11 December 2018

Regional Wastewater Treatment Consolidation Study Workshop #2

Naugatuck Valley Council of Governments

BUILDING A WORLD OF DIFFERENCE®

BLACK & VEATCH

Agenda

- Introduction & Roles
- Review Base Case
- Review Long List of Alternatives
- What's Next

Introduction & Roles

NVCOG
Black & Veatch
Participating Communities
OPM, DEEP

Review Base Case

Derby
Ansonia
Seymour
Beacon Falls
Naugatuck

Derby WPCF Base Case – Summary Points

- Plant upgraded to secondary treatment in 1972; limited modifications since that time (some upgrades in 1998).
- Overall condition is poor; overdue for major overhaul, approaching full replacement.
- Significant safety hazards must be remedied.
- Capital program should start as soon as practical.

DEEP Consent Order (8/3/2015) requires: "modernization of entire treatment facility or abandonment and redirection of wastewater to another facility", with construction to be completed by 12/31/2020.

Derby WPCF Base Case

1. Replace existing headworks, to provide reliable screening facility upstream of influent pump station.

2. Replace/ upgrade the grit removal facility.

3. Complete mechanical upgrade of influent pump station (pumps, motors, valves, piping, controls, major upgrade of buildings).

Derby WPCF Base Case

4. Replace primary clarifier mechanisms, review concrete structures

5. Full process upgrade of secondary treatment (high efficiency blowers, air distribution system, etc.)

6. Improve flow spit to secondary clarifiers. Replace mechanisms. Modify clarifiers/ add a third.

Derby WPCF Base Case

7. Upgrade sludge pumping system. Store thickened sludge onsite, to be trucked offsite for dewatering and incineration.

8. Upgrade plant electrical system and provide plant SCADA.

9. Upgrade other plant systems, including disinfection, dechlorination, odor control.

Derby Collection System Base Case

- Old collection system; about 70% is vitrified clay (VC) pipe, characteristically with serious defects.
- System is leaky, with very high I/I. Peak wet weather flows can exceed plant capacity.
- Significantly higher expenditures are required for sewer replacement/ repairs due to poor condition of system and years of deferred replacement.
- USEPA Order required collection system improvements, including I/I Control Plan and CMOM Corrective Action Plan.

Recommended: Five years of catch-up at a 2.5%/yr system-wide renewal rate (= 1.0 miles/yr), followed by a more moderate annual investment for system strengthening/ maintenance.

Ansonia WPCF Base Case – Summary Points

- Extensive plant upgrade completed in 2011.
- Overall condition of the plant is good.
- Hydraulic restrictions limit peak flows that can be handled by plant – this needs to be resolved asap.

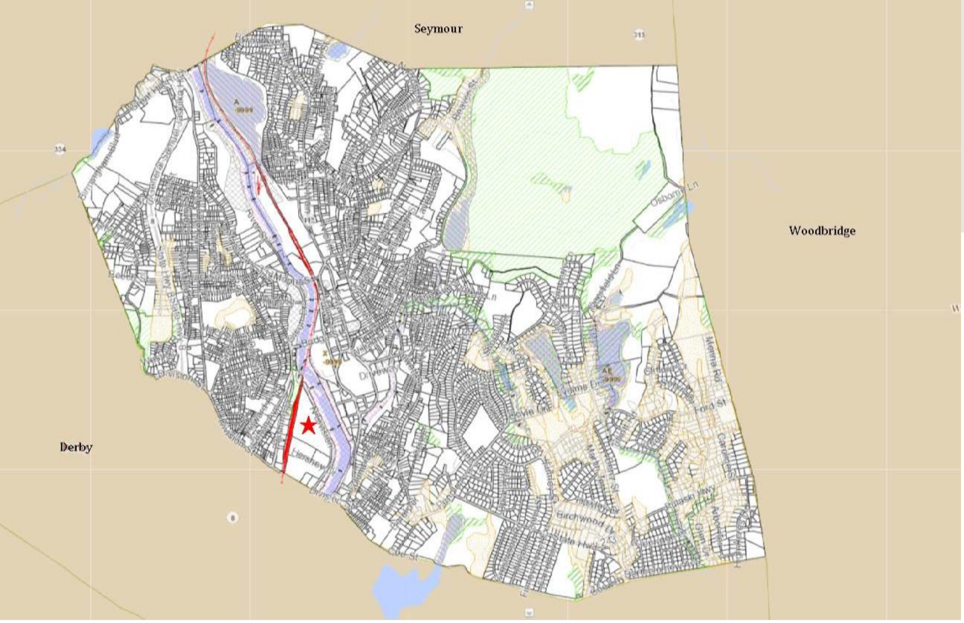
Anticipate that mechanical equipment upgrades will be required by approximately 2030, as existing systems reach projected life expectancy.

Ansonia WPCF Base Case

- Treatment performance and condition of relatively new equipment is good at this time.

- Plan for replacement of pumps, mixers, other mechanical systems later in the 20-year planning period.

Ansonia Collection System Base Case



Recommended: Five years of catch-up at 2%/yr system-wide renewal rate (= 1.3 miles/yr), followed by a more moderate annual investment for system strengthening/ maintenance

- Old collection system, much of which is VC pipe.
- System is leaky, with very high I/I.
- While some I/I work was done in the past, overall much work needs to be done to catch up and to maintain this very old pipe system.

Seymour WPCF Base Case Summary Points

Plant is now due for a major upgrade. Under base case, capital program should start as soon as practical.

- Plant built in the 1970's, with most recent upgrade in the early 1990's.
- At minimum, replace/rehab: headworks screening, grit removal, influent pump station, primary clarifiers/mechanisms, secondary clarifier upgrade, BNR system upgrade including aeration blowers, sludge processing, plant-wide electrical, SCADA

Seymour WPCF Base Case

1. Replace screenings and grit removal facilities at headworks.

2. Complete mechanical upgrade of influent pump station (all pumps, motors, valves, piping, controls, etc.)

3. Replace mechanisms on two primary clarifiers; review condition of concrete structure.

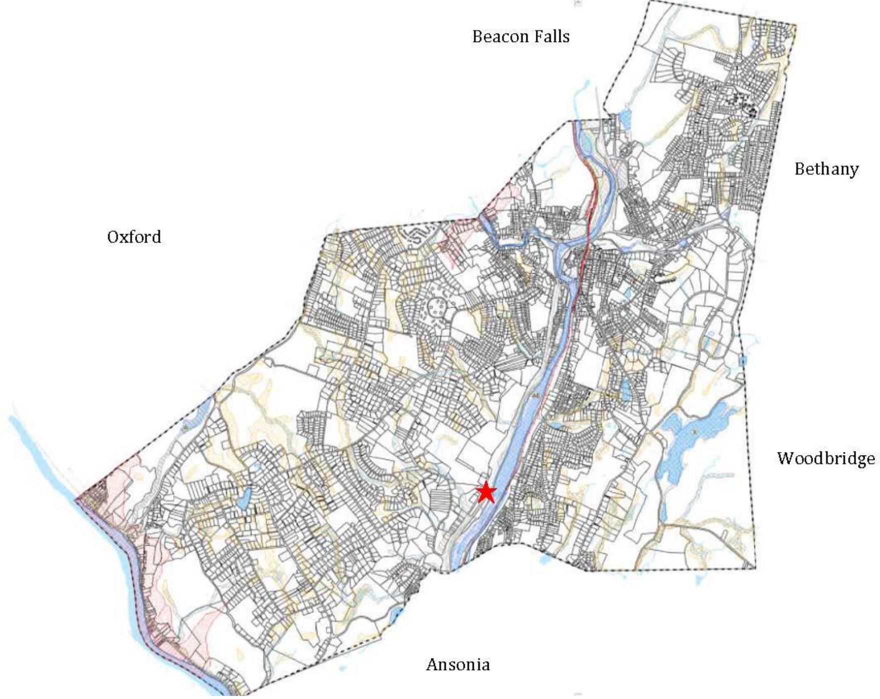
Seymour WPCF Base Case

4. Upgrade BNR system. Replace diffusers, old blowers; fix HVAC and segregation issues for blowers.

5. Replace secondary clarifier mechanisms.

6. Replace RDT's, provide liquid sludge storage onsite for offsite dewatering and incineration.

7. Upgrade plant electrical system, replace MCC's and old panels. Provide full SCADA upgrade.



Seymour Collection System Base Case

- Old collection system (23% of which is VC pipe)
- Limited maintenance or inspections.
- System is leaky, with very high I/I.
- Significantly higher expenditures are required for sewer replacement/ repairs due to poor condition of system and years of deferred replacement/upgrade.

Recommended: Five years of catch-up at 2%/yr system-wide renewal rate (= 1.3 miles/yr), followed by a more moderate annual investment for system strengthening/ maintenance

Beacon Falls WPCF Base Case Summary Points

Town is planning to undertake plant upgrade in the near term.

❖ Plant built in 1971, with the most recent upgrade in 1994.

❖ Plant is due for a major upgrade.

❖ At minimum, upgrade or replace: influent pump station, headworks, clarifiers, aeration system, sludge pumping, rotary drum thickener, plant-wide electrical, SCADA

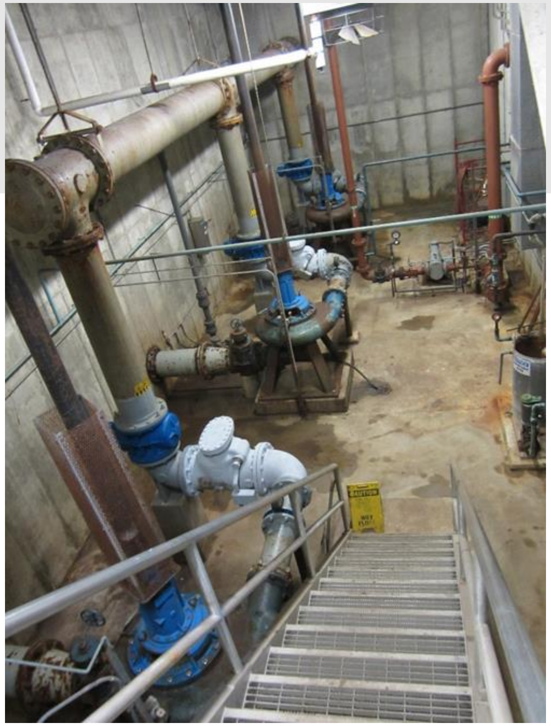
Beacon Falls WPCF Base Case

1. Mechanical upgrade of influent pump station; replace headworks.

2. Upgrade BNR system.

3. Replace sludge pumping system.

4. Replace or upgrade clarifiers; issues with old, shallow, partially buried units.



Beacon Falls Collection System Base Case

- Approx. 2/3 installed within the past 20 years.
- Currently spending very little for system maintenance ($15k/year).
- Town plans to focus on collection system after plant upgrade.

Recommended: Plan maintenance of 0.75%/yr system-wide renewal rate (= 0.25 miles/yr), for sustained performance

Naugatuck WPCF Base Case Summary Points

Plant is due for a mechanical upgrade. Improvement for phosphorus control are underway.

- Secondary treatment plant from the 1970's, with significant regional solids processing operation.
- Recent Facilities Plan (12/2017) identified upgrades with capital costs through 2026. Upgrades needed include: grit removal, septage receiving, dewatering and phosphorus removal.
- In view of the age of the facility, additional capital expenditures should be programmed for during the 2027-2040 period.

Naugatuck WPCF Base Case

1. No headworks grit and screenings removal upstream of influent PS causes operational challenges.

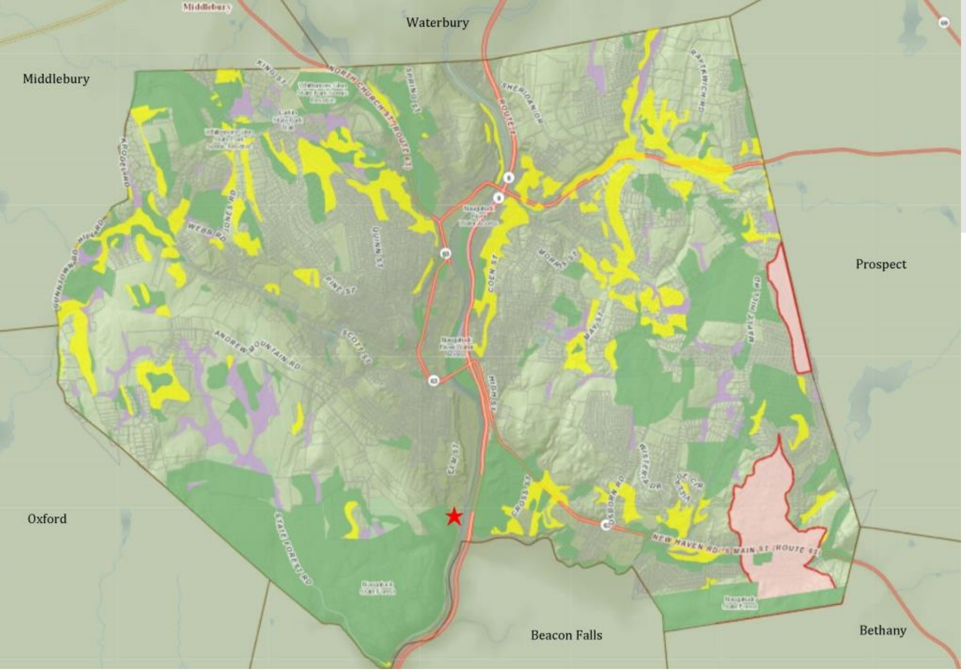
2. Scum collection on primary clarifiers not functional.

3. Upgrade to optimize BNR system to improve treatment and energy efficiencies; deficiencies noted in Facilities Plan.

Naugatuck WPCF Base Case

4. Phosphorus treatment systems required; this is underway.

5. Secondary clarifiers collectors, drives, RAS pumps WAS pumps, etc. from 1970’s need to be replaced.



Naugatuck Collection System Base Case

Recommended: Five years of catch-up at 1.5%/yr system-wide renewal rate (= 2.3 miles/yr), followed by a more moderate annual investment for system strengthening/ maintenance

- Old collection system, much of which is VC pipe.
- Under a Consent Order regarding collection system O&M and I/I control.

Review Long List of Alternatives

- Identification of Alternatives
- Conveyance Routes
- Evaluation Criteria
- Conclusions and Recommendations

Managing Peak Flows

Aging Facilities

Upstream to Downstream

Conveyance Corridors

Identification of Alternatives

Aggressive rehabilitation is costly but may be the best long-term solution

Aggressive I/I Control

Building extra plant capacity for infrequent events

Treatment Capacity

Storage

Storage can be cost-effective but pose operational headaches

High Peaking Factors are costly to manage and will require balancing approaches for an optimal solution

Identification of Alternatives

- Managing Peak Flows
- **Aging Facilities**
- Upstream to Downstream
- Conveyance Corridors

Naugatuck ⟹	Adequate capacity. Improvements will be required, but not all are urgent.
Beacon Falls ⟹	Plant is due for major upgrade
Seymour ⟹	Plant is due for major upgrade
Ansonia ⟹	Fairly recent upgrade. Equipment updates will be needed in planning period.
Derby ⟹	Plant is due for major upgrade

Aging facilities require immediate attention, but they also provide opportunity for economies of scale

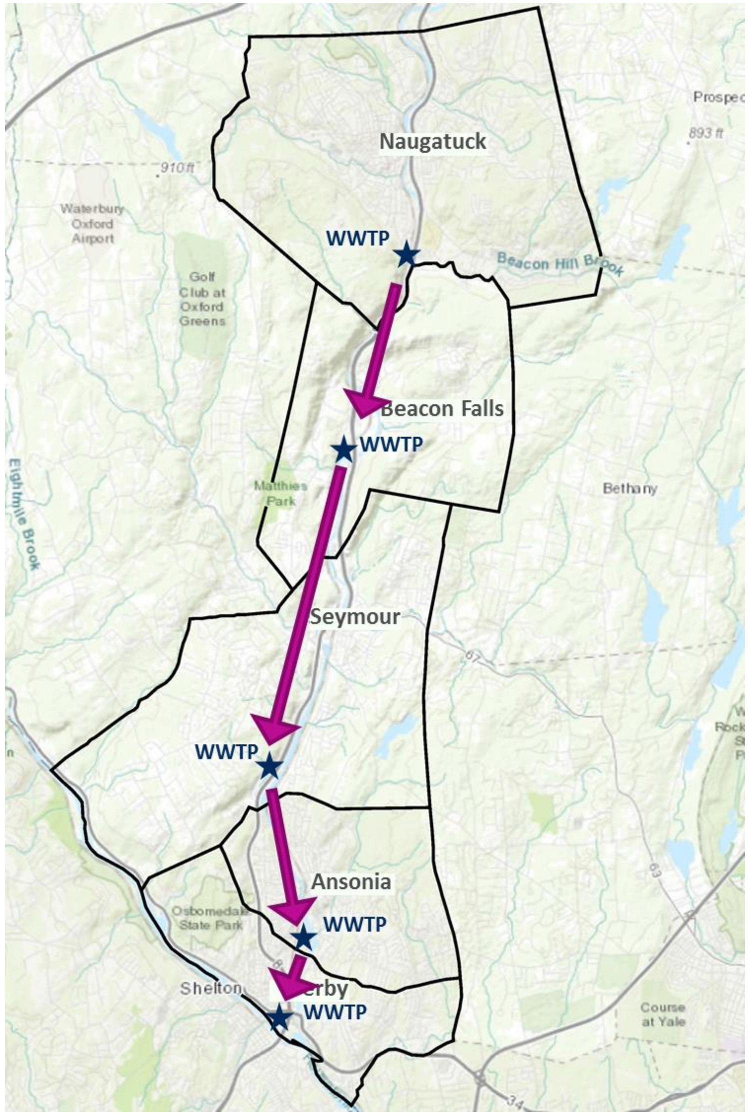
Managing Peak Flows

Aging Facilities

Upstream to Downstream

Conveyance Corridors

Identification of Alternatives

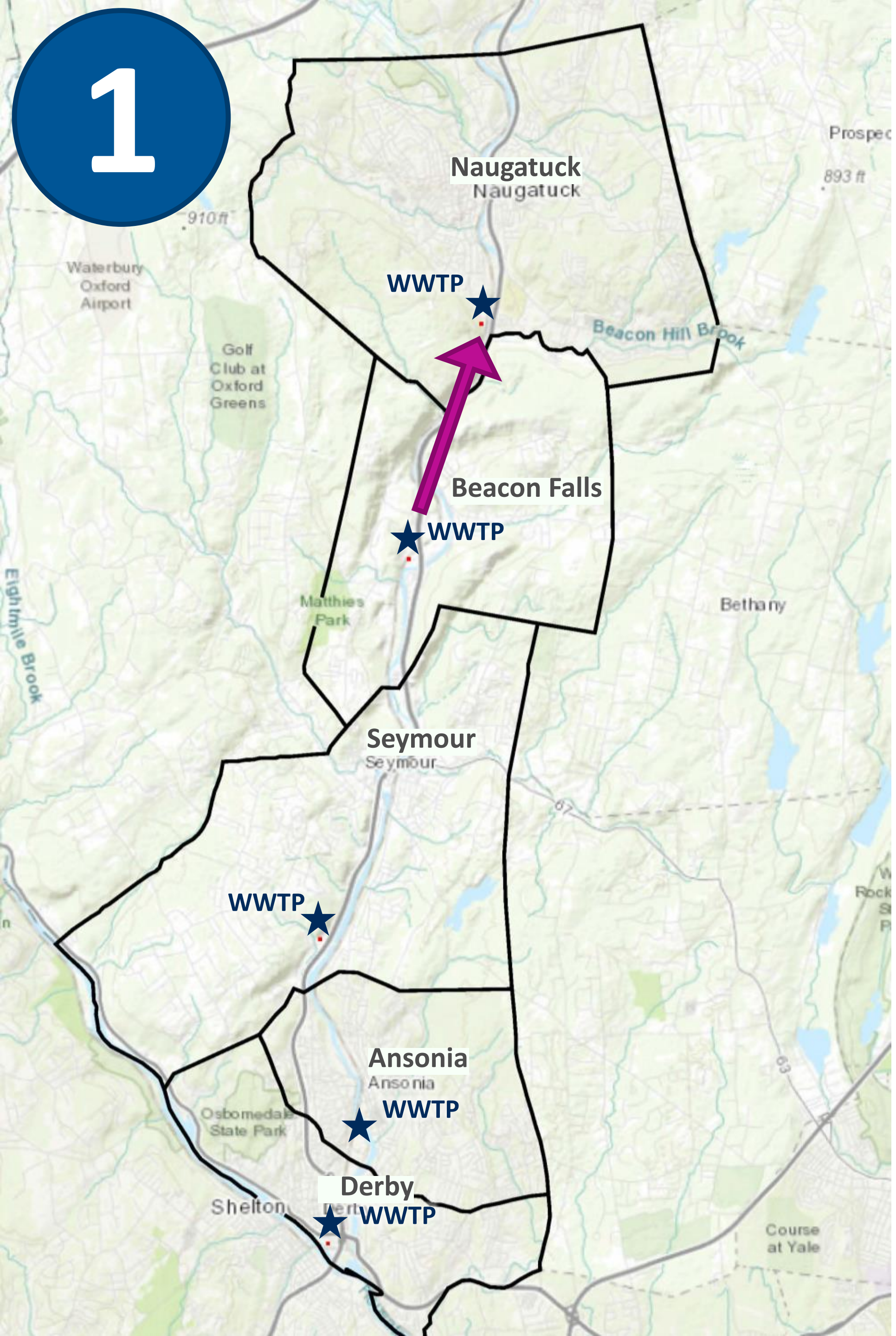


- Although pumping will be required, it is easier to pump it downhill
- Neighboring communities are easier to interconnect
- Phosphorus discharge requirements on Naugatuck River
- Derby does not have phosphorus discharge requirements (Housatonic River)

Identification of Alternatives

- Managing Peak Flows
- Aging Facilities
- Upstream to Downstream
- **Conveyance Corridors**

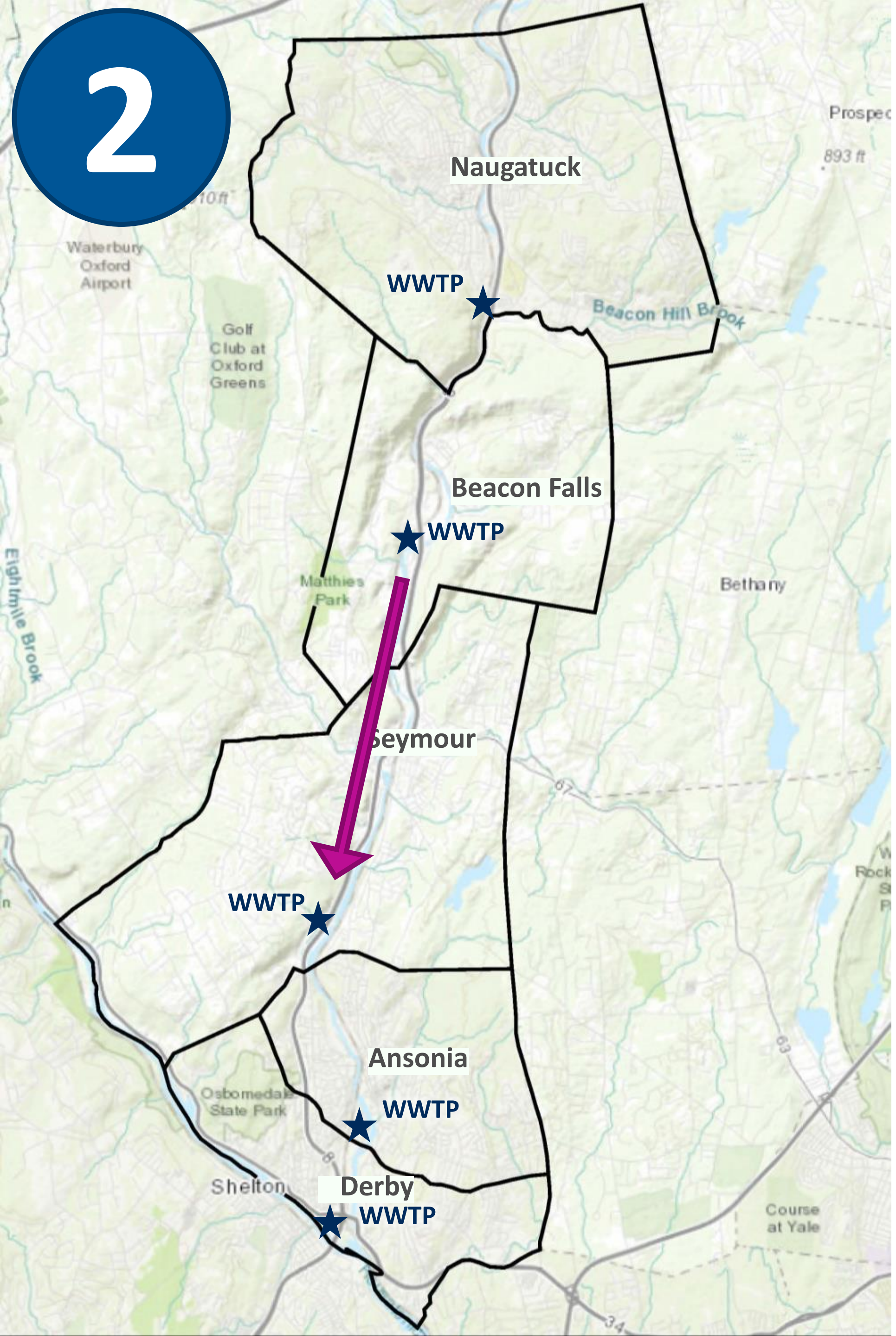
- Topography poses significant constraints in some alternatives
- Distance is relatively long in some alternatives
- Existing rights of way (railroad, Route 8) can be challenging
- Construction on town roads can be disruptive



Beacon Falls to Naugatuck

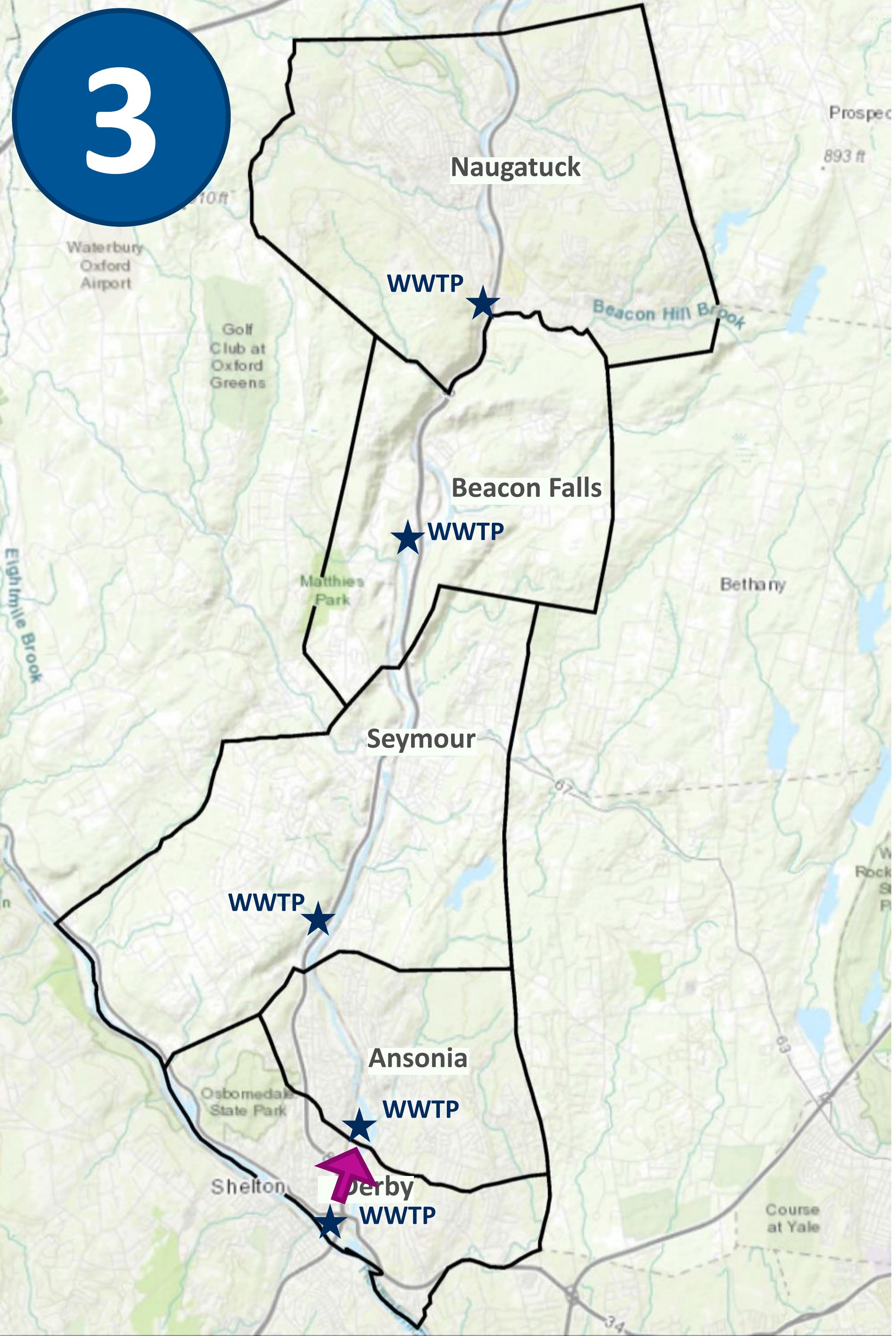
- Decommission Beacon Falls WPCF
- Convey flow to Naugatuck (adequate capacity)
- Conveyance route is challenging

2



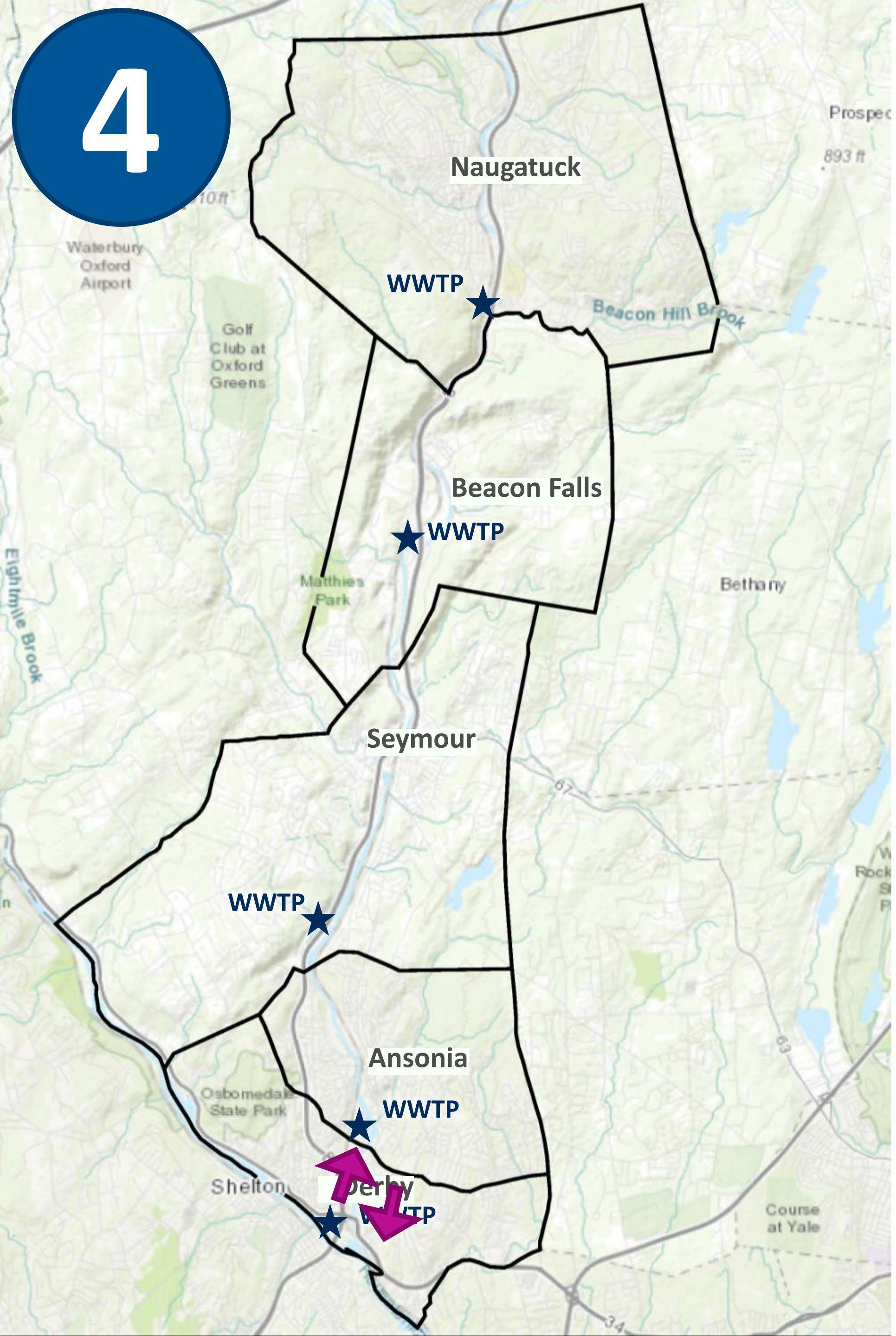
Beacon Falls to Seymour

- Decommission Beacon Falls WPCF
- Convey flow to Seymour
  - Peak flows are constraint
  - Plant capacity, I/I removal, and/or storage
- Conveyance route is challenging



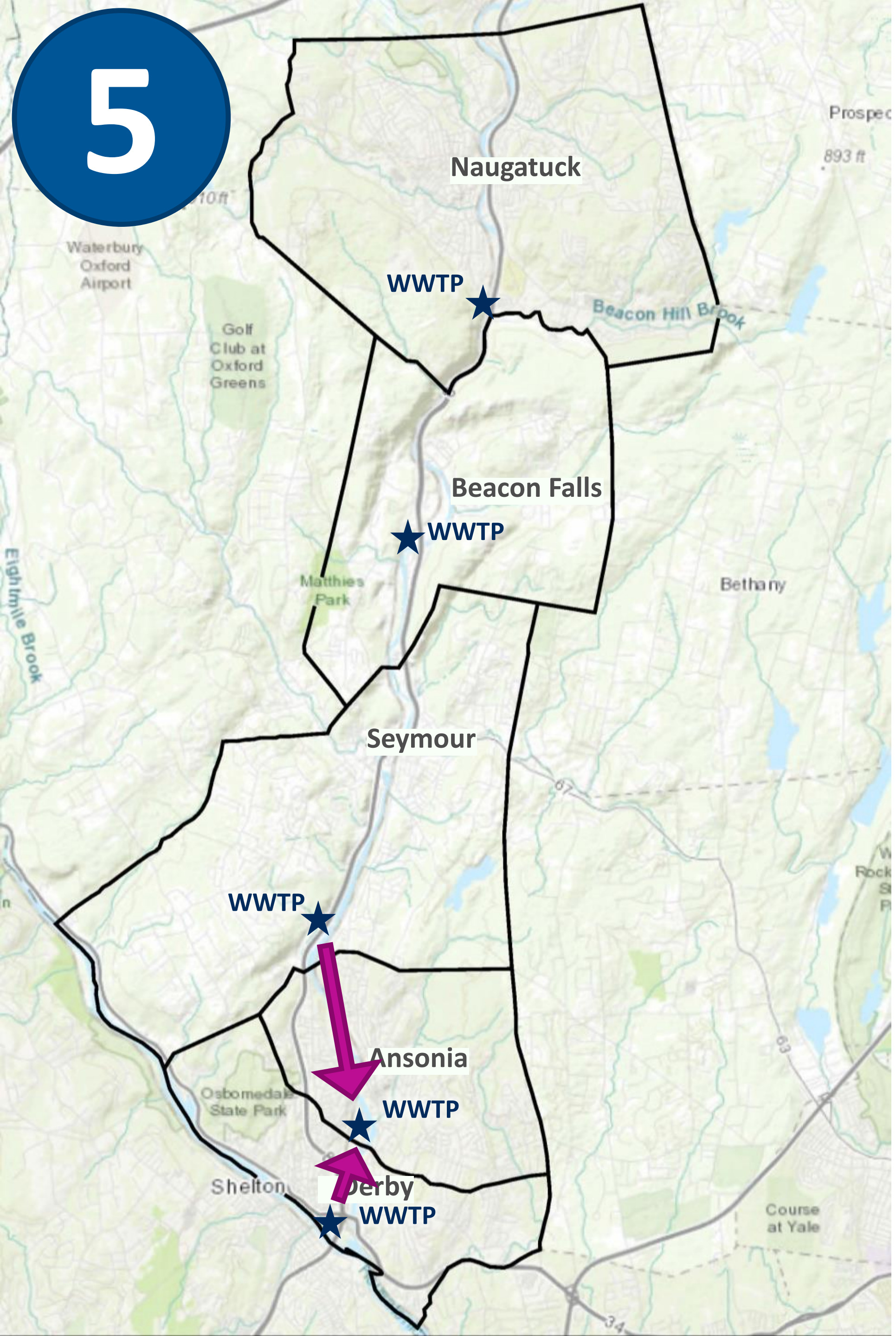
Derby to Ansonia

- Decommission Derby WPCF
- Convey flow to Ansonia
  - Peak flows are constraint
  - Plant capacity, I/I removal, and/or storage
- Phosphorus treatment required



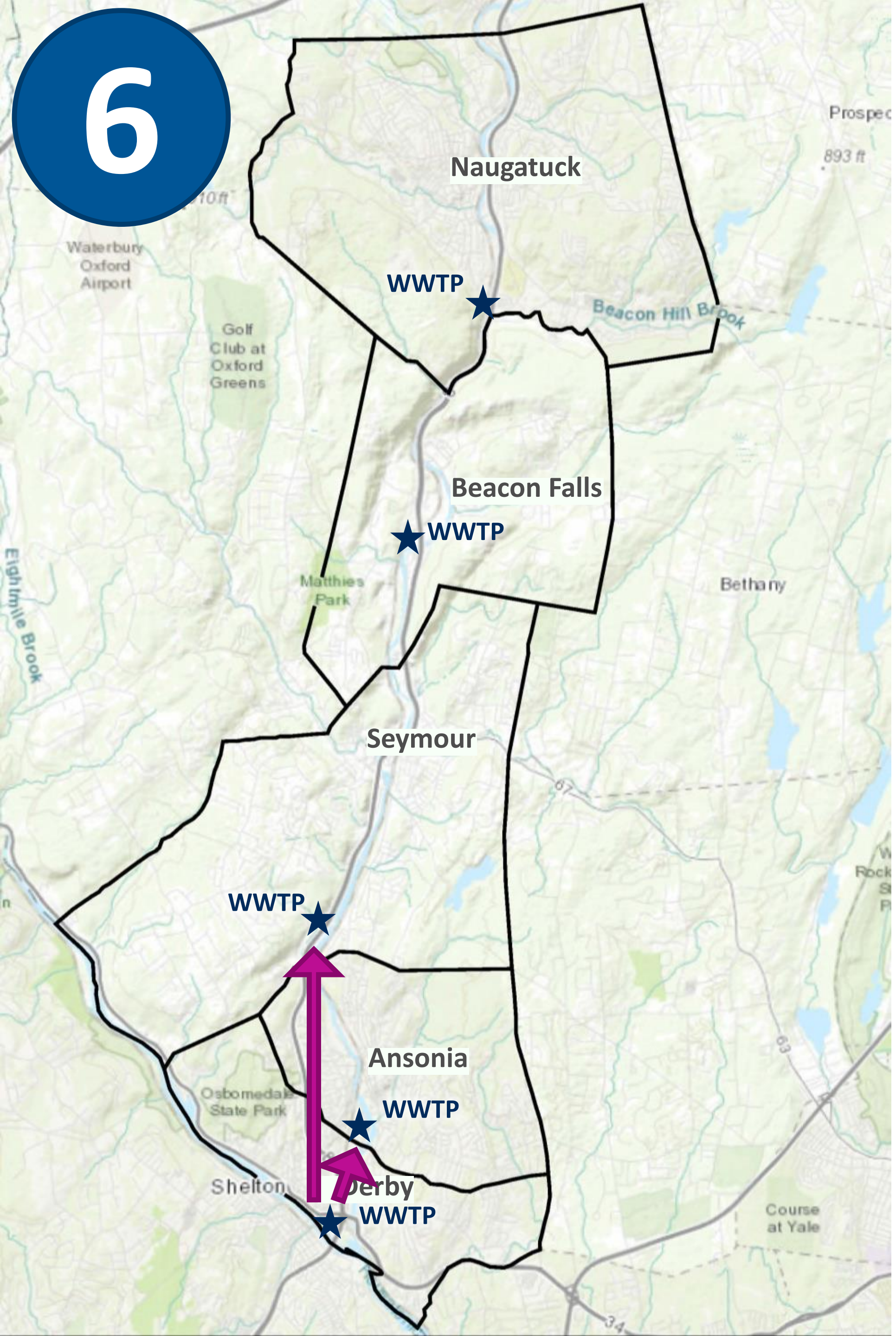
Derby to Ansonia Effluent Pumped to Housatonic

- Decommission Derby WPCF
- Convey flow to Ansonia
  - Peak flows are constraint
  - Plant capacity, I/I removal, and/or storage
- Additional conveyance costs to pump to Housatonic



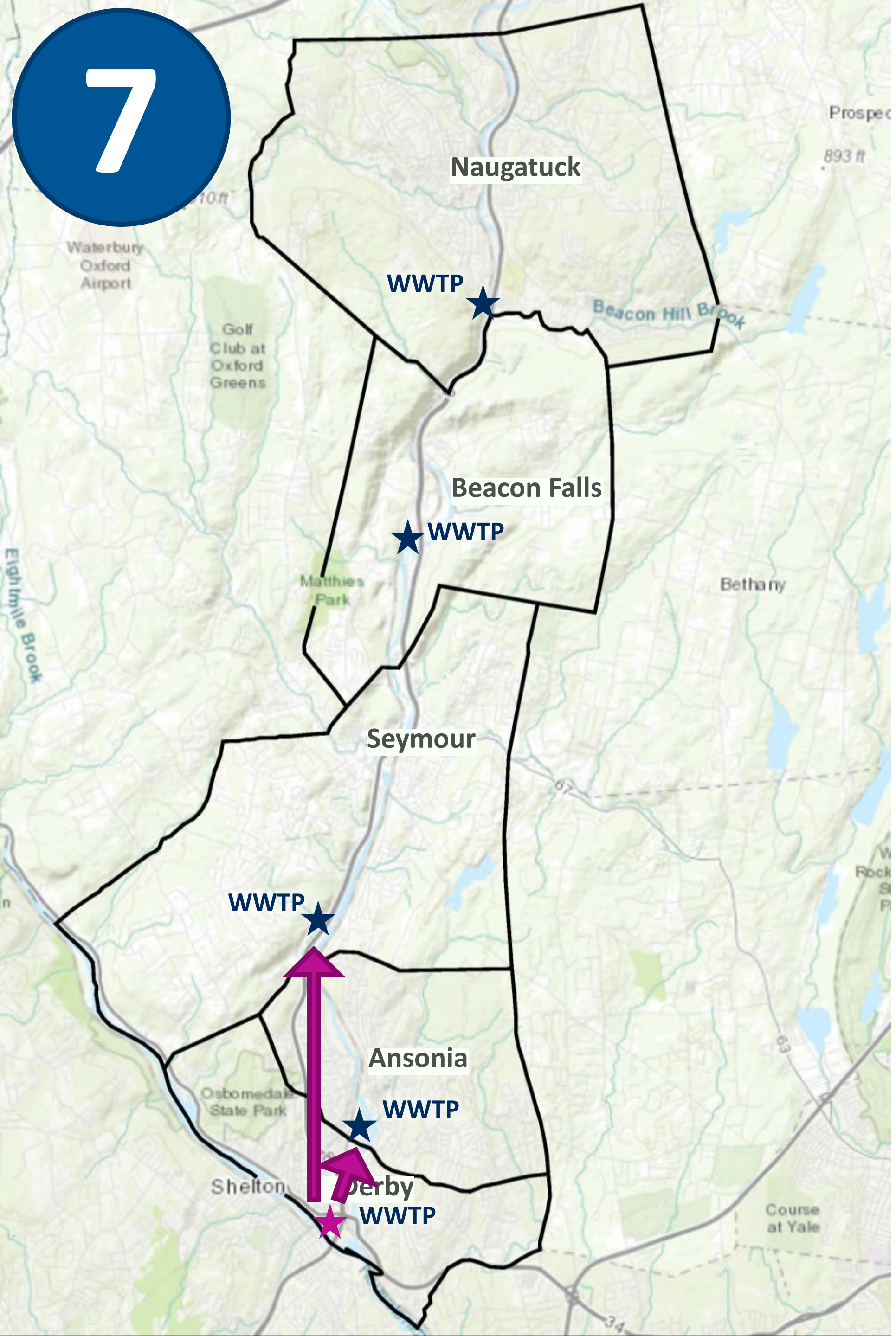
Derby and Seymour to Ansonia

- Decommission Derby and Seymour WPCFs
- Convey flow to Ansonia
  - Plant upgrade required
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Phosphorus treatment required



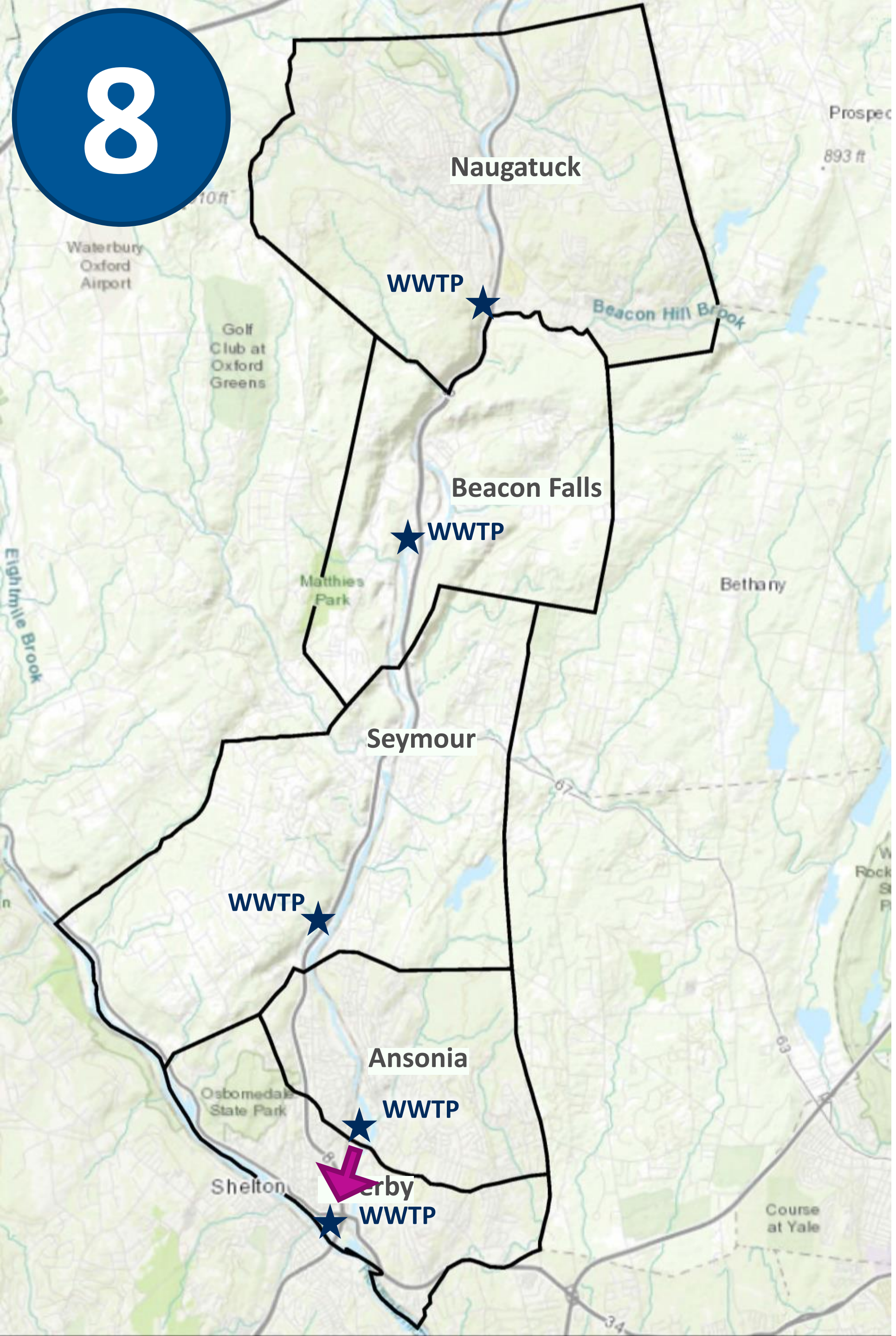
Derby to Seymour and Ansonia

- Decommission Derby WPCF
- Convey flow to Ansonia and Seymour
  - Smaller plant upgrades required
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Phosphorus treatment required



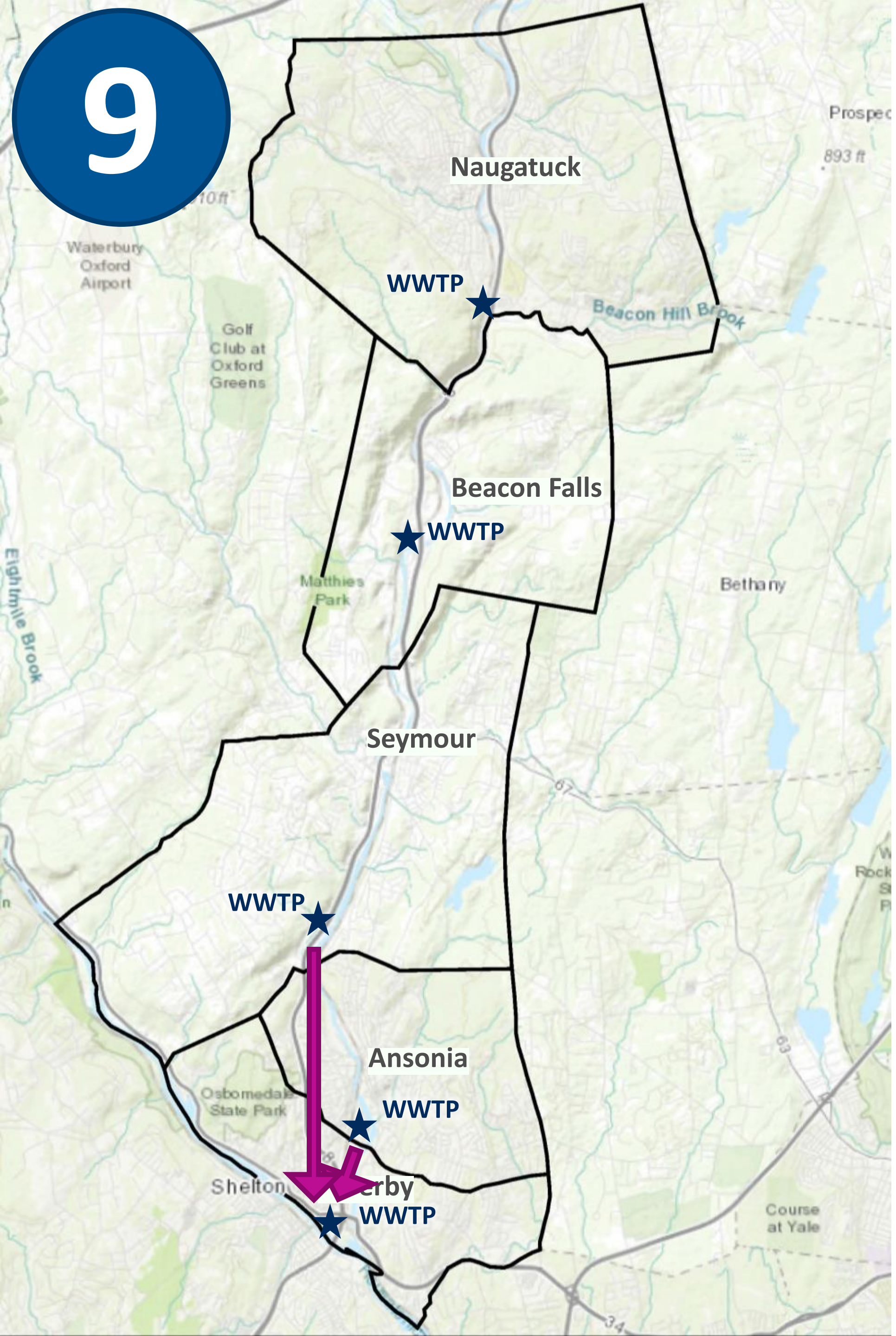
Derby to Seymour and Ansonia and Derby

- Maintain smaller plant at Derby
- Convey excess flow to Ansonia and Seymour
  - Smaller plant upgrades required
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Phosphorus treatment required for flow not treated in Derby



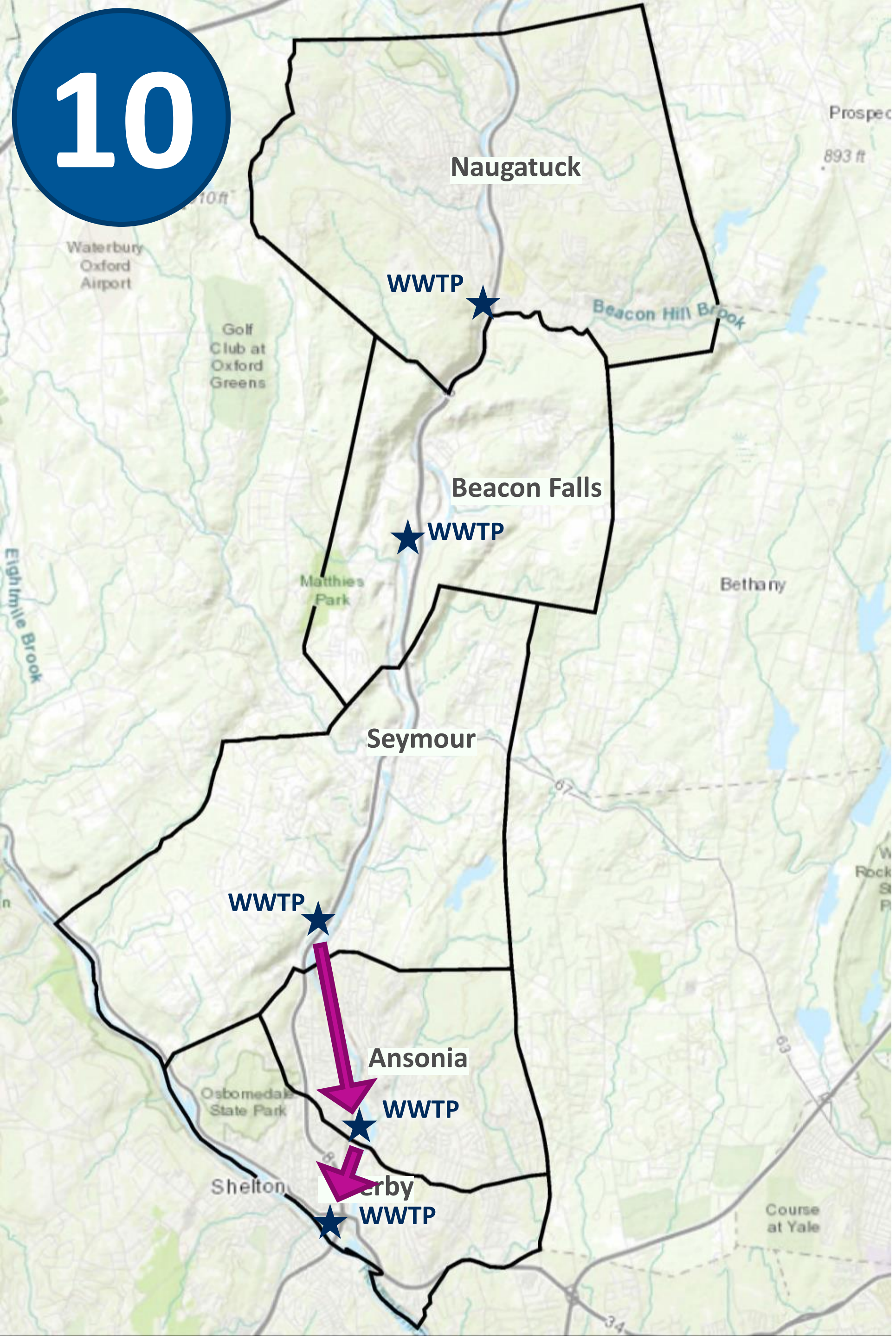
Ansonia to Derby

- Decommission Ansonia WPCF in future (rather than rehabilitating)
- Convey flow to Derby
  - Size Derby WPCF to accommodate future Ansonia flows
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Eliminates need for phosphorus treatment



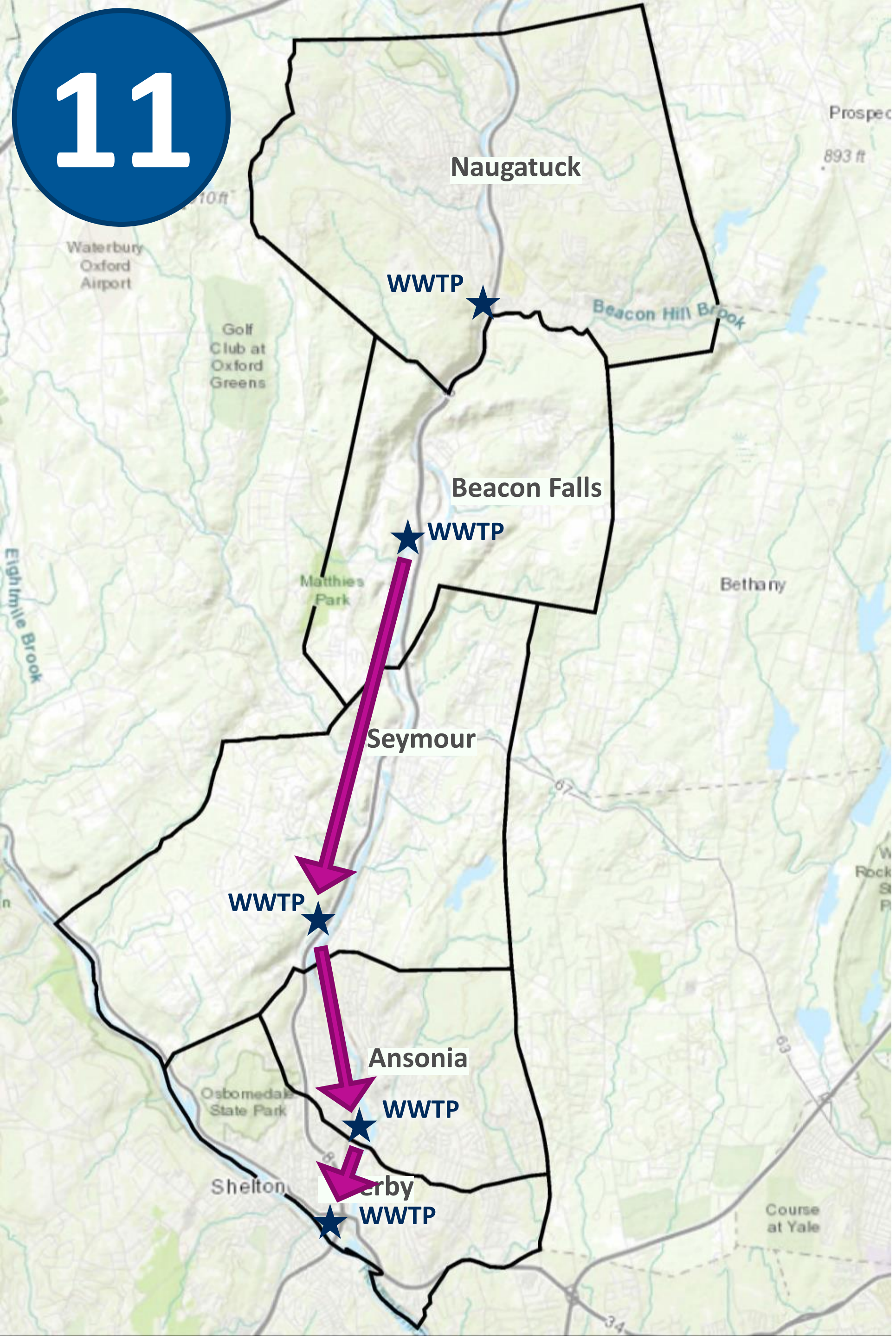
Seymour and Ansonia to Derby

- Decommission Ansonia WPCF in future (rather than rehabilitating)
- Decommission Seymour WPCF
- Convey flow to Derby
  - Size Derby WPCF to accommodate future Ansonia and Seymour flows
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Eliminates need for phosphorus treatment



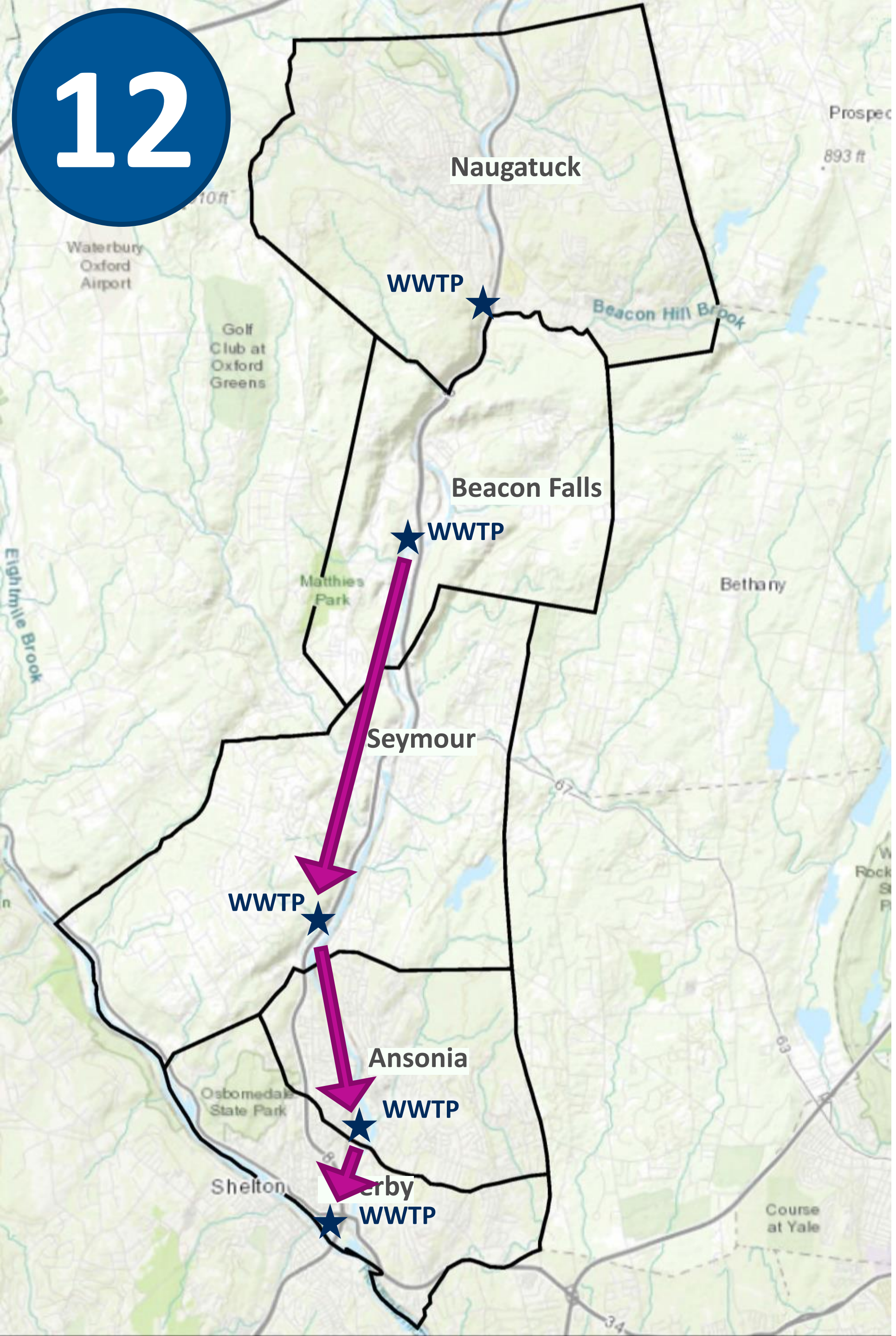
Seymour to Ansonia
Part of Ansonia to Derby

- Decommission Seymour WPCF
- Convey flow to Ansonia
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Decommission Ansonia Bartholomew PS
  - Convey flow to Derby
  - Size Derby WPCF to accommodate flows
- Phosphorus treatment not required for flows to Derby



Beacon Falls and Seymour to Ansonia Part of Ansonia to Derby

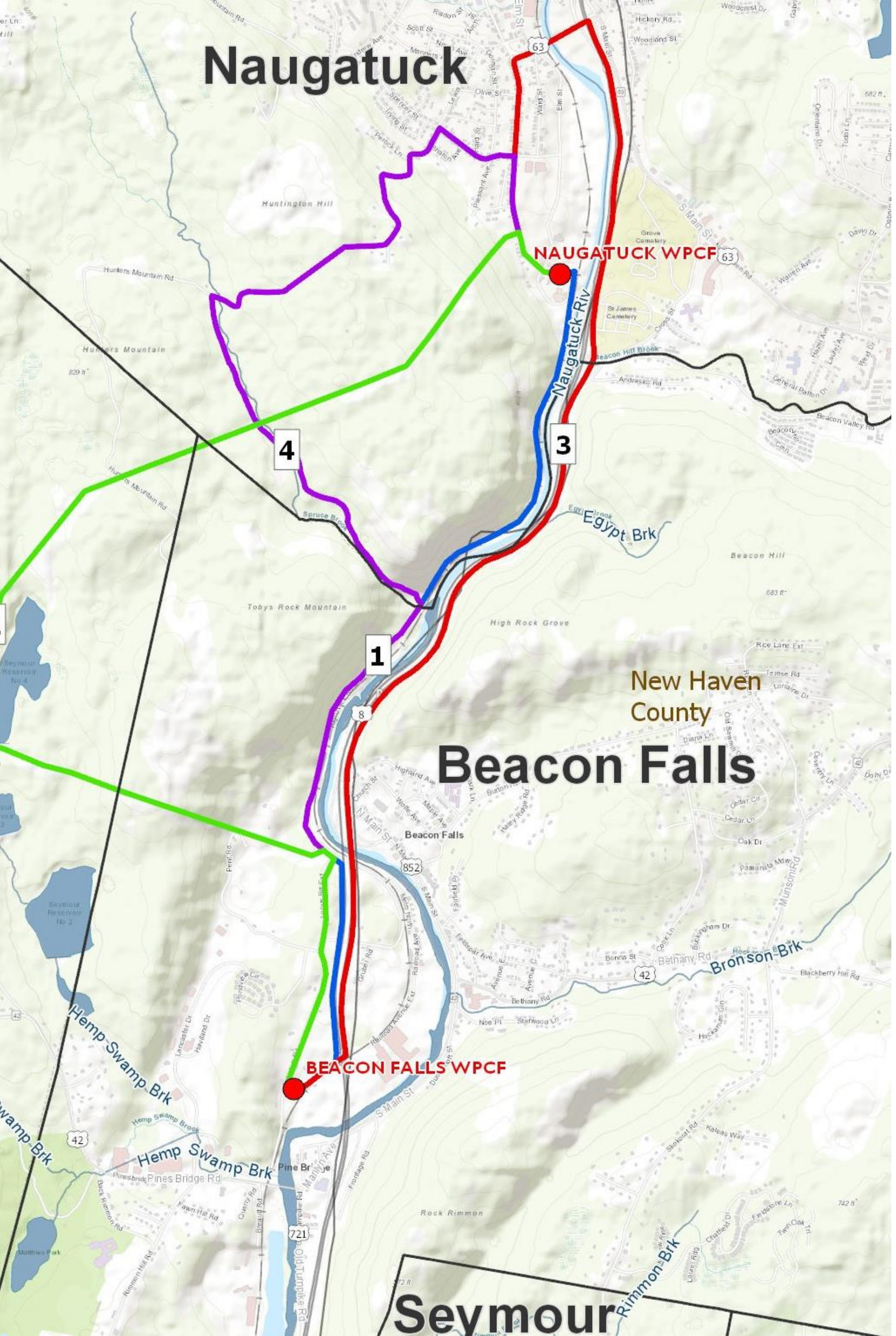
- Decommission Beacon Falls and Seymour WPCFs
- Convey flow to Ansonia
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
- Decommission Ansonia Bartholomew PS
  - Convey flow to Derby
  - Size Derby WPCF to accommodate flows
- Phosphorus treatment not required for flows to Derby



Beacon Falls, Seymour, and Ansonia to Derby

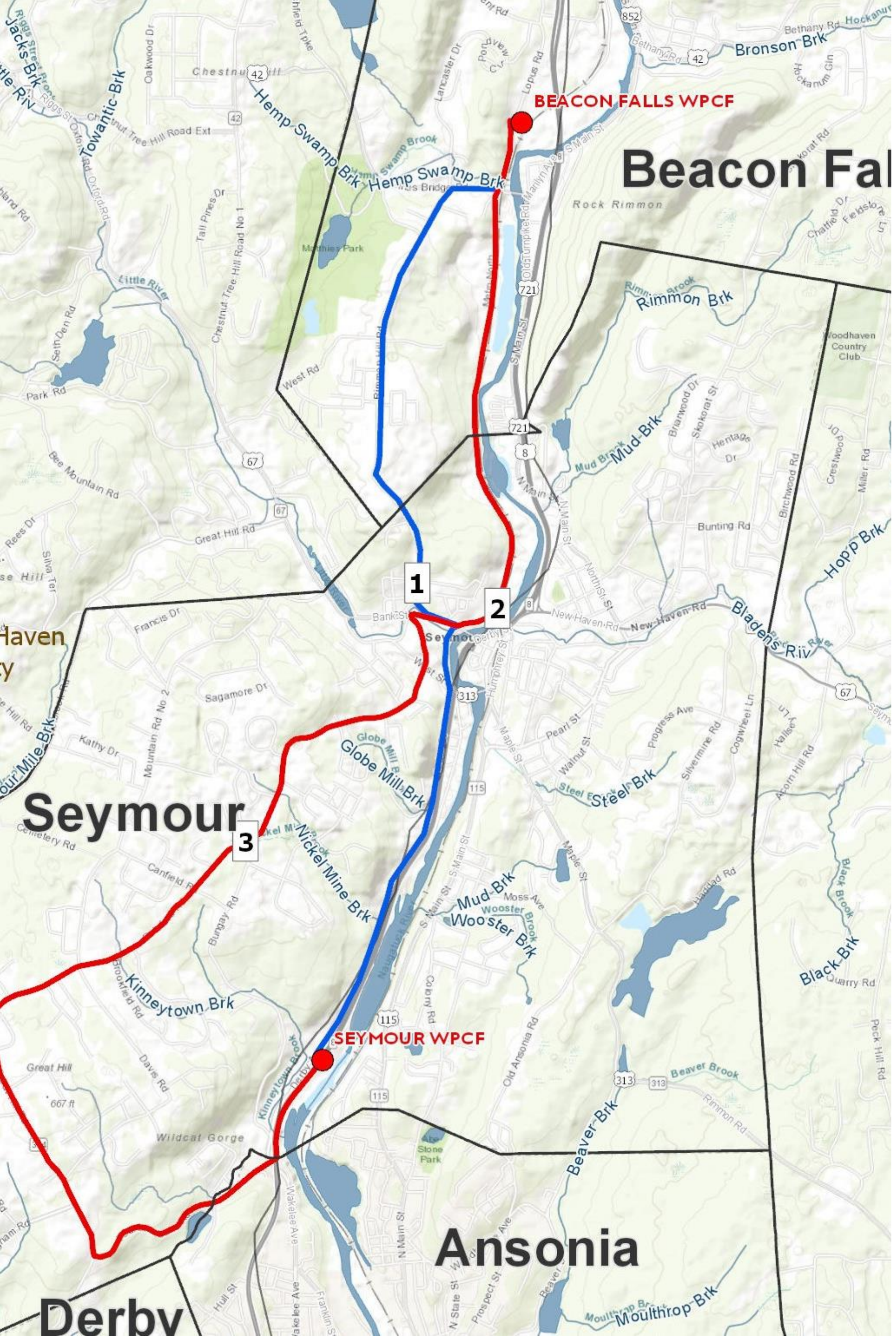
- Decommission Beacon Falls and Seymour WPCFs
- Decommission Ansonia WPCF in future (rather than rehabilitating)
- Convey flow to Derby
  - Peak flow management needed
  - Plant capacity, I/I removal, and/or storage
  - Size Derby WPCF to accommodate flows
- Eliminates need for phosphorus treatment

Conveyance Routes



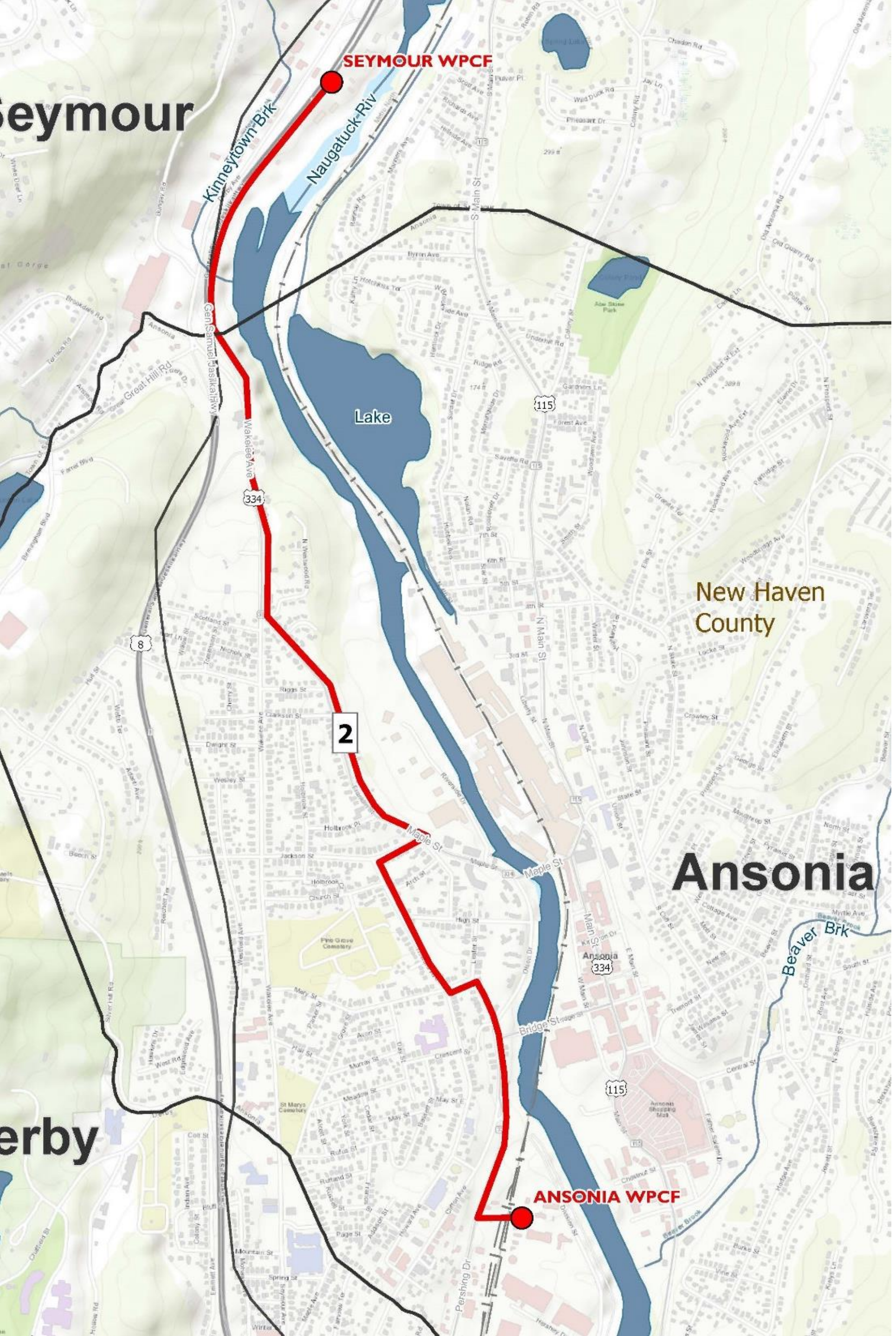
Beacon Falls to Naugatuck

- Railroad ROW is most direct path
- Route 8 ROW is less direct, but still provides more favorable topography
- Other routes require going over or around Toby's Rock Mountain
- Length: Approx. 3.5 to 5.5 miles



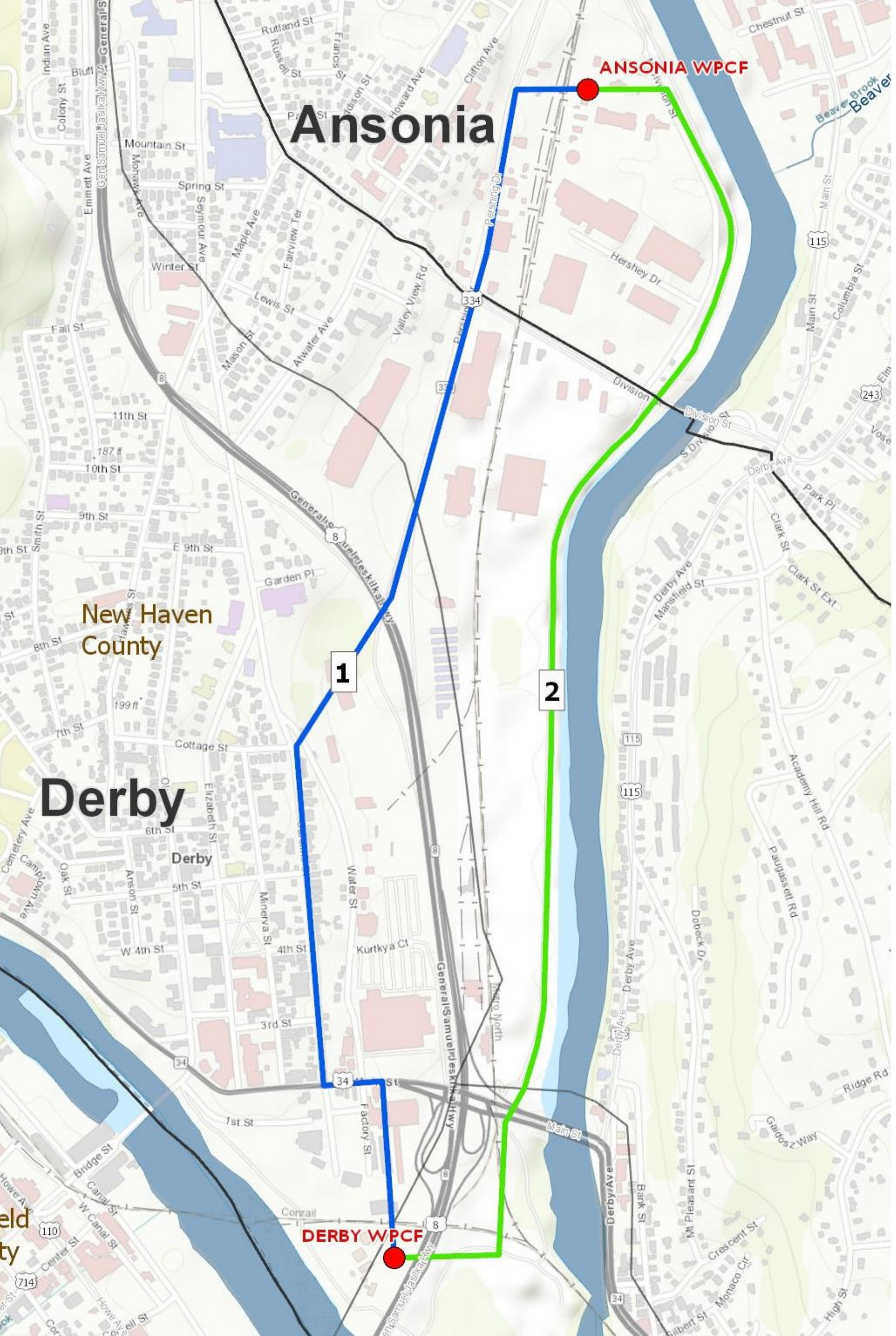
Beacon Falls to Seymour

- Railroad ROW is most direct option
- Route 8 ROW is less direct alternative
- Avoiding existing ROW adds significant length and elevation
- Length: Approx. 5 to 9 miles



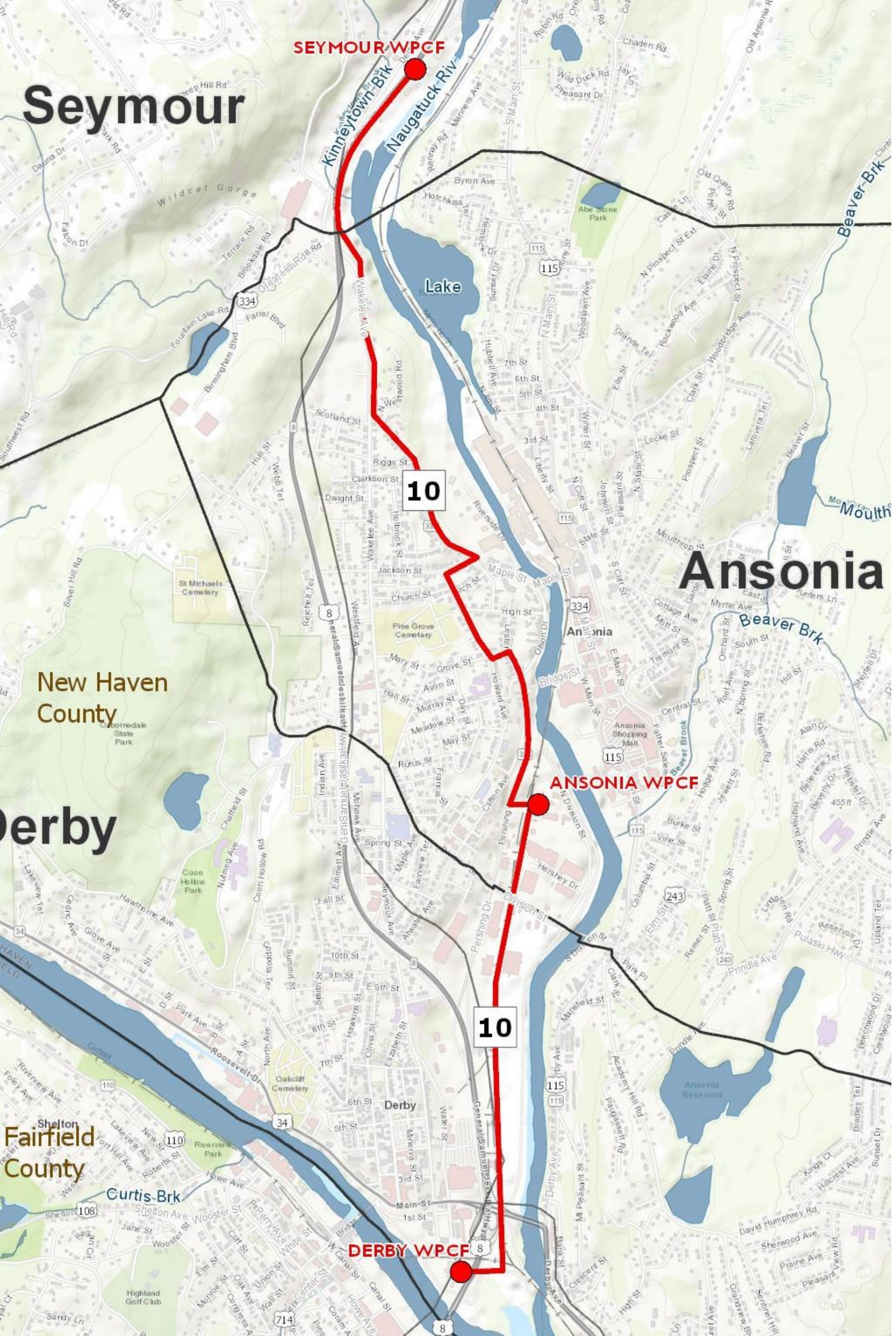
Seymour to/from Ansonia

- **Multiple town roads available for alternative alignments**
- **Elevation constraints less significant**
- **Length: Approx. 2.5 to 3 miles**



Ansonia to/from Derby

- Routes have been previously investigated
- Multiple routes are available
  - Pershing Street and town roads
  - Along Naugatuck River
- Length: Approx. 1.5 to 2 miles



Seymour to/from Derby

- Likely most desirable to pass through Ansonia WPCF for flexibility
- Similar routing options to individual segments Seymour → Ansonia → Derby
- Length: Approx. 4 to 5 miles

Rough Screening of Alternatives

Screening Criteria – Rough Screening of Alternatives

WPCF Site Constraints

- Adequate space at the WPCF site
- Ease or difficulty of implementing changes at the plant

Other Constraints

- Complexity in operation and maintenance
- Environmental restrictions
- Regulatory and permitting requirements
- Community benefits

Cost and Difficulty of Implementation

- Implementation schedule
- Capital and O&M costs, and overall life cycle cost
- Topographic or right-of-way constraints in interconnecting communities

Rough Screening of Alternatives

- Space/ Constraints
  - Most plants will have constraints to be overcome for expansion
  - Naugatuck can handle Beacon Falls without expansion
  - Seymour can handle Beacon Falls if peak flow conditions are controlled

Alt No.	Abbreviated Description	Space/ Constraint
1	BF→N	🟢
2	BF→S	🟡
2a	BF→S, I/I	🟢
3	D→A	🟡
3a	D→A, I/I	🟡
4	D→A→H	🟡
4a	D→A→ H, I/I	🟡
5	D&S→A	🟡
5a	D&S→A, I/I	🟡
5b	D&S→A→H	🟡
5c	D&S→A→H, I/I	🟡
6	D→S, D→A	🟡
6a	D→S, D→A, I/I	🟡
7	D→S, D→A, D→D	🟡
7a	D→S, D→A, D→D, I/I	🟡
8	A→D	🟡
8a	A→D, I/I	🟡
9	S&A→D	🟡
9a	S&A→D, I/I	🟡
10	S→A, A→D	🟡
10a	S→A, A→D, I/I	🟡
11	BF,S→A, A→D	🟡
11a	BF,S→A, A→D, I/I	🟡
12	BF,S,A→D	🟡
12a	BF,S,A→D, I/I	🟡

Rough Screening of Alternatives

- Existing Facilities
  - Naugatuck and Seymour may be able to receive flow from Beacon Falls
  - Alternative 7 does not provide any benefit regarding facilities
  - All other alternatives require upgrades to existing facilities

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities
1	BF→N	🟢	🟢
2	BF→S	🟡	🟡
2a	BF→S, I/I	🟢	🟢
3	D→A	🟡	🟡
3a	D→A, I/I	🟡	🟡
4	D→A→H	🟡	🟡
4a	D→A→ H, I/I	🟡	🟡
5	D&S→A	🟡	🟡
5a	D&S→A, I/I	🟡	🟡
5b	D&S→A→H	🟡	🟡
5c	D&S→A→H, I/I	🟡	🟡
6	D→S, D→A	🟡	🟡
6a	D→S, D→A, I/I	🟡	🟡
7	D→S, D→A, D→D	🟡	🔴
7a	D→S, D→A, D→D, I/I	🟡	🔴
8	A→D	🟡	🟡
8a	A→D, I/I	🟡	🟡
9	S&A→D	🟡	🟡
9a	S&A→D, I/I	🟡	🟡
10	S→A, A→D	🟡	🟡
10a	S→A, A→D, I/I	🟡	🟡
11	BF,S→A, A→D	🟡	🟡
11a	BF,S→A, A→D, I/I	🟡	🟡
12	BF,S,A→D	🟡	🟡
12a	BF,S,A→D, I/I	🟡	🟡

Rough Screening of Alternatives

- Operations & Maintenance
  - Consolidating plants will generally reduce O&M needs, but pumping needs must be considered
  - Differences in O&M will require more detailed assessment in Phase 2

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities	O&M
1	BF→N	🟢	🟢	🟢
2	BF→S	🟡	🟡	🟢
2a	BF→S, I/I	🟢	🟢	🟢
3	D→A	🟡	🟡	🟢
3a	D→A, I/I	🟡	🟡	🟢
4	D→A→H	🟡	🟡	🟢
4a	D→A→ H, I/I	🟡	🟡	🟢
5	D&S→A	🟡	🟡	🟢
5a	D&S→A, I/I	🟡	🟡	🟢
5b	D&S→A→H	🟡	🟡	🟢
5c	D&S→A→H, I/I	🟡	🟡	🟢
6	D→S, D→A	🟡	🟡	🟢
6a	D→S, D→A, I/I	🟡	🟡	🟢
7	D→S, D→A, D→D	🟡	🔴	🟢
7a	D→S, D→A, D→D, I/I	🟡	🔴	🟢
8	A→D	🟡	🟡	🟢
8a	A→D, I/I	🟡	🟡	🟢
9	S&A→D	🟡	🟡	🟢
9a	S&A→D, I/I	🟡	🟡	🟢
10	S→A, A→D	🟡	🟡	🟢
10a	S→A, A→D, I/I	🟡	🟡	🟢
11	BF,S→A, A→D	🟡	🟡	🟢
11a	BF,S→A, A→D, I/I	🟡	🟡	🟢
12	BF,S,A→D	🟡	🟡	🟢
12a	BF,S,A→D, I/I	🟡	🟡	🟢

Rough Screening of Alternatives

- **Schedule**
  - **All alternatives have significant schedule constraints due to immediate improvement needs**
  - **Alternative 7 poses additional schedule constraints**

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities	O&M	Schedule
1	BF→N	🟢	🟢	🟢	🟡
2	BF→S	🟡	🟡	🟢	🟡
2a	BF→S, I/I	🟢	🟢	🟢	🟡
3	D→A	🟡	🟡	🟢	🟡
3a	D→A, I/I	🟡	🟡	🟢	🟡
4	D→A→H	🟡	🟡	🟢	🟡
4a	D→A→ H, I/I	🟡	🟡	🟢	🟡
5	D&S→A	🟡	🟡	🟢	🟡
5a	D&S→A, I/I	🟡	🟡	🟢	🟡
5b	D&S→A→H	🟡	🟡	🟢	🟡
5c	D&S→A→H, I/I	🟡	🟡	🟢	🟡
6	D→S, D→A	🟡	🟡	🟢	🟡
6a	D→S, D→A, I/I	🟡	🟡	🟢	🟡
7	D→S, D→A, D→D	🟡	🔴	🟢	🔴
7a	D→S, D→A, D→D, I/I	🟡	🔴	🟢	🔴
8	A→D	🟡	🟡	🟢	🟡
8a	A→D, I/I	🟡	🟡	🟢	🟡
9	S&A→D	🟡	🟡	🟢	🟡
9a	S&A→D, I/I	🟡	🟡	🟢	🟡
10	S→A, A→D	🟡	🟡	🟢	🟡
10a	S→A, A→D, I/I	🟡	🟡	🟢	🟡
11	BF,S→A, A→D	🟡	🟡	🟢	🟡
11a	BF,S→A, A→D, I/I	🟡	🟡	🟢	🟡
12	BF,S,A→D	🟡	🟡	🟢	🟡
12a	BF,S,A→D, I/I	🟡	🟡	🟢	🟡

Rough Screening of Alternatives

- Environmental
  - Consolidating plants eliminates outfalls
  - Further evaluation required in Phase 2

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities	O&M	Schedule	Env
1	BF→N	🟢	🟢	🟢	🟡	🟢
2	BF→S	🟡	🟡	🟢	🟡	🟢
2a	BF→S, I/I	🟢	🟢	🟢	🟡	🟢
3	D→A	🟡	🟡	🟢	🟡	🟢
3a	D→A, I/I	🟡	🟡	🟢	🟡	🟢
4	D→A→H	🟡	🟡	🟢	🟡	🟢
4a	D→A→ H, I/I	🟡	🟡	🟢	🟡	🟢
5	D&S→A	🟡	🟡	🟢	🟡	🟢
5a	D&S→A, I/I	🟡	🟡	🟢	🟡	🟢
5b	D&S→A→H	🟡	🟡	🟢	🟡	🟢
5c	D&S→A→H, I/I	🟡	🟡	🟢	🟡	🟢
6	D→S, D→A	🟡	🟡	🟢	🟡	🟢
6a	D→S, D→A, I/I	🟡	🟡	🟢	🟡	🟢
7	D→S, D→A, D→D	🟡	🔴	🟢	🔴	🟢
7a	D→S, D→A, D→D, I/I	🟡	🔴	🟢	🔴	🟢
8	A→D	🟡	🟡	🟢	🟡	🟢
8a	A→D, I/I	🟡	🟡	🟢	🟡	🟢
9	S&A→D	🟡	🟡	🟢	🟡	🟢
9a	S&A→D, I/I	🟡	🟡	🟢	🟡	🟢
10	S→A, A→D	🟡	🟡	🟢	🟡	🟢
10a	S→A, A→D, I/I	🟡	🟡	🟢	🟡	🟢
11	BF,S→A, A→D	🟡	🟡	🟢	🟡	🟢
11a	BF,S→A, A→D, I/I	🟡	🟡	🟢	🟡	🟢
12	BF,S,A→D	🟡	🟡	🟢	🟡	🟢
12a	BF,S,A→D, I/I	🟡	🟡	🟢	🟡	🟢

Rough Screening of Alternatives

- Regulatory
  - Consolidating plants eliminates outfalls
  - Further evaluation required in Phase 2

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities	O&M	Schedule	Env	Reg
1	BF→N	🟢	🟢	🟢	🟡	🟢	🟢
2	BF→S	🟡	🟡	🟢	🟡	🟢	🟢
2a	BF→S, I/I	🟢	🟢	🟢	🟡	🟢	🟢
3	D→A	🟡	🟡	🟢	🟡	🟢	🟢
3a	D→A, I/I	🟡	🟡	🟢	🟡	🟢	🟢
4	D→A→H	🟡	🟡	🟢	🟡	🟢	🟢
4a	D→A→ H, I/I	🟡	🟡	🟢	🟡	🟢	🟢
5	D&S→A	🟡	🟡	🟢	🟡	🟢	🟢
5a	D&S→A, I/I	🟡	🟡	🟢	🟡	🟢	🟢
5b	D&S→A→H	🟡	🟡	🟢	🟡	🟢	🟢
5c	D&S→A→H, I/I	🟡	🟡	🟢	🟡	🟢	🟢
6	D→S, D→A	🟡	🟡	🟢	🟡	🟢	🟢
6a	D→S, D→A, I/I	🟡	🟡	🟢	🟡	🟢	🟢
7	D→S, D→A, D→D	🟡	🔴	🟢	🔴	🟢	🟢
7a	D→S, D→A, D→D, I/I	🟡	🔴	🟢	🔴	🟢	🟢
8	A→D	🟡	🟡	🟢	🟡	🟢	🟢
8a	A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢
9	S&A→D	🟡	🟡	🟢	🟡	🟢	🟢
9a	S&A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢
10	S→A, A→D	🟡	🟡	🟢	🟡	🟢	🟢
10a	S→A, A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢
11	BF,S→A, A→D	🟡	🟡	🟢	🟡	🟢	🟢
11a	BF,S→A, A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢
12	BF,S,A→D	🟡	🟡	🟢	🟡	🟢	🟢
12a	BF,S,A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢

Rough Screening of Alternatives

- Benefits
  - Most alternatives provide benefits of consolidating treatment facilities
  - Some alternatives conveying to Ansonia are less beneficial because of necessary upgrades to a relatively new plant

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities	O&M	Schedule	Env	Reg	Benefits
1	BF→N	Green	Green	Green	Yellow	Green	Green	Green
2	BF→S	Yellow	Yellow	Green	Yellow	Green	Green	Green
2a	BF→S, I/I	Green	Green	Green	Yellow	Green	Green	Green
3	D→A	Yellow	Yellow	Green	Yellow	Green	Green	Green
3a	D→A, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
4	D→A→H	Yellow	Yellow	Green	Yellow	Green	Green	Green
4a	D→A→ H, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
5	D&S→A	Yellow	Yellow	Green	Yellow	Green	Green	Green
5a	D&S→A, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
5b	D&S→A→H	Yellow	Yellow	Green	Yellow	Green	Green	Green
5c	D&S→A→H, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
6	D→S, D→A	Yellow	Yellow	Green	Yellow	Green	Green	Green
6a	D→S, D→A, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
7	D→S, D→A, D→D	Yellow	Red	Green	Red	Green	Green	Red
7a	D→S, D→A, D→D, I/I	Yellow	Red	Green	Red	Green	Green	Red
8	A→D	Yellow	Yellow	Green	Yellow	Green	Green	Green
8a	A→D, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
9	S&A→D	Yellow	Yellow	Green	Yellow	Green	Green	Green
9a	S&A→D, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
10	S→A, A→D	Yellow	Yellow	Green	Yellow	Green	Green	Green
10a	S→A, A→D, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
11	BF,S→A, A→D	Yellow	Yellow	Green	Yellow	Green	Green	Green
11a	BF,S→A, A→D, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green
12	BF,S,A→D	Yellow	Yellow	Green	Yellow	Green	Green	Green
12a	BF,S,A→D, I/I	Yellow	Yellow	Green	Yellow	Green	Green	Green

Rough Screening of Alternatives

- Relative Cost
  - Alternative 7 is clearly not favorable
  - Further evaluation required in Phase 2

Alt No.	Abbreviated Description	Space/ Constraint	Existing Facilities	O&M	Schedule	Env	Reg	Benefits	Relative Cost
1	BF→N	🟢	🟢	🟢	🟡	🟢	🟢	🟢	🟡
2	BF→S	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
2a	BF→S, I/I	🟢	🟢	🟢	🟡	🟢	🟢	🟢	🟡
3	D→A	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
3a	D→A, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
4	D→A→H	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
4a	D→A→ H, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
5	D&S→A	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
5a	D&S→A, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
5b	D&S→A→H	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
5c	D&S→A→H, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
6	D→S, D→A	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
6a	D→S, D→A, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
7	D→S, D→A, D→D	🟡	🔴	🟢	🔴	🟢	🟢	🔴	🔴
7a	D→S, D→A, D→D, I/I	🟡	🔴	🟢	🔴	🟢	🟢	🔴	🔴
8	A→D	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
8a	A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
9	S&A→D	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
9a	S&A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
10	S→A, A→D	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
10a	S→A, A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
11	BF,S→A, A→D	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
11a	BF,S→A, A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
12	BF,S,A→D	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡
12a	BF,S,A→D, I/I	🟡	🟡	🟢	🟡	🟢	🟢	🟢	🟡

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