

MEMORANDUM

TO: Stephen Connearney – Carlisle Public Schools

FROM: Marianna N. Coombs – Weston & Sampson Services, Inc.

DATE: June 14, 2023

SUBJECT: Summary of Observations – Carlisle Public Schools Wastewater Treatment Facility

On Tuesday, May 16, 2023, Weston & Sampson Services, Inc. (WSS) performed a site visit of the wastewater treatment facilities (WWTF) located at Banta-Davis Field in Carlisle, MA and servicing the Carlisle Public Schools. The following is a summary of the observations made during the site visit.

Observations of Carlisle Public Schools WWTF

Documentation

- O&M Manual: Did not observe (will follow up on status on documents onsite)
- Site Plans: YES, onsite hardcopies available and electronic copies pending
- Active Permit: YES, GWDP# 783-2 (expires 2024)
- Compliance History: Review of Discharge Monitoring Reports (DMRs) suggests that the system is typically in compliance with permit limits. There are a few exceedances over the last 5 years that appear to be anomalies that cannot be traced back to any equipment failures.
- Current O&M Contract: Current, active with WSS
- Pumping Records: The primary tanks are typically pumped annually.

System

- Technology: Lift Station (1), Primary Tank (1), FET (1), RBC (1), Anoxic RBC (1), Clarifier (1) Sand Filter (1), UV Disinfection (1), Effluent Tank (1), Leaching Field (at the baseball field)
- Alarms: auto dialer enabled and working
- Chemicals: methanol for denitrification, sodium bicarbonate for alkalinity
- Generator: YES, requires semiannual inspection
- Extra system notes: 3 monitoring wells around the leaching field

Summary and Notes

- Lift station – did not observe during the site visit, but assume float trees and pump rail packages are needed within the next few years.
- FET – corrosion was noted on the rail brackets and float trees (Figure 1); float trees and pump rail packages are needed.
- Methanol room – the methanol drums need to be properly grounded; a copper ground bus should be mounted to the walls with individual ground cables/clips for each drum. Also, the electrical heater is disconnected (unsure of the functionality), and power wires are bare/exposed in a rated area.

- Aerobic RBC – there is significant corrosion evident on the exterior of the tank (Figure 2). A metal density test should be performed and the tank should be recoated/sandblasted.
- Anoxic RBC – corrosion is again evident on the equipment; a metal density test should be performed. The aluminum covers used as a walkway above the anoxic tank appear to be ok, but the steel support beneath should be tested to determine if they are structurally safe.
- Clarifier –corrosion is evident on the clarifier trough (Figure 3); a metal density test should be performed.
- Sand filter – the sand media is likely ok but will need to be replaced (along with air diffusers and underdrain) within the next 5-10 years, based on typical industry life expectancy. A metal density test should be performed on the tank.
- Effluent chamber - corrosion was noted on the rail brackets and float trees (Figure 4); float trees and pump rail packages are needed.
- Effluent valve pit – there is standing water in the valve pit that should be pumped out during the next pumping event (Figure 5). Also, the hatch frame and/or latch appears to be bent, preventing easy access to the pit.
- Instrumentation and controls – electrical connections in the control panel should be retorqued. The PLC CPU is obsolete, and a newer replacement should be considered (Figure 6).
- General – there are numerous float switches throughout the WWTF; floats are readily available and can be replaced as needed.
 - the alkalinity feed system (mixers and metering pumps) is not used, sodium bicarb is added to the system manually.
 - the effluent flowmeter should be calibrated/verified annually. The current flowmeter is obsolete.
 - the UV system bulbs are typically replaced annually.

Estimated Planning Level Budget Figures

The following table illustrates budget figures, for planning level purposes, that are estimated from an operational standpoint based on previous experience from projects of similar size and complexity. Further investigations will be required to provide accurate quotes for any projected work to be performed.

Item	Estimated Budget ¹
Routine operations and maintenance services (annually)	\$65,000
Additional operating expenses (annually) ²	\$9,000
Generator service – semiannual maintenance and 24/7 support (annually)	\$3,500
DEP compliance fee (annually)	\$8,500
DEP permit renewal (every five years)	\$8,000
Engineering evaluation for permit renewal ³	\$15,000
Immediate capital required improvements	<i>see attached</i>
Replacement reserve budget planning ⁴	<i>see attached</i>

¹ Estimated budget figures detailed further on attached spreadsheets.

² Does not include emergency situations, utilities, taxes, or other such costs not associated with the WWTF process directly. Assumes one routine pumping event of the primary tank.

³ Assumes evaluation is due in Year 2033.

⁴ Does not include cost of critical spare parts should spares be required or desired.

Figure 1



Figure 2

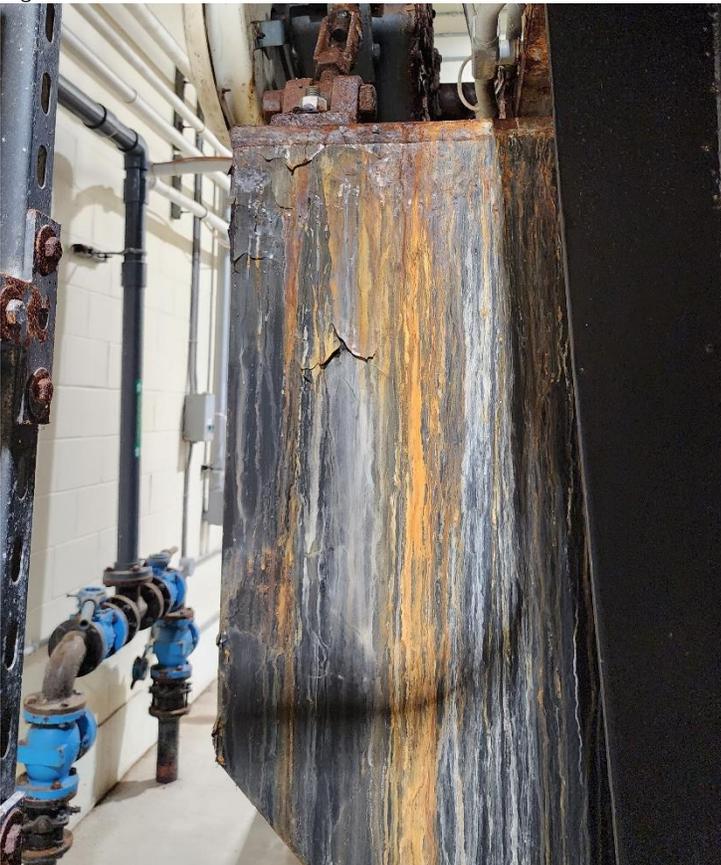


Figure 3



Figure 4



Figure 5



Figure 6



Carlisle Public Schools WWTF
GWDP# 783
Carlisle, MA

Equipment	Industry Life Expectancy	Concern	Recommended Improvement	Replacement Estimated Cost
Maintenance needs				
1 Tanks (steel) RBCs, Clarifier, Sand Filter	25 - 30 YEARS	Exterior Corroison	Metal density testing	\$ 2,500.00
2 Tanks (steel) RBCs, Clarifier, Sand Filter	25 - 30 YEARS	Exterior Corroison	Recoat and sandblast	\$ 15,000.00
3 Float trees and pump rail systems	15 - 20 YEARS	Corrosion	Replace float trees and rail systems at lift station, FET, and effluent chamber	\$ 24,000.00
4 Lift station pumps	5 - 10 YEARS	Industry life expectancy	Replace (2) pumps at lift station as needed	\$ 9,000.00
5 FET pumps	5 - 10 YEARS	Industry life expectancy	Replace (2) FET pumps as needed	\$ 2,000.00
6 Methanol grounding	25 - 30 YEARS	Missing	Add proper grounding	\$ 2,500.00
7 Metering Pumps (methonal)	5 - 10 YEARS	Industry life expectancy	Supply (2) LMI explosion proof pumps as needed	\$ 5,000.00
8 Methanol room heaters (Electric)	15 YEARS	Not connected and wires exposed	Replace methanol room heater if methanol is to be diluted	\$ 2,500.00
9 Rotating Biological Contactor (RBC), Aerobic/Anoxic	20 - 30 YEARS	Industry life expectancy	Determine replacement based on metal denisty testing	\$ 300,000.00
10 RBC feed pumps, Aerobic/Anoxic	5 - 10 YEARS	Industry life expectancy	Replace as needed	\$ 10,000.00
11 RBC drive systems, Aerobic/Anoxic	15 - 20 YEARS	Industry life expectancy	Replace as needed	\$ 7,000.00
12 RBC chain and sprocket, Aerobic/Anoxic	5 - 7 YEARS	Industry life expectancy	Replace as needed	\$ 15,000.00
13 RBC bearings, Aerobic/Anoxic	5 - 7 YEARS	Industry life expectancy	Replace as needed	\$ 1,500.00
14 Clarifier drive unit	15 - 20 YEARS	Industry life expectancy	Replace as needed	\$ 15,000.00
15 Sand filter media and air manifold	5 - 10 YEARS	Industry life expectancy	Replace sand media and air diffusers/underdrain as needed	\$ 6,500.00
16 Backwash pumps	5 - 10 YEARS	Industry life expectancy	Replace as needed	\$ 5,000.00
17 Level sensor	5 - 7 YEARS	Industry life expectancy	Replace as needed	\$ 2,500.00
18 Solenoid valves	5 - 10 YEARS	Industry life expectancy	Replace (4) as needed	\$ 1,000.00
19 Process Valves (Cast Iron)	20 YEARS	Corrosion	Replace as needed	\$ 16,000.00
20 Process Piping , Valves (PVC) and Pipe Support	15 - 20 YEARS	Corrosion	Replace as needed	\$ 20,000.00
21 Sump pumps	7 - 10 YEARS	Industry life expectancy	Replace as needed	\$ 2,500.00
22 Process Piping and Valves - Chemical Systems	10 YEARS	Industry life expectancy	Replace as needed	\$ 5,000.00
23 Exhaust Fans	20 YEARS	Industry life expectancy	Replace as needed	\$ 5,000.00
24 Emergency Generators	15 - 25 YEARS	Industry life expectancy	Replace as needed	\$ 25,000.00
25 Automatic Transfer Switches	20 YEARS	Industry life expectancy	Replace as needed	\$ 5,000.00
26 Control panel wiring	40 YEARS	Industry life expectancy	Retorque wire connections	\$ 4,000.00
27 PLC CPU	15 - 20 YEARS	Obsolete	Replace CPU with newer model	\$ 6,000.00
28 Input/Output cards	5 - 7 YEARS	No spares onsite	Purchase spares	\$ 1,500.00
29 Blowers	5 - 10 YEARS	Industry life expectancy	Replace (2) blowers as needed	\$ 7,000.00
30 Anoxic tank walkway	30 YEARS	Corrosion	Test structure and replace aluminum walkway as needed	\$ 10,000.00
31 UV System	1 YEAR	Industry life expectancy	Replace bulbs as needed	\$ 5,000.00
32 Effluent discharge pumps	5 - 10 YEARS	Industry life expectancy	Replace (2) effluent discharge pumps as needed	\$ 16,000.00
33 Flowmeter	5 - 7 YEARS	Obsolete	Replace unit if calibration fails	\$ 5,000.00
34 Flowmeter	5 - 7 YEARS	Requires annual calibration	Calibrate the effluent flowmeter	\$ 1,000.00
35 Floats	5 - 7 YEARS	Industry life expectancy	Replace floats throughout as needed	\$ 1,200.00
SUBTOTAL				\$ 561,200.00
Routine operational needs				
1 Routine O&M Services	1 YEAR	Permit requirement for contract operations	Routine 2 hrs/day, 5 days/wk (incl. labs for routine compliance)	\$ 65,000.00
2 Additional treatment operating expenses	1 YEAR	Includes chemicals, pumping, reagents, and routine consumables	Does not incl. utilities, taxes, or other indirect costs	\$ 9,000.00
3 Generator services	1 YEAR	Semiannual preventative maintenance and 24/7 support	-	\$ 3,500.00
4 DEP Compliance fee	1 YEAR	Required groundwater discharge fee based on design flow	-	\$ 8,500.00
5 Groundwater Discharge Permit Renewal	5 YEARS	Required by DEP	-	\$ 8,000.00
6 Engineering Evaluation	20 YEARS	Required by DEP	-	\$ 15,000.00
SUBTOTAL				\$ 109,000.00
TOTAL				\$ 670,200.00

Immediate Capital Required Improvements
Replacement / Reserve Budget Planning

YEAR														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037

1	\$ 2,500.00														
2		\$ 15,000.00													
3		\$ 24,000.00													
4	\$ 4,500.00		\$ 5,000.00				\$ 5,500.00		\$ 6,000.00					\$ 6,500.00	
5	\$ 1,000.00		\$ 1,500.00				\$ 2,000.00		\$ 2,500.00					\$ 3,000.00	
6	\$ 2,500.00														
7				\$ 2,500.00			\$ 3,000.00			\$ 3,500.00			\$ 4,000.00		
8	\$ 2,500.00														
9	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	
10		\$ 5,000.00					\$ 5,500.00			\$ 6,000.00				\$ 6,500.00	
11	\$ 3,500.00												\$ 5,000.00		
12	\$ 7,500.00				\$ 8,000.00				\$ 8,500.00					\$ 9,000.00	
13	\$ 1,500.00			\$ 2,000.00		\$ 2,000.00		\$ 2,500.00		\$ 2,500.00			\$ 3,000.00		
14			\$ 15,000.00												
15		\$ 6,500.00						\$ 7,500.00							
16		\$ 2,500.00						\$ 3,500.00			\$ 4,000.00				
17		\$ 2,500.00						\$ 3,500.00					\$ 3,500.00		
18	\$ 1,000.00		\$ 1,000.00		\$ 1,500.00		\$ 1,500.00		\$ 2,000.00		\$ 2,000.00		\$ 2,500.00	\$ 2,500.00	
19				\$ 4,000.00				\$ 4,500.00			\$ 5,000.00				
20					\$ 4,500.00				\$ 5,000.00			\$ 5,500.00			
21	\$ 2,500.00							\$ 3,500.00							
22			\$ 2,500.00									\$ 3,500.00			
23				\$ 5,500.00											
24						\$ 25,000.00									
25						\$ 5,000.00									
26	\$ 4,000.00														
27		\$ 6,000.00													
28		\$ 1,500.00													
29			\$ 3,500.00				\$ 4,500.00			\$ 5,500.00				\$ 6,500.00	
30											\$ 12,500.00				
31	\$ 5,000.00		\$ 5,500.00	\$ 5,500.00		\$ 6,000.00	\$ 6,000.00		\$ 6,500.00	\$ 6,500.00		\$ 7,000.00	\$ 7,000.00	\$ 7,500.00	
32			\$ 8,000.00		\$ 8,500.00			\$ 9,000.00		\$ 9,500.00			\$ 10,000.00	\$ 10,500.00	
33				\$ 6,000.00						\$ 7,000.00					
34	\$ 1,000.00	\$ 1,000.00	\$ 1,500.00	\$ 1,500.00	\$ 2,000.00	\$ 2,000.00	\$ 2,500.00	\$ 2,500.00	\$ 3,000.00	\$ 3,000.00	\$ 3,500.00	\$ 3,500.00	\$ 4,000.00	\$ 4,000.00	\$ 4,500.00
35	\$ 200.00	\$ 200.00	\$ 250.00	\$ 250.00	\$ 300.00	\$ 300.00	\$ 350.00	\$ 350.00	\$ 400.00	\$ 400.00	\$ 450.00	\$ 450.00	\$ 500.00	\$ 500.00	\$ 550.00
	\$ 59,200.00	\$ 84,200.00	\$ 63,750.00	\$ 47,250.00	\$ 44,800.00	\$ 65,800.00	\$ 41,350.00	\$ 47,350.00	\$ 50,400.00	\$ 62,400.00	\$ 44,450.00	\$ 52,450.00	\$ 53,000.00	\$ 46,500.00	\$ 70,550.00

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1	\$ 65,000.00	\$ 68,250.00	\$ 71,500.00	\$ 75,000.00	\$ 79,000.00	\$ 83,000.00	\$ 87,000.00	\$ 91,500.00	\$ 96,000.00	\$ 101,000.00	\$ 106,000.00	\$ 111,500.00	\$ 117,000.00	\$ 123,000.00	\$ 129,000.00
2	\$ 9,000.00	\$ 9,500.00	\$ 10,000.00	\$ 10,500.00	\$ 11,000.00	\$ 11,500.00	\$ 12,000.00	\$ 12,500.00	\$ 13,000.00	\$ 13,500.00	\$ 14,000.00	\$ 14,500.00	\$ 15,000.00	\$ 16,000.00	\$ 17,000.00
3	\$ 3,500.00	\$ 3,800.00	\$ 4,000.00	\$ 4,200.00	\$ 4,400.00	\$ 4,600.00	\$ 4,800.00	\$ 5,000.00	\$ 5,300.00	\$ 5,600.00	\$ 5,900.00	\$ 6,200.00	\$ 6,500.00	\$ 6,800.00	\$ 7,100.00
4	\$ 8,500.00	\$ 8,900.00	\$ 9,300.00	\$ 9,800.00	\$ 10,300.00	\$ 10,800.00	\$ 11,300.00	\$ 11,900.00	\$ 12,500.00	\$ 13,100.00	\$ 13,800.00	\$ 14,500.00	\$ 15,200.00	\$ 16,000.00	\$ 16,800.00
5		\$ 8,000.00					\$ 9,000.00					\$ 10,000.00			
											\$ 15,000.00				
	\$ 86,000.00	\$ 98,450.00	\$ 94,800.00	\$ 99,500.00	\$ 104,700.00	\$ 109,900.00	\$ 124,100.00	\$ 120,900.00	\$ 126,800.00	\$ 133,200.00	\$ 154,700.00	\$ 156,700.00	\$ 153,700.00	\$ 161,800.00	\$ 169,900.00
	\$ 145,200.00	\$ 182,650.00	\$ 158,550.00	\$ 146,750.00	\$ 149,500.00	\$ 175,700.00	\$ 165,450.00	\$ 168,250.00	\$ 177,200.00	\$ 195,600.00	\$ 199,150.00	\$ 209,150.00	\$ 206,700.00	\$ 208,300.00	\$ 240,450.00