



The Experience to Listen.
The Power to Solve.



Regional Biosolids Approach at a Western NY WPCF

North East Residuals & Biosolids Conference
November 2, 2022 9:00 AM

Presenters

Agenda

- I. Project Need
- II. Food Waste Study
- III. Project Development and Design
- IV. Economics

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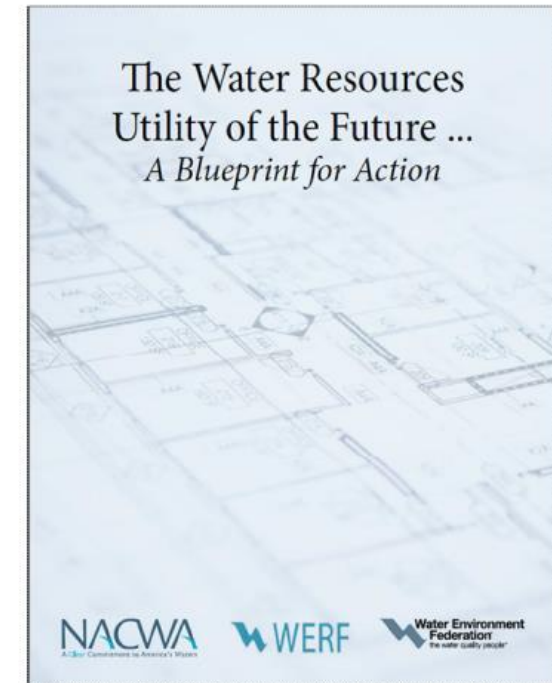
The Town of Webster, New York





We've heard this before:

- **Wastewater Pollution Control Facility Traditional Mindset:** "...simply collect, treat, and dispose of municipal and industrial wastewater."
- **Water Resource Recovery Facility Mindset:** "...all inputs are valuable resources....as such, the objective is to separate, extract, reuse, or convert valuable water, energy, and commodities from wastewater while using utility assets in innovative **ways to reduce costs, increase revenue, and strengthen the local economy.**"

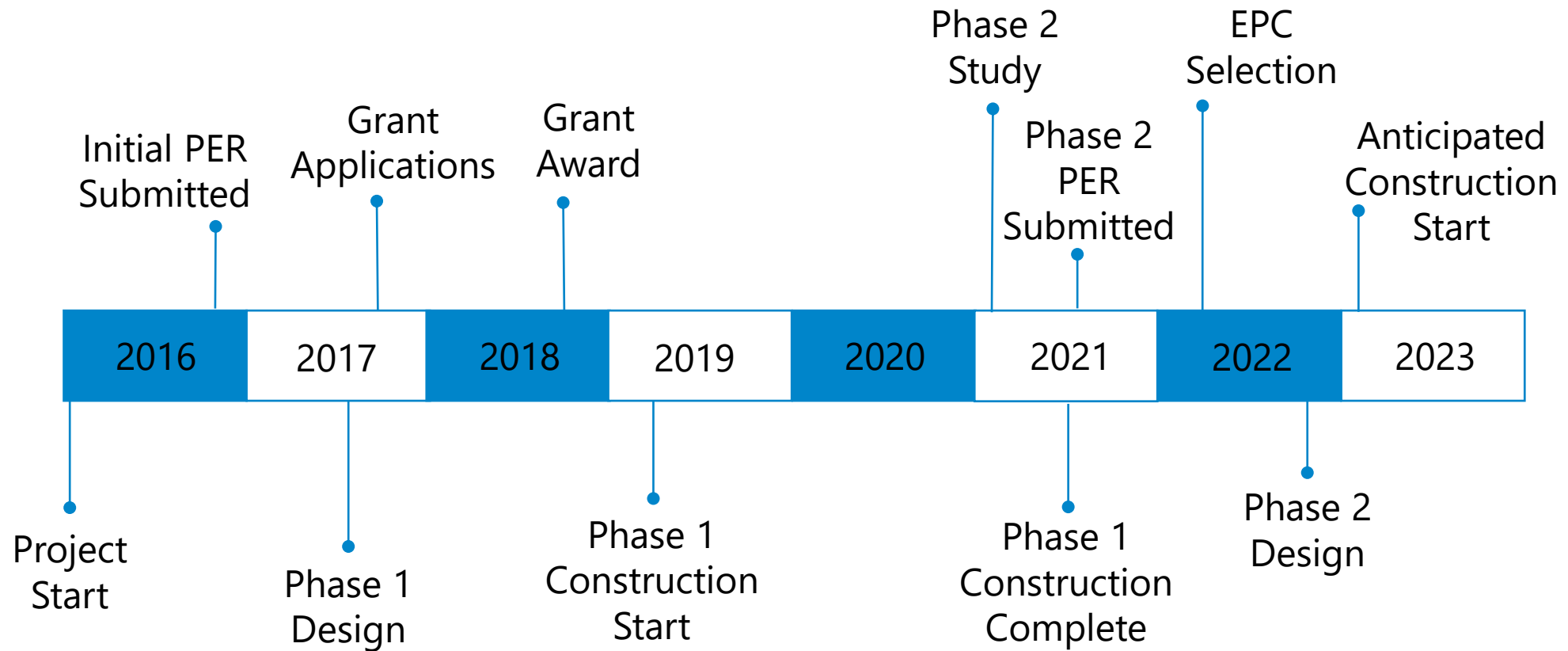


- **A NEW WAY OF THINKING!**
- **A NEW WAY OF DOING BUSINESS!**
- **LOOKING AT TODAY AND THE FUTURE!**

The Need for the Project

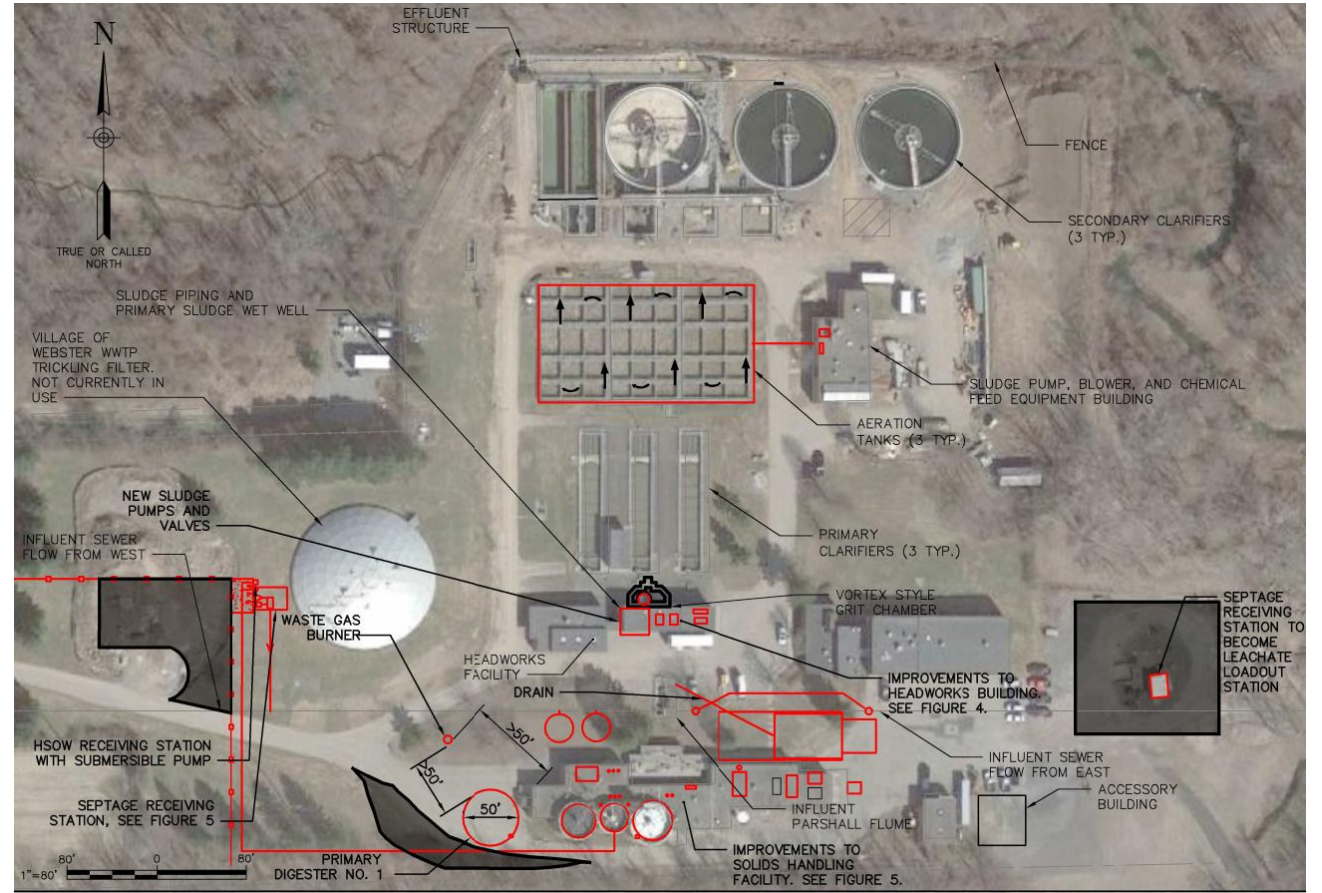
- Outdated & Non-Operable equipment → Code compliance → Operator Safety
- Regulatory compliance
- Increasing tipping fees and imminent landfill closures
- Process & Energy optimization
- 20-year planning period.....capacity for growth

Project Timeline



Summary of Preliminary Report

	July 2021 PER Estimate
Headworks	\$ 1,160,000
Primary Clarifiers	\$ 450,000
Aeration System	\$ 1,870,000
Liquid Receiving	\$ 1,490,000
Solids Handling	\$ 6,320,000
Sludge Dryer	\$ 7,110,000
Facilities	\$ 3,310,000
Site/Civil/Storm Improvements	\$ 590,000
Subtotal	\$ 22,300,000
Contingency	\$ 4,020,000
General Conditions + Mob/Demob	\$ 1,610,000
Engineering/Legal/Admin	\$ 3,180,000
Total	\$ 31,110,000





Food Waste Study

Food Waste Study

- Goals: Identify up to 5 truckload of high-quality FOG or high strength organic liquid waste per day.
- Criteria:
 - Must be feasible for both Webster and Feed Stock Provider
 - Long-term and consistent supply.
 - Tipping fees amenable to both and a hauler able to transport waste.
 - Must be pumpable.
 - Targeted BOD > 10,000 ppm.
- Limitations: Waste acceptance is 2 years out. Many potential sources do not pay to dispose or have low-cost disposal options such as animal feed.

Food Waste Types

- **Protein –**
 - Medium Energy,
 - Longer HRT to breakdown
 - Nitrogen
- **Fats, Oil, Greases –**
 - High Energy,
 - Longer HRT to breakdown
 - Congealing
- **Carbohydrate –**
 - Favorable Energy if concentrated
 - Shorter HRT
 - Easy to break down

Just like your stomach we need a good blend

Type of Waste	Clean Liquid	FOG	Solid Sorted	Liquid Packaged	Solid Unsorted
Characteristics	Easier to handle	Difficult to handle	Contaminants	Contaminants	Contaminants
	Easier to Digest	Great Energy	Lower Value Gas	Preprocessing	Preprocessing
	Good Gas Yield	Can Impact receiving	Good Diversity	Inerts	Inerts
	Hard to Get	Can Impact Digester		Good Diversity Macro/Micro	Good Diversity Macro/Micro
	High Value	Foaming		Lower Gas Value	Lower Gas Value
	Foaming				
Extra Equipment	Tank	Tank	Grinding	Depackaging	Depackaging
	Mixing	Mixing	Receiving/Holding/Mixing	Grinding	Grinding
	Receiving	Receiving	Dosing	Receiving/Holding/Mixing	Receiving/Holding/Mixing
	Dosing	Dosing	Digester Mixing	Dosing	Dosing
	pH/Alkalinity	pH/Alkalinity		pH/Alkalinity	Holding/Storage
		Digester Mixing		pH/Alkalinity	Digester Mixing
Potentials	Whey	Waste Float	Raw Ingredient Waste	Raw Ingredient Waste	Raw Ingredient Waste
	Beverages	Bad/Extra Product	Bad Product	Bad Product	Bad Product
	Sauces	OWS/Grease Traps	Expired Product	Expired Product	Expired Product
		Food Producers	Waste Food	Waste Food	Waste Food
			Large Venues	Beverage Manufacturers	Grocery Stores
			Universities	Grocery Stores	

Watchouts

Watchouts

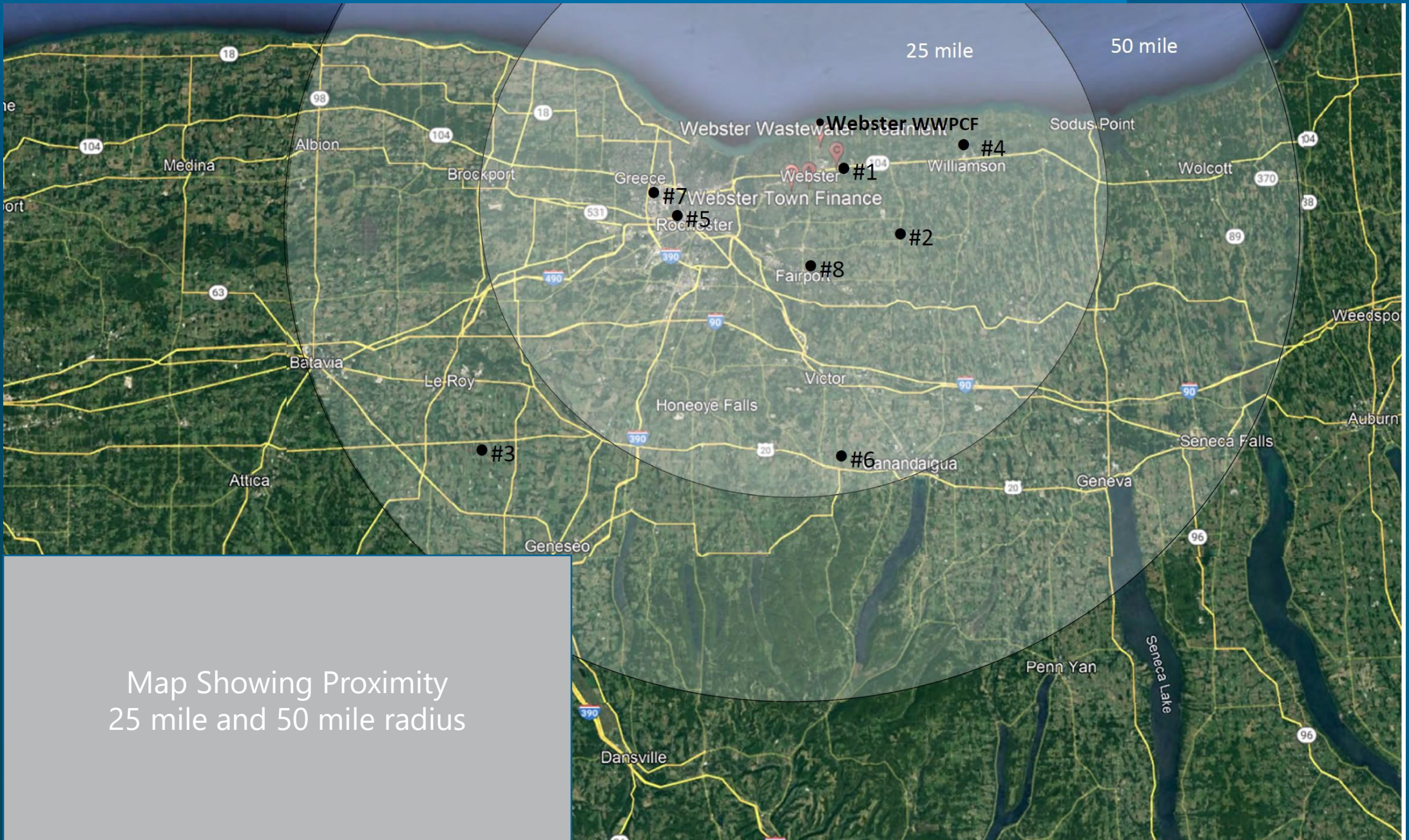
- Inerts – Residual Packaging, Bones
- Plastics – Residual Packaging
- Meat, Blood - Nitrogen
- low pH - Alkalinity
- Corrosiveness - Whey
- Dairy - Phosphorus
- Cleaning Chemicals - Quaternary Ammonium Compounds - Disinfectant - not chlorinated
- Float/Sludge/Waste - Surfactants/High Polymers/Antifoam
- Hydrocarbons – Not Good For Digester
- Cooked Waste – Lower Calorific Value
- Cellulose (Peels, Husks, Seeds) – Hard to Break Down

Evaluation Scoring

Parameter	● Not Feasible	● Poor	● Medium	● Good
Points	0	1	2	3
Distance	>50 miles	25 - 50 miles	<25 miles	In Webster
Source Motivation	Unable to contact after multiple attempts	No interest, don't much pay or at all.	Willing to discuss further	High interest
Treatability at Webster	Packaged waste	Solid	Chunky liquid	FOG or liquid
Nutrient Level	-	Excessive nutrients	-	Proportionate nutrients
Disposal Frequency	Disposal to Sewer	Monthly	Weekly	Daily
Average Weekly Volume	Drum or tote	<5,000	5,000 - 10,000 gal	>10,000 gal
Methane Potential	BOD equivalent to sanitary sewage	BOD < 10,000 mg/L	BOD > 10,000 mg/L	Fats, Oils or Grease (FOG)

Most Viable Feed Stock Sources

Description	Restaurant grease trap hauler	Apple matter waste	Variable liquid waste streams	Waste Broker
Distance from site to Webster WWRF	<ul style="list-style-type: none"> 5.2 miles 	<ul style="list-style-type: none"> 16 miles 	<ul style="list-style-type: none"> Considering Co-locating Depackaging 	<ul style="list-style-type: none"> 25 miles
Current Disposal Practice	Van Laere WWRF and Wyoming County	Casella Waste Systems land applies on nearby farm	New Market	Natural Upcycle
Source Motivation	<ul style="list-style-type: none"> Webster WWRF would be their preferred location for disposal of hauled waste. 	<ul style="list-style-type: none"> Previous land application farm is no longer accepting waste so looking for alternate disposal options 	<ul style="list-style-type: none"> New Business 	<ul style="list-style-type: none"> Seeking financially feasible alternatives
Treatability at Webster	<ul style="list-style-type: none"> FOG is a preferred feedstock. 	<ul style="list-style-type: none"> Pumpable apple matter is a preferred feedstock 	<ul style="list-style-type: none"> Potential for high strength spirit waste, a preferred feed stock. Screened liquid streams available. 	<ul style="list-style-type: none"> Typically, good digester material – sugar, waste beer – may have some solids
Nutrient Level	<ul style="list-style-type: none"> Acceptable 	<ul style="list-style-type: none"> Acceptable 	<ul style="list-style-type: none"> Acceptable 	<ul style="list-style-type: none"> TBD
Disposal Frequency	<ul style="list-style-type: none"> Minimum of twice per week. 	<ul style="list-style-type: none"> 42,000 gal 	<ul style="list-style-type: none"> Daily 	<ul style="list-style-type: none"> Daily
Average Weekly Volume	<ul style="list-style-type: none"> 16,000 gal 	<ul style="list-style-type: none"> 42,000 gal 	<ul style="list-style-type: none"> 20,000 gal (Per Day) 	<ul style="list-style-type: none"> 5,000 gal (Per Day)
Daily Weight (ton/d)	9.4	TBD (25)	10	TBD
Daily Methane Potential (CF/d)	28,100	TBD (44,800)	46,704	TBD
Limitations	Current contracts with disposal facilities	Land applied at low cost	Need to establish economics and location of depackaging	TBD



Map Showing Proximity
25 mile and 50 mile radius

Other Potential Sources

- **Alternate Source 1** – Dispose of in sewer. One 5,000 gpd waste stream with BOD of 18,000 ppm. Surcharge is \$50,000 per year. Financials may not be not feasible to haul given strength. Check back in after built to see if changes.
- **Alternate Source 2** – No cost to dispose of high waste stream. Could change in two years
- **Alternate Source 3** – Could have 1 truck per month for us – not a large impact
- **Alternate Source 4** – Interested but probably do not have a lot of waste compared to others, also kind of far but check back in in two years

Next Steps for finalizing Food Waste sources

- Plenty of Opportunity
- Need to work backwards with sizing to determine target quantity, type – impact to downstream processes?
- Prioritize targeted wastes?
- How secure two years out? Secure Contracts
- Discuss Depackaging Scenario with Waste Broker

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The Power to **Solve**.



Project Development & Design

A Unique Project Team



Food Waste Study & Technical QAQC

Biosolids End-Use Study



Engineer of Record



Energy Performance Contractor



Owner



Trade Partner

Trade Partner

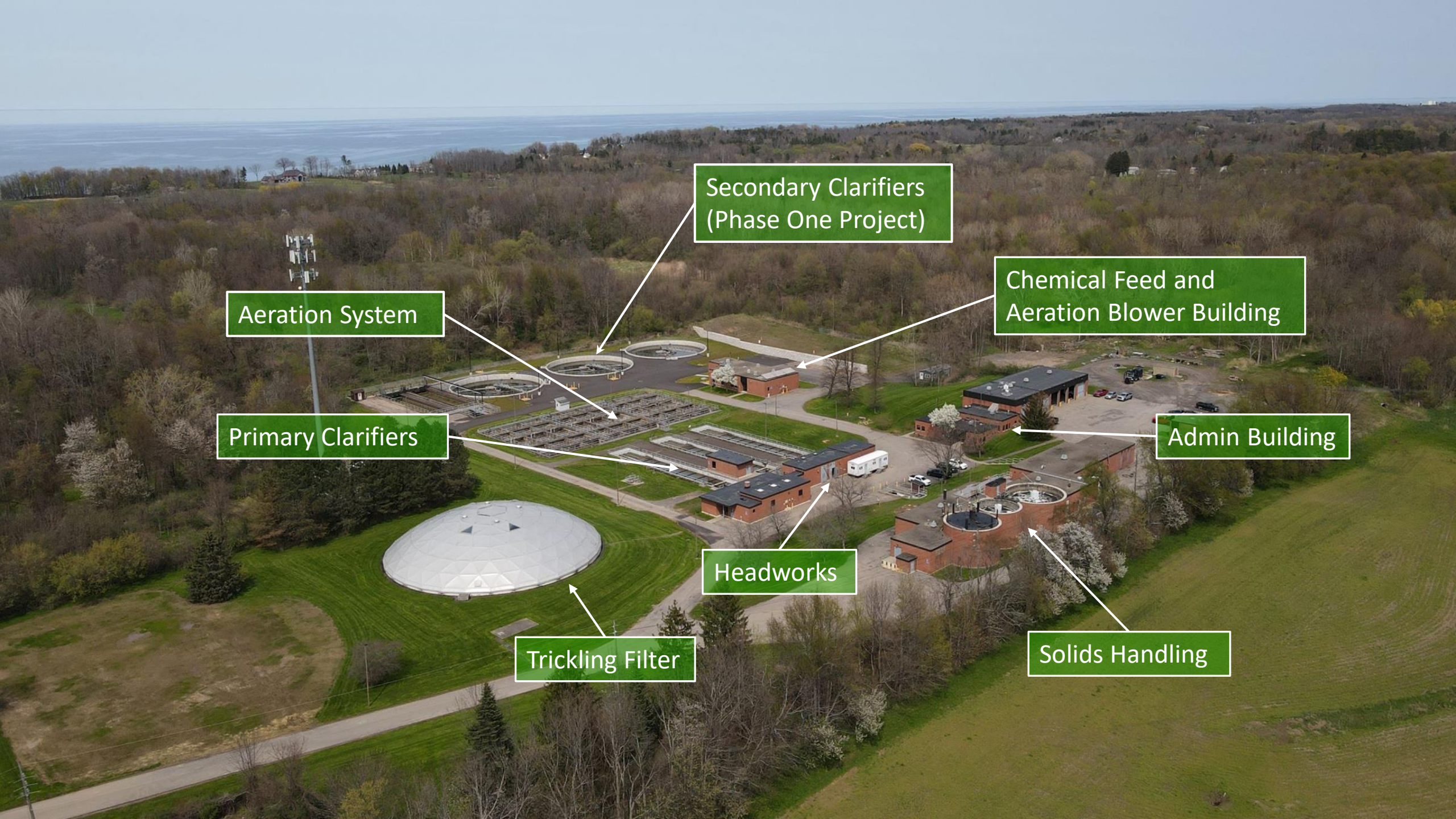
Trade Partner



Team Efforts to Date

- **12** technical memos completed
- **9** geotechnical underground borings and site survey completed
- **306** page Basis of Design Report completed
- **294** sheet design drawing set completed
- **10** company design and construction team assembled
- **400** line detailed construction schedule determined
- **65** vendor proposals for **18** major equipment systems evaluated
- **35** potential providers of outside waste identified and evaluated
- **90** outlets identified for Webster's final biosolids product use





Secondary Clarifiers
(Phase One Project)

Chemical Feed and
Aeration Blower Building

Aeration System

Admin Building

Primary Clarifiers

Headworks

Solids Handling

Trickling Filter

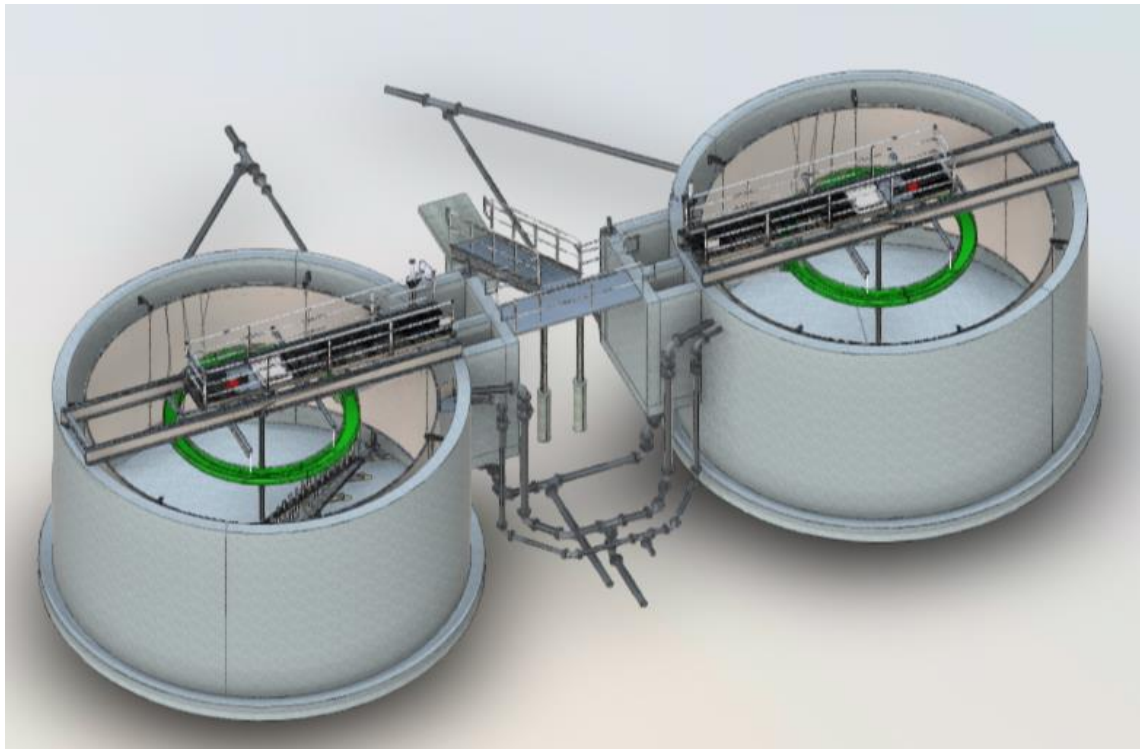
Outside Waste Acceptance

- New infrastructure to accept:
 1. Septage
 2. Leachate
 3. High strength organic waste
 4. Biosolids



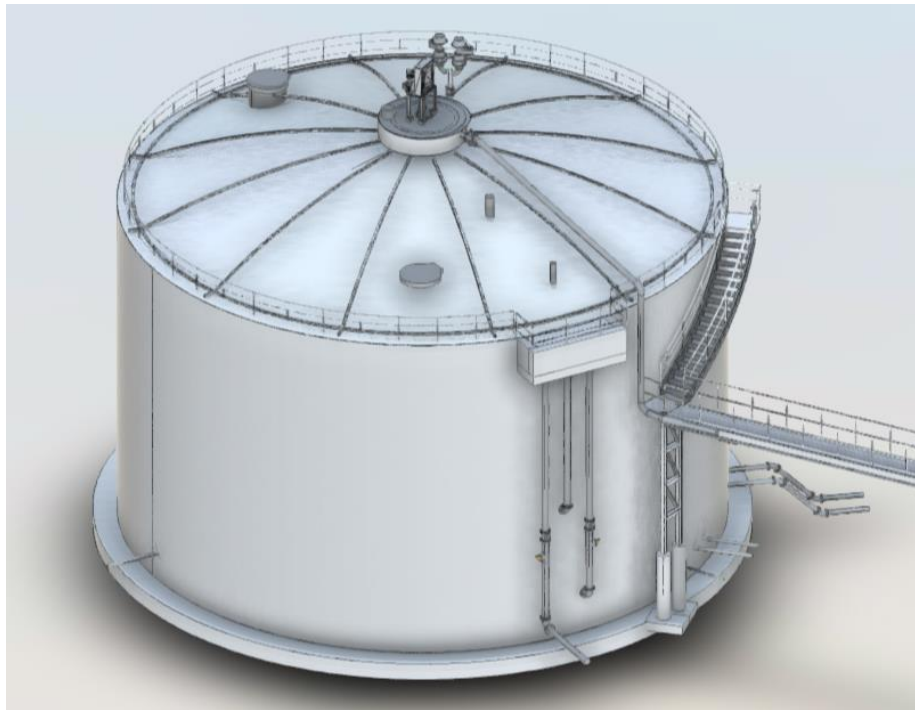
New Solids Thickening Equipment

- New Gravity thickeners – remove water from Digestion
- New pumping systems

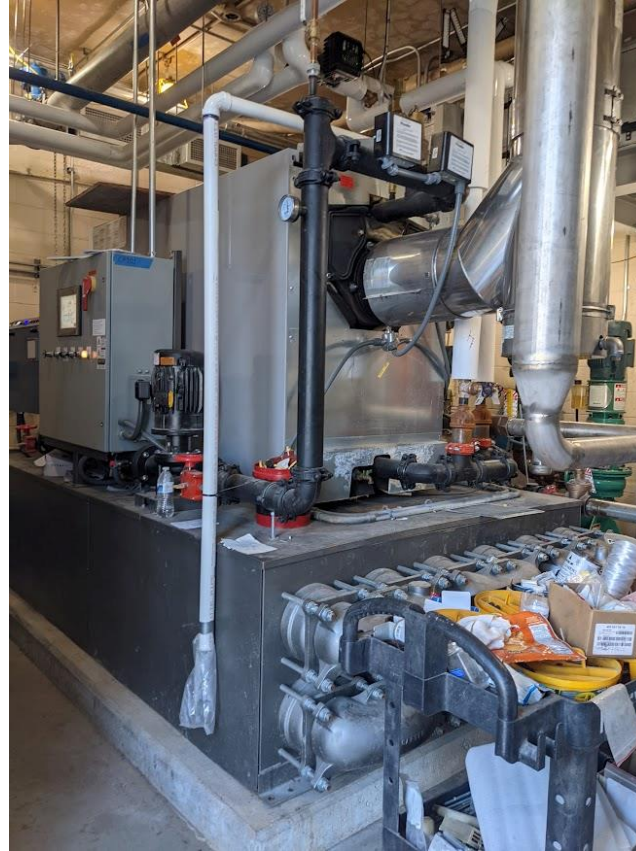


New Anaerobic Digester

- Insufficient existing capacity
- Increase VS reduction
- Beneficial recovery of biogas



Design Model of new Tank



Biogas Usage for building & tank heating



Biogas Storage in dual membrane cover

Recuperative Thickening

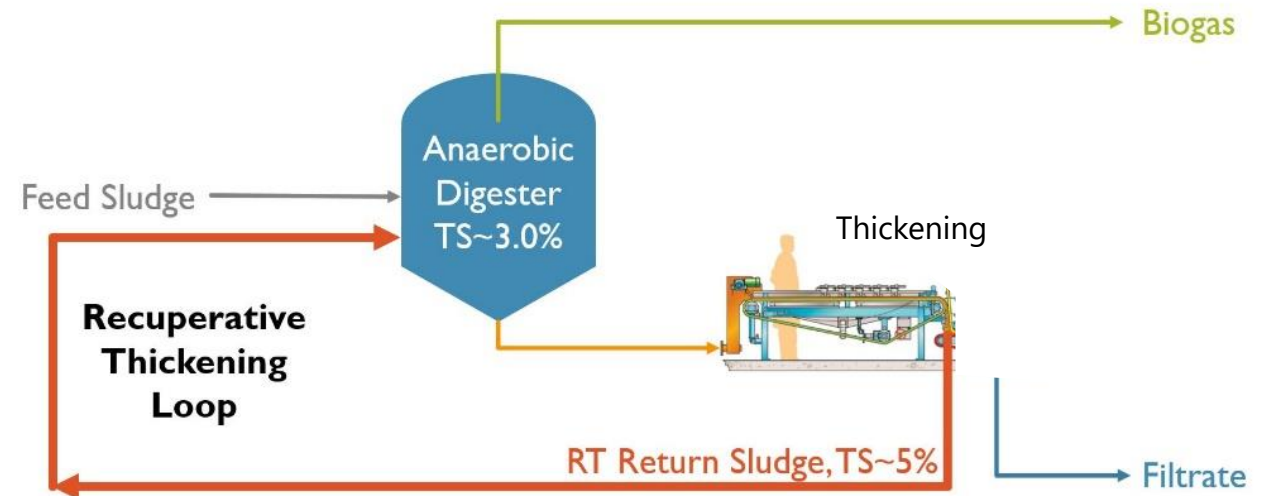
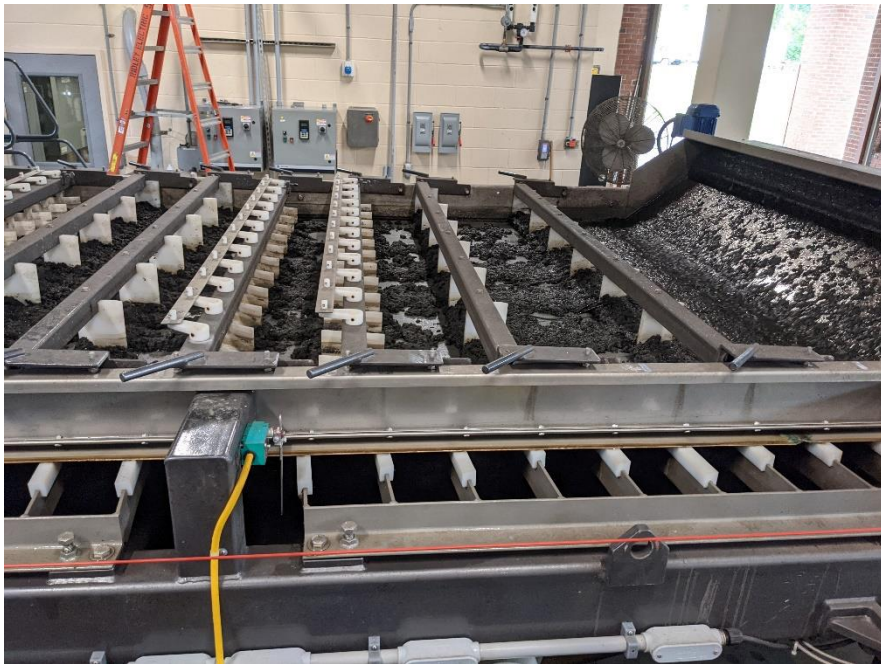
- Retrofit existing Gravity belt thickener
- Use GBT to Thicken AD solids
- Increase digester capacity



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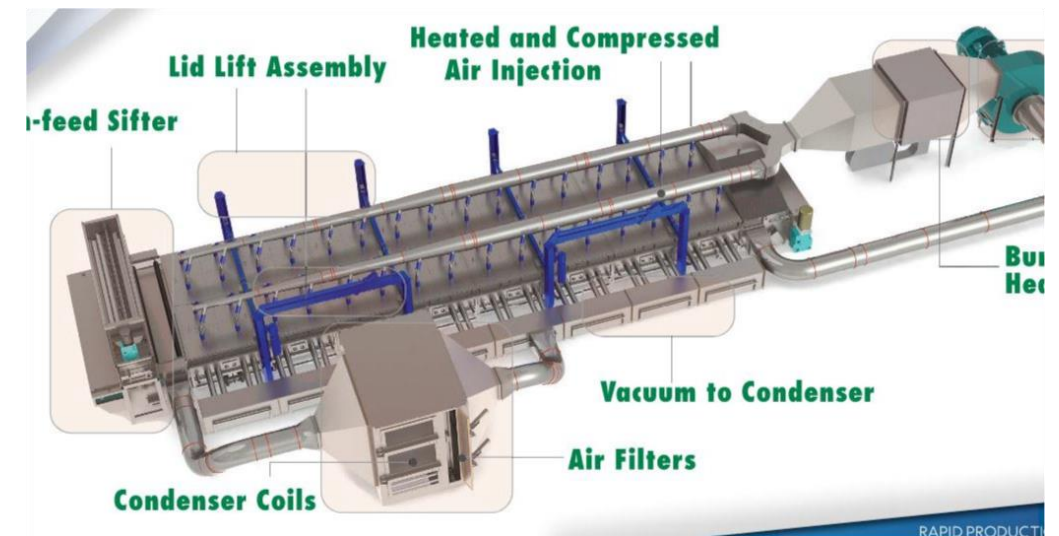
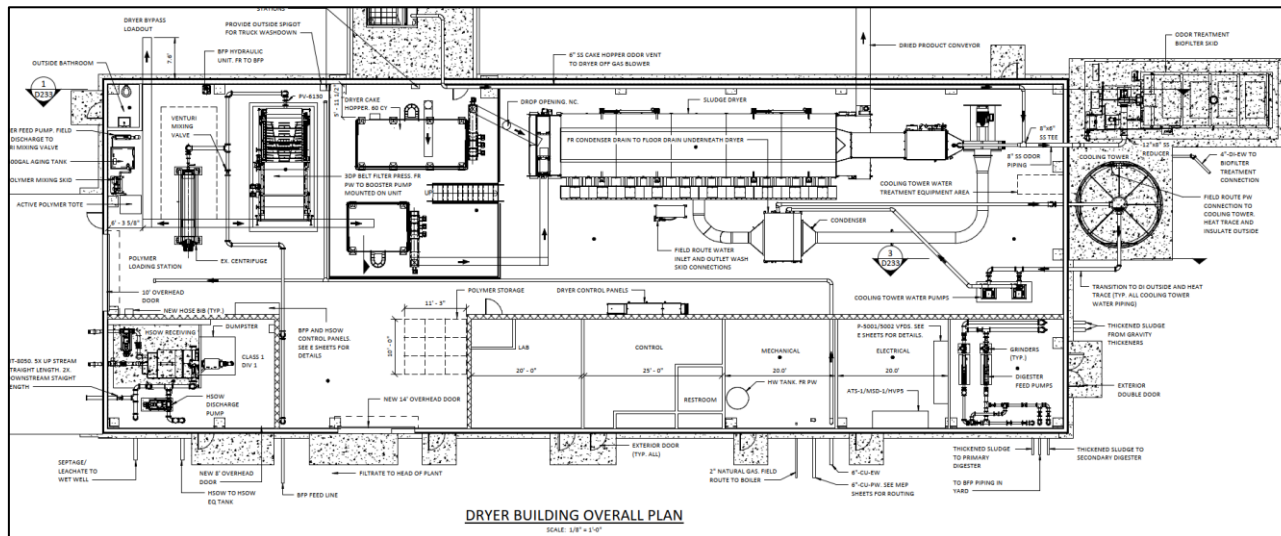
Navitas
CONSERVING RESOURCES • RENEWING FACILITIES

Critical Path
ENGINEERING SOLUTIONS

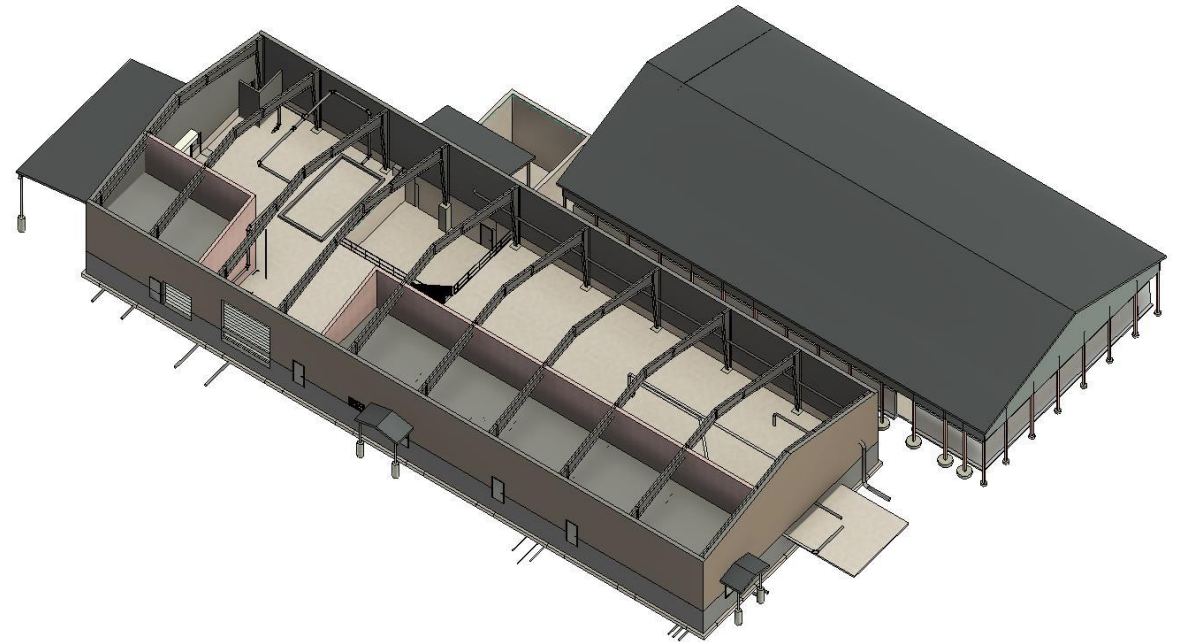
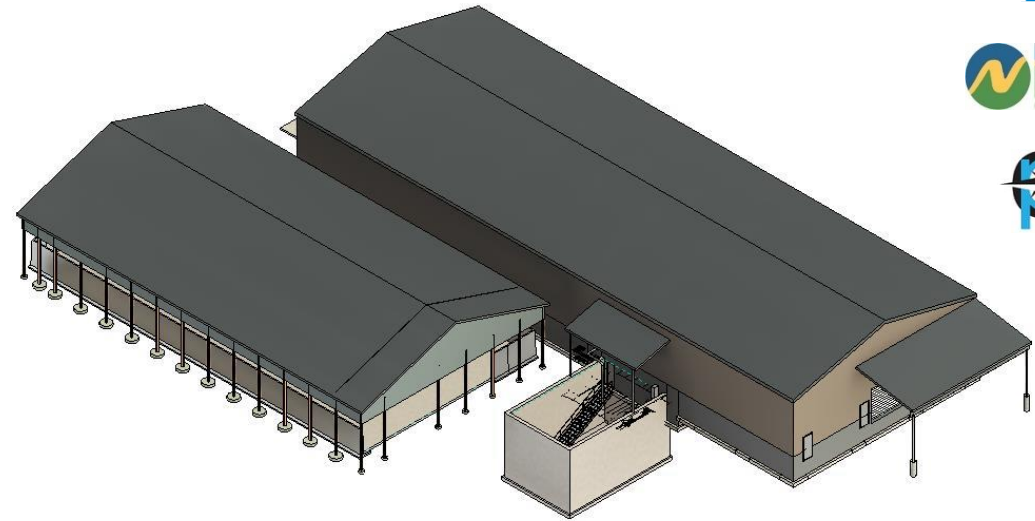
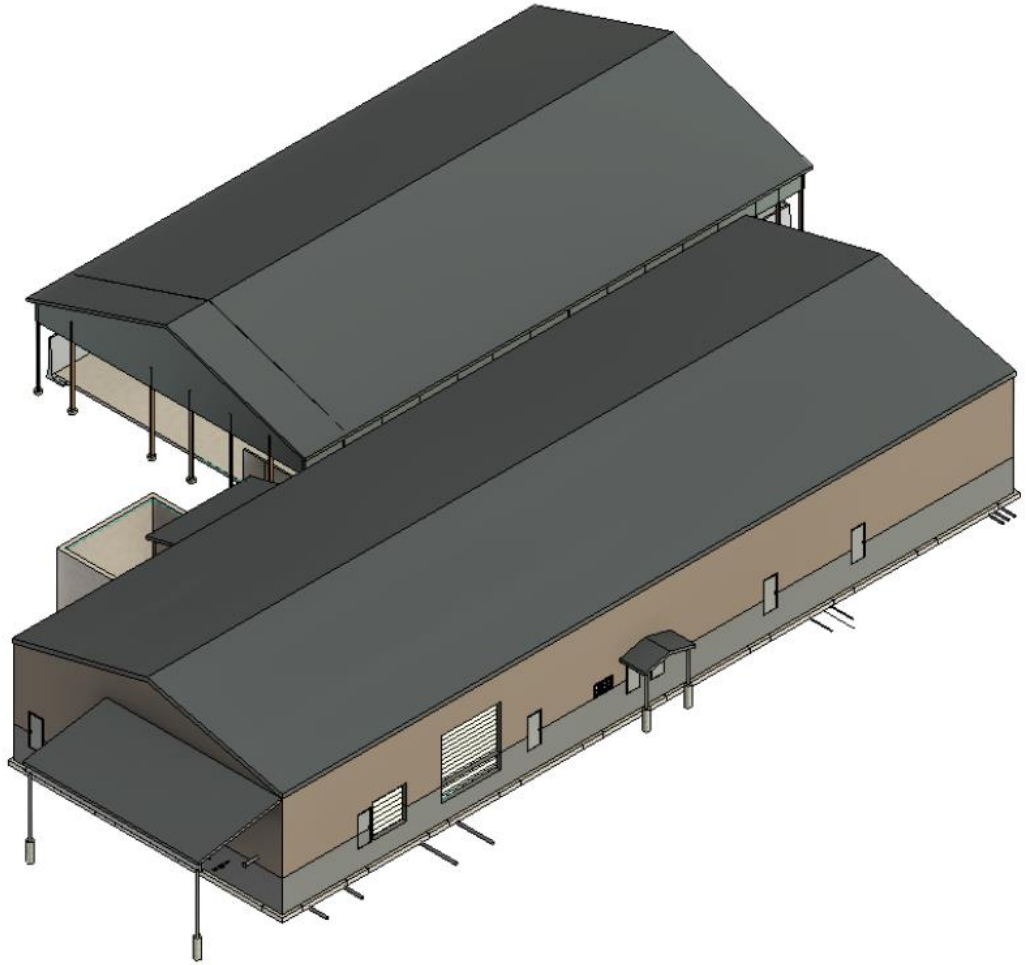


Sludge Dryer

- Reduce Volume:
 - Dry biosolids from 20% -> 90%
- Stabilize to Class A Biosolids for beneficial use
- Town + Imported Cake Processing



Biosolids & Acceptance Building



Biosolids End-Use

Table ES-1 The Town of Webster Market Assessment summary.

Management Method	Most Promising Markets/ Interested TPCs and Landfills <i>Listed in order of Most Promising to Least Promising</i>	Net Annual Outside-the-Gate ^a Expenses \$/year	
		Low Expense	High Expense
Self-Managed Program - Beneficial Use	<ul style="list-style-type: none"> • Agriculture • Soil Blending / Nurseries • Turf production • Fertilizer Blending 	\$8,600	\$28,700
Third Party Contractor Management – Beneficial Use	<ul style="list-style-type: none"> • Casella • Denali 	\$21,600	\$48,600
Landfill Disposal	<ul style="list-style-type: none"> • Ontario County Landfill • Seneca Meadows Landfill 	\$67,500	\$74,000

^a Annual outside-the-gate expenses/revenues are based on an annual production of 540 wt of dried biosolids produced annually.

Biosolids End-Use



July 2022
Rev. August 2022

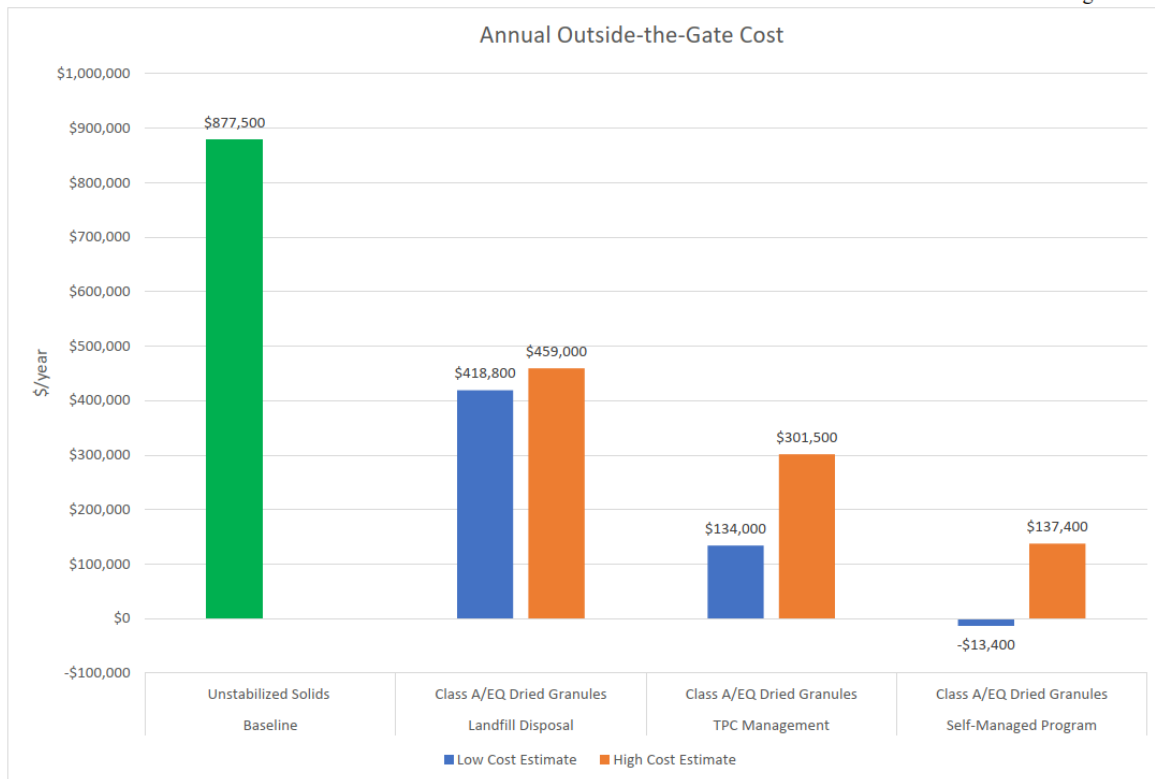


Figure 5-1 Estimated annual outside-the-gate expenses for the Town of Webster's biosolids management program.



July 2022

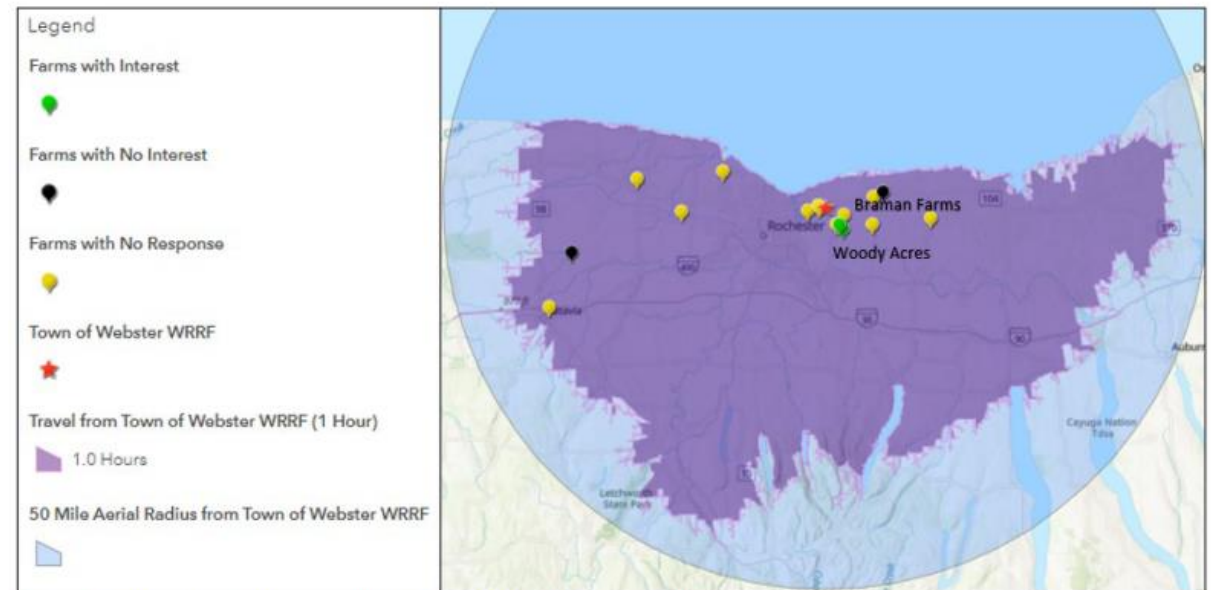
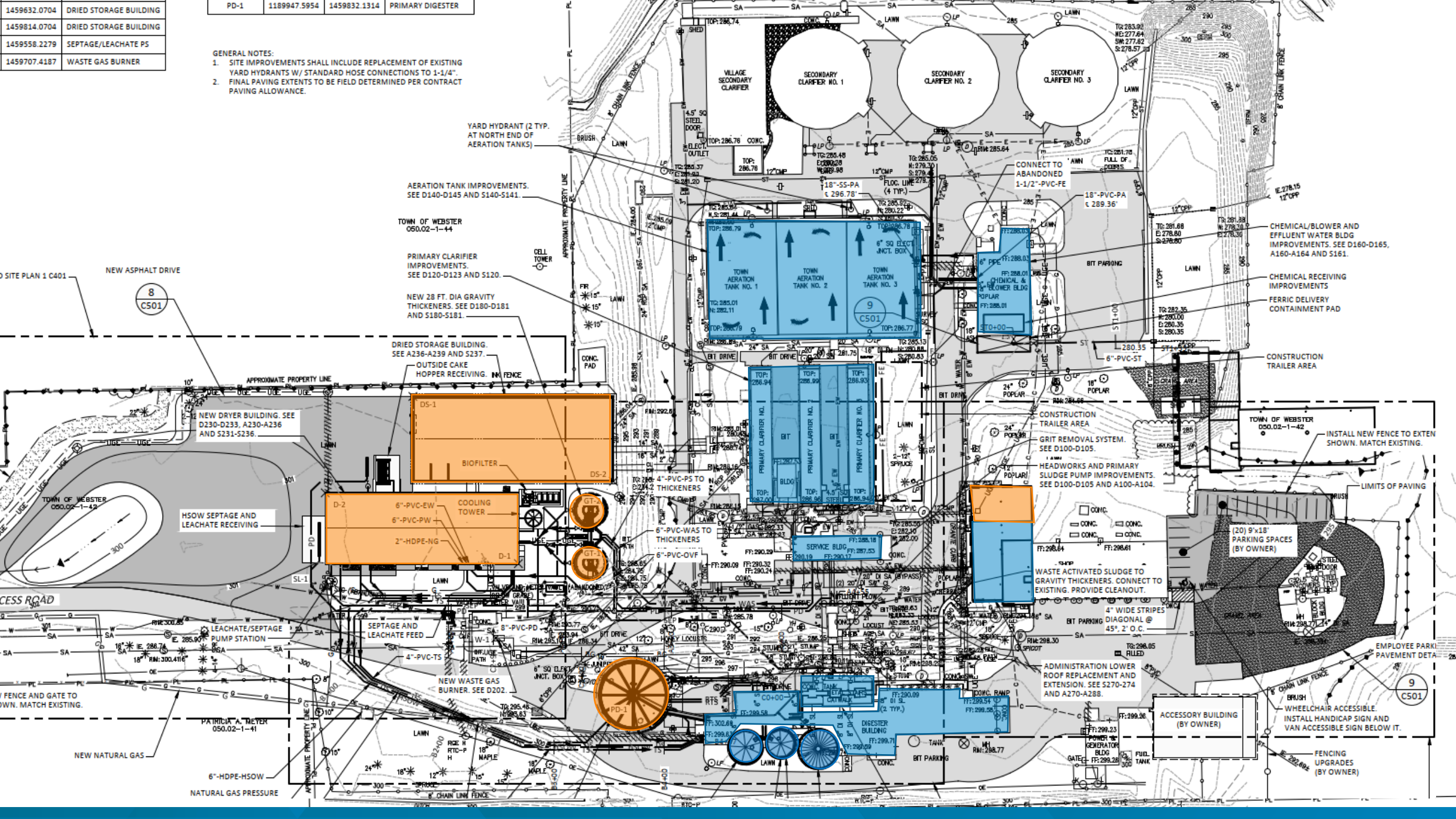


Figure 4-5. Location of farms contacted in the Market Assessment.

1459632.0704	DRIED STORAGE BUILDING
1459814.0704	DRIED STORAGE BUILDING
1459558.2279	SEPTAGE/LEACHATE P5
1459707.4187	WASTE GAS BURNER

PD-1 1189947.5954 1459832.1314 PRIMARY DIGESTER

- GENERAL NOTES:
 1. SITE IMPROVEMENTS SHALL INCLUDE REPLACEMENT OF EXISTING YARD HYDRANTS W/ STANDARD HOSE CONNECTIONS TO 1-1/4".
 2. FINAL PAVING EXTENTS TO BE FIELD DETERMINED PER CONTRACT PAVING ALLOWANCE.



YARD HYDRANT (2 TYP. AT NORTH END OF AERATION TANKS)

AERATION TANK IMPROVEMENTS. SEE D140-D145 AND S140-S141.

TOWN OF WEBSTER 050.02-1-44

PRIMARY CLARIFIER IMPROVEMENTS. SEE D120-D123 AND S120.

NEW 28 FT. DIA GRAVITY THICKENERS. SEE D180-D181 AND S180-S181.

DRIED STORAGE BUILDING. SEE A236-A239 AND S237.

OUTSIDE CAKE HOPPER RECEIVING. IN FENCE

NEW DRYER BUILDING. SEE D230-D233, A230-A236 AND S231-S236.

HSOW SEPTAGE AND LEACHATE RECEIVING

LEACHATE/SEPTAGE PUMP STATION

PATRICIA A. MEYER 050.02-1-41

NATURAL GAS PRESSURE

CHEMICAL/BLOWER AND EFFLUENT WATER BLDG IMPROVEMENTS. SEE D160-D165, A160-A164 AND S161.

CHEMICAL RECEIVING IMPROVEMENTS
 FERRIC DELIVERY CONTAINMENT PAD

CONSTRUCTION TRAILER AREA

TOWN OF WEBSTER 050.02-1-42
 INSTALL NEW FENCE TO EXTEN SHOWN. MATCH EXISTING.

(20) 9'x18' PARKING SPACES (BY OWNER)

EMPLOYEE PARK PAVEMENT DATA

WHEELCHAIR ACCESSIBLE. INSTALL HANDICAP SIGN AND VAN ACCESSIBLE SIGN BELOW IT.

FENCING UPGRADES (BY OWNER)

WASTE ACTIVATED SLUDGE TO GRAVITY THICKENERS. CONNECT TO EXISTING. PROVIDE CLEANOUT.

4" WIDE STRIPES CONCRETE DIAGONAL @ 45° 2" O.C.

ADMINISTRATION LOWER ROOF REPLACEMENT AND EXTENSION. SEE S270-274 AND A270-A288.

ACCESSORY BUILDING (BY OWNER)

FUEL TANK

GRIT REMOVAL SYSTEM. SEE D100-D105.

HEADWORKS AND PRIMARY SLUDGE PUMP IMPROVEMENTS. SEE D100-D105 AND A100-A104.

CONCRETE

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Project Economics

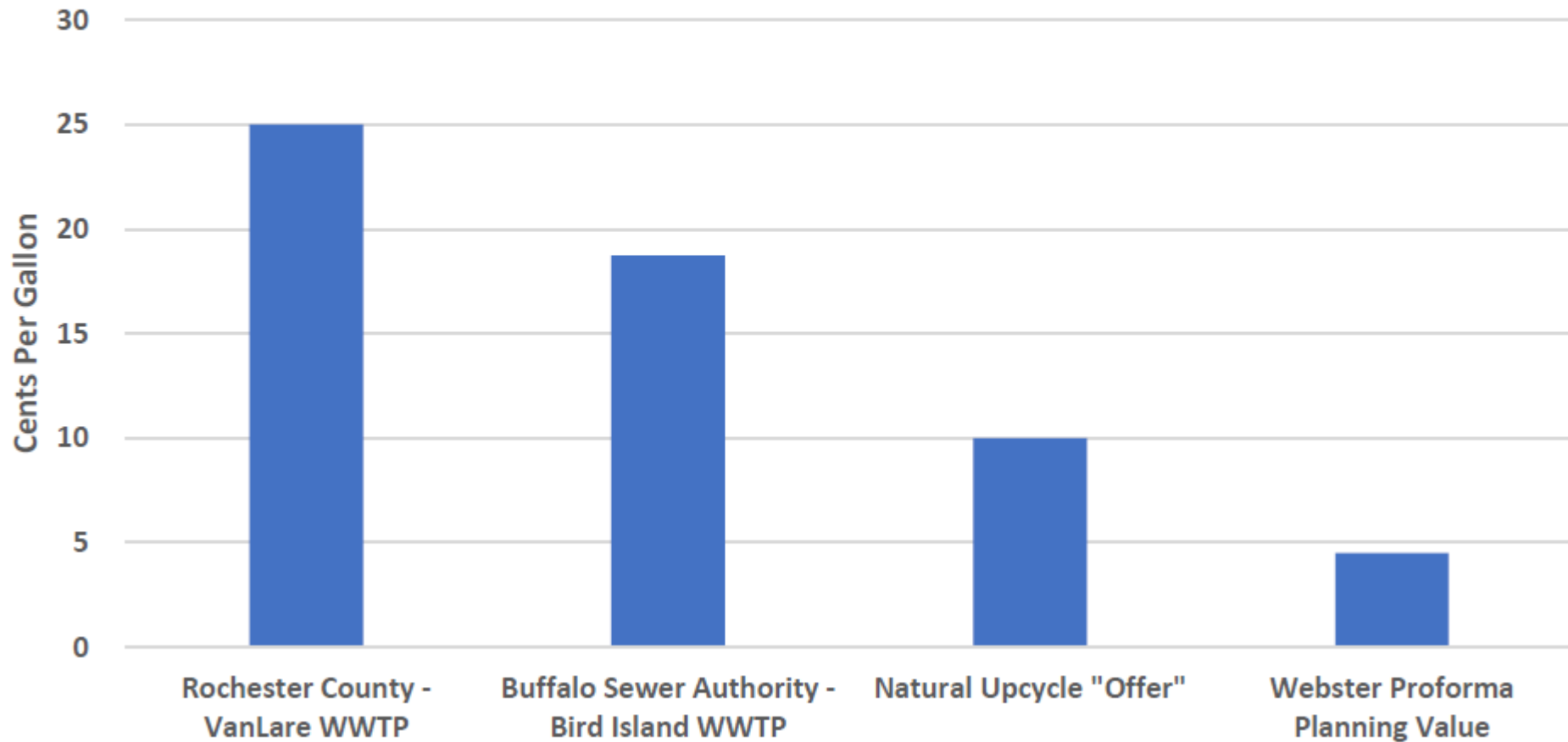
	July 2021 PER Estimate	July 2022 Budget
Headworks	\$ 1,160,000	\$ 1,360,000
Primary Clarifiers	\$ 450,000	\$ 1,560,000
Aeration System	\$ 1,870,000	\$ 4,320,000
Liquid Receiving	\$ 1,490,000	\$ 2,630,000
Solids Handling	\$ 6,320,000	\$ 9,710,000
Sludge Dryer	\$ 7,110,000	\$ 11,620,000
Facilities	\$ 3,310,000	\$ 2,910,000
Site/Civil/Storm Improvements	\$ 590,000	\$ 1,420,000
<i>Subtotal</i>	<i>\$ 22,300,000</i>	<i>\$ 35,530,000</i>
Contingency	\$ 4,020,000	\$ 1,800,000
General Conditions + Mob/Demob	\$ 1,610,000	\$ 3,790,000
Engineering/Legal/Admin	\$ 3,180,000	\$ 3,110,000
Total	\$ 31,110,000	\$ 44,230,000

	Asset Renewal			WRRF	
	July 2021 PER Estimate	July 2022 Budget		July 2021 PER Estimate	July 2022 Budget
Aeration System	\$ 1,870,000	\$ 4,320,000		Liquid Receiving	\$ 1,490,000 \$ 2,630,000
Headworks	\$ 1,160,000	\$ 1,360,000		Sludge Dryer	\$ 7,110,000 \$ 11,620,000
Solids Handling	\$ 6,320,000	\$ 9,710,000		subtotal	\$ 8,600,000 \$ 14,250,000
Primary Clarifiers	\$ 450,000	\$ 1,560,000		Contingency	\$ 1,550,000 \$ 580,000
Site/Civil/Storm Improvements	\$ 590,000	\$ 1,420,000		General Conditions + Mob/Demob	\$ 620,000 \$ 1,520,000
Facilities	\$ 3,310,000	\$ 2,910,000		Engineering/Legal/Admin	\$ 1,230,000 \$ 1,250,000
subtotal	\$ 13,700,000	\$ 21,280,000		Total	\$ 12,000,000 \$ 17,600,000
Contingency	\$ 2,470,000	\$ 1,080,000			
General Conditions + Mob/Demob	\$ 990,000	\$ 2,270,000			
Engineering/Legal/Admin	\$ 1,950,000	\$ 1,860,000			
Total	\$ 19,110,000	\$ 26,490,000			

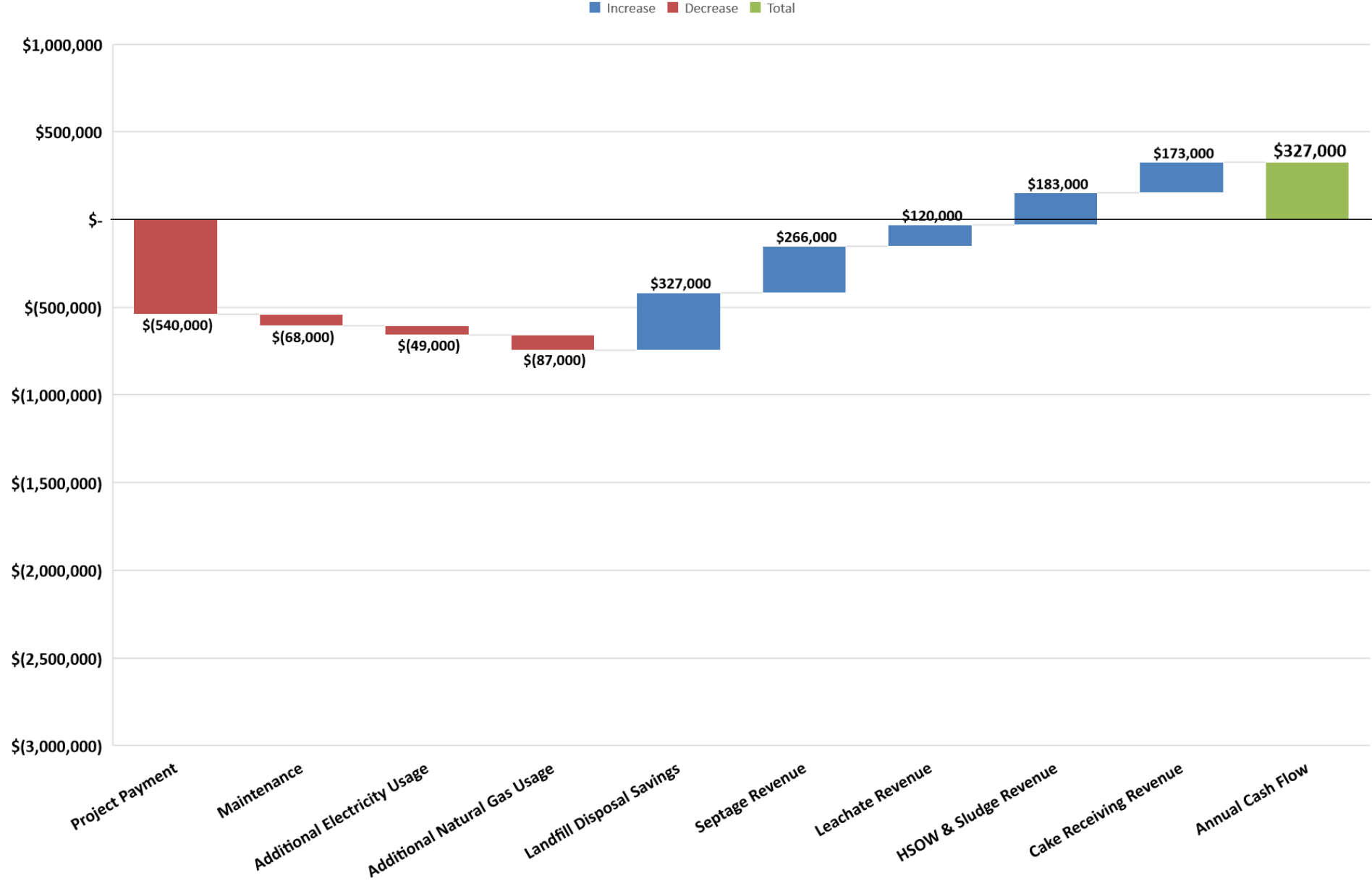
Basis of Design Update Comparison

July 2021 PER Report						
	Septage	Leachate	HSOW	Outside Sludge	Outside Cake	
Tipping Fee, \$/gal (\$/WT cake)	\$ 0.04	\$ 0.04	\$ 0.03	\$ 0.04	\$ 65	
Acceptance (gallons or cake tons/week)	100,000	45,000	25,000	50,000	34.2	
Annual Revenue Potential	\$ 208,000	\$ 93,600	\$ 39,000	\$ 104,000	\$ 115,500	
Total Revenue Potential						\$ 560,100
July 2022 Basis of Design Update						
	Septage	Leachate	HSOW	Outside Sludge	Outside Cake	
Tipping Fee, \$/gal (\$/WT cake)	\$ 0.04	\$ 0.04	\$ 0.05	\$ 0.04	\$70	
Capacity at Day One (Gallon/week)	280,000	140,000	205,000	\$ -		
Annual Revenue Potential	\$ 582,400	\$ 291,200	\$ 479,700	\$0.00	561,860	
60% Revenue Value	\$ 349,440	\$ 174,720	\$ 287,820	\$ -	\$ 337,116	
Annual Revenue Planning Value						\$ 1,149,096

HSOW Tipping Fee Comparison - What the "Market" is telling us.

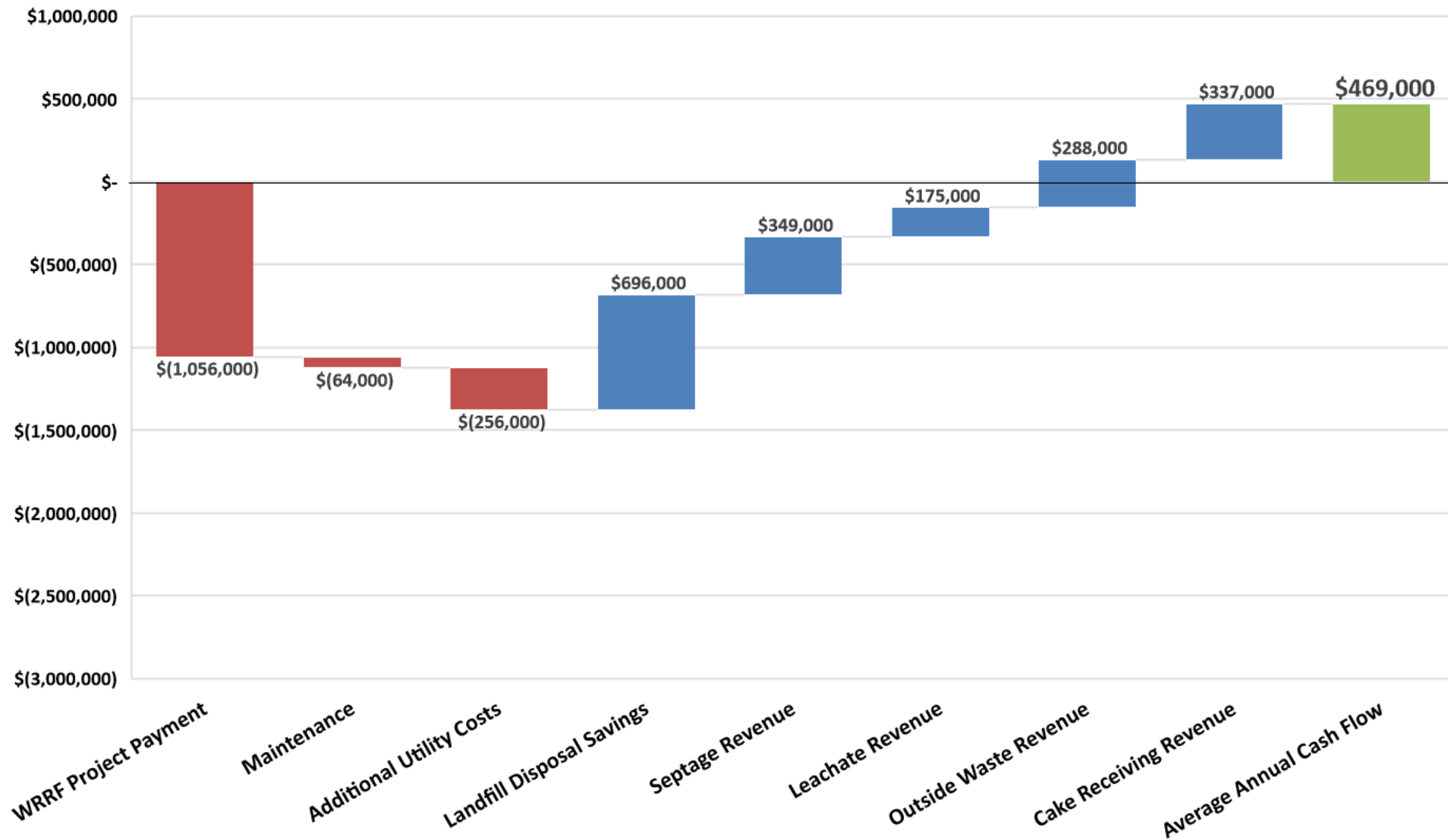


PER REPORT - WRRF 20 YEAR AVERAGE ANNUAL EXPENSE VS. SAVINGS/REVENUE



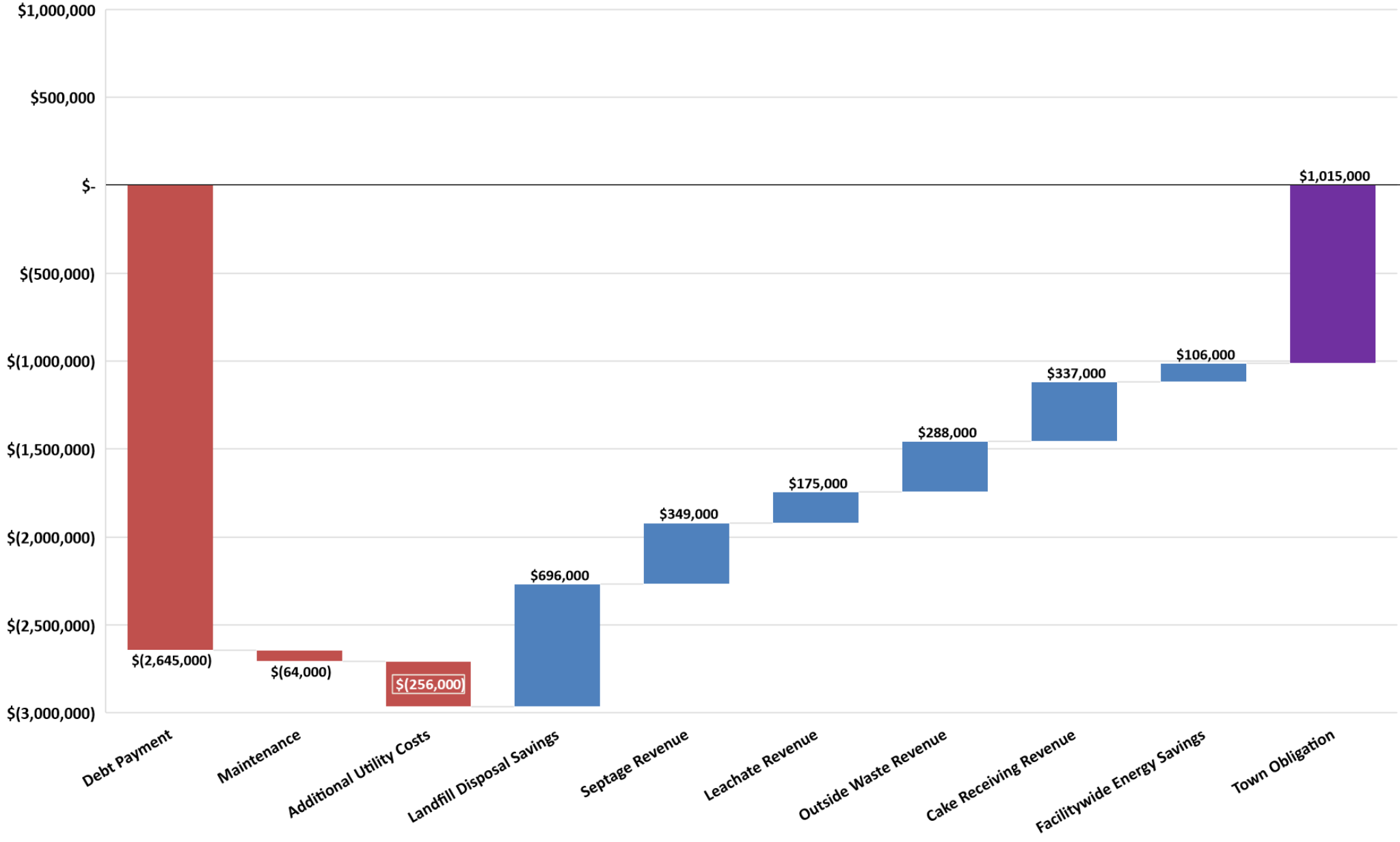
WRRF Project Self-Funds and Creates Additional \$469,000 Annually

20 Year Average Annual Expense vs. Savings/Revenue



SAVINGS AND NEW REVENUE COVERS 66% OF PROJECT EXPENSE ANNUALLY

FULL PROJECT - 20 YEAR AVERAGE ANNUAL EXPENSE VS. SAVINGS/REVENUE



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The Power to **Solve**.



Questions?