

March 31, 2023

Compliance Assurance Section
Division of Water Pollution Control
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9726

Subject: Village of Hanover Park STP#1 NPDES Permit No. IL0034479 – Compliance Submittal for Special Condition 18.E – Phosphorus Discharge Optimization Plan (PDOP) Annual Report

Dear IEPA Compliance Assurance Section:

On behalf of the Village of Hanover Park (Village), we are submitting this NPDES Special Condition 18.E compliance report for the Sewage Treatment Plant (STP) PDOP Annual Report, due by March 31, 2023.

Special Condition 18.E – Phosphorus Discharge Optimization Plan (PDOP) Annual Report

Special Condition 18.E states that an annual progress report on the optimization of the existing treatment facilities shall be submitted by March 31, 2023. The Village has performed a Chemical Phosphorus Removal Evaluation to compare three (3) chemicals (coagulants) to be used to achieve a 1.0 mg/L monthly average effluent limit by October 1, 2028. The evaluation, which is attached, developed a general implementation schedule for the chemical phosphorus removal system.

Chemical Phosphorus Removal Evaluation Results Summary

Operating data was compiled and analyzed from January 2020 through August 2022. On average, phosphorus influent and effluent concentrations were 7.8 mg/L and 4.8 mg/L respectively. The current process achieves some removal biologically; however, the observed biological phosphorus removal is not consistent or sufficient to achieve the effluent limit of 1.0mg/L. Therefore, phosphorus removal by chemical addition is recommended.

The evaluation considered aluminum-based metal salts, including alum and poly-aluminum chloride (PAC), and lanthanide chloride (FX300). The evaluation looked at dosage requirements and chemical costs, chemical sludge production and sludge handling costs, and capital cost for implementation of the chemical feed system.

The evaluation recommends that an alum feed system is installed in a new chemical building and comprised of a duplex feed pump skid with a 2,550-gallon chemical storage tank that will provide around 30 days of chemical storage. Chemical shall be dosed at either the distribution box upstream of the clarifier or at the final ring at the oxidation ditch. Two dosing points are not required but can be considered.

We trust this submittal satisfies the Special Condition 18.E PDOP Annual Report requirements. Please contact me at 815-444-3372 if you have questions.

Sincerely,

BAXTER & WOODMAN, INC.
CONSULTING ENGINEERS



Nichole Schaeffer, P.E., BCCE
Environmental Department Manager

C: Christian Rebone, Wastewater Treatment Plant Supervisor, Village of Hanover Park (via email)

Enclosures

Chemical Phosphorus Removal Evaluation, Village of Hanover Park, Illinois (2023)

ELECTRONIC SUBMITTAL ONLY



Chemical Phosphorus Removal Evaluation

Village of Hanover Park, IL



BAXTER & WOODMAN
Consulting Engineers

March 2023

Village of Hanover Park, Illinois

Chemical Phosphorus Removal Evaluation

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LIST OF ABBREVIATIONS

avg	-	average
alum	-	aluminum sulfate
BOD5	-	five day biochemical oxygen demand
BPR	-	biological phosphorus removal
BNR	-	biological nutrient removal
CBOD5	-	five day carbonaceous biochemical oxygen demand
cfm	-	cubic feet per day
cfm	-	cubic feet per minute
cfs	-	cubic feet per second
col/100 mL	-	colonies (bacteria) per 100 milliliters
DO	-	dissolved oxygen
EPA	-	Environmental Protection Agency
ft	-	feet
ft ²	-	square feet
ft ³	-	cubic feet
gpd	-	gallons per day
gpm	-	gallons per minute
hp	-	horsepower
hr	-	hour
in	-	inches
lbs	-	pounds
max	-	maximum
MG	-	million gallons (or mil gal)
MGD	-	million gallons per day
mg/L	-	milligrams per liter (parts per million in dilute solutions)
min	-	minimum
ML	-	mixed liquor
MLSS	-	mixed liquor suspended solids
MLVSS	-	mixed liquor volatile suspended solids
mo	-	months
NH ₃ N	-	ammonia nitrogen

P	-	phosphorus
PAC	-	polyaluminum chloride
PE	-	population equivalent
ppd	-	pounds per day (or lb/day)
psig	-	pounds per square inch gauge
RAS	-	return activated sludge
REE	-	rare-earth element
RW	-	raw wastewater
SRT	-	solids retention time
TKN	-	total Kjeldahl nitrogen
TN	-	total nitrogen
TP	-	total phosphorous
TSS	-	total suspended solids (or SS)
µg	-	micrograms
µg/L	-	micrograms per liter (parts per billion in dilute solutions)
VFA	-	volatile fatty acid
VFD	-	variable frequency drive
VSS	-	volatile suspended solids
WAS	-	waste activated sludge
WWTP	-	wastewater treatment plant

LIST OF DEFINITIONS

Aerobic

A condition in which sufficient dissolved oxygen (and other forms of oxygen, such as NO₃-Oxygen (nitrate) or SO₄-Oxygen) is available for use by microorganisms.

Anaerobic

A condition in which dissolved oxygen or NO₃-Oxygen (nitrate) is not available are used by microorganisms.

Anoxic

A condition in which dissolved oxygen is not available and other forms of oxygen, such as NO₃-Oxygen or SO₄-Oxygen, are used by microorganisms.

Aerobic digestion

Microbial decomposition of wastewater sludge in the presence of oxygen.

Anaerobic digestion

Microbial decomposition of wastewater sludge in the absence of oxygen

Biochemical oxygen demand

Measurement of the oxygen utilized by microorganisms in the stabilization of the organic matter present in wastewater.

Denitrification

Anoxic conversion of nitrate to nitrate gas, which is removed from the wastewater.

Infiltration

Water other than wastewater that enters a sewage collection system (including sewer service connections) from the ground through such sources as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.

Inflow

Water other than wastewater that enters a sewage collection system (including sewer service connections) from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm water, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration.

Nitrification

Aerobic conversion of ammonia to nitrate by microorganisms.

Phosphorous Accumulating Organisms (PAOs)

Specific microorganisms that utilize VFA's to release soluble phosphorus under anaerobic conditions and uptake soluble phosphorus under aerobic conditions.

Readily biodegradable chemical oxygen demand (rbCOD)

Portion of chemical oxygen demand that can be easily broken down in volatile fatty acids (VFA's) which support biological phosphorus removal.

Readily biodegradable chemical oxygen demand (ffCOD or ccCOD)

Soluble portion of chemical oxygen demand determined after filter sampling. The particulate portion remains on the filter. This soluble portion is quickly and easily assimilated by biomass for phosphorus removal.

Soluble Non-Reactive Phosphorus

Soluble portion of chemical oxygen demand determined after filter sampling. The particulate portion remains on the filter. This soluble portion does not assimilate by biomass for phosphorus removal and essentially passes through the STP. This portion is important when considering very low total phosphorus limits such as 0.1 mg/L.

Sludge

Concentrated organic solids produced during wastewater treatment (also termed "biosolids").

Suspended solids

Particulate matter suspended in wastewater.

Volatile fatty acids

Organic substances that select microorganisms (PAO's specifically) use to release phosphorus under anaerobic conditions. Also utilized in denitrification, thus can create competing demands.

Volatile suspended solids

That portion of the suspended solids that is destroyed at temperatures above 550°C and is an indicator of the organic fraction of the suspended solids.

EXECUTIVE SUMMARY

The Village of Hanover Park operates a sewage treatment plant (STP) that provides service to the DuPage County portion of the Village. This facility is rated for an average flow of 2.42 MGD, and a maximum flow of 8.68 MGD. The Village of Hanover Park STP No. 1 renewed their NPDES Permit No. IL0034479 in 2022. Special Condition 18 requires the STP to achieve a 1.0 mg/L monthly average effluent limit by October, 2028.

Operating data was compiled and analyzed from January 2020 through August 2022. On average, phosphorus influent and effluent concentrations were 7.8 mg/L and 4.8 mg/L respectively. The current process achieves some removal biologically; however, the observed biological phosphorus removal is not consistent or sufficient to achieve the effluent limit of 1.0mg/L. Therefore, phosphorus removal by chemical addition is proposed.

The evaluation considered aluminum-based metal salts, including alum and poly-aluminum chloride (PAC), and rare-earth products, such as lanthanide chloride (FX300). The evaluation looks at dosage requirements and chemical costs, chemical sludge production and sludge handling costs, and capital cost for implementation of the chemical feed system.

Alum is perhaps the most widely used chemical in wastewater treatment plants. It can achieve target effluent limits of 1.0 mg/L and lower very efficiently, but becomes limited at effluent limits less than 0.1 mg/L. In general, alum requires higher chemical dosages, reflected in the chemical feed equipment and storage volume required. It also produces higher chemical sludge volumes when compared to other chemicals. However, at roughly a \$1.33 per gallon, the lower chemical costs can offset the higher sludge handling costs and initial capital costs.

PAC is a pre-hydrolyzed aluminum-based compound and as such it removes phosphorus in a similar manner as alum. The basic nature of PAC can mitigate the effects of chemical addition on pH levels. However, its lower molecular weight results in a lower dosage rate than alum while using the same molar ratio. Sludge production is also about 20% lower than alum because there is less residual aluminum to form sludge. The downside of PAC is that at a cost of \$2.76 per gallon, more than double the cost for alum.

Lanthanide chloride and other rare-earth element (REE) blends are highly efficient at removing phosphorus, especially at ultra-low levels <0.1 mg/L. The main drawback of the lanthanide chlorides is the bulk chemical price – approximately ten times that of alum. Therefore, for the target effluent concentration of 1.0 mg/L, lanthanide chloride is simply cost-prohibitive.

It is recommended that an alum feed system is installed in a new chemical building and comprised of a duplex feed pump skid with a 2,550-gallon chemical storage tank that will provide around 30 days of chemical storage. Chemical shall be dosed at either the distribution box upstream of the clarifier or at the final ring at the oxidation ditch. Two dosing points are not required but can be considered.

1. PROJECT BACKGROUND AND SCOPE

1.1 Project Overview

The Village of Hanover Park operates a wastewater conveyance and treatment facility that provides service to the DuPage County portion of the Village's residents, industries, and businesses. The Village of Hanover Park STP No. 1 received their renewed NPDES Permit No. IL0034479 with an effective date of May 01, 2022. Special Condition 18 requires an annual progress report to be submitted on March 31 of each year and to achieve a 1.0 mg/L monthly average effluent limit by October 1, 2028. The purpose of this report is to satisfy the annual progress report requirement in the NPDES permit and develop a plan to implement chemical phosphorus removal by October 1, 2028.

1.2 Evaluation Methodology

Phosphorus removal in wastewater can be achieved by chemical precipitation. Typically, it involves the addition of metal salts, such as aluminum sulfate (alum) or polyaluminum chloride (PAC), to react with soluble phosphate and form precipitates that are removed by clarification or filtration. More recently, technologies using rare earth elements (e.g. Lanthanum and Cerium) have emerged with claims of effective removal of phosphorus to very low levels. The addition of these chemicals results in the production of chemical sludge in addition to sludge resulting from the biological treatment process, which will directly impact the STP's sludge handling facilities. Chemical addition can also impact water quality parameters, such as pH and alkalinity. All of this should be taken into consideration in the selection of the recommended chemical.

The study will evaluate three (3) coagulants: alum, PAC, and lanthanide chloride based on the following approach:

1. Determine the chemical requirements for each alternative to achieve a monthly average effluent concentration of 1.0 mg/L by chemical means only. Any potential phosphorus removal achieved by enhanced biological phosphorus removal (EBPR) will be disregarded for the purposes of the study.
2. Determine the anticipated chemical sludge produced by the chemical phosphorus removal process, and its impact on sludge hauling costs.
3. Develop an Engineer's Opinion of Probable Cost (EOPC) for the implementation of a chemical phosphorus removal system for each alternative. Annual operation and maintenance (O&M) costs will be documented for each alternative.

1.3 Current Regulations

The current Illinois Environmental Protection Agency (IEPA) NPDES permit No. IL0034479 is effective for a period of five years, until April 30, 2027. The current permit has requirements for monitoring effluent nutrient loadings, meeting a monthly total phosphorus limit of 1 mg/L. The current NPDES permit effluent limits for flows up to a Design Maximum Flow (DMF) of 8.68 MGD are shown in Table 1, and a copy of the NPDES permit is provided in Appendix A.

A limit of 1.0 mg/L of effluent total phosphorus will become effective by October 2028 since chemical phosphorus removal will be utilized.

TABLE 1

NPDES Permit No. IL0034479 STP Monitoring Frequency and Effluent Limits

Parameter	Concentration Limits (mg/L)		
	Monthly Average	Weekly Average	Daily Maximum
CBOD ₅	10		20
TSS	12		24
pH	Shall be in the range of 6 to 9 Standard Units		
Fecal Coliform	Monthly geometric mean < 200 units per 100 mL (May -Oct)		
Chlorine Residual			0.038
Ammonia Nitrogen			
April - October	1.5		3.0
Nov. - Feb.	4.0		5.0
March	2.6	6.5	8.0
Total Phosphorus (as P)		Monitor Only*	
Dissolved Phosphorus		Monitor Only	
Nitrate/Nitrite		Monitor Only	
Total Kjeldahl Nitrogen (TKN)		Monitor Only	
Alkalinity		Monitor Only	
Temperature		Monitor Only	
Specific Conductivity		Monitor Only	
Chloride		Monitor Only	
Dissolved Oxygen			
March-July	N/A	6.0	5.0
August-Feb.	5.5	4.0	3.5

**1.0mg/L monthly average concentration effective in October 2028 (Special Condition 18 F.)*

2. EXISTING CONDITIONS

2.1 General Facility Information

Hanover Park STP was originally designed and constructed in 1970 and has undergone several improvement projects over the years, including consolidation of a second Village STP in 1995. The STP received primarily residential sewage from 20 square miles of service area. However, the Village has a small commercial corridor and two major industrial areas contributing non-residential flows. Additionally, the STP receives leachate from two different landfills.

The current treatment units include the following: raw sewage pumping, screening, grit removal, activated sludge treatment, secondary clarification, ultraviolet (UV) disinfection, post-aeration, and discharge to the West Branch of the DuPage River. The complete treatment process is designed for a design average flow (DAF) of 2.42 MGD, and a design maximum flow (DMF) of 8.68 MGD. The plant currently receives annual daily flows of 1.3 MGD including mostly residential and industrial flows. As a part of the 2017 Phosphorus Discharge Optimization Plan (PDOP), phosphorus samples were collected in two main industrial zones. Based on the sampling and site investigation performed it does not appear that there are significant sources of phosphorus in Hanover Park. Their current list of permitted industries has remained static for the last 8 years and none of these processes discharge high amounts of phosphorus that may create upsets in the plant.

The activated sludge process at the plant is designed to reduce the influent biological oxygen demand (BOD) as well as remove ammonia via nitrification. This process occurs in an Orbal® three-pass oxidation ditch. The three channels in the Orbal® process are operated in series from outer to inner: The outer channel receives the influent wastewater and RAS, transfers forward flow mixed liquor suspended solids (MLSS) to the 2nd ring and finally to the 3rd and inner ring. MLSS is discharged to three secondary clarifiers (typically two operating).

The STP has excess flow facilities consisting of excess flow pumps, a grinder, an excess flow clarifier and a first flush tank. The excess flow facilities are used only when the STP flow exceeds 8.68 MGD, which is a rare occurrence.

The sludge treatment process includes aerobic digestion of the waste activated sludge (WAS) and underground storage of the digested sludge. WAS undergoes supernatant removal and in-tank thickening in the aerobic digester before being stored in an underground sludge storage tank. This digested sludge is removed quarterly, on average. The stored sludge further thickens and is decanted regularly during the long detention time. Digested sludge dewatering is performed by a 3rd party sludge hauler on-site via a portable belt filter press. Supernatants from the aerobic digester, the sludge storage tank, as well as the belt filter press filtrate (when in use) return intermittently to the head of the plant. These recycle flows are not typically measured and discharge to the excess flow clarifier. Then are pumped from the scum pit to the head of the plant to the influent flume.

2.2 Influent Flows and Loadings

Wastewater flow and operational data was compiled for the period of January 2020 to August 2022. The data is tabulated in Table B-1 of Appendix B, depicted in Figure 1 through Figure 3.

Table 2 presents a summary of monthly averages including influent flow, BOD, total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN).

FIGURE 1
STP Influent Flow (January 2020 - August 2022)

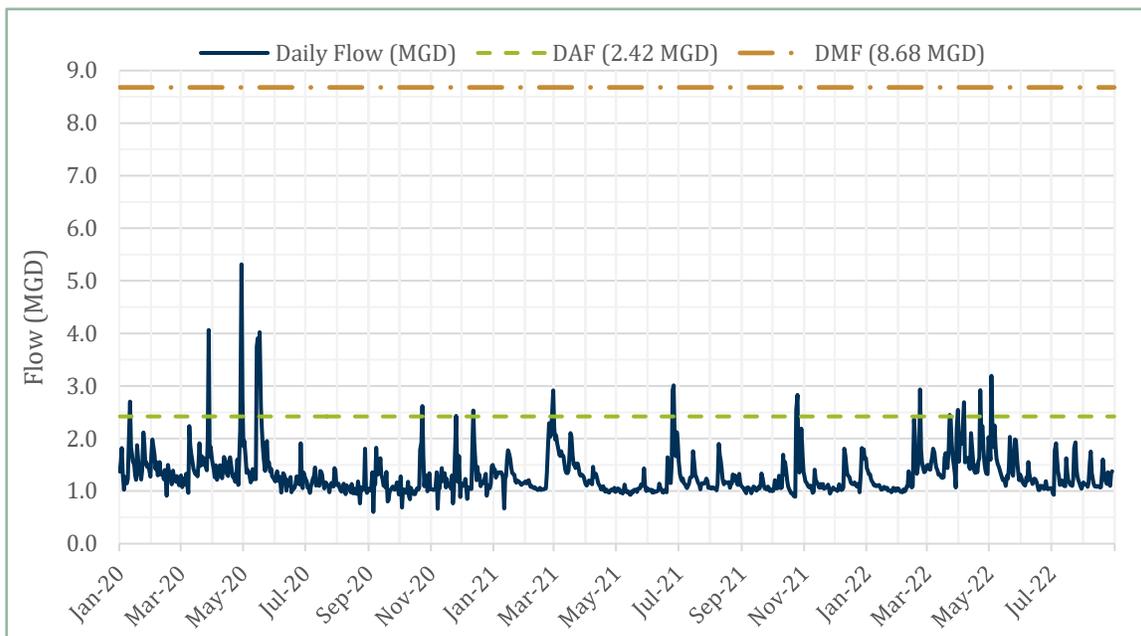


FIGURE 2

STP Influent Wastewater Quality Parameters (January 2020 - August 2022)

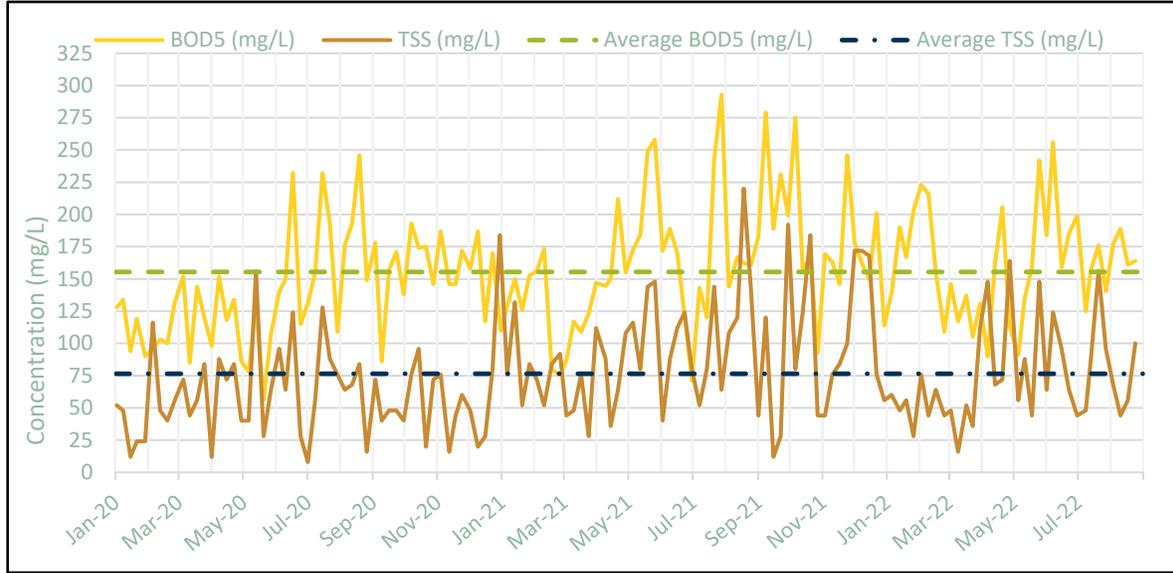
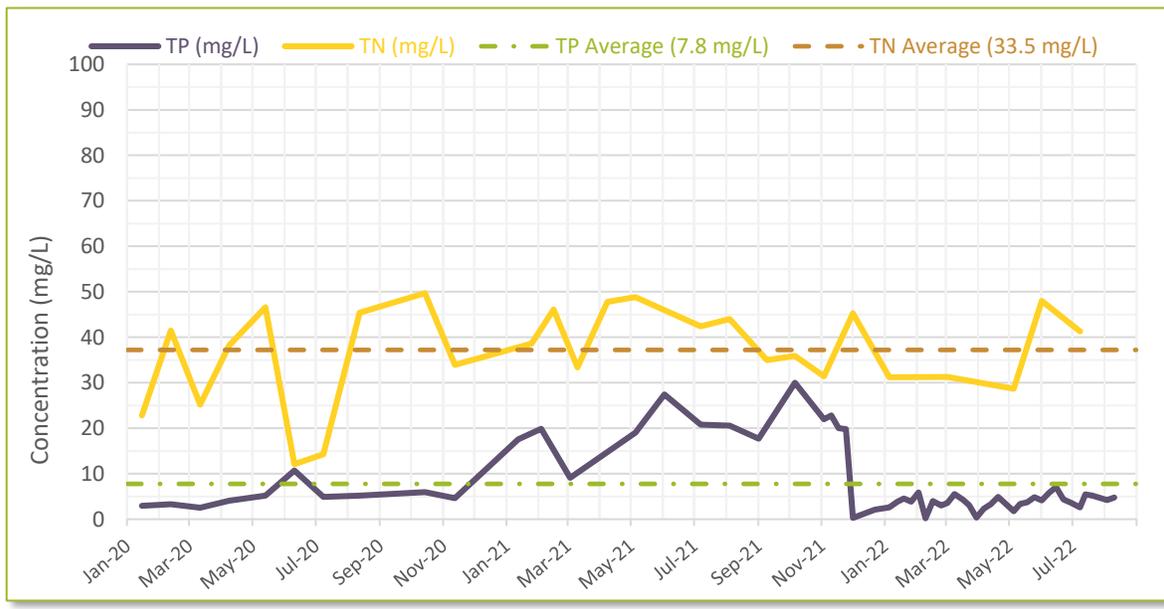


FIGURE 3

STP Influent Wastewater Quality Parameters - Nutrients (January 2020 - August 2022)



The monthly average flow over this period was 1.31 MGD and the DMF was 5.3 MGD. The average BOD and TSS concentration was 155.4 mg/L and 76.5 mg/L respectively. The NH₃-N concentration was 33.5 mg/L and the average TP influent concentration was 7.8 mg/L. TP concentrations range from 0.2 mg/L to 30 mg/L.

The facility decants about 0.03 MGD from sludge storage tanks a day and about 0.1 MGD from the aerobic digester every 3 days. The facility's target solids retention time (SRT) is 20 days but can be as long as 120 days. The long detention times for waste activated sludge and digested sludge allow for the re-release of phosphorus and ammonia in the side streams that are returned to the plant. On average, recycle flows from the digester and sludge storage can reach ammonia and phosphorus concentrations of up to 198 mg/L and 183 mg/L. Influent sampling for wastewater quality parameters is performed downstream of the grit removal process and incorporates leachate, side streams, and influent flow. During 2021, observed phosphorus concentrations consistently reached 20 - 30 mg/L. This is possibly attributed to the effects of side stream concentrations and limitations to haul sludge off-site, which results in extremely long sludge storage times and allows secondary release of nutrients. In 2022, influent phosphorus concentrations have remained around 3.88 mg/L.

2.3 Effluent Characteristics

Figure 4 through Figure 6 show the effluent quality for the period of January 2020 - August 2022. The effluent quality data is also tabulated in Table B-2 of Appendix B. As demonstrated in Figure 4, BOD and TSS effluent concentrations are consistently met, achieving removal efficiencies of 98% and 96% respectively. Ammonia removal occurs somewhat consistently with removal efficiencies of 99%. A few violations have been reported in 2020 and more recently in August of 2022. Spikes in ammonia may also be caused by high concentrations in side streams from the digesters and sludge storage tanks supernatant. Ammonia nitrogen effluent concentrations are shown in Figure 5.

Biological Phosphorus removal within the plant occurs, but is erratic. As shown on Figure 6, the TP in the effluent measured on a reported monthly basis from January 2020 through August 2022, ranged from 1.2 to 30 mg/L, with higher values encountered in 2021 and consistent with the high influent concentrations.

FIGURE 4

STP Effluent BOD and TSS Concentrations (January 2020 - August 2022)

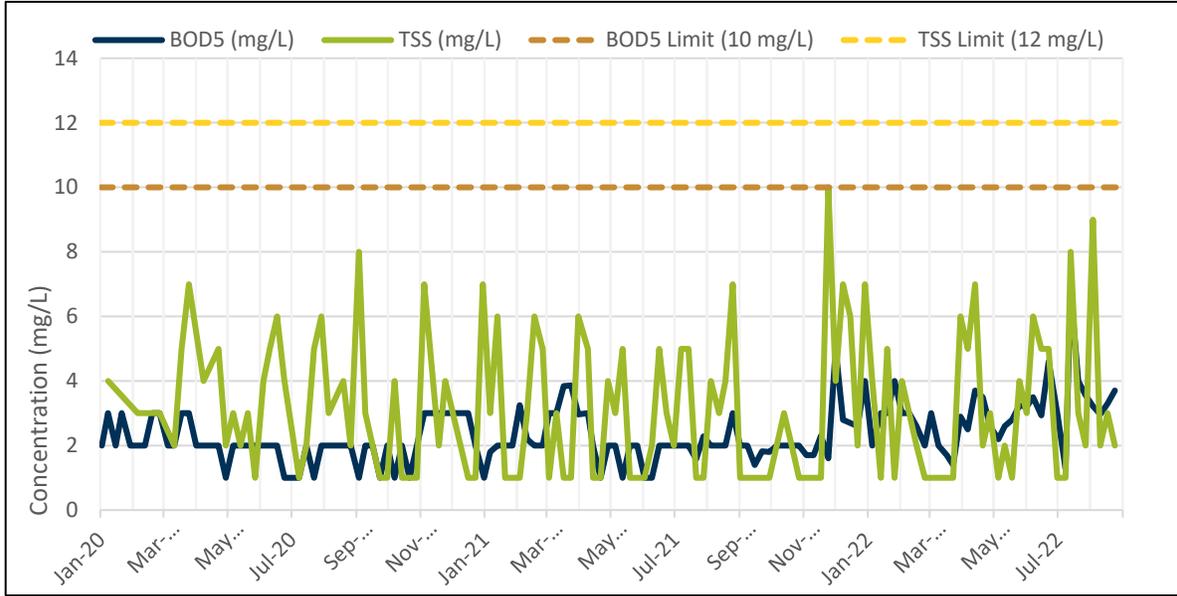


FIGURE 5

STP Effluent Ammonia-Nitrogen Concentrations (January 2020 - August 2022)

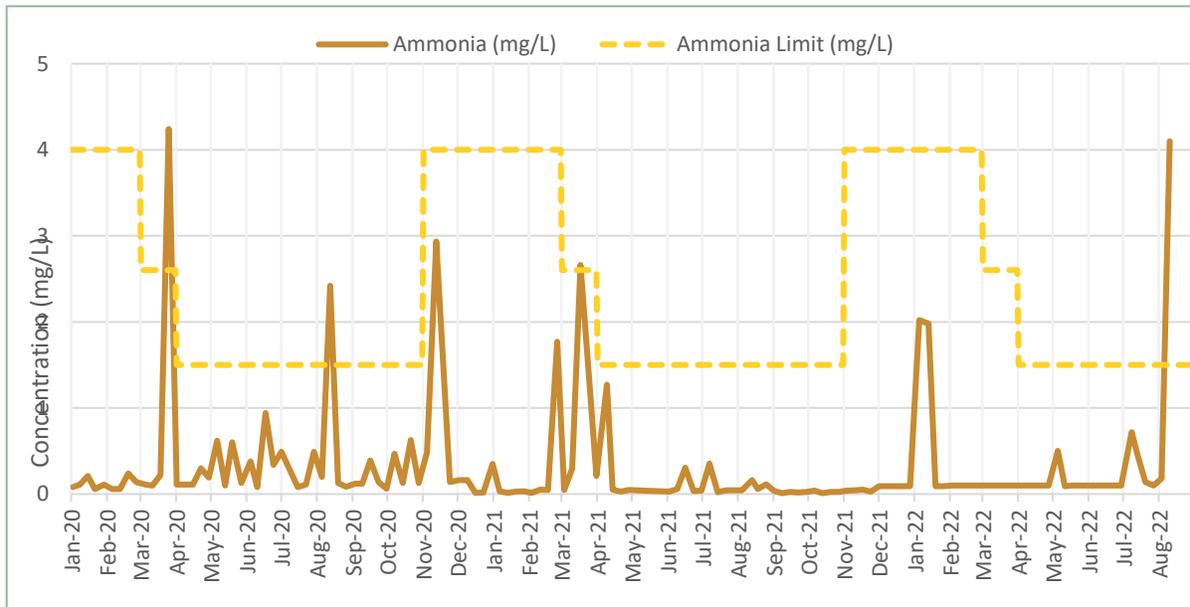
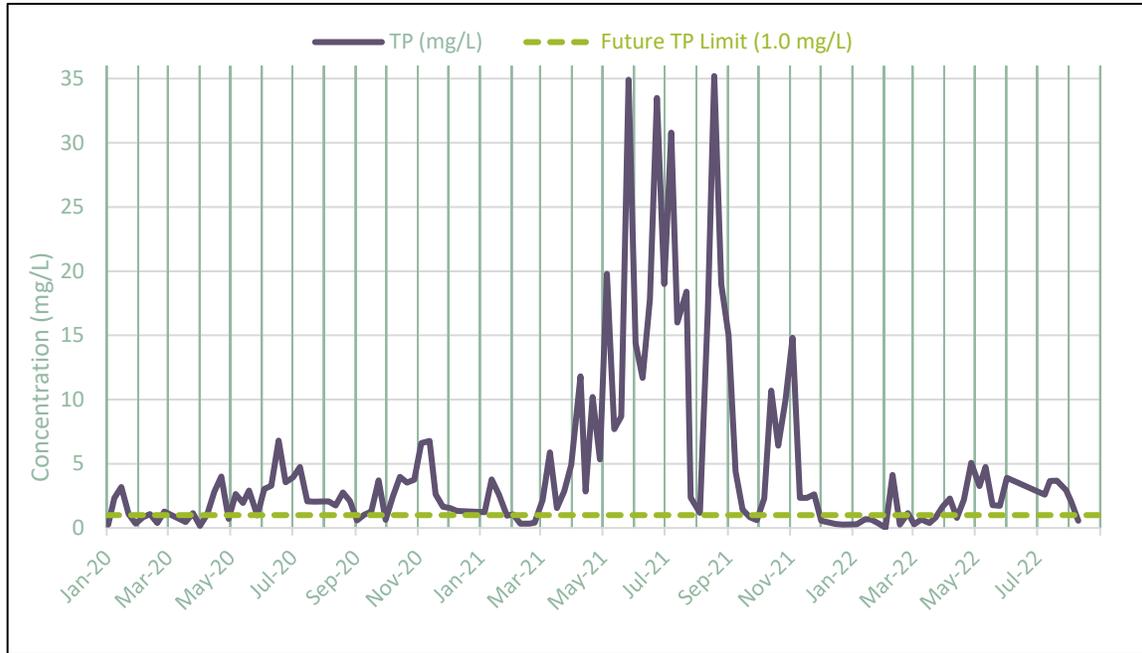


FIGURE 6

STP Effluent Total Phosphorus Concentrations (January 2020 - August 2022)



On average, phosphorus effluent concentration is 4.8 mg/L. It seems that the phosphorus removal is higher in the winter months than in summer months, which is promising for future implementation of EBPR. However, current conditions don't support enough biological phosphorus removal to achieve levels close to 1.0mg/L and chemical addition will be required. Table 2 below presents the anticipated phosphorus loading that will need to be removed by chemical means to achieve a target effluent of 1 mg/L. The calculation assumes a phosphorus uptake of 2.3% which is typical for microorganism under normal conditions, without luxury uptake. The actual targeted effluent of 0.8 mg/L, slightly below 1.0 mg/L, is selected to ensure that the permitted limit can be met consistently and that potential upsets can be accounted for.

TABLE 2
Anticipated Phosphorus Load to be Chemically Removed

	Actual Average	Design Average
Influent Flow (MGD)	1.31	2.42
Influent Phosphorus (mg/L)	7.8	7.8
Influent Phosphorus (lbs/d)	85	157
Phosphorus uptake (no EBPR)	2.3%	2.3%
Phosphorus remaining in sludge after digestion (lbs/d)	23	52
Calculated phosphorus in recycles (lbs/d)	16	34
Calculated phosphorus in clarifier effluent (lbs/d)	62	106
Effluent limit (monthly average in mg/L)	1	1
Effluent limit (monthly average in lbs/d)	10.9	20.2
Target effluent limit (mg/L)	0.8	0.8
Target effluent limit (lbs/d)	8.74	16.1
Phosphorus to be removed chemically (lbs/d)	25.1	88.8

3. CHEMICAL PHOSPHORUS REMOVAL EVALUATION

There are several factors that can drive the implementation of chemical phosphorus removal, including phosphorus recovery objectives, influent phosphorus concentration, and imposed effluent phosphorus limits, which applies in this case. The goal is to precipitate dissolved phosphorus by adding a metal ion to the wastewater in an effective and operationally simple process. However, an important consideration is that chemical phosphorus removal can be costly both in terms of the chemical costs as well as the cost of treating the additional sludge generated. Both costs are highly correlated to the chemical selected.

The most used metals salts are aluminum and iron-based coagulants, such as, aluminum sulfate (alum) and ferric chloride (ferric). Other metals such poly-aluminum chloride, ferric sulfate, or rare earth elements (REE) are also utilized but are less common. Iron-based metal salts are not recommended in facilities with UV disinfection systems, as iron can interfere with equipment performance by staining and occluding UV lamps. For these reasons, iron-based coagulants will not be evaluated as a part of this study. The evaluation will look at aluminum-based metal salts, including alum and poly-aluminum chloride, and REE products, such as lanthanide chloride.

Phosphorus, in the form of orthophosphorus (Ortho-P), can be removed from the liquid stream through a combination of chemical and physical processes. Chemicals react with Ortho-P to form precipitates that can be removed by clarification or filtration. Typically, chemicals are added to the mixed liquor at a point just upstream of the secondary clarifiers. Adding chemical after the biological process results in the most complete removal of residual phosphorus because it is at this point when the most Ortho-P is available to react.

Introducing chemicals prior to the biological process does not significantly hinder the biological process, however it presents some drawbacks relative to the chemical application just upstream of the clarifiers. First, the chemical addition at this point of the treatment process would have immediate effect on removing Ortho-P, but only the chemical solids built up into the mixed liquor suspended solids by the cycling of return activated sludge (RAS) are available to adsorb the remaining portion of P that must first be released by biological treatment. Second, chemicals will compete for phosphorus that could be consumed naturally by microorganisms resulting in a higher overall consumption of chemical.

Two-point chemical addition can be beneficial for facilities with primary treatment. Since the Village of Hanover Park STP does not operate primaries, a single point chemical addition system is proposed at the distribution box located upstream of the final clarifiers. The distribution box receives the secondary effluent from the oxidation ditch and exerts high turbulence on the flow which exposes more active surfaces of the freshly forming chemical solids and increases chemical uptake of phosphorus. Good mixing ensures uniform dispersion of metal salts and efficient chemical use.

3.1 Aluminum Sulfate (Alum)

Alum is a broadly used chemical for phosphorus removal in wastewater treatment plants. Alum is effective at achieving target effluent concentrations in the range of 0.5 - 1.0 mg/L while being a widely available and relatively affordable chemical. Alum is moderately corrosive and acidic; it may lower pH by consuming alkalinity in the wastewater. The pH value is an important factor for efficient phosphorus removal using alum, as the solubility of the resulting precipitates varies with pH. In liquid form, alum can be temperature sensitive and must be kept above freezing temperatures. Crystallization can occur when alum is stored for extended periods of time. Crystallization should be avoided because the chemical is difficult to redissolve, it can plug pipes and interfere with equipment performance.

In general, the addition of a metal ion such as aluminum results in the formation of two precipitates: aluminum phosphate and aluminum hydroxide. The removal of phosphate in the wastewater will not only occur as it precipitates in the form of aluminum phosphate but as it adsorbs to aluminum hydroxide. As previously mentioned, the solubility of these precipitates is highly dependent on pH. Phosphorus removal with alum is most efficient in the pH range of 5.0 to 7.0.

3.1.1 Alum Requirements and Sludge Production

Although the theoretical dose of alum required may be calculated on a stoichiometric basis from the chemical reactions, the actual chemical dose depends on many other factors and is usually much higher. The alkalinity present in the wastewater will strongly compete for the metal ions to produce aluminum hydroxides. The competition between hydroxide and phosphate ions for available aluminum ions increases the demand, hence increasing the required dose. Due to these competing reactions, the dosage is generally established on the basis of bench-scale and full-scale testing, and other operating treatment plants data.

Figure 7 below shows the molar ratio of aluminum (Al) to phosphorus (P) required to achieve different target effluent concentrations. For target concentrations above 2 mg/L a dose of 1.0 mole of aluminum per mole of phosphorus may be sufficient. However, to achieve extremely low effluent phosphorus limits (<0.1 mg/L), molar ratios of up to 6 may be required, resulting in excessive chemical usage and costs.

For the target effluent limit of 1.0 mg/L a molar ratio in the range of 1.0 to 1.2 seems appropriate. However, it is prudent to target a slightly lower target effluent concentration of 0.8 mg/L to ensure that the system can handle fluctuations of influent P and system upsets. Therefore, a molar ratio of 1.5 will be used to determine the alum demand. Table 4 below presents the estimated alum dosage requirements and associated chemical costs. The complete basis of design is presented in Appendix C.

FIGURE 7

Aluminum to Phosphorus Molar Ratios

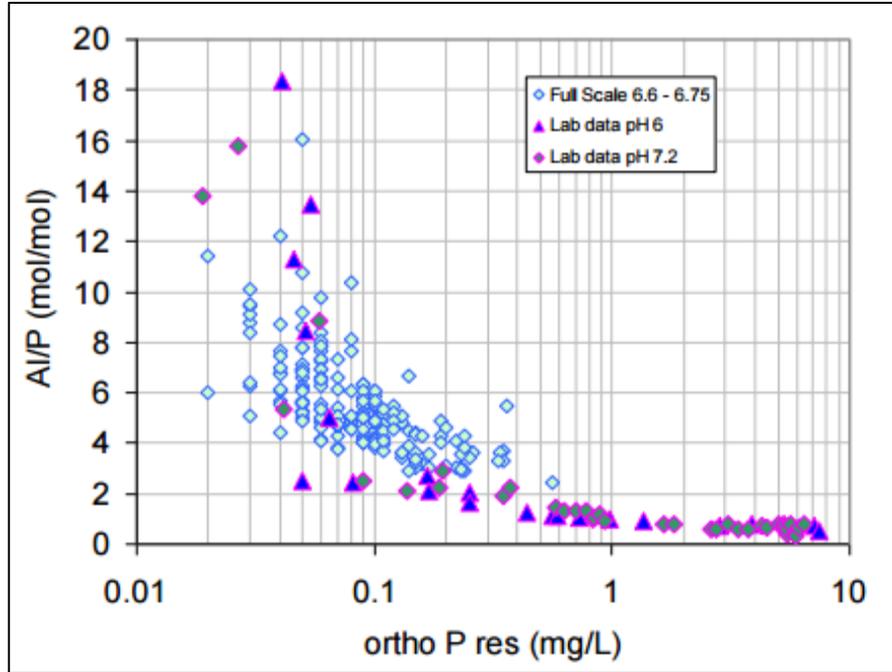


TABLE 3

Alum Dosage Requirements and Chemical Costs

Parameter	Actual Average (1.31 MGD)	Design Average (2.42 MGD)
Molar Ratio	1.5	1.5
Molecular Weight (Alum)	297 g/mol	297 g/mol
P to be removed chemically	25.1 lbs/day	88.8 lbs/day
Dose of aluminum required	361 lbs/day	1,276 lbs/day
Alum Specific gravity at 48.5% w/w solution	1.33	1.33
Dose of alum required	67 gpd (3 gph)	237 gpd (10 gph)
Storage requirements:		
10-days	671 gal	2,372 gal
30-days	2,013 gal	7,116 gal
Cost of alum per gallon delivered	\$1.33	\$1.33
Annual chemical expenses	\$32,500	\$114,700

Chemical addition removes phosphorus in the form of precipitating solids, therefore regardless of the chemical selection, an increase in sludge production is anticipated. For the purpose of this evaluation, the economic impact of additional sludge production assumes that all additional dewatered sludge will be hauled off-site for disposal, without undergoing any dewatering. The assumed cost per gallon hauled off-site is \$0.06/gallon. As a rule of thumb, it is assumed that 0.44

lbs TSS is produced per pound of alum added. Sludge production and estimated annual costs for disposal are presented in the table below.

TABLE 4
Anticipated Chemical Sludge Produced by the Addition of Alum

Parameter	Actual Average (1.31 MGD)	Design Average (2.42 MGD)
Sludge production ratio per lbs TSS/lbs alum	0.44	0.44
Anticipated addition sludge production (lbs/d)	159	561
@ 2% solids (gpd)	952	3,366
Average cost per gallon of sludge removed	\$0.06	\$0.06
Annual cost for removal of additional sludge	\$20,900	\$73,700

On an existing average basis, the total annual operating cost for alum is roughly \$53,400 including annual chemical expenses and additional chemical sludge removal.

3.1.2 Recommended Improvements for Implementation

The proposed chemical phosphorus removal system mainly consists of chemical dosing pumps and a chemical storage tank. Based on solution consumption rates calculated above, recommendations are based on duplex skid with at least 10 gph capacity pumps. Considering minimum storage requirements for 10 days at design average conditions, a 2,550-gal of alum storage volume is required. This volume would satisfy a 30-day alum storage volume under actual average conditions. Therefore, under existing average conditions, the facility can receive monthly chemical deliveries. Existing infrastructure has limited space for the installation of this size tank; therefore, the implementation of an alum feed system will necessitate a new building. The building will house the equipment and will provide secondary containment for the storage. Table 5 below presents the engineer's opinion of probable cost for the Alum system with 30 days of storage.

TABLE 5
EOPC for Alum with 30-Day Storage

Item	Amount
General Conditions	\$124,000
Chemical building (18ft x 28ft)	\$151,200
Concrete pad	\$5,000
Secondary containment	\$10,000
Chemical storage tank (2,550 gal)	\$11,000
Feed pump	\$32,000
Emergency eyewash/shower	\$10,000
Phosphate analyzer, chemical flow meters, ultrasonic level	\$58,000
Equipment installation (35%)	\$39,000
Subtotal	\$440,000
Chemical piping (10%)	\$44,000

Item	Amount
HVAC (5%)	\$22,000
Electrical (10%)	\$44,000
Instrumentation (5%)	\$22,000
Site work (15%)	\$66,000
Subtotal	\$638,000
<i>Contractor's OH&P (15%)</i>	\$96,000
Subtotal	\$734,000
Contingency (30%)	\$220,000
Construction total with Contingency	\$954,000
Design Engineering (7.5%)	\$71,550
Construction Engineering (7.5%)	\$71,550
Legal & Admin (1%)	\$9,540
Total Capital Cost	\$1,107,000

3.1.3 Anticipated Effectiveness and Limitations

Alum can effectively achieve a 1.0 mg/L target effluent concentration. Its main limitation is linked to extremely low target effluent concentration which require exponentially higher molar ratios. Alum alone would not be recommended to achieve effluent limits of 0.1 mg/L or below.

Other important considerations for alum are its sensitivity to temperature, which requires storage above freezing temperatures. This limits storage in a temperature-controlled space, most likely indoors or alternatively located outside with adequate heat tracing. Additionally, to avoid crystallization, it is recommended that storage capacity is limited to 30 to 45 days maximum.

Lastly, alum is acidic in nature and addition of the chemical will consume available alkalinity, further reducing pH. It is recommended that pH is constantly monitored to ensure that pH levels are favorable for phosphate precipitation. The pH levels measured at the plant's range from 7.2 to 8.3, which are high enough to withstand the effects of alum addition.

3.2 Polyaluminum Chloride (PAC)

Polyaluminium chloride (PAC) is a pre-hydrolyzed aluminum compound which is widely used in both potable water and wastewater treatment applications because it provides high coagulation efficiency. However, the presence of hydroxide ions in PAC gives it a higher basicity. The higher the basicity of the coagulant the lower the impact on the effluent pH, which allows PAC to operate at a wider pH range. PAC also has a lower aluminum concentration which results in lower chemical dosage and lower sludge production. PAC typically produces about 20% less sludge than alum because it produces a more compact and dense floc.

3.2.1 PAC Requirements and Sludge Production

As an aluminum-based compound, PAC follows a similar coagulation mechanism to Alum. The molar ratios shown in Figure 7 apply for both Alum and PAC. Therefore, a molar ratio of 1.5 will be used to determine the PAC demand. Table 6 below presents the estimated PAC dosage

requirements and associated chemical costs. As shown, despite using the same molar ratio, the lower molecular weight of PAC results in a lower dosage. The higher cost at \$2.79 per gallon delivered results in higher chemical costs when compared to alum. The complete basis of design is presented in Appendix D.

TABLE 6
PAC Dosage Requirements and Chemical Costs

Parameter	Actual Average (1.31 MGD)	Design Average (2.42 MGD)
Molar Ratio	1.5	1.5
Molecular Weight (PAC)	212 g/mol	212 g/mol
Pounds of P to be removed chemically	25.1 lbs/day	88.8 lbs/day
Dose of aluminum required	258 lbs/day	911 lbs/day
Alum Specific gravity at 48.5% w/w solution	1.31	1.31
Dose of PAC required	52 gpd (2 gph)	185 gpd (8 gph)
Storage requirements:		
10-days (gal)	525	1,853
30-days (gal)	1,574	5,559
Cost of PAC per gallon delivered	\$2.79	\$2.79
Annual chemical expenses	\$53,400	\$188,400

In general, PAC produces around 20% less sludge than alum, or 0.35 lbs TSS is produced per pound of PAC added. Sludge production and estimated annual costs for disposal are presented in Table 7 below.

TABLE 7
Anticipated Chemical Sludge Produced by the Addition of PAC

Parameter	Actual Average (1.31 MGD)	Design Average (2.42 MGD)
Sludge production ratio per lbs TSS/lbs PAC	0.35	0.35
Anticipated additional sludge production (lbs/d)	91	321
@ 2% solids (gpd)	544	1,922
Average cost per gallon of sludge removed	\$0.06	\$0.06
Annual cost for removal of additional sludge	\$12,000	\$42,100

Total annual operating cost for PAC, based on existing average conditions, is \$65,400 including annual chemical expenses and additional chemical sludge removal.

3.2.2 Recommended Improvements for Implementation

The proposed chemical phosphorus removal system mainly consists of chemical dosing pumps and a chemical storage tank. Based on solution consumption rates calculated above, recommendations are based on duplex skid with at least 10 gph capacity pumps. Considering a minimum storage requirement of 10 days, at least 1,600-gal of PAC storage volume is required. A 30 day storage

volume is preferred to reduce chemical deliveries to the site. Considering 30 days of storage, PAC would require a 1,600-gal tank to meet requirements on an actual average flow basis. Existing facilities have limited space for the installation of this size tank; therefore, the implementation of the chemical feed system will necessitate a new building. Table 8 below presents the engineer's opinion of probable cost for the PAC system with 30 days of storage.

TABLE 8
EOPC for PAC with 30-Day Storage

Item	Amount
General Conditions	\$110,000
Chemical building (16ft x 26ft)	\$124,800
Concrete pad	\$5,000
Secondary containment	\$10,000
Chemical storage tank (1,600 gal)	\$8,000
Feed pump	\$32,000
Emergency eyewash/shower	\$10,000
Phosphate analyzer, chemical flow meters, ultrasonic level	\$58,000
Equipment installation (35%)	\$38,000
Subtotal	\$396,000
Chemical piping (10%)	\$40,000
HVAC (5%)	\$20,000
Electrical (10%)	\$40,000
Instrumentation (5%)	\$20,000
Site work (15%)	\$59,000
Subtotal	\$575,000
<i>Contractor's OH&P (15%)</i>	<i>\$86,000</i>
Subtotal	\$661,000
Contingency (30%)	\$198,000
Construction total with contingency	\$859,000
Design Engineering (7.5%)	\$64,425
Construction Engineering (7.5%)	\$64,425
Legal & Admin (1%)	\$8,590
Total Capital Cost	\$996,000

3.2.3 Anticipated Effectiveness and Limitations

Like alum, PAC can efficiently achieve a 1.0 mg/L target effluent concentration and its major limitation is the extremely high molar ratios needed to achieve extremely low effluent concentrations. Overall, a smaller dose of PAC is required to achieve the target effluent of 1.0 mg/L. This higher efficiency is also reflected in a better settling and more dense floc, which reduces sludge production for up to 20%. Additionally, PAC is anticipated to operate more effectively over a wider pH range. PAC is basic in nature and will have minimal impact on pH, eliminating the need to add lime to maintain alkalinity. However, chemical cost is double when compared to alum.

3.3 Lanthanide Chloride (Rare Earth Elements)

An alternative to adding traditional coagulants like alum is to add a blended rare earth element (REE) solution also known as lanthanide chloride solution. A blended lanthanide chloride product is available from Neo Water Treatment as Neo Water FX300. One advantage of the lanthanide chlorides for chemical removal relates to the strong affinity of their cations for phosphates, with which they directly and quickly form precipitates without engaging inside reactions with other ions. Fewer moles of the REE are needed for the same phosphorus removal.

The main drawback of the lanthanide chlorides is the bulk chemical price is approximately ten times that of alum. In cases where the lower chemical consumption allows significant reductions in capital costs, lanthanide chloride addition deserves some consideration despite the purchase price. Other benefits include lower sludge production, improved dewaterability performance, non-hazardous and non-corrosive material that will not stain or discolor structures and equipment, so it can be safely used in UV, and there is no potential need for pH adjustment.

3.3.1 REE Requirements and Sludge Production

A molar ratio of 1:1 typically holds true regardless of the phosphorus effluent limit. Unlike the traditional aluminum-based coagulants previously discussed in this report, the molar ratio of REE to P doesn't not significantly increase depending on target effluent phosphorus. Table 9 below presents the REE solution dosage and storage requirements, as well as its associated annual cost. The required dosage is lower than for alum, but that efficiency comes at a significantly higher cost. The complete basis of design is presented in Appendix E.

TABLE 9

FX300 (REE) Dosage Requirements and Chemical Costs

Parameter	Actual Average (1.31 MGD)	Design Average (2.42 MGD)
Molar Ratio	1.0	1.0
Molecular Weight (FX300)	212 g/mol	212 g/mol
P to be removed chemically	25.1 lbs/day	88.8 lbs/day
Dose of REE required	199 lbs/day	705 lbs/day
Concentration of REE in FX300 (g/L)	640	640
Dose of FX300 required	52 gpd (2 gph)	185 gpd (8 gph)
Storage requirements:		
10-days (gal)	373	1,321
30-days (gal)	1,118	3,962
Cost of FX300 per gallon delivered	\$11.03	\$11.03
Annual chemical expenses	\$150,100	\$531,800

Preliminary information available from the vendor indicates a molecular weight of 246 g/mol for FX300 and a concentration of REE in FX300 of 640g/L. Using these values, it can be estimated that based on actual average conditions 52 gpd of coagulant are required and 185 gpd on design average conditions. On actual average basis, this means that a 10-day supply could be covered by

Item	Amount
Emergency eyewash/shower	\$10,000
Phosphate analyzer, chemical flow meters, ultrasonic level	\$58,000
Equipment installation (35%)	\$38,000
Subtotal	\$386,000
Chemical piping (10%)	\$39,000
HVAC (5%)	\$19,000
Electrical (10%)	\$39,000
Instrumentation (5%)	\$19,000
Site work (15%)	\$58,000
Subtotal	\$560,000
<i>Contractor's OH&P (15%)</i>	<i>\$84,000</i>
Subtotal	\$644,000
Contingency (30%)	\$193,000
Construction total with contingency	\$837,000
Design Engineering (7.5%)	\$62,775
Construction Engineering (7.5%)	\$62,775
Legal & Admin (1%)	\$8,370
Total Capital Cost	\$971,000

3.3.3 Anticipated Effectiveness and Limitations of REE

Lanthanide chloride has been proven very effective in achieving extremely low effluent limits, however, it is not a cost-effective option to achieve a target effluent limit of 1.0 mg/L. This is because at this target effluent concentration, aluminum-based coagulant have very comparable molar ratios.

Lanthanide chloride blends, such as FX300, offer other benefits. It has a very low freezing point, around -40F, so smaller totes can be installed outdoor without requiring heated space. Lower sludge production would also result in lower sludge handling cost. However, with a cost nearly 10 times that of Alum, the savings in the cost of a new building and smaller storage tank would be quickly offset.

Another limitation of this chemical is its availability. Rare-earth metals are predominantly found overseas, in Russia and China, and its production can be highly affected by supply chain or geopolitical issues. Moreover, in Illinois there is only one manufacturer offering the chemical.

4. CONCLUSIONS AND RECOMMENDATIONS

The Village of Hanover Park will have to meet a 1.0 mg/L TP effluent concentration October 2028. Like most activated sludge processes, the current oxidation ditch achieves some phosphorus removal biologically. However, the phosphorus removal is not reliable or enough to meet the future effluent concentration limit. Therefore, achieving phosphorus removal through chemical addition was recommended.

Alum, PAC, and FX300 (REE) were compared considering three main criteria: dosage requirements, sludge production, and costs (capital costs, chemical costs, and sludge handling cost). Other non-monetary considerations were also discussed, including ease of handling, sludge dewaterability, freezing point, and effects on effluent pH. The evaluation determined that Alum is the most cost-effective chemical to achieve the desired target effluent limit. Despite having higher dosage requirements when compared to PAC and FX300, Alum has significantly lower chemical costs at \$1.33 per gallon delivered to Hanover Park. This will rapidly offset the need for higher upfront costs related to the implementation of the Alum system, which requires a larger building and storage tank.

An important consideration with alum, is its potential to lower pH. This is not anticipated to be an issue at the plant since effluent pH ranges from 7.2 to 8.3. The addition of alum may reduce the pH, but not enough to fall below the lower limit of 6.0. Also, it is not anticipated that lime will need to be added to maintain the pH and reduce solubility of the precipitates.

Finally, sizing equipment to meet alum requirements offer the flexibility to switch to any other chemical in the future, if pH were to become an issue, or if a future effluent limit were to be imposed. While significantly oversized for FX300, the chemical storage can be reused and operated at half capacity. FX300 doesn't have the same crystallization tendency of Alum.

The implementation schedule presented in Table 12 is proposed to achieve a 1.0 mg/L monthly average effluent limit by October 1, 2028. The proposed schedule does not consider pursuance of an IEPA loan and assumes the implementation of the project will be financed by Village funds.

TABLE 12
Recommended Implementation Schedule

Milestone	Date Completed
Chemical Phosphorus Removal Evaluation	March 2023
Chemical Pilot Testing	June 2024
Notice to Proceed with Design	March 2025
Submit Plans and Specs to IEPA	January 2026
IEPA Issues Construction Permit	April 2026
Advertise for Bids	April 2026

Milestone	Date Completed
Open Bids	May 2026
Issue Notice of Award	June 2026
Issue Notice to Proceed	June 2026
Construction Substantial Completion	September 2027
Construction Final Completion	October 2027
Achieve 1.0 mg/L monthly average TP effluent concentration	October 2028

As presented in the table above, to ensure that a 1.0 mg/L monthly average total phosphorus effluent limit is achieved consistently by October 2028, it is recommended that construction and implementation of the chemical feed system is substantially completed by September 2027 and completed October 2027.

APPENDICES

APPENDIX A
VILLAGE OF HANOVER PARK NPDES PERMIT



ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

JB PRITZKER, GOVERNOR

JOHN J. KIM, DIRECTOR

217/782-0610

April 21, 2022

Village of Hanover Park
2121 West Lake Street
Hanover Park, Illinois 60133

Re: Village of Hanover Park
Village of Hanover Park STP #1
NPDES Permit No. IL0034479
Bureau ID: W0314480002
Final Permit

Gentlemen:

Attached is the final NPDES Permit for your discharge. The Permit as issued covers discharge limitations, monitoring, and reporting requirements. Failure to meet any portion of the Permit could result in civil and/or criminal penalties. The Illinois Environmental Protection Agency is ready and willing to assist you in interpreting any of the conditions of the Permit as they relate specifically to your discharge.

Pursuant to the Final NPDES Electronic Reporting Rule, all permittees must report DMRs electronically unless a waiver has been granted by the Agency. The Agency utilizes NetDMR, a web based application, which allows the submittal of electronic Discharge Monitoring Reports instead of paper Discharge Monitoring Reports (DMRs). More information regarding NetDMR can be found on the Agency website, <https://www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx>. If your facility has received a waiver from the NetDMR program, a supply of preprinted paper DMR Forms will be sent to your facility. Additional information and instructions will accompany the preprinted DMRs. Please see the attachment regarding the electronic reporting rule.

The attached Permit is effective as of the date indicated on the first page of the Permit. Until the effective date of any re-issued Permit, the limitations and conditions of the previously-issued Permit remain in full effect. You have the right to appeal any condition of the Permit to the Illinois Pollution Control Board within a 35 day period following the issuance date.

Should you have questions concerning the Permit, please contact Getie Yilma at 217/782-0610.

Sincerely,

Darin E. LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control

ALD:GY:20052202.bdf

Attachment: Final Permit

cc: Records
Compliance Assurance Section
Des Plaines Region
Billing
CMAP
DuPage River Salt Creek Workgroup

4302 N. Main St., Rockford, IL 61103 (815) 987-7780
595 S. State, Elgin, IL 60123 (847) 608-3131
2125 S. First St., Champaign, IL 61820 (217) 278-5800
2009 Mall St., Collinsville, IL 62234 (618) 346-5120

9511 Harrison St., Des Plaines, IL 60016 (847) 294-4000
412 SW Washington St., Sulte D, Peoria, IL 61602 (309) 671-3022
2309 W. Main St., Suite 116, Marion, IL 62959 (618) 993-7200
100 W. Randolph, Suite 10-300, Chicago, IL 60601

NPDES Permit No. IL0034479

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date: April 30, 2027

Issue Date: April 21, 2022

Effective Date: May 01, 2022

Name and Address of Permittee:

Village of Hanover Park
2121 West Lake Street
Hanover Park, Illinois 60133

Facility Name and Address:

Village of Hanover Park STP #1
5600 Greenbrook Boulevard
Hanover Park, Illinois 60133
(DuPage County)

Receiving Waters: West Branch of DuPage River

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the Effluent Limitations, Monitoring, and Reporting requirements; Special Conditions and Attachment H Standard Conditions attached herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.



Darin E. LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): B01 STP Outfall

Load limits computed based on a design average flow (DAF) of 2.42 MGD (design maximum flow (DMF) of 8.68 MGD).

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

Parameter	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS mg/L			Sample Frequency	Sample Type
	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum		
Flow (MGD)							Continuous	
CBOD ₅ ** & (2)	202 (724)		404 (1448)	10		20	1 Day/Week	Composite
Suspended Solids (2)	242 (869)		484 (1737)	12		24	1 Day/Week	Composite
pH	Shall be in the range of 6 to 9 Standard Units						1 Day/Week	Grab
Fecal Coliform (1)	See Below						1 Day/Week	Grab
Chlorine Residual ***						0.038	***	Grab
Ammonia Nitrogen: As (N)								
April-Oct.	30 (109)		61 (217)	1.5		3.0	1 Day/Week	Composite
Nov.-Feb.	81 (290)		101 (362)	4.0		5.0	1 Day/Week	Composite
March	52 (188)	131 (471)	161 (579)	2.6	6.5	8.0	1 Day/Week	Composite
Total Phosphorus (as P) (3)	20 (72)			1.0			1 Day/Week	Composite
Total Nitrogen (as N)	Monitor Only						1 Day/Month	Composite
Dissolved Phosphorus	Monitor only						1 Day/Month	Composite
Nitrate/Nitrite	Monitor only						1 Day/Month	Composite
Total Kjeldahl Nitrogen (TKN)	Monitor only						1 Day/Month	Composite
Alkalinity	Monitor only						1 Day/Month	Grab
Temperature	Monitor only						1 Day/Month	Grab
Specific Conductivity	Monitor only						1 Day/Month	Grab
Chloride	Monitor only						1 Day/Month	Grab
				Monthly Average not less than	Weekly Average not less than	Daily Minimum		
Dissolved Oxygen March-July				N/A	6.0	5.0	1 Day/Week	Grab
August-February				5.5	4.0	3.5	1 Day/Week	Grab

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.

**Carbonaceous BOD₅ (CBOD₅) testing shall be in accordance with 40 CFR 136.

Discharge Number(s) and Name(s): B01 STP Outfall (continued)

Effluent Limitations, Monitoring, and Reporting

FINAL

***See Special Condition 9.

(1) From May through October the monthly geometric mean shall not exceed 200 per 100 mL or 18 billion cfu per day (66 billion cfu per day), nor shall more than 10% of the samples during the month exceed 400 per 100 mL. See Special Condition 10.

(2) BOD₅ and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent CBOD₅ concentration to determine the effluent BOD₅ concentration. Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

(3) See Special Condition 18.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as a monthly geometric mean, a daily maximum value, and as a percentage of samples exceeding 400 per 100 mL pH shall be reported on the DMR as minimum and maximum value.

Chlorine Residual shall be reported on the DMR as daily maximum value.

Dissolved oxygen shall be reported on the DMR as a minimum value.

Total Nitrogen shall be reported on the DMR as a daily maximum value. Total Nitrogen is the sum of Total Kjeldahl Nitrogen, nitrate, and nitrite.

Total Phosphorus shall be reported on the DMR as a daily maximum and monthly average value.

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): A01 Excess Flow Outfall (flows over 6,027 gpm)

These flow facilities shall not be utilized until the main treatment facility is receiving its design maximum flow (flows in excess of 6,027 gpm)*.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

Parameter	CONCENTRATION LIMITS mg/L		Sample Frequency	Sample Type
	Monthly Average	Weekly Average		
Total Flow (MG)	See Below		Daily When Discharging	Continuous
BOD ₅	Monitor only		Daily When Discharging	Grab
Suspended Solids	Monitor only		Daily When Discharging	Grab
Fecal Coliform	Daily Maximum Shall Not Exceed 400 per 100 mL		Daily When Discharging	Grab
Ammonia Nitrogen (as N)	Monitor only		Daily When Discharging	Grab
Total Phosphorus (as P)	Monitor only		Daily When Discharging	Grab

Total flow in million gallons shall be reported on the Discharge Monitoring Report (DMR) in the quantity maximum column. The main treatment facility flows at the time that A01 Excess flow facilities are first utilized shall be reported in the comment section of the DMR in gallons per minute (gpm).

*An explanation shall be provided in the comment section of the DMR should these facilities be used when the main treatment facility is not receiving Design Maximum Flow (DMF). The explanation shall identify the reasons the main facility is at a diminished treatment capacity. Additionally, the Permittee shall comply with the provisions of Special Condition 7.

The duration of each A01 discharge and rainfall event (i.e., start and ending time) including rainfall intensity shall be provided in the comment section of the DMR.

Report the number of days of discharge in the comments section of the DMR.

Fecal Coliform shall be reported on the DMR as daily maximum.

Chlorine Residual shall be reported on the DMR as a monthly average concentration.

Ammonia Nitrogen and Total Phosphorus shall be reported on the DMR as a daily maximum value.

BOD₅ and Suspended Solids shall be reported on the DMR as a monthly average concentration.

Total Phosphorus shall be reported on the DMR as a daily maximum and monthly average value.

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 Combined Discharge from A01 and B01 Outfall**

The effluent of the above discharge(s) shall be monitored and limited at all times as follows:

Parameter	CONCENTRATION LIMITS mg/L		Sample Frequency	Sample Type
	Monthly Average	Weekly Average		
Total Flow (MG)			Daily When A01 is Discharging	Continuous
BOD ₅ ***	30	45	Daily When A01 is Discharging	Grab
Suspended Solids***	30	45	Daily When A01 is Discharging	Grab
pH	Shall be in the range of 6 to 9 Standard Units		Daily When A01 is Discharging	Grab
Chlorine Residual *****	0.75		*****	Grab
Ammonia Nitrogen (as N)****	Monitor only		Daily When A01 is Discharging	Grab
Total Phosphorus (as P)	Monitor only		Daily When A01 is Discharging	Grab
Dissolved Oxygen****	Monitor only		Daily When A01 is Discharging	Grab

Total flow in million gallons shall be reported on the Discharge Monitoring Report (DMR) in the quantity maximum column.

Report the number of days of discharge in the comments section of the DMR.

Chlorine Residual shall be reported on the DMR as a monthly average concentration.

pH shall be reported on the DMR as a minimum and a maximum.

BOD₅ and Suspended Solids shall be reported on the DMR as a monthly and weekly average concentration.

Total Phosphorus shall be reported on the DMR as a daily maximum and monthly average value.

**An explanation shall be provided in the comment section of the DMR should these facilities be used when the main treatment facility is not receiving Design Maximum Flow (DMF). The explanation shall identify the reasons the main facility is at a diminished treatment capacity. Additionally, the Permittee shall comply with the provisions of Special Condition 7.

*** BOD₅ and Suspended Solids (85% removal required): In accordance with 40 CFR 133, the 30-day average percent removal shall not be less than 85 percent. The percent removal need not be reported to the IEPA on DMRs but influent and effluent data must be available, as required elsewhere in this permit, for IEPA inspection and review. For measuring compliance with this requirement, 5 mg/L shall be added to the effluent CBOD₅ concentration to determine the effluent BOD₅ concentration.

Percent removal is a percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period.

****See Special Condition 19.

***** Sampling is required daily when A01 is discharging if chlorine is being used for any purpose.

A monthly average value for ammonia shall be computed for each month that A01 discharges beginning one month after the effective date of the permit. A monthly average concentration shall be determined by combining data collected from A01 and B01 (only B01 data from days when A01 is not discharging) for the reporting period. These monitoring results shall be submitted to the Agency on the DMR. Ammonia Nitrogen shall also be reported on the DMR as a maximum value.

A monthly and weekly average value for Dissolved Oxygen (DO) shall be computed for each month that A01 discharges beginning one month after the effective date of the permit. The monthly and weekly average concentrations for 001 shall be determined by combining data collected from A01 and B01 (only B01 data from days when A01 is not discharging) for the reporting period. These monitoring results shall be submitted to the Agency on the DMR. DO shall also be reported on the DMR as a minimum value.

Total Phosphorus shall be reported on the DMR as a maximum value.

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Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

<u>Parameter</u>	<u>Sample Frequency</u>	<u>Sample Type</u>
Flow (MGD)	Continuous	
BOD ₅	1 Day/Week and Daily When Outfall A01 is Discharging	Composite
Suspended Solids	1 Day/Week and Daily When Outfall A01 is Discharging	Composite
Total Phosphorus (as P)	1 Day/Month	Composite
Total Nitrogen (as N)	1 Day/Month	Composite

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

BOD₅ and Suspended Solids shall be reported on the DMR as a monthly average concentration.

Total Phosphorus and Total Nitrogen shall be reported on the DMR as a maximum value. Total Nitrogen is the sum of Total Kjeldahl Nitrogen, nitrate, and nitrite.

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SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws and regulations. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 1 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR § 122.63 and Without Public Notice.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302.

SPECIAL CONDITION 6. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) electronic forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee is required to submit electronic DMRs (NetDMRs) instead of mailing paper DMRs to the IEPA unless a waiver has been granted by the Agency. More information, including registration information for the NetDMR program, can be obtained on the IEPA website, <https://www2.illinois.gov/epa/topics/water-quality/surface-water/netdmr/pages/quick-answer-guide.aspx>.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 25th day of the following month, unless otherwise specified by the permitting authority.

Permittees that have been granted a waiver shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code # 19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 7. The provisions of 40 CFR Section 122.41(m) & (n) are incorporated herein by reference.

SPECIAL CONDITION 8. Samples taken in compliance with the effluent monitoring requirements shall be taken:

- A. For Outfall Number B01: Samples for all effluent limitations and monitoring parameters applicable to Outfall B01 shall be taken at a point representative of the flows from Outfall B01 but prior to entry into the receiving stream. On days when there are discharges from Outfall A01, samples for all effluent limitations and monitoring parameters applicable to Outfall B01 shall be representative of discharges from B01 and shall be taken at a point prior to admixture with discharges from Outfall A01.
- B. For Outfall Number A01: Samples for all effluent limitations and monitoring parameters applicable to Outfall A01 shall be taken at a point representative of the discharge from Outfall A01 and shall be taken at a point prior to admixture with discharges from Outfall B01.
- C. For Outfall Number 001: Samples for all effluent limitations and monitoring parameters applicable to Outfall 001 shall be taken at a point representative of the discharge from Outfall 001 but prior to entry into the receiving stream and shall include all flow from Outfalls A01 and B01. On days when there are no discharges through Outfall A01, samples for discharges through Outfall 001 can be taken at the location of sampling for Outfall B01. Samples for discharges through Outfall B01 taken on days when Outfall A01 does not discharge must be reported on the DMR for both Outfalls B01 and 001. When there are discharges from Outfall A01, samples for all effluent limitations and monitoring parameters applicable to Outfall 001 shall be representative of the discharge from Outfall 001 and shall be taken at a point after flows from Outfalls A01 and B01 are mixed.

SPECIAL CONDITION 9. For Discharge No. B01, any use of chlorine to control slime growths, odors or as an operational control, etc. shall not exceed the limit of 0.038 mg/L (daily maximum) total residual chlorine in the effluent. Sampling is required on a daily grab basis during the chlorination process. Reporting shall be submitted on the DMR's on a monthly basis.

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SPECIAL CONDITION 10. Fecal Coliform limits for Discharge Number B01 are effective May thru October. Sampling of Fecal Coliform is only required during this time period.

SPECIAL CONDITION 11. The Permittee shall conduct semi-annual monitoring of the effluent and report concentrations (in mg/L) of the following listed parameters. Monitoring shall begin three (3) months from the effective date of this permit. The sample shall be a 24-hour effluent composite except as otherwise provided below and the results shall be submitted on Discharge Monitoring Report (DMR) electronic forms, unless otherwise specified by the IEPA. The parameters to be sampled and the minimum reporting limits to be attained are as follows:

<u>STORET</u> <u>CODE</u>	<u>PARAMETER</u>	<u>Minimum reporting limit</u>
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hexavalent) (grab)	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00720	Cyanide (total) (grab)***	5.0 µg/L
00722	Cyanide (grab) (available**** or amenable to chlorination)***	5.0 µg/L
00951	Fluoride	0.1 mg/L
01045	Iron (total)	0.5 mg/L
01046	Iron (Dissolved)	0.5 mg/L
01051	Lead	0.05 mg/L
01055	Manganese	0.5 mg/L
71900	Mercury (grab)**	1.0 ng/L*
01067	Nickel	0.005 mg/L
00556	Oil (hexane soluble or equivalent) (Grab Sample only)	5.0 mg/L
32730	Phenols (grab)	0.005 mg/L
01147	Selenium	0.005 mg/L
01077	Silver (total)	0.003 mg/L
01092	Zinc	0.025 mg/L

The minimum reporting limit for each parameter is specified by Illinois EPA as the regulatory authority.

The minimum reporting limit for each parameter shall be greater than or equal to the lowest calibration standard and within the acceptable calibration range of the instrument.

The minimum reporting limit is the value below which data are to be reported as non-detects.

The statistically-derived laboratory method detection limit for each parameter shall be less than the minimum reporting limit required for that parameter.

All sample containers, chemical and thermal preservation, holding times, analyses, method detection limit determinations and quality assurance/quality control requirements shall be in accordance with 40 CFR Part 136.

Unless otherwise indicated, concentrations refer to the total amount of the constituent present in all phases, whether solid, suspended or dissolved, elemental or combined, including all oxidation states.

*1.0 ng/L = 1 part per trillion.

**Utilize USEPA Method 1631E and the digestion procedure described in Section 11.1.1.2 of 1631E.

***Analysis for cyanide (available or amenable to chlorination) is only required if cyanide (total) is detected at or above the minimum reporting limit.

****USEPA Method OIA-1677 or Standard Method SM 4500-CN G.

The Permittee shall sample and analyze the effluent for the pollutants identified in 40 CFR Appendix J, Table 2. Provide data from a minimum of 3 samples taken within four and one-half years prior to the expiration of this Permit. Samples must be representative of the seasonal variation in the discharge. All samples must be collected and analyzed in accordance with analytical methods approved under 40 CFR Part 136. Sample results shall be submitted with the application for renewal of this Permit.

The Permittee must provide notice of any new introduction of pollutants from an indirect discharger which would be subject to Section 301 or 306 of the Clean Water Act as if it were directly discharging these pollutants and any substantial change in the volume or character of pollutants being introduced by a source introducing pollutants at the time of issuance of this Permit. The notice must include information

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on the quality and quantity of effluent introduced and any anticipated impact of the change on the quantity or quality of the effluent to be discharged.

The Permittee shall provide a report briefly describing the permittee's pretreatment activities and an updated listing of the Permittee's significant industrial users. The list should specify which categorical pretreatment standards, if any, are applicable to each Industrial User. Permittees who operate multiple plants may provide a single report. Such report shall be submitted within six (6) months of the effective date of this Permit to the following addresses:

U.S. Environmental Protection Agency
Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604
Attention: Water Assurance Branch Enforcement and Compliance

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attention: Compliance Assurance Section, Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 12. The Permittee has undergone a Monitoring Reduction review and the influent and effluent sample frequency has been reduced due to sustained compliance. The IEPA will require that the influent and effluent sampling frequency for these parameters be increased if effluent deterioration occurs due to increased wasteload, operational, maintenance or other problems. The increased monitoring will be required Without Public Notice when a permit modification is received by the Permittee from the IEPA.

SPECIAL CONDITION 13. During January of each year the Permittee shall submit annual fiscal data regarding sewerage system operations to the Illinois Environmental Protection Agency/Division of Water Pollution Control/Compliance Assurance Section. The Permittee may use any fiscal year period provided the period ends within twelve (12) months of the submission date.

Submission shall be on forms provided by IEPA titled "Fiscal Report Form For NPDES Permittees".

SPECIAL CONDITION 14. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) B01.

Biomonitoring

- A. Acute Toxicity - Standard definitive acute toxicity tests shall be run on at least two trophic levels of aquatic species (fish, invertebrate) representative of the aquatic community of the receiving stream. Testing must be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fifth Ed.) EPA/821-R-02-012. Unless substitute tests are pre-approved; the following tests are required:
1. Fish 96-hour static LC₅₀ Bioassay using fathead minnows (*Pimephales promelas*).
 2. Invertebrate 48-hour static LC₅₀ Bioassay using *Ceriodaphnia*.
- B. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Sample collection and testing must be conducted in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit. When possible, bioassay sample collection should coincide with sample collection for metals analysis or other parameters that may contribute to effluent toxicity.
- C. Reporting - Results shall be reported according to EPA/821-R-02-012, Section 12, Report Preparation, and shall be mailed to IEPA, Bureau of Water, Compliance Assurance Section or emailed to EPA.PrmtSpecCondtns@Illinois.gov within one week of receipt from the laboratory. Reports are due to the IEPA no later than the 16th, 13th, 10th, and 7th month prior to the expiration date of this Permit.
- D. Toxicity – Should a bioassay result in toxicity to >20% of organisms tested in the 100% effluent treatment, the IEPA may require, upon notification, six (6) additional rounds of monthly testing on the affected organism(s) to be initiated within 30 days of the toxic bioassay. Results shall be submitted to IEPA within one (1) week of becoming available to the Permittee. Should any of the additional bioassays result in toxicity to ≥50% of organisms tested in the 100% effluent treatments, the Permittee must contact the IEPA within one (1) day of the results becoming available to the Permittee and begin the toxicity identification and reduction evaluation process as outlined below.

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E. Toxicity Identification and Reduction Evaluation - Should any of the additional bioassays result in toxicity to $\geq 50\%$ of organisms tested in the 100% effluent treatment, the Permittee must contact the IEPA within one (1) day of the results becoming available to the Permittee and begin the toxicity identification evaluation process in accordance with Methods for Aquatic Toxicity Identification Evaluations, EPA/600/6-91/003. The IEPA may also require, upon notification, that the Permittee prepare a plan for toxicity reduction evaluation to be developed in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, which shall include an evaluation to determine which chemicals have a potential for being discharged in the plant wastewater, a monitoring program to determine their presence or absence and to identify other compounds which are not being removed by treatment, and other measures as appropriate. The Permittee shall submit to the IEPA its plan for toxicity reduction evaluation within ninety (90) days following notification by the IEPA. The Permittee shall implement the plan within ninety (90) days or other such date as contained in a notification letter received from the IEPA.

The IEPA may modify this Permit during its term to incorporate additional requirements or limitations based on the results of the biomonitoring. In addition, after review of the monitoring results, the IEPA may modify this Permit to include numerical limitations for specific toxic pollutants. Modifications under this condition shall follow public notice and opportunity for hearing.

SPECIAL CONDITION 15. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 25 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

The Permittee shall comply with existing federal regulations governing sewage sludge use or disposal and shall comply with all existing applicable regulations in any jurisdiction in which the sewage sludge is actually used or disposed.

The Permittee shall comply with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish the standards for sewage sludge use or disposal even if the permit has not been modified to incorporate the requirement.

The Permittee shall ensure that the applicable requirements in 40 CFR Part 503 are met when the sewage sludge is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator.

Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 16. This Permit may be modified to include alternative or additional final effluent limitations pursuant to an approved Total Maximum Daily Load (TMDL) Study, an approved trading program or upon completion of an alternate East Branch of DuPage River Water Quality Study.

SPECIAL CONDITION 17. The Permittee shall work towards the goals of achieving no discharges from sanitary sewer overflows or

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basement back-ups and ensuring that overflows or back-ups, when they do occur do not cause or contribute to violations of applicable standards or cause impairment in any adjacent receiving water. Overflows from sanitary sewers are expressly prohibited by this permit and by Ill. Adm. Code 306.304. As part of the process to ultimately achieve compliance through the elimination of and mitigating the adverse impacts of any such overflows if they do occur, the Permittee shall (A) identify and report to IEPA all SSOs that do occur, and (B) update the existing Capacity, Management, Operations, and Maintenance (CMOM) plan at least annually and maintain it at the facility for review during Agency Field Operations Section inspections. The Permittee shall submit copies of the CMOM to the IEPA upon written request. The Permittee shall modify the Plan to incorporate any comments that it receives from IEPA and shall implement the modified plan as soon as possible. The Permittee should work as appropriate, in consultation with affected authorities at the local, county, and/or state level to develop the plan components involving third party notification of overflow events. The Permittee may be required to construct additional sewage transport and/or treatment facilities in future permits or other enforceable documents should the implemented CMOM plan indicate that the Permittee's facilities are not capable of conveying and treating the flow for which they are designed.

The CMOM plan shall include the following elements:

A. Measures and Activities:

1. A complete map and system inventory for the collection system owned and operated by the Permittee;
2. Organizational structure; budgeting; training of personnel; legal authorities; schedules for maintenance, sewer system cleaning, and preventative rehabilitation; checklists, and mechanisms to ensure that preventative maintenance is performed on equipment owned and operated by the Permittee;
3. Documentation of unplanned maintenance;
4. An assessment of the capacity of the collection and treatment system owned and operated by the Permittee at critical junctions and immediately upstream of locations where overflows and backups occur or are likely to occur; use flow monitoring and/or sewer hydraulic modeling, as necessary;
5. Identification and prioritization of structural deficiencies in the system owned and operated by the Permittee. Include preventative maintenance programs to prevent and/or eliminate collection system blockages from roots or grease, and prevent corrosion or negative effects of hydrogen sulfide which may be generated within collection system;
6. Operational control, including documented system control procedures, scheduled inspections and testing, list of scheduled frequency of cleaning (and televising as necessary) of sewers;
7. The Permittee shall develop and implement an Asset Management strategy to ensure the long-term sustainability of the collection system. Asset Management shall be used to assist the Permittee in making decisions on when it is most appropriate to repair, replace or rehabilitate particular assets and develop long-term funding strategies; and
8. Asset Management shall include but is not limited to the following elements:
 - a. Asset Inventory and State of the Asset;
 - b. Level of Service;
 - c. Critical Asset Identification;
 - d. Life Cycle Cost; and
 - e. Long-Term Funding Strategy.

B. Design and Performance Provisions:

1. Monitor the effectiveness of CMOM;
2. Upgrade the elements of the CMOM plan as necessary; and
3. Maintain a summary of CMOM activities.

C. Overflow Response Plan:

1. Know where overflows and back-ups within the facilities owned and operated by the Permittee occur;
2. Respond to each overflow or back-up to determine additional actions such as clean up; and
3. Locations where basement back-ups and/or sanitary sewer overflows occur shall be evaluated as soon as practicable for excessive inflow/infiltration, obstructions or other causes of overflows or back-ups as set forth in the System Evaluation Plan.
4. Identify the root cause of the overflow or basement backup, and document to files;
5. Identify actions or remediation efforts to reduce risk of reoccurrence of these overflows or basement backups in the future, and document to files.

D. System Evaluation Plan:

1. Summary of existing SSO and Excessive I/I areas in the system and sources of contribution;
2. Evaluate plans to reduce I/I and eliminate SSOs;
3. Evaluate the effectiveness and performance in efforts to reduce excessive I/I in the collection system;
4. Special provisions for Pump Stations and force mains and other unique system components; and
5. Construction plans and schedules for correction.

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E. Reporting and Monitoring Requirements:

1. Program for SSO detection and reporting; and
2. Program for tracking and reporting basement back-ups, including general public complaints.

F. Third Party Notice Plan:

1. Describes how, under various overflow scenarios, the public, as well as other entities, would be notified of overflows within the Permittee's system that may endanger public health, safety or welfare;
2. Identifies overflows within the Permittee's system that would be reported, giving consideration to various types of events including events with potential widespread impacts;
3. Identifies who shall receive the notification;
4. Identifies the specific information that would be reported including actions that will be taken to respond to the overflow;
5. Includes a description of the lines of communication; and
6. Includes the identities and contact information of responsible POTW officials and local, county, and/or state level officials.

For additional information concerning USEPA CMOM guidance and Asset Management please refer to the following web site addresses.
http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf and
http://water.epa.gov/type/watersheds/wastewater/upload/guide_smallsystems_assetmanagement_bestpractices.pdf

SPECIAL CONDITION 18.

- A. The Permittee shall participate in the DuPage River Salt Creek Workgroup (DRSCW). The Permittee shall work with other watershed members of the DRSCW to determine the most cost-effective means to remove dissolved oxygen (DO) and offensive condition impairments in the DRSCW watersheds.
- B. The Permittee shall ensure that the following projects and activities set out in the Revised DRSCW Implementation Plan (June, 2021), are completed (either by the permittee or through the DRSCW) by the scheduled dates set forth below; and that the short term objectives are achieved for each by the time frames identified below:

Project Name	Completion Date	Short Term Objectives	Long Term Objectives
Oak Meadows Golf Course dam removal	December 31, 2016 (Completed)	Improve DO	Improve fish passage
Oak Meadows Golf Course stream restoration	December 31, 2017 (Completed)	Improve aquatic habitat (QHEI), reduce inputs of nutrients and sediment	Raise miBi
Fawell Dam Modification	December 31, 2022	Modify dam to allow fish passage	Raise fiBi upstream of structure
Spring Brook Restoration and dam removal	December 31, 2020 (Completed)	Improve aquatic habitat (QHEI), reduce inputs of nutrients and sediment	Raise miBi and fiBi
Fullersburg Woods dam modification concept plan development	December 31, 2016 (Completed)	Identify conceptual plan for dam modification and stream restoration	Build consensus among plan stakeholders
Fullersburg Woods dam modification	December 31, 2023	Improve DO, improve aquatic habitat (QHEI)	Raise miBi and fiBi
Fullersburg Woods dam modification area stream restoration	December 31, 2023	Improve aquatic habitat (QHEI), reduce inputs of nutrients and sediment	Raise miBi and fiBi

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West Branch Physical Enhancement	December 31, 2023	Improve aquatic habitat (QHEI)	Raise miBi and fiBi
Southern East Branch Stream Enhancement	December 31, 2024	Improve aquatic habitat (QHEI), reduce inputs of nutrients and sediment	Raise miBi and fiBi
QUAL 2Kw, West Branch, East Branch and Salt Creek	December 31, 2023	Collect new baseline data and update model	Quantify Improvements in watershed. Prioritize DO Improvement projects for years beyond 2024.
NPS Phosphorus Feasibility Analysis	December 31, 2021	Assess NPS performance from reductions leaf litter and street sweeping	Reduce NPS contributions to lowest practical levels
East Branch Phase II	December 31, 2028	Improve aquatic habitat (QHEI), reduce inputs of nutrients and sediment	Raise miBi and FiBi
Lower Salt Creek Phase 2	December 31, 2028	Improve aquatic habitat (QHEI), Remove fish barrier, reduce inputs of nutrients and sediment	Raise miBi and fiBi
West Branch Restoration Project	December 31, 2028	Improve aquatic habitat (QHEI), reduce inputs of nutrients and sediment	Raise miBi and fiBi

- C. The Permittee shall participate in implementation of a watershed Chloride Reduction Program, either directly or through the DRSCW. The program shall work to decrease DRSCW watershed public agency chloride application rates used for winter road safety, with the objective of decreasing watershed chloride loading. An annual report on the annual implementation of the program identifying the practices deployed, chloride application rates, estimated reductions achieved, analyses of watershed chloride loads, precipitation, air temperature conditions and relative performance compared to a baseline condition shall be submitted electronically to EPA.PrmtSpecCondtns@illinois.gov with "IL0034479 Special Condition 18.C" as the subject of the email and posted to the DRSCW's website by March 31 of each year. The annual report shall reflect the Chloride Abatement Program performance for the preceding year (example: 2019-20 winter season report shall be submitted no later than March 31, 2021). The Permittee may work cooperatively with the DRSCW to prepare a single annual progress report that is common among DRSCW permittees and may be submitted as part of a combined annual report with paragraph D below.
- D. The Permittee shall submit an annual progress report on the projects listed in the table of paragraph B above. The report shall be submitted electronically to EPA.PrmtSpecCondtns@illinois.gov with "IL0034479 Special Condition 18.D" as the subject of the email and posted to the DRSCW's website by March 31 of each year. The report shall include project implementation progress. The Permittee may work cooperatively with the DRSCW to prepare a single annual progress report that is common among DRSCW permittees.
- E. The Permittee shall maintain and implement any recommendations from its Phosphorus Discharge Optimization Plan in accordance with the schedule set forth in the Plan. Annual progress reports on the optimization of the existing treatment facilities shall be submitted electronically to EPA.PrmtSpecCondtns@illinois.gov with "IL0034479 Special Condition 18.E" as the subject of the email and posted to the permittee's website by March 31 of each year. If the permittee's plan does not already include a schedule, the permittee shall include a schedule for the implementation of any optimization measures recommended by the plan in the permittee's annual progress report due the March 31 one year after the permit becomes effective. As part of said plan, the Permittee shall continue to evaluate a range of measures for reducing phosphorus discharges from the treatment plant, including possible source reduction measures, operational improvements, and minor facility modifications that will optimize reductions in phosphorus discharges from the wastewater treatment facility. The Permittee's evaluation shall include, but not be limited to, an evaluation of the following optimization measures:
1. WWTF influent reduction measures.
 - a. Evaluate the phosphorus reduction potential of users.

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- b. Determine which sources have the greatest opportunity for reducing phosphorus (i.e., industrial, commercial, institutional, municipal and others).
 - i. Determine whether known sources (i.e., restaurant and food preparation) can adopt phosphorus minimization and water conservation plans.
 - ii. Evaluate implementation of local limits on influent sources of excessive phosphorus.
 2. WWTF effluent reduction measures.
 - a. Reduce phosphorus discharges by optimizing existing treatment processes without causing non-compliance with permit effluent limitations or adversely impacting stream health.
 - i. Adjust the solids retention time for biological phosphorus removal.
 - ii. Adjust aeration rates to reduce dissolved oxygen and promote biological phosphorus removal.
 - iii. Change aeration settings in plug flow basins by turning off air or mixers at the inlet side of the basin system.
 - iv. Minimize impact on recycle streams by improving aeration within holding tanks.
 - v. Adjust flow through existing basins to enhance biological nutrient removal.
 - vi. Increase volatile fatty acids for biological phosphorus removal.
- F. Total phosphorus in the effluent shall be limited as follows:
1. If the Permittee will use chemical precipitation to achieve the limit, the effluent limitation shall be 1.0 mg/L on a monthly average basis, effective October 1, 2028, or in accordance with the implementation schedule included in the Nutrient Implementation Plan unless the Agency approves and reissues or modifies the permit to include an alternate phosphorus reduction program or limit pursuant to paragraphs F.3 thru F.8 below.
 2. If the Permittee will primarily use biological phosphorus removal to achieve the limit, the effluent limitation shall be 1.0 mg/L monthly average to be effective October 1, 2029, or in accordance with the implementation schedule included in the Nutrient Implementation Plan unless the Agency approves and reissues or modifies the permit to include an alternate phosphorus reduction program or limit pursuant to paragraphs F.3 thru F.8 below.
 3. The Permittee demonstrates that the Limit is not technologically feasible; or
 4. The Permittee demonstrates the Limit would result in substantial and widespread economic or social impact. Substantial and widespread economic impacts must be demonstrated using applicable USEPA guidance, including but not limited to any of the following documents: 1. Interim Economic Guidance for Water Quality Standards, March 1995, EPA-823-95-002; 2. Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, February 1997, EPA-832—97-004; 3. Financial Capability Assessment Framework for Municipal Clean Water Act Requirements, November 24, 2014; or
 5. If the Nutrient Implementation Plan determines that a greater phosphorus reduction is necessary, then the Permittee shall meet the phosphorus limit identified in the Nutrient Implementation Plan in accordance with the schedule set out therein, prioritized among all watershed needs; or
 6. If the DRSCW has developed and implemented a trading program for POTWs in the DRSCW watersheds, providing for reallocation of allowed phosphorus loadings between two or more POTWs in the DRSCW and Lower DuPage Watershed Coalition watersheds, that delivers the same results of overall watershed phosphorus point-source reduction and loading anticipated from the uniform application of the applicable 1.0 mg/L monthly average effluent limitation, or other allocation identified in the Nutrient Implementation Plan, whichever is more stringent, among the POTW permits in the DRSCW watersheds and removes DO and offensive condition impairments and meets the applicable dissolved oxygen criteria in 35 Ill. Adm. Code 302.206 and the narrative offensive aquatic algae criteria in 35 Ill. Adm. Code 302.203.; or
 7. If the DRSCW has demonstrated and implemented an alternate means of reducing watershed phosphorus loading to a comparable result that removes DO and offensive condition impairments and meets the applicable dissolved oxygen criteria in 35 Ill. Adm. Code 302.206 and the narrative offensive aquatic algae criteria in 35 Ill. Adm. Code 302.203.; or
 8. If the Limit is demonstrated not to be technologically (e.g., no space available) or economically feasible, which shall be determined by an economic feasibility analysis by the date herein stipulated, but is feasible within a long timeline, then the permit shall include a compliance schedule requiring the discharger to comply with the phosphorus effluent limit as soon as possible, consistent with 40 C.F.R. § 122.47 (1), made applicable to Illinois at 40 C.F.R. § 123.25 (a)(18).
- G. The Permittee shall monitor the wastewater effluent, consistent with the monitoring requirements on Page 2 of this permit, for total phosphorus, dissolved phosphorus, nitrate/nitrite, total Kjeldahl nitrogen (TKN), ammonia, total nitrogen (calculated), alkalinity and temperature at least once a month. The Permittee shall monitor the wastewater influent for total phosphorus and total nitrogen at least once a month. The results shall be submitted on electronic DMRs (NetDMRs) to the Agency unless otherwise specified by the Agency.
- H. The Permittee shall submit electronically to EPA.PrmtSpecCondtns@illinois.gov with "IL0034479 Special Condition 18.H" as the subject of the email and post to the DRSCWs website by December 31, 2023 a Nutrient Implementation Plan (NIP) for the DRSCW

Special Conditions

watersheds that identifies phosphorus input reductions by point source discharges, non-point source discharges and other measures necessary to remove DO and offensive condition impairments and meet the applicable dissolved oxygen criteria in 35 Ill. Adm. Code 302.206 and the narrative offensive aquatic algae criteria in 35 Ill. Adm. Code 302.203. The NIP shall also include a schedule for implementation of the phosphorus input reductions and other measures. The Permittee may work cooperatively with the DRSCW to prepare a single NIP that is common among DRSCW permittees. Progress reports shall be submitted every year until completion and submission of the NIP. The DRSCW may prepare a single progress report for all DRSCW permittees and may be submitted as part of a combined annual report with paragraph D above. The Agency will renew or modify the NPDES permit as necessary to incorporate NIP requirements.

SPECIAL CONDITION 19. The Agency shall consider all monitoring data submitted by the discharger in accordance with the monitoring requirements of this permit for all parameters, including but not limited to data pertaining to ammonia and dissolved oxygen for discharges from Discharge Number 001, to determine whether the discharges are at levels which cause, have the reasonable potential to cause or contribute to exceedances of water quality standards; and, if so, to develop appropriate water quality based effluent limitations. If the discharger wants the Agency to consider mixing when determining the need for and establishment of water quality based effluent limitations, the discharger shall submit a study plan on mixing for IEPA approval.

Attachment H
Standard Conditions
Definitions

Act means the Illinois Environmental Protection Act, 415 ILCS 5 as Amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Pub. L 92-500, as amended. 33 U.S.C. 1251 et seq.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly-selected time over a period not exceeding 15 minutes.

24-Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8-Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

- (1) **Duty to comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.
- (2) **Duty to reapply.** If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.
- (3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
- (4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
- (5) **Proper operation and maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.
- (6) **Permit actions.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62 and 40 CFR 122.63. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.
- (7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.
- (8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency upon request, copies of records required to be kept by this permit.
- (9) **Inspection and entry.** The permittee shall allow an authorized representative of the Agency or USEPA (including an authorized contractor acting as a representative of the Agency or USEPA), upon the presentation of credentials and other documents as may be required by law, to:
 - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records

- must be kept under the conditions of this permit;
 - (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
 - (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
 - (d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.
- (10) **Monitoring and records.**
- (a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
 - (b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of this permit, measurement, report or application. Records related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503). This period may be extended by request of the Agency or USEPA at any time.
 - (c) Records of monitoring information shall include:
 - (1) The date, exact place, and time of sampling or measurements;
 - (2) The individual(s) who performed the sampling or measurements;
 - (3) The date(s) analyses were performed;
 - (4) The individual(s) who performed the analyses;
 - (5) The analytical techniques or methods used; and
 - (6) The results of such analyses.
 - (d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Where no test procedure under 40 CFR Part 136 has been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.
- (11) **Signatory requirement.** All applications, reports or information submitted to the Agency shall be signed and certified.
- (a) **Application.** All permit applications shall be signed as follows:
 - (1) For a corporation: by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation;
 - (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
 - (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.
 - (b) **Reports.** All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - (1) The authorization is made in writing by a person described in paragraph (a); and
 - (2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and
 - (3) The written authorization is submitted to the Agency.
 - (c) **Changes of Authorization.** If an authorization under (b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of (b) must be submitted to the Agency prior to or together with any reports, information, or applications to be signed by an authorized representative.
 - (d) **Certification.** Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
- (12) **Reporting requirements.**
- (a) **Planned changes.** The permittee shall give notice to the Agency as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required when:
 - (1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source pursuant to 40 CFR 122.29 (b); or
 - (2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements pursuant to 40 CFR 122.42 (a)(1).
 - (3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.
 - (b) **Anticipated noncompliance.** The permittee shall give advance notice to the Agency of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
 - (c) **Transfers.** This permit is not transferable to any person except after notice to the Agency.
 - (d) **Compliance schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.
 - (e) **Monitoring reports.** Monitoring results shall be reported at the intervals specified elsewhere in this permit.
 - (1) Monitoring results must be reported on a Discharge Monitoring Report (DMR).

- (2) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
- (3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Agency in the permit.
- (f) **Twenty-four hour reporting.** The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24-hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and time; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported within 24-hours:
- (1) Any unanticipated bypass which exceeds any effluent limitation in the permit.
 - (2) Any upset which exceeds any effluent limitation in the permit.
 - (3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit or any pollutant which may endanger health or the environment.
- The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24-hours.
- (g) **Other noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs (12) (d), (e), or (f), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12) (f).
- (h) **Other information.** Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Agency, it shall promptly submit such facts or information.
- (13) **Bypass.**
- (a) Definitions.
 - (1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.
 - (2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
 - (b) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (13)(c) and (13)(d).
 - (c) Notice.
 - (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
 - (2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (12)(f) (24-hour notice).
 - (d) Prohibition of bypass.
 - (1) Bypass is prohibited, and the Agency may take enforcement action against a permittee for bypass, unless:
 - (i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 - (ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
 - (iii) The permittee submitted notices as required under paragraph (13)(c).
 - (2) The Agency may approve an anticipated bypass, after considering its adverse effects, if the Agency determines that it will meet the three conditions listed above in paragraph (13)(d)(1).
- (14) **Upset.**
- (a) Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
 - (b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (14)(c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
 - (c) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - (1) An upset occurred and that the permittee can identify the cause(s) of the upset;
 - (2) The permitted facility was at the time being properly operated; and
 - (3) The permittee submitted notice of the upset as required in paragraph (12)(f)(2) (24-hour notice).
 - (4) The permittee complied with any remedial measures required under paragraph (4).
 - (d) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

- (15) **Transfer of permits.** Permits may be transferred by modification or automatic transfer as described below:
- (a) Transfers by modification. Except as provided in paragraph (b), a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued pursuant to 40 CFR 122.62 (b) (2), or a minor modification made pursuant to 40 CFR 122.63 (d), to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act.
 - (b) Automatic transfers. As an alternative to transfers under paragraph (a), any NPDES permit may be automatically transferred to a new permittee if:
 - (1) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;
 - (2) The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage and liability between the existing and new permittees; and
 - (3) The Agency does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement.
- (16) All manufacturing, commercial, mining, and silvicultural dischargers must notify the Agency as soon as they know or have reason to believe:
- (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant identified under Section 307 of the Clean Water Act which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:
 - (1) One hundred micrograms per liter (100 ug/l);
 - (2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6 dinitrophenol; and one milligram per liter (1 mg/l) for antimony.
 - (3) Five (5) times the maximum concentration value reported for that pollutant in the NPDES permit application; or
 - (4) The level established by the Agency in this permit.
 - (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the NPDES permit application.
- (17) All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Agency of the following:
- (a) Any new introduction of pollutants into that POTW from an indirect discharge which would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and
 - (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
 - (c) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.
- (18) If the permit is issued to a publicly owned or publicly regulated treatment works, the permittee shall require any industrial user of such treatment works to comply with federal requirements concerning:
- (a) User charges pursuant to Section 204 (b) of the Clean Water Act, and applicable regulations appearing in 40 CFR 35;
 - (b) Toxic pollutant effluent standards and pretreatment standards pursuant to Section 307 of the Clean Water Act; and
 - (c) Inspection, monitoring and entry pursuant to Section 308 of the Clean Water Act.
- (19) If an applicable standard or limitation is promulgated under Section 301(b)(2)(C) and (D), 304(b)(2), or 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked, and reissued to conform to that effluent standard or limitation.
 - (20) Any authorization to construct issued to the permittee pursuant to 35 Ill. Adm. Code 309.154 is hereby incorporated by reference as a condition of this permit.
 - (21) The permittee shall not make any false statement, representation or certification in any application, record, report, plan or other document submitted to the Agency or the USEPA, or required to be maintained under this permit.
 - (22) The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed \$25,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or both. Additional penalties for violating these sections of the Clean Water Act are identified in 40 CFR 122.41 (a)(2) and (3).
 - (23) The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.
 - (24) The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.
 - (25) Collected screening, slurries, sludges, and other solids shall be disposed of in such a manner as to prevent entry of those wastes (or runoff from the wastes) into waters of the State. The proper authorization for such disposal shall be obtained from the Agency and is incorporated as part hereof by reference.
 - (26) In case of conflict between these standard conditions and any other condition(s) included in this permit, the other condition(s) shall govern.
 - (27) The permittee shall comply with, in addition to the requirements of the permit, all applicable provisions of 35 Ill. Adm. Code, Subtitle C, Subtitle D, Subtitle E, and all applicable orders of the Board or any court with jurisdiction.
 - (28) The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit is held invalid, the remaining provisions of this permit shall continue in full force and effect.

APPENDIX B
INFLUENT FLOWS AND LOADINGS

Table B-1

Date	Monthly Average Flow MGD	BOD		TSS		TP, as P		TN, as N	
		mg/L	ppd	mg/L	ppd	mg/L	ppd	mg/L	ppd
Jan-20	1.53	113	1308	32	369	2.96	37.2	22.80	287
Feb-20	1.36	108	1207	65	740	3.28	36.5	41.50	462
Mar-20	1.57	125	1491	64	764	2.56	36.7	25.20	361
Apr-20	1.60	118	1938	59	945	4.10	50.9	38.20	475
May-20	1.81	93	1076	72	803	5.16	52.7	46.60	476
Jun-20	1.21	159	1512	78	735	10.70	116.8	12.10	132
Jul-20	1.18	164	1738	71	771	4.93	50.6	7.65	78
Aug-20	1.06	191	1642	58	498	5.18	46.4	45.40	407
Sep-20	1.14	146	1296	50	445	N/A	N/A	N/A	N/A
Oct-20	1.17	172	1704	66	575	5.98	49.3	49.70	410
Nov-20	1.20	163	1684	49	508	4.61	45.7	33.90	336
Dec-20	1.26	148	1534	72	811	N/A	N/A	N/A	N/A
Jan-21	1.30	140	1482	86	914	17.60	180.5	38.60	383
Feb-21	1.34	121	1267	75	867	19.90	197.7	46.10	408
Mar-21	1.60	117	1610	62	844	9.11	156.5	33.40	465
Apr-21	1.11	165	1513	74	681	N/A	N/A	47.80	582
May-21	1.04	216	1851	122	1046	19.00	153.5	48.80	394
Jun-21	1.32	145	1343	89	892	27.40	232.2	46.00	390
Jul-21	1.22	200	1979	85	836	20.80	196.2	42.40	400
Aug-21	1.21	159	1641	147	1505	20.60	183.8	44.00	393
Sep-21	1.06	216	1899	79	687	17.70	159.3	35.00	304
Oct-21	1.33	173	1712	108	1070	30.00	265.2	35.90	317
Nov-21	1.10	181	1666	76	696	21.15	193.7	31.40	302
Dec-21	1.27	161	1610	129	1255	1.21	10.9	45.30	393
Jan-22	1.11	175	1591	48	448	3.73	33.8	31.20	320
Feb-22	1.37	176	2077	57	718	3.28	42.4	0.10	1
Mar-22	1.61	127	1864	53	827	3.37	46.3	31.30	392
Apr-22	1.76	143	2221	113	1846	3.48	53.5	0.10	2
May-22	1.59	157	2017	84	1107	3.41	43.3	28.70	440
Jun-22	1.15	197	1907	78	771	5.01	52.5	48.00	503
Jul-22	1.28	150	1459	97	936	4.45	41.9	41.30	441
Aug-22	1.22	173	1655	67	636	4.48	44.5	N/A	N/A
Average	1.31	156	1640	77	830	9.83	96.9	34.43	354
Maximum	1.81	216	2221	147	1846	30.00	265.2	49.70	582
Minimum	1.04	93	1076	32	369	1.21	10.9	0.10	1

APPENDIX C
BASIS OF DESIGN (ALUM)

Provide two chemical metering pump(s).

Number of pumps		2 pumps
Capacity, each		15 gph
Total pump capacity with one as standby		15 gph

Provide storage tank

Minimum storage (10 days)	671	2372 days
Recommended storage days (30 days)	2013	7116 days
Storage Provided		2,013 gallons
	Say -->	5,000 gallons

2. Estimated Annual Alum Cost

Dose at a mole ratio of 1.5Al:1P		
Average alum consumed [as Al ₂ (SO ₄) ₃ · 14H ₂ O]	67	237 gpd
	24,493	86,573 gal/year

Average Cost per gal of Al₂(SO₄)₃ · 14H₂O \$ 1.33

Chemical Cost \$ 32,500 \$ 114,700 \$/year

3. Estimated Phosphorus Sludge Production

Chemical P Sludge
Sludge production ratio 0.44 0.44 lbsTSS/lbs al

Sludge Production
= 0.35 x 237 lbs alum /day 159 561 lbs/day
assumed at 2% solids 952 3,366 gpd

Additional Sludge Removal Cost

Average Cost per gallon of sludge removed \$ 0.06 \$ 0.06 per gallon
Annual Cost \$ 20,900 \$ 73,700 \$/year

Total Annual Operating Cost

Chemical Cost + Sludge Hauling Costs \$ 53,400 \$ 188,400 \$/year

APPENDIX D
BASIS OF DESIGN (PAC)

Appendix D

Village of Hanover Park
Chemical P Removal Evaluation - 220867.30

Chemical Phosphorus Removal Calculations (PAC)

Average Daily Flow (ADF)	1.31 MGD
WAS production, lbs TS/day @ 70% Volatile Solids	2,417 ppd TSS 1,692 ppd VSS
Total Design Average Flow (DAF) (incl. sidestreams)	3.05 MGD
Sidestream Average Flow	0.63 MGD
WAS production, lbs TS/day @ 70% Volatile Solids	5,333 ppd TSS 3,733 ppd VSS

1. Phosphorus Removal Options

Chemical - Alum (only)

	ADF	DAF
(Raw) Influent Phosphorus	7.8	7.8 mg/L
	85	157 lbs/day
Phosphorus uptake, % of cell mass	2.3%	2.3%
Phosphorus removal in WAS VSS	39	86 lbs/day
Digestion VS reduction	40%	40%
Phosphorus remaining in sludge after digestion	23	52 lbs/day
Calculated Phosphorus in Recycles	16	34 lbs/day
	136	136 mg/L
Net phosphorus in clarifiers effluent	62	106 lbs/day
	3.1	5.2 mg/L
Effluent Limit, monthly average for annual monitoring		1 mg/L
Target Effluent Limit		0.8 mg/L
Phosphorus to be removed chemically	25.1	88.8 lbs/day
Dose at a mole ratio of 1.5Al:1P per EPA Nutrient Removal Design Manual		
Average PAC consumed [as Al ₂ (OH) ₃ Cl ₃]		
(lbs P/day) x 1.5 (mole Al/mole P) x 212 (g PAC/mole Al) / 31 (g P/mol P)		
	258	911 lbs/day
Use 45% w/w solution (SG = 1.31)		
911 lbs/day / (0.45 x 1.31 x 8.34)	52	185 gpd
	2	8 gph

Provide two chemical metering pump(s).

Number of pumps		2 pumps
Capacity, each		10 gph
Total pump capacity with one as standby		10 gph

Provide storage tank

Minimum storage (10 days)	525	1853 days
Recommended storage days (30 days)	1574	5559 days
Storage Provided		1,574 gallons
	Say -->	3,900 gallons

2. Estimated Annual PAC Cost

Dose at a mole ratio of 1.5Al:1P

Average PAC consumed [as Al ₂ (OH) ₃ Cl ₃]	52	185 gpd
	19,154	67,633 gal/year

Average Cost per gal of Al ₂ (SO ₄) ₃ · 14H ₂ O		\$	2.79
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Chemical Cost	\$	53,400	\$	188,400	\$/year
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3. Estimated Phosphorus Sludge Production

Chemical P Sludge

Sludge production ratio	0.352	0.352 lbsTSS/lbs PA
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Sludge Production

= 0.35 x 185 lbs alum /day	91	321 lbs/day
assumed at 2% solids	544	1,922 gpd

Additional Sludge Removal Cost

Average Cost per gallon of sludge removed	\$	0.06	\$	0.06	per gallon
Annual Cost	\$	12,000	\$	42,100	\$/year

Total Annual Operating Cost

Chemical Cost + Sludge Hauling Costs	\$	65,400	\$	230,500	\$/year
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APPENDIX E
BASIS OF DESIGN (REE)

Appendix E

Village of Hanover Park
 Chemical P Removal Evaluation - 220867.30

Chemical Phosphorus Removal Calculations (REE)

Average Daily Flow (ADF)	1.31 MGD
WAS production, lbs TS/day	2,417 ppd TSS
@ 70% Volatile Solids	1,692 ppd VSS
Total Design Average Flow (DAF) (incl. sidestreams)	3.05 MGD
Sidestream Average Flow	0.63 MGD
WAS production, lbs TS/day	5,333 ppd TSS
@ 70% Volatile Solids	3,733 ppd VSS

1. Phosphorus Removal Options

Chemical - Alum (only)

	ADF	DAF
(Raw) Influent Phosphorus	7.8	7.8 mg/L
	85	157 lbs/day
Phosphorus uptake, % of cell mass	2.3%	2.3%
Phosphorus removal in WAS VSS	39	86 lbs/day
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Phosphorus remaining in sludge after digestion	23	52 lbs/day
Calculated Phosphorus in Recycles	16	34 lbs/day
	136	136 mg/L
Net phosphorus in clarifiers effluent	62	106 lbs/day
	3.1	5.2 mg/L
Effluent Limit, monthly average for annual monitoring		1 mg/L
Target Effluent Limit		0.8 mg/L
Phosphorus to be removed chemically	25.1	88.8 lbs/day

Dose at a mole ratio of 1La:1P per NeoWater Technnologies (chemical manufacturer)

Average REE consumed [as LaCl ₃]		
(lbs P/day) x 1(mole La/mole P) x 246 (g REE/mole La) / 31 (g P/mol P)	199	705 lbs/day
REE concentration of REE in FX300 is 640 g/L		
705 lbs/day / (0.64 x 8.34)	37	132 gpd
	2	6 gph

Provide two chemical metering pump(s).

Number of pumps		2 pumps
Capacity, each		6 gph
Total pump capacity with one as standby		6 gph

Provide storage tank

Minimum storage (10 days)	373	1321 days
Recommended storage days (30 days)	1118	3962 days
Storage Provided		1,348 gallons
	Say -->	1,400 gallons

2. Estimated Annual REE Cost

Dose at a mole ratio of 1La:1P

Average alum consumed [as FX300]	37	132 gpd
	13,608	48,210 gal/year

Average Cost per gal of FX300 \$ 11.03

Chemical Cost \$ 150,100 \$ 531,800 \$/year

3. Estimated Phosphorus Sludge Production

Chemical P Sludge

Sludge production ratio 0.45 0.45 lbsTSS/lbs F

Sludge Production

= 0.35 x 132 lbs alum /day 90 317 lbs/day
assumed at 2% solids 537 1,902 gpd

Additional Sludge Removal Cost

Average Cost per gallon of sludge removed \$ 0.06 \$ 0.06 per gallon

Annual Cost \$ 11,800 \$ 41,700 \$/year

Total Annual Operating Cost

Chemical Cost + Sludge Hauling Costs \$ 161,900 \$ 573,500 \$/year