Is Dredging The Right Flood Control Improvement For Onondaga Creek?

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AGENDA

Recognition of a Flooding Issue

Dredging Evaluation

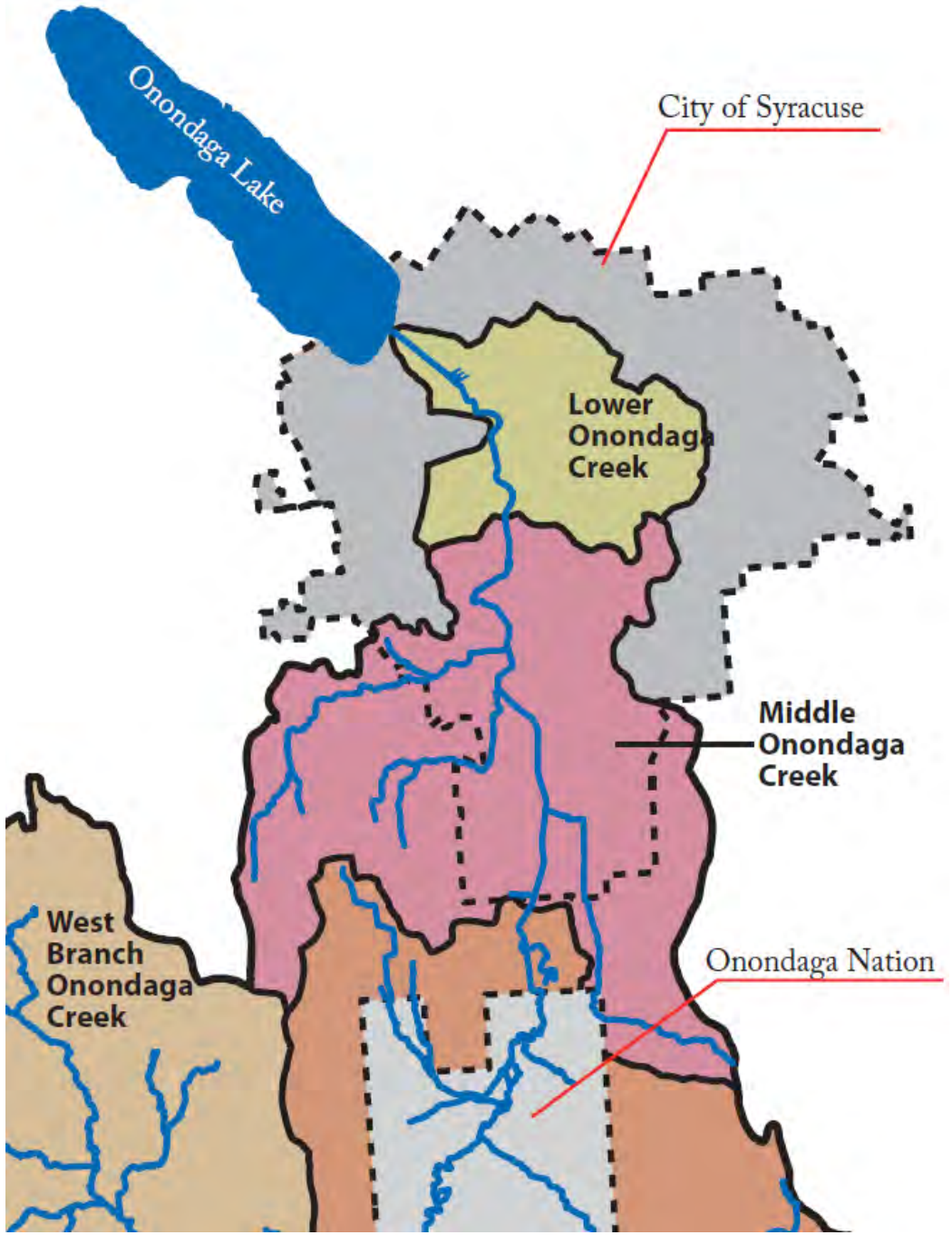
Other Flooding Reduction Strategies

Feasibility Assessment

Benefit-cost Analysis

Questions

Onondaga Creek Located in Syracuse, New York Area



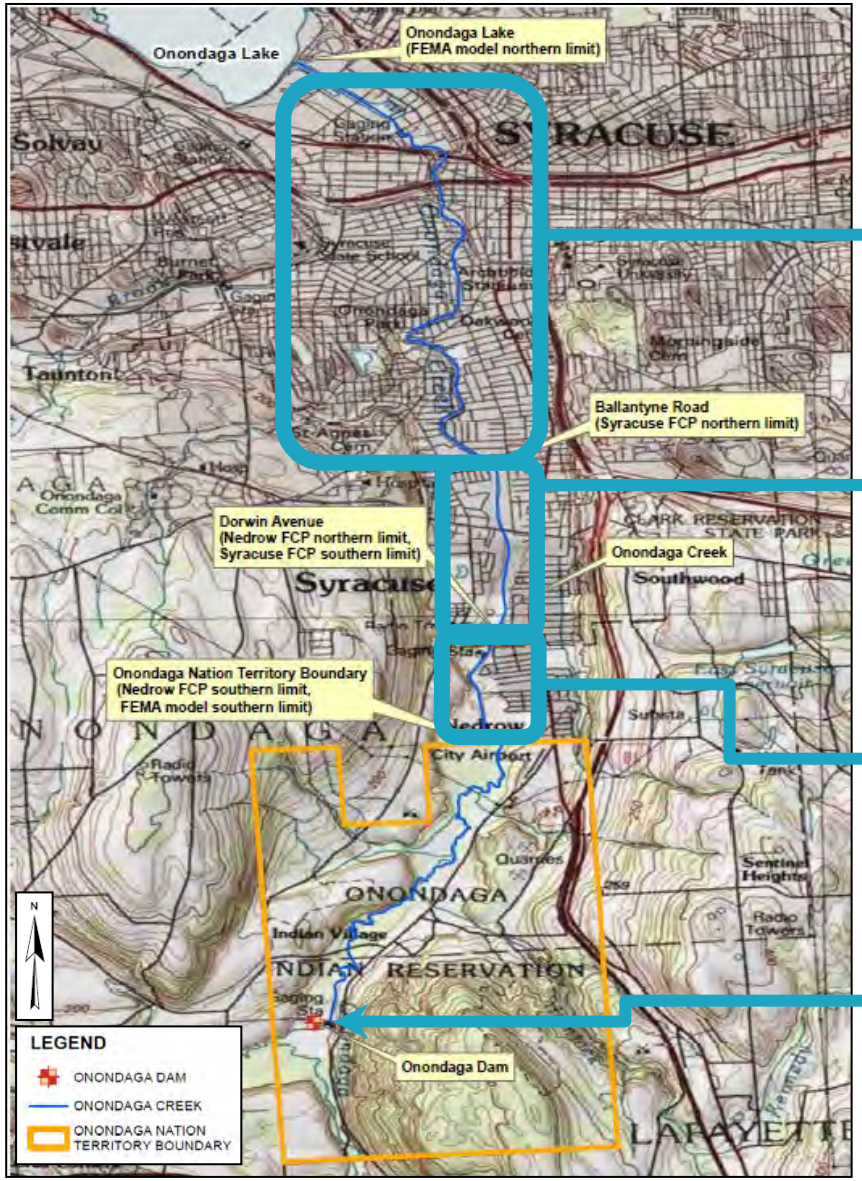
Syracuse, New York - History of flooding

1751 – First Settlement on Onondaga Lake and up to 2 miles away

Earlier Past Floods

- **1807** – First recorded flood
- **1865, 1902, 1915** – Major damages
- **1920** – Maximum recorded flow: 6,000 cfs

Onondaga Creek - Improvements



SYRACUSE CHANNEL IMPROVEMENTS

- Syracuse Intercepting Sewer Board, 1908 - 1923
- Concrete and block lined

SYRACUSE FLOOD CONTROL PROJECT

- U.S. Army Corps of Engineers (USACE), 1949
- Unlined

NEDROW FLOOD CONTROL PROJECT

- USACE, 1962
- Unlined

ONONDAGA DAM

USACE, 1947

Flood Insurance Studies (FIS)

Initial City of Syracuse FIS

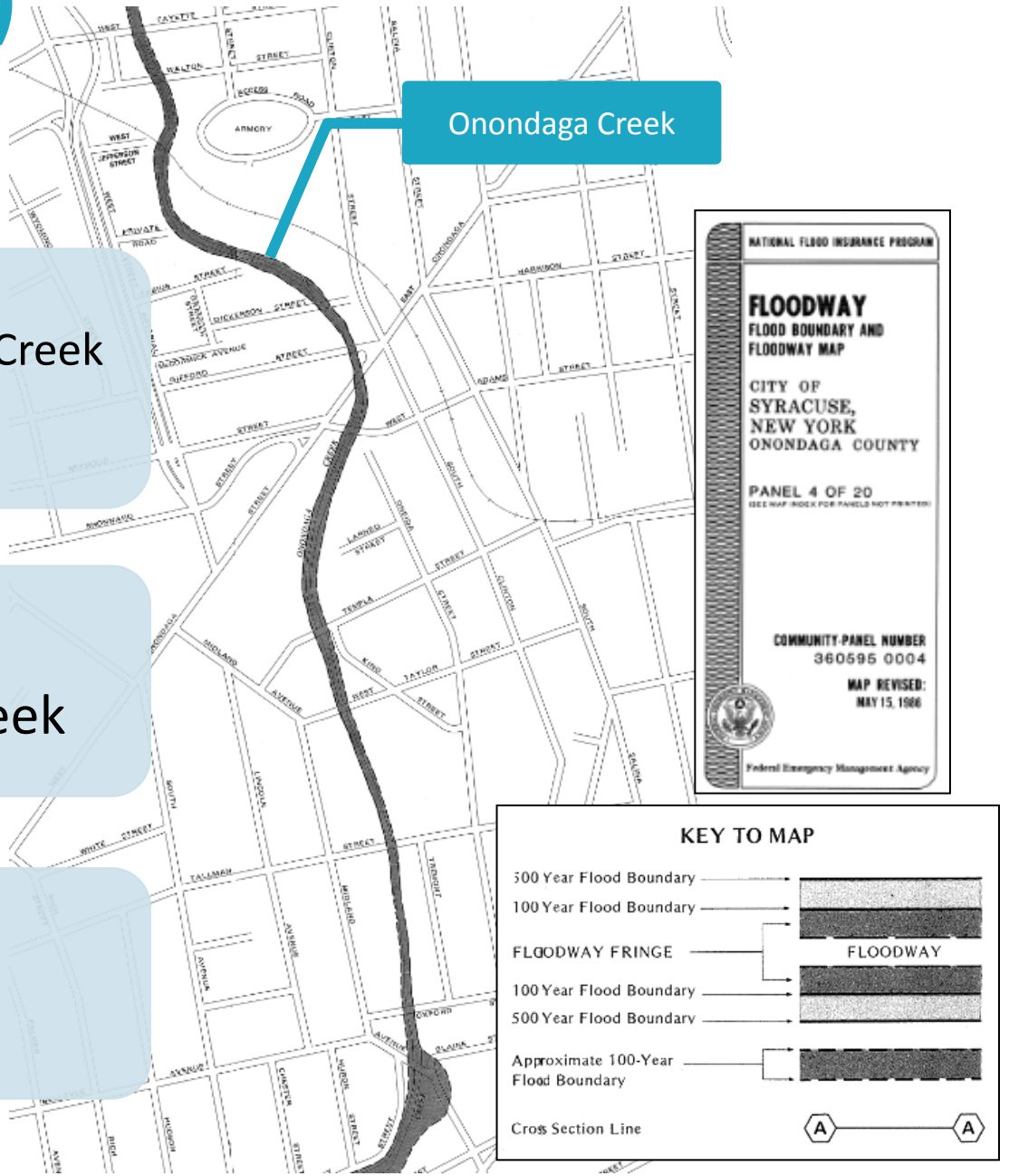
- Completed 1986
- "Approximate analysis" of Onondaga Creek
- Limited or no 100-yr floodplain near Downtown Syracuse

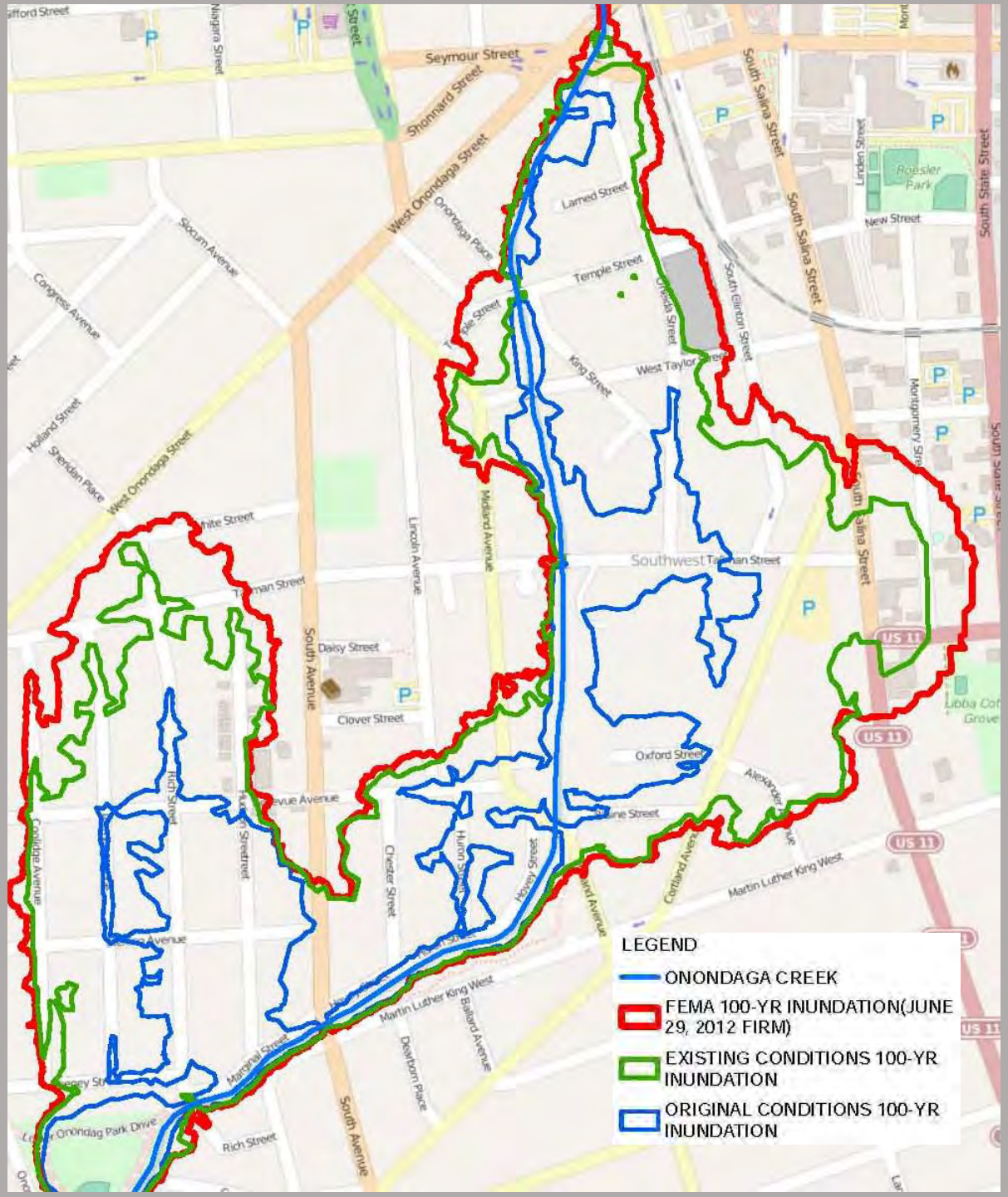
Preliminary FIS

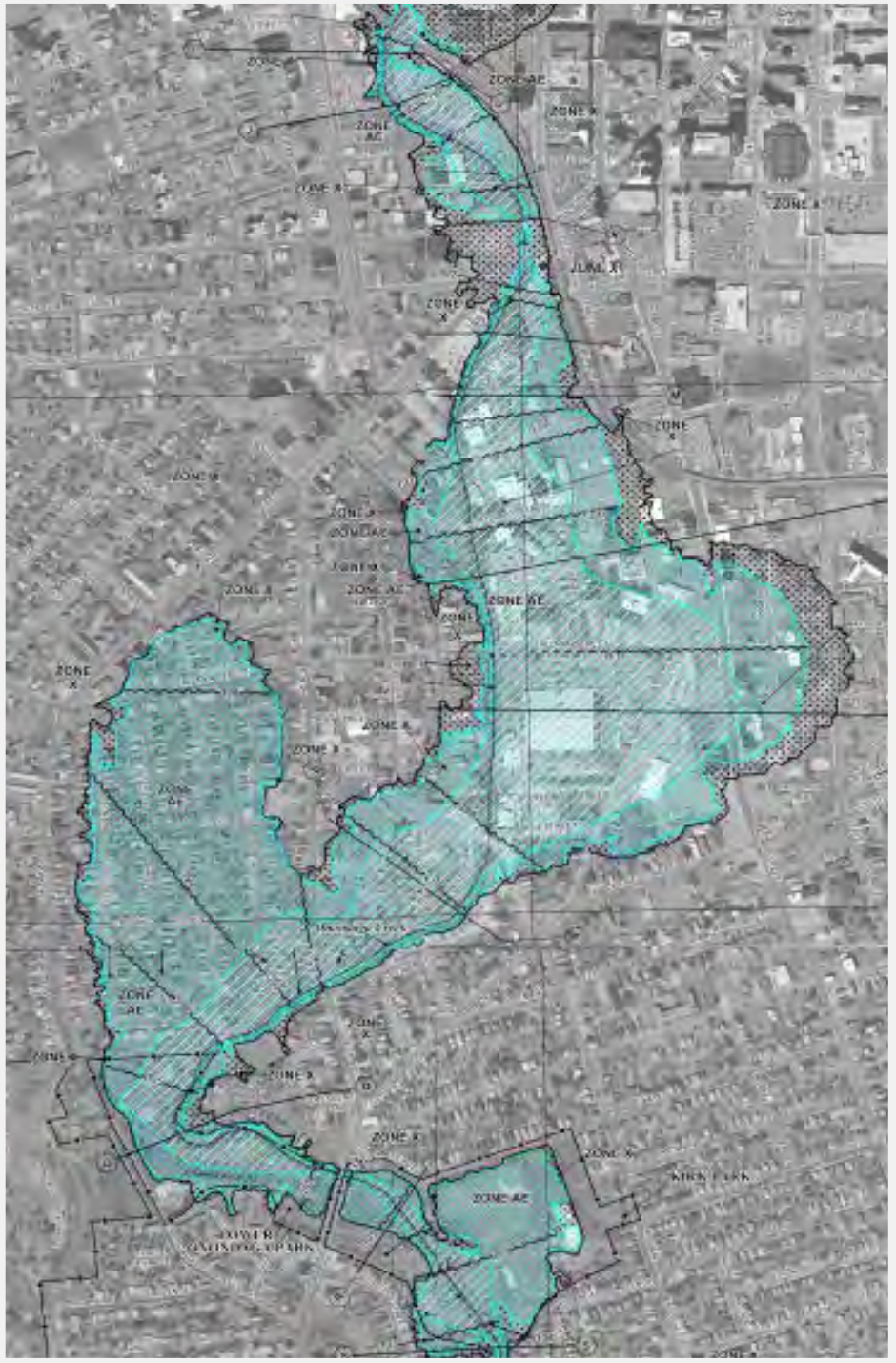
- June 2008
- Detailed study of Onondaga Creek

Revised Preliminary FIS

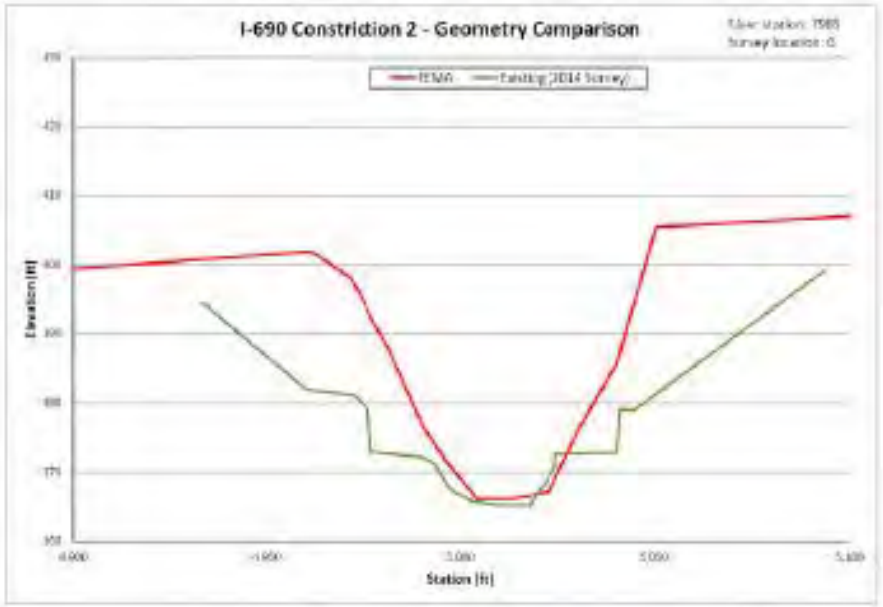
- June 2012
- Revisions from several appeals

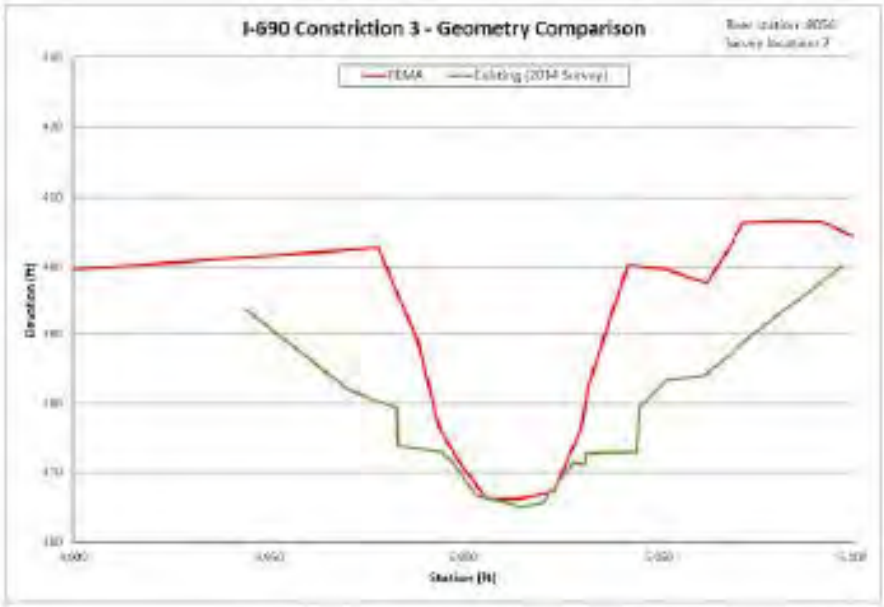


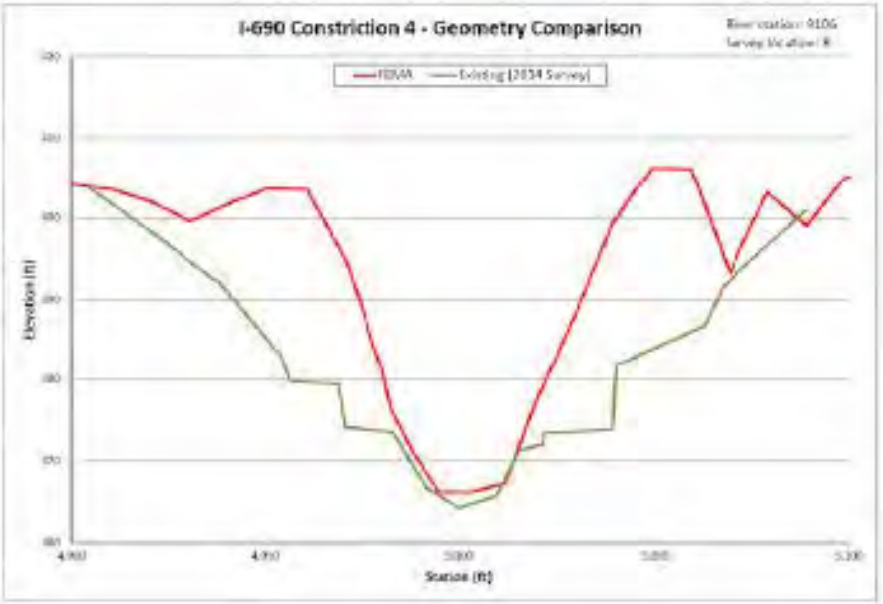

Seymour Street
Shonnard Street
West Onondaga Street
Lamed Street
Temple Street
South Salina Street
New Street
Roesler Park
Slocum Avenue
Congress Avenue
Holland Street
Sheridan Place
King Street
West Taylor Street
Montgomery Street
White Street
Lincoln Avenue
Midland Avenue
Southwest Tarman Street
South Avenue
Daisy Street
Clover Street
US 11
Oxford Street
Alexander Avenue
Martin Luther King West
Chester Street
Honey Street
Conrad Avenue
Ballard Avenue
Dearborn Place
Onondaga Park Drive
Rich Street
LEGEND
ONONDAGA CREEK
FEMA 100-YR INUNDATION(JUNE 29, 2012 FIRM)
EXISTING CONDITIONS 100-YR INUNDATION
ORIGINAL CONDITIONS 100-YR INUNDATION

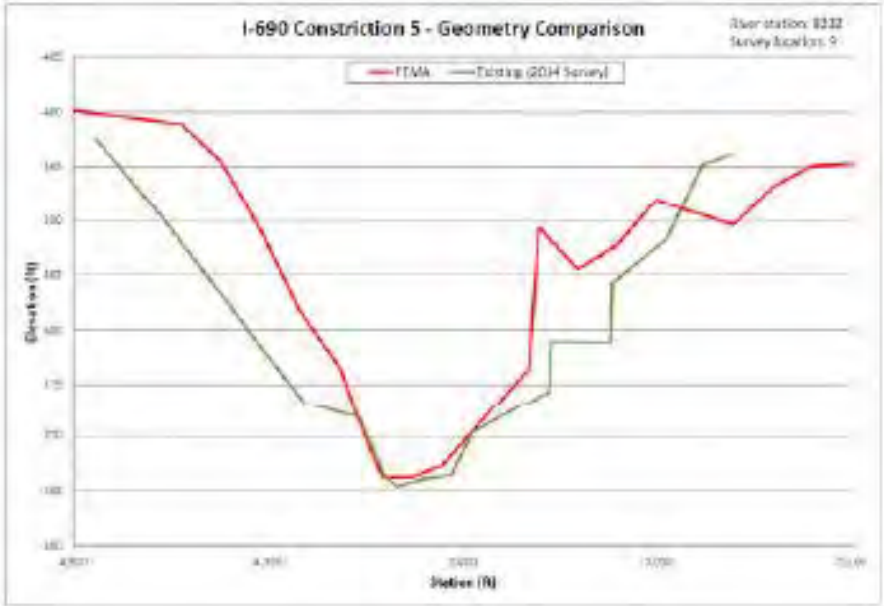


Floodplain Reduction Through Data Refinement







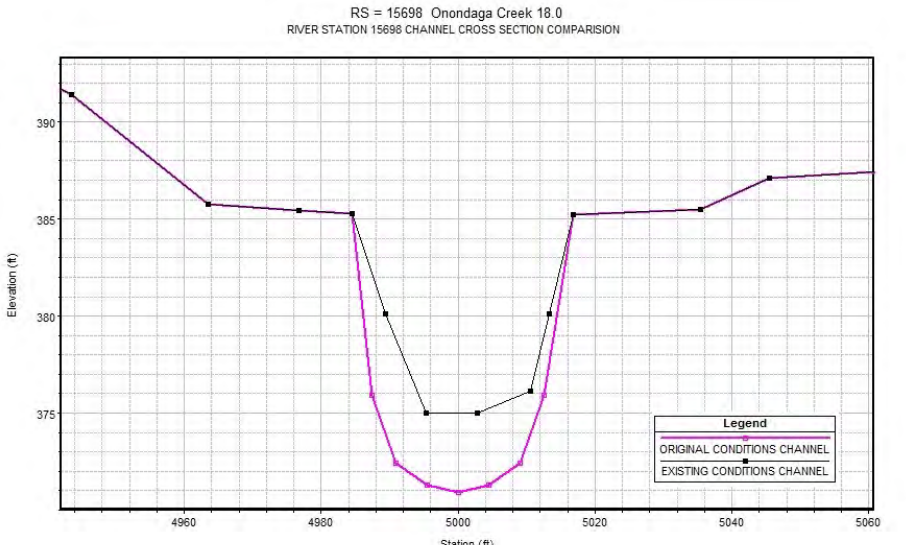


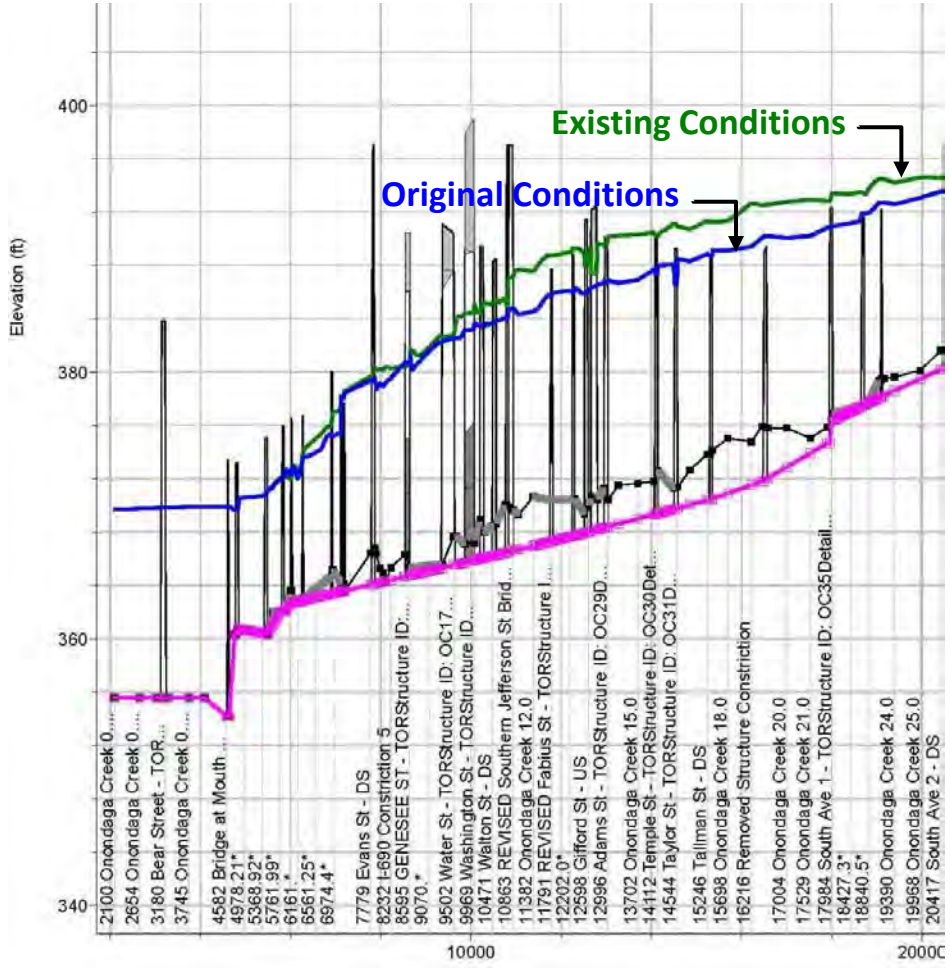
Option 1

Sediment & Vegetation Removal

Vegetation Removal – along 4 miles of creek

Sediment Removal - up to 3 ft thick

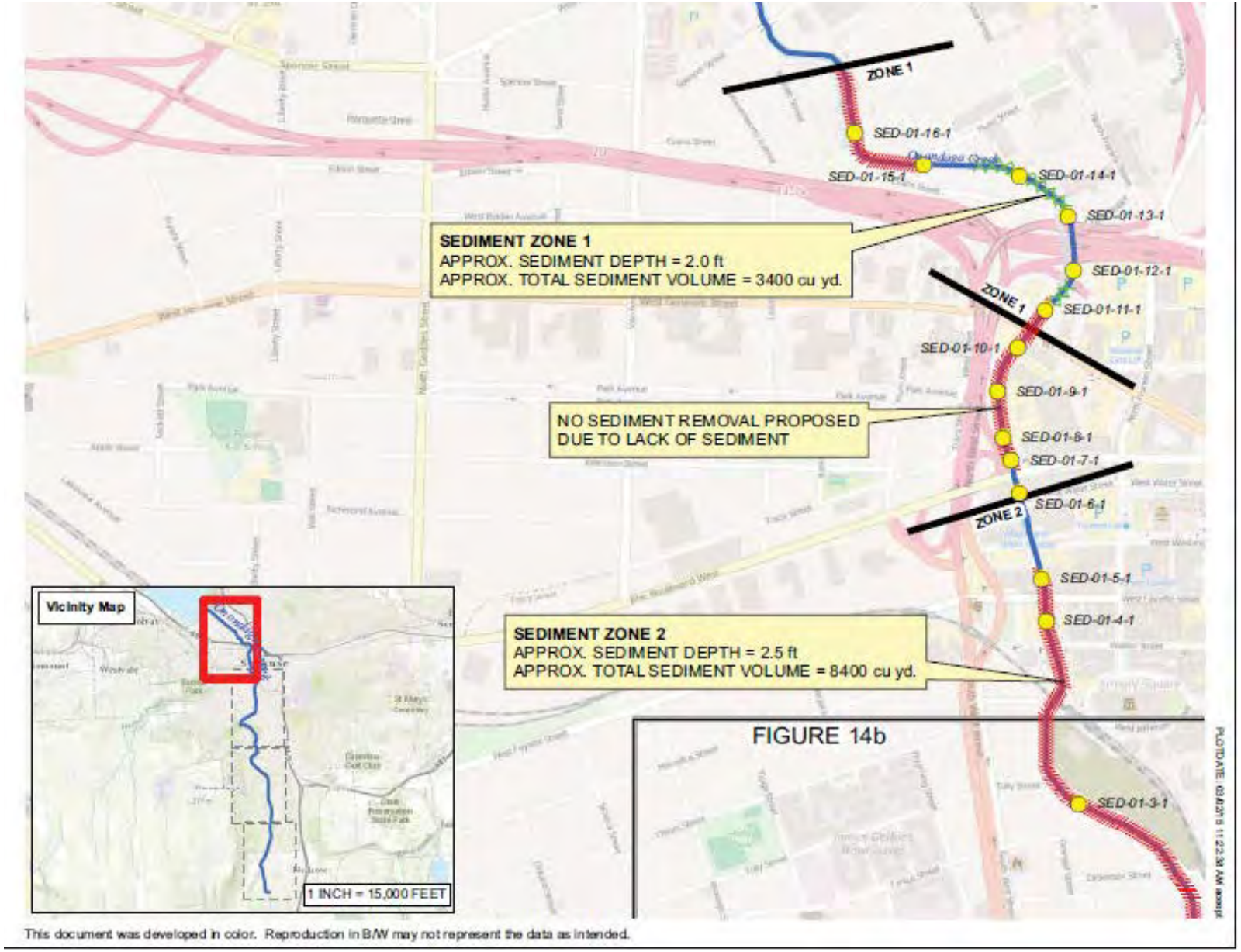




Approximately 13 Acres of Vegetation Considered For Removal

Dredging Evaluation

- Creek zoned based on sediment depth
- Estimated 25,000 cy of sediment targeted for removal



Urban Setting With Challenging Access

Sediment Quality

TABLE 2-6. SUMMARY OF CHEMICAL CONCENTRATIONS IN SEDIMENT AFFECTING DISPOSAL

Analytes	Commercial /Industrial	SED-01-1-1	SED-01-2-1	SED-01-3-1	SED-01-4-1	SED-01-5-1	SED-01-6-1	SED-01-7-1	SED-01-8-1	SED-01-9-1	SED-01-10-1	SED-01-11-1	SED-01-12-1	SED-01-13-1	SED-01-14-1	SED-01-15-1	SED-01-16-1	OC-1
Metals (mg/kg)																		
Chromium	1,500	7.2	10	11	10.3	26.7	*31.7*	10.6	17.8	5.2 J	*34.4*	14.2	26.3	15.5	45.8	24.6	5.9	8.7
Copper	270	13.3 J	26 J	31.8 J	22.0 J	28.8 J	*51.1 J*	20.4 J	*53.6 J*	15.9 J	27.2 J	44 J	*102 J*	*104 J*	*108 J*	*112 J*	9.7 J	12.3
Lead	450	6.0 J	22.5 J	*98.7 J*	47 J	*144 J*	40.9 J	*686 J*	31.6 J	*67.2 J*	*95.0 J*	*42.4 J*	*91.4 J*	43.5 J	*82.8 J*	*100 J*	8.9 J	8.9
Zinc	2,480	39.8 J	60.8 J	60.9 J	60.0 J	62.1 J	77.4 J	ND	*175 J*	53.1 J	*157 J*	*227 J*	*240 J*	*166 J*	*284 J*	*335 J*	43.8 J	36.9
Semi-volatile organic concentrations (SVOCs) (µg/kg)																		
Benz[a]anthracene	1,000	65 J	**3,000**	**3,600**	**2,100**	**2,000**	**10,000 J**	**2,500**	**1,200 J**	930 J	**3,300 J**	**7,200**	**1,500**	**2,500**	180 J	920 J	590 J	48 J
Benzo(b)fluoranthene	1,000	ND	**2,200**	**2,600**	**1,400**	**1,100**	**10,000 J**	**3,000**	**1,100 J**	**1,100 J**	**3,500 J**	**5,100**	**1,100**	**2,500**	150 J	990 J	420 J	51J
Benzo[a]pyrene	1,000	ND	**3,000**	**3,100**	**1,800**	**1,600**	**9,100 J**	**2,800**	**1,300 J**	**1,000 J**	**3,400 J**	**6,400**	**1,300**	**2,400**	170 J	910 J	550 J	43 J
Benzo[k]fluoranthene	1,700	ND	**3,000**	**2,300**	1,300	1,500	**8,300 J**	**2,000**	720 J	930 J	**3,800 J**	**5,500**	1,000	1,500	130 J	520 J	440 J	26 J
Chrysene	1,000	88 J	**3,100**	**3,700**	ND	**2,100**	**16,000 J**	**2,900**	**1,400 J**	**1,200 J**	**4,500 J**	**8,100**	**1,800**	**3,200**	210 J	**1,300 J**	740 J	46 J
Dibenz[a,h]anthracene	560	ND	**970 J**	**830 J**	160 J	130 J	**3,000 J**	350 J	**1,200 J**	85 J	440 J	**1,500 J**	280 J	140 J	58 J	120 J	140 J	ND
Pesticides (mg/kg)																		
Endosulfan sulfate	200	*5 J*	*3 J*	ND	3.7 J	*4.7 J*	*6.7 J*	ND	ND	ND	ND	ND	ND	ND	6.6 J	ND	ND	ND

NOTES: J = Estimated value

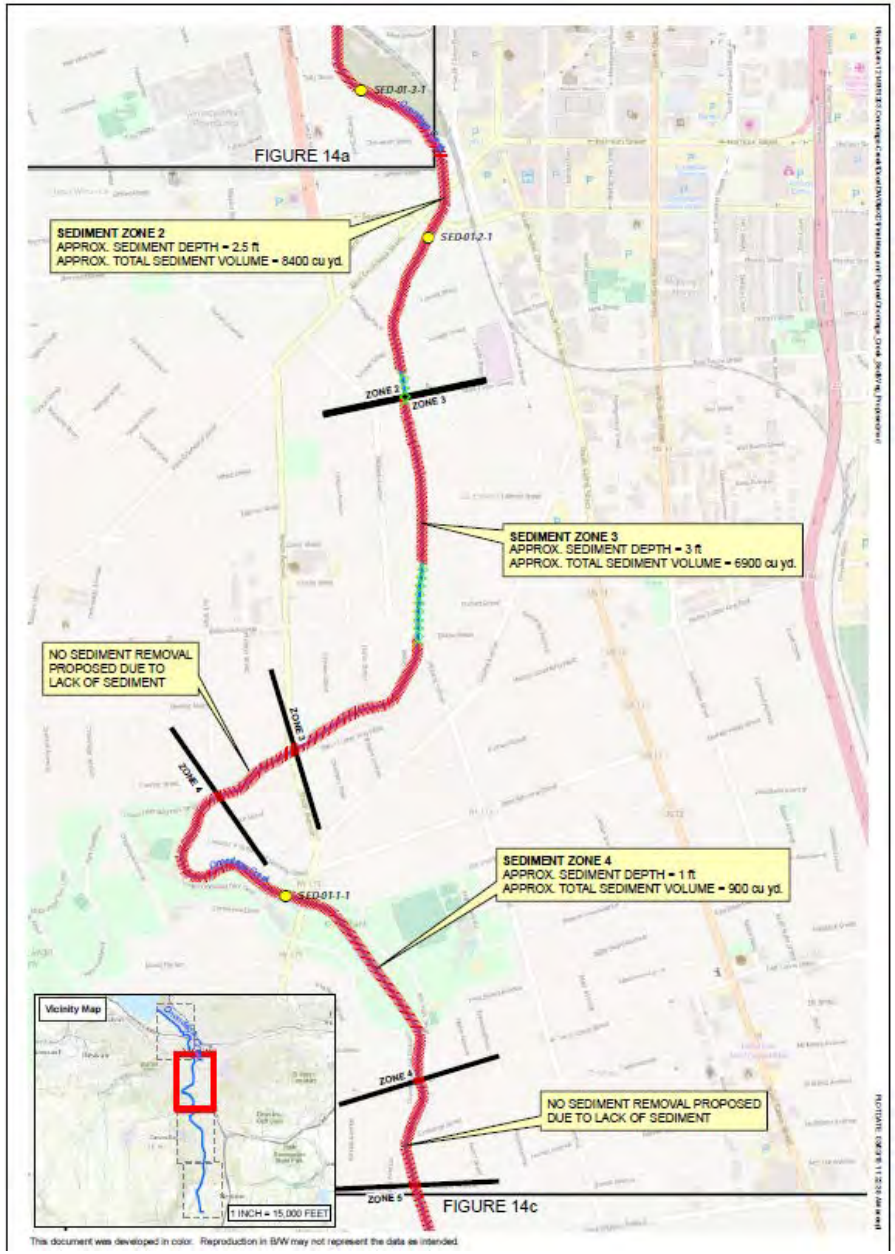
ND = Below the Detection Limit

Metal and pesticide concentrations in *italics* that exceed the New York State Unrestricted Soil Cleanup Objectives

SVOC concentrations in **bold** that exceed the New York State Commercial and Industrial Soil Cleanup Objectives

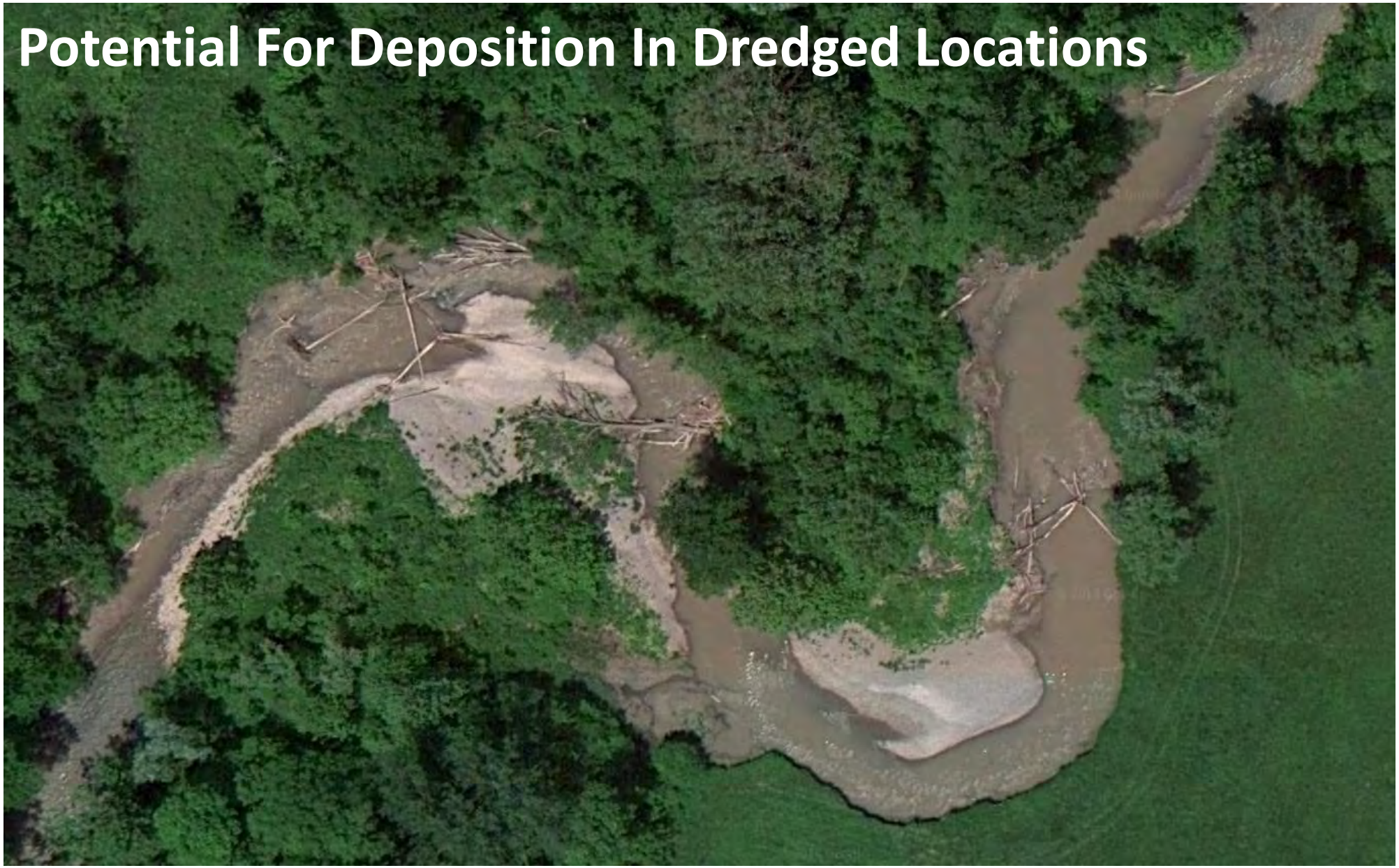
Removal Components

- Remove vegetation
- Bypass pump and remove in the dry
- Portion to landfill
- Portion for reuse pending BUD from NYSDEC
- Restore vegetation
- FS level cost - $16.4M



Potential For Deposition In Dredged Locations

High sediment load in **Onondaga Creek** from upstream



Option 2 *Onondaga Dam Modification*

Dam Features

- 1,780 feet long
- 67 feet high
- Rolled-Earth Embankment Structure
- **Primary spillway – 6.5 ft diameter pipe**
- Secondary spillway – 200 ft long concrete channel

Proposed Modification

- **Reduce the primary spillway to 3 ft diameter**

Onondaga Dam

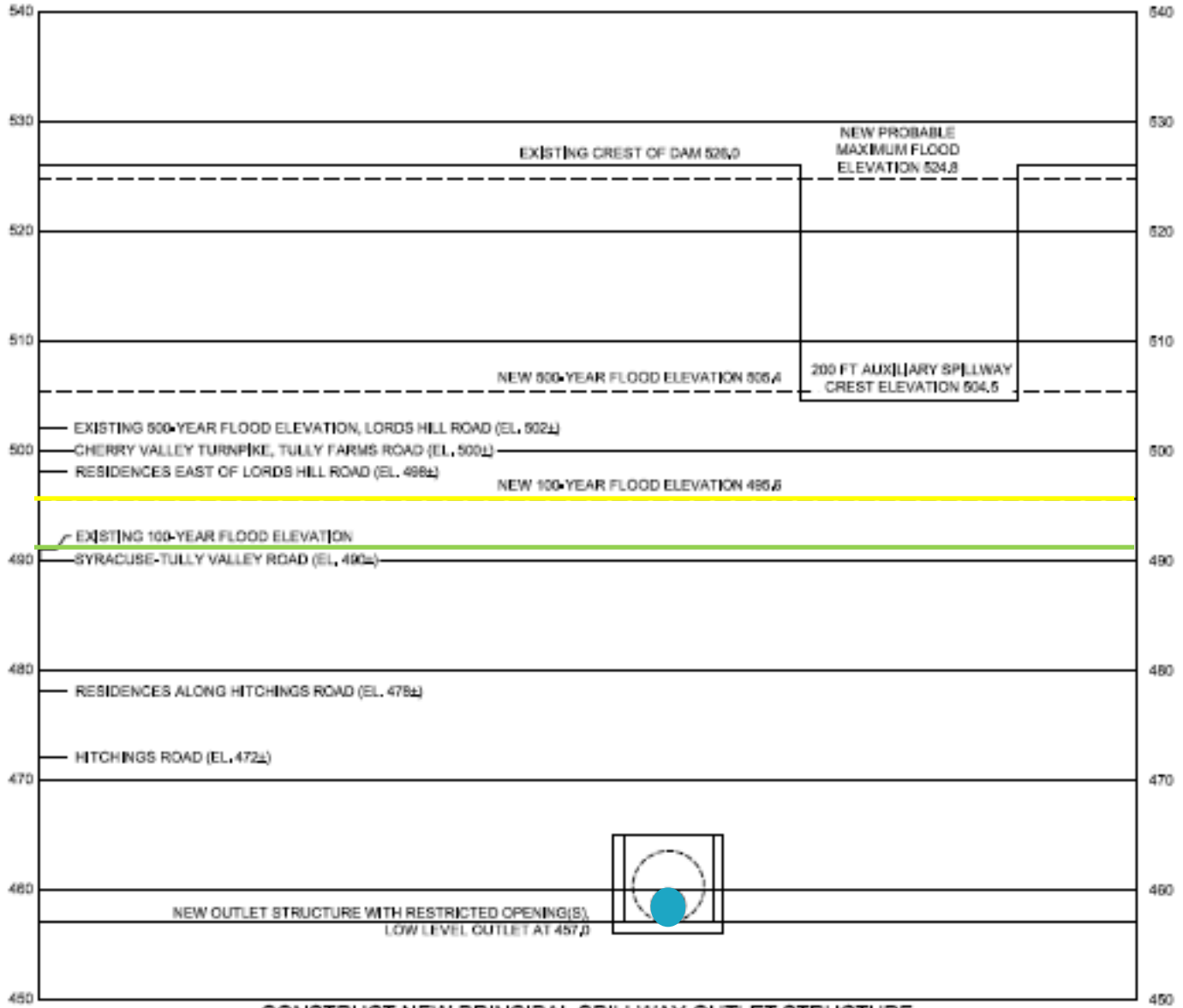
Dam Outlet Modification

- Proposed Outlet

Existing 100 yr flood elevation

New 100 yr flood elevation

FS level cost - $3.2M



CONSTRUCT NEW PRINCIPAL SPILLWAY OUTLET STRUCTURE
(INCREASE DOWNSTREAM LEVEL OF FLOOD PROTECTION)

Option 3 *Conveyance Improvements*

Alternatives Considered

- 40 ft widening
- 20 ft widening
- Parallel conveyance feature

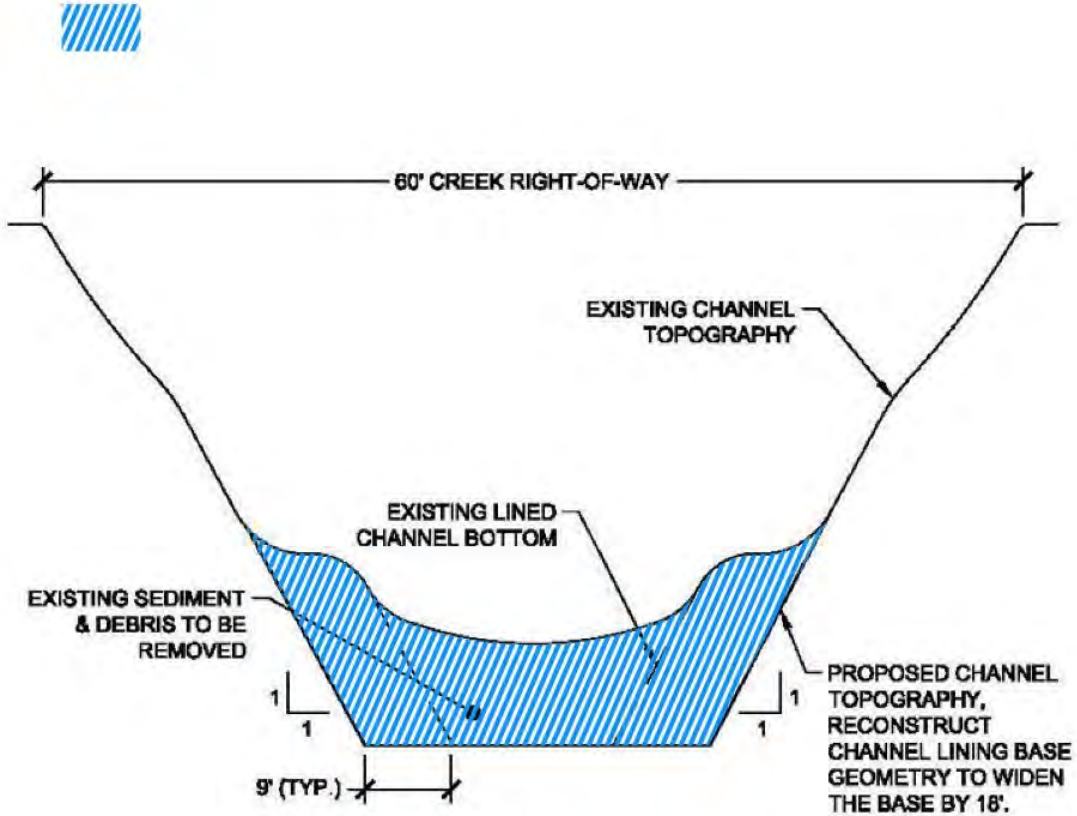
Limitations

- 60 ft Right of way
- Bridge abutments
- Buildings

Proposed Modification

- 20 ft Widening
- 1.5 miles of channel
- **FS level cost $46M**

Soil & sediment to be removed



WIDENING OF CHANNEL BASE - TYPICAL SECTION

Feasibility Assessment

Flood Inundation Limits

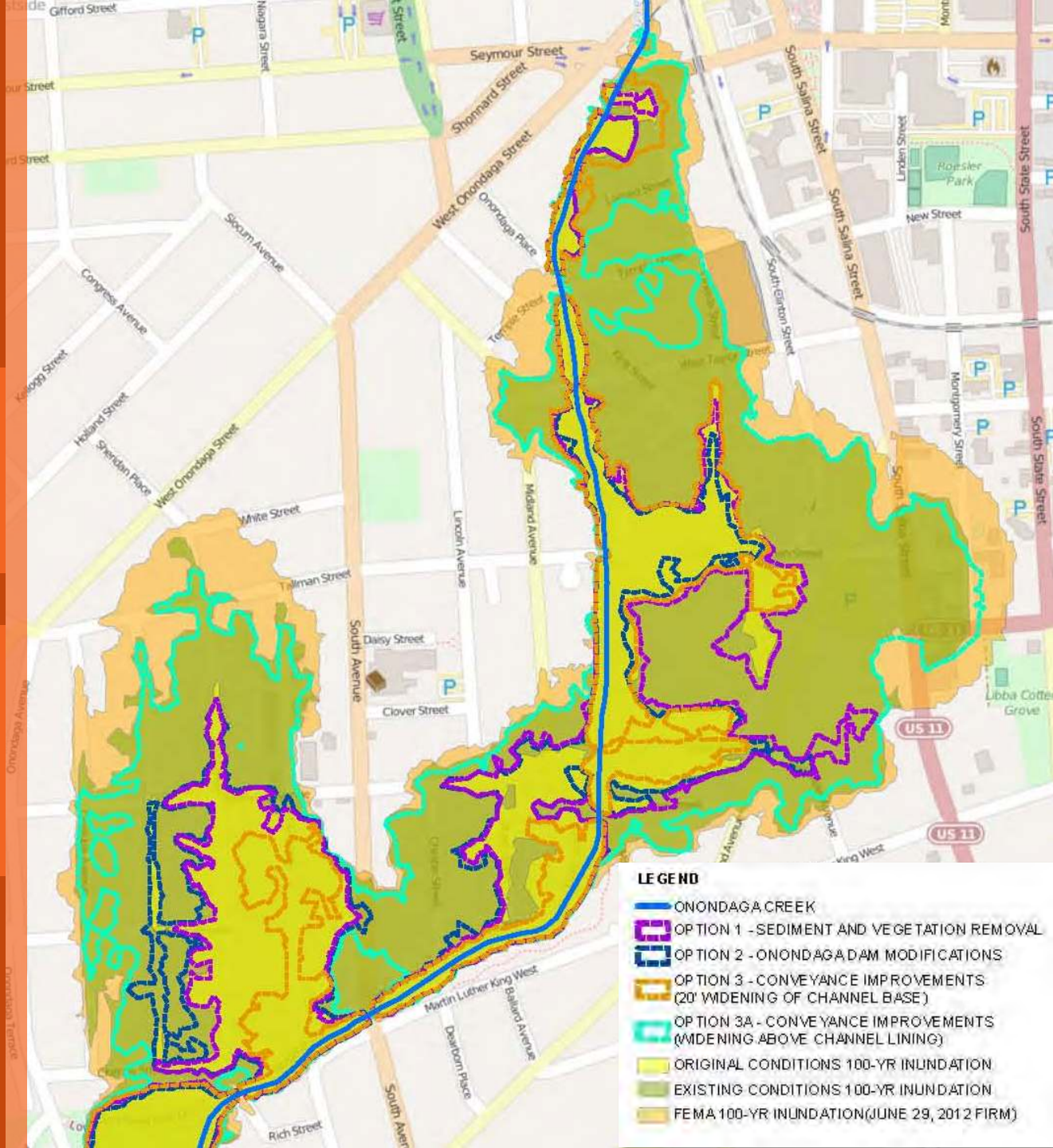
Most Effective

Widening of Channel Base
(Option 3)

Moderately Effective

- Sediment & Vegetation Removal
(Option 1)
- Dam Modification (Option 2)

How do we compare these options on the basis of cost?



Benefit Cost Analysis

Option	Option Name	Capital Cost	Annual Maintenance Cost	Residential Structures Removed	Commercial/ Industrial Structures Removed	Total Structures Removed	Benefit Cost Ratio
1	Sediment & Vegetation Removal	$16.4 million	$40,000	215	46	261	0.75
2	Onondaga Dam Outlet Modification	$3.2 million	$5000	203	52	255	3.74
3	Conveyance Improvements	$46 million	$40,000	260	52	312	0.31

OUTCOME

30 – 50%
Structures Potentially Removed From Floodplain

Options 1 & 3
Sediment & Vegetation Removal / Conveyance Improvements
Not financially viable

Option 2
Onondaga Dam Modifications
Financially viable

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Questions?