CITY OF ANTIGO

PUBLIC WORKS COMMITTEE MEETING

COUNCIL CHAMBERS	Wednesday, September 24, 2025
CITY HALL, 700 EDISON STREET	5:30 PM

Call to Order

Minutes Approval

1. Approve the Minutes from the August 13 and August 27, 2025 Meetings

Discussion and Action May Occur on Any of the Following Agenda Items:

1. Sanitary Landfill 1357 Methane Detection
2. Wastewater Treatment Plant Solar Project Report
3. Wastewater Treatment Plant Future Industrial Flow and Loading Evaluation and Request for Proposal
4. Discuss Condition of Wastewater Treatment Plant and Status of Request for Proposal for Full Scope Study of Wastewater Treatment Plant

Any Other Matters Authorized by Law to be Considered

Adjournment

Upon reasonable notice, efforts will be made to accommodate disabled individuals through appropriate aids and services. For additional information, contact clerk treasurer's office, 700 Edison Street, Antigo, Wisconsin 54409. (715) 623-3633 extension 100. Members of and possibly a quorum of members of other governmental bodies may be in attendance to gather information. Any governmental body other than that specifically referred to above will take no action.

DATE MAILED: September 18,2025 SCOTT HENRICKS

Antigo
"Antigo Area on the go"

To: Mayor and City Council

From: Charley Brinkmeier, Land Surveyor/Project Manager

Date: September 24, 2025

Re: Sanitary Landfill 1357 Methane Detection

Sand Creek Environmental has been doing our landfill monitoring and reporting to the Wisconsin Department of Natural Resources (WI DNR).

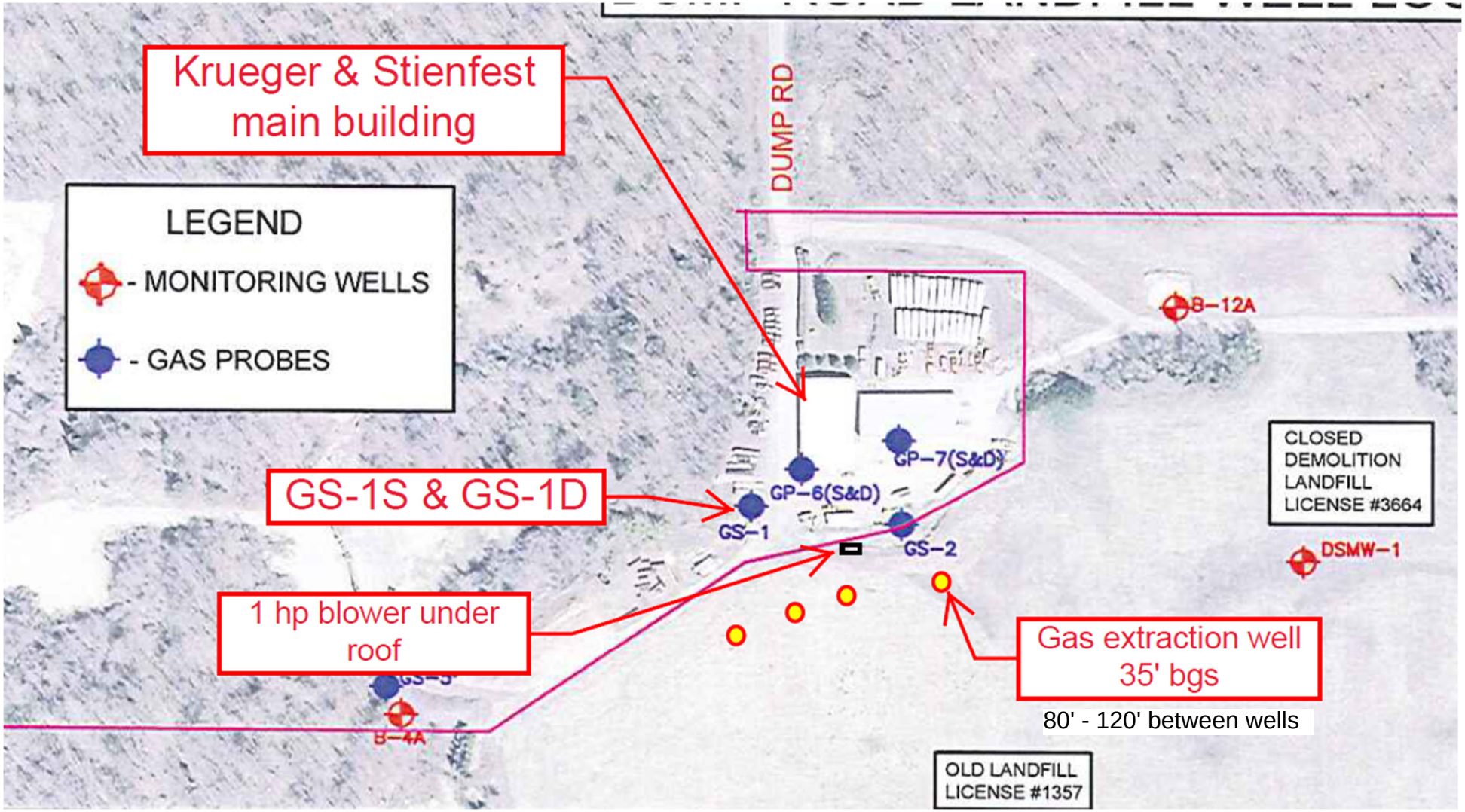
A few years ago we were having methane limit exceeded in wells GS-1S&D and GP-6S&D. We installed a three passive venting system that helps pull the methane from the landfill. Levels began to decline. Now the last rounds of sampling, the methane level are rising again in GS-1&D. We had a meeting with WI DNR last week and we informed them we would like to install four additional venting wells beginning with a passive venting but with the ability to convert them to an extraction system in the future. Sand Creek has estimated the cost $31,800. We are asking the committee to approve the funds and install the venting system. Funds will be derived from the long term monitoring account for the landfills.

The following budget is for Sand County Environmental to:

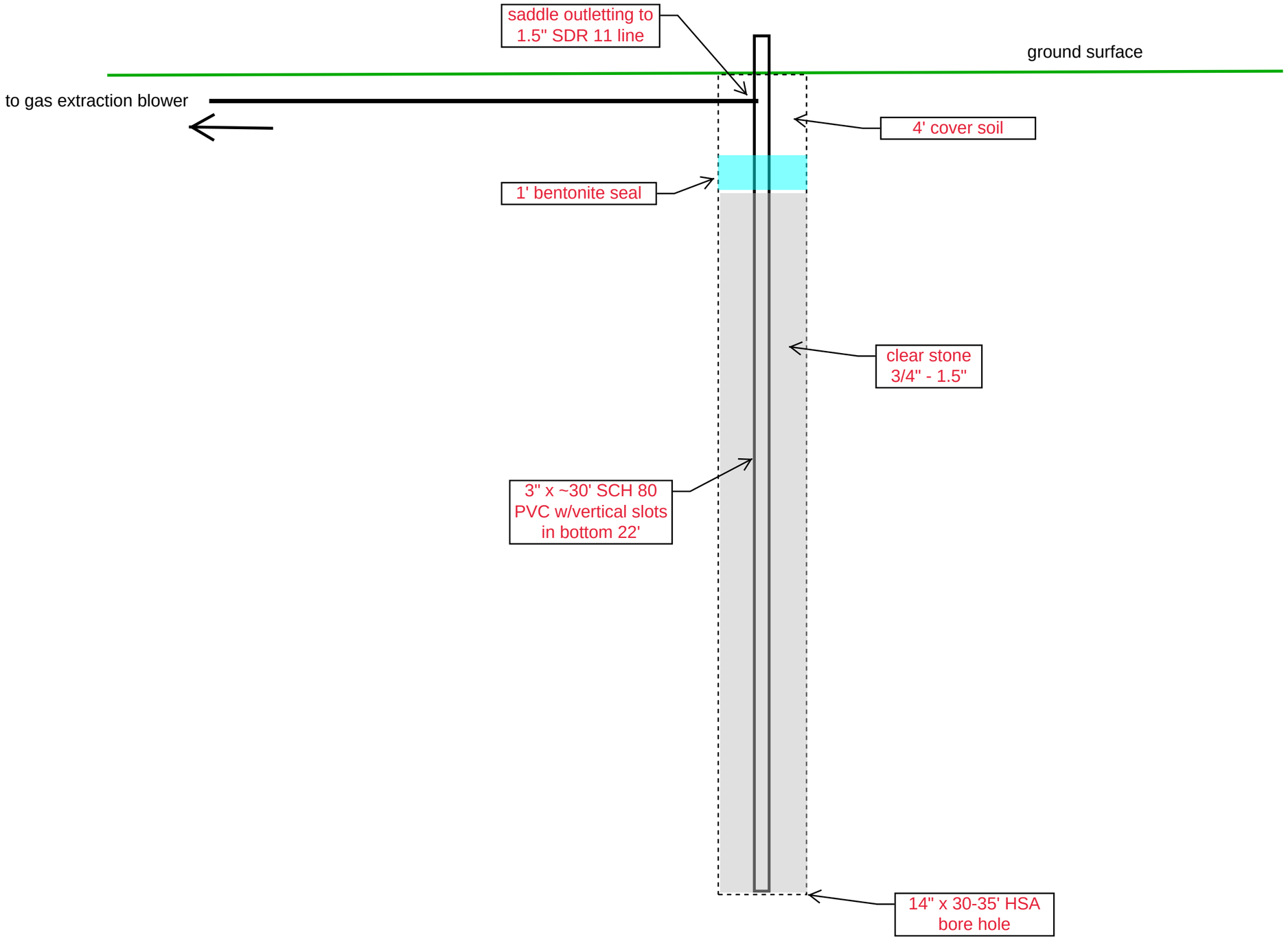
1. Finalize passive/active system design
2. Submit a remediation plan to WDNR (this will include installation of an active blower system if soil methane concentration trends are not decreasing by May 2026)
3. Install 4, passive vents in the location and method as shown on attached
4. Submit documentation report to WDNR

Facility 1357 Passive Gas Vent install

SCE Design/PM	$7,000
Install	$7,400
Driller	$14,000
Materials	$3,400
	$31,800



Antigo Facility 1357 gas extraction well



Antigo
"Antigo Area on the go"

To: Mayor and City Council

From: Charley Brinkmeier, Land Surveyor/Project Manager

Date: September 24, 2025

Re: Wastewater Treatment Plant Solar Project Report

The Solar Panels are completed and online out at the Waste Water Treatment plant as of July of this year. We contacted Wisconsin Public Service (WPS) to have them look back and see what the impacts were on the bills. We are happy to say that it seems to be performing better than accepted. For the month of August we had a $3,200 dollar saving on the electrical bill. We are planning on keeping track and will report back in a couple of months and inform the committee on the progress.

Business Solutions Center	877-444-0888
Electric Emergencies	800-450-7240
Contact your Account Executive	877-444-0888

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
08/01/2025	0402052155-00179	09/01/2025	$6,992.42	08/25/2025

Customer Name CITY OF ANTIGO
Service Address SPRBK TRMT
N2420 KOSZAREK RD
ANTIGO WI 54409-8849

Account Summary
Bill Period: 07/01/2025 to 07/31/2025

	Jul 2025	Jun 2025
Billing Days	31	41
Avg Temp	69°F	46°F
Heating Deg Days	21	131
Cooling Deg Days	137	69
KWH Used	77316	133014
Avg KWH / Day	2494.1	3244.2

Activity Since Last Bill

07/10/2025	Previous Balance	$13,228.88
07/21/2025	Payment	-$13,228.88
	Balance	$0.00
	Total Current Charges	$6,992.42
	Total Current Balance	$6,992.42

Electric Service

Elec Lrg Coml & Ind Sec Interruptible Cp

Meter 7000185

Interval Reading 08/01/2025	562
Interval Reading 07/01/2025	-347
	215
Meter Constant	x 400
Total Electric Use	86000 KWH
On Peak	24354.6 KWH
Off Peak	52961.4 KWH

Energy Charges/Credits		
Daily Fixed Charge	31 Days at $21.86300	$677.75
Power Factor Adjustment	410 KW x (1/0.90 - 1/0.80) at 0.40 31 days Customer Demand: 410 KW Pwr Fctr: 77,316 KWH/sqrt(77,316 KWH^2)+(38,398 KVARH^2)) = 0.90	-$22.78
Demand Charges/Credits		
Customer Demand	410 KW @ 02/03/2025 09:45 * $2.264	$928.24
Peak	244 KW @ 07/16/2025 12:00 * $0	$0.00
Peak Firm	0 KW @ 06/06/2079 00:00 * $20.496	$0.00
Peak Interruptible	244 KW @ 07/16/2025 12:00 * $12.457	$0.00
Intermediate	256 KW @ 07/24/2025 22:15 * $0	$0.00
Intermediate Firm	0 KW @ 06/06/2079 00:00 * $15.372	$0.00
Intermediate Interruptible	256 KW @ 07/24/2025 22:15 * $12.457	$3,188.99
Base	217 KW @ 07/14/2025 23:45 * $0	$0.00
Base Firm	217 KW @ 07/14/2025 23:45 * $0	$0.00
Base Interruptible	0 KW @ 06/06/2079 00:00 * $12.457	$0.00
Energy Charges/Credits		
On-Peak	24,355 KWH at $0.06843	$1,666.61
Off-Peak	52,961 KWH at $0.04025	$2,131.68
Buyout Energy	9,088 KWH at $0.1710607	$1,554.53
MISO 105 Day Settlement	1,873 KWH at -$0.0542721	-$101.63

Please return this stub with your payment.

ACCOUNT NUMBER: 0402052155-00179

Amount Due By 08/25/2025 $6,992.42

A 1% late fee will be charged on any unpaid balance

Please write your account number on your check

Amount Enclosed

CITY OF ANTIGO
N2420 KOSZAREK RD
ANTIGO WI 54409-8849

Wisconsin Public Service
PO Box 1109
Glenview IL 60025-8109

0110402052155001797 4000699242

Business Solutions Center	877-444-0888
Electric Emergencies	800-450-7240
Contact your Account Executive	877-444-088

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
08/01/2025	0402052155-00179	09/01/2025	$6,992.42	08/25/2025

Other Service Charges/Credits

WI Low Income Assistance Fee			$167.72
		Subtotal:	**$10,191.11**

Elec Parallel Generation 3Ph PG-2B

Meter 999986

Interval Reading 08/01/2025	0	
Interval Reading 07/01/2025	-0	
Total Electric Use	0	KWH
On Peak	29853.8	KWH
Off Peak	40668.4	KWH

Energy Charges/Credits

Customer Charge	31 Days at $0.65750	$20.38
Parallel Generation		
On-Peak Avoided Energy Cost Rate	29,854 KWH at -$0.03746	-$1,118.33
Off-Peak Avoided Energy Cost Rate	40,668 KWH at -$0.02724	-$1,107.80
Avoided Capacity Cost Rate	29,854 KWH at -$0.03326	-$992.94
	Subtotal:	**-$3,198.69**
	Electric Service Total:	**$6,992.42**

Messages

View your bill online anytime in My Account. Visit our website to sign up.

KWH consumption is billed using 15 Minutes interval electronic pulse data, which may not match your meter readings.

Business Solutions Center	877-444-0888
Electric Emergencies	800-450-7240
Contact your Account Executive	877-444-0888

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
07/10/2025	0402052155-00179	08/01/2025	$13,228.88	08/01/2025

Customer Name CITY OF ANTIGO
Service Address SPRBK TRMT
N2420 KOSZAREK RD
ANTIGO WI 54409-8849

Account Summary
Bill Period: 05/21/2025 to 06/30/2025

	Jun 2025	May 2025
Billing Days	41	69
Avg Temp	46°F	16°F
Heating Deg Days	131	208
Cooling Deg Days	69	12
KWH Used	133014	259947
Avg KWH / Day	3244.2	3767.3

Activity Since Last Bill

06/02/2025	Previous Balance	$6,283.49
06/30/2025	Late Fee	$62.83
07/03/2025	Cancel Service Bill	-$54.18
07/03/2025	Cancel Service Bill	-$0.68
07/03/2025	Cancel Service Bill	-$6,228.63
07/03/2025	Cancel Service Bill	-$5,969.17
07/03/2025	Cancel Service Bill	-$11,085.28
07/09/2025	Payment	-$6,283.49
07/10/2025	Misc Adjustment	-$413.09
07/10/2025	Misc Adjustment	-$30.75
	Balance	-$23,718.95
	Total Current Charges	$36,947.83
	Total Current Balance	$13,228.88

Electric Service

Elec Lrg Coml & Ind Sec Interruptible Cp

Meter 7000185

Interval Reading 07/01/2025	347
Interval Reading 06/01/2025	-97
	250
Meter Constant	x 400
Total Electric Use	100000 KWH
On Peak	36484.4 KWH
Off Peak	57735.4 KWH

Energy Charges/Credits

Daily Fixed Charge	30 Days at $21.86300	$655.89
Power Factor Adjustment	410 KW x (1/0.96 - 1/0.80) at 0.40 30 days Customer Demand: 410 KW Pwr Fctr: 94,220 KWH/sqrt(94,220 KWH^2)+(27,589 KVARH^2)) = 0.96	-$34.17

Demand Charges/Credits

Customer Demand	410 KW @ 02/03/2025 09:45 * $2.264	$928.24
Peak	272 KW @ 06/13/2025 11:15 * $0	$0.00
Peak Firm	0 KW @ 06/06/2079 00:00 * $20.496	$0.00
Peak Interruptible	272 KW @ 06/13/2025 11:15 * $12.457	$0.00
Intermediate	300 KW @ 06/13/2025 10:00 * $0	$0.00
Intermediate Firm	0 KW @ 06/06/2079 00:00 * $15.372	$0.00
Intermediate Interruptible	300 KW @ 06/13/2025 10:00 * $12.457	$3,737.10
Base	278 KW @ 06/09/2025 07:00 * $0	$0.00
Base Firm	278 KW @ 06/09/2025 07:00 * $0	$0.00

Please return this stub with your payment.

WPS

ACCOUNT NUMBER: 0402052155-00179

Amount Due By 08/01/2025	**$13,228.88**
A 1% late fee will be charged on any unpaid balance	
Please write your account number on your check	
Amount Enclosed	

CITY OF ANTIGO
N2420 KOSZAREK RD
ANTIGO WI 54409-8849

Wisconsin Public Service
PO Box 1109
Glenview IL 60025-8109

01104020521550017977001322888

Business Solutions Center 877-444-0888
Electric Emergencies 800-450-7240
Contact your Account Executive 877-444-0888

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
07/10/2025	0402052155-00179	08/01/2025	$13,228.88	08/01/2025

Base Interruptible	0 KW @ 06/06/2079 00:00 * $12.457		$0.00
Energy Charges/Credits			
On-Peak	36,484 KWH at $0.06843		$2,496.60
Off-Peak	57,735 KWH at $0.04025		$2,323.83
Buyout Energy	5,595 KWH at $0.210291		$1,176.58
MISO 105 Day Settlement	17,343 KWH at -$0.0089121		-$154.56
Other Service Charges/Credits			
WI Low Income Assistance Fee			$165.72
		Subtotal:	**$11,295.23**

Elec Parallel Generation 3Ph PG-2B

Meter 999986	Interval Reading 07/01/2025	0	
	Interval Reading 06/01/2025	-0	
	Total Electric Use	0 KWH	
	On Peak	2600.4 KWH	
	Off Peak	2175 KWH	
Energy Charges/Credits			
Customer Charge	30 Days at $0.65750		$19.73
Parallel Generation			
On-Peak Avoided Energy Cost Rate	2,600 KWH at -$0.03746		-$97.40
Off-Peak Avoided Energy Cost Rate	2,175 KWH at -$0.02724		-$59.25
Avoided Capacity Cost Rate	2,600 KWH at -$0.03326		-$86.48
		Subtotal:	**-$223.40**

Elec Lrg Coml & Ind Sec Interruptible Cp

Meter 7000185	Interval Reading 06/01/2025	97	
	Remove Reading 05/20/2025	-8495	
		97	
	Meter Constant	x 400	
	Total Electric Use	38800 KWH	
	On Peak	15961.4 KWH	
	Off Peak	22833 KWH	
Energy Charges/Credits			
Daily Fixed Charge	11 Days at $21.86300		$240.49
Power Factor Adjustment	410 KW x (1/1.00 - 1/0.80) at 0.40 11 days Customer Demand: 410 KW Pwr Fctr: 38,794 KWH/sqrt(38,794 KWH^2)+(3,255 KVARH^2)) = 1.00		-$15.03
Demand Charges/Credits			
Customer Demand	410 KW @ 02/03/2025 09:45 * $2.264		$309.41
Peak	251 KW @ 05/20/2025 18:45 * $0		$0.00
Peak Firm	0 KW @ 06/06/2079 00:00 * $11.387		$0.00
Peak Interruptible	251 KW @ 05/20/2025 18:45 * $7.367		$616.37
Intermediate	251 KW @ 05/21/2025 07:45 * $0		$0.00
Intermediate Firm	0 KW @ 06/06/2079 00:00 * $8.54		$0.00
Intermediate Interruptible	251 KW @ 05/21/2025 07:45 * $7.367		$0.00
Base	249 KW @ 05/21/2025 00:00 * $0		$0.00
Base Firm	249 KW @ 05/21/2025 00:00 * $0		$0.00
Base Interruptible	0 KW @ 06/06/2079 00:00 * $7.367		$0.00
Energy Charges/Credits			
On-Peak	15,961 KWH at $0.06843		$1,092.21
Off-Peak	22,833 KWH at $0.04025		$919.03
		Subtotal:	**$3,162.48**

Elec Parallel Generation 3Ph PG-2B

Meter 999986	Interval Reading 06/01/2025	0	
	Interval Reading 05/20/2025	-0	
	Total Electric Use	0 KWH	
	On Peak	309.8 KWH	
	Off Peak	1775.8 KWH	
Energy Charges/Credits			
Customer Charge	11 Days at $0.65750		$7.23

Business Solutions Center 877-444-0888
Electric Emergencies 800-450-7240
Contact your Account Executive 877-444-0888

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
07/10/2025	0402052155-00179	08/01/2025	$13,228.88	08/01/2025

Parallel Generation

On-Peak Avoided Energy Cost Rate	310 KWH at -$0.03374		-$10.46
Off-Peak Avoided Energy Cost Rate	1,776 KWH at -$0.02786		-$49.48
Avoided Capacity Cost Rate	310 KWH at -$0.03228		-$10.01
		Subtotal:	**-$62.72**

Elec Lrg Coml & Ind Sec Interruptible Cp

Meter 7000023

Remove Reading 05/20/2025	8495	
Set Reading 05/20/2025	-0	
	178	
Meter Constant	x 400	
Total Electric Use	71200 KWH	

Energy Charges/Credits

Daily Fixed Charge	20 Days at $21.86300	$437.26
Power Factor Adjustment	410 KW x (1/0.98 - 1/0.80) at 0.40 20 days Customer Demand: 410 KW Pwr Fctr: 70,909 KWH/sqrt(70,909 KWH^2)+(15,351 KVARH^2)) = 0.98	-$25.10

Demand Charges/Credits

Customer Demand	410 KW @ 02/03/2025 09:45 * $2.264	$618.83
Peak	352 KW @ 05/02/2025 11:00 * $0	$0.00
Peak Firm	0 KW @ 06/06/2079 00:00 * $11.387	$0.00
Peak Interruptible	352 KW @ 05/02/2025 11:00 * $7.367	$1,605.30
Intermediate	308 KW @ 05/02/2025 08:15 * $0	$0.00
Intermediate Firm	0 KW @ 06/06/2079 00:00 * $8.54	$0.00
Intermediate Interruptible	308 KW @ 05/02/2025 08:15 * $7.367	$0.00
Base	290 KW @ 05/01/2025 23:00 * $0	$0.00
Base Firm	290 KW @ 05/01/2025 23:00 * $0	$0.00
Base Interruptible	0 KW @ 06/06/2079 00:00 * $7.367	$0.00

Energy Charges/Credits

On-Peak	23,806 KWH at $0.06843	$1,629.04
Off-Peak	47,103 KWH at $0.04025	$1,895.90
Buyout Energy	361 KWH at $0.1676363	$60.55

Other Service Charges/Credits

WI Low Income Assistance Fee		$165.72
	Subtotal:	**$6,387.50**

Elec Parallel Generation 3Ph PG-2B

Meter 999986

Interval Reading 05/20/2025	0	
Interval Reading 05/01/2025	-0	
Total Electric Use	0 KWH	
On Peak	2431 KWH	
Off Peak	1526.2 KWH	

Energy Charges/Credits

Customer Charge	20 Days at $0.65750	$13.15

Parallel Generation

On-Peak Avoided Energy Cost Rate	2,431 KWH at -$0.03374	-$82.02
Off-Peak Avoided Energy Cost Rate	1,526 KWH at -$0.02786	-$42.51
Avoided Capacity Cost Rate	2,431 KWH at -$0.03228	-$78.47
	Subtotal:	**-$189.85**

Elec Lrg Coml & Ind Sec Interruptible Cp

Meter 7000023

Interval Reading 05/01/2025	8317	
Interval Reading 04/01/2025	-8007	
	310	
Meter Constant	x 400	
Total Electric Use	124000 KWH	
On Peak	50195.8 KWH	
Off Peak	72879 KWH	

Energy Charges/Credits

Daily Fixed Charge	30 Days at $21.86300	$655.89

Business Solutions Center 877-444-0888
Electric Emergencies 800-450-7240
Contact your Account Executive 877-444-0888

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
07/10/2025	0402052155-00179	08/01/2025	$13,228.88	08/01/2025

Power Factor Adjustment	410 KW x (1/0.95 - 1/0.80) at 0.40 30 days Customer Demand: 410 KW Pwr Fctr: 123,075 KWH/sqrt(123,075 KWH^2)+(41,170 KVARH^2)) = 0.95		-$32.37
Demand Charges/Credits			
Customer Demand	410 KW @ 02/03/2025 09:45 * $2.264		$928.24
Peak	395 KW @ 04/28/2025 10:45 * $0		$0.00
Peak Firm	0 KW @ 06/06/2079 00:00 * $11.387		$0.00
Peak Interruptible	395 KW @ 04/28/2025 10:45 * $7.367		$2,909.96
Intermediate	364 KW @ 04/28/2025 08:15 * $0		$0.00
Intermediate Firm	0 KW @ 06/06/2079 00:00 * $8.54		$0.00
Intermediate Interruptible	364 KW @ 04/28/2025 08:15 * $7.367		$0.00
Base	288 KW @ 04/30/2025 23:30 * $0		$0.00
Base Firm	288 KW @ 04/30/2025 23:30 * $0		$0.00
Base Interruptible	0 KW @ 06/06/2079 00:00 * $7.367		$0.00
Energy Charges/Credits			
On-Peak	50,196 KWH at $0.06843		$3,434.91
Off-Peak	72,879 KWH at $0.04025		$2,933.38
Buyout Energy	765 KWH at $0.0573952		$43.90
Other Service Charges/Credits			
WI Low Income Assistance Fee			$165.72
		Subtotal:	**$11,039.63**

Elec Parallel Generation 3Ph PG-2B

Meter 999986

Interval Reading 05/01/2025	0
Interval Reading 04/01/2025	-0
Total Electric Use	0 KWH
On Peak	1435.6 KWH
Off Peak	2187.6 KWH

Energy Charges/Credits			
Customer Charge	30 Days at $0.65750		$19.73
Parallel Generation			
On-Peak Avoided Energy Cost Rate	1,436 KWH at -$0.03374		-$48.45
Off-Peak Avoided Energy Cost Rate	2,188 KWH at -$0.02786		-$60.96
Avoided Capacity Cost Rate	1,436 KWH at -$0.03228		-$46.35
		Subtotal:	**-$136.03**

Elec Lrg Coml & Ind Sec Interruptible Cp

Meter 7000023

Interval Reading 04/01/2025	8007
Interval Reading 03/12/2025	-7837
	170
Meter Constant	x 400
Total Electric Use	68000 KWH
On Peak	21710.8 KWH
Off Peak	44252.6 KWH

Energy Charges/Credits		
Daily Fixed Charge	20 Days at $21.86300	$437.26
Power Factor Adjustment	410 KW x (1/0.99 - 1/0.80) at 0.40 20 days Customer Demand: 410 KW Pwr Fctr: 65,963 KWH/sqrt(65,963 KWH^2)+(9,843 KVARH^2)) = 0.99	-$26.23
Demand Charges/Credits		
Customer Demand	410 KW @ 02/03/2025 09:45 * $2.264	$587.89
Peak	284 KW @ 03/24/2025 10:45 * $0	$0.00
Peak Firm	0 KW @ 06/06/2079 00:00 * $11.387	$0.00
Peak Interruptible	284 KW @ 03/24/2025 10:45 * $7.367	$0.00
Intermediate	298 KW @ 03/19/2025 12:15 * $0	$0.00
Intermediate Firm	0 KW @ 06/06/2079 00:00 * $8.54	$0.00
Intermediate Interruptible	298 KW @ 03/19/2025 12:15 * $7.367	$1,463.58
Base	302 KW @ 03/30/2025 20:15 * $0	$0.00
Base Firm	302 KW @ 03/30/2025 20:15 * $0	$0.00
Base Interruptible	0 KW @ 06/06/2079 00:00 * $7.367	$0.00

Business Solutions Center	877-444-0888
Electric Emergencies	800-450-7240
Contact your Account Executive	877-444-0888

Bill Date	Account Number	Next Meter Read Date	Amount Due	Payment Due Date
07/10/2025	0402052155-00179	08/01/2025	$13,228.88	08/01/2025

Energy Charges/Credits			
On-Peak	21,711 KWH at $0.06843		$1,485.68
Off-Peak	44,253 KWH at $0.04025		$1,781.18
Buyout Energy	1,873 KWH at $0.0648941		$121.52
Other Service Charges/Credits			
WI Low Income Assistance Fee			$49.45
		Subtotal:	**$5,900.33**

Elec Parallel Generation 3Ph PG-2B

Meter 999986

Actual Reading 04/01/2025	0	
Start Reading 03/12/2025	-0	
Total Electric Use	0 KWH	

Energy Charges/Credits			
Customer Charge	19 Days at $0.65750		$12.49
Parallel Generation			
On-Peak Avoided Energy Cost Rate	3,079 KWH at -$0.03374		-$103.89
Off-Peak Avoided Energy Cost Rate	1,240 KWH at -$0.02786		-$34.55
Avoided Capacity Cost Rate	3,079 KWH at -$0.03228		-$99.39
		Subtotal:	**-$225.34**
		Electric Service Total:	**$36,947.83**

Messages

View your bill online anytime in My Account. Visit our website to sign up.

KWH consumption is billed using 15 Minutes interval electronic pulse data, which may not match your meter readings.

Antigo
"Antigo Area on the go"

To: Mayor and City Council

From: Charley Brinkmeier, Land Surveyor/Project Manager

Date: September 24, 2025

Re: Wastewater Treatment Plant Future Industrial Flow and Loading Evaluation and Request for Proposal

Strand & Associates, Inc have completed the Flow and Loading Evaluation and they have returned with some draft evaluations. We have also received an additional example of a full facility review from another community. We are in the process of comparing that with what was already completed and combining them and getting them to our interested firms.

DRAFT 9/2/2025
Strand Associates, Inc.®
910 West Wingra Drive
Madison, WI 53715
(P) 608.251.4843
www.strand.com

STRAND ASSOCIATES®
Excellence in Engineering℠

September 2, 2025

Mr. Charley Brinkmeier, Project Manager
City of Antigo
700 Edison Street
Antigo, WI 54409

Re: Wastewater Treatment Plant (WWTP) Future Industrial Flow and Loading Evaluation

Dear Mr. Brinkmeier:

Enclosed is the draft WWTP Future Industrial Flow and Loading Evaluation. Strand Associates, Inc.® would be happy to discuss any questions or comments you have.

Please call 608-251-4843 with questions.

Sincerely,

STRAND ASSOCIATES, INC.®

DRAFT

Randy Langer, P.E.

DRAFT

Nick Bartolerio, P.E.

Enclosure: Report

DRAFT 9/2/2025

Report for

City of Antigo, Wisconsin

Wastewater Treatment Plant Future Industrial Flow and Loading Evaluation

Prepared by:

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INTRODUCTION

The City of Antigo (City) owns a wastewater treatment plant (WWTP) that serves residential, commercial, and industrial customers within the City. The City has received inquiries regarding the potential to treat additional industrial loads at the WWTP. The purpose of this report is to evaluate the capacity of the existing WWTP processes to determine whether the existing WWTP has adequate capacity for increased industrial flows and loadings. Potential modifications to any processes that are identified as inadequate to treat the proposed flows and loadings are also presented.

EXISTING WASTEWATER TREATMENT FACILITIES

The City's WWTP consists of influent screening, grit removal, influent pumping, primary clarification, conventional activated sludge secondary treatment for carbonaceous 5-day biochemical oxygen demand (BOD_5) and ammonia removal, secondary clarification, tertiary sand filtration, ultraviolet (UV) disinfection, and aerobic sludge digestion. Based on the WWTPs current Wisconsin Pollutant Discharge Elimination System (WPDES) permit, the WWTP is designed for an average flow of 1.68 MGD. Record drawings indicate that the existing peak hour design flow (PHF) for the WWTP is 6.226 MGD.

Preliminary treatment is provided by mechanically cleaned influent screens followed by grit removal.

Grit tank effluent is pumped to two "squircle" primary clarifiers, each with a surface area of approximately 2,000 sf. Based on a maximum surface overflow rate (SOR) of 1,500 gallons per day per square foot (gpd/sf) as indicated in Wisconsin Administrative Code (WAC) NR 110, the existing primary clarifiers have a peak flow capacity of approximately 6 MGD. The WWTP adds alum upstream of the primary clarifiers for chemical phosphorus removal (CPR). Primary effluent is not regularly sampled to evaluate primary clarifier total suspended solids (TSS) or BOD_5 removal.

Primary effluent is conveyed to a conventional activated sludge system design for carbonaceous BOD_5 and ammonia removal. The activated sludge system consists of three trains with fine bubble diffusers, each with a volume of approximately 296,000 gallons and side water depth (SWD) of approximately 20 feet. The WWTP typically operates two of the three trains under current flow and loading conditions. The third train has been out of service for an extended period and would require rehabilitation to be brought into service.

Mixed liquor (ML) from the activated sludge process is conveyed to three "squircle" final clarifiers, each with a surface area of approximately 3,025 sf and a SWD of 12 feet. Secondary effluent flows from the secondary clarifiers to sand filters for tertiary treatment. Filter effluent is disinfected using a UV disinfection system and discharged through the plant outfall to Spring Brook.

Waste activated sludge (WAS) is thickened using a gravity thickener and mixed with primary sludge (PRS) for stabilization in aerobic digesters. The aerobic digesters consist of eight cells with a total volume of approximately 510,000 gallons and a SWD of approximately 11 feet at the maximum sludge level. Aeration for the aerobic digesters is provided with coarse bubble diffusers. Telescoping valves are provided to allow decanting for thickening of sludge in the digesters.

Digested sludge is thickened with a gravity belt thickener (GBT) and pumped to sludge storage tanks. These storage tanks were originally first-stage aeration tanks that were covered and converted to biosolids storage tanks. The storage tanks are mixed with a pumped mixing system. At a depth of 22 feet, these tanks provide a total storage capacity of approximately 930,000 gallons. Stabilized biosolids are land applied to agricultural fields.

Aeration for the activated sludge system and aerobic digesters is provided by five positive displacement blowers: four 125-horsepower (hp) blowers that are rated for approximately 1,900 standard cubic feet per minute (scfm) each and one 50-hp blower rated for XXX scfm. The blower discharge piping connects into one aeration header that allows various blowers to be dedicated to the aeration tanks or aerobic digesters. Based on the current piping arrangement, the small blower and one large blower can only be used for the aeration tanks and two large blowers can only be used for the aerobic digesters, while one of the large blowers can be used for either.

EXISTING INFLUENT FLOWS AND LOADS

Influent data from January 2020 through October 2024 was provided by the City to evaluate current flow and loading conditions.

A. Influent Flow Summary

A summary of the measured influent flow from January through October 2024 are presented in Tables 1 and 2. As shown, the average flow over this period was approximately 1.50 MGD and the maximum monthly flow (calculated as a 30-day rolling average) was approximately 2.44 MGD. Using the average influent flow of 1.50 MGD and the current design average flow (ADF) of 1.68 MGD, the WWTP is currently at approximately 89 percent of its design flow.

	2020	2021	2022	2023	2024
January	1.57	1.44	1.13	1.06	1.32
February	1.57	1.46	1.10	1.09	1.30
March	1.82	1.56	1.20	1.13	1.25
April	2.11	1.66	1.39	1.47	1.28
May	1.98	1.66	1.57	1.53	1.45
June	2.12	1.64	1.39	1.41	1.76
July	2.31	1.61	1.29	1.32	2.04
August	2.11	1.74	1.31	1.42	1.72
September	1.49	1.82	1.28	1.45	1.55
October	1.62	1.54	1.19	1.49	1.42
November	1.62	1.40	1.17	1.42	
December	1.40	1.18	1.13	1.32	
Average	1.81	1.56	1.26	1.34	1.51

Table 1 Influent Flow Summary: January 2020 to October 2024

	Influent Flow (MGD)					
	2020	2021	2022	2023	2024	2020 to 2024
Average	1.81	1.56	1.26	1.34	1.51	1.50
Maximum Month	2.44	1.89	1.61	1.57	2.09	2.44
Maximum Day	3.95	2.65	1.98	1.98	2.54	3.95

Table 2 Average and Maximum Influent Flow Summary: January 2020 to October 2024

B. Influent Load Summary

A summary of the measured influent BOD_5 and TSS loads from January through October 2024 are presented in Tables 3 and 4. As shown, the average and maximum month BOD_5 load during this period was 2,220 and 2,930 pounds per day (lb/day) while the average and maximum month TSS loads were 1,710 and 2,909 lb/day, respectively.

	BOD Load (lb/day)					
	2020	2021	2022	2023	2024	2020 to 2024
Average	2,210	2,240	2,090	2,250	2,300	2,220
Maximum Month	2,650	2,930	2,670	2,860	2,690	2,930
Maximum Day	8,180	3,940	6,020	6,510	4,720	8,180

Table 3 Influent BOD_5 Load Summary

	TSS Load (lb/day)					
	2020	2021	2022	2023	2024	2020 to 2024
Average	2,100	1,670	1,560	1,620	1,620	1,710
Maximum Month	2,909	2,034	1,891	1,934	2,182	2,909
Maximum Day	4,917	5,429	3,978	6,183	3,894	6,183

Table 4 Influent TSS Load Summary

C. Industrial Load Summary

Current influent loads from the City's largest industrial user were provided by the City for use in this evaluation. These influent flows and loads are presented in Table 5. Based on the annual average flow of 0.10 MGD and average BOD_5 load of 530 lb/day, this industry contributes approximately 7 percent of the total influent flow and 24 percent of the total influent BOD_5 load.

Parameter	2024 Average	2024 Maximum Month (Maximum 30-Day Rolling Average)
Flow (MGD)	0.10	0.13
BOD_5 (lb/day)	530	853
TSS (lb/day)	165	361
TP(lb/day)	12	18

Table 5 Major Industrial Wastewater Flow and Load Summary

POPULATION PROJECTIONS

Population projections for the City were gathered from the Wisconsin Department of Administration (WDOA) for us in this report. These projections are presented in Table 6. As shown, the WDOA projects a decrease in population in the City between 2020 and 2050. Therefore, no additional flows or loads from population growth are assumed in the evaluation.

Municipality	2020 Population	2030 Projection	2040 Projection	2050 Projection
City	8,100	7,467	6,689	5,920

Table 6 WDOA Population Projections

FUTURE REGULATORY CONSIDERATIONS

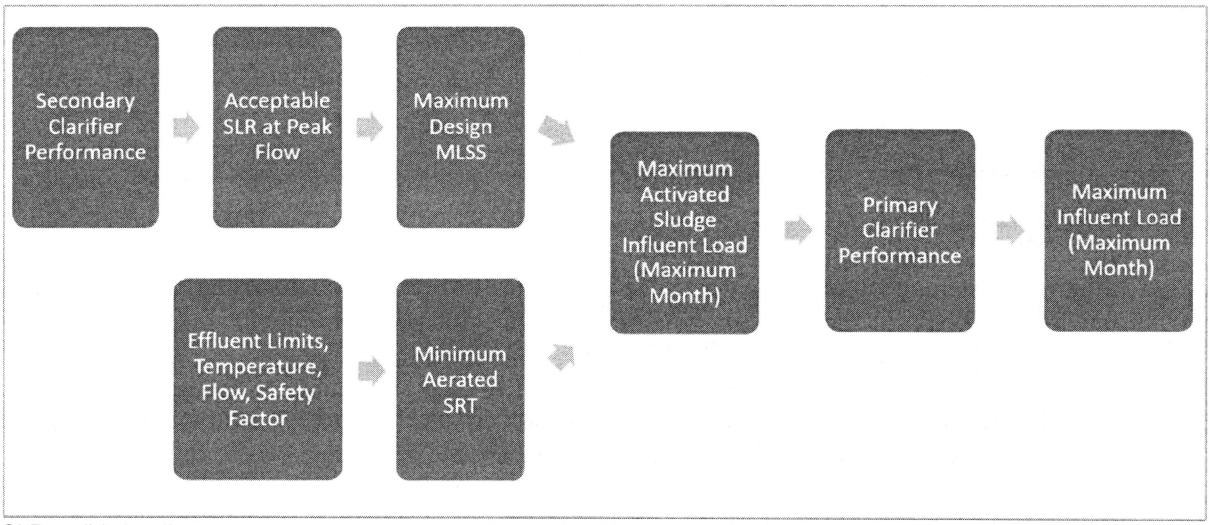
A cursory review of potential regulatory issues that may affect wastewater management in the foreseeable future for the City was conducted as is summarized in the following:

- Future water quality standards for ammonia-nitrogen (related to mussel and snail toxicity) could result in more stringent effluent ammonia limits in future WPDES permits.
- Total nitrogen (TN) limits appear likely within the 20-year planning period. TN can be removed using a modification to the existing activated sludge system to incorporate unaerated anoxic zones for denitrification.
- Influent flows are currently nearing the ADF capacity of the WWTP. If an increase in influent flow necessitates an increase in the WWTP ADF, an anti-degradation analysis will likely be required and more stringent ammonia or phosphorus limits could be imposed on the WWTP.
- Per- and polyfluoroalkyl substances (PFAS) and other compounds of emerging concern may affect the City's pretreatment program scope in the short-term and may require additional processes and/or changes to biosolids disposal in the long-term if land application of biosolids becomes inviable.

TREATMENT CAPACITY EVALUATION

The capacity of a WWTP is most commonly defined by the hydraulic capacity (the amount of flow that the WWTP can treat regardless of wastewater strength) and organic loading capacity (the amount of influent organic loading that the biological treatment process can treat while meeting effluent limits). While high loads of other parameters (nitrogen, phosphorus, and suspended solids) can impact treatment performance and effluent concentrations, biological treatment reactor size is generally not dictated by these parameters unless unusually high loadings of these parameters relative to the organic loading are present (which is not the case for the City). Therefore, the organic loading capacity is used as the basis for evaluation of treatment capacity in this report.

The determination of the organic loading capacity of an activated sludge WWTP requires the evaluation of several process components, including secondary clarifiers, activated sludge reactors, and primary clarifiers (if applicable). The organic loading capacity is also dependent on environmental conditions (temperature), flow rates, and effluent limits. Figure 1 presents a simplified flowchart of the steps used to determine the organic loading capacity of a WWTP. This section describes these steps in detail and how they are applied to evaluate the capacity of the WWTP.



SLR=solids loading rate
MLSS=mixed liquor suspended solids
SRT=solids retention time

Figure 1 Organic Loading Capacity Evaluation Steps

The primary design criterion for the activated sludge process is the SRT. The operating SRT of an activated sludge system impacts the treatment performance, oxygen demand, solids production, and robustness of system operation. When ammonia removal is required (as is the case for the City), the design SRT is established based on the growth rate of nitrifying microorganisms (nitrifiers), as these microorganisms are slower growing than microorganisms responsible for oxidation of carbonaceous matter (ordinary heterotrophic organisms). Because nitrifiers only grow in aerobic conditions, the SRT of the biomass in aerobic conditions (called the aerobic solids retention time [aSRT]) is the critical criterion

for nitrifying activated sludge system design. Based on a minimum wastewater temperature of approximately 10 degrees Celsius (°C), the minimum design aSRT used in this analysis is 12 days.

When establishing a design aSRT, the maximum month organic loading is typically used as the design condition because it generally takes the duration of multiple SRTs for a significant change in the microbial population to occur and nitrifying activated sludge systems typically operate at aSRT values in approximately 6 to 15 days. Therefore, the maximum month loading and cold weather conditions are typically used to determine the capacity of activated sludge systems, and these conditions will be used in the capacity evaluation presented in this report.

To determine the capacity of an activated sludge system based on a design aSRT value, the maximum allowable ML concentration is determined based on the design of the subsequent solids removal process (typically secondary clarifiers). If solids loading to the secondary clarification system exceeds its solids loading capacity, clarification performance will suffer, and solids will be discharged in the clarifier effluent. WAC NR 110 indicates a maximum SLR of 1.4 pounds per square foot per hour (lb/sf/hr) at the ADF and 2.0 lb/sf/hr at the PHF rate for secondary clarifiers following activated sludge systems.

Based on a maximum returned activated sludge (RAS) rate of 2.52 MGD (150 percent of ADF), this results in a maximum design MLSS concentration of 5,000 milligrams per liter (mg/L) to maintain a SLR of less than 2.0 lb/sf/hr at peak flow assuming two clarifiers are in service. With three clarifiers in service, a maximum design MLSS of 6,000 mg/L would maintain a SLR of less than 2.0 lb/sf/hr at peak flow. For the purposes of this evaluation, a maximum MLSS of 5,000 mg/L was used as a maximum practical concentration based on mixing and aeration limitations. Table 7 presents a summary of the maximum MLSS concentration determination for the WWTP, which was then used for the evaluation of treatment capacity in this report.

Number of Clarifiers In Service	Total Clarifier Area (sf)	PHF (MGD)	Maximum RAS Flow (MGD)	MLSS (mg/L)	SLR (lb/sf/hr)
2	6,050	6.23	2.52	4,000	2.0
3	9,075	6.23	2.52	5,000	1.7

[1]Maximum RAS flowrate of 150 percent of ADF.

Table 7 Secondary Clarifier SLR Calculation Summary

Data on the organic loading to the activated sludge system and secondary solids production was not available for this evaluation. Therefore, a typical WAS yield of approximately 0.7 pounds of total suspended solids per pound of 5-day biochemical oxygen demand (lb TSS/lb BOD_5) removed was used in this evaluation. Additional sampling and data collection is recommended to determine a site-specific yield to refine this capacity evaluation.

As described earlier, the existing activated sludge system consists of three trains, each with a volume of approximately 296,000 gallons. Two of these trains are typically used while the third has been out of service for an extended period and would require rehabilitation to be brought into service. Using design MLSS concentrations of 4,000 (two clarifiers in service) and 5,000 mg/L (three clarifiers in service), WAS yield of 0.7, and aSRT of 12 days, the existing activated sludge system has a maximum month

organic load capacity of approximately 3,500 lb/day (two clarifiers in service) to 4,400 lb/day (three clarifiers in service), assuming all three trains are in service.

With a maximum organic loading capacity of the activated sludge system defined, the maximum influent organic loading capacity of the WWTP can be calculated based on primary clarifier performance. The WWTP does not currently sample primary effluent to determine primary clarifier performance. The existing primary clarifiers have a SOR of approximately 550 gpd/sf at the maximum month condition, which typically results in a BOD_5 removal in the range of 35 to 40 percent for a typical domestic wastewater. However, the WWTP currently adds metal salt to the primary clarifiers for phosphorus removal, which is anticipated to result in higher-than-typical BOD_5 removal. Tables 8 and 9 present the resulting influent BOD_5 treatment capacity values calculated at a range in primary clarifier BOD_5 removal values. It is recommended that the WWTP further evaluate primary clarifier performance to more accurately determine the maximum organic loading capacity of the WWTP.

Activated Sludge Maximum Month BOD_5 Loading Capacity (lb/day)	Primary Clarifier BOD_5 Removal (%)	WWTP Maximum Month Influent Loading Capacity (lb/day)
3,500	30	5,000
3,500	35	5,380
3,500	40	5,830
3,500	45	6,360
3,500	50	7,000
3,500	55	7,780

Table 8 Maximum Organic Loading Capacity at Various Primary Clarifier BOD_5 Removal Values (Two Secondary Clarifiers in Service)

Activated Sludge Maximum Month BOD_5 Loading Capacity (lb/day)	Primary Clarifier BOD_5 Removal (%)	WWTP Maximum Month Influent Loading Capacity (lb/day)
4,400	30	6,290
4,400	35	6,770
4,400	40	7,330
4,400	45	8,000
4,400	50	8,800
4,400	55	9,780

Table 9 Maximum Organic Loading Capacity at Various Primary Clarifier BOD_5 Removal Values (Three Secondary Clarifiers in Service)

The treatment capacity values presented in Tables 8 and 9 are based on the three existing aeration trains being in operation; based on current operation with two trains, the maximum organic loading capacity would be approximately 66 percent of the values presented in Tables 8 and 9.

WWTP staff indicate that under typical conditions, the small aeration blower runs at full speed and one of the larger blowers is occasionally needed to supplement the air demand for the activated sludge system while one blower is used for the aerobic digestion system. As noted earlier, two large blowers and the small blower could be used for the activated sludge system, but one of the large blowers is not currently included in the aeration control system and does not have a variable frequency drive (VFD). If a VFD is added for this large blower and this blower is incorporated into the activated sludge system aeration control, it is anticipated that the aeration system has adequate capacity for the maximum organic loading values presented earlier (3,500 to 4,400 lb/day). The City could also consider modifying the discharge piping to allow an additional large blower to be used for the aerobic digestion system or aeration system to additional redundancy.

In addition to the secondary treatment process, the biosolids stabilization and sludge storage must also be considered, as an increase in organic loading will also result in an increase in sludge production.

Based on information provided by WWTP staff, the maximum month digester feed rate (primary sludge plus thickened waste activated sludge [TWAS]) was approximately 14,200 gallons per day in 2024. Using an overall aerobic digester volume of approximately 510,000 gallons, the digesters currently provide a SRT of approximately 36 days assuming no thickening or decanting occurs within the digesters. WAC NR 110 does not prescribe a minimum SRT in aerobic digesters. However, a value of 28 days is often used for covered aerobic digesters. This suggests that the existing aerobic digesters have approximately 28 percent excess capacity for increased solids production, assuming no decanting occurs in the digesters.

Sludge storage has become an increasingly important consideration for WWTPs, as land availability and land spreading timeframes have become challenging for some facilities. The existing sludge storage tanks have a volume of approximately 930,000 gallons. Limited data was available on aerobic digester performance, digested sludge solids content, or sludge storage feed flow for use in this evaluation. Based on measured PRS and TWAS flow, assumed PRS percent solids of 3.0 percent with 85 percent volatile solids (VS), assumed TWAS percent solids of 2.0 percent with 80 percent VS, aerobic digester VS destruction values of 50 percent for PRS and 30 percent for TWAS, and a sludge storage solids content of 4.0 percent, the existing sludge storage tanks provide approximately 193 days of storage. This is reduced to approximately 170 days if the sludge storage tanks are maintained at approximately 3.5 percent solids. WAC NR 204 requires that WWTPs have at least 180 days of sludge storage, although some facilities prefer to have more storage available based on the timing and ability of agricultural fields for land application. Based on this, the existing sludge storage tanks are at or near their capacity. If the WWTP cannot further thicken the sludge in the sludge storage tanks (either through GBT operation or decanting), additional sludge storage should be provided to accommodate an increase in influent loads and associated solids production.

SUMMARY

The City has received inquiries from an industry regarding the potential for the WWTP to treat higher loads from increased industrial discharges. The discharges that have been inquired about include two waste streams: one waste stream is an increase in an existing waste stream with similar characteristics and the second waste stream is a high strength whey product that is currently land applied.

Whey products often have BOD_5 values in excess of 10,000 mg/L and would require pretreatment if any significant volume were to be treated at the WWTP.

Based on information provided by this industry, the increase in the existing waste stream could range from approximately 25 to 100 percent greater than the current discharge. Using the current maximum month industrial discharge of 853 lb/day (as summarized in Table 5), this equates to an increase in influent BOD_5 load of approximately 213 to 853 lb/day.

Scenario	Influent BOD_5 Load
Current Maximum Month	2,930
25% Increase in Industrial Load	3,143
50% Increase in Industrial Load	3,463
100% Increase in Industrial Load	3,783

Table 10 Projected Load Scenarios

The capacity evaluation presented earlier suggests that the existing activated sludge system can treat significantly more load than is currently being treated. Based on approximately 35 percent BOD_5 removal in the primary clarifiers, the two aeration tanks that are currently in service provide a maximum organic loading capacity of approximately 5,380 lb/day at the maximum month condition with two secondary clarifiers in service. Therefore, there should be adequate capacity in these two trains to accommodate any of the growth scenarios presented in Table 10. However, this provides little redundancy should one of the two aeration trains or secondary clarifiers need to be removed from service for maintenance. To realize the full capacity of the activated sludge system, the aeration train that is currently out of service and the third secondary clarifier would require rehabilitation to be brought online. This would include new aeration diffusers and piping, new influent gates, new piping and valves inside the tanks, and a new secondary clarifier mechanism.

As discussed earlier, the existing sludge storage tanks likely require expansion to accommodate the additional sludge production from any significant increase in influent organic loading. In addition, it would be advantageous to expand the existing aeration control system to include one of the existing large blowers that is currently used as a stand-by blower for aerobic digestion.

Table 11 presents a preliminary opinion of probable construction cost (OPCC) for the improvements that have been identified to provide capacity to treat the '100 Percent Increase in Industrial Load' scenario presented in Table 10. These costs are based on an additional 350,000 gallons of sludge storage to provide during 180 days at the '100 Percent Increase in Industrial Load' scenario assuming 3.5 percent solids in the sludge storage tanks.

Component	OPCC
Aeration Blower Control Modifications	$130,000
Sludge Storage Expansion	$1,800,0000
Total	**$1,930,000**

Notes: All costs are in 1st Quarter 2025 Dollars.

Table 11 OPCC Summary–Industrial Capacity Improvements

A preliminary OPCC for other improvements that could be considered (but are not necessarily required to treat the increased industrial load) are presented in Table 12. These include rehabilitation of the secondary treatment process to improve redundancy while increasing capacity along with expansion of the aerobic digesters. An additional 125,000 gallons (25 percent additional volume) to the aerobic digestion system is also included, because it appears that the existing aerobic digestion system may near its treatment capacity at the '100 Percent Increase in Industrial Load' scenario.

Component	OPCC
Aeration Tank Rehabilitation	$700,000
Final Clarifier Rehabilitation	$800,000
Aerobic Digester Expansion	$1,100,000
Total	**$2,600,000**

Notes: All costs are in 1st Quarter 2025 Dollars.

Table 12 OPCC Summary–Other Improvements

There are several options that could be available to the City to fund potential modifications, including bonding, private loans, and State Revolving Fund (SRF) loans. While SRF loans have a subsidized interest rate, the WDNR may not provide a subsidized rate if it is determined that the project is being funded is for the purpose of industrial growth. Some WWTPs have worked directly with industrial customers to negotiate project funding when expansion is required specifically for a new or expanded industrial discharge. It is recommended that the City consult legal and financial advisers when evaluating funding options.