Pennsylvania Department of Environmental Protection

Northeast Regional Office
CLEAN WATER PROGRAM

NPDES PERMIT FACT SHEET INDIVIDUAL SEWAGE

Application Type	**Renewal**	Application No.	**PA0055131**
Facility Type	**Non-Municipal**	APS ID	**598858**
Major / Minor	**Minor**	Authorization ID	**1449544**

Applicant and Facility Information

Applicant Name	**Lehigh County - Lehigh Valley Zoo**	Facility Name	**Lehigh Valley Zoo**
Applicant Address	5150 Game Preserve Road	Facility Address	5150 Game Preserve Road
	Schnecksville, PA 18078-3305		Schnecksville, PA 18078-3305
Applicant Contact	Amanda Shurr, President and CEO	Facility Contact	Kenneth L. Fulford, Operator
Applicant Phone	(610) 799-4171	Facility Phone	(610) 216-0150
Client ID	77890	Site ID	250615
Ch 94 Load Status	Not Overloaded	Municipality	North Whitehall Township
Connection Status	-	County	Lehigh
Date Application Received	August 2, 2023	EPA Waived?	Yes
Date Application Accepted	August 16, 2023	If No, Reason	-
Purpose of Application	Renewal of NPDES permit for discharge of treated sewage.		

Summary of Review

The applicant is requesting the renewal of an NPDES permit to discharge up to 0.021 MGD of treated sewage into Jordan Creek, a Trout Stocking, Migratory Fish (TSF, MF) receiving stream in State Water Plan Basin 2-C (Lower Lehigh River). As per the Department's current existing use list, the receiving stream does not have an existing use classification that is more protective than its designated use. This stream segment is not designated as a naturally reproducing trout stream as per PA Fish & Boat Commission. This discharge is not expected to affect public water supplies.

Limitations for pH and Fecal Coliform are technology-based and carried over from the previous permit.

Limitations for $CBOD_5$, Total Suspended Solids (TSS), and Ammonia-Nitrogen are water quality-based and carried over from the previous permit. WQM 7.0 modeling did not recommend stricter limits.

A BPJ-based limitation of 5.0 mg/L instantaneous minimum for Dissolved Oxygen (DO) has been added to the permit. eDMR Data from September 2023 to August 2024 (summarized on pages 4 and 5 of this fact sheet) confirms the facility is already meeting this limitation. The new limit will come into effect one year after the permit effective date. Reporting will still be required during the first year.

The monthly monitoring and reporting for Total Nitrogen, Total Phosphorous, Total Kjeldahl Nitrogen, and Nitrate-Nitrite as N has been maintained in this permit.

The Total Residual Chlorine (TRC) Calculation Spreadsheet did not recommend stricter limitations than the previous permit. The TRC limits from the previous permit have been maintained in this permit renewal.

Sewage discharges now require monitoring and reporting for E. Coli. A monitoring frequency of 1/month for design flows >= 1 MGD, 1/quarter for design flows >= 0.05 and < 1 MGD, 1/year for design flows of 0.002 – 0.05 MGD will be utilized.

Approve	Deny	Signatures	Date
X		/s/ Allison S. Zukosky / Project Manager	October 29, 2024
X		/s/ Amy M. Bellanca, P.E. / Acting Engineer Manager	11-22-24

Summary of Review

The latest DRBC Preliminary Docket No. D-2013-006 CP-3 includes monitoring/reporting for influent $CBOD_5$ and $CBOD_5$ Percent Removal at the same monitoring frequency as effluent $CBOD_5$ Monitoring/ reporting for Total Dissolved Solids with a 1,000 mg/L limit is also required. These limitations are carried over from the previous permit.

Monitoring frequencies for all parameters with limitations have been updated to the recommended frequencies found in Table 6-3 of DEP's Technical Guidance for the Development and Specification of Effluent Limitations (Document No. 362-0400-001).

Stream gage 1451800 (Jordan Creek near Schnecksville, PA) was used as a reference gage to develop the low flow yield (LFY) used to model the discharge. The Q_{7-10} and drainage area at gage 1451800 were obtained from USGS's StreamStats, RMI values were obtained using the Department's eMapPA, drainage areas were delineated using USGS's StreamStats interactive map, and elevations were obtained using the elevation profile tool on StreamStats.

The existing permit expired on January 31, 2024 and the application for renewal was received on time.

A Water Management System Inspection query indicated that on September 12, 2023 a Routine/Partial Inspection was performed.

There are currently no open violations for this client that warrant withholding issuance of this permit.

Sludge use and disposal description and location(s): As per the permittee's NPDES Renewal Application, sludge is hauled to the Lehigh County Authority Pre-Treatment Wastewater Facility in Fogelsville, PA by Allstate Septic Systems.

Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.021
Latitude	40º 39' 43.64"	Longitude	-75º 37' 34.74"
Quad Name	Slatedale	Quad Code	1340
Wastewater Description:	Sewage Effluent		
Receiving Waters	Jordan Creek (TSF, MF)	Stream Code	3424
NHD Com ID	26292349	RMI	17.4
Drainage Area	53	Yield (cfs/mi^2)	0.0415
Q_{7-10} Flow (cfs)	2.20	Q_{7-10} Basis	Stream Gage 1451800
Elevation (ft)	389.31	Slope (ft/ft)	-
Watershed No.	2-C	Chapter 93 Class.	TSF, MF
Existing Use	-	Existing Use Qualifier	-
Exceptions to Use	-	Exceptions to Criteria	-
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment	-		
Source(s) of Impairment	-		
TMDL Status	-	Name	-
Nearest Downstream Public Water Supply Intake	Bucks County Water & Sewer Authority		
PWS Waters	Delaware River	Flow at Intake (cfs)	-
PWS RMI	73.3	Distance from Outfall (mi)	~ 69

Treatment Facility Summary

Treatment Facility Name: Lehigh Valley Zoo

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary	Extended Aeration	Chlorination	0.0032 (2020-2022)

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.021	43.8	Not Overloaded	Holding Tank	Hauled

Compliance History

DMR Data for Outfall 001 (from September 1, 2023 to August 31, 2024)

Parameter	AUG-24	JUL-24	JUN-24	MAY-24	APR-24	MAR-24	FEB-24	JAN-24	DEC-23	NOV-23	OCT-23	SEP-23
Flow (MGD) Average Monthly	0.0050	0.0012	0.0015	0.0026	0.0070	0.0063	0.0018	0.0085	0.0101	0.0024	0.0013	0.0033
Flow (MGD) Daily Maximum	0.0256	0.0055	0.0041	0.0112	0.0769	0.0359	0.0130	0.507	0.0537	0.0108	0.0033	0.0080
pH (S.U.) Instantaneous Minimum	6.92	6.98	6.95	6.68	6.96	6.81	6.98	6.92	6.72	6.96	6.82	6.33
pH (S.U.) Instantaneous Maximum	7.94	7.70	7.66	7.80	7.69	7.58	7.63	7.56	7.52	7.53	7.62	7.88
DO (mg/L) Average Monthly	6.0	6.0	5.9	6.4	7.8	6.8	10.6	11.1	7.0	8.0	7.2	6.7
TRC (mg/L) Average Monthly	0.01	< 0.002	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01
TRC (mg/L) Instantaneous Maximum	0.14	0.02	0.03	0.03	0.08	0.09	0.02	0.04	0.19	0.04	0.28	0.07
CBOD5 (mg/L) Average Monthly	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.2	< 2.3	< 2.0
CBOD5 (mg/L) Raw Sewage Influent Average Monthly	92.2	148.0	239	67.6	648.0	32.5	293.0	130	7.6	19.9	420.8	124.0
CBOD5 % Removal (%) Raw Sewage Influent Average Monthly	97.8	98.6	99.2	97.0	99.7	93.8	99.3	98.5	73.7	89.2	98.9	98.4
TSS (mg/L) Average Monthly	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.8	< 4.0	< 4.0	10.2	< 4.0	< 4.0	6.0
Total Dissolved Solids (mg/L) Average Quarterly			627.0			446.0			608.0			518.0
Fecal Coliform (No./100 ml) Geometric Mean	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
Fecal Coliform (No./100 ml) Instantaneous Maximum	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.0

Nitrate-Nitrite (mg/L) Average Monthly	88.2	102.0	78.4	48.0	21.3	8.66	7.5	6.4	25.0	51.7	26.6	31.3
Total Nitrogen (mg/L) Average Monthly	88.2	104	80.3	49.7	21.3	8.66	7.5	7.2	25.7	53	26.6	31.3
Ammonia (mg/L) Average Monthly	< 0.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.10	< 0.1	< 0.10	< 0.1	0.1	< 0.1
TKN (mg/L) Average Monthly	< 0.7	1.5	1.9	1.8	< 0.7	< 0.70	< 0.7	0.8	< 0.70	1.4	< 0.7	< 0.7
Total Phosphorus (mg/L) Average Monthly	7.86	9.05	6.20	2.93	2.21	0.97	1.08	1.58	2.64	3.82	2.50	3.01

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.021
Latitude 40º 39' 40.77" **Longitude** -75º 37' 32.66"
Wastewater Description: Sewage Effluent

Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Pollutant	Limit (mg/l)	SBC	Federal Regulation	State Regulation
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)
	1.6	IMAX		
E. Coli	Report	IMAX	-	92a.61
Dissolved Oxygen	5.0	Inst. Minimum	-	BPJ

Water Quality-Based Limitations

The following limitations were determined through water quality modeling:

Parameter	Limit (mg/l)	SBC	Model
$CBOD_5$ Nov 1 - Apr 30	20.0	Average Monthly	Previous Modeling
	40.0	IMAX	
$CBOD_5$ May 1 - Oct 31	10.0	Average Monthly	
	20.0	IMAX	
Total Suspended Solids	15.0	Average Monthly	
	30.0	IMAX	
Ammonia-Nitrogen Nov 1 - Apr 30	9.0	Average Monthly	
	18.0	IMAX	
Ammonia-Nitrogen May 1 - Oct 31	3.0	Average Monthly	
	6.0	IMAX	
Carbonaceous Biochemical Oxygen Demand (CBOD5) Raw Sewage Influent	Report	Average Monthly	DRBC Docket D-2013-006 CP-3
CBOD5 Minimum % Removal (%)	Report	Average Monthly	
Total Dissolved Solids	1,000	Average Quarterly	
Nitrate-Nitrite as N	Report	Average Monthly	
Total Nitrogen	Report	Average Monthly	
Total Phosphorus	Report	Average Monthly	
Total Kjeldahl Nitrogen	Report	Average Monthly	

Anti-Backsliding

No limitations were made less stringent.

Modeling Using USGS Stream Gage 001451800 – Jordan Creek near Schnecksville, PA:

Name	Value
USGS Station Number	01451800
Station Name	Jordan Creek near Schnecksville, Pa.
Station Type	Gaging Station, continuous record
Latitude	40.66176
Longitude	-75.62685
NWIS Latitude	40.66176219
NWIS Longitude	-75.626854
Is regulated?	false
Agency	United States Geological Survey
NWIS Discharge Period of Record	02/01/1966 - 10/22/2024

Characteristic Name	Value	Units
Contributing Drainage Area	53	square miles

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
1 Day 10 Year Low Flow	1.7	cubic feet per second	✓	42		49	Statistic Date Range 4/1/1966 - 3/31/2008
7 Day 2 Year Low Flow	7	cubic feet per second	✓	42		49	Statistic Date Range 4/1/1966 - 3/31/2008
7 Day 10 Year Low Flow	2.2	cubic feet per second	✓	42		49	Statistic Date Range 4/1/1966 - 3/31/2008

$$\boldsymbol{LFY} = \frac{Q_{7-10}}{Stream\ Gage\ Drainage\ Area} \times \frac{2.2\ cfs}{53\ mi^2} = \mathbf{0.0415}$$

$$\boldsymbol{Stream\ Flow\ at\ Outfall} = Outfall\ 001\ Drainage\ Area \times LFY = 53\ mi^2 \times 0.0415 = \mathbf{2.20\ cfs}$$

Modeling Using USGS StreamStats:

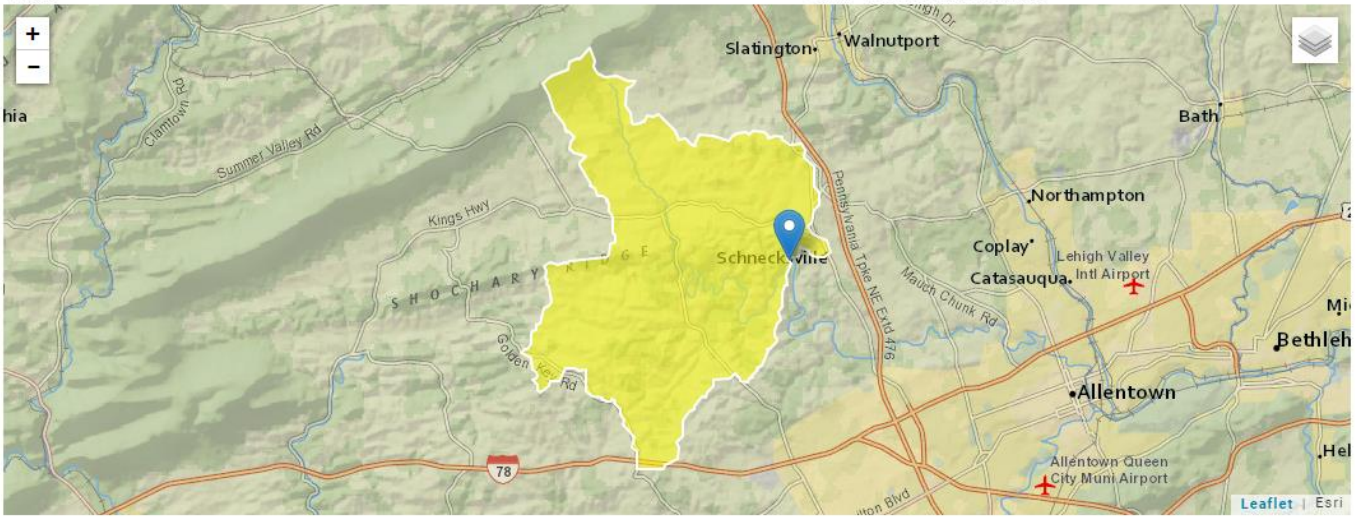
At Outfall 001 on Jordan Creek:

RMI	Elevation (ft)	Drainage Area (mi^2)	$Q_{7\text{-}10}$ Flow (cfs)
17.4	389.31	53	1.59

$$Low\ Flow\ Yield\ using\ StreamStats = \frac{1.59\ ft^3/sec}{53\ mi^2} = \mathbf{0.03}\ \frac{\boldsymbol{ft^3/sec}}{\boldsymbol{mi^2}}$$

StreamStats Report

Region ID:	PA
Workspace ID:	PA20241023150550302000
Clicked Point (Latitude, Longitude):	40.66212, -75.62632
Time:	2024-10-23 11:06:12 -0400



Parameter Code	Parameter Name	Value	Units
DRNAREA	Drainage Area	53	square miles

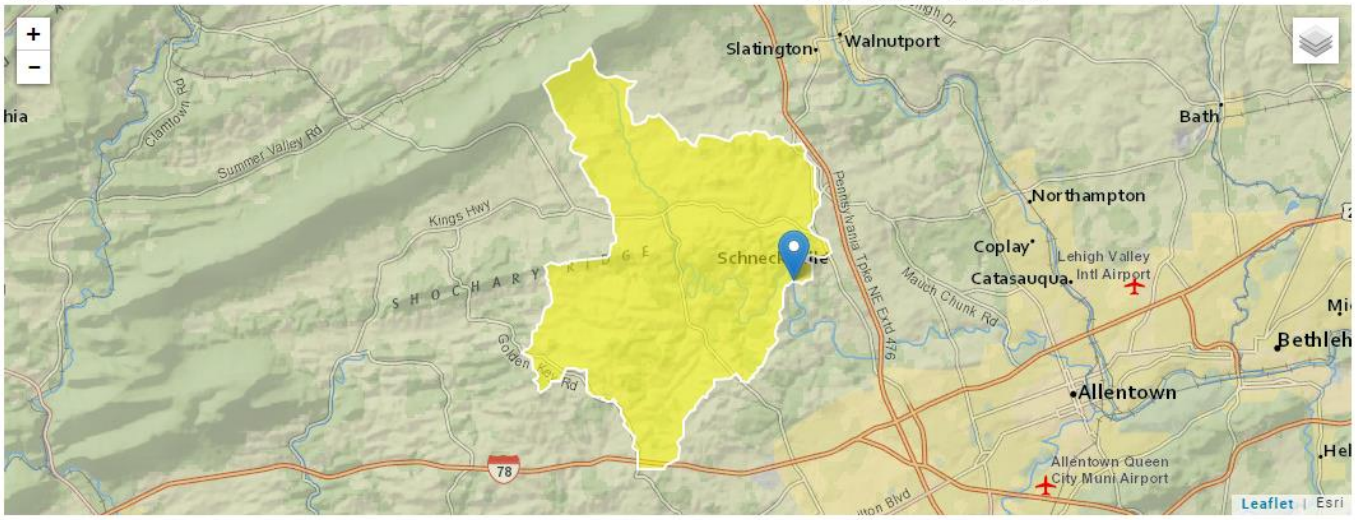
Statistic	Value	Unit
7 Day 2 Year Low Flow	4.54	ft^3/s
30 Day 2 Year Low Flow	6.74	ft^3/s
7 Day 10 Year Low Flow	1.59	ft^3/s

At confluence with Unnamed Tributary to Jordan Creek (3454):

RMI	Elevation (ft)	Drainage Area (mi^2)
16.70	380.38	53.5

StreamStats Report

Region ID:	PA
Workspace ID:	PA20241023151241451000
Clicked Point (Latitude, Longitude):	40.65359, -75.62430
Time:	2024-10-23 11:13:03 -0400



Parameter Code	Parameter Name	Value	Units
DRNAREA	Drainage Area	53.5	square miles

Modeling using the state-wide Low-Flow Yield (LFY) of 0.1 cfs/mi²:

$$\frac{0.1\ ft^3/sec}{mi^2} \times 53\ mi^2 = \frac{\mathbf{5.3\ ft^3}}{\mathbf{sec}}$$

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
02C	3424	JORDAN CREEK

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
17.400	LV Zoo	PA0055131	0.021	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			3

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

2.2	= Q stream (cfs)	0.5	= CV Daily
0.021	= Q discharge (MGD)	0.5	= CV Hourly
30	= no. samples	1	= AFC_Partial Mix Factor
0.3	= Chlorine Demand of Stream	1	= CFC_Partial Mix Factor
0	= Chlorine Demand of Discharge	15	= AFC_Criteria Compliance Time (min)
0.5	= BAT/BPJ Value	720	= CFC_Criteria Compliance Time (min)
0	= % Factor of Safety (FOS)		=Decay Coefficient (K)

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 21.621	1.3.2.iii	WLA cfc = 21.072
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 8.057	5.1d	LTA_cfc = 12.250

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) = 1.635	

WLA afc	(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...
	...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...
	...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)

WQM 7.0 - LV Zoo.pdf

DRBC Docket 2013-006 CP-3.pdf

Pennsylvania
Department of
Environmental Protection

Approve	Deny	Signatures	Date
X		/s/ Allison S. Zukosky / Project Manager	October 29, 2024
X		/s/ Amy M. Bellanca, P.E. / Acting Engineer Manager	11-22-24