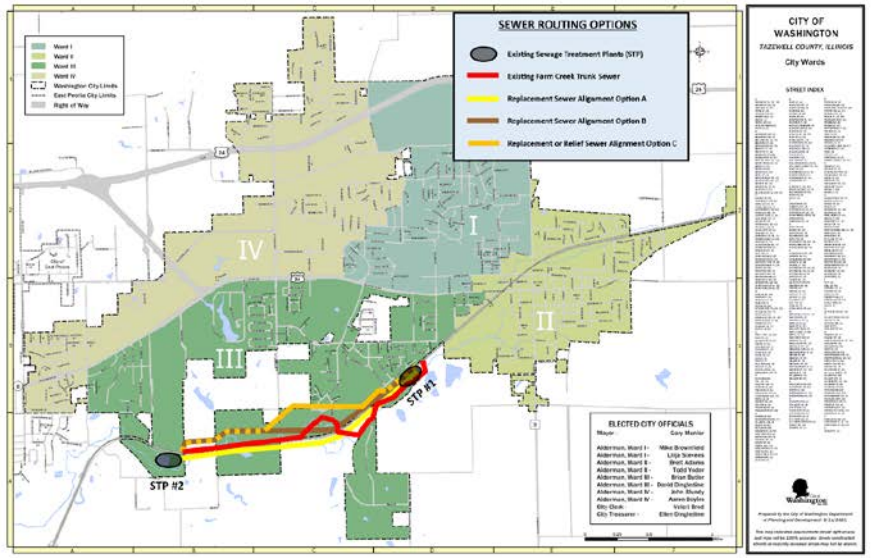
DRAFT

Certified DBE-WBE-BEP

City of Washington, Illinois
Farm Creek Trunk Sewer
3rd Party Alignment Analysis
HCE Job# 21911

February 15, 2022



Prepared By: Howard J. Hamilton, P.E., CFM, CPESC
Hamilton Consulting Engineers, Inc.

Prepared For:
City of Washington, Illinois

Environmental Design International inc.
Chicago & Joliet

33 W. Monroe St., Suite 1825
Chicago, IL 60603-5326
phone: 312-345-1400
fax: 312-345-0529
web: www.envdesigni.com

3230 Executive Drive
Joliet, IL 60431-8401
phone: 815-730-3444
fax: 815-730-6703

MEMORANDUM

DATE: June 22, 2023
TO: City of Washington, IL
FROM: Howard Hamilton, PE, CFM, CPESC
SUBJECT: Alternative Analysis, Draft Concerns/Updates and Smoke Test Discussion
HCE # 21911

ALTERNATIVE ANALYSIS

In response to the City's questions regarding Alternatives Analysis prepared by Hamilton Consulting Engineers, Inc. (HCE), we are pleased to provide additional context and answers to the Council. It is our understanding that that the Council met to discuss the report on Monday, March 20, 2023, and expressed the following concerns:

1. Apparent errors and/or discrepancies with the Preliminary Engineer's Opinion of Probable Construction Costs (PEOPCC) for both the L-1 and E-3 alignments.
2. Revisions to Alignment E-3 from the original location proposed by Aptim/Goat Springs, LLC.

Background

HCE completed the first, *Draft* version, of the analysis, titled the "Farm Creek Trunk Sewer 3rd Party Alignment Analysis" on February 15, 2022, and presented our finding to the City Council on February 21, 2022. As outlined in our proposal and through discussions with City staff, HCE would present a draft version of the analysis to the city, finalize the report over the next one to two weeks, and then release a final version for public review and comment. While the substance of the final version would not change in a material way from the draft version, the estimates, exhibits, and text would continue to be refined, and input from the Council and City staff would be incorporated. At the direction of the city, HCE ceased all work after presenting to Draft version to the Council and HCE made no further edits.

Estimates

Specifically, the factor resulting in apparent errors is the draft nature of both the estimate and plans, specifically regarding the method of construction for each length of sewer.

Engineering is an iterative process involving trial runs, estimates and analyses, and then revisions. Through this process, HCE laid out the L-1 and E-3 alignments, provided manholes at key locations, and identified obvious locations where construction would use directional boring (at extreme sewer depths) or jack and bore methods (at sensitive crossings like creeks and railroads). This information was conveyed on the Plan and Profile drawings for each alignment.

Environmental Design International inc.

has combined with

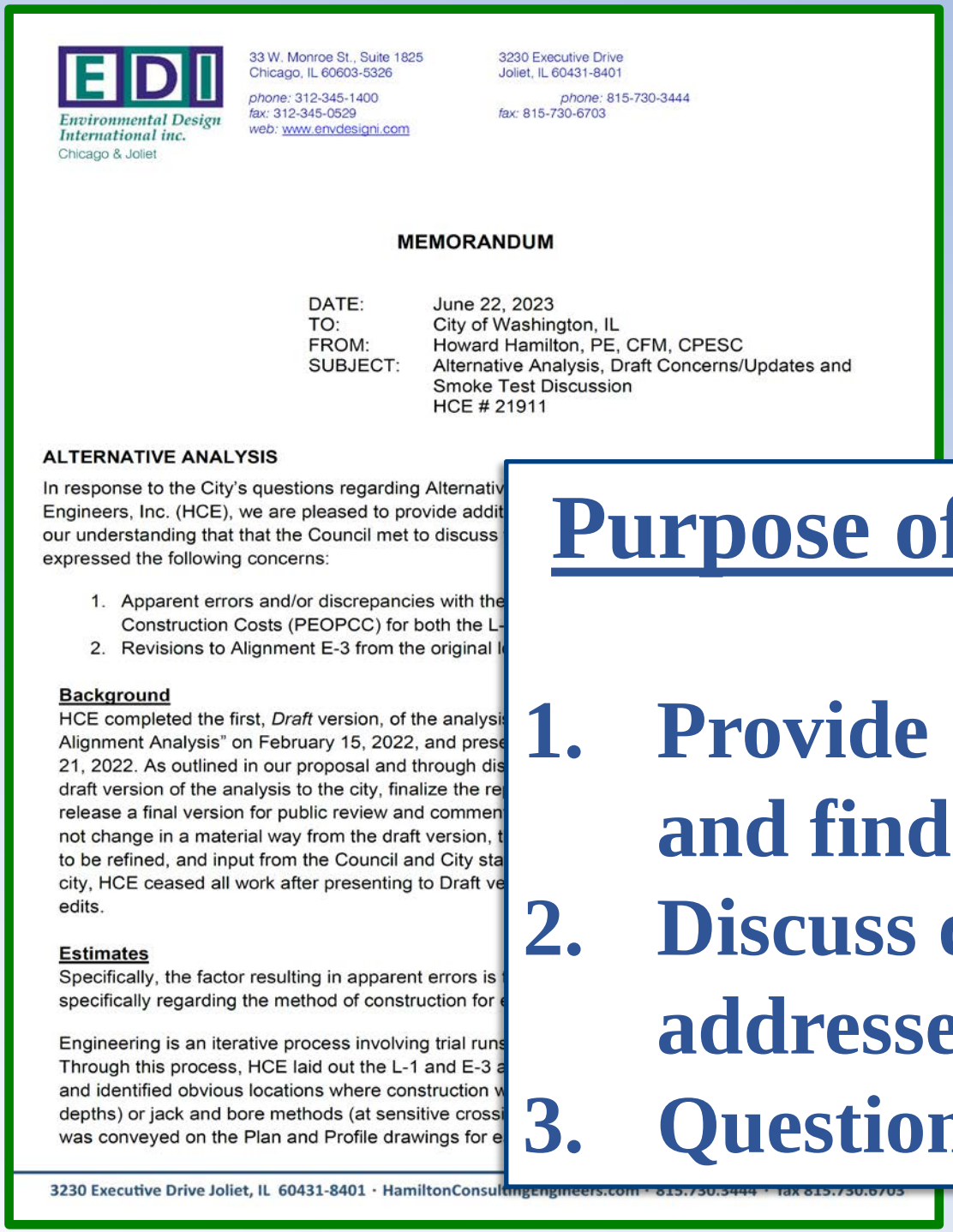
Hamilton Consulting Engineers, Inc.

Effective June 1, 2023

Howard J. Hamilton PE, CFM, CPESC

Director of Civil Engineering

EDI
Environmental Design International inc.
Chicago & Joliet



Environmental Design International inc.
Chicago & Joliet

33 W. Monroe St., Suite 1825
Chicago, IL 60603-5326
phone: 312-345-1400
fax: 312-345-0529
web: www.envdesigni.com

3230 Executive Drive
Joliet, IL 60431-8401
phone: 815-730-3444
fax: 815-730-6703

MEMORANDUM

DATE: June 22, 2023
TO: City of Washington, IL
FROM: Howard Hamilton, PE, CFM, CPESC
SUBJECT: Alternative Analysis, Draft Concerns/Updates and Smoke Test Discussion
HCE # 21911

ALTERNATIVE ANALYSIS

In response to the City's questions regarding Alternativ
Engineers, Inc. (HCE), we are pleased to provide addit
our understanding that that the Council met to discuss
expressed the following concerns:

1. Apparent errors and/or discrepancies with the
Construction Costs (PEOPCC) for both the L-
2. Revisions to Alignment E-3 from the original l

Background

HCE completed the first, *Draft* version, of the analysi
Alignment Analysis" on February 15, 2022, and prese
21, 2022. As outlined in our proposal and through dis
draft version of the analysis to the city, finalize the re
release a final version for public review and commen
not change in a material way from the draft version, t
to be refined, and input from the Council and City sta
city, HCE ceased all work after presenting to Draft ve
edits.

Estimates

Specifically, the factor resulting in apparent errors is
specifically regarding the method of construction for

Engineering is an iterative process involving trial runs
Through this process, HCE laid out the L-1 and E-3 a
and identified obvious locations where construction w
depths) or jack and bore methods (at sensitive crossi
was conveyed on the Plan and Profile drawings for e

3230 Executive Drive Joliet, IL 60431-8401 · HamiltonConsultingEngineers.com · 815.730.3444 · fax 815.730.6703

Purpose of Tonight's Discussion

1. Provide "brief" review of work and findings to date
2. Discuss questions that are addressed in the Memo
3. Question and Answer

Environmental Design International inc.
Chicago & Joliet

Some Definitions

GPM = Gallons Per Minute

GPD = Gallons Per Day

MGD = Million Gallons Per Day

I/I = Infiltration and Inflow

Infiltration = The groundwater that seeps into leaky sewers

Inflow = The stormwater that flows into open sewers

PE = Population Equivalent

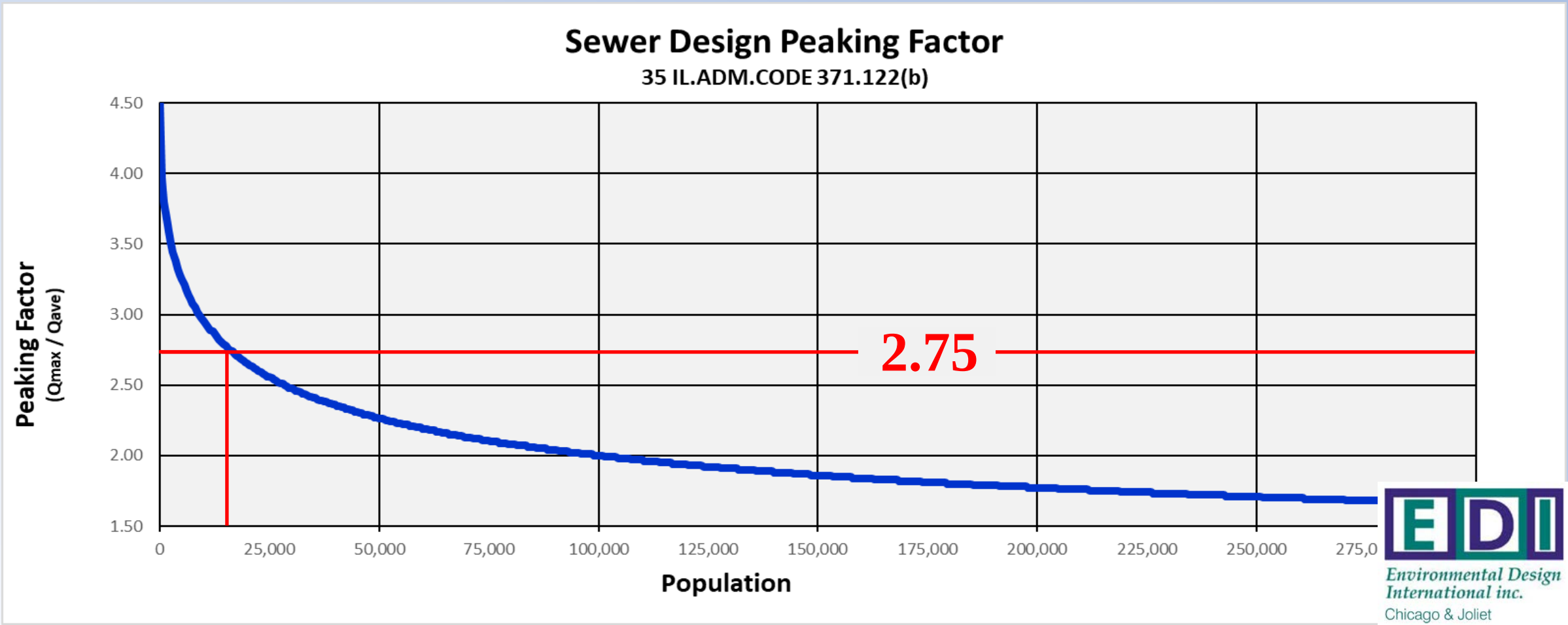
100 gallons of sewage per day per PE

70 – 80 gallons sewage

20 – 30 gallons I/I

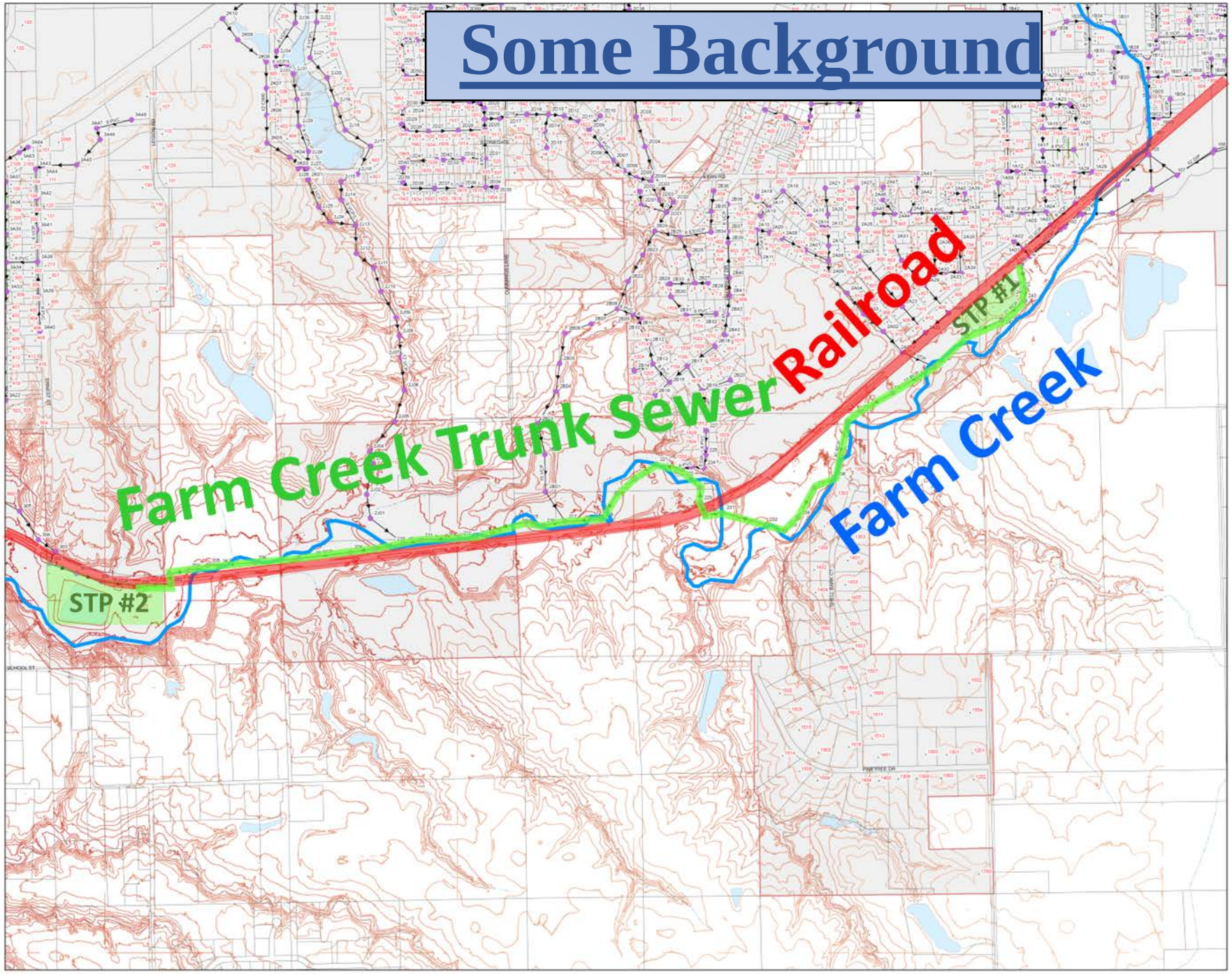
Some Definitions

Peaking Factor = The ratio of the peak flow over the average flow in a sewer



Environmental Design International inc.
Chicago & Joliet

Some Background



Legend
- Clean_Out
- Fittings
- Manholes
- Pump_Station
- Relief_Valve
- Sanitary_Treatment_Plant
- Sanitary_Pipe
- Sanitary_Service
- Valve_Vault
- Wet_Well
- Address_Points
- Parcels
- Centerlines
- Right_of_Way
- Streams / Creeks / Ditches
- Tazewell_Hydro_Breaklines

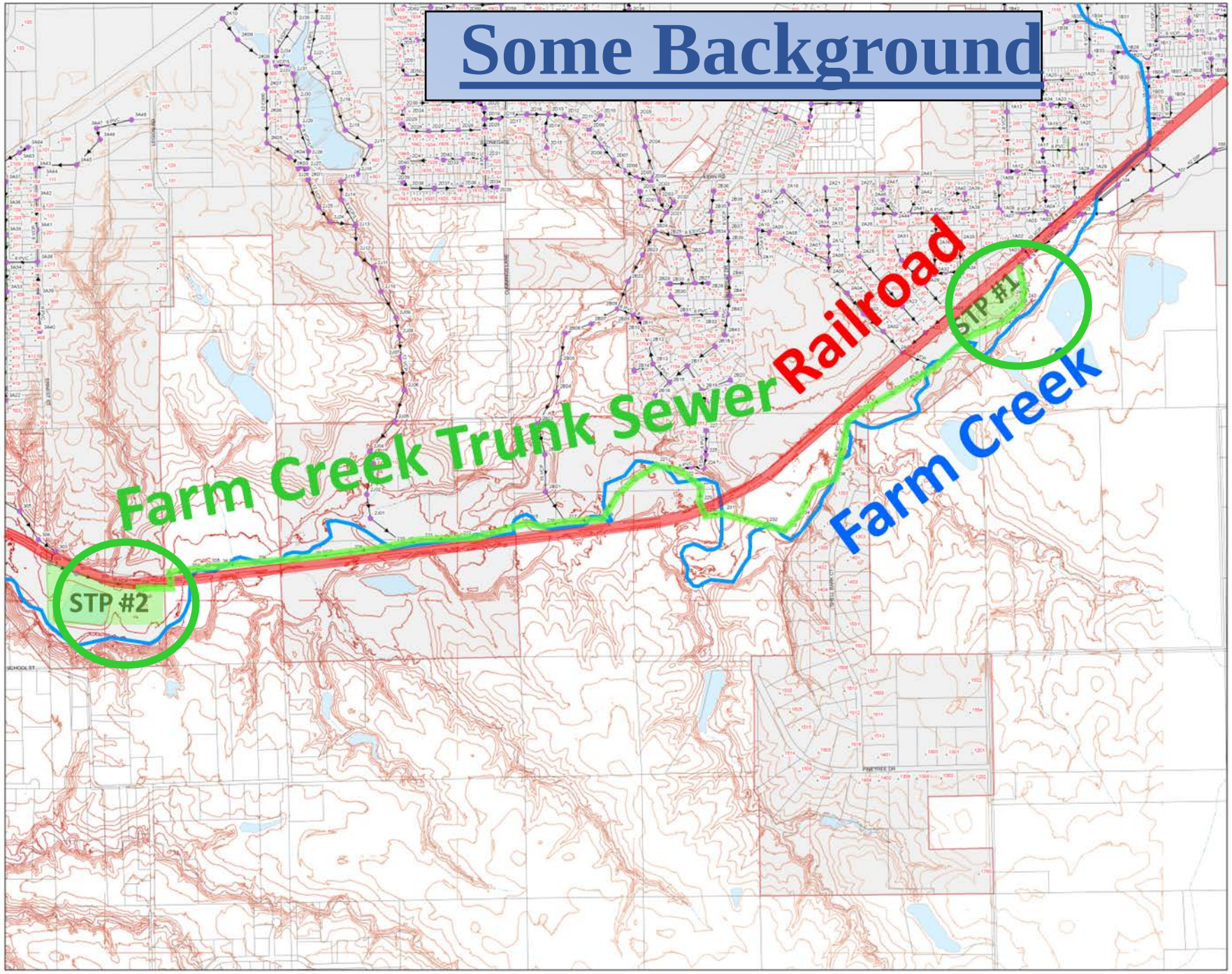
10' Contours

Contour
- 840
- 830
- 820
- 810
- 800
- 790
- 780
- 770
- 760
- 750
- 740
- 730
- 720
- 710
- 700
- 690
- 680
- 670
- 660
- 650
- 640
- 630
- 620
- City_Limit_Washington

1 inch = 500 fe

Environmental Design International inc.
Chicago & Joliet

Some Background



Legend
- Clean_Out
- Fittings
- Manholes
- Pump_Station
- Relief_Valve
- Sanitary_Treatment_Plant
- Sanitary_Pipe
- Sanitary_Service
- Valve_Vault
- Wet_Well
- Address_Points
- Parcels
- Centerlines
- Right_of_Way
- Streams / Creeks / Ditches
- Tazewell_Hydro_Breaklines

10' Contours

Contour
- 840
- 830
- 820
- 810
- 800
- 790
- 780
- 770
- 760
- 750
- 740
- 730
- 720
- 710
- 700
- 690
- 680
- 670
- 660
- 650
- 640
- 630
- 620
- City_Limit_Washington

1 inch = 500 fe

Environmental Design International inc.
Chicago & Joliet

Some Background

1950	STP #1 Constructed
1971	STP #2 and Farm Creek Trunk Sewer (FCTS)
2015	FCTS Easements reviewed
2016	Strand retained for FCTS Replacement Project
2019	Strand conducts a systemwide flow study to size FCTS
2020	Property Owners adjacent to FCTS express concerns
2021	Strand and Property Owner Representatives prepare competing alignment alternatives for the Farm Creek Trunk Sewer

Environmental Design International inc.
Chicago & Joliet

11/4/2021

HCE Retained to Evaluate FCTS Alternatives:

1. Collect Existing Data
2. Interview City Staff
3. Interview Property Owners
4. Community Survey and Website
5. Existing FCTS Evaluation from Existing Data
6. Draft Report
7. Report Revisions
8. Public Hearing
9. Presentation to Council
10. Final Draft
11. Final Report
12. Contingency, Allowance

Environmental Design International inc.
Chicago & Joliet

11/4/2021 **HCE Retained to Evaluate FCTS Alternatives:**

1. Collect Existing Data
2. Interview City Staff

12/14/2021

3. Interview Property Owners

1/18 – 2/28

4. Community Survey and Website
5. Existing FCTS Evaluation from Existing Data
6. Draft Report
7. ~~Report Revisions~~
8. ~~Public Hearing~~

2/21/2022

9. Presentation to Council
10. ~~Final Draft~~
11. ~~Final Report~~
12. Contingency, Allowance

Memo Re: Alignment and Estimates, Smoke Test Discussion

Environmental Design International inc.
Chicago & Joliet

Key Points

From the Draft Report

Sewage Flows

1. **Wet Weather flows from the City sewerage basins into FCTS are excessive**

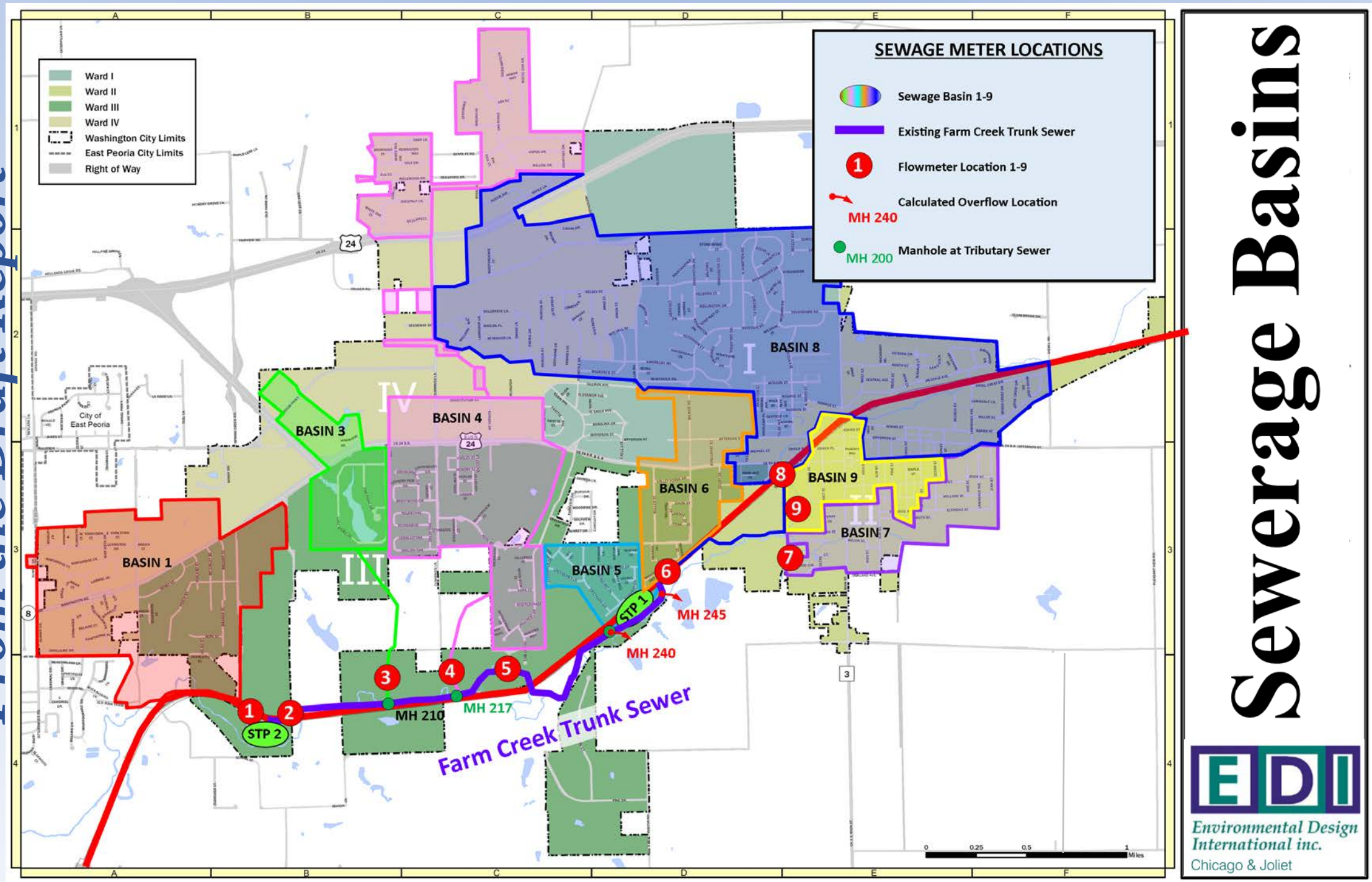
2. **Flows recorded August 30, 2016 were equivalent to peak flow expected from a town of 92,230 people (PE)**

3. **Excess flows are generated from older areas in town, NOT due to the condition of FCTS**

EDI
Environmental Design International inc.
Chicago & Joliet

Key Points

From the Draft Report



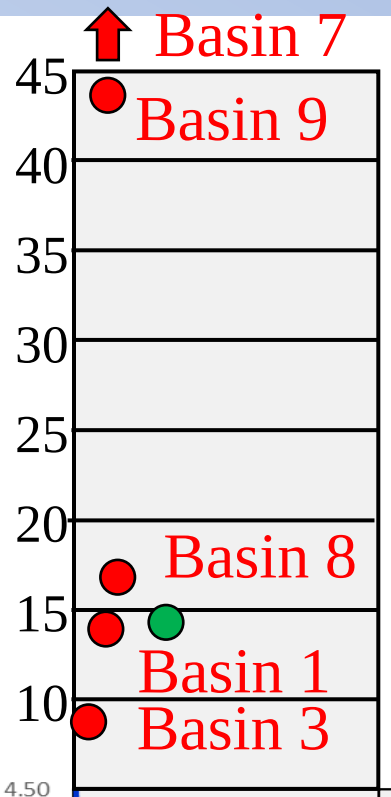
Sewerage Basins

Environmental Design International inc.
Chicago & Joliet

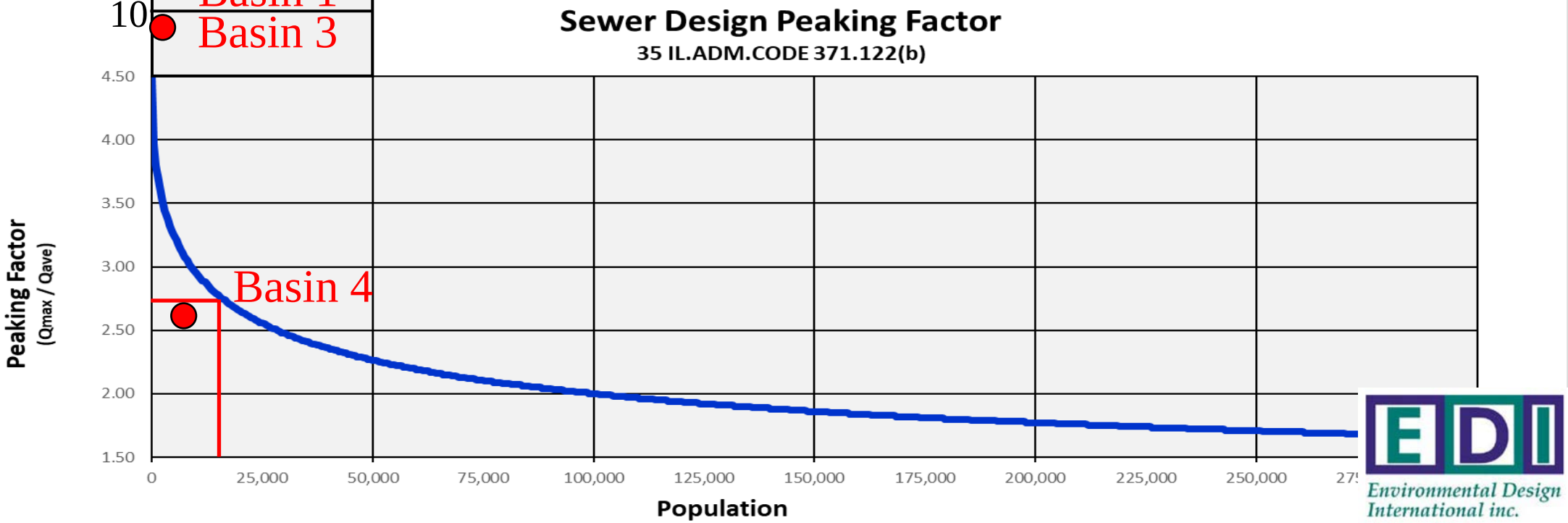
Key Points

From the Draft Report

Sewage Flows



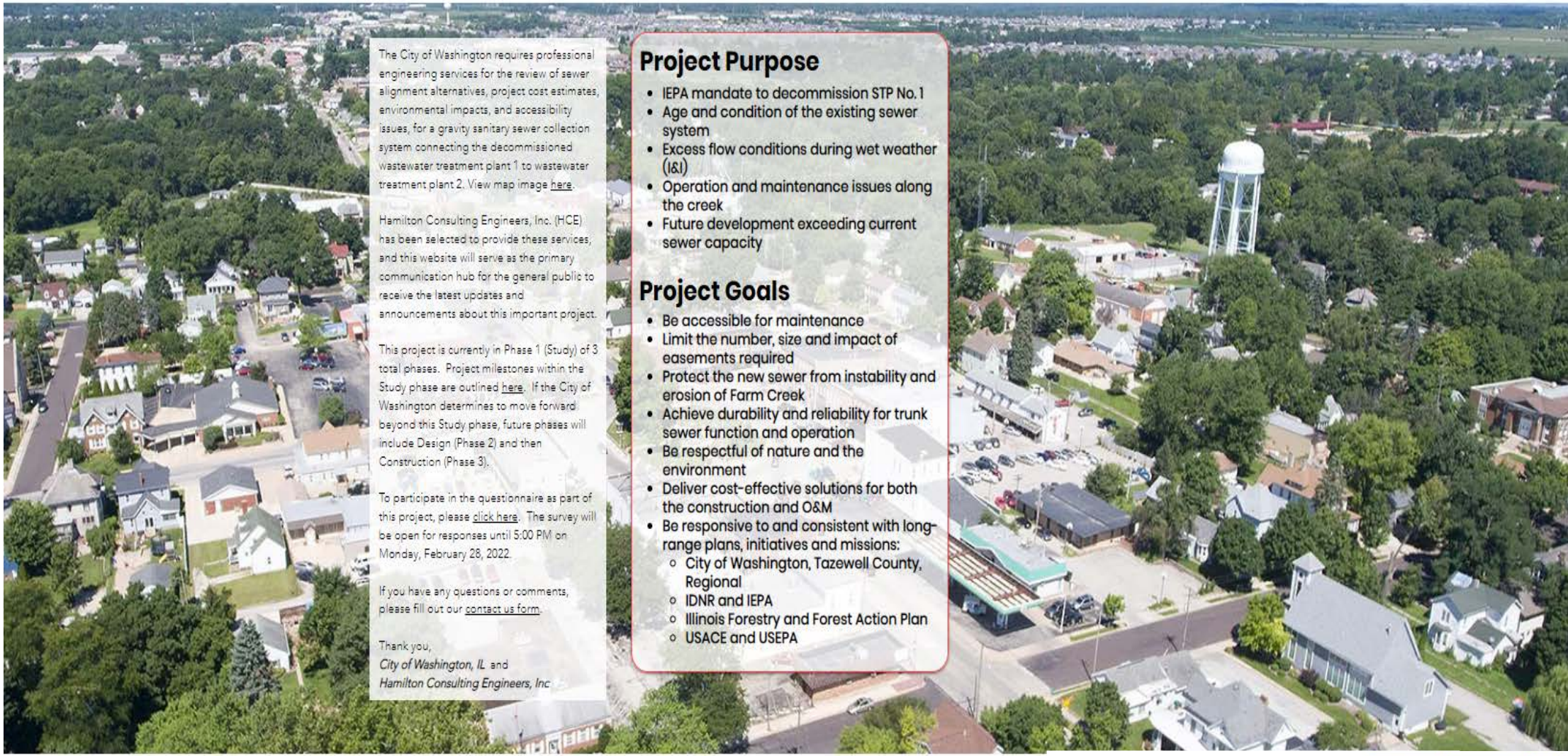
STP #2



Environmental Design International inc.
Chicago & Joliet

Website

https://www.farmcreeksewerproject.com



EDI
Environmental Design International inc.
Chicago & Joliet

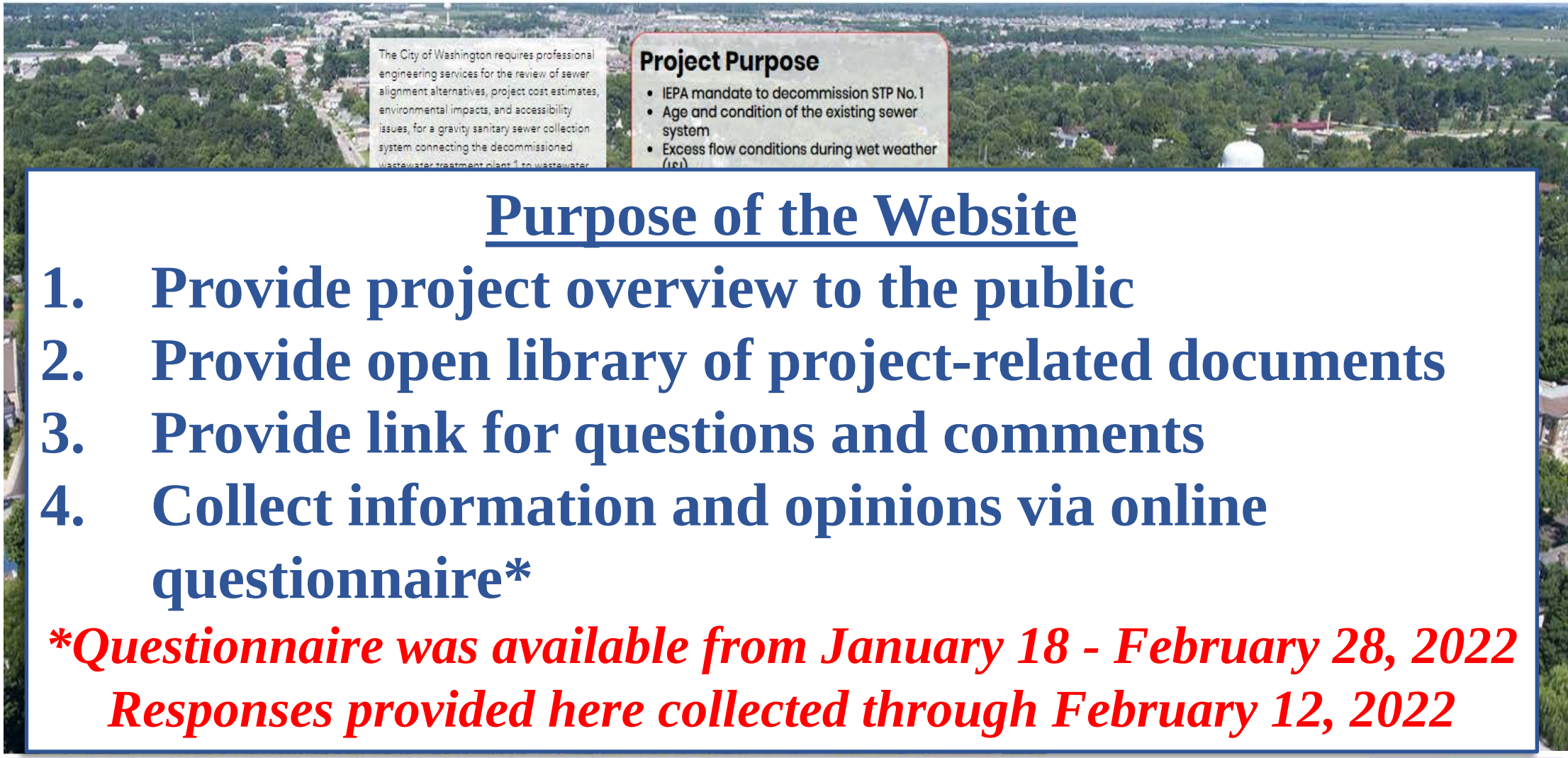
Farm Creek Trunk Sewer Project

Washington, IL / City Engineer

https://www.farmcreeksewerproject.com

Project Overview | Map | Milestones | Documents | Contact Us

Website



Purpose of the Website

1. Provide project overview to the public
2. Provide open library of project-related documents
3. Provide link for questions and comments
4. Collect information and opinions via online questionnaire*

Questionnaire was available from January 18 - February 28, 2022

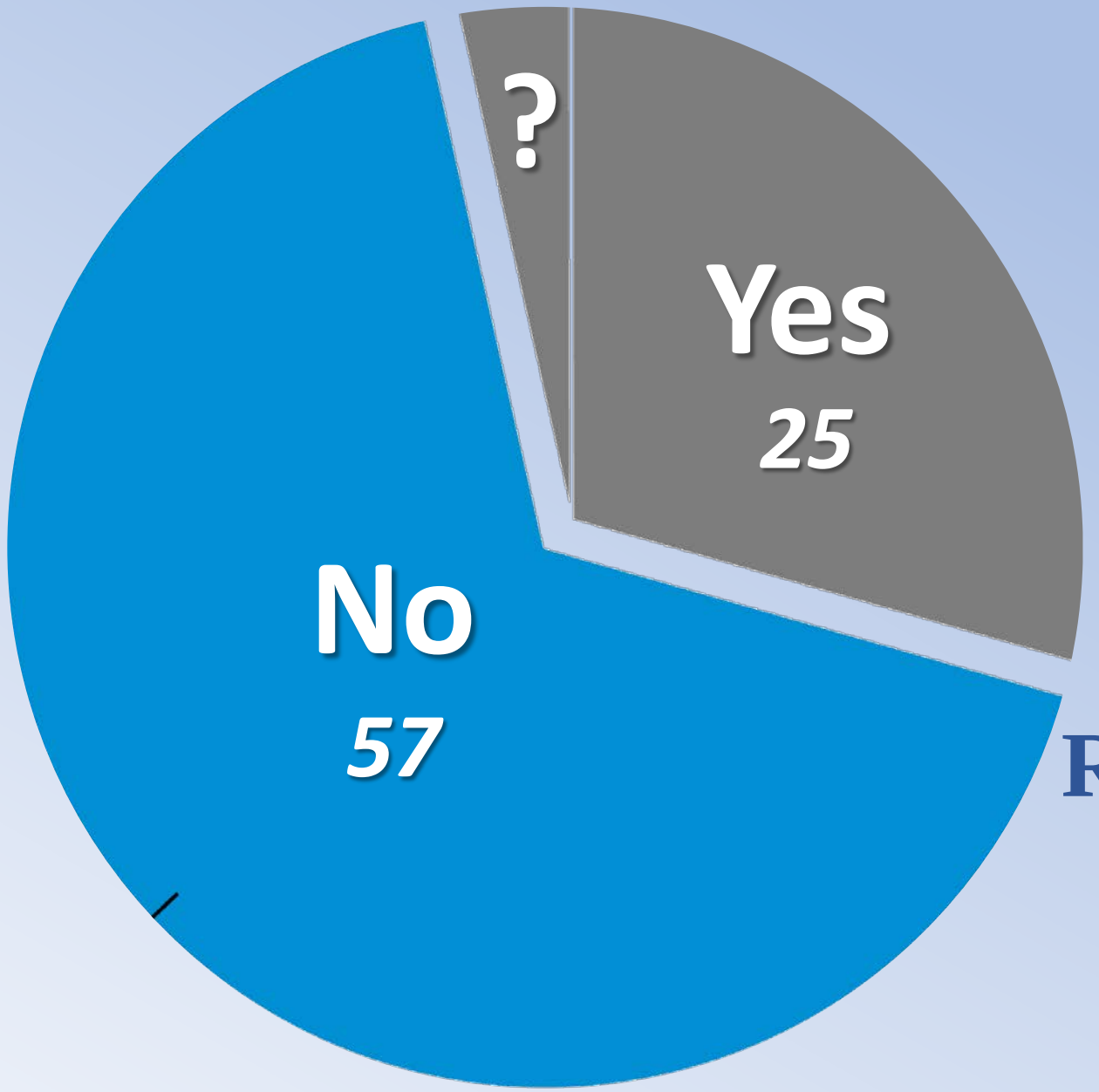
Responses provided here collected through February 12, 2022

EDI
Environmental Design International inc.
Chicago & Joliet

https://www.farmcreeksewerproject.com

Key Points

From the Draft Report



Have you experienced sewer backups?

Out of 150 Respondents

EDI
Environmental Design International inc.
Chicago & Joliet

Key Points

From the Draft Report

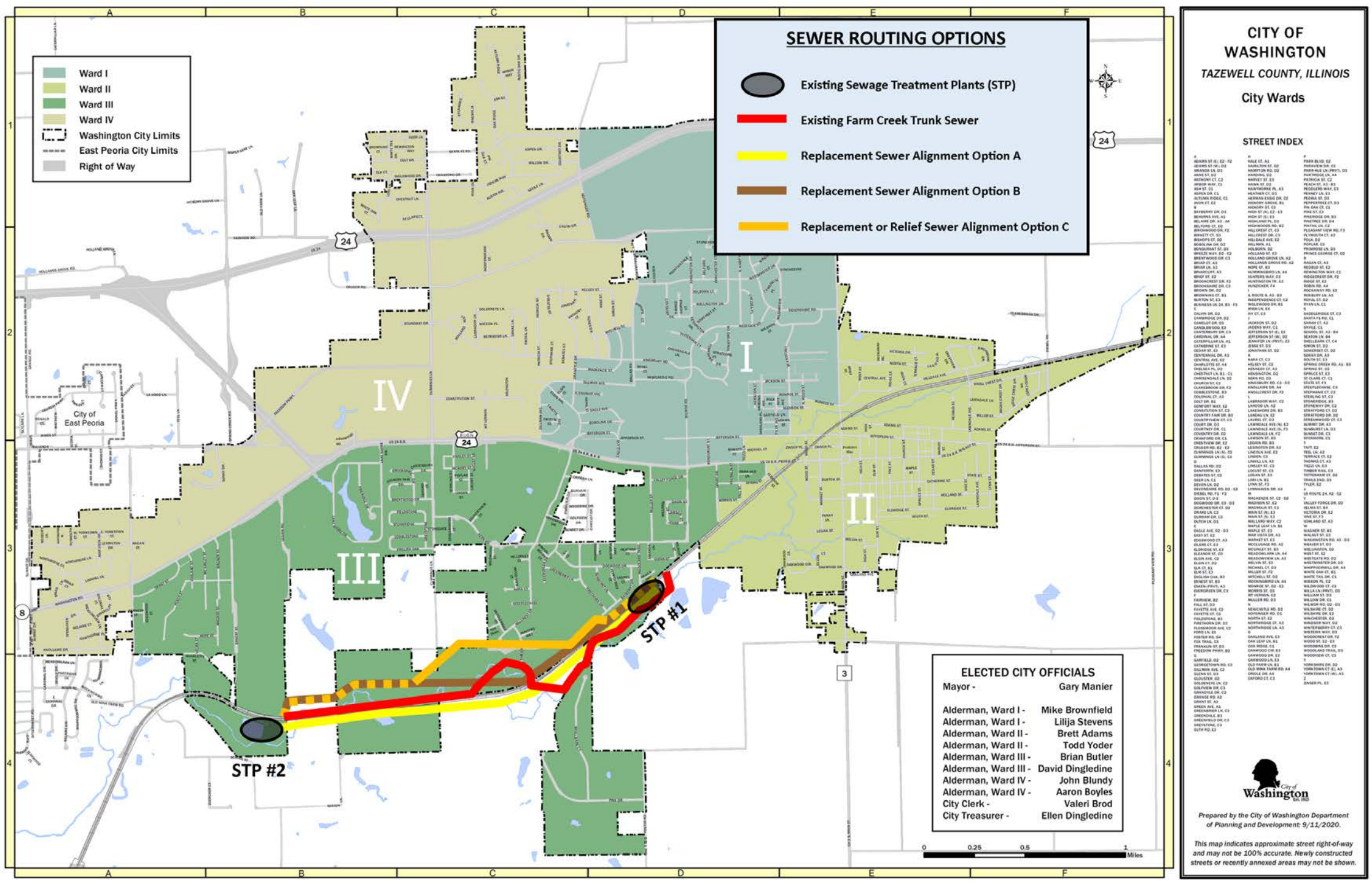
Seven Farm Creek Trunk Sewer Alternatives were Evaluated, Designated A-G

Pump station improvements at STP#2 are required at $3,000,000[CE] regardless of the chosen alternative

Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report



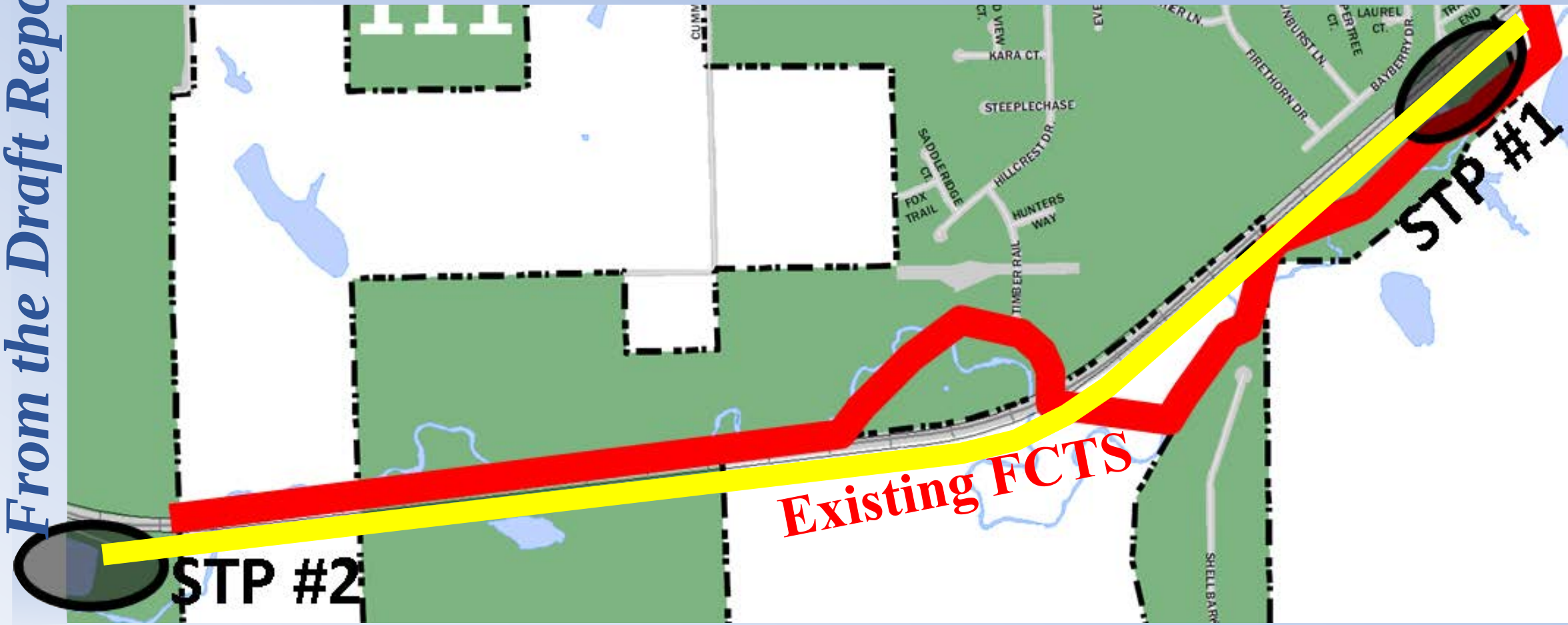
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE A

Strand Alignment B



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE A

Strand Alignment B

- 42” Sewer along south side of Railroad
- Abandon existing FCTS
- Capacity of 21,437 gpm, 169,611 PE
- 90% Designed
- Easements required
- Does not reduce excess flows
- $8,000,000^{CE} plus $3,000,000^{CE} pump station at STP#2 and FCTS abandonment costs

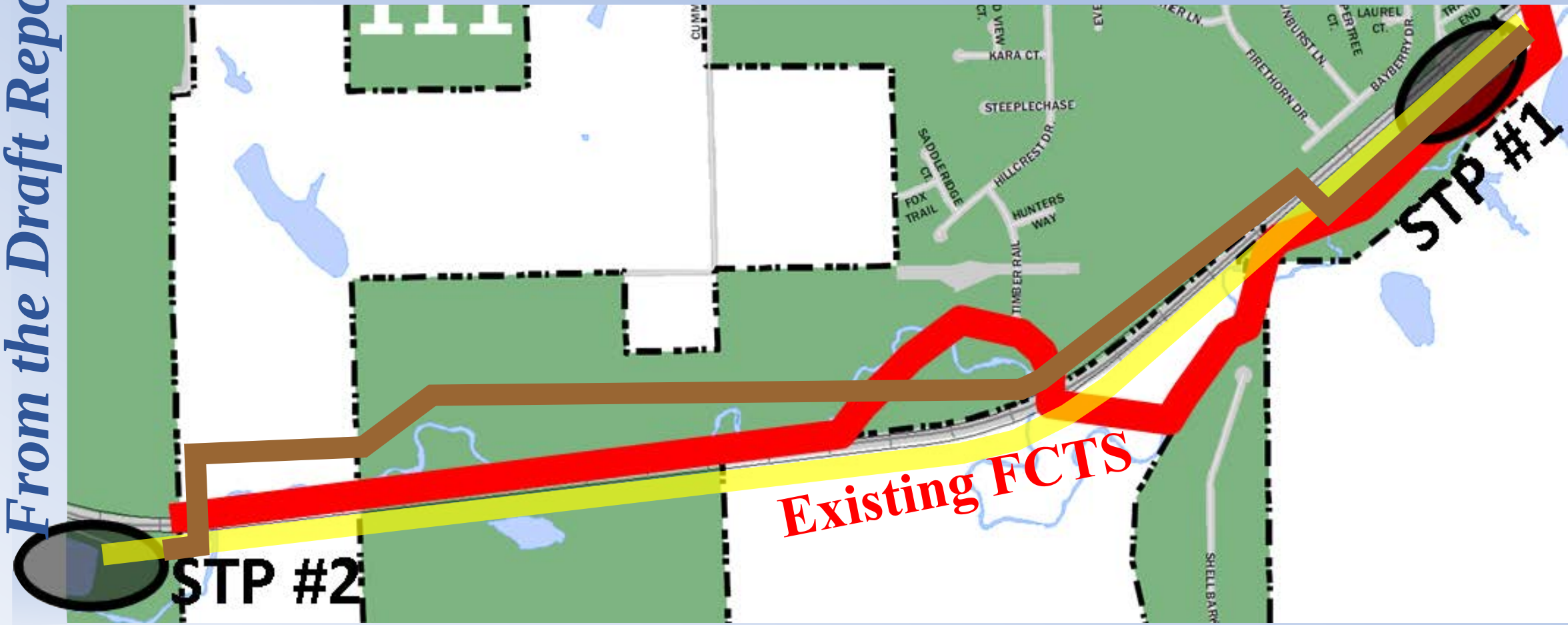
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE B

Pudik Alignment L-1



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE B

Pudik Alignment L-1

- 42” Sewer north of Farm Creek
- Abandon existing FCTS
- Capacity of 21,437 gpm, 169,611 PE
- Easements required
- Does not reduce excess flows
- Does not serve areas south of the railroad
- $10,980,000^{CE}
  plus $3,000,000^{CE} pump station at STP#2 and FCTS abandonment costs

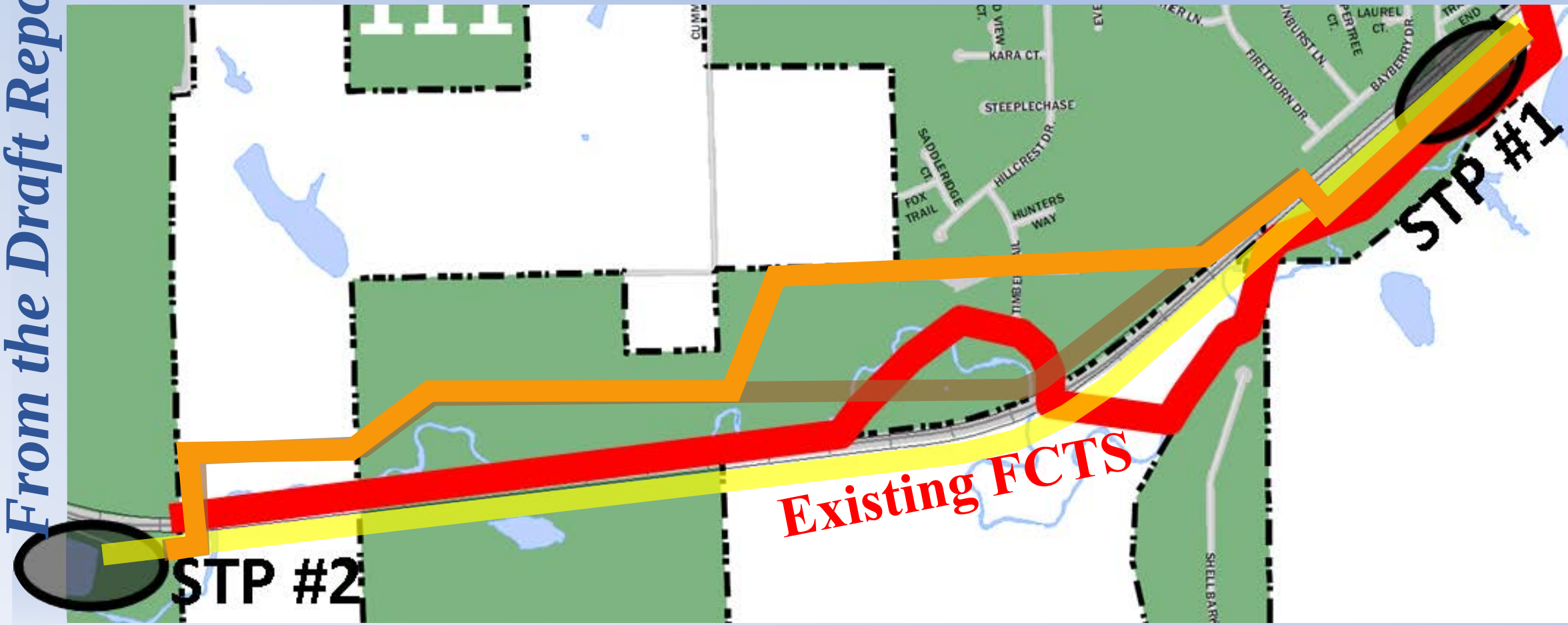
EDI
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE C

Pudik Alignment E-3



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE C

Pudik Alignment E-3

- 42” Sewer north of Farm Creek
- Abandon existing FCTS
- Capacity of 21,437 gpm, 169,611 PE
- Easements required
- Does not reduce excess flows
- Does not serve areas south of the railroad
- Excessive depth
- $12,581,197^{CE}$
  plus $3,000,000^{CE}$ pump station at STP#2 and FCTS abandonment costs

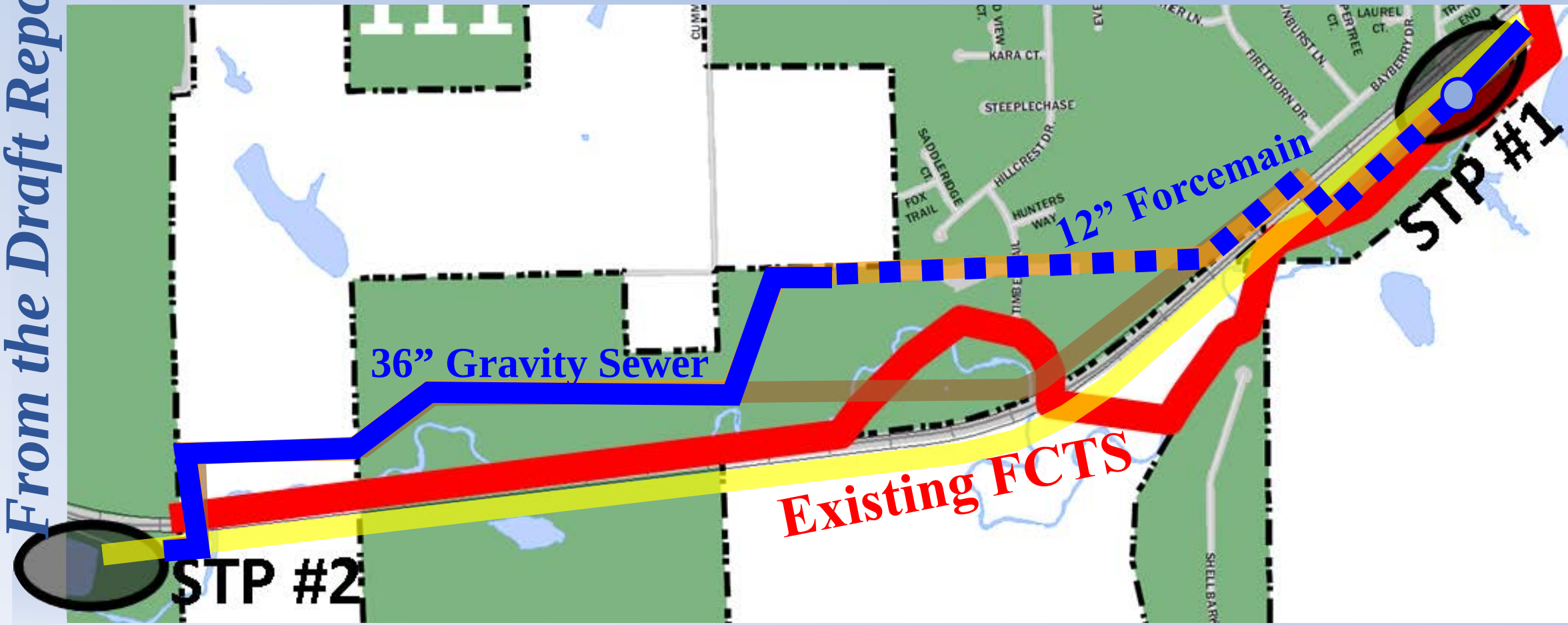
EDI
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE D

Pump Station, Forcemain & Relief Sewer



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE D

Pump Station, Forcemain & Relief Sewer

- Pump Station to offload high flows from FCTS
- Keep existing FCTS with evaluation, repair as needed
- Capacity of 12,973 gpm + FCTS at 4,645 gpm = 17,618 gpm, equivalent to 129,434 PE
- Easements required
- Does not reduce excess flows, but pump station can be downsized as excess flows are reduced systemwide
- Improved service north and south
- $7,618,040^{CE}$ plus $3,000,000^{CE}$ pump station at STP#2 and FCTS evaluation and repair

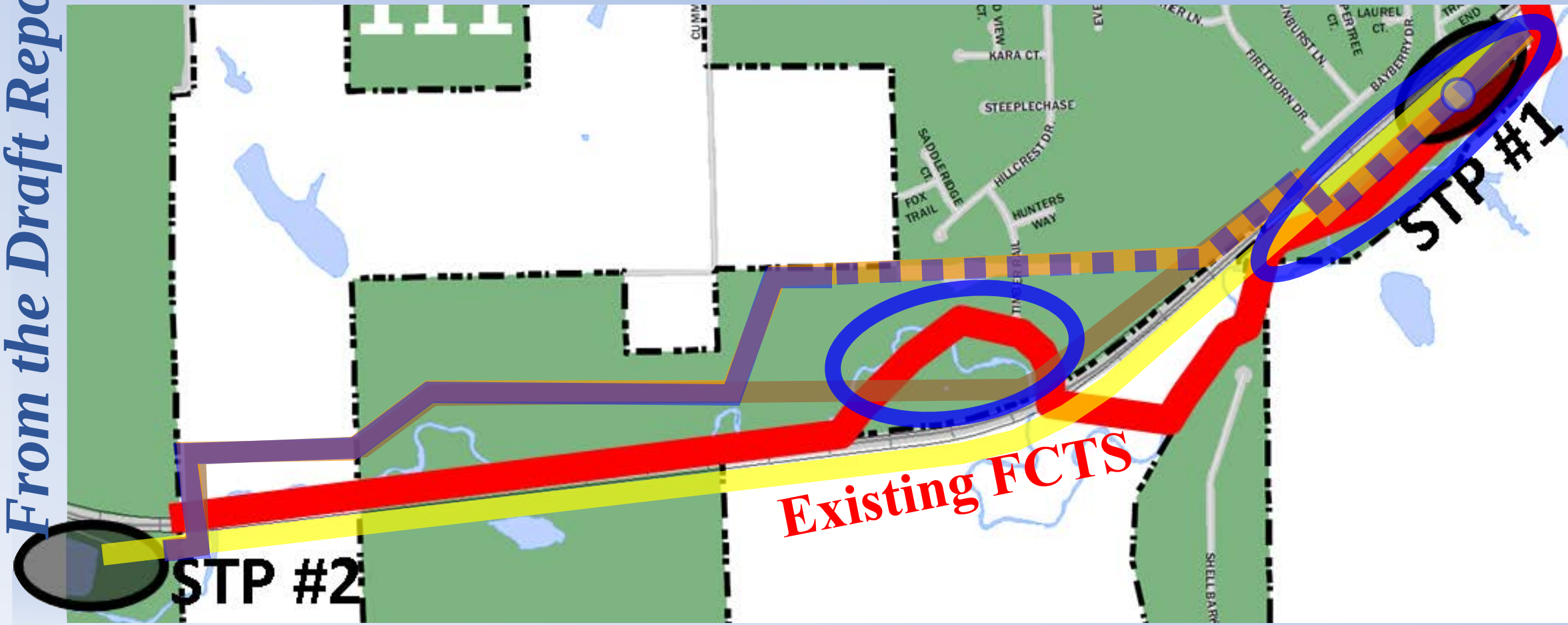
EDI
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers

1. Sewer appears to be in generally good condition, although internal inspection and repair as needed is recommended

2. Sewer has two “bottlenecks”:
   - First bottleneck has manholes overflowing during precipitation events
   - Second bottleneck severely limits capacity of sewer

Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers

Existing Farm Creek Trunk Sewer Bottleneck #1

3. The length of sewer between Manholes 238 and 245 has a capacity of only 5,882 gallons per minute (gpm) which is enough for peak flow from 35,145 PE.

However, the recorded flow on August 30, 2016 was nearly double that amount at 11,671 gpm.

This causes Manholes 245 and 240 to overflow.

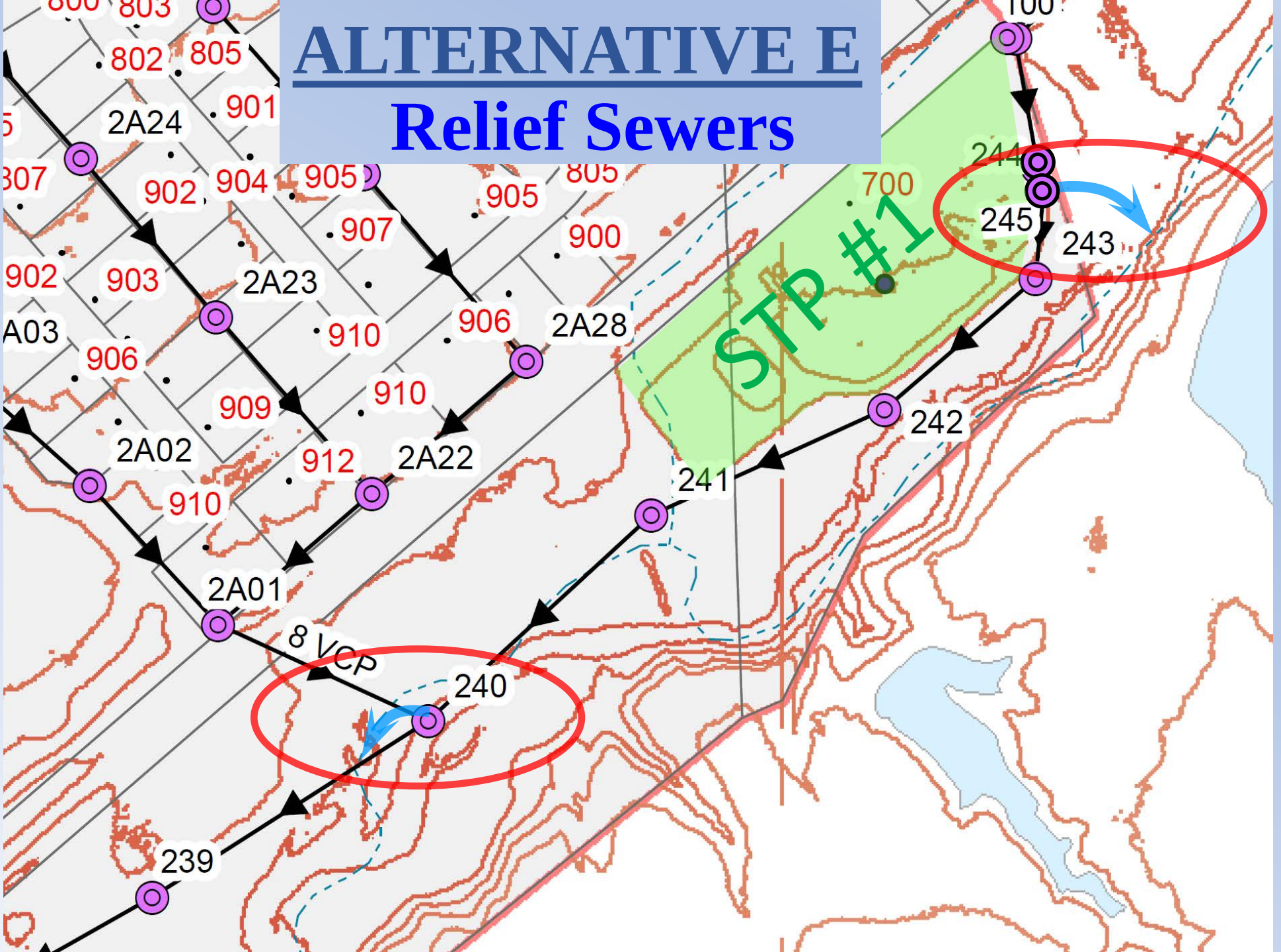
EDI
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers

Existing Farm Creek Trunk Sewer Bottleneck #2

4. **The length of sewer south of Timber Rail Drive, between Manholes 229 and 219, has capacity of 4,645 gpm, which is enough for the peak flow from 26,443 PE.**

However, the recorded flow on August 30, 2016 was nearly 2 ½ times that amount at 11,470 gpm.

EDI
Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers

Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers

5. If the two "bottlenecks" were corrected:
   - Capacity of existing FCTS would expand to 7,826 gpm, enough for the peak flow from 49,648 PE
   - However, this expanded capacity is still 1.5 times less than recorded flow of 11,671 gpm on August 30, 2016 – overflows eliminated
6. Existing FCTS is well-located to provide future service area expansion potential both north and south of Farm Creek and railroad.

EDI
Environmental Design International inc.
Chicago & Joliet

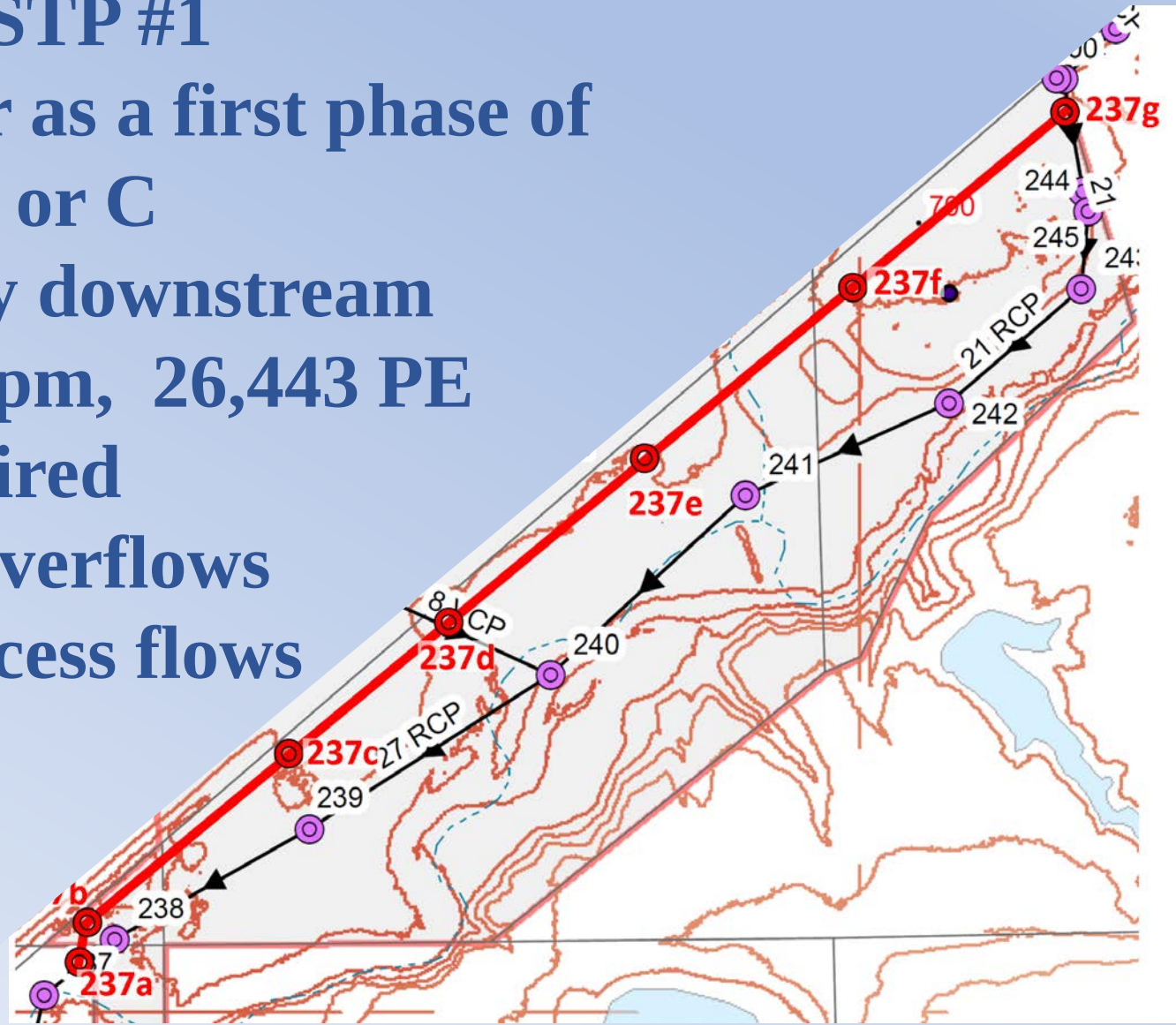
Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers, STP #1 Bypass Sewer

- 30” Sewer around STP #1
- Could be 42” sewer as a first phase of Alternatives A, B, or C
- Capacity limited by downstream sewers to 4,645 gpm, 26,443 PE
- No easements required
- Eliminates FCTS overflows
- Does not reduce excess flows
- $719,500[CE]



Environmental Design International inc.
Chicago & Joliet

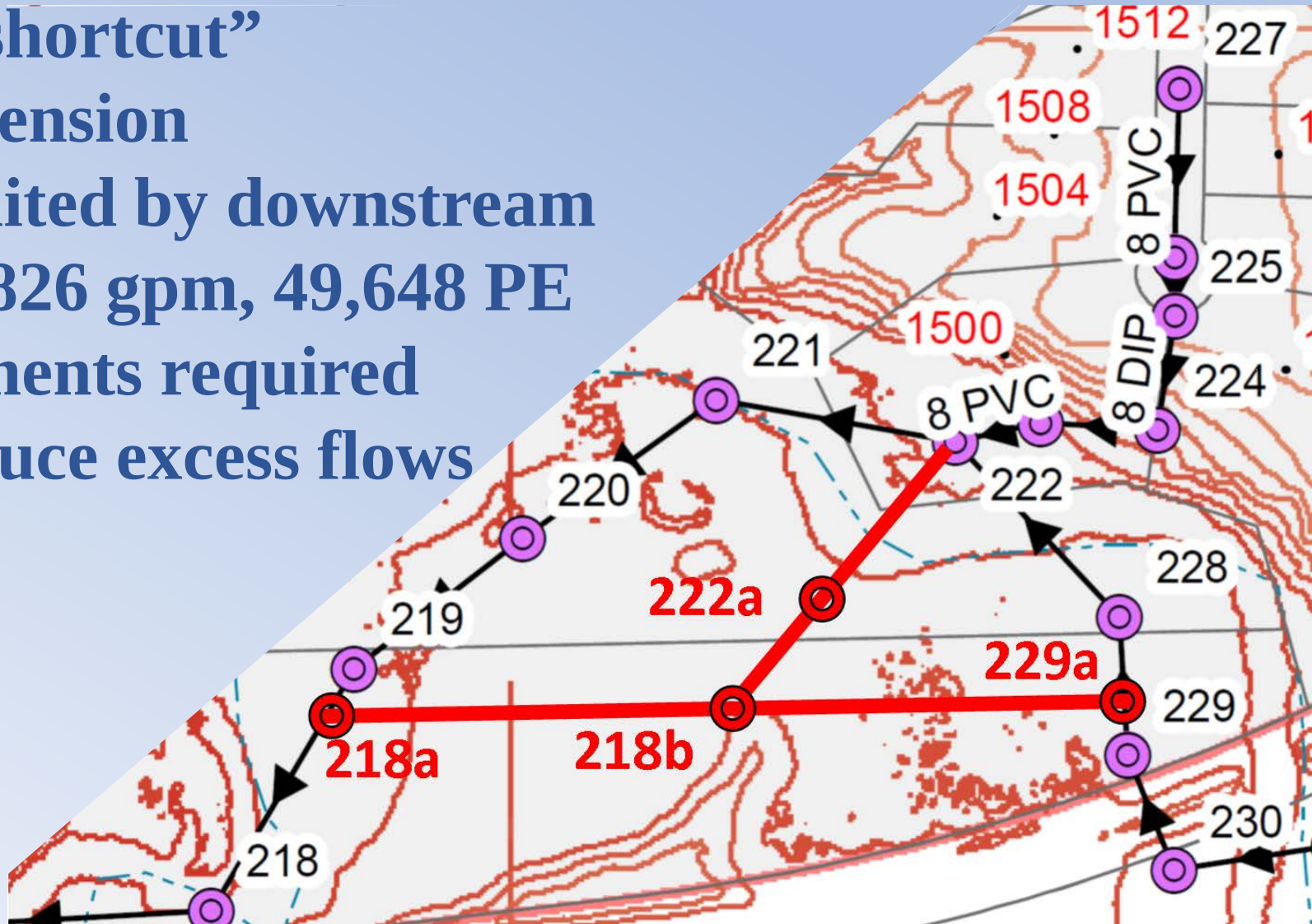
Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers, Timber Rail Relief Sewer

- 30” Sewer “shortcut”
- 8” Sewer extension
- Capacity limited by downstream sewers to 7,826 gpm, 49,648 PE
- Only 2 easements required
- Does not reduce excess flows
- $617,712[CE]



Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVE E

Relief Sewers

- If the entire existing FCTS requires lining, cost could be up to $3,000,000^{CE}
- $3,000,000^{CE} pump station at STP#2 is required
- Sanitary Sewer Evaluation Survey (SSES) and I/I removal necessary

Environmental Design International inc.
Chicago & Joliet

Alternatives

From the Draft Report

ALTERNATIVES F AND G

Alternative F - SSES

- Perform a Sanitary Sewer Evaluation Survey (SSES) and repair all identified sources of I/I
- If successful, this will end the overflows of FCTS, but success is not guaranteed

Alternative G – No Build

- Evaluate and repair FCTS
- Take long-term approach toward eliminating I/I

Neither of these Alternatives are recommended, as neither addresses the immediate issue of FCTS overflows

EDI
Environmental Design International inc.
Chicago & Joliet

Recommendations

From the Draft Report

Alternative A - or - Alternative E

- Already designed to 90%
- Difficult easements
- SSES advisable
- Sewer oversized for service area (169,611 PE)
- $8,000,000.00[CE] *

*Least expensive construction Alternative

- Small project
- Fewer easements
- SSES required
- Sewer undersized for service area (49,648 PE)
- $???*

*Potentially the least expensive Alternative

Environmental Design International inc.
Chicago & Joliet

Memorandum

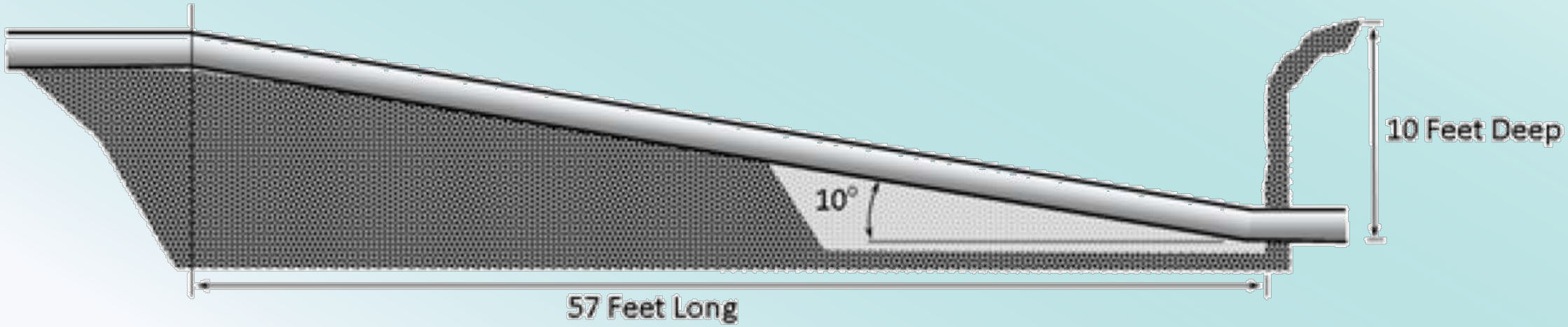
1. Explain apparent errors and/or discrepancies with the Preliminary Engineer's Opinion of Probable Construction Costs (PEOPCC) for both the L-1 and E-3 alignments.
2. Explain revisions to Alignment E-3 from the original location proposed by Aptim/Goat Springs, LLC.
3. Discuss the Smoke Test SSES Report

EDI
Environmental Design International inc.
Chicago & Joliet

Memorandum

1. Preliminary Engineer's Opinion of Probable Construction Costs (PEOPCC)

- Draft report, analysis not 100% complete



- HCE/EDI has since re-evaluated these two alignments

Environmental Design International inc.
Chicago & Joliet

Memorandum

Updated Estimates

	Alternative A *Strand*	Alternative B *L-1*	Alternative C *E-3*
2/15/2022*	$8,000,000.00CE	$10,980,000.00CE	$12,580,000.00CE
6/12/2023**	no change	$9,570,000.00CE	$11,850,000.00CE

CE *Comparative estimate, using EOPCC unit prices from others*

* *Estimates are from the report, not from 2/11/22 presentation to Council which included Pump Station and FCTS Abandonment Estimates*

** *Exclusive of Pump Station and FCTS Abandonment Estimates*

EDI
Environmental Design International inc.
Chicago & Joliet

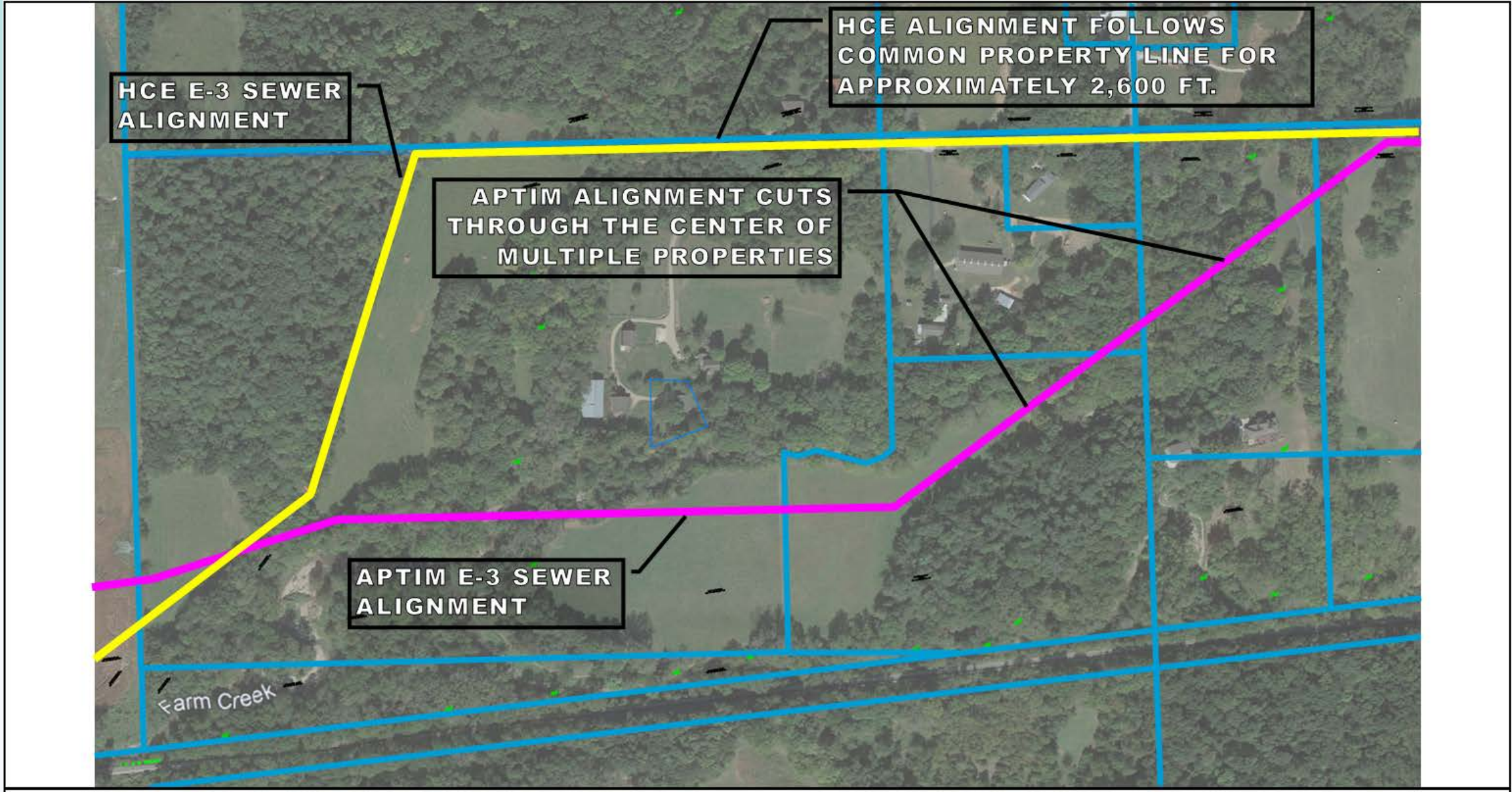
Memorandum

2. Explain revisions to Alignment E-3 from the original location proposed by Aptim/Goat Springs, LLC.

- Cost
- Ease of construction
- Acquisition of easements
- Impact upon future use of the properties
- Ability to extend service to the sewer in the future

EDI
Environmental Design International inc.
Chicago & Joliet

Memorandum



CITY OF WASHINGTON

FARM CREEK TRUNK SEWER 3RD PARTY ALIGNMENT ANALYSIS

ALIGNMENT E-3 COMPARISON

Scale: N.T.S.

N W E S

EDI Environmental Design International inc. Chicago & Joliet

Hamilton Consulting Engineers, Inc.	May 2023	HCE PROJECT #21911	City of Washington

Smoke Test Report

City of Washington

2022 Smoke Testing Program

REL Project #22-R0435

WASHINGTON ILLINOIS

Prepared by:

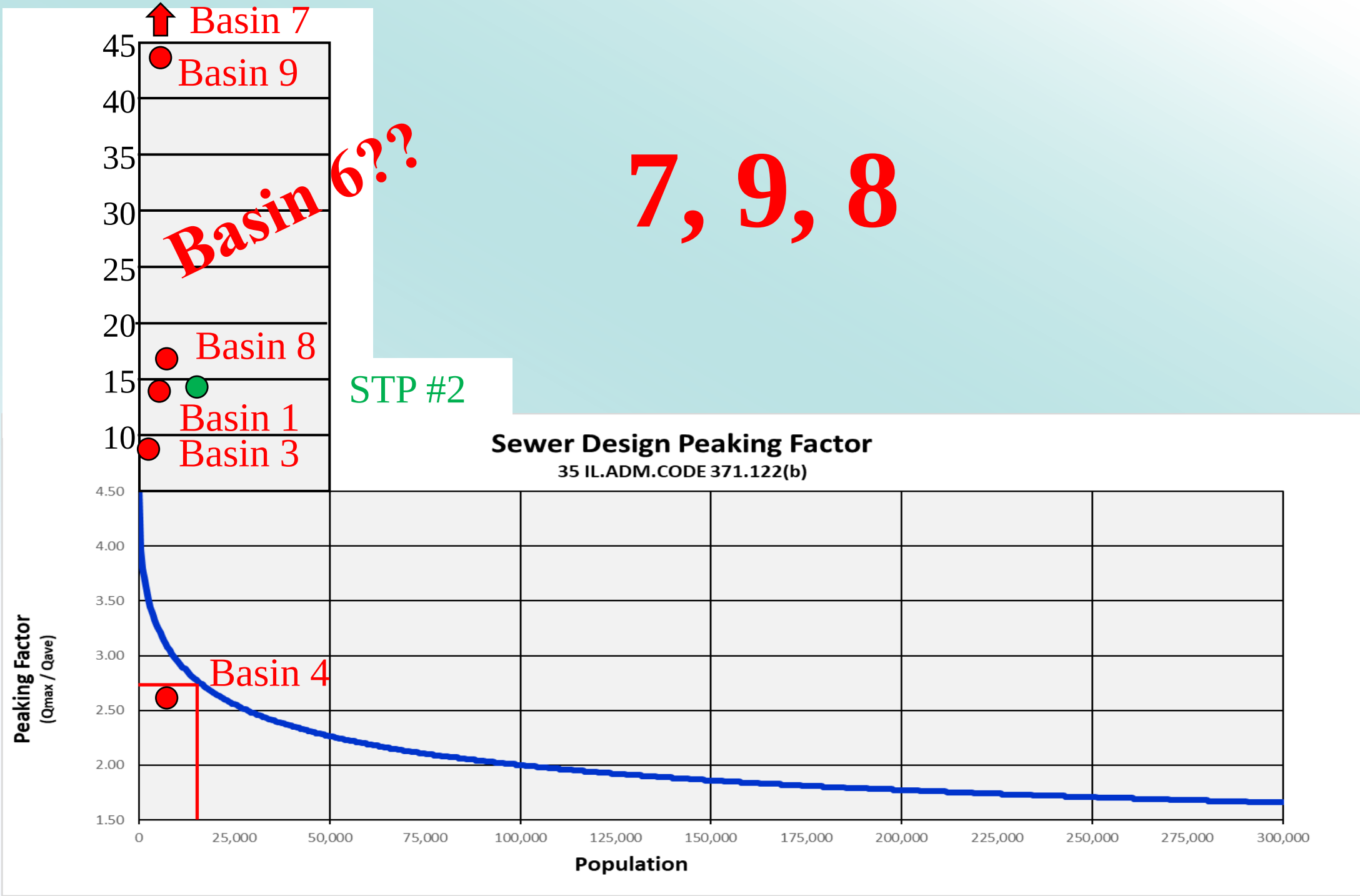
Robinson ENGINEERING

Robinson Engineering. Ltd.
Joseph Sullivan
630-346-2877
joe.sullivan@reltd.com

June – September 2022

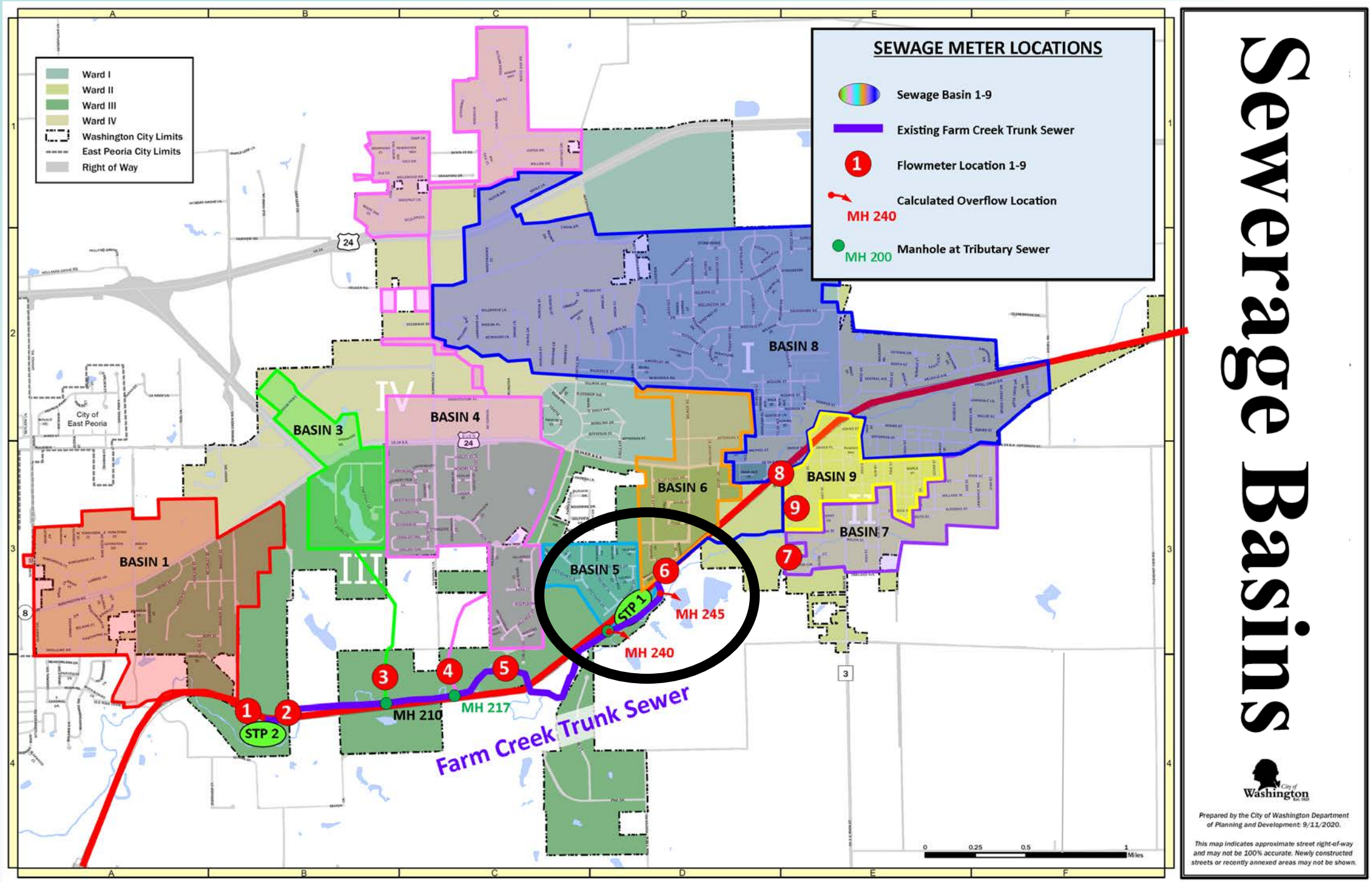
EDI
Environmental Design International inc.
Chicago & Joliet

Smoke Test Report



Environmental Design International inc.
Chicago & Joliet

Smoke Test Report



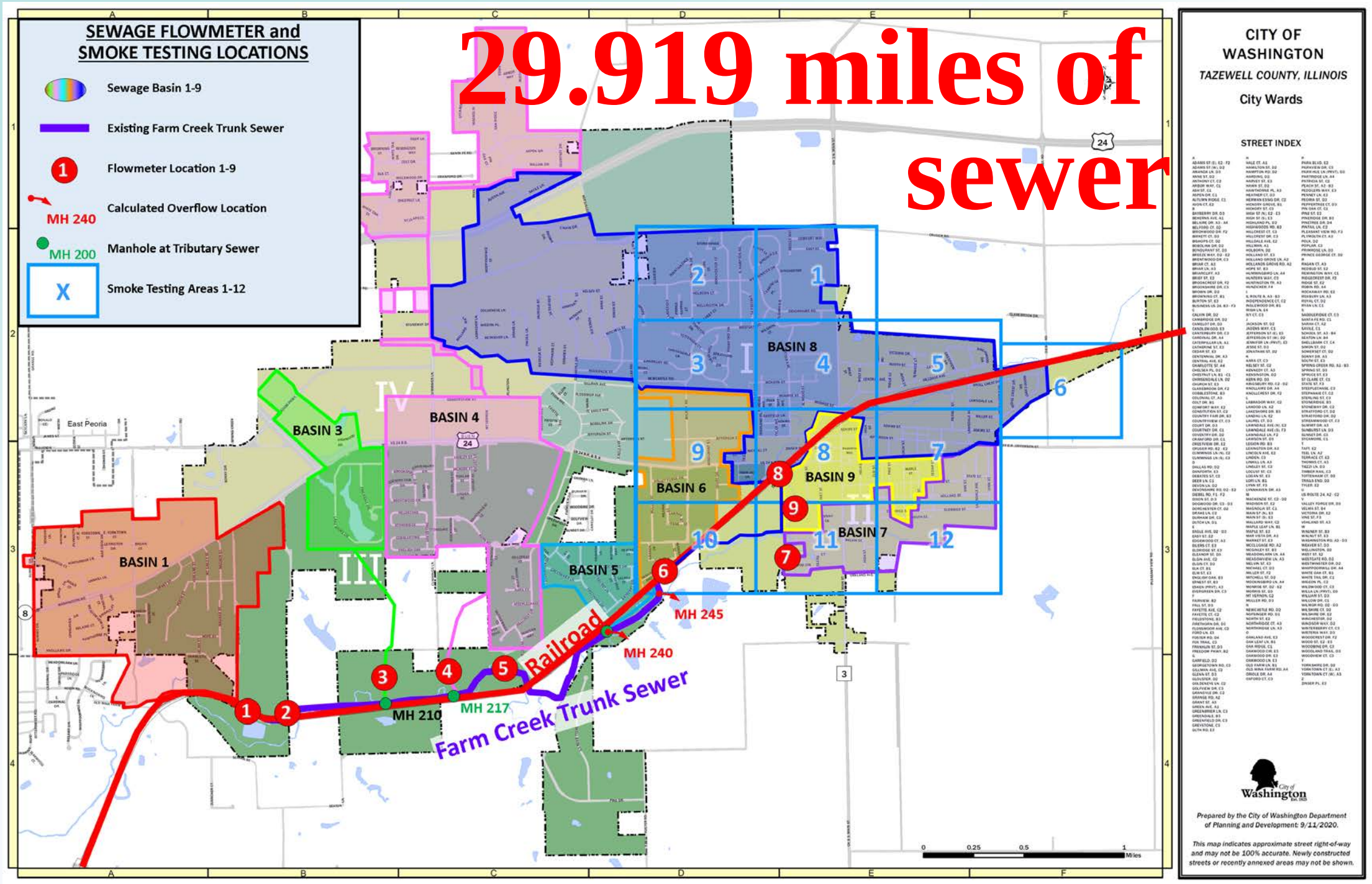
Sewerage Basins

Prepared by the City of Washington Department of Planning and Development: 9/11/2020.

This map indicates approximate street right-of-way and may not be 100% accurate. Newly constructed streets or recently annexed areas may not be shown.

Environmental Design International inc.
Chicago & Joliet

Smoke Test Report



Environmental Design International inc.
Chicago & Joliet

Smoke Test Report

Environmental Design International inc.
Chicago & Joliet

Defect	Basin 6 No.	Basin 6 GPM	Basin 7 No.	Basin 7 GPM	Basin 8 No.	Basin 8 GPM	Basin 9 No.	Basin 9 GPM	Total No.	Total GPM	Repair Estimate
1 Storm Sewer Connection	2	25.3	13	102.6	15	181.4	18	196.6	48	505.9	$ 146,500
2 "Easy" System Repairs	16	31.7	25	51.5	81	152.8	24	44.6	146	280.6	$ 127,950
3 "Easy" Private Repairs	40	73.0	68	111.9	165	446.8	46	82.5	319	714.2	$ 37,050
4 Clean and Televise Sewer between MHs	27		43		136		45		95,380	* LF	$ 476,900 *
5 Point Repairs	13	19.5	13	19.5	35	52.5	8	12.0	69	103.5	unknown
6 Complicated Private Repairs	26	9.0	51	37.6	151	103.3	45	18.4	273	168.3	$1,197,450
		158.5		323.1		936.8		354.1			

1 Public inflow sources should be a priority to remove
2 Manhole lid replacements and frame adjustments are effective and can tyoically be completed as force account work
3 Downspout connections, sump pump connections are large inflow contributors, ordinance violations, and easily/inexpensively completed
4 Cleaning and televising should be part of a continuing maintenance program, once conidition of the sewers has been assessed create a repair program
* Based upon an average pipe diameter of 8 inches, average length of 380 feet beteen manholes, light cleaning for an average cost of $5.00/LF
5 Point repairs can be by liner or excavation and pipe replacement, advance televising would be benneficial - cost is variable and not provided
6 Footing tile connections, window well drains, yard drains, leaking service pipes, etc. are expensive and difficult to correct on private property

Environmental Design International inc.
Chicago & Joliet

7, 9, 8 or 8, 9, 7, 6?

Defect	Basin 6 No.	Basin 6 GPM	Basin 7 No.	Basin 7 GPM	Basin 8 No.	Basin 8 GPM	Basin 9 No.	Basin 9 GPM	Total No.	Total GPM	Repair Estimate
1 Storm Sewer Connection	2	25.3	13	102.6	15	181.4	18	196.6	48	505.9	$ 146,500
2 "Easy" System Repairs	16	31.7	25	51.5	81	152.8	24	44.6	146	280.6	$ 127,950
3 "Easy" Private Repairs	40	73.0	68	111.9	165	446.8	46	82.5	319	714.2	$ 37,050
4 Clean and Televise Sewer between MHs	27		43		136		45		95,380	* LF	$ 476,900 *
5 Point Repairs	13	19.5	13	19.5	35	52.5	8	12.0	69	103.5	unknown
6 Complicated Private Repairs	26	9.0	51	37.6	151	103.3	45	18.4	273	168.3	$1,197,450
		158.5		323.1		936.8		354.1			

1 Public inflow sources should be a priority to remove
2 Manhole lid replacements and frame adjustments are effective and can tyoically be completed as force account work
3 Downspout connections, sump pump connections are large inflow contributors, ordinance violations, and easily/inexpensively completed
4 Cleaning and televising should be part of a continuing maintenance program, once conidition of the sewers has been assessed create a repair program
* Based upon an average pipe diameter of 8 inches, average length of 380 feet beteen manholes, light cleaning for an average cost of $5.00/LF
5 Point repairs can be by liner or excavation and pipe replacement, advance televising would be benneficial - cost is variable and not provided
6 Footing tile connections, window well drains, yard drains, leaking service pipes, etc. are expensive and difficult to correct on private property

Environmental Design International inc.
Chicago & Joliet

7, 9, 8 or 8, 9, 7, 6?

Smoke Test Report

1. **Smoke Testing seldom finds all the system defects.**

Smoke Test Report

2. The severity of mainline leaks are difficult to estimate from smoke tests. The testing found 13 defects in Basin 6 with an estimated flow of 19.5 gpm, 13 defects in Basin 7 with an estimated flow of 19.5 gpm, 35 defects in Basin 8 with an estimated flow of 52.5 gpm, and 8 defects in Basin 9 with an estimated flow of 12.0 gpm.

The number and severity of the defects needs to be confirmed with follow-up testing as recommended by Robinson.

3. Inflow source amounts can vary widely dependent upon the areas draining to them and the precipitation event. Of the 816 identified defects, 161 can be identified as inflow sources and they are estimated to account for 63% of the total I/I.

Smoke Test Report

3. Inflow sources

Identified Inflow Source	Basin 6		Basin 7		Basin 8		Basin 9		Total	
	No.	GPM	No.	GPM	No.	GPM	No.	GPM	No.	GPM
Area Drain	0	0	3	7.7	1	1.5	3	5.4	7	14.6
Creek / Stream	1	10.0	0	0	0	0	0	0	1	10.0
Drainage Ditch	0	0	1	5.0	0	0	0	0	1	5.0
Downspouts	14	64.2	20	73.4	47	369.4	16	67.3	97	574.3
Driveway Drain	0	0	3	9.5	0	0	0	0	3	9.5
Stairwell Drain	1	0.5	1	0.5	10	5.0	3	1.5	15	7.5
Storm Inlet, Catchbasin	1	15.3	6	80.4	14	179.9	15	191.2	36	466.8
Window Well Drain	1	0.5	1	0.5	7	3.5	0	0	9	4.5
Total	**18**	**90.5**	**35**	**177.0**	**79**	**559.3**	**37**	**265.4**	**169**	**1,092.2**

Smoke Test Report

3. Inflow sources

Identified Inflow Source	Basin 6		Basin 7		Basin 8		Basin 9		Total	
	No.	GPM	No.	GPM	No.	GPM	No.	GPM	No.	GPM
Area Drain	0	0	3	7.7	1	1.5	3	5.4	7	14.6
Creek / Stream	1	10.0	0	0	0	0	0	0	1	10.0
Drainage Ditch	0	0	1	5.0	0	0	0	0	1	5.0
Downspouts	14	64.2	20	73.4	47	369.4	16	67.3	97	574.3
Driveway Drain	0	0	3	9.5	0	0	0	0	3	9.5
Stairwell Drain	1	0.5	1	0.5	10	5.0	3	1.5	15	7.5
Storm Inlet, Catchbasin	1	15.3	6	80.4	14	179.9	15	191.2	36	466.8
Window Well Drain	1	0.5	1	0.5	7	3.5	0	0	9	4.5
Total	**18**	**90.5**	**35**	**177.0**	**79**	**559.3**	**37**	**265.4**	**169**	**1,092.2**

Environmental Design International inc.
Chicago & Joliet

Smoke Test Report

Recommended Next Steps (Robinson)

1. Fix manhole defects
2. Manhole inspections
3. Video inspection of sewers and repairs
4. Confirm inlet connections (#1)
5. Investigate creek connections (#2)
6. Private sector (Downspouts #1 a)

Smoke Test Report

Recommended Future Steps (Robinson)

7 a. Lateral inspection and repair (144)

7 b. Foundation drain disconnection (14)

8. Internal building inspections

9. Private source disconnection

Thank you!

Questions?

Environmental Design International inc.
Chicago & Joliet