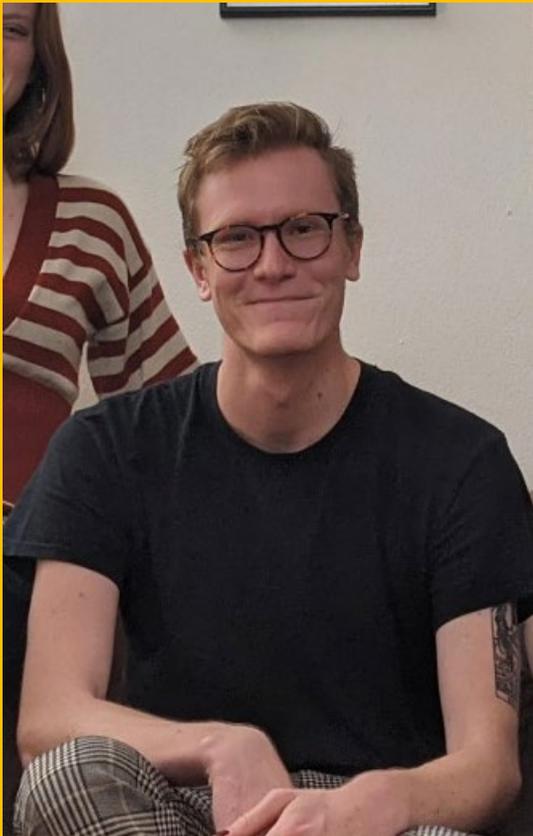




Waterway Redevelopment & Flood Management

City of Manchester, Iowa





Project Team

- Vance Davis (they/them)—Project Manager
- Kendall Wobig (she/her)
- Connor Johnson (he/him)
- Luke Lesnik (he/him)

Overview



Client and location



Project Objectives



Design components



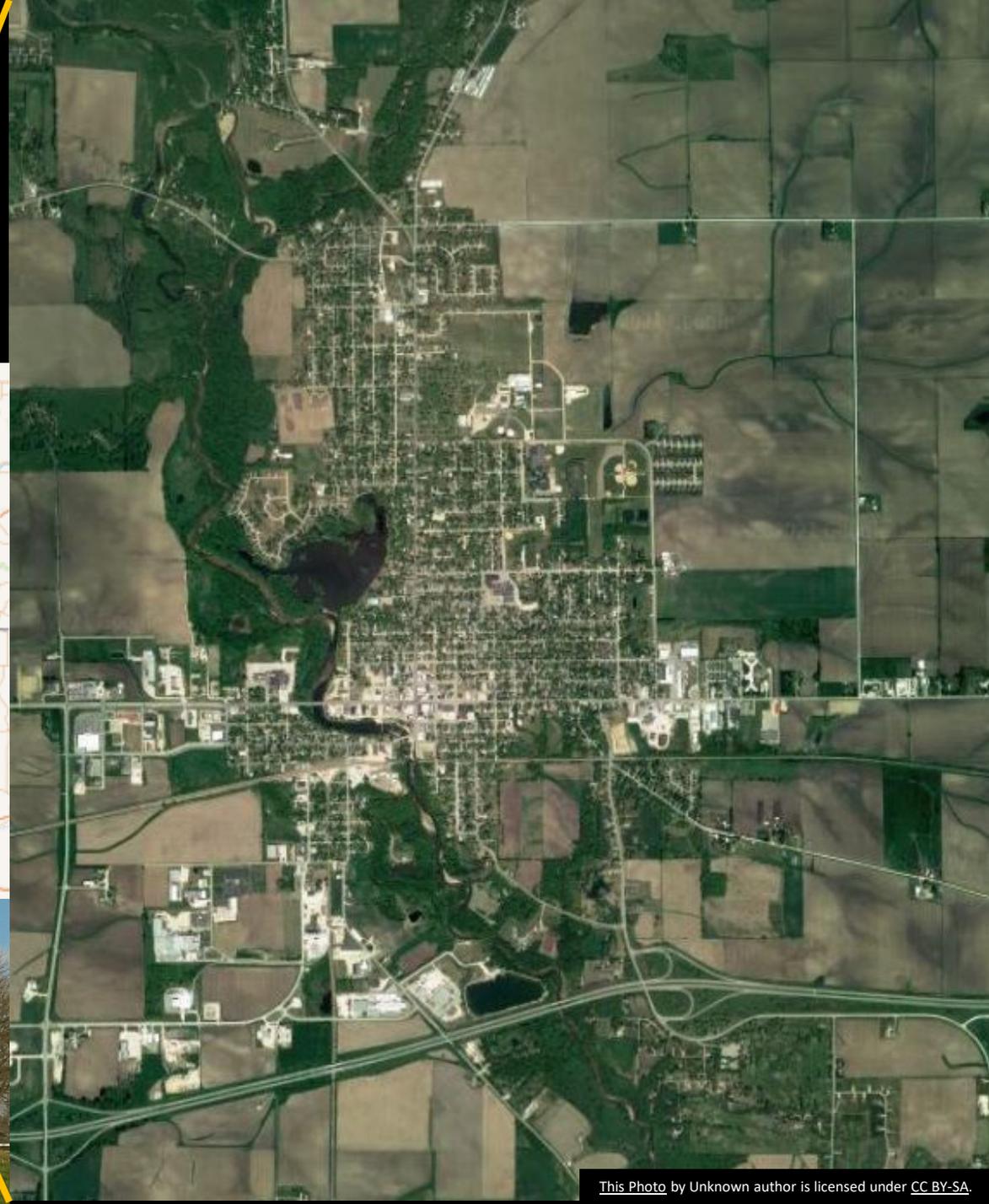
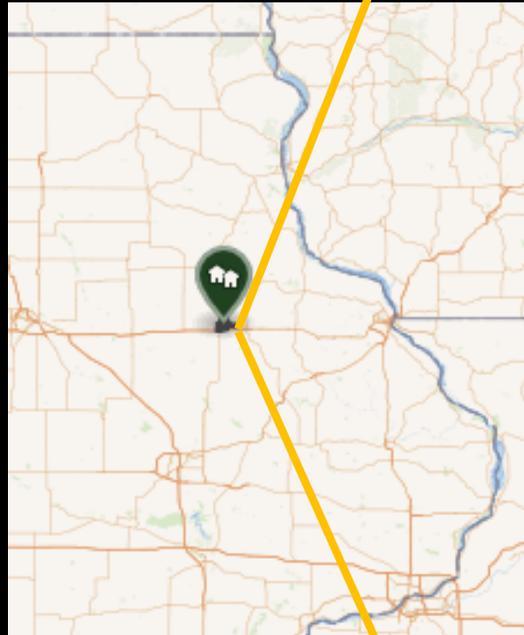
Cost Estimation



Q&A

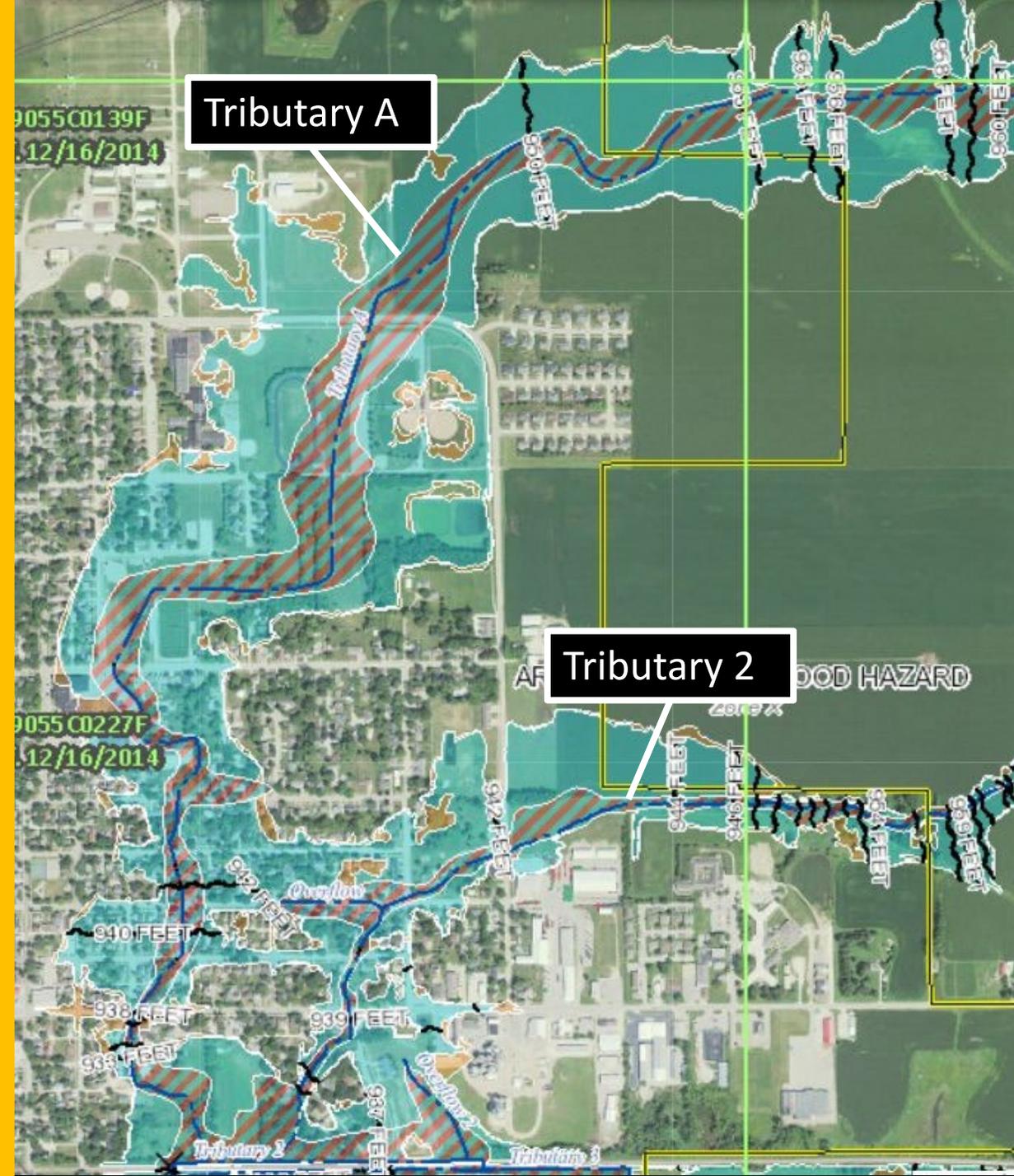
Manchester

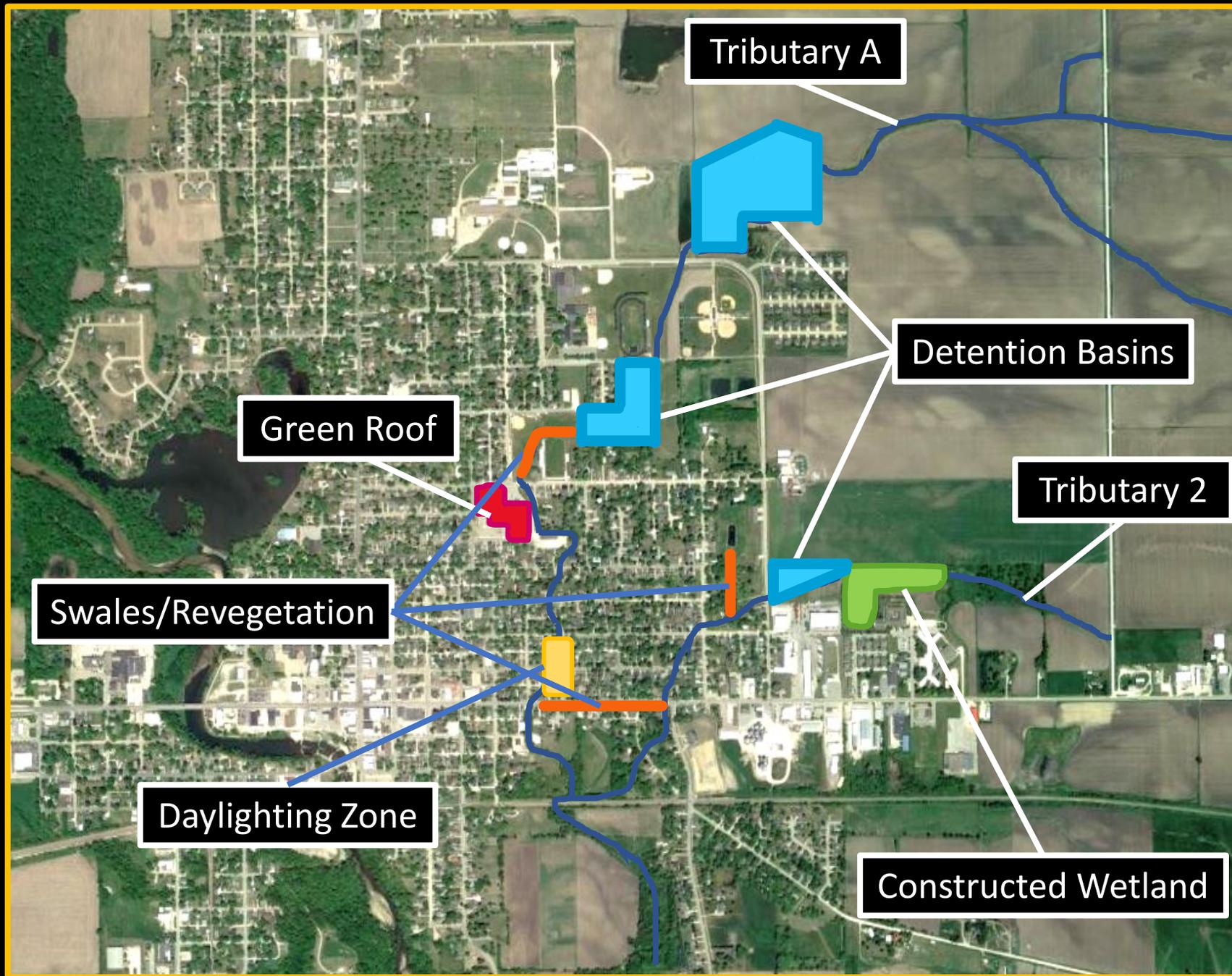
- Tim Vick, City Manager
- Ryan Wicks, Fehr Graham
- Tim Heims, Project Building



Project Objectives

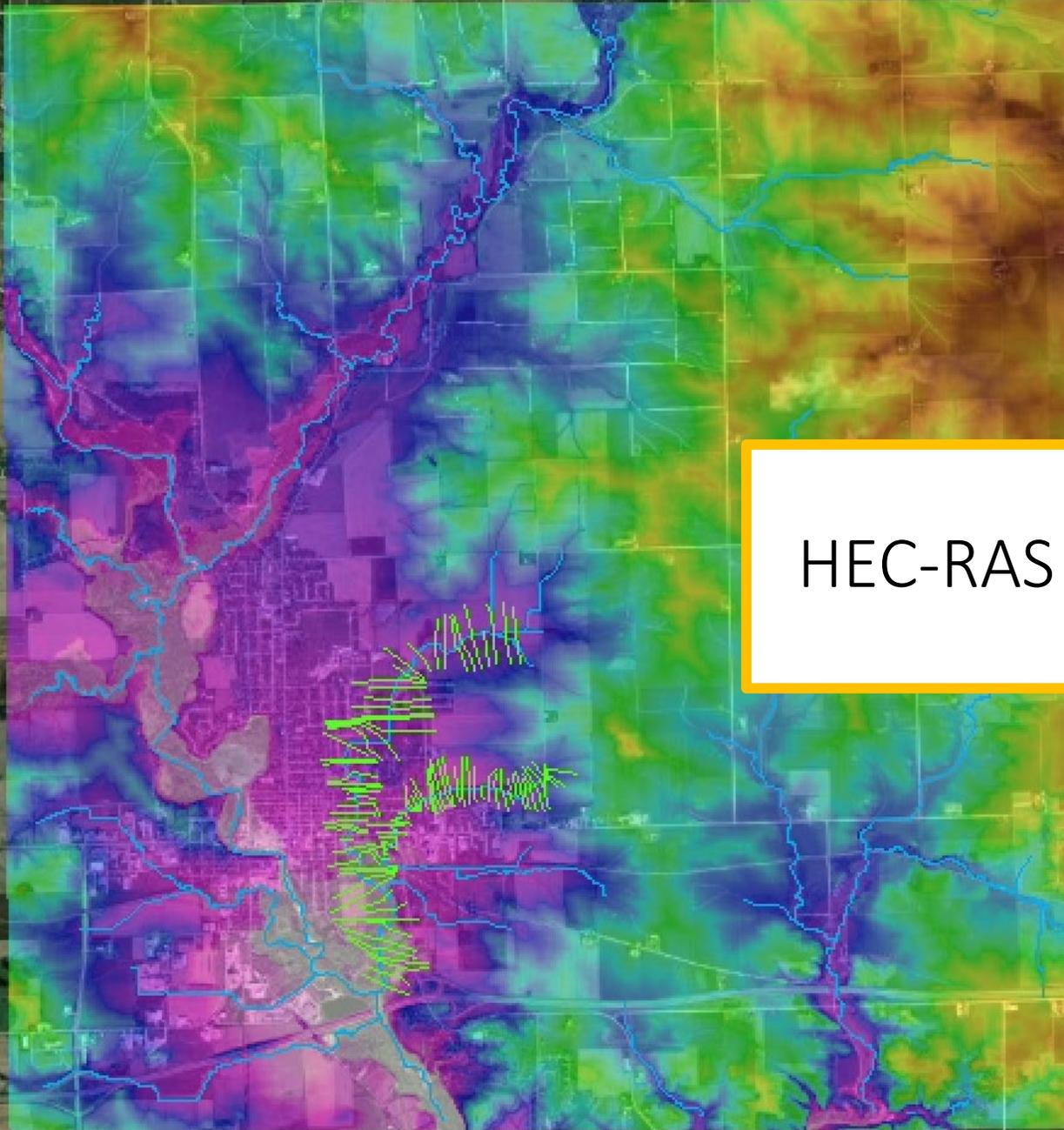
1. Minimize physical and financial risk from flood impacts of the Trib. A & Trib. 2 updated 100-year floodplain
2. Design stormwater mitigation elements that are appealing to the residents of Manchester
3. Provide a broad array of alternatives from which Manchester can decide on how to proceed



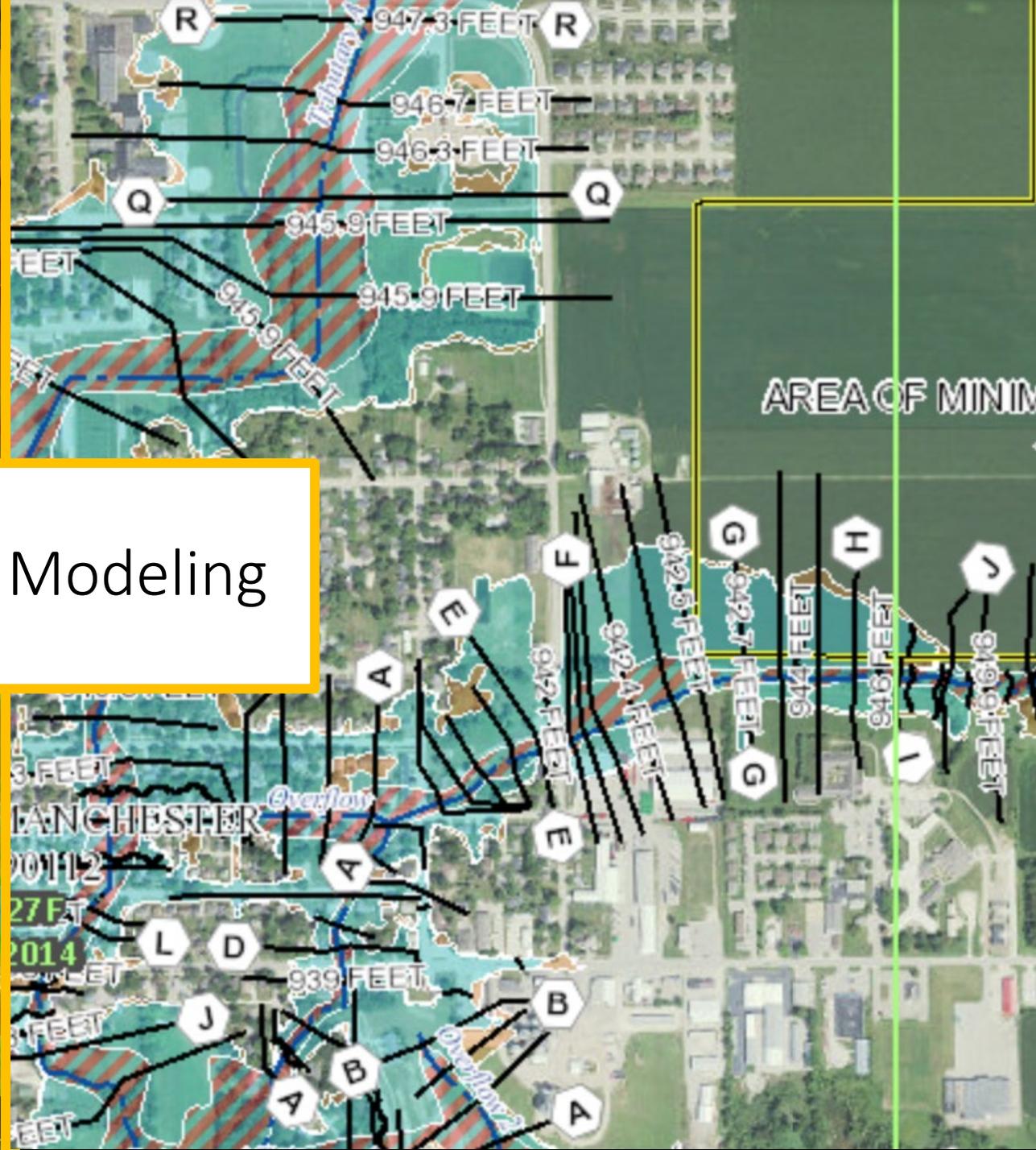


Project Outline

1. HEC-RAS Modeling
2. Three detention basins
3. Green roof
4. Swales/Revegetation
5. Daylighting Tributary A
6. Constructed wetland



HEC-RAS Modeling



HEC-RAS Outputs

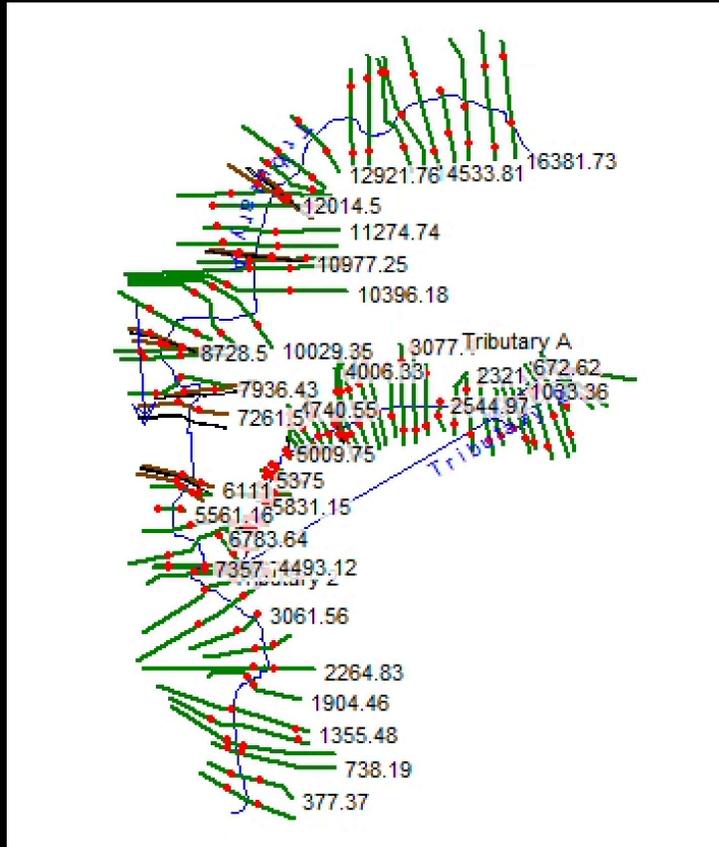
The main channel and its eastern tributary were included in the model

Steady flow was assumed

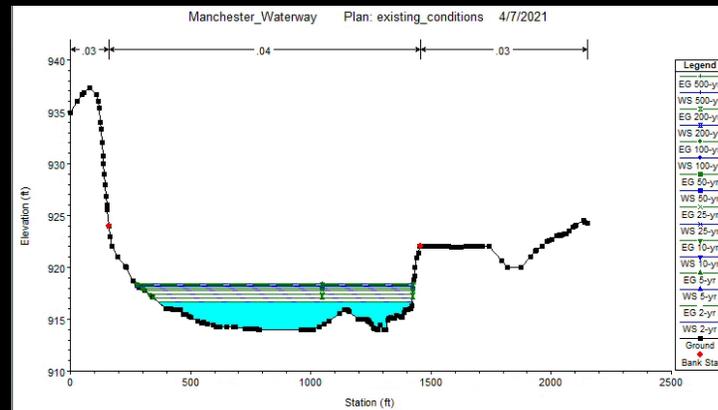
Elevation data obtained from Iowa DNR, cross-sections downloaded from FEMA

Existing culverts were included

Model was run to determine discharge levels and storage volumes



Plan: existing_conditions Tributary A Tributary A RS: 1131.65 Profile: 100-yr					
Elev (ft)	918.13	Element	Left OB	Channel	Right OB
Bed (ft)	0.00	Wt. n-Val.		0.040	
Elev (ft)	918.12	Reach Len. (ft)	281.20	278.73	25
S. (ft)		Flow Area (sq ft)		3645.16	
Slope (ft/ft)	0.000016	Area (sq ft)		3645.16	
Flow (cfs)	1180.34	Flow (cfs)		1180.34	
Depth (ft)	1142.31	Top Width (ft)		1142.31	
Vel (ft/s)	0.32	Avg. Vel. (ft/s)		0.32	
Hyd Depth (ft)	4.12	Hydr. Depth (ft)		3.19	
Total (cfs)	293405.1	Conv. (cfs)		293405.1	
Wtd. (ft)	278.93	Wetted Per. (ft)		1142.86	
EI (ft)	914.00	Shear (lb/sq ft)		0.00	
	1.00	Stream Power (lb/ft s)		0.00	
Loss (ft)	0.02	Cum Volume (acre-ft)	0.22	18.37	
Loss (ft)	0.04	Cum SA (acres)	0.50	8.02	

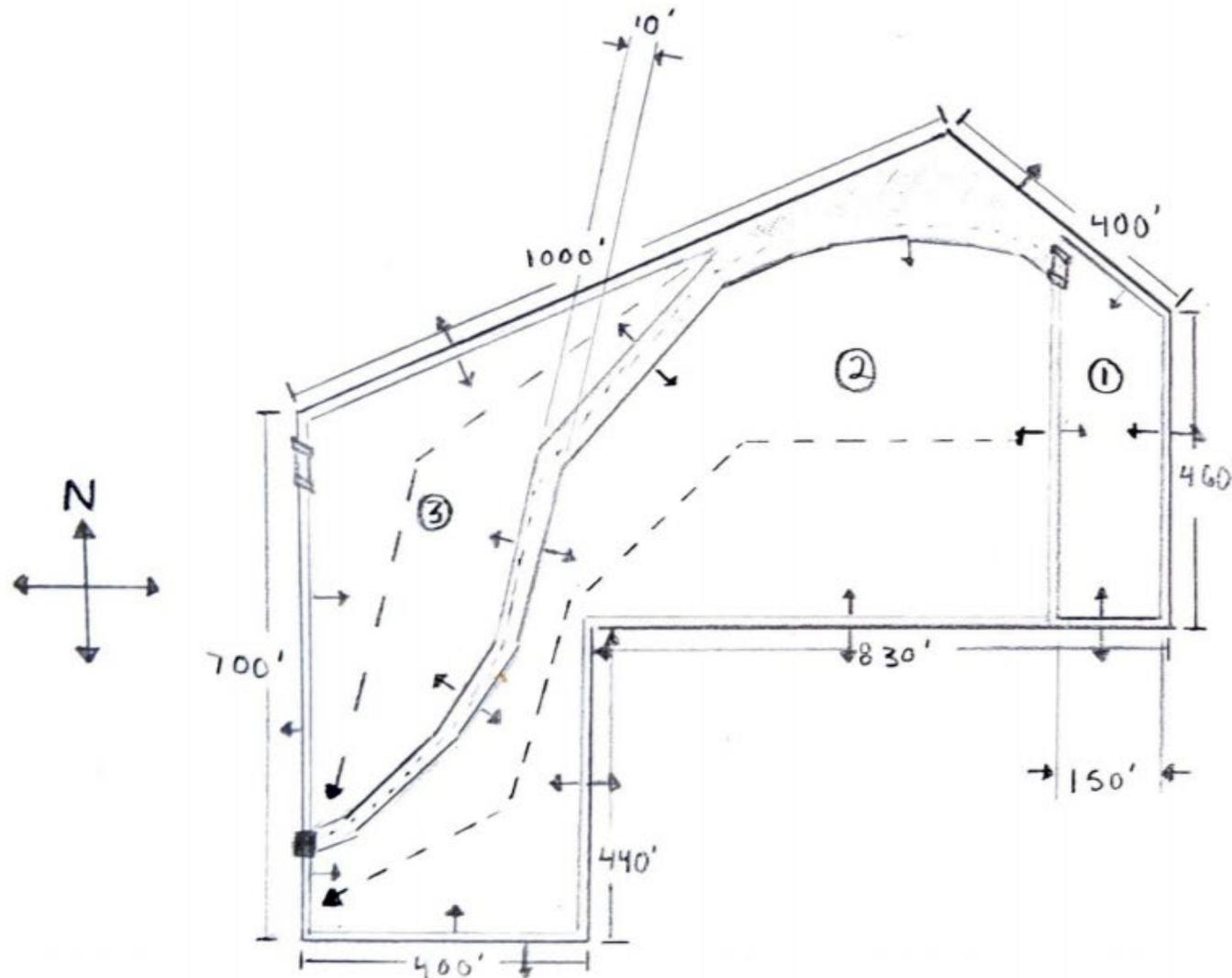


Krogmann Site Detention Basin

Location: Northeast Manchester
Storage Volume: 63 acre-ft

Peak Flow Reduction Percentages

1-year	--
2-year	--
5-year	76%
10-year	57%
25-year	30%
50-year	16%
100-year	8%



KEY

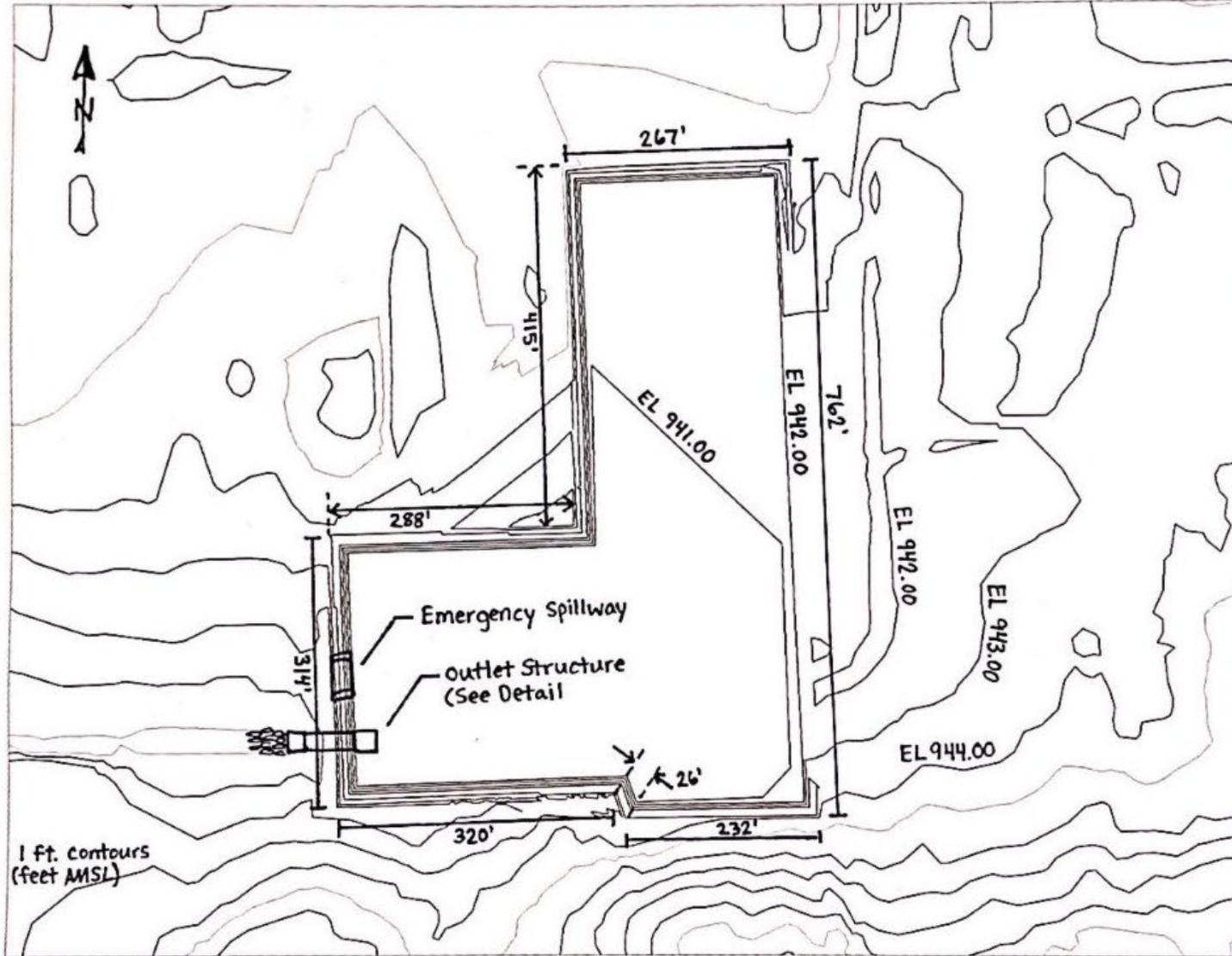
- ① : SEDIMENT FOREBAY
- ② : SOUTH DETENTION BASIN
- ③ : NORTH DETENTION BASIN
- ▨ : UNEXCAVATED STORAGE
- : 6:1, H:V SLOPE
- ↘ : 0.2% BOTTOM SLOPE
- : OUTLET STRUCTURE
- == : WEIR STRUCTURE

Bunting Site Detention Basin

Location: Central Manchester
Storage Volume: 27 acre-ft

Peak Flow Reduction Percentages

1-year	72%
2-year	51%
5-year	21%
10-year	8%
25-year	--
50-year	--
100-year	--

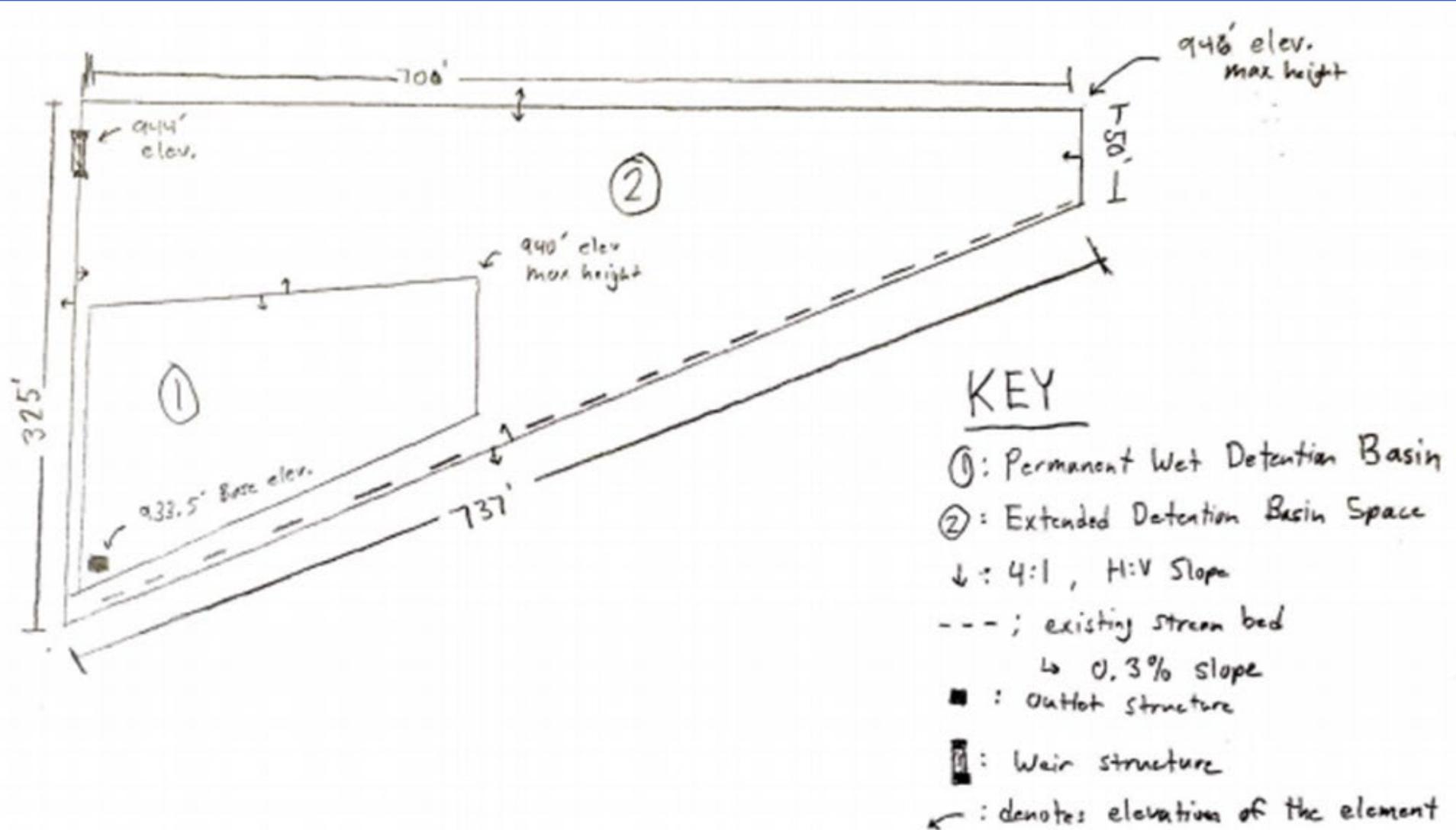


Hutchison Site Detention Basin

Location: Southeast Manchester
Storage Volume: 10 acre-ft

Peak Flow Reduction Percentages

1-year	71%
2-year	52%
5-year	23%
10-year	10%
25-year	2%
50-year	--
100-year	--

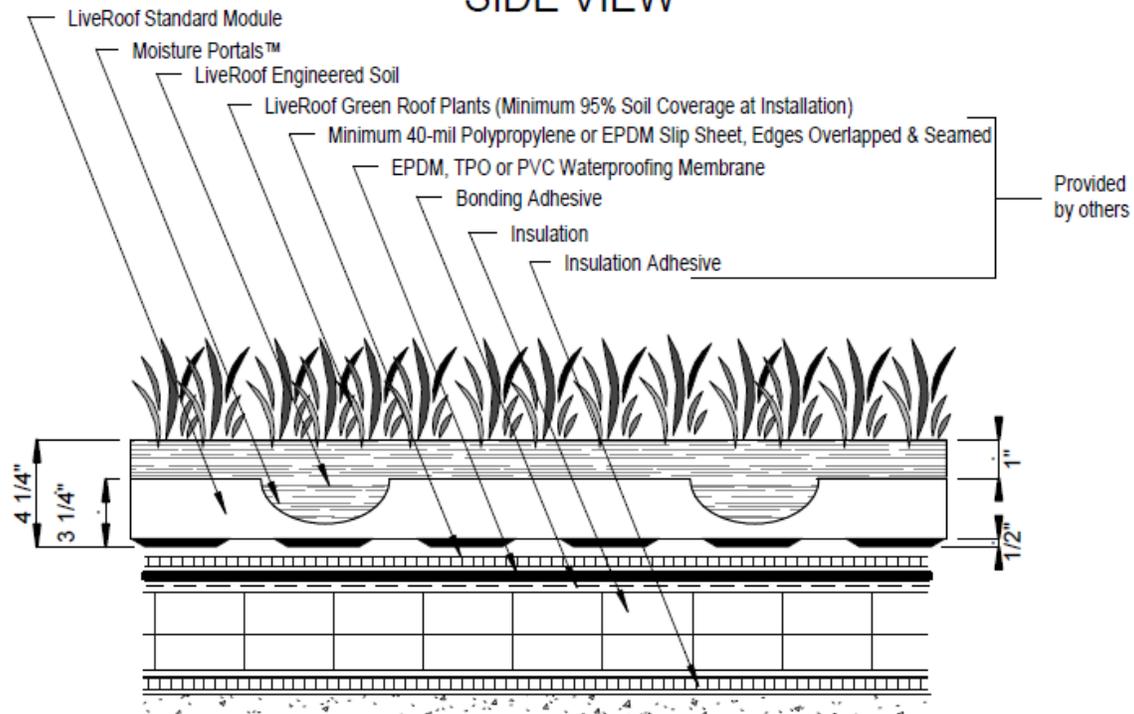


Recommendations: Moving Forward

LiveRoof STANDARD SYSTEM

Over Conventional Roofing Assembly

SIDE VIEW



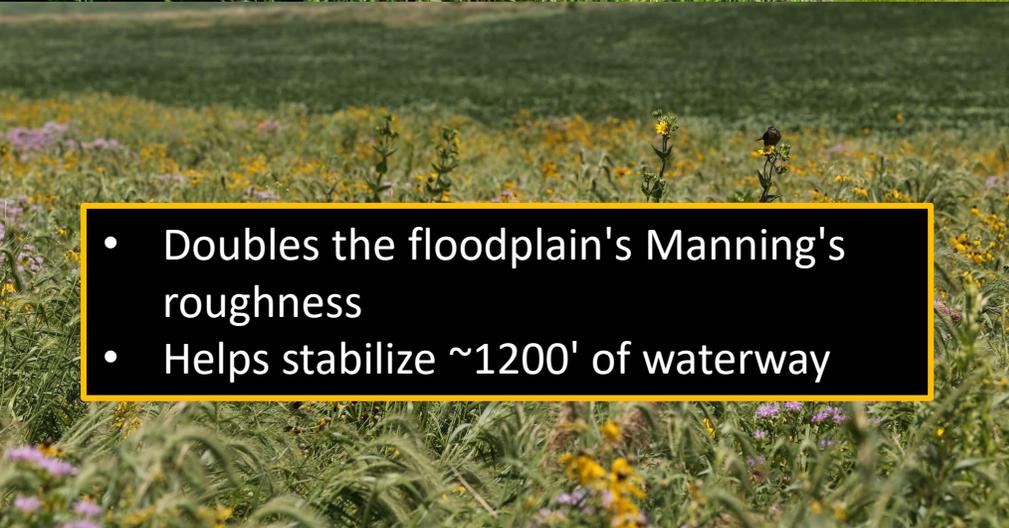
0.15 acre-ft storage (~74% of WQv)



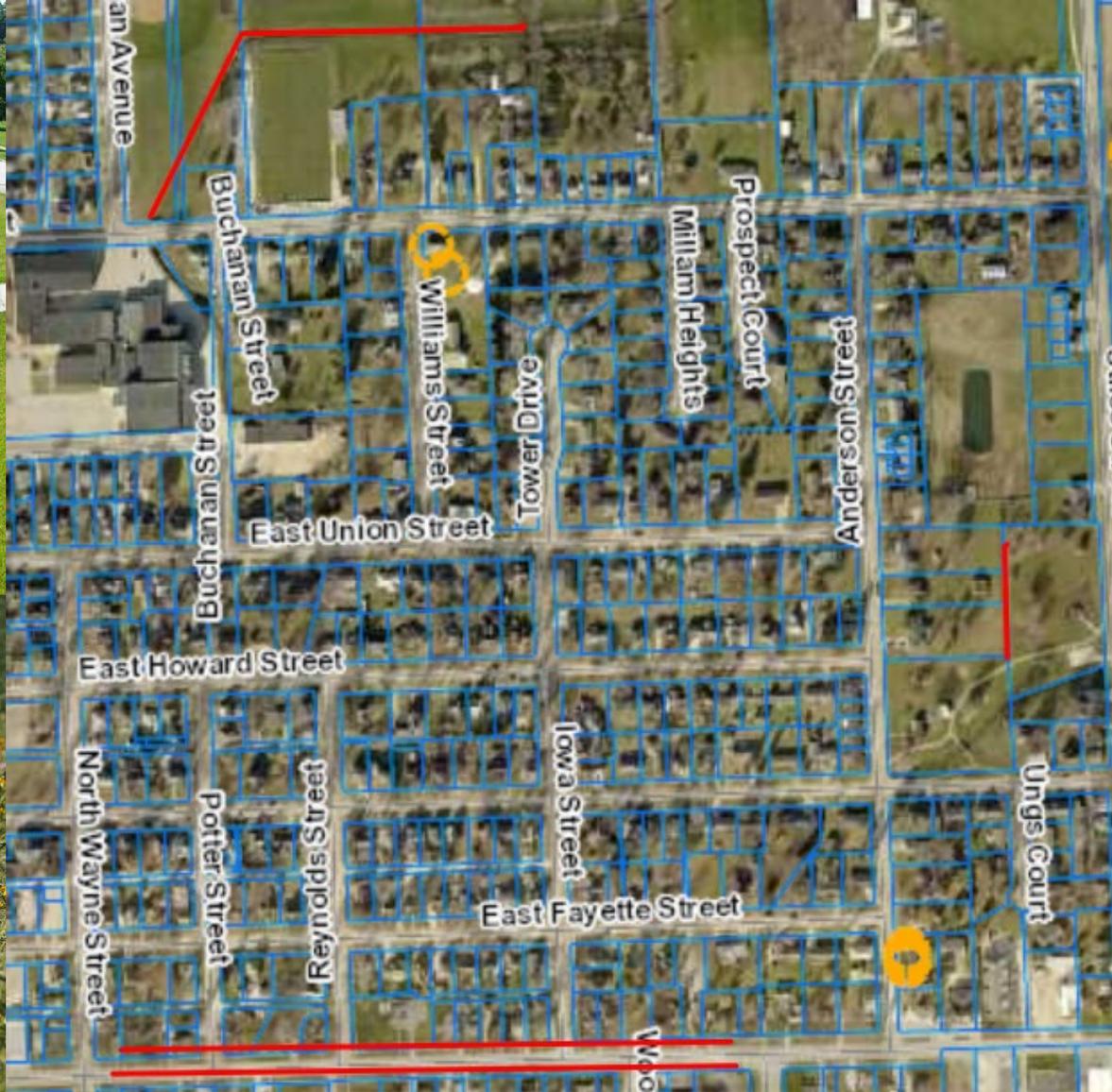
Green Roof: West Delaware High School



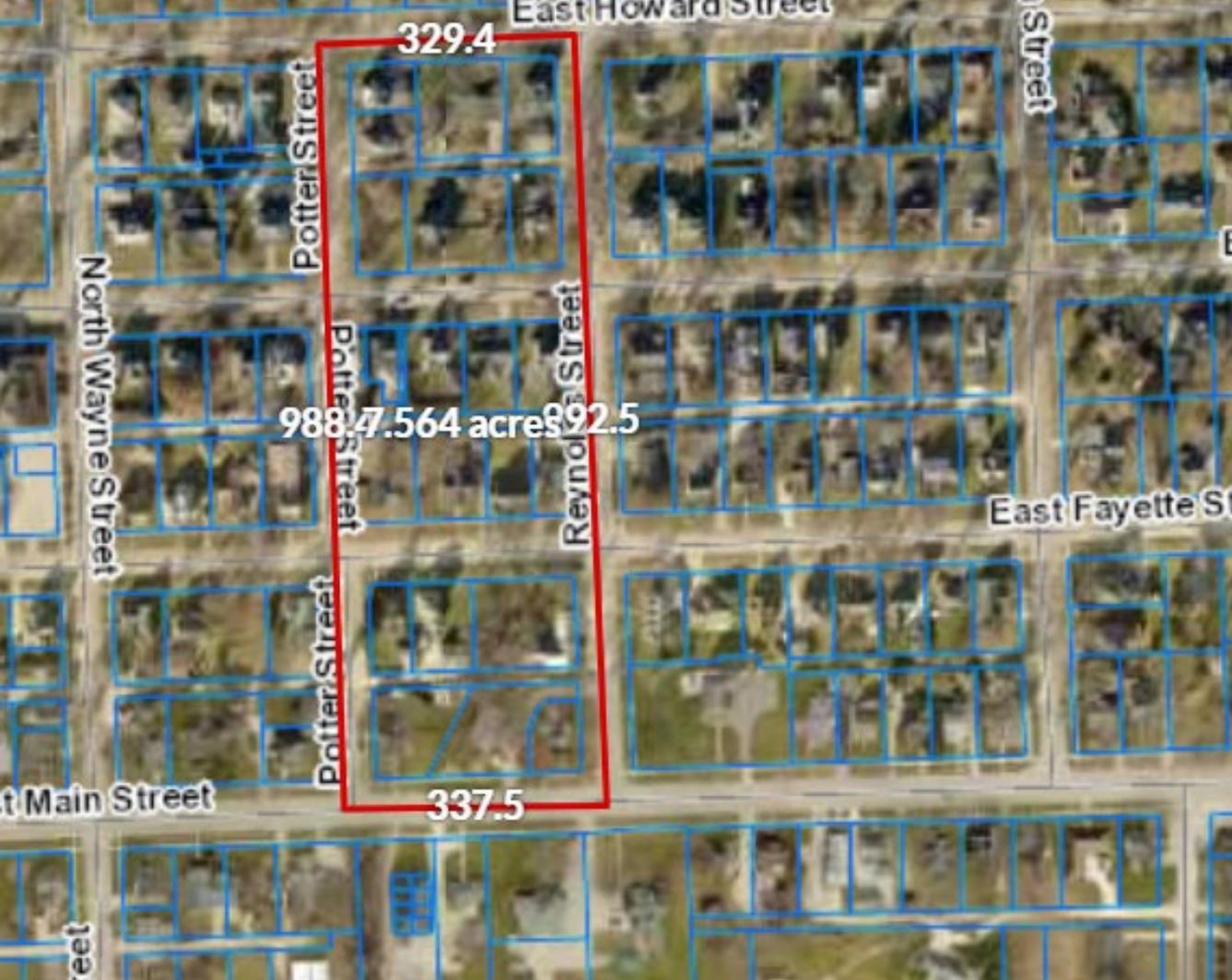
Swales, rain gardens, and infiltration basins can minimize runoff.



- Doubles the floodplain's Manning's roughness
- Helps stabilize ~1200' of waterway



Swales, Rain Gardens, & Native Vegetation



Daylighting Tributary A

Estimating Cost

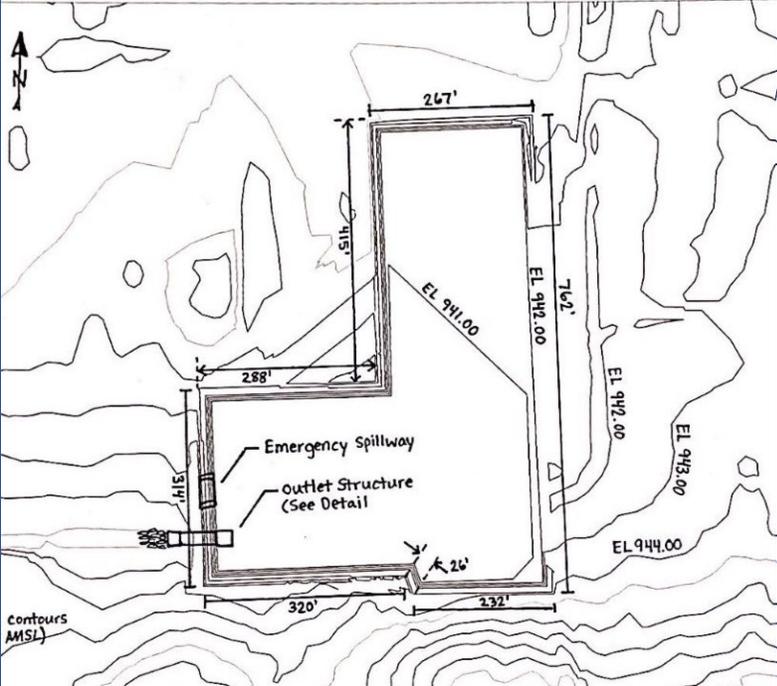
Total Cost, Base Design:
\$1,082,820

Design Item	Cost of Construction	Property Acquisition	Contingency	Admin. Cost	Total
Krogmann Pond	\$555,000	\$31,900	\$58,590	\$116,500	\$761,990
Bunting Pond	\$131,000	\$13,310	\$14,300	\$28,600	\$187,210
Hutchison Pond	\$94,000	\$9,020	\$10,200	\$20,400	\$133,620

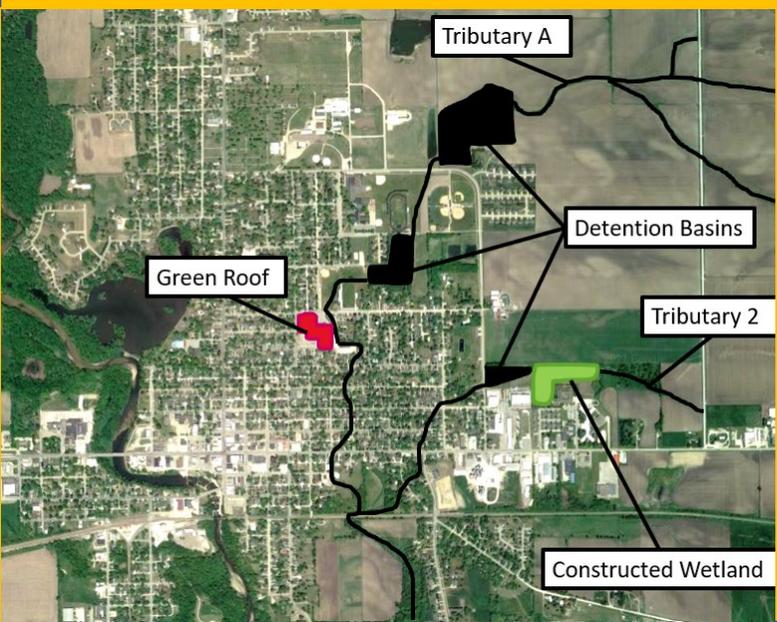
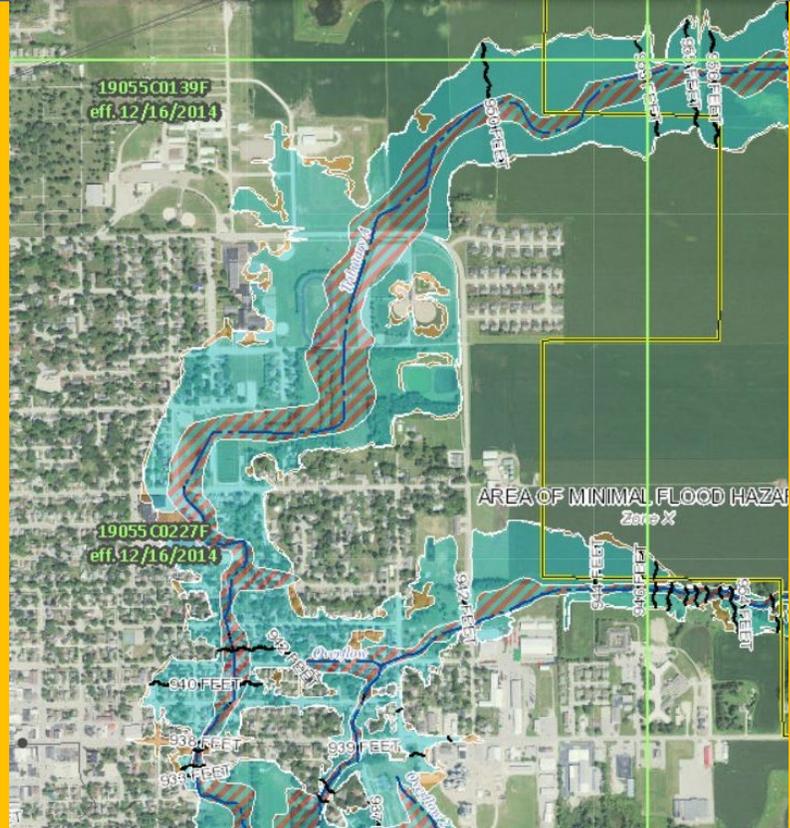
10% Contingency, 20% Administration Cost

Qty	Description	Unit	Extended Total	Extended Total O&P	Labor Type
96289.63	Excavating, bulk, dozer, open site, bank measure, comm	B.C.Y.	\$473,744.98	\$535,370.34	Open Shop
77.78	Rip-rap and rock lining, random, broken stone, 3/8 to 1/	S.Y.	\$7,144.09	\$8,656.91	Open Shop
5082.24	Backfill, structural, common earth, 300 H.P. dozer, 300'	L.C.Y.	\$7,115.14	\$8,385.70	Open Shop
613.50	Structural concrete, in place, elevated slab (4000 psi), 6	S.F.	\$1,883.45	\$2,276.09	Standard Union

UNTING PROPERTY DETENTION BASIN - PLAN VIEW



Match existing elevations around the perimeter of the basin, greater than 10 feet from all property boundaries. Minimum elevation = 944.00 on all north, west and south borders of the basin with 3:1 inward...



Questions?
Comments?