



Regional Wastewater Treatment Consolidation Study – Phase 2

Workshop #3 – Screen-out Long List; Identify Short List Regional Alternatives

25 June 2020

**Naugatuck Valley
Council of Governments**



BLACK & VEATCH

Agenda

Introduction & Roles

Phase 1 - Long List Regional Alternatives

Develop & Screen Out Evaluations - Long List

Aggressive I/I

Conveyance Corridors

Plant Process and Site Layouts

Next Steps

Introduction & Roles

- NVCOG
- Black & Veatch
- Participating Communities
- OPM, DEEP

Phase 1 - Long List Regional Alternatives

Phase 1 – Long List Regional Alternatives

No.	Alternative Description
1	Beacon Falls to Naugatuck
2	Beacon Falls to Seymour
2a	Beacon Falls to Seymour, I/I Reduction
3	Derby to Ansonia
3a	Derby to Ansonia, I/I Reduction
4	Derby to Ansonia, Effluent Pumped to Housatonic River
4a	Derby to Ansonia, I/I Reduction, Effluent Pumped to Housatonic River
5	Derby and Seymour to Ansonia
5a	Derby and Seymour to Ansonia, I/I Reduction
5b	Derby and Seymour to Ansonia, Effluent Pumped to Housatonic River
5c	Derby and Seymour to Ansonia, I/I Reduction, Effluent Pumped to Housatonic River

No.	Alternative Description
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12	Beacon Falls, Seymour, and Ansonia to Derby
12a	Beacon Falls, Seymour, and Ansonia to Derby, I/I Reduction



Methodology

Regional Alternatives were developed and screened out in a progression of three major steps (i.e. assessments):

1. Aggressive I/I Evaluation

- Review of extraneous flow reduction and feasibility of such measures

2. Conveyance Corridors Evaluation

- Feasibility of pipeline routes between communities

3. Plant Process and Site Layout Evaluation

- Treatment process upgrade and space requirements of regionalized plants

Aggressive I/I Evaluation

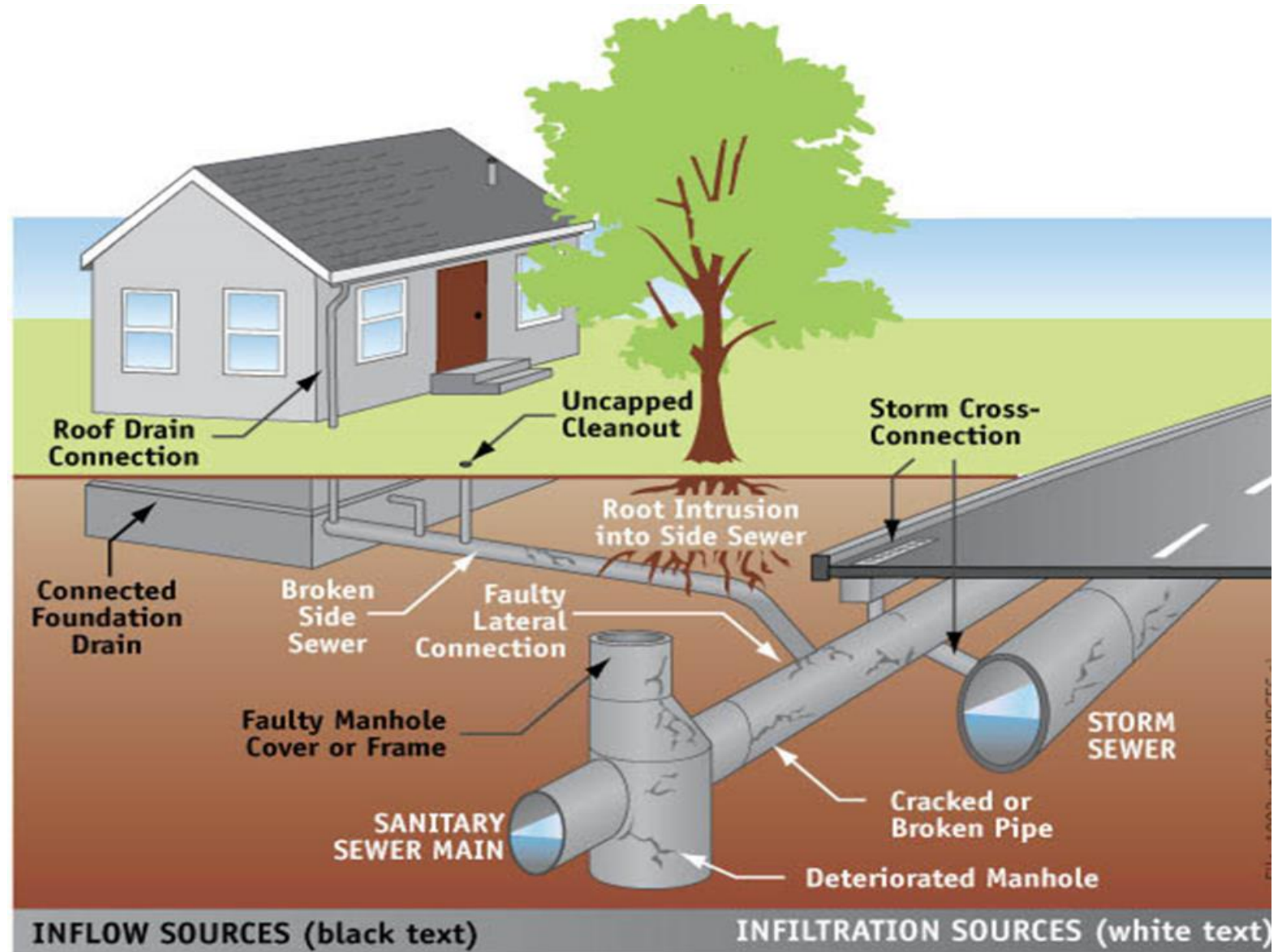
- I/I Programs – Overview
- I/I Programs Enacted at the Study Communities
- Aggressive I/I Programs – What Can Be Achieved?
- Regional Alternatives Screen Out

I/I Overview

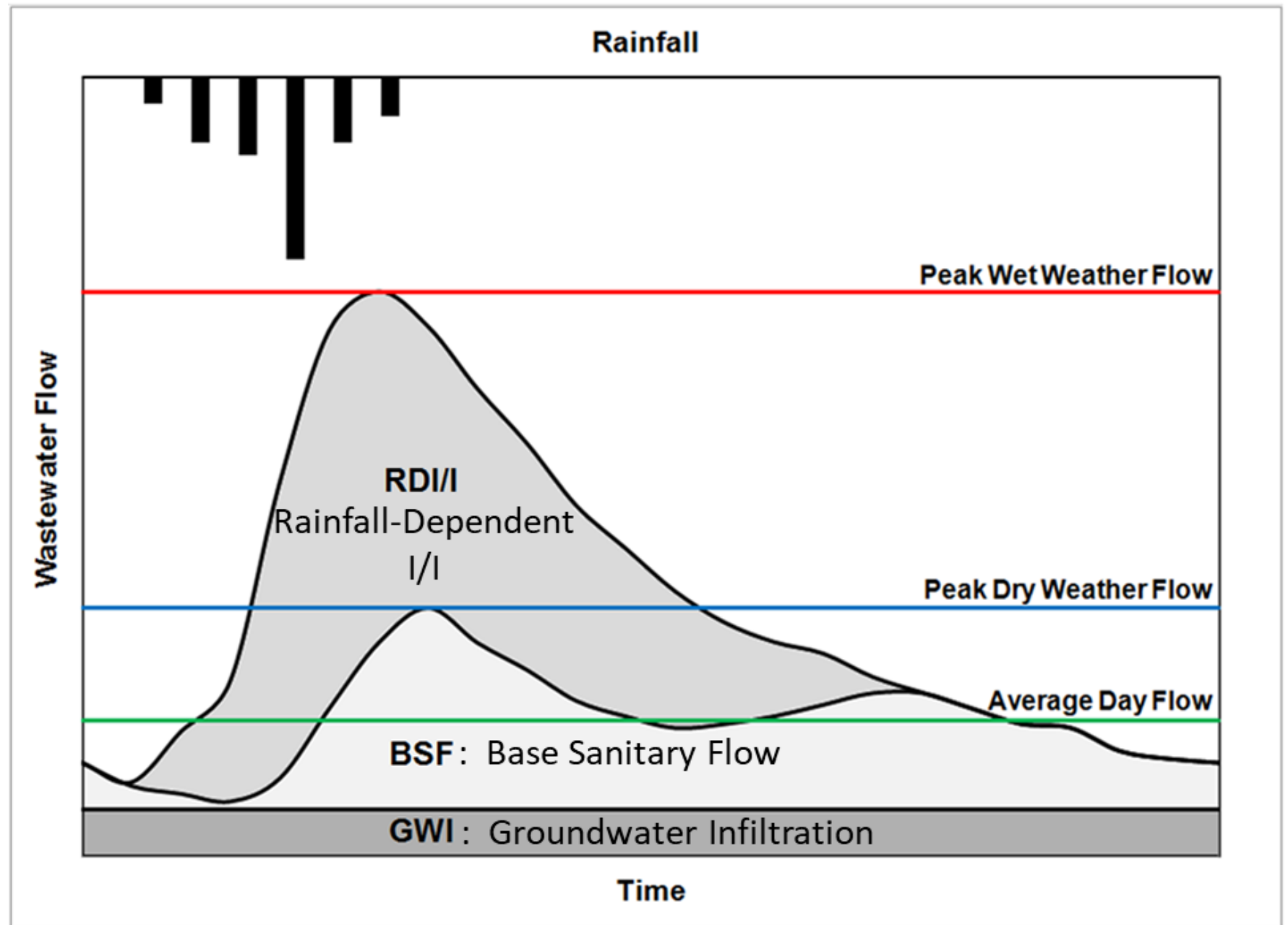
- What is I/I and levels of control
- Identifying I/I
 1. Flow monitoring
 2. Major inflow sources
 3. Infiltration sources
 4. Sewer system evaluation surveys



Typical Sources of Inflow & Infiltration (I/I)



Wastewater Flow Analysis

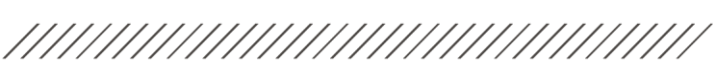


Identifying Inflow Sources

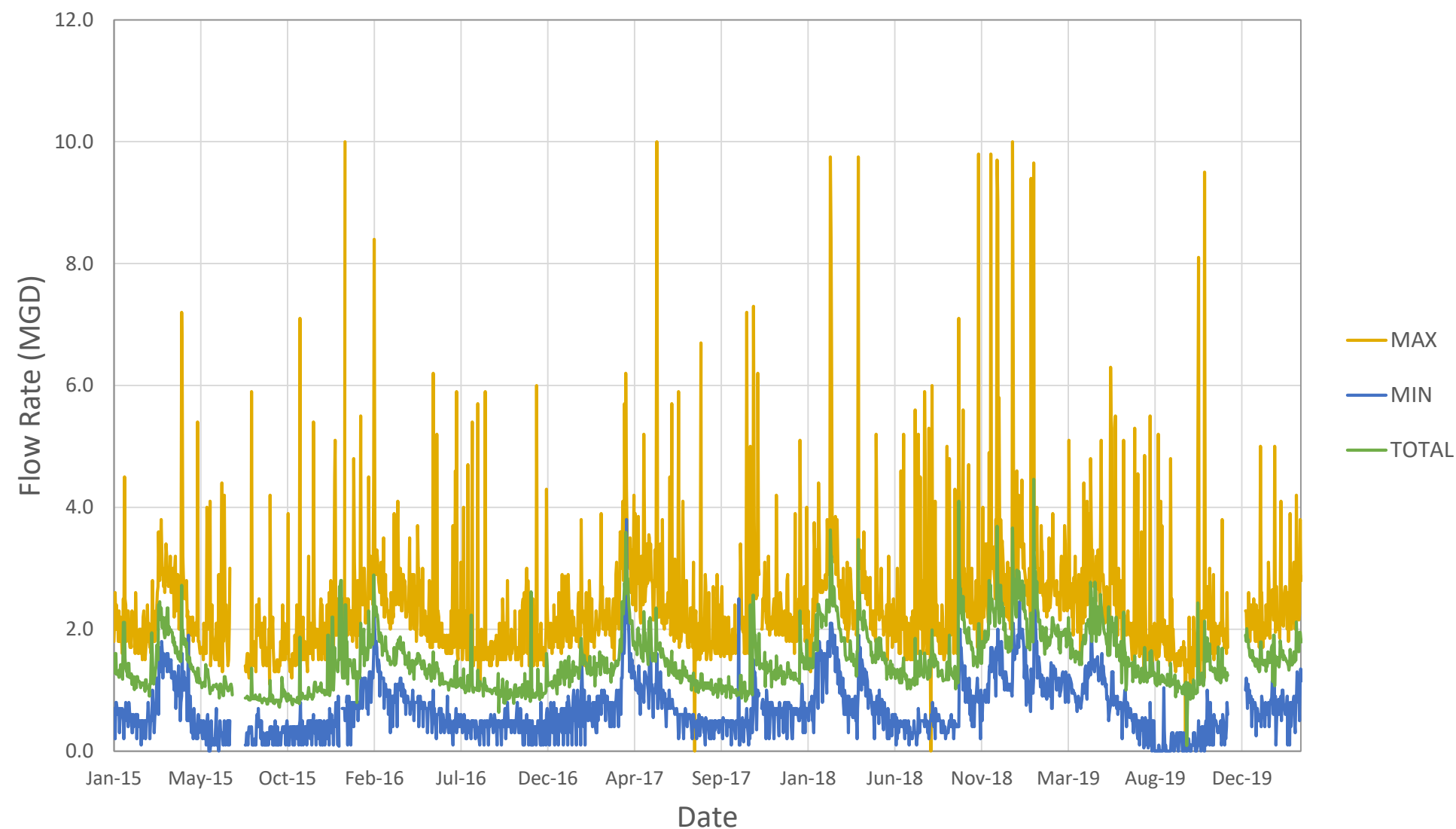


I/I at the Study Communities

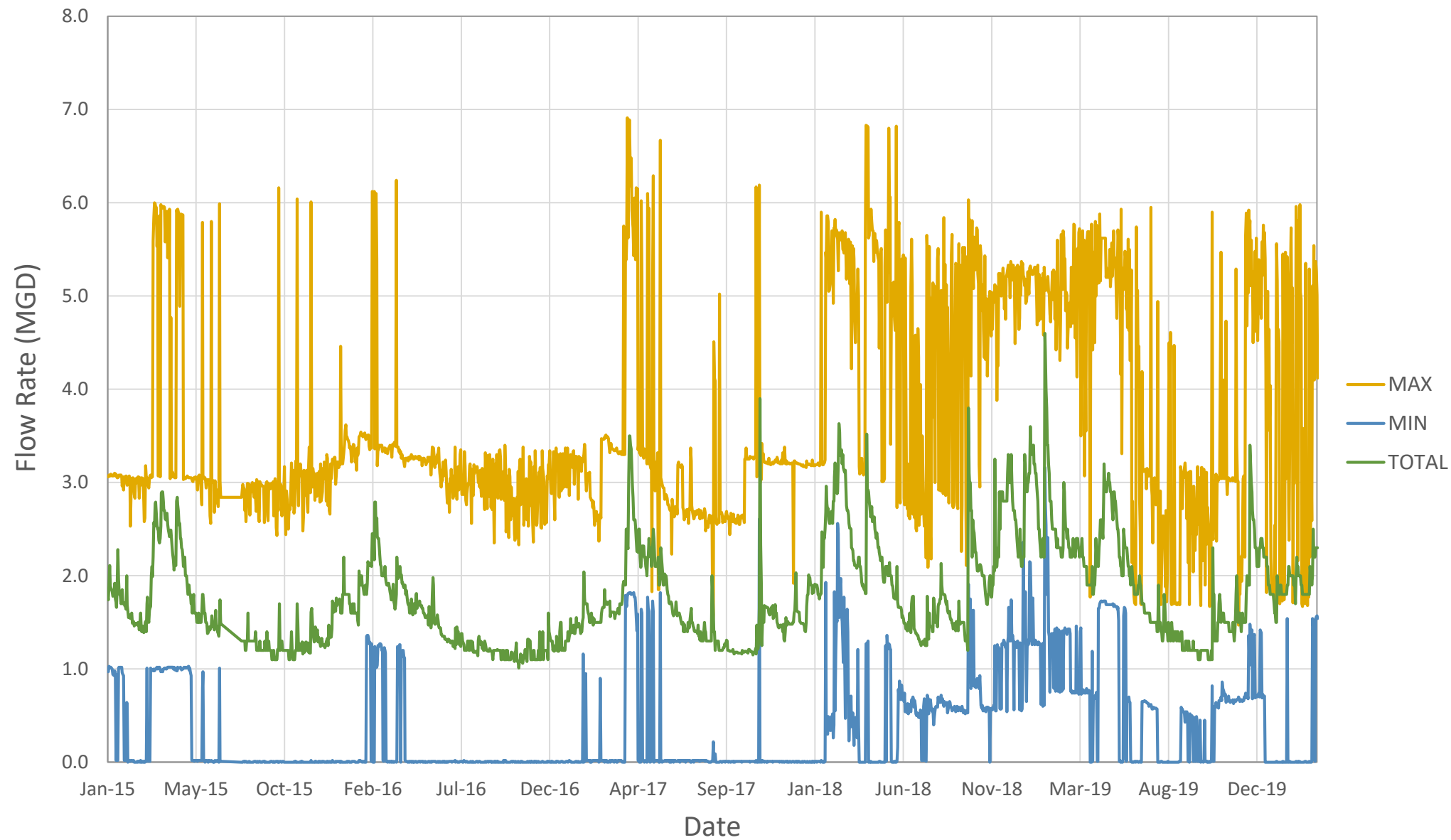
Derby	Ansonia	Seymour	Beacon Falls	Naugatuck
SSES (2016 – 2017)				SSES (2015 & 2017)
Phased I/I control plan (2019- Present and beyond)	No city-wide I/I program in over 15 years	No city-wide I/I program in over 15 years	No need for aggressive I/I	Re-procuring professional O&M services (includes capital to control I/I)



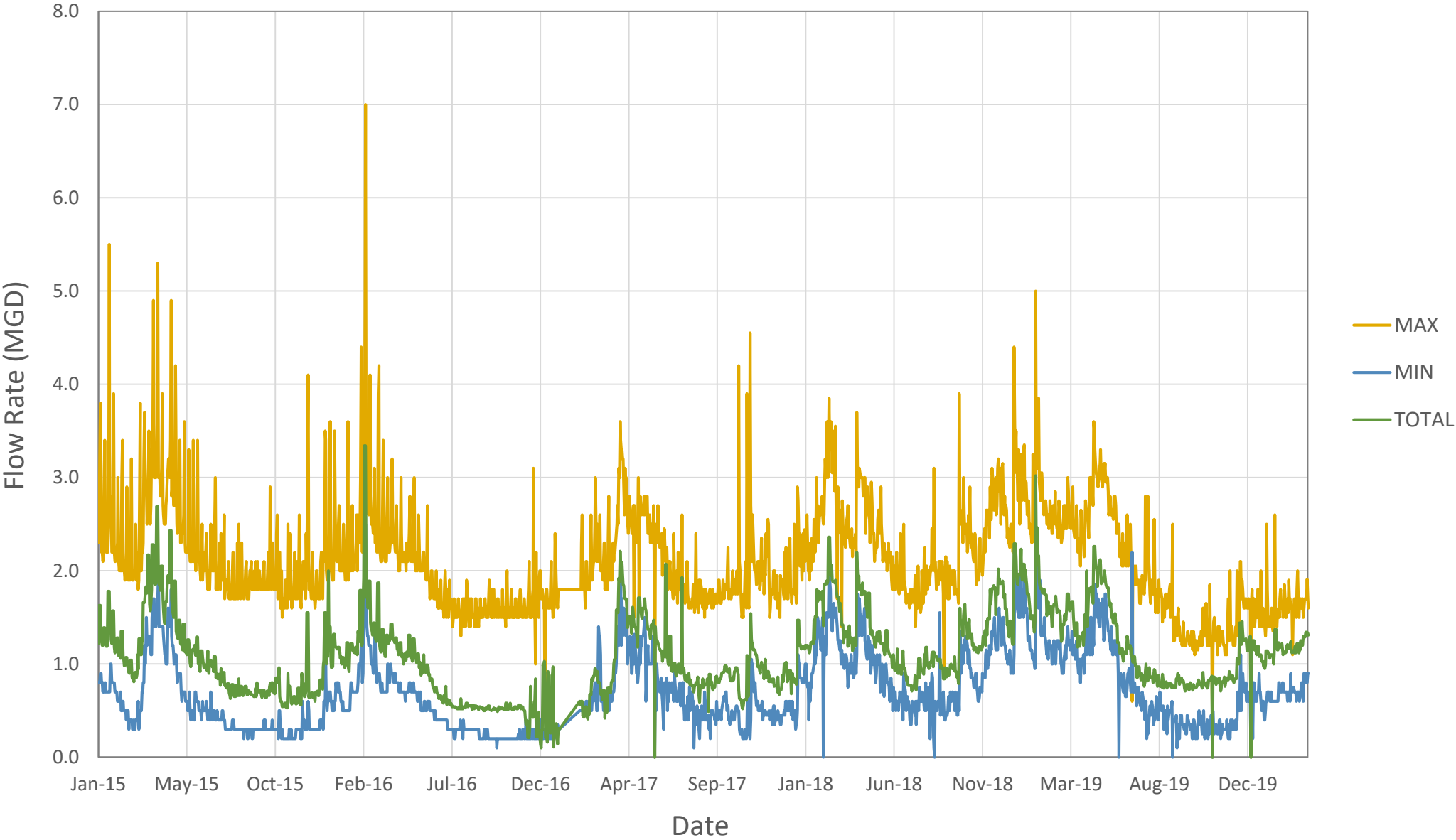
Derby Plant Flows 2015 – 2020



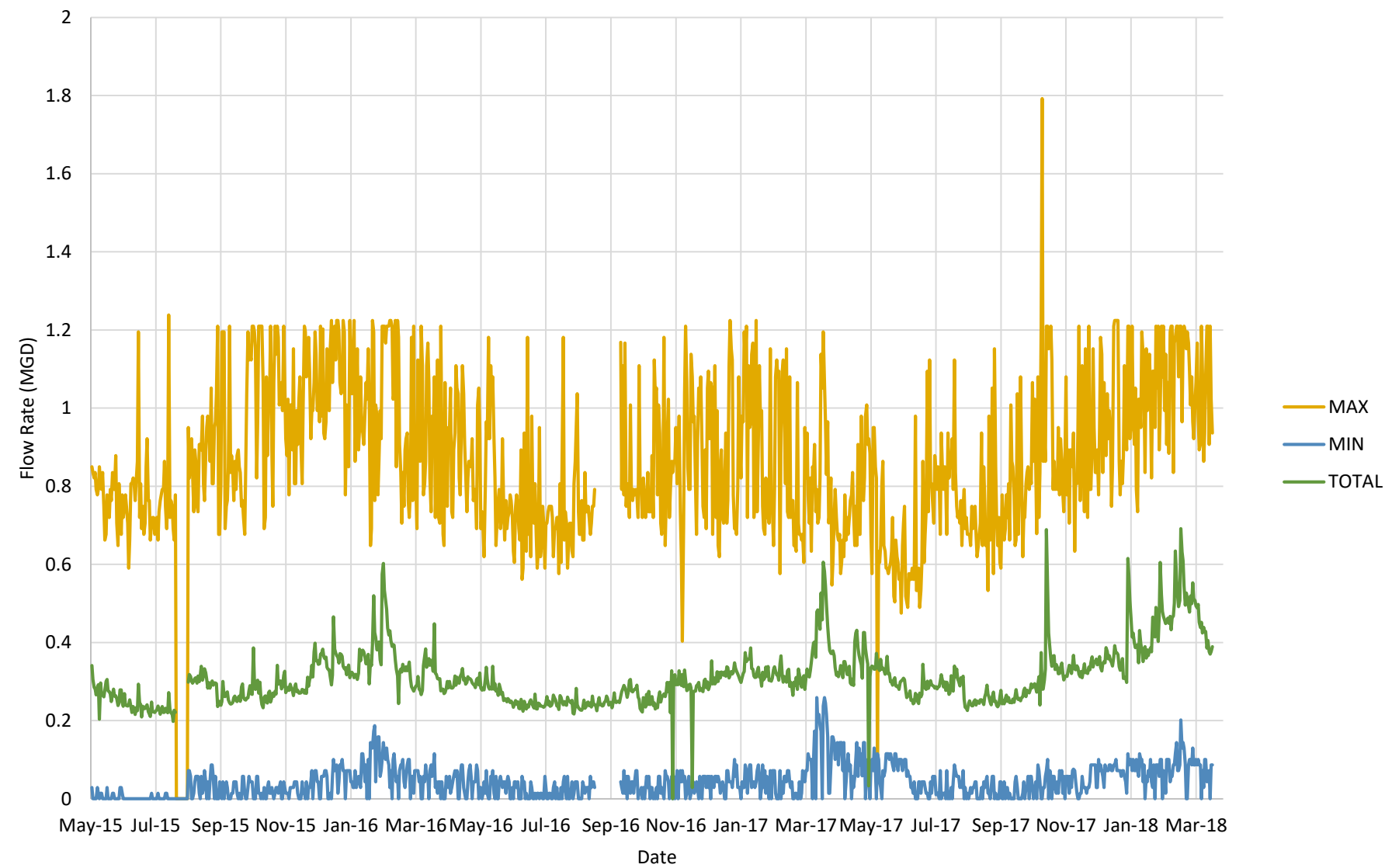
Ansonia Plant Flows 2015 – 2020



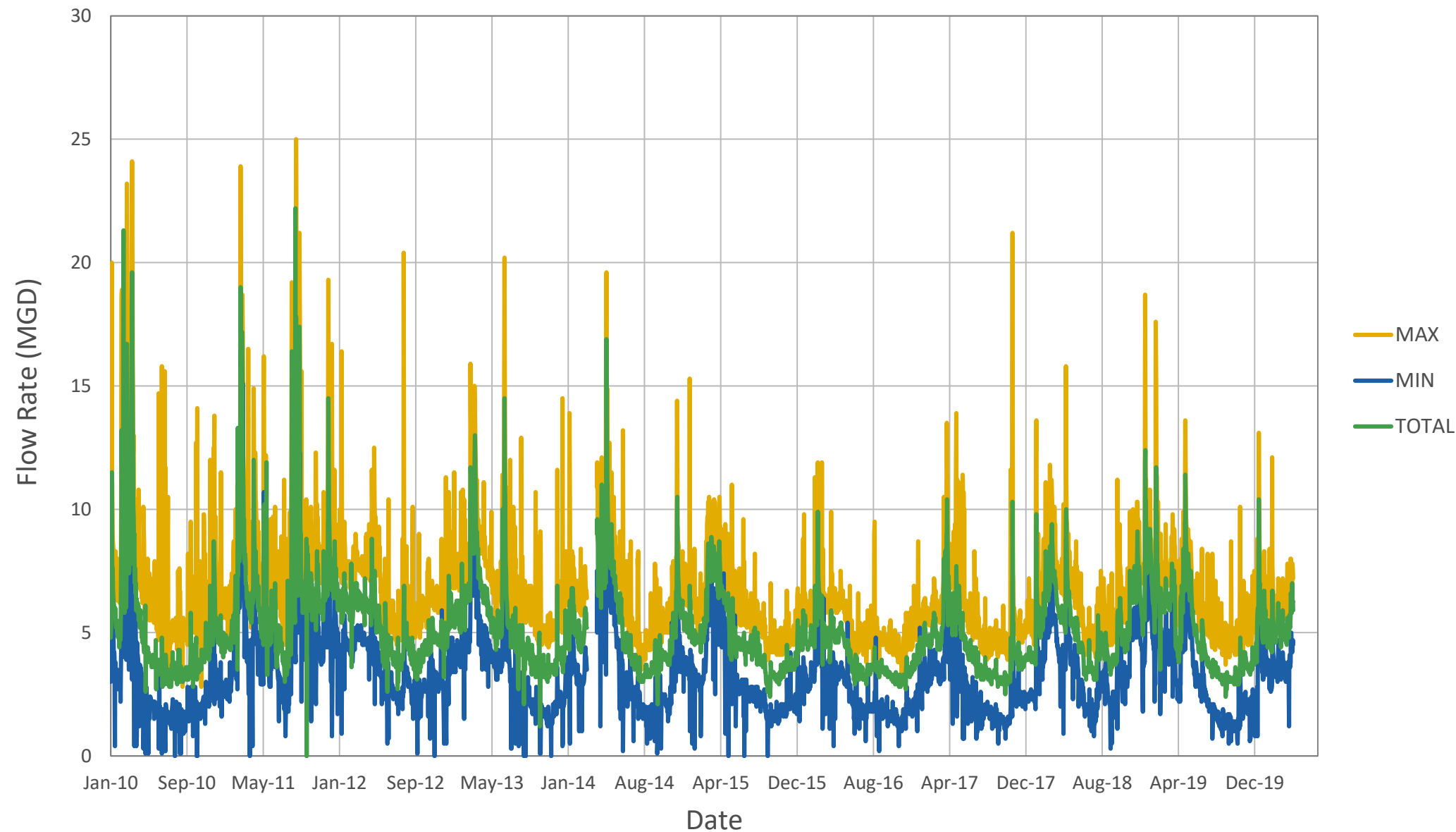
Seymour Plant Flows 2015 – 2020



Beacon Falls Plant Flows 2015 – 2018



Naugatuck Plant Flows 2015 – 2020



Aggressive I/I and Regional Alternatives Screen Out

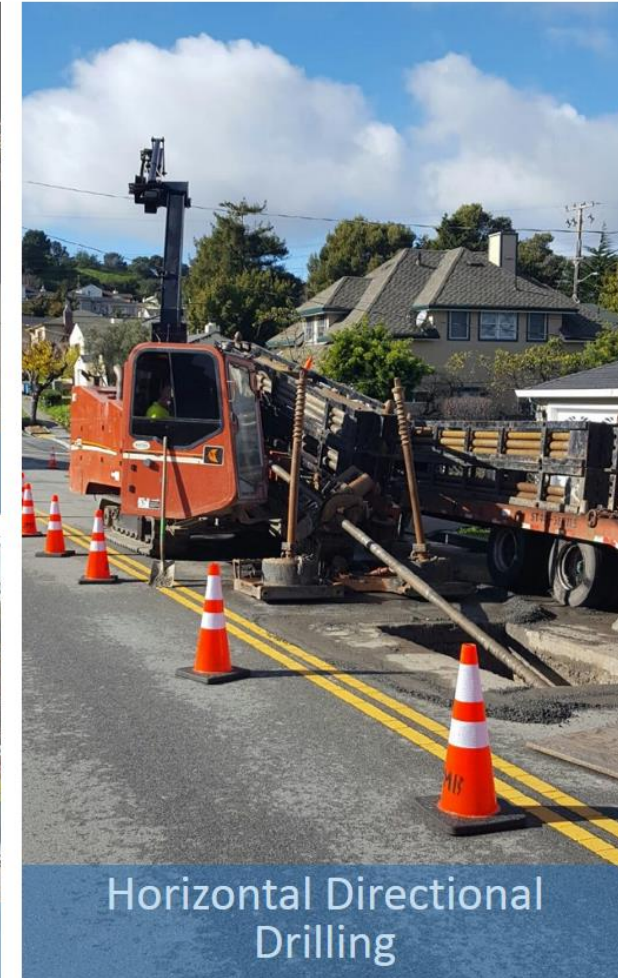
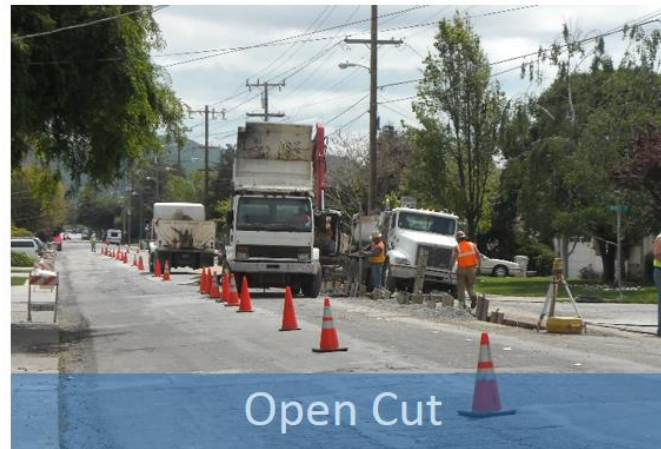
Standard I/I Management

- Target reduction of peak flows
- Inflow and rapid infiltration are priority
- Point repairs or limited extents
- Focus on known/identified sources

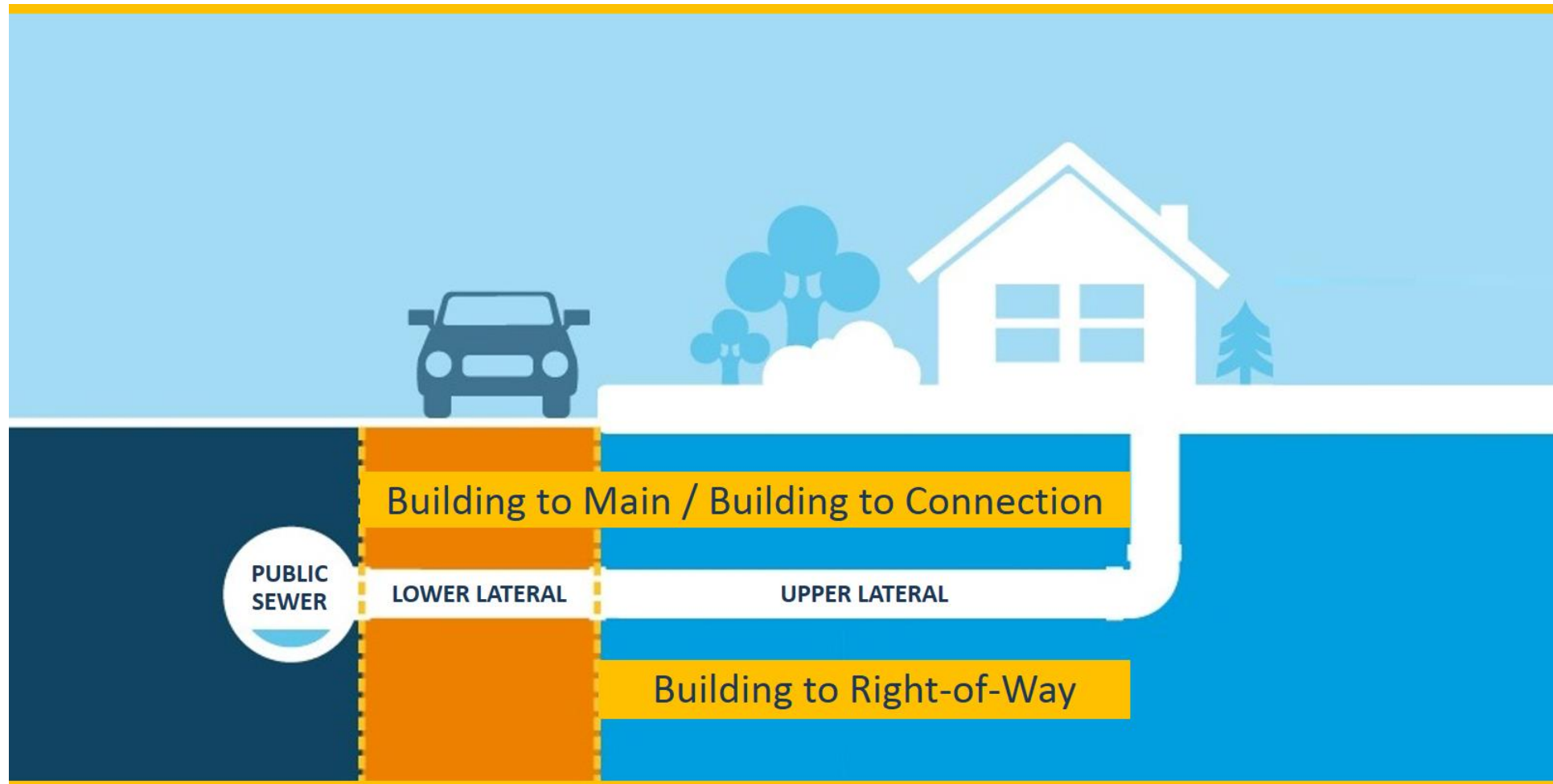
Aggressive I/I Removal

- Target reduction of peak and average flows
- Comprehensive rehabilitation
- Removal of private I/I sources

Rehabilitation/Replacement Methods



Managing I/I from Private Laterals



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Conveyance Corridors

- Reviewed Phase 1 Conveyance Corridors
- Initial Route Feasibility Review
- Developed Routes
- Evaluated Routes

Initial Route Feasibility Review

- Phase 1 routes were aligned along major infrastructure ROWs for ease of implementation
- ROW access almost impossible to obtain

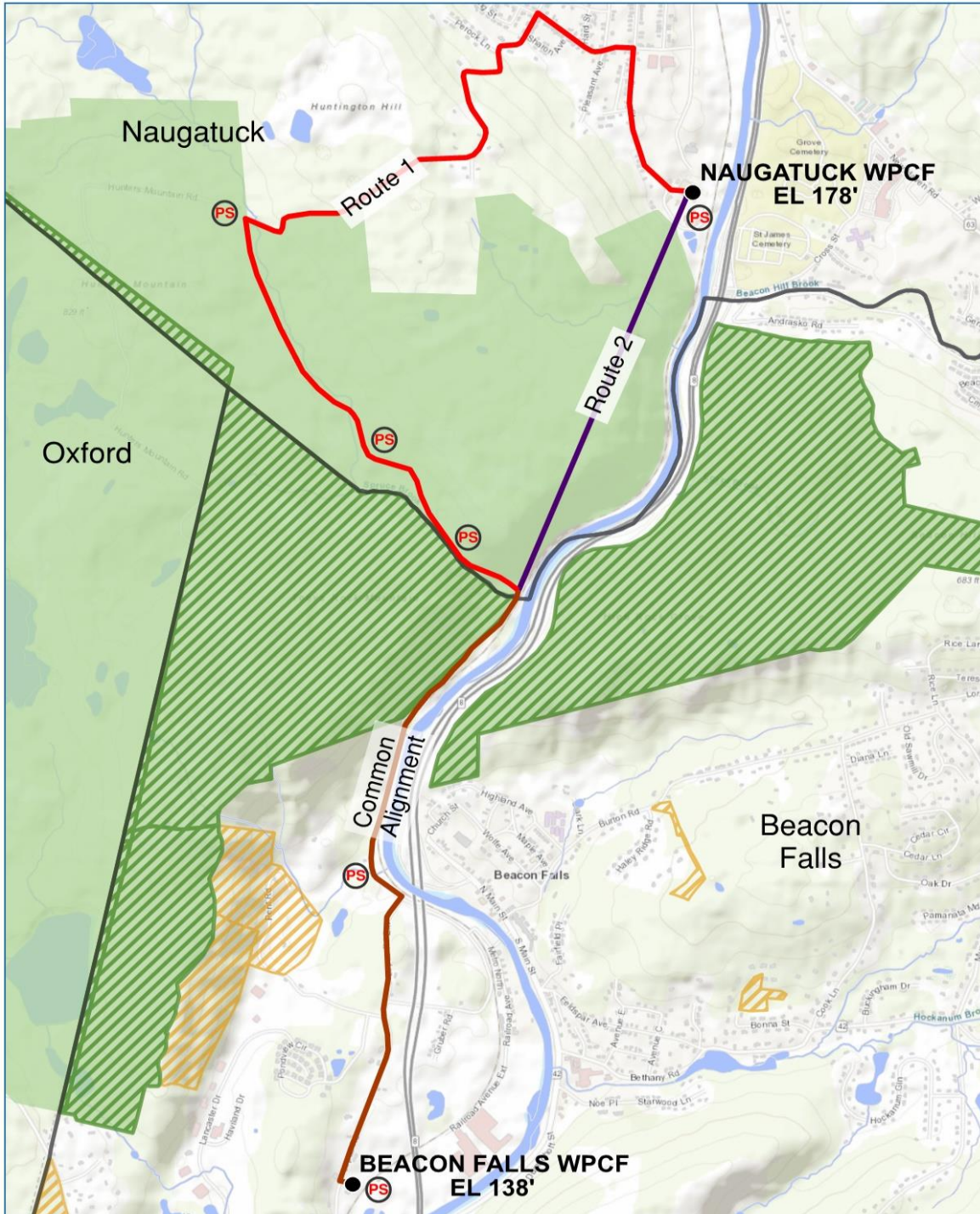


Pipeline Routes Developed

- Development

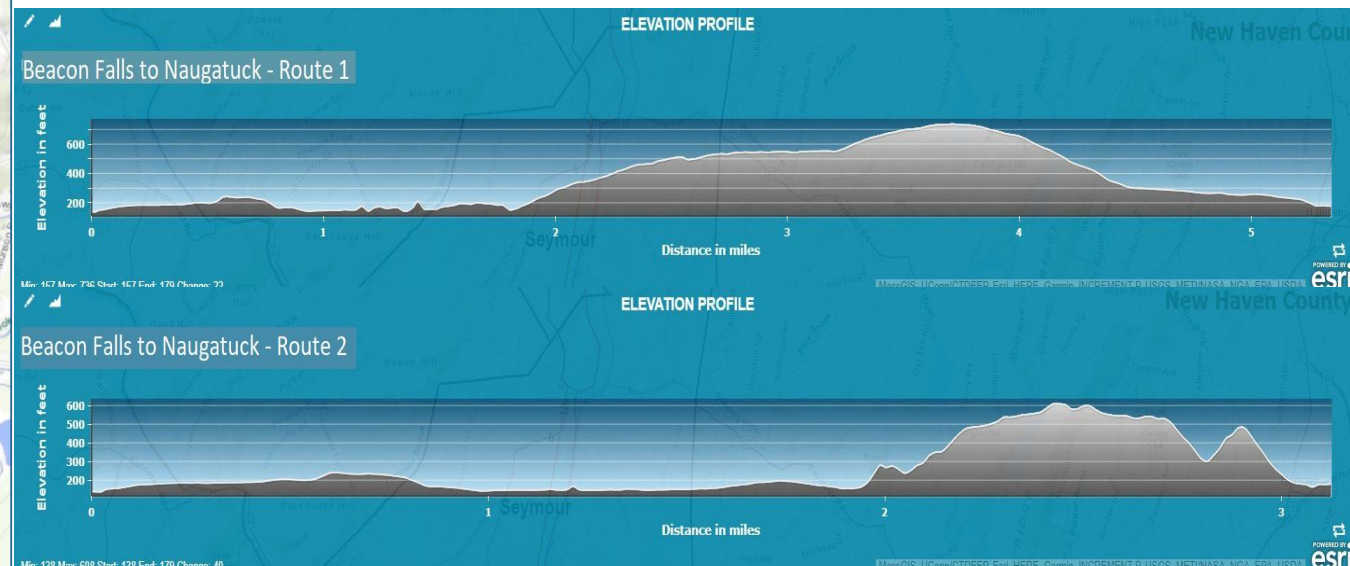
Physical	Constructability	Environmental
Length	Topography	Wetlands
Pipe Size	Geology	Flood Zones
Pump Stations	Easements	Protected Open Space

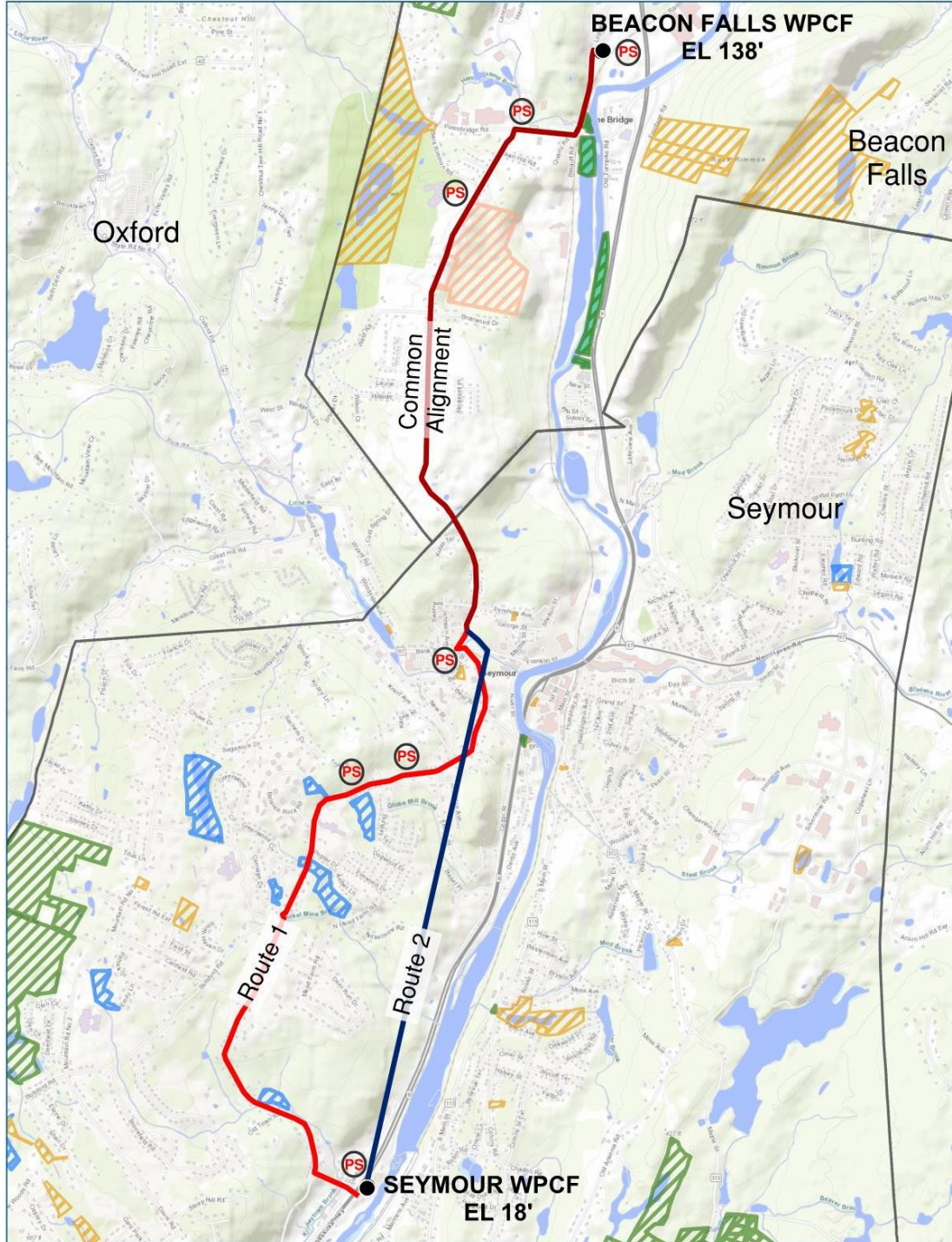
- Routes were defined and analyzed using:
 - Satellite Images
 - Connecticut GIS Data
 - Parcel Data



Beacon Falls to Naugatuck

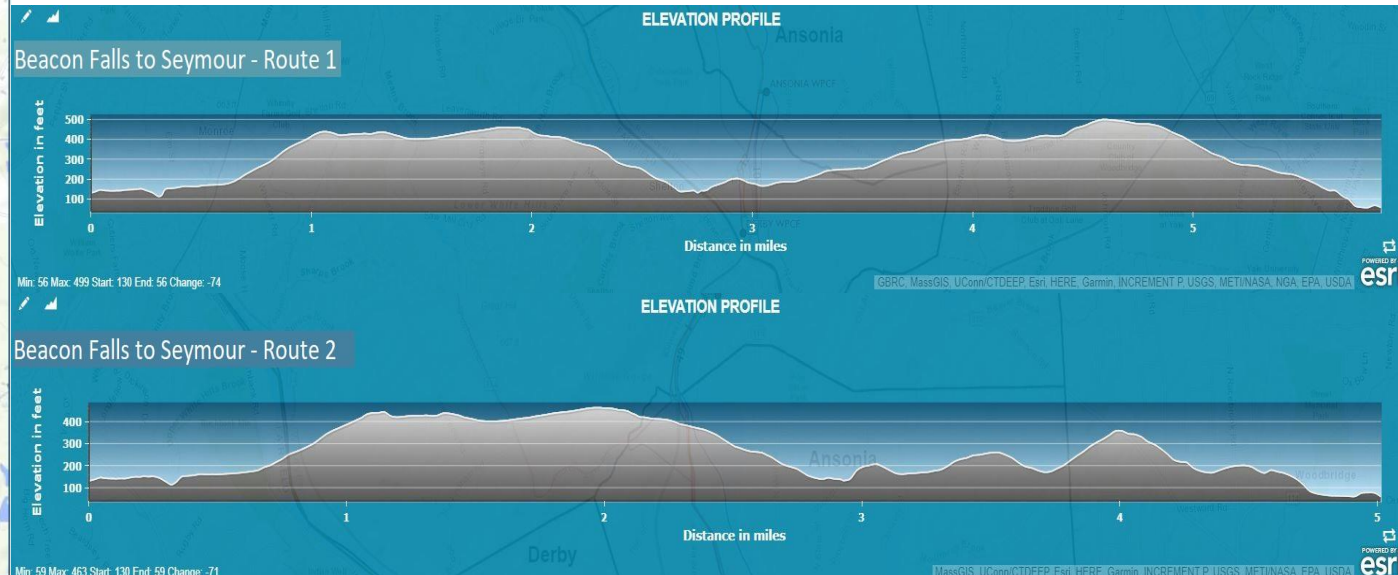
	ROUTE 1	ROUTE 2
Total Length (ft)	28,100	16,500
Pipeline	10" to 12" gravity and force main	10" to 12" gravity and force main, and tunnel
Number of Pump Stations	5	3
Easements	~65% route along Naugatuck State Forest	~65% route along Naugatuck State Forest





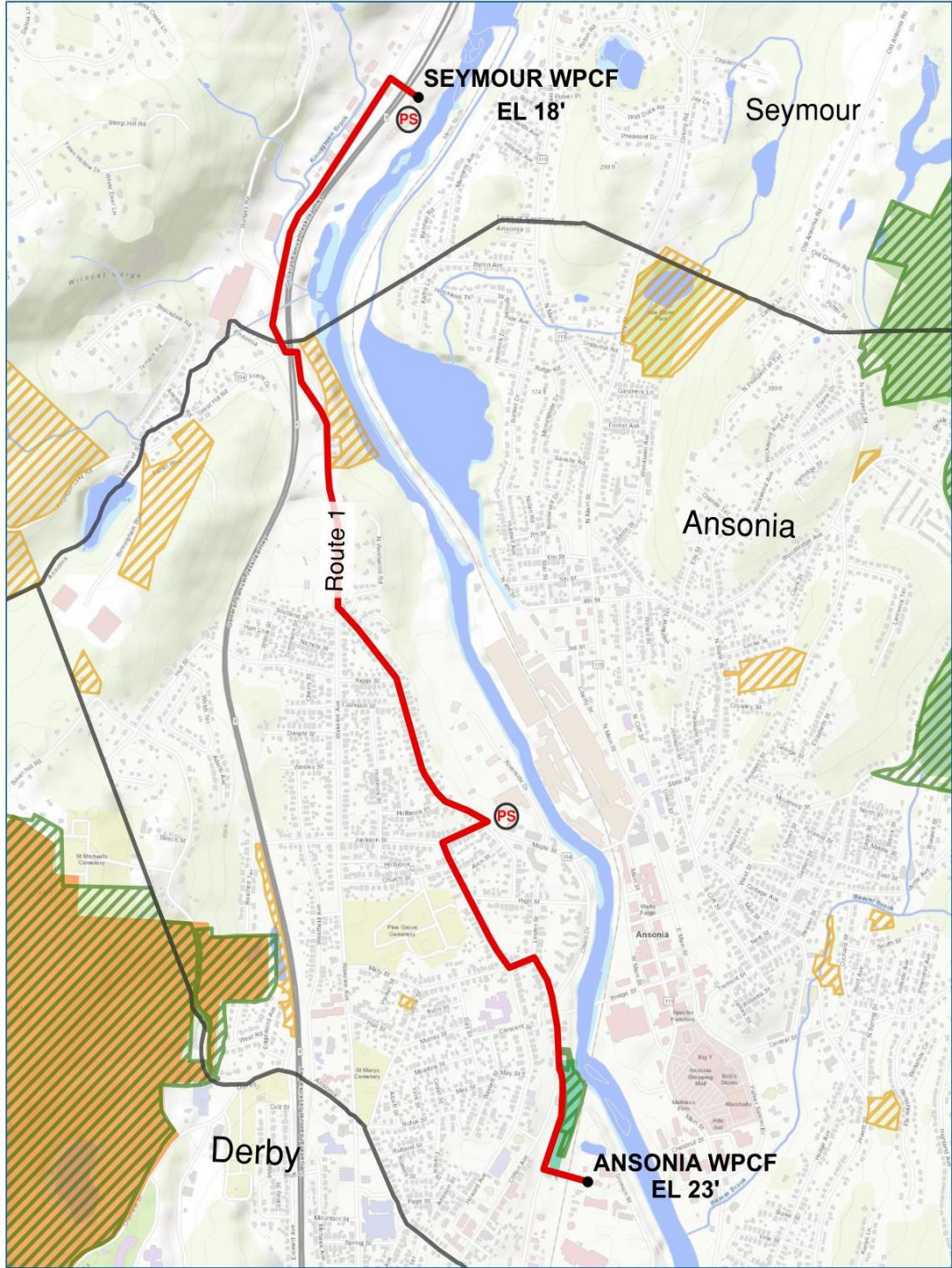
Beacon Falls to Seymour

	ROUTE 1	ROUTE 2
Total Length (ft)	31,000	26,500
Pipeline	10" to 12" gravity and force main	10" to 12" gravity and force main, and tunnel
Number of Pump Stations	6	4
Easements	~5% route crosses private parcels	~45% route crosses private parcels



Seymour to Ansonia

ROUTE 1 MAIN ATTRIBUTES	
Total Length (ft)	14,200
Pipeline	14" to 18" gravity and force main
Number of Pump Stations	2
Easements	~10% route crosses private parcels



Ansonia to/from Derby



	DERBY TO ANSONIA	ANSONIA TO DERBY
Total Length (ft)	8,100	
Pipeline	18" force main	16" to 18" gravity and force main
Number of Pump Stations	1	
Easements	~20% route crosses private parcels	



Alternatives Screen-Out Based on Conveyance Corridors

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Plant Process and Site Layouts

- Plant Treatment and Process Evaluation:
 1. Flows and Loads Update
 2. Treatment Capacity Assessment
 3. Site Layouts

Flows and Loads Update – Derby, Ansonia & Seymour

- Flows and loads through design (2040) were updated from Phase 1
- Daily MOR (2018 through March 2020) was used

Design Flows	Derby	Ansonia	Seymour
Annual Average (MGD)	1.9	1.9	1.3
Max. Month (MGD)	3.0	3.3	2.6
Peak Day (MGD)	5.5	5.0	4.5



Treatment Capacity Assessment

- Evaluated existing plants to handle individual and combined flows
- Assessment focused on:
 - Footprint intensive processes - primary and secondary treatment
 - Effluent requirements - tertiary treatment
- Treatment intensification selected for constrained plant sites
- Created plant facility layouts to meet treatment needs

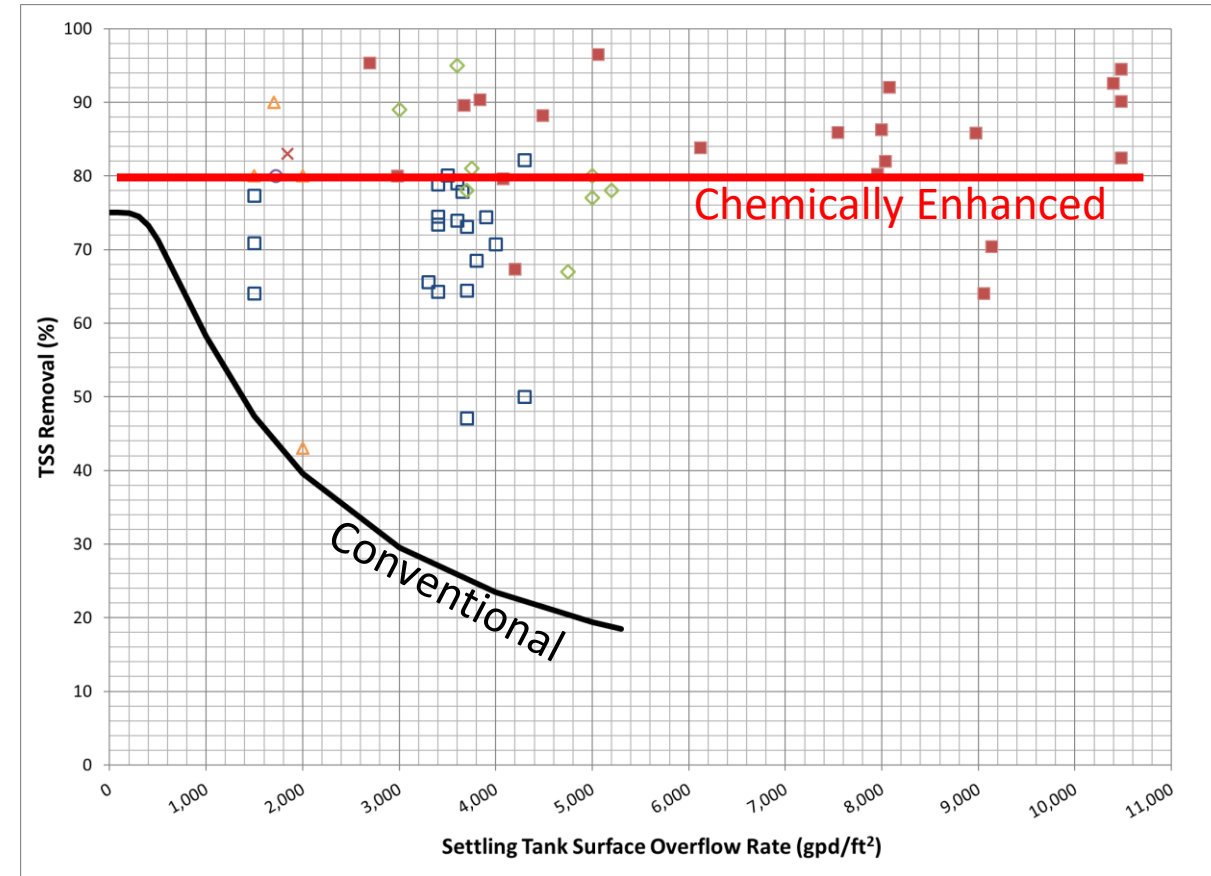
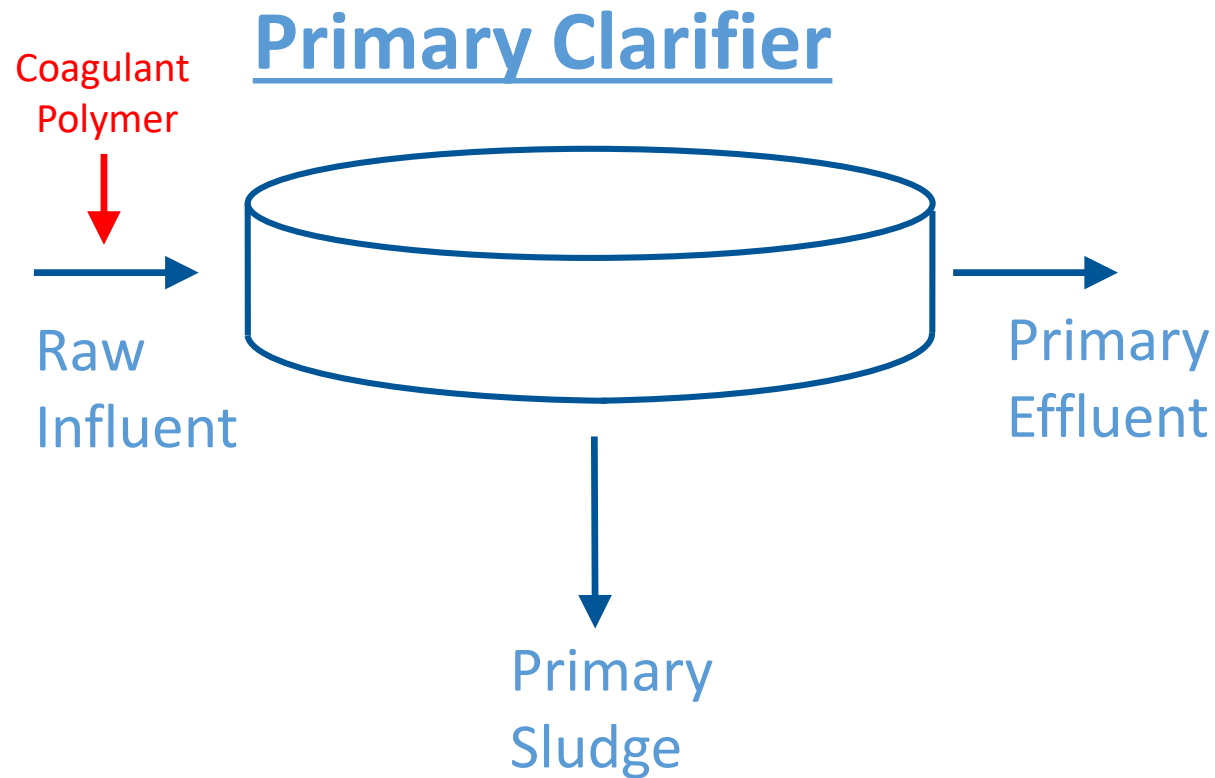


Treatment Intensification

- Treatment intensification considered over conventional treatment due to limited footprint

Process	Overview
Chemically Enhanced Primary Treatment (CEPT)	Allows the treatment of higher flows by increasing surface overflow rate
Ballasted Activated Sludge (BioMag)	Addition of magnetite (inert iron particles) to enhance settling
Integrated fixed film activated sludge (IFAS)	Use of plastic media to increase activated sludge inventory

Chemically Enhanced Primary Treatment (CEPT)

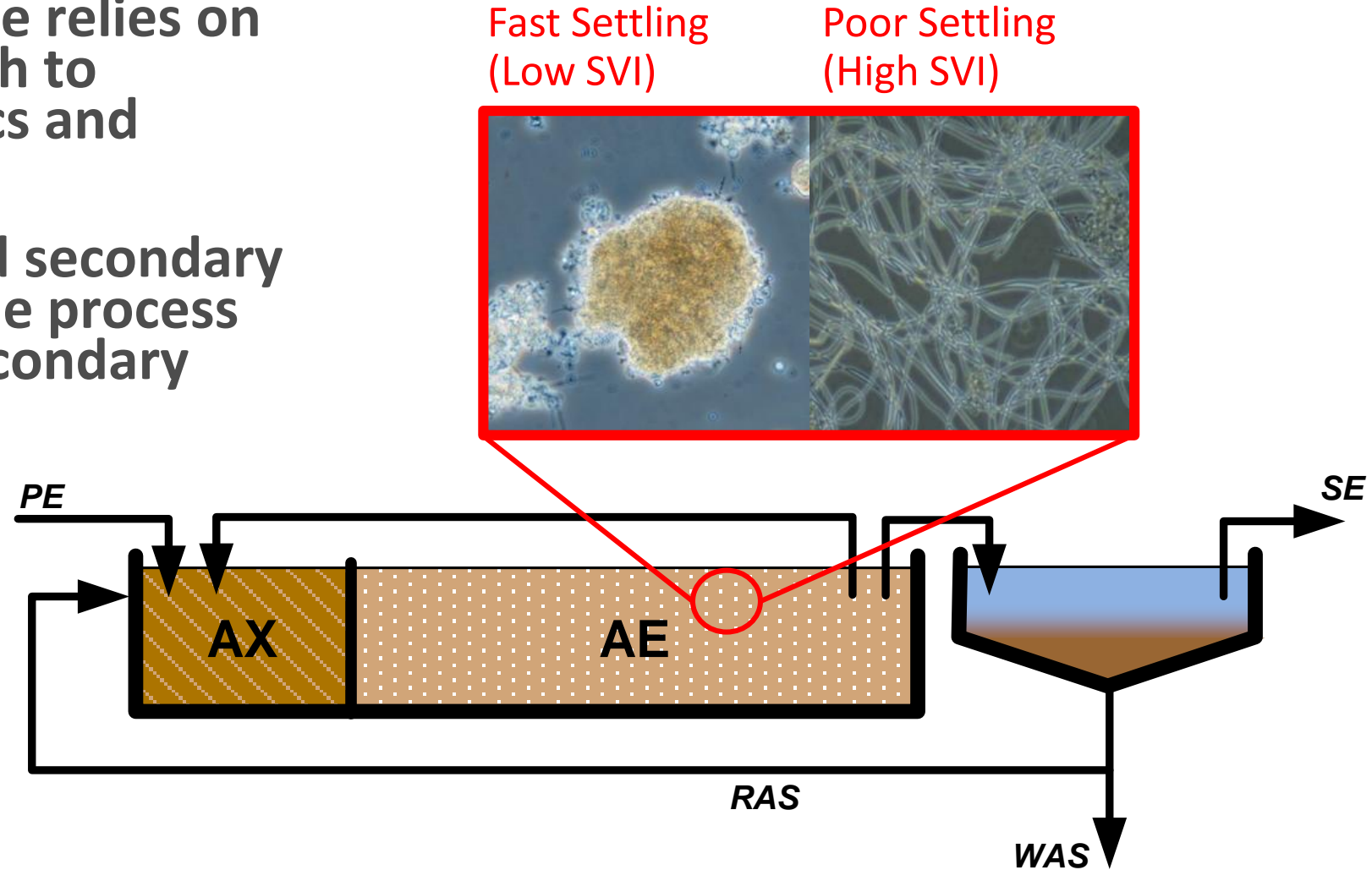


CEPT can increase primary clarifier capacity by approximately three times.



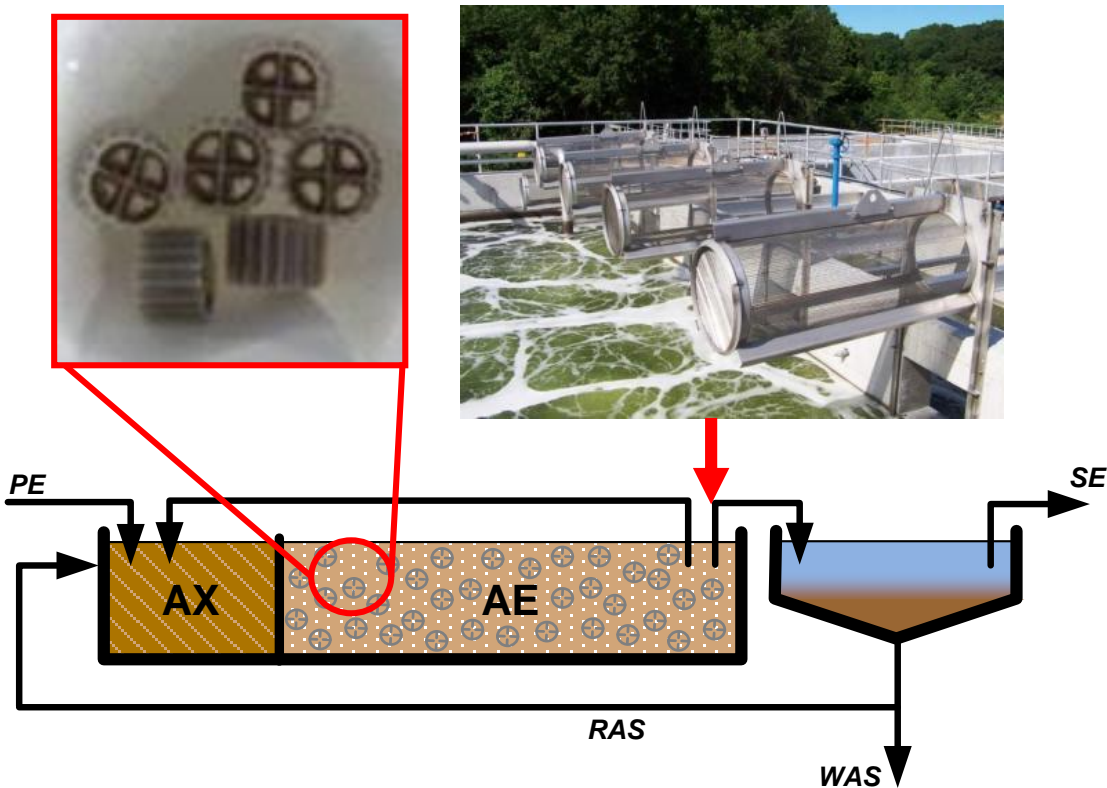
Conventional Activated Sludge (CAS)

- Activated sludge relies on bacterial growth to remove organics and nitrogen.
- Bioreactors and secondary clarifiers a single process when rating secondary capacity.



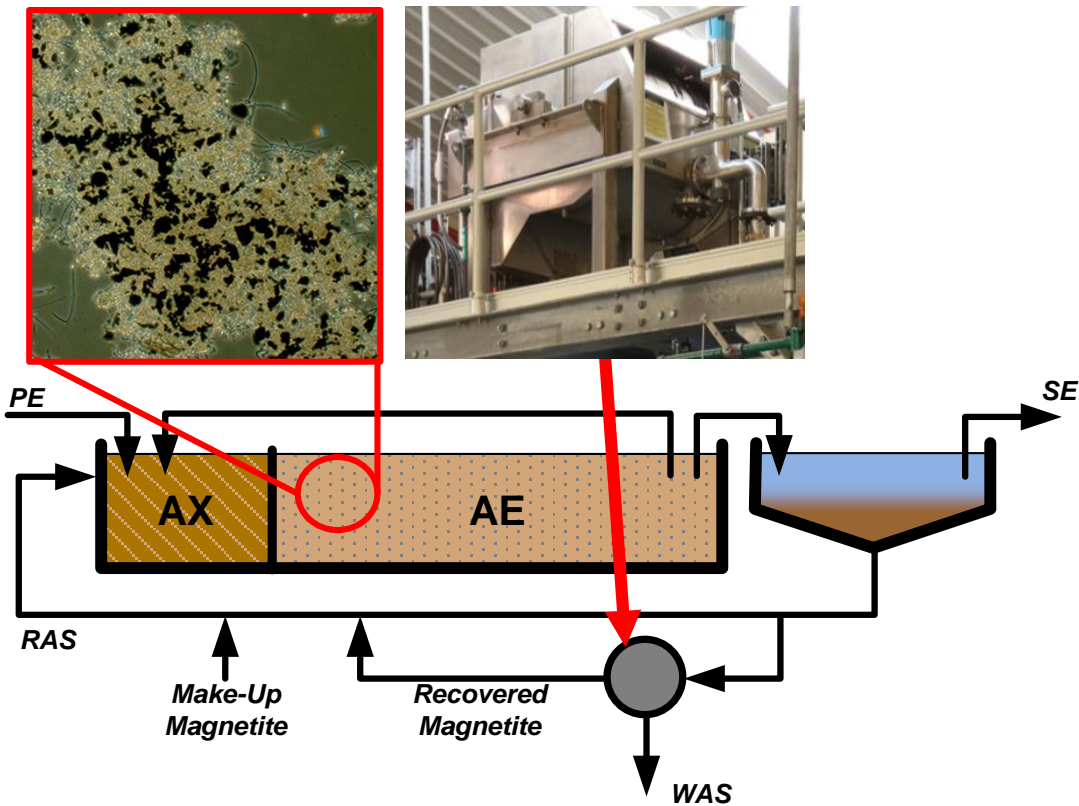
Process Intensification Options

Integrated Fixed Film Activated Sludge (IFAS)



IFAS increases active bacteria in bioreactor without increasing the solids loading to the clarifiers

Ballasted Activated Sludge (BioMag™ by Evoqua)



BioMag™ increases settling rates in the clarifier.

Plant Site Layouts

- Base Case
- Regional alternatives

Derby – Base Case



Derby Plus Ansonia - Regional Alternatives



With BioMag



With IFAS

Derby Plus Seymour - Regional Alternatives



With BioMag



With IFAS

Derby Plus Ansonia & Seymour - Regional Alternatives



With BioMag



With IFAS

Ansonia – Base Case



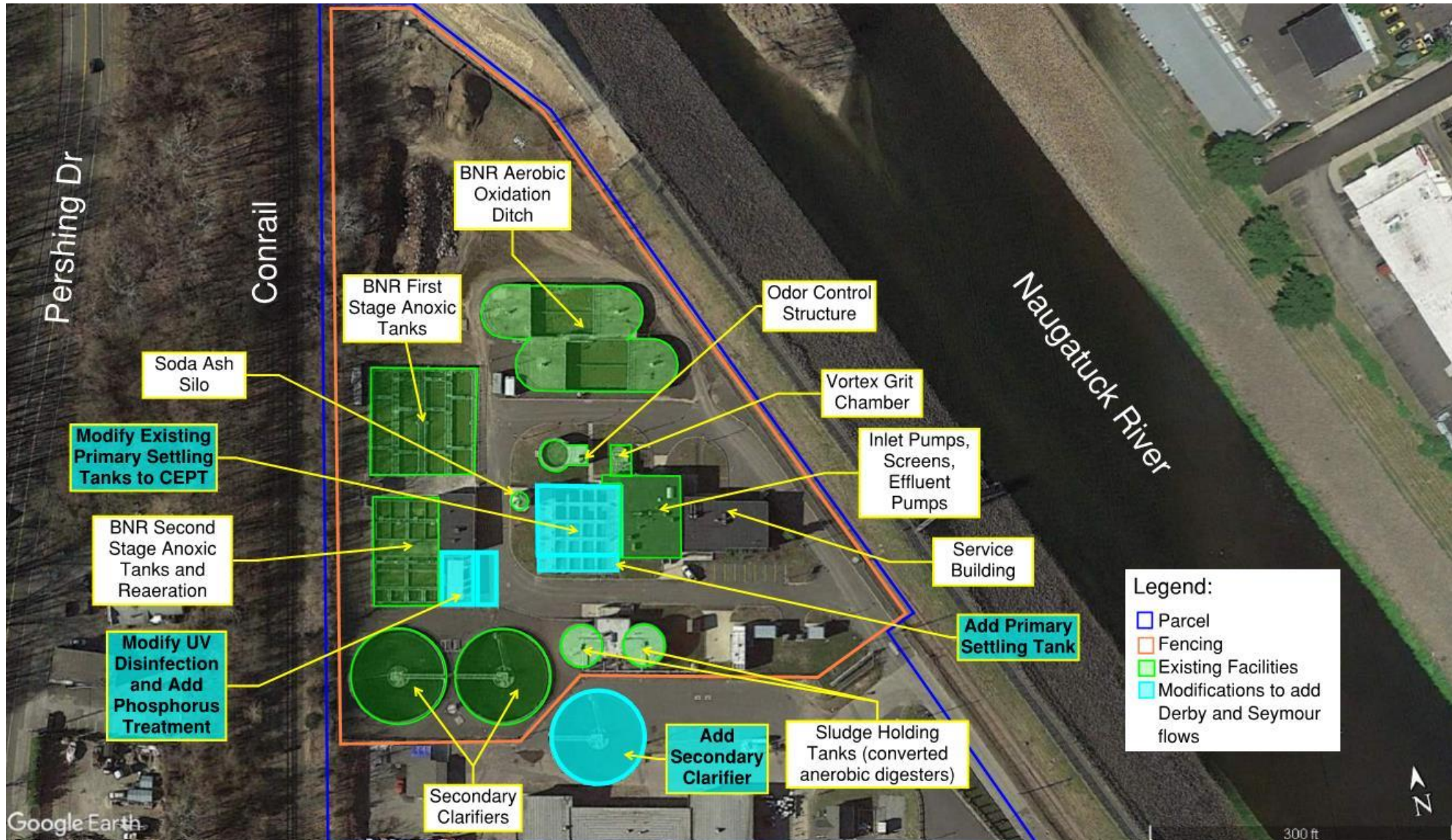
Ansonia Plus Derby - Regional Alternatives



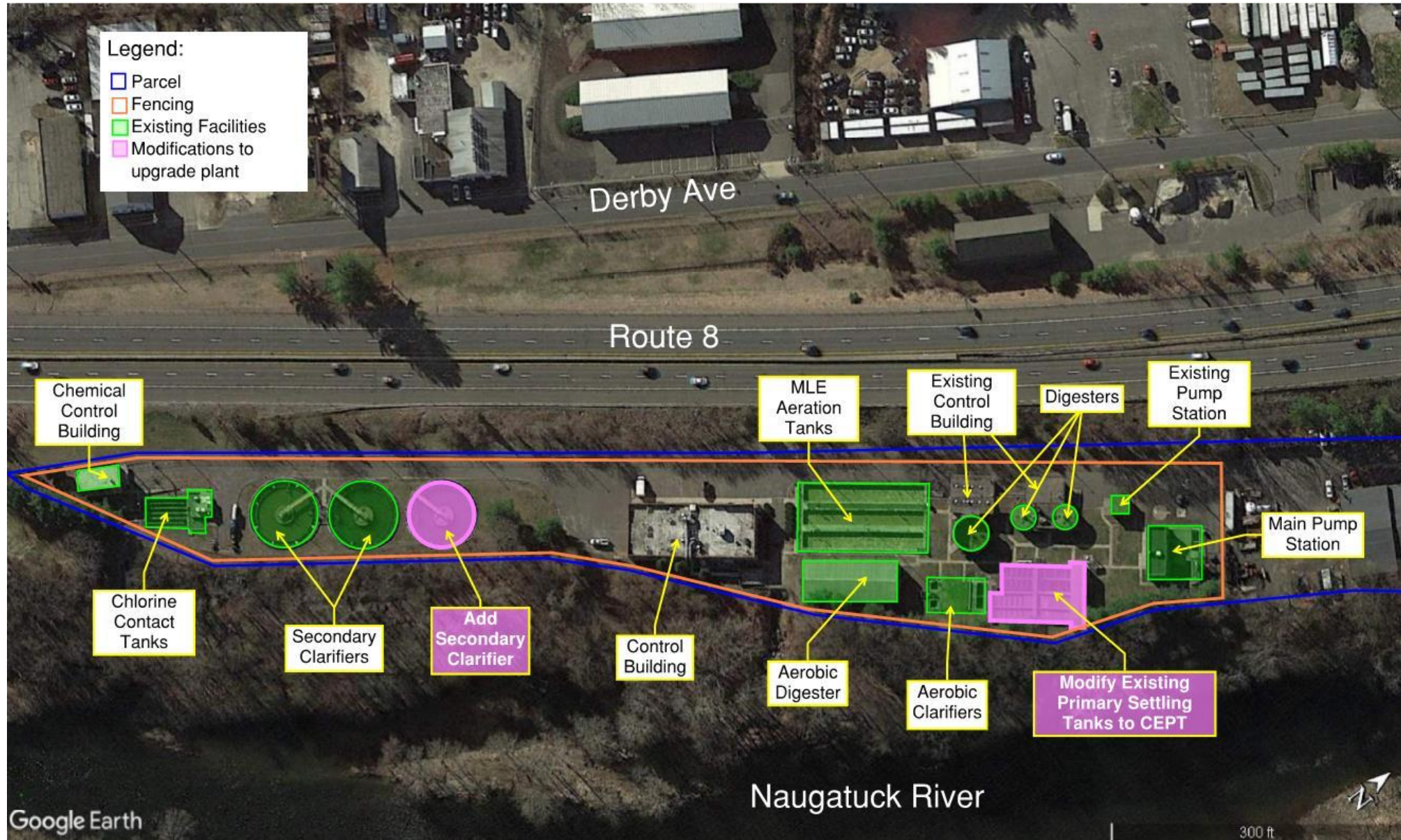
Ansonia Plus Seymour - Regional Alternatives



Ansonia Plus Derby & Seymour - Regional Alternatives



Seymour Base Case or Seymour Plus Beacon Falls Regional Alternatives



Alternatives Screen-Out

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Next Steps

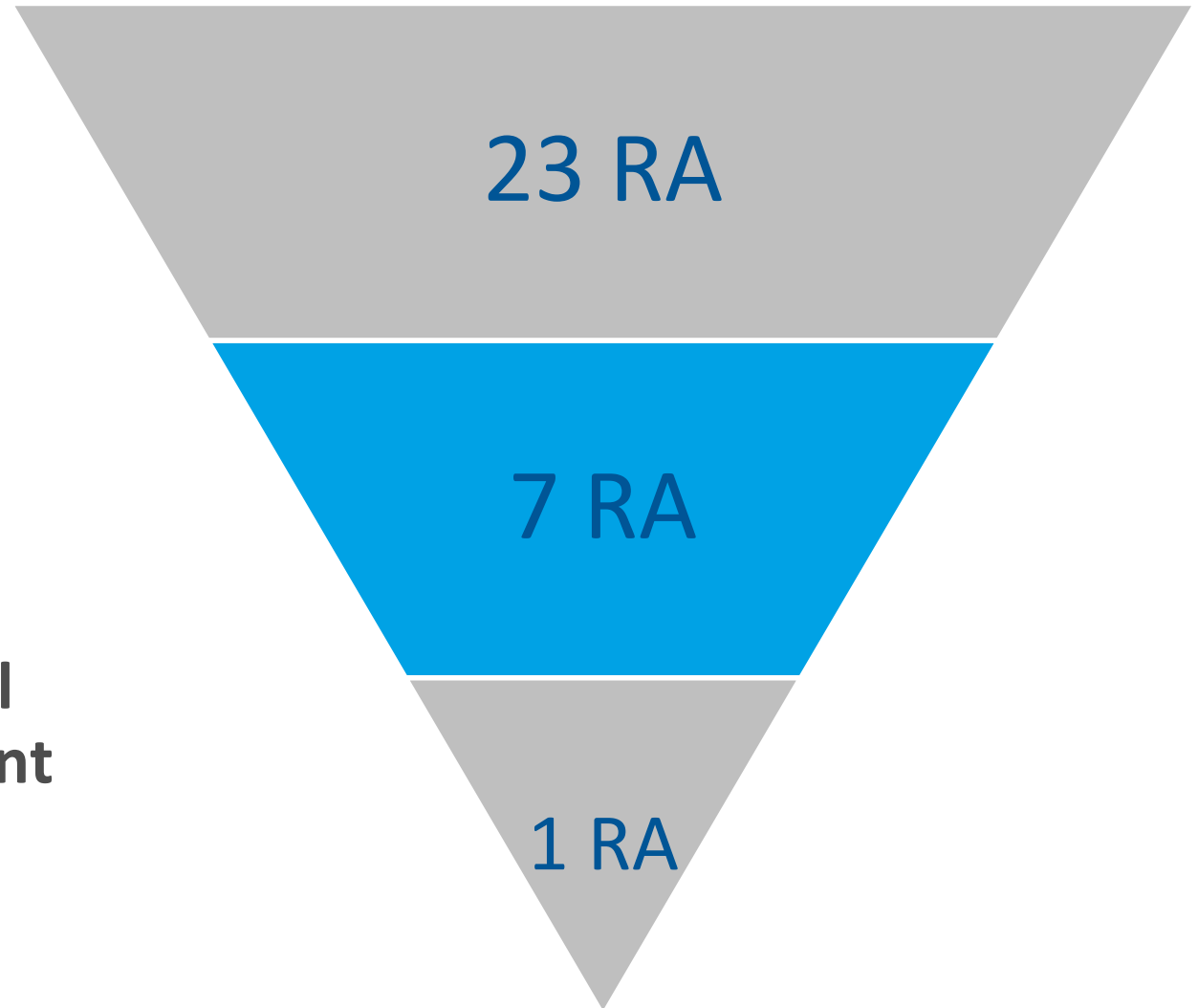
Short List of Regional Alternatives

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Task 3 Look Ahead

1. Develop and evaluate short list regional alternatives
2. Compare short list regional wastewater alternatives
 - a) Non-cost criteria
 - b) Cost criteria
3. Recommend one or two regional alternatives for final development





Thank you!

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