossing prior to construction of railroad
- Continues to be a low spot that floods often

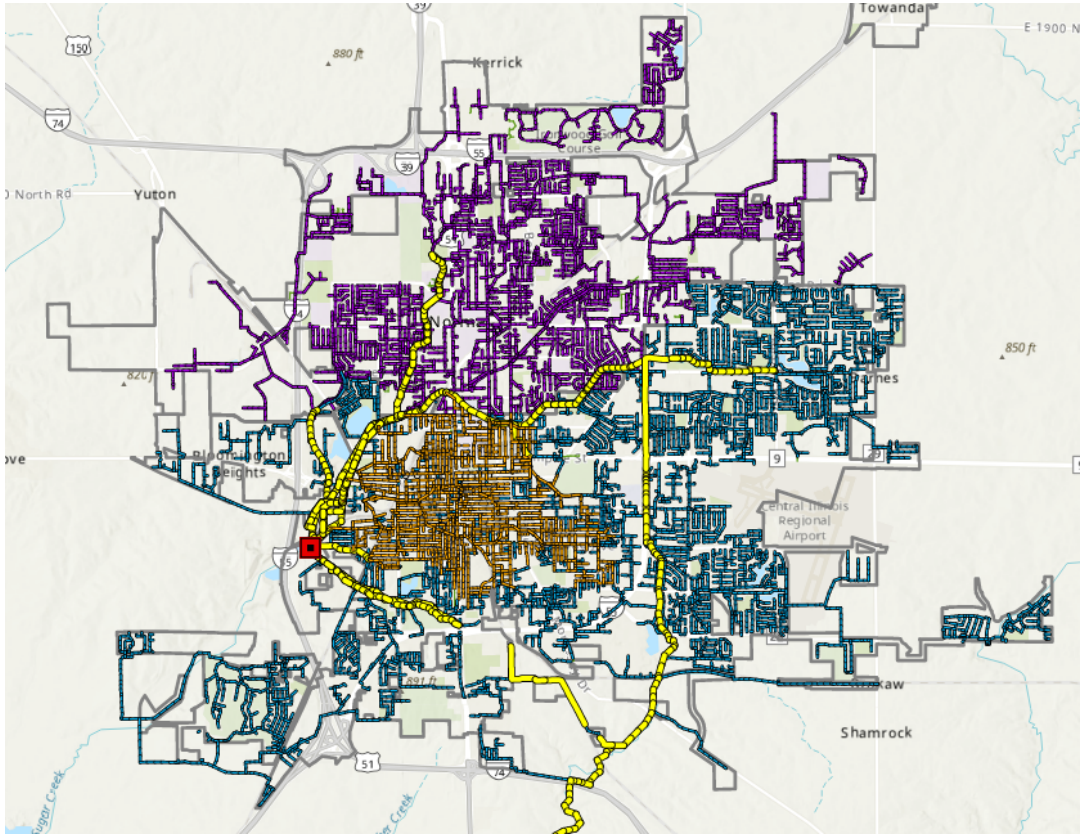


Oakland Avenue Current Day

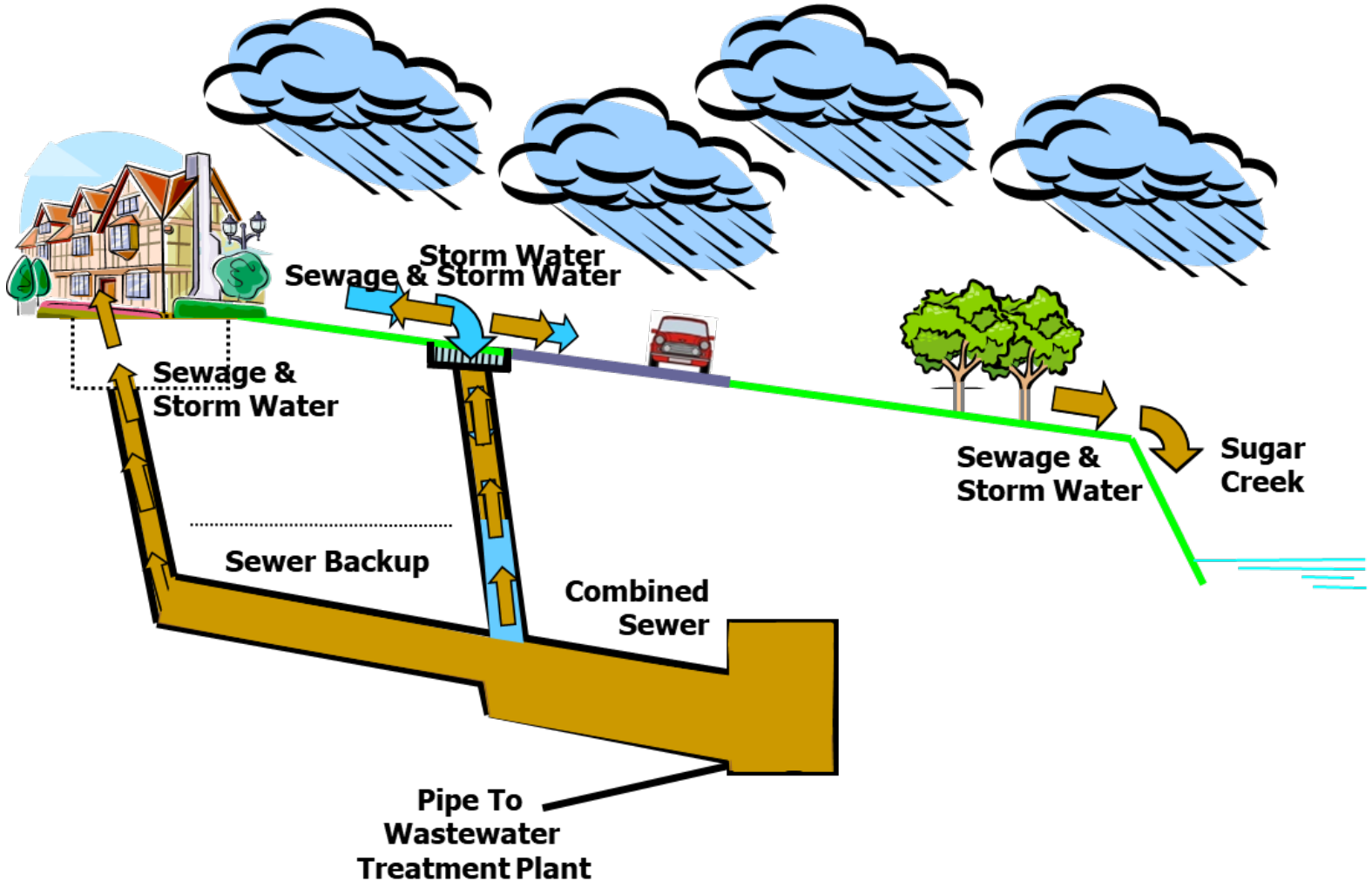
- 60” combined pipe was constructed to replace stream
- Continues to be a low spot that floods often

Bloomington Sewer System & BNWRD

- Storm sewers generally discharge to Creeks
- Combined and sanitary sewers discharge to BNWRD sewers
- BNWRD sewers also accept sanitary discharge from Normal
- BNWRD sewers discharge to wastewater treatment plants



Bloomington Sewer System & BNWRD



2014 Stormwater and Sanitary Sewer Masterplan

Determined Oakland Avenue watershed has highest density of stormwater issues in City

Roads are impassible and dozens of residences are at risk of flooding

Proposed a phased improvement plan

2014 Stormwater and Sanitary Sewer Masterplan

Proposed phased improvement plan:

- Sewer separation
- New detention basin on the City's public works facility along East Street

2014 Stormwater and Sanitary Sewer Masterplan

Proposed phased improvement plan:

- Conveyance to Pond 2 along Constitution Trail
- Combined improvements would divert ~ 200M gallons/year of stormwater

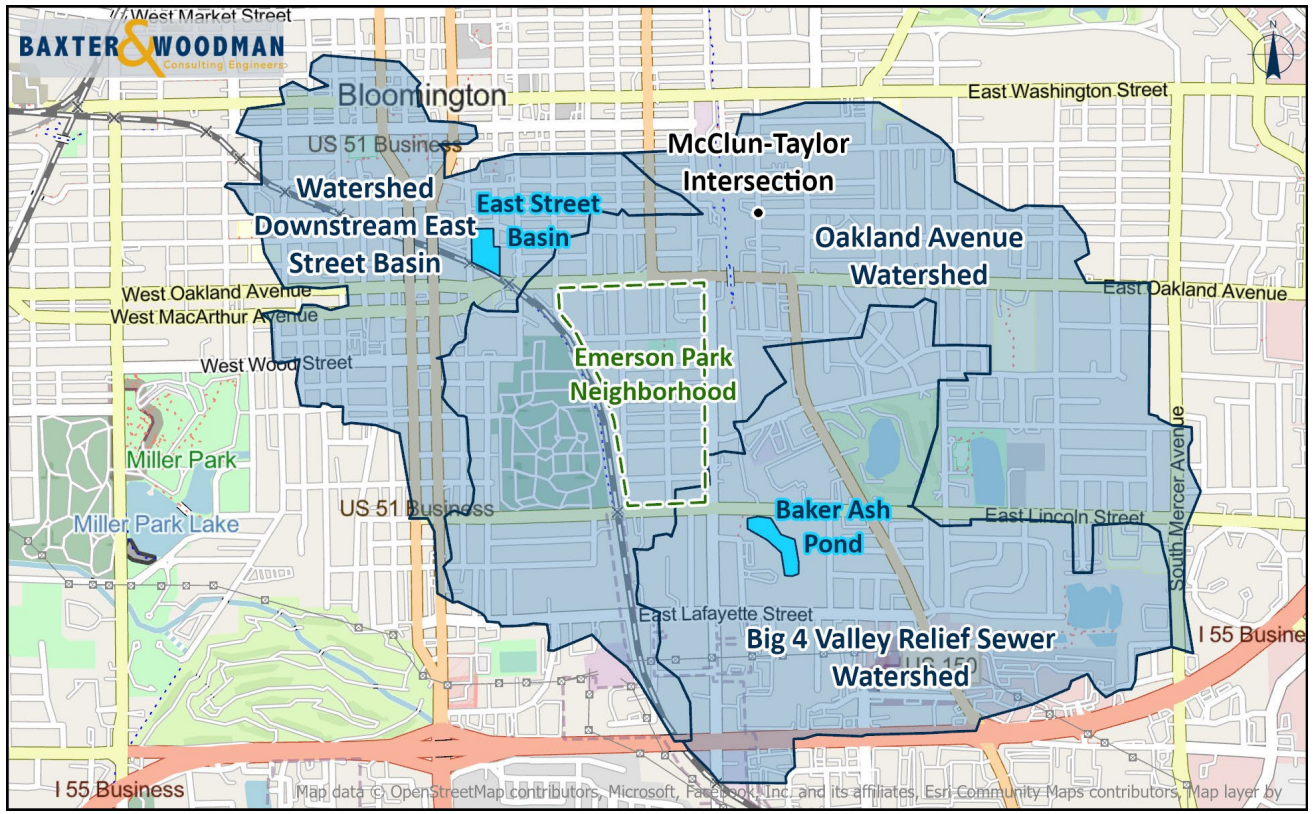
Design Considerations – Goals for East Street Basin Study:

Develop	Determine	Ensure
Develop in-depth understanding of stormwater hydrology and flooding	Determine efficient way to get stormwater only to East Street Basin	Ensure Basin provides maximum benefit for design event

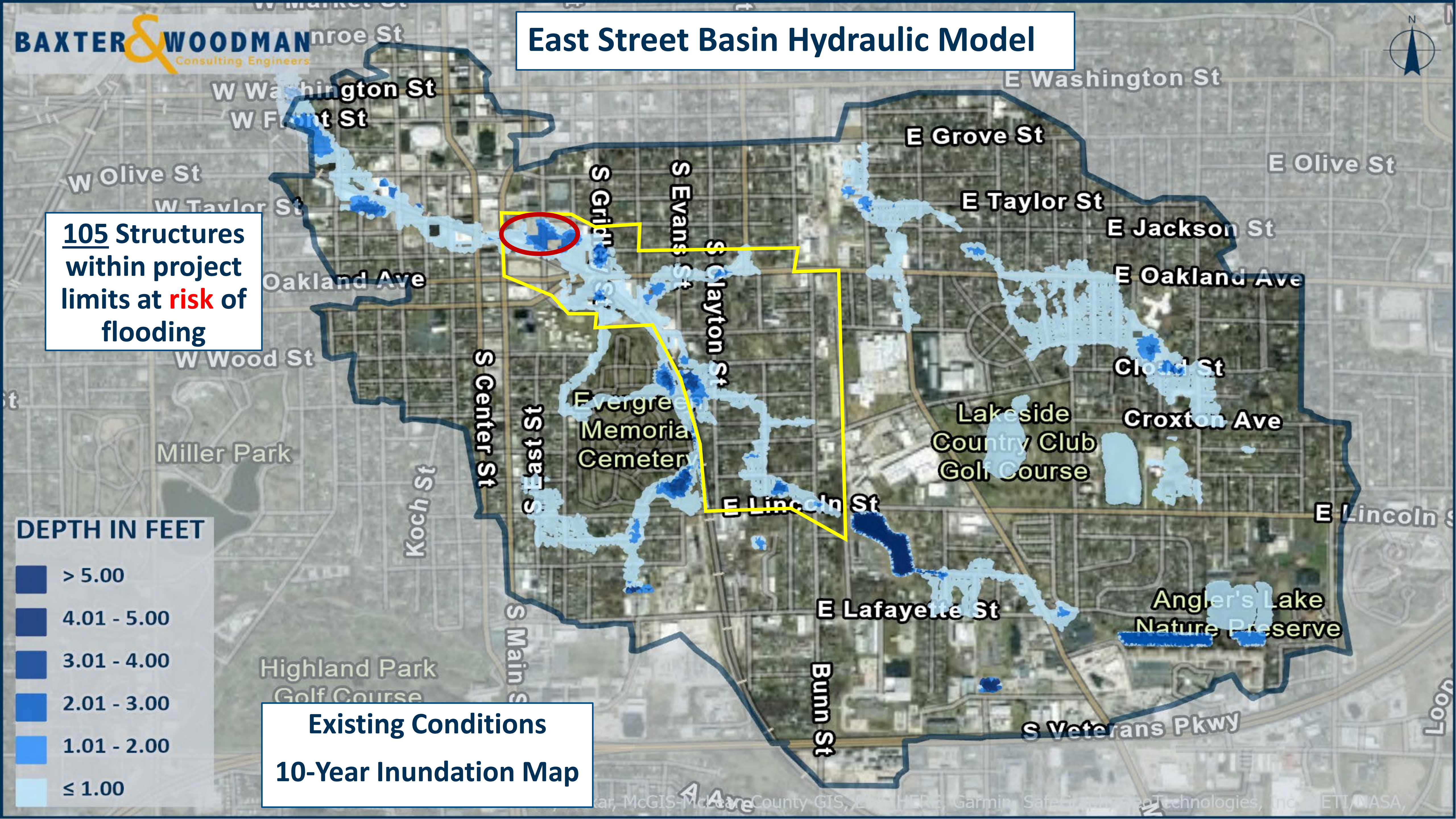
East Street Basin Hydraulic Model

B&W developed a hydrologic and hydraulic model for:

- **Oakland Avenue,**
- **the BNWRD Storm Sewer,**
- **downstream watersheds.**



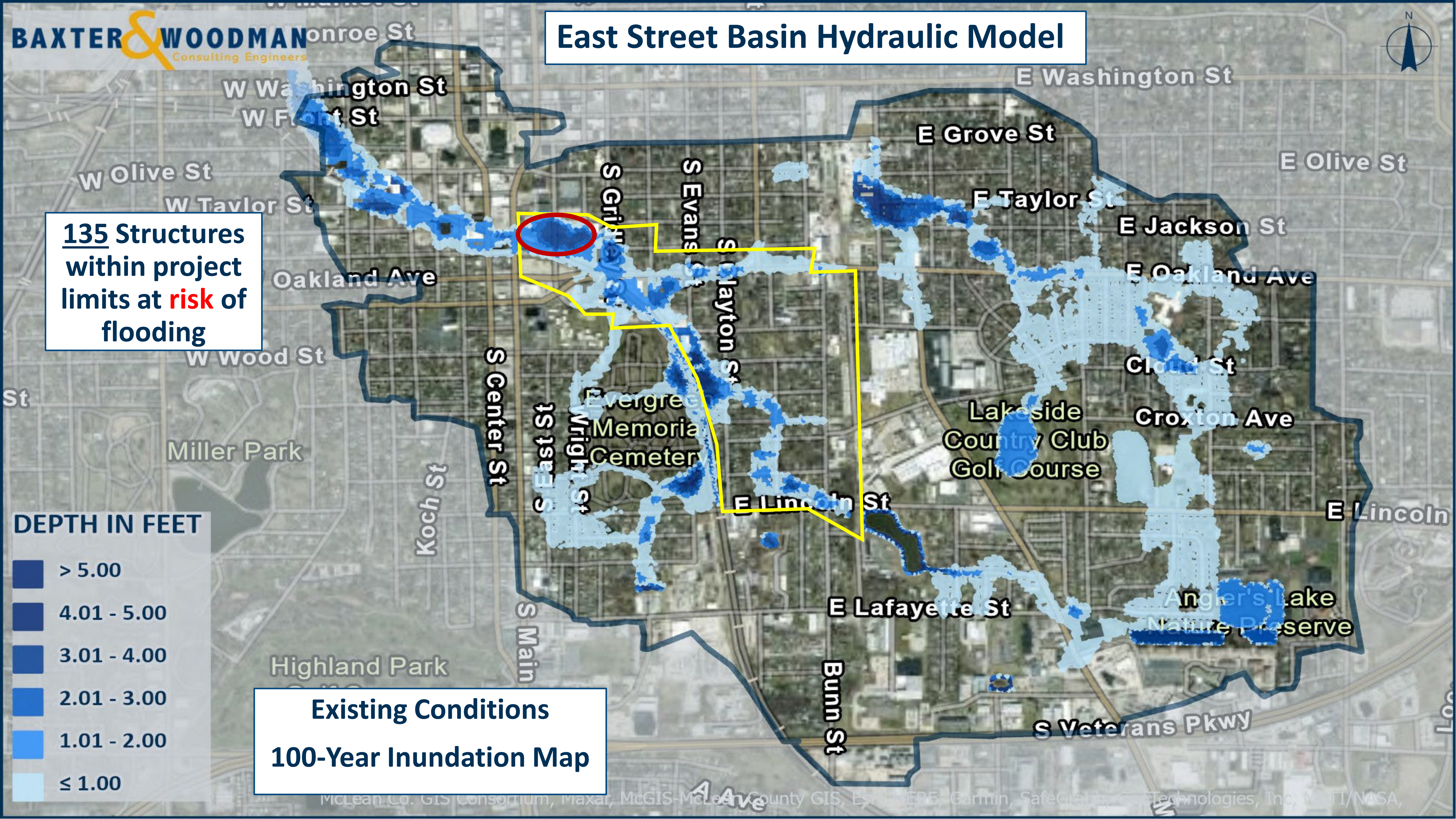
East Street Basin Hydraulic Model

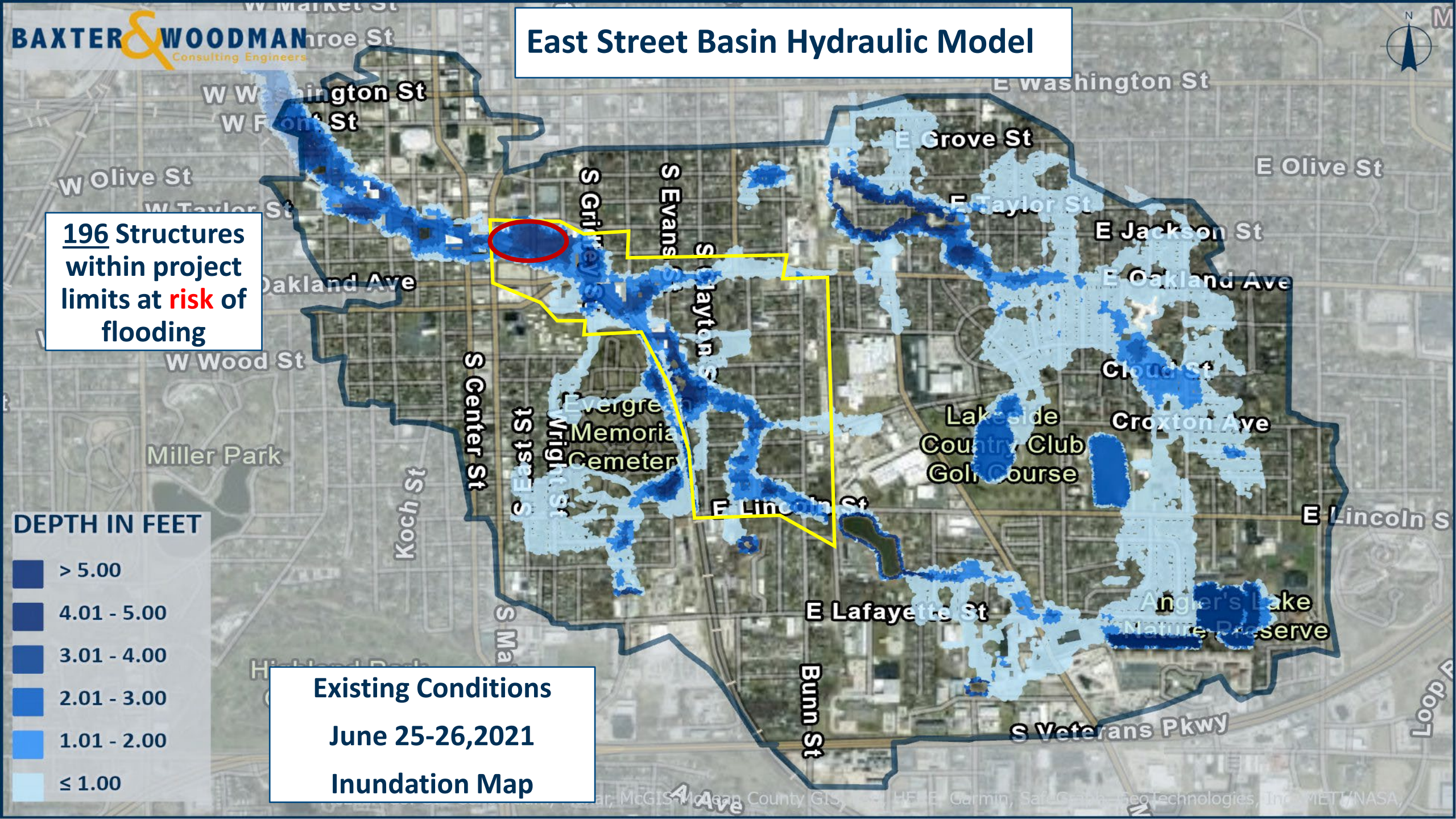


105 Structures within project limits at risk of flooding

Existing Conditions

10-Year Inundation Map

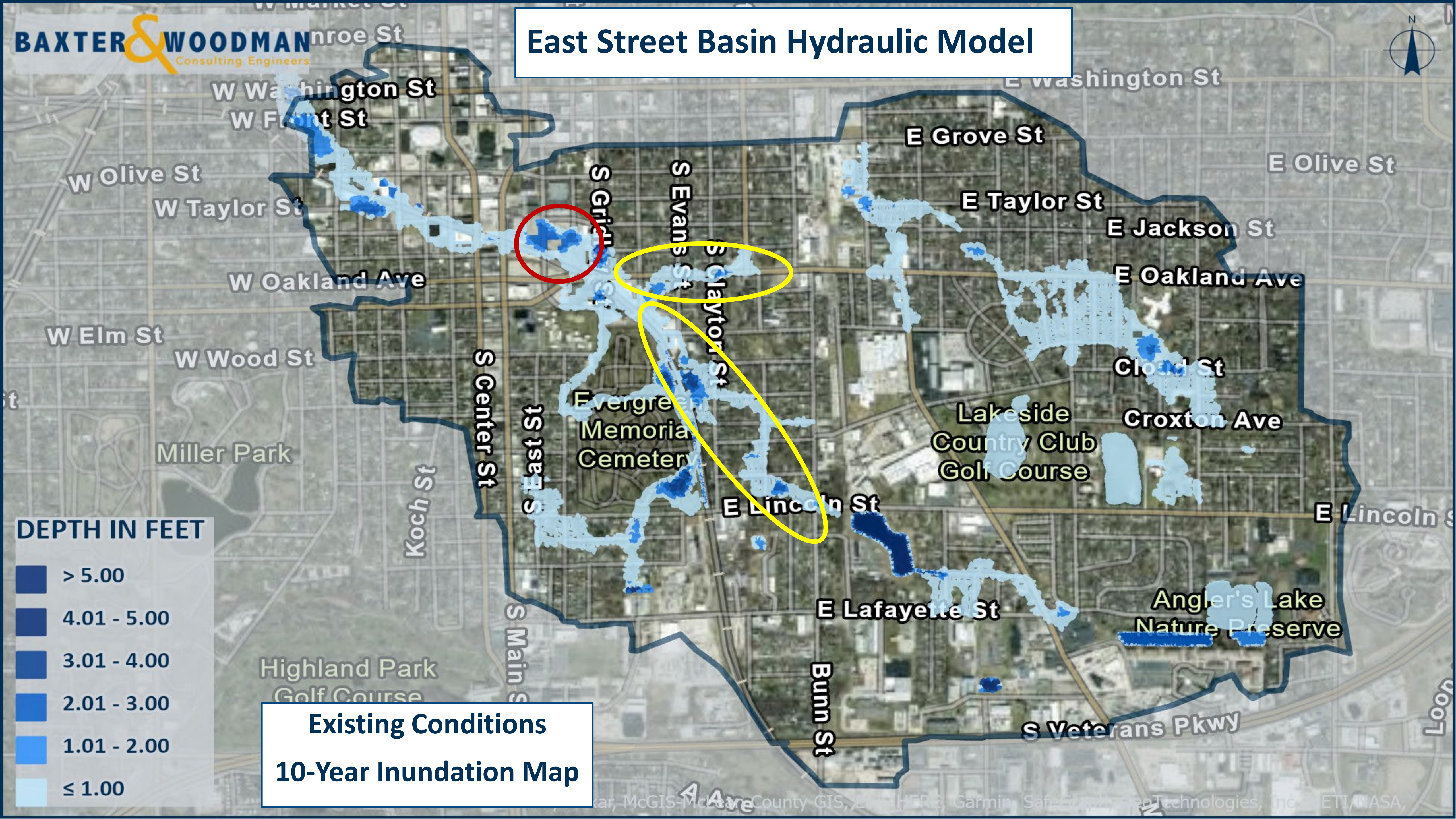

BAXTER & WOODMAN
Consulting Engineers
East Street Basin Hydraulic Model
135 Structures within project limits at risk of flooding
DEPTH IN FEET
> 5.00
4.01 - 5.00
3.01 - 4.00
2.01 - 3.00
1.01 - 2.00
≤ 1.00
Existing Conditions
100-Year Inundation Map
E Washington St
E Grove St
E Olive St
E Taylor St
E Jackson St
E Oakland Ave
Croxton Ave
Lakeside Country Club Golf Course
E Lincoln St
E Lincoln
E Lafayette St
Angler's Lake Nature Preserve
S Veterans Pkwy
Bunn St
S Evans St
S Clayton St
S Center St
S East St
Wright St
Evergreen Memorial Cemetery
S Main
W Washington St
W Front St
W Olive St
W Taylor St
Oakland Ave
W Wood St
Miller Park
Koch St
Highland Park
Monroe St
N


BAXTER & WOODMAN
Consulting Engineers
East Street Basin Hydraulic Model
196 Structures within project limits at risk of flooding
DEPTH IN FEET
> 5.00
4.01 - 5.00
3.01 - 4.00
2.01 - 3.00
1.01 - 2.00
≤ 1.00
Existing Conditions
June 25-26,2021
Inundation Map
E Washington St
E Grove St
E Olive St
E Taylor St
E Jackson St
E Oakland Ave
W Olive St
W Wood St
S Center St
S East St
S Grimes St
S Evans St
S Clayton St
Wright St
Koch St
Miller Park
Evergreen Memorial Cemetery
Lakeside Country Club Golf Course
Croxton Ave
E Lincoln St
E Lafayette St
Angler's Lake Nature Preserve
Bunn St
S Veterans Pkwy
4 Ave

Design Considerations

- Ensure no negative impact downstream of East Street basin
- Design upstream improvements to only divert stormwater into detention basin
- Mitigate structural flooding– 100-year Design Storm Event
- Mitigate Street closures – 10-year Design Storm Event
- Implement green infrastructure and landscape design

East Street Basin Hydraulic Model



Existing Conditions

10-Year Inundation Map

B&W Recommends…

Project Phases

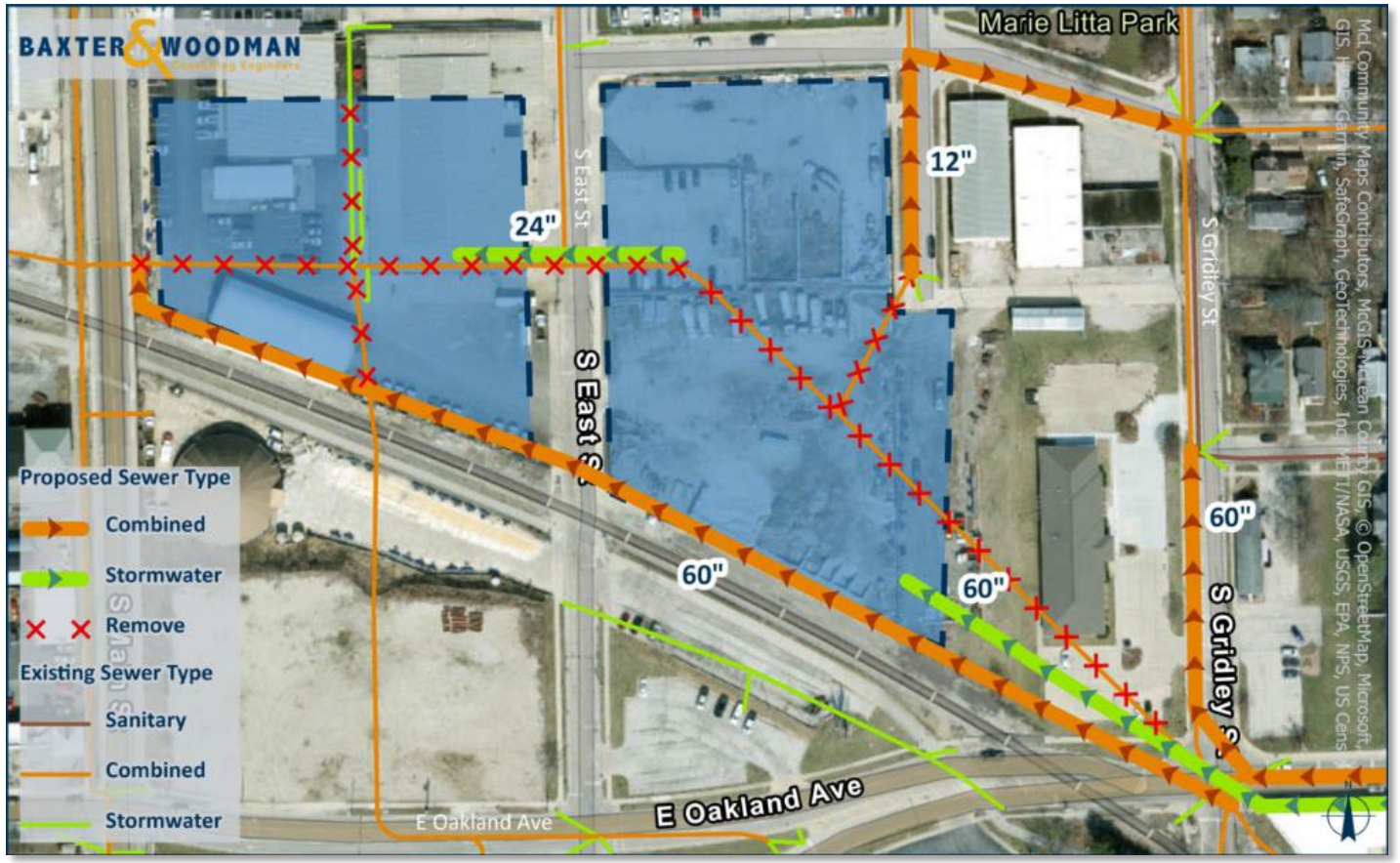
- 1: Pipe Relocations
- 2: East Basin at East Street
- 3: East Basin Amenities
- 4: Oakland Avenue
- 5: Baker-Ash Basin
- 6: Clayton-Miller Basin
- 7: West Basin at East Street
- 8: East Basin Remaining Amenities

Phase 1: Pipe Relocations

Reroute existing combined sewer along railroad

&

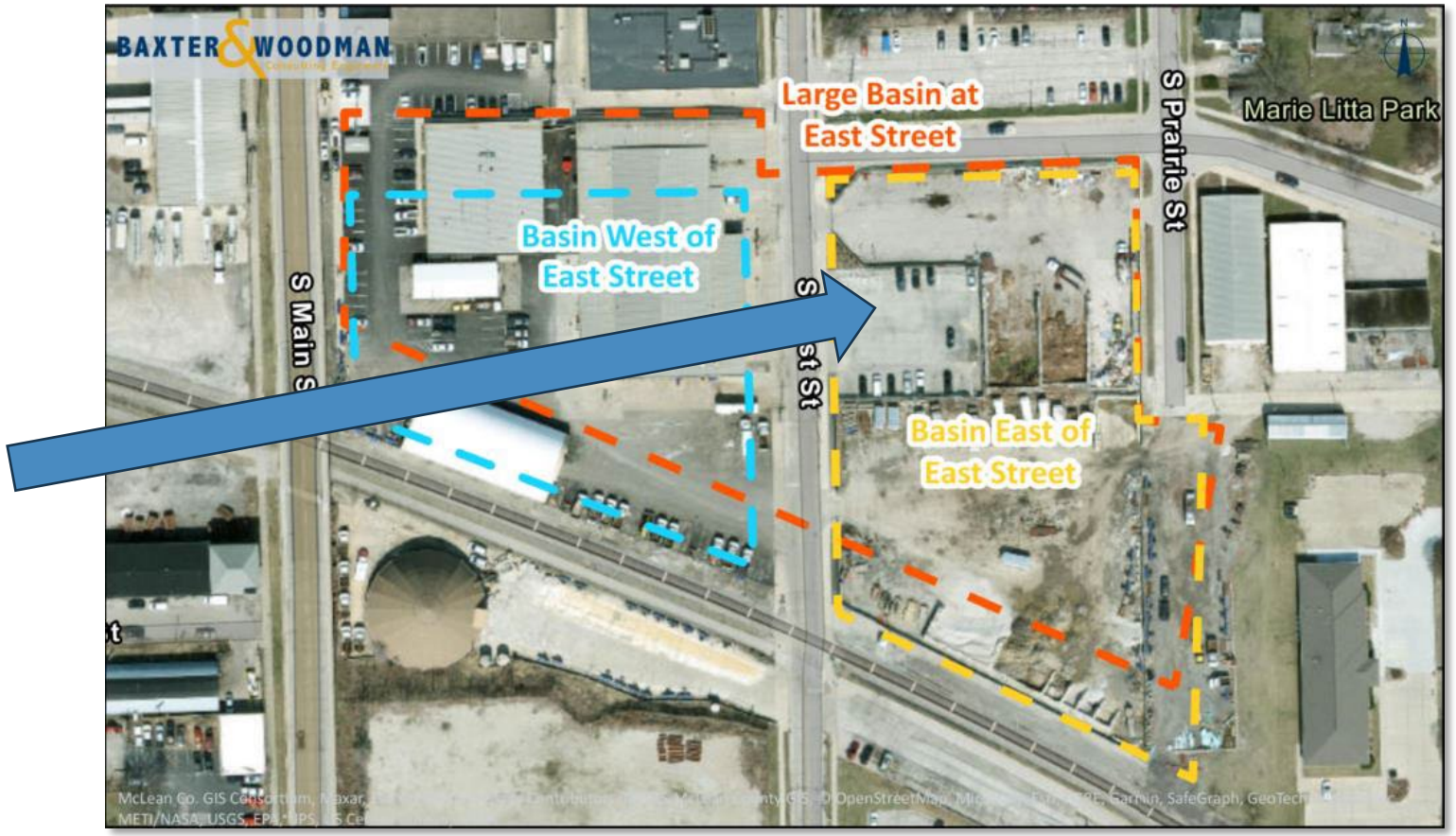
Pipe Under Railroad Crossing (not shown)



Phase 2: Basin East of East Street

East side of East Street Basin

***Construction of East Basin requires relocation the Citizen's Convenience Center (CCC) Public Works Yard**



Phase 2: Accompanying Amenities for East Basin

Wetland

Wet Bottom Basin

Phase 2: Conceptual Rendering

Phase 3: Potential East Basin Amenities

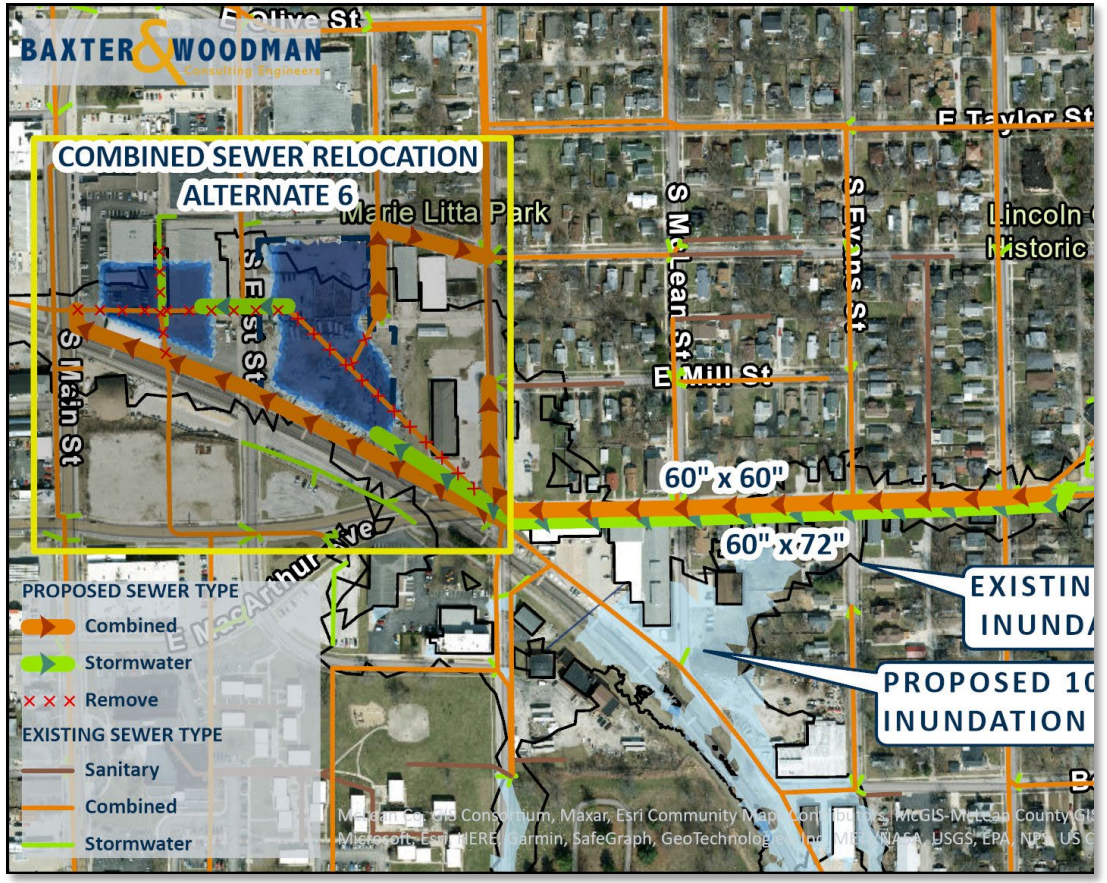
Stone Waterfall

Connection to Constitution Trail

Phase 3: Example project: Champaign Second St. Basin

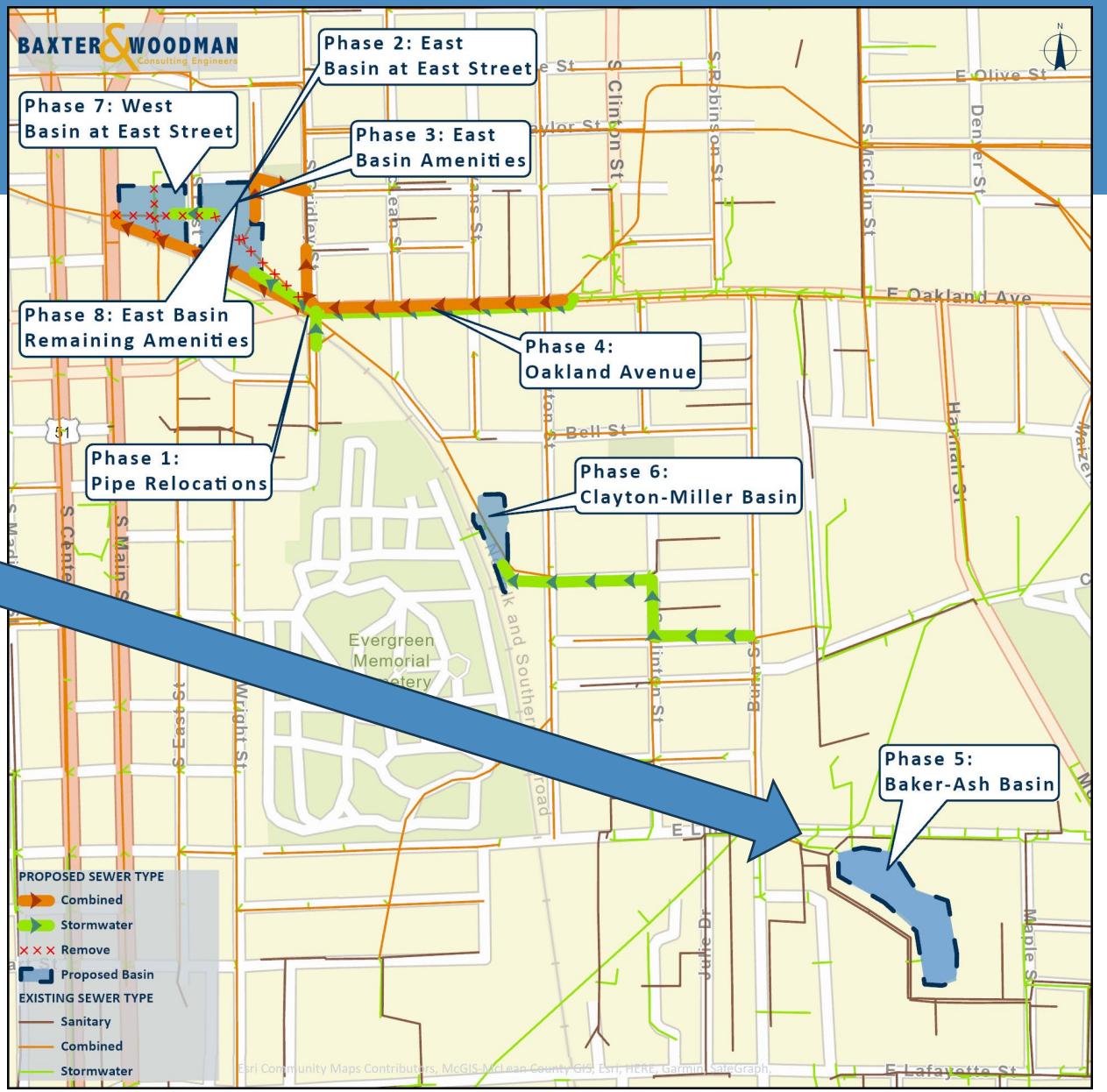
Phase 4: Oakland Avenue

Oakland Avenue Improvements – Relief Storm Sewer and Relocate existing Combined sewer



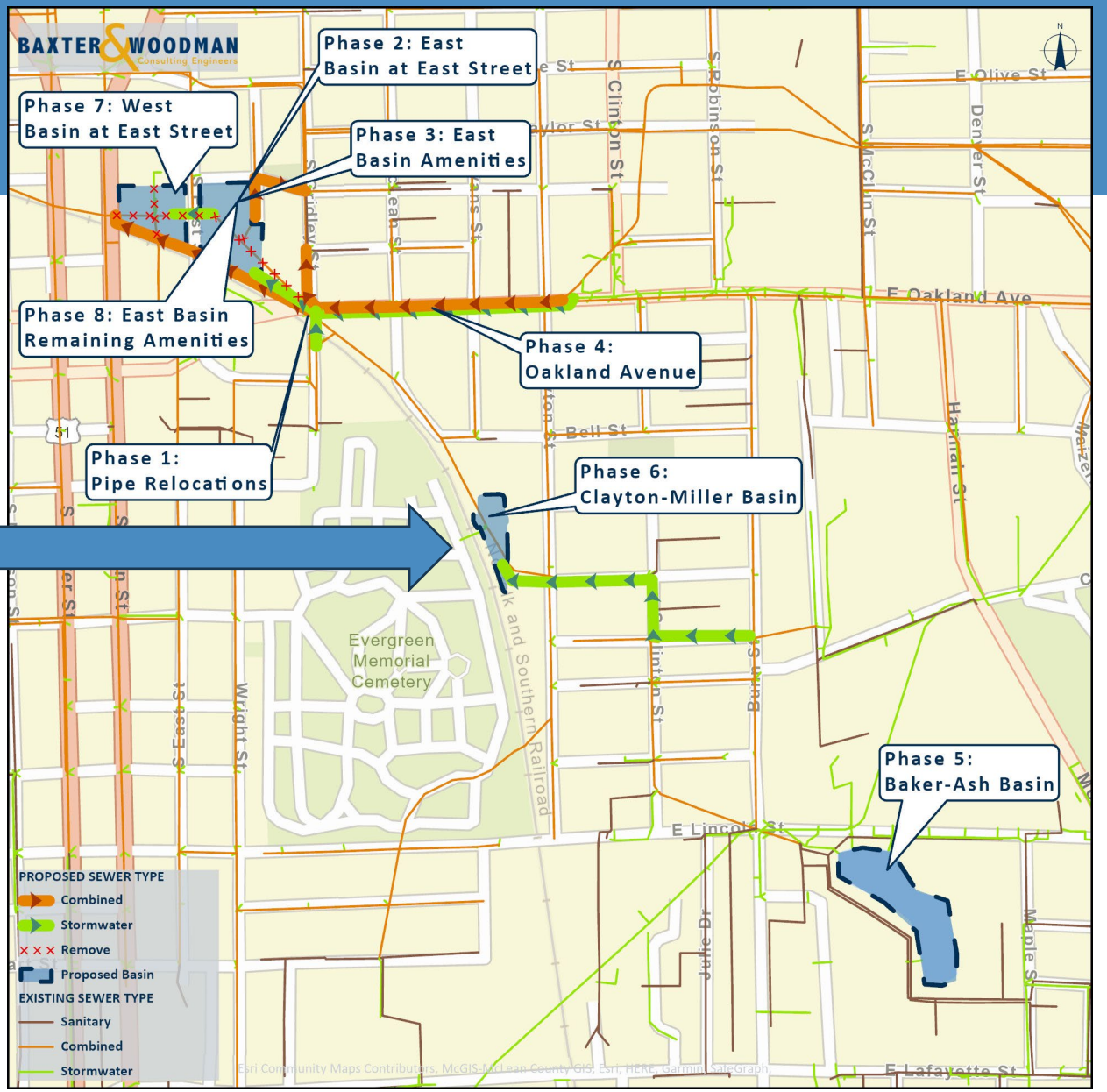
Phase 5: Baker-Ash Basin

Increase Detention Capacity to reduce overflow



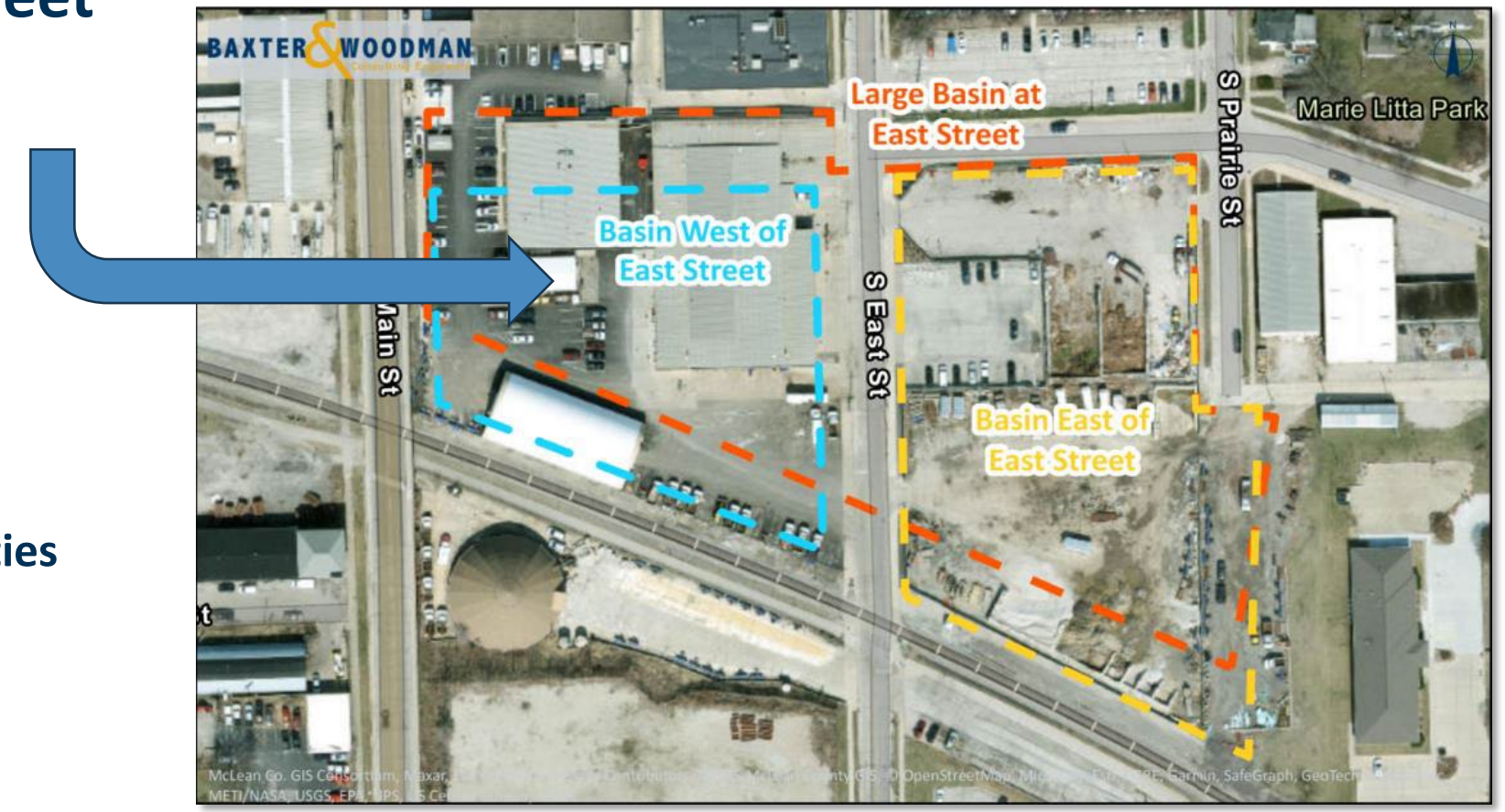
Phase 6: Clayton-Miller Basin

Neighborhood storm sewers with local detention basin



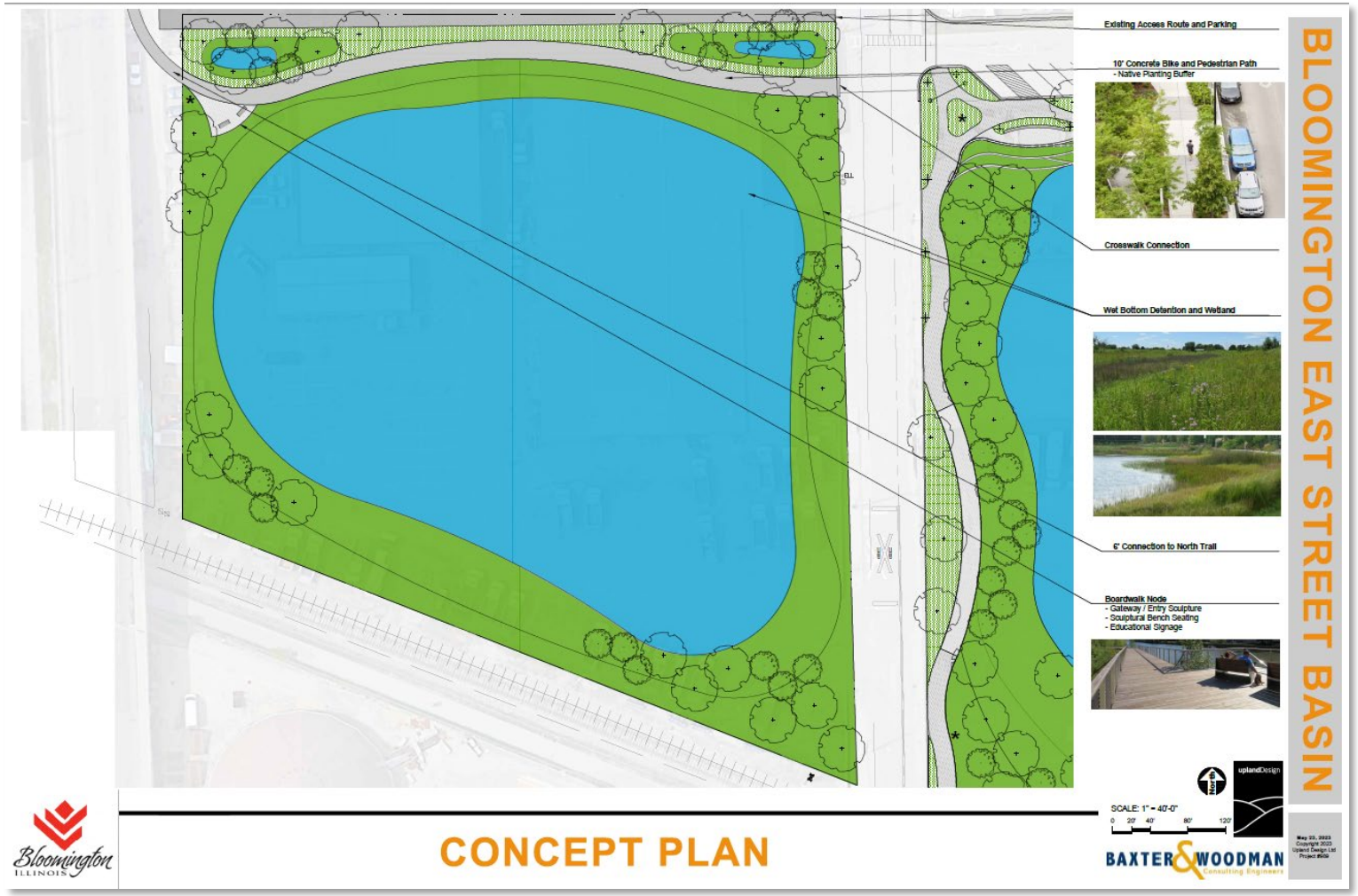
Phase 7: West Basin at East Street

West side of East Street Basin



*Requires moving City facilities

Phase 7: West Basin at East Street



Phase 8: Remaining Potential Amenities

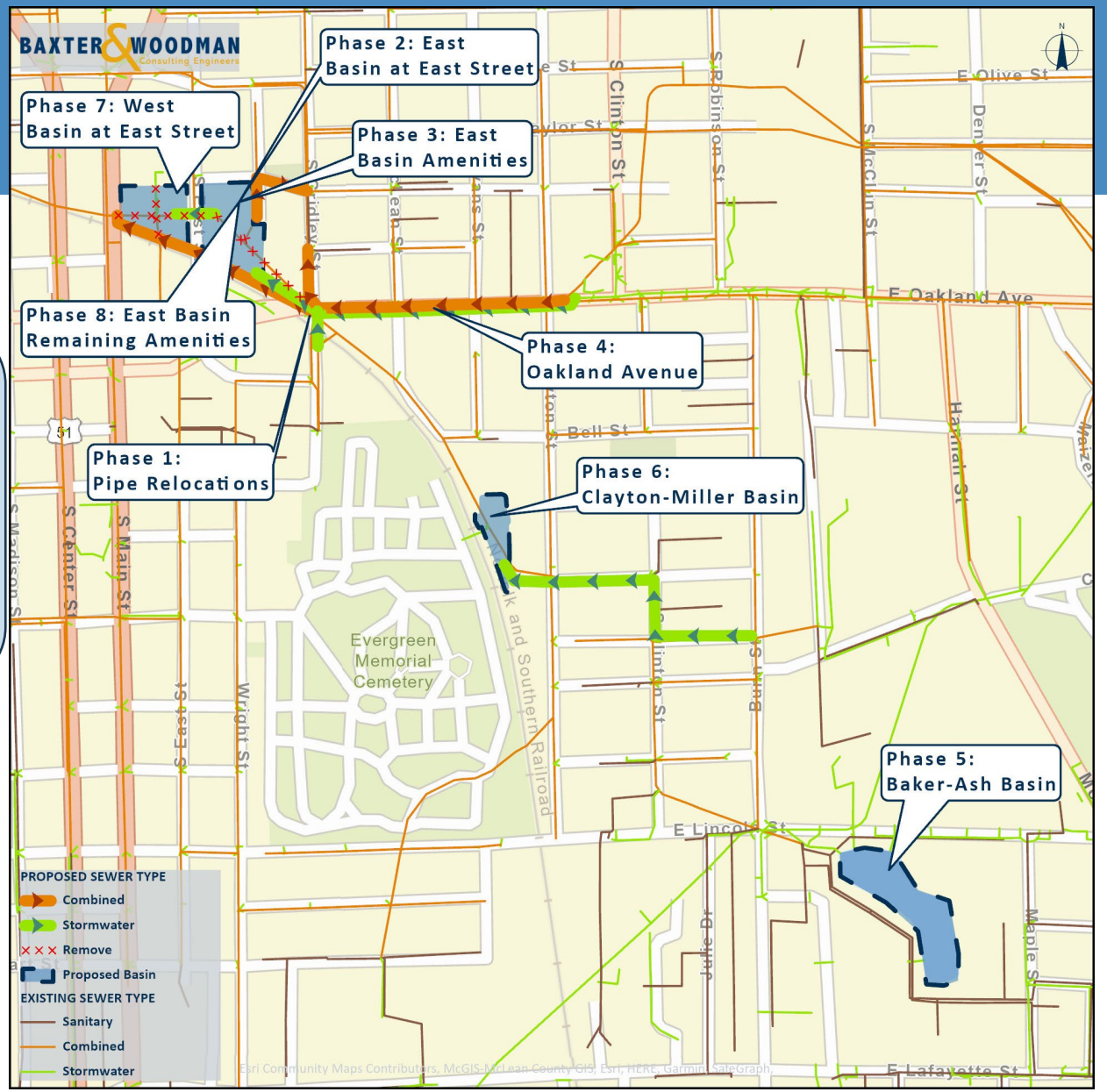
Gateway Entry (North & South)

Social Plaza

B&W Recommends…

Project Phases

- 1: Pipe Relocations
- 2: East Basin at East Street
- 3: East Basin Amenities
- 4: Oakland Avenue
- 5: Baker-Ash Basin
- 6: Clayton-Miller Basin
- 7: West Basin at East Street
- 8: East Basin Remaining Amenities



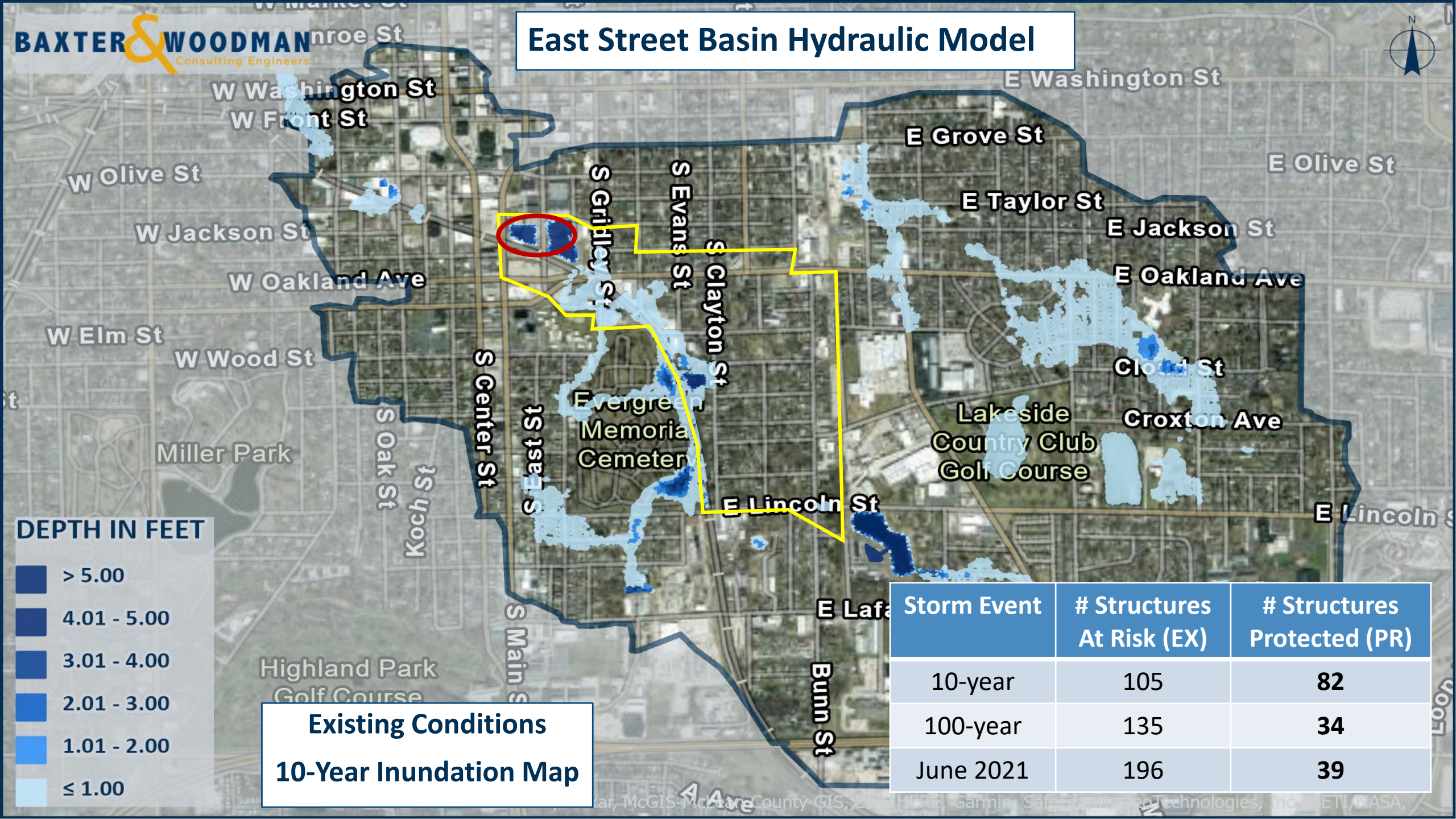
CITY OF

Bloomington ILLINOIS

CITY OF

Bloomington ILLINOIS

East Street Basin Hydraulic Model



Existing Conditions

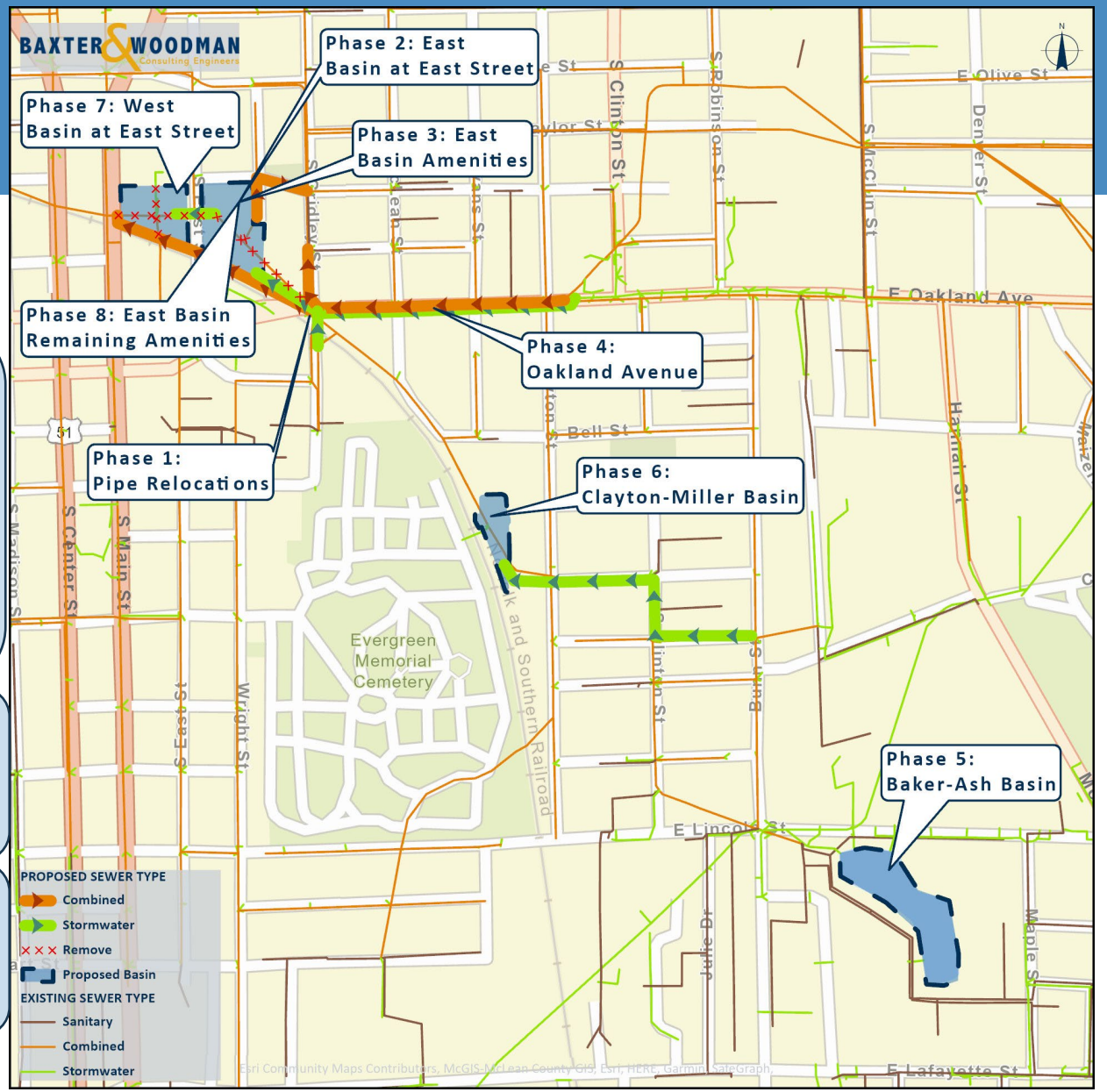
10-Year Inundation Map

Storm Event	# Structures At Risk (EX)	# Structures Protected (PR)
10-year	105	**82**
100-year	135	**34**
June 2021	196	**39**

B&W Recommends…

Project Phases

- 1: Pipe Relocations
- 2: East Basin at East Street
- 3: East Basin Amenities
- 4: Oakland Avenue
- 5: Baker-Ash Basin
- 6: Clayton-Miller Basin
- 7: West Basin at East Street
- 8: East Basin Remaining Amenities

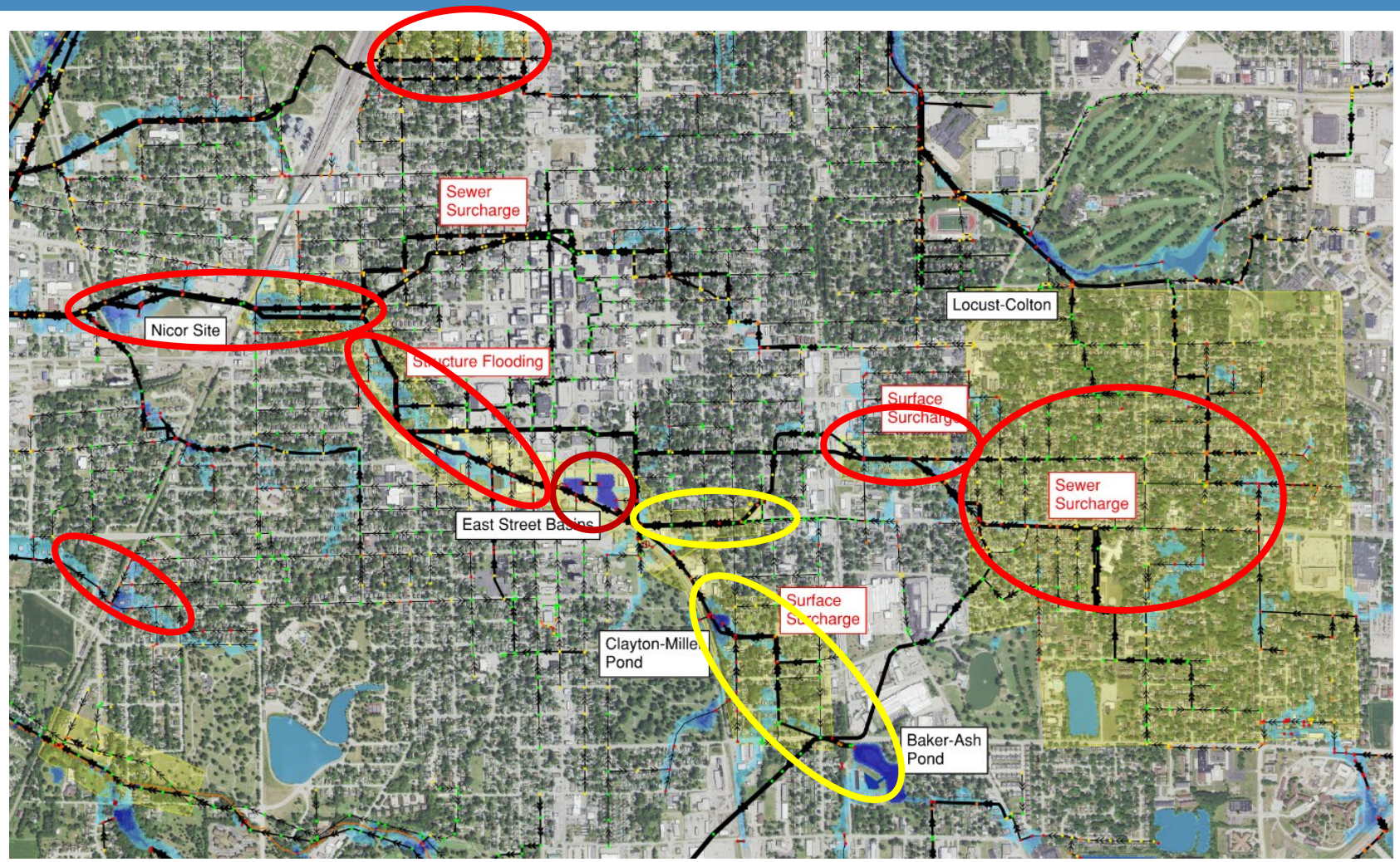


Cost Estimate for Project Recommendations by Phase

Phase	2023 Cost
Phase 1: Pipe Relocations	$2,420,000
Phase 2: East Basin at East Street	$4,640,000
Phase 3: East Basin Amenities	$2,180,000
Phase 4: Oakland Avenue	$4,170,000
Phase 5: Baker-Ash Basin	$880,000
Phase 6: Clayton-Miller Basin	$1,900,000
Phase 7: West Basin at East Street	$1,370,000
Phase 8: East Basin Remaining Amenities	$1,590,000
Total	**$19,150,000**

Stormwater Master Plan

- Ongoing citywide effort to address problem areas in a cost-effective manner.
- Flooding primarily caused by undersized combined sewer mainlines.
- Largescale, multi-phase project needed to divert and detain stormwater.
- Sewer separation for diversion.
- Detention basins for detainment.



B&W Recommends…

Project Phases

- 1: Pipe Relocations
- 2: Basin East at East Street
- 3: East Basin Amenities
- 4: Oakland Avenue
- 5: Baker-Ash Basin
- 6: Clayton-Miller Basin
- 7: Basin West at East Street
- 8: East Basin Remaining Amenities