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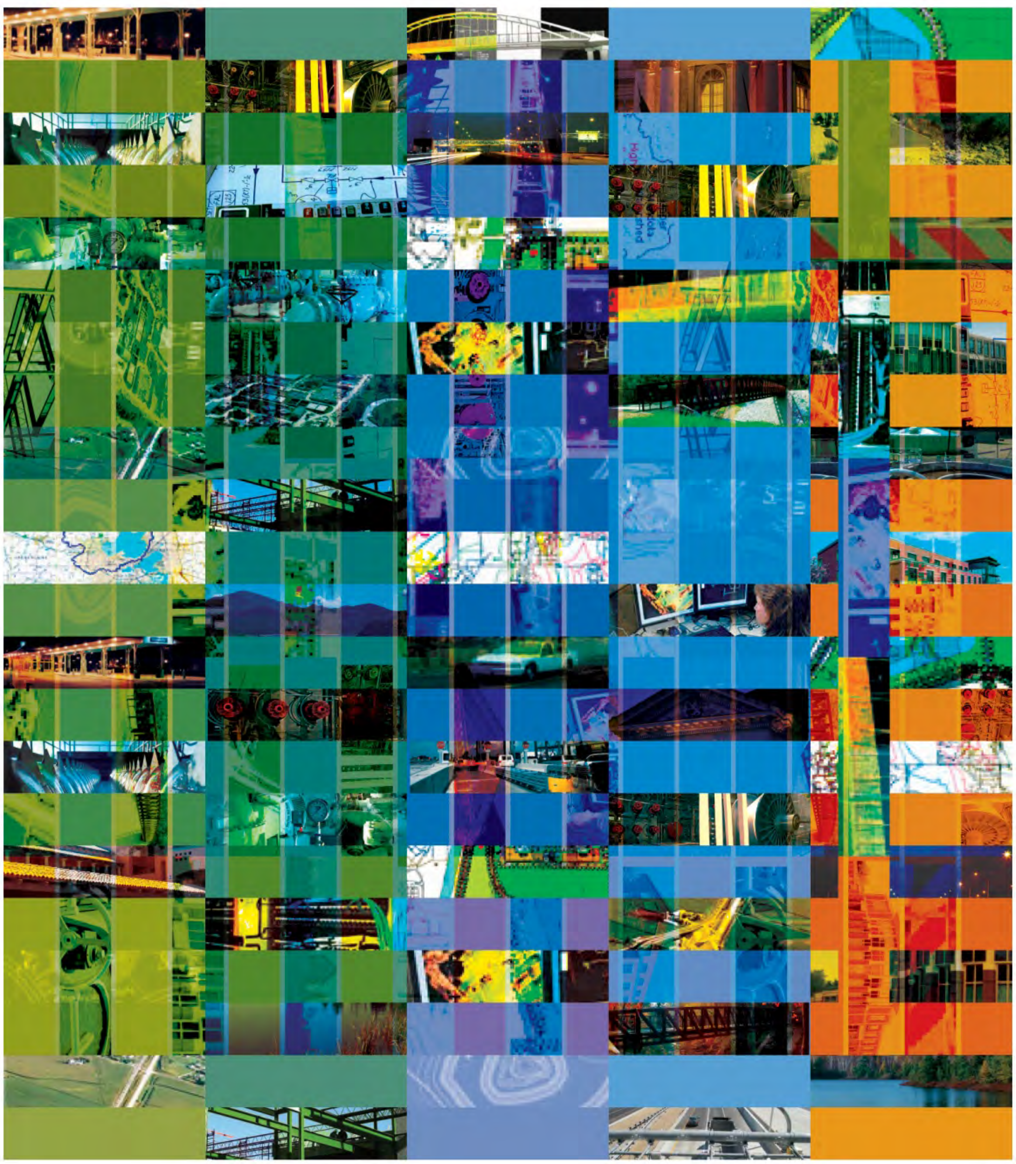
Facilities Plan



Report

Glenbard Wastewater Authority, IL

June 2013

STRAND ASSOCIATES®

STRAND ASSOCIATES®

Strand Associates, Inc.®
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Madison, WI 53715
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June 27, 2013

Mr. Geoff Andres
Illinois Environmental Protection Agency
Infrastructure Financial Assistance Section
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Glenbard Wastewater Authority
2013 Wastewater Facilities Plan

Dear Mr. Andres:

Enclosed for review are three copies of the Glenbard Wastewater Authority (GWA) Facilities Plan report. This plan recommends numerous projects over the 20-year planning period to address the Glenbard Wastewater Authority needs including modifications to the existing GWA wastewater treatment plant (WWTP), the Lombard Combined Sewage Treatment Facility (LCSTF), and Valley View Lift Station to address both age and operational issues. The projects identified in the plan are proposed to be funded by the GWA Capital Reserve Fund except for the Effluent Filtration, UV Disinfection, and Biosolids Storage project, which is anticipated to be financed through the Illinois Revolving Loan program. Included in Appendix A is the completed IEPA-Facilities Planning Submittal Checklist.

Need for the Improvements

The WWTP and LCSTF have numerous process equipment reaching the end of its useful life and is in need of upgrades. Most of the WWTP was construction through the 1969 and 1977 projects. A number of projects in the past 20 years have modified or replaced portions of the WWTP facilities. The LCSTF was originally constructed in 1982. Many of these WWTP and LCSTF facilities, however, are over 20 years old, resulting in maintenance and performance issues.

Current Status and Implementation Schedule

GWA would like to maintain the following schedule in anticipation of receiving funding in State Fiscal Year 2015 for the Effluent Filtration, UV Disinfection, and Biosolids Storage project.

Mr. Geoff Andres
Illinois Environmental Protection Agency
Page 2
June 27, 2013

Facilities Plan Submittal to IEPA	June 2013
IEPA Approval of Facilities Plan	October 2013
Submit Design Documents to IEPA	October 2014
Submit IEPA Loan Application	October 2014
IEPA Approval of Design	January 2015
Advertise for Bids	February 2015
Construction Bid Date	March 2015
Construction Start Date	May 2015
Construction Completion	May 2017

In addition, a modification to the Facility Planning Area is not proposed as part of the Facilities Plan, nor is the design average flow at the facility proposed to be increased. Thank you for your consideration.

Sincerely,

STRAND ASSOCIATES, INC.®

Troy W. Stinson

Troy W. Stinson, P.E.

Enclosure

c: Erik Lanphier, Executive Director, Glenbard Wastewater Authority

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Report for

Glenbard Wastewater Authority

Facilities Plan

STATE OF ILLINOIS
TROY W.
STINSON
0062-052342
REGISTERED
PROFESSIONAL ENGINEER

Troy W. Stinson
Exp 11/30/2013

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June 2013

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ASSOCIATES®

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APPENDICES

EXECUTIVE SUMMARY

This Executive Summary presents the highlights of the facilities planning effort. Each section of the facilities plan is condensed and summarized.

ES.01 PURPOSE AND SCOPE OF REPORT

The Glenbard Wastewater Authority (GWA) provides wastewater treatment for the communities of Glen Ellyn, Lombard, and adjacent unincorporated areas. This study was conducted to develop an overall wastewater management plan for the GWA facilities to meet the anticipated future growth as well as the anticipated state and federal water quality protection requirements. The facilities plan has a specific focus with respect to the influent pumping station, the activated sludge system operation, nutrient removal, effluent filtration, ultraviolet (UV) disinfection, and biosolids management. In addition, the Lombard Combined Sewage Treatment Facility (LCSTF) and Valley View Lift Station are evaluated and recommended improvements are included. The existing treatment facilities were evaluated for their ability to serve the GWA sewer service area for a period of 20 years through 2033.

ES.02 EXISTING WASTEWATER CONVEYANCE FACILITIES

The 2006 Facilities Plan included a detailed description of the wastewater conveyance facilities owned and operated by the GWA as well as a discussion of previous, current, and planned evaluations. Each customer community served by GWA owns and maintains a locally owned collection system. The entire collection system is comprised of separate sanitary sewers with the exception of portions of Lombard, which has combined sewers. GWA owns and operates the major interceptors that convey wastewater from the customer communities to the GWA WWTP which include the North Regional Interceptor (NRI) and the South Regional Interceptor (SRI). The GWA also owns and maintains five pumping stations–the St. Charles Road, Hill Avenue, Sunny Side, Valley View, and SRI Pump Stations. The LCSTF receives peak wet weather flows from a portion of the Village of Lombard. Several components of the LCSTF have been identified as requiring replacement within the facilities planning period and are discussed further in Sections 6 and 7 of the facilities plan.

A. Valley View Pumping Station Upgrades

The existing wet well/dry well pump station rated for 2.2 million gallons per day (mgd) includes two 75 horsepower (hp), two-speed, dry pit centrifugal pumps. A drawdown test completed January 10, 2013, however, determined the actual firm pumping station capacity is only 1.7 mgd. The pump station upgrades will increase the firm capacity to the rated pump capacity of 1,540 gpm or 2.2 mgd. The proposed project includes installation of two 85 hp submersible pumps, a valve vault, emergency bypass connections, and magnetic flow metering. In addition to the pump station upgrades, a building will be constructed to house a standby generator, fuel tank, and electrical equipment.

ES.03 EXISTING WASTEWATER TREATMENT PLANT (WWTP) FACILITIES

The GWA WWTP was constructed in 1977. A number of projects in the past 20 years have replaced or modified portions of the WWTP facilities. The WWTP is rated for an annual average flow of 16.02 mgd and a maximum daily flow of 47 mgd, which are reflected in the National Pollutant Discharge Elimination System (NPDES) permit. Treatment consists of deep mechanical fine screening, pumping, grit removal, primary sedimentation, two-stage high purity oxygen-activated sludge treatment (TS-HPOAS), intermediate clarification, final clarification, granular media filtration, and UV disinfection. The treated effluent is discharged to the East Branch of the DuPage River.

ES.04 WASTELOAD AND FLOW FORECASTS

The GWA serves the communities of Glen Ellyn and Lombard, and adjacent unincorporated areas including Glen Ellyn Heights (DuPage County) and Citizen Utilities Company's Valley View service area. The projected Year 2033 population for the GWA is 109,125, which has not changed from the 2006 Facilities Plan. These population projections were used in conjunction with existing flow data and Illinois Environmental Protection Agency (IEPA)-recommended per capita loadings to project future wastewater flows and loadings at the plant. The resulting design flows and loadings are as follows:

Parameter	Year 2033
Design Average Flow (DAF), mgd	16.02
Design Maximum Hourly Flow, mgd	47.00
Annual Average BOD_5, lb/day	18,600
Annual Average TSS, lb/day	21,800
Annual Average TKN, lb/day	3,800
Annual Average TP, lb/day	800

Table ES.04-1 Design Flows and Loadings

ES.05 REGULATORY AND NPDES PERMITTING ISSUES

The purpose of this section is to discuss regulatory initiatives now under consideration, review their impact on the GWA WWTP, and recommend provisions that should be included in any proposed WWTP modifications to address these future regulatory concerns.

Nutrient limits for total nitrogen (TN) and total phosphorus (TP) are not anticipated in the next permit cycle. However, it is likely that effluent nutrient limits will be imposed within the 20-year planning period of this facilities plan. Limits could be contained in the 2017 reissued permit and a 3-year or longer compliance schedule may be included. Additionally, more stringent ammonia limits could be contained in the 2017 reissued permit and a three year or longer compliance schedule may be included.

TP is a concern because of the impaired status of the East Branch of the Dupage River. Based on current IEPA thinking and experience from other states, an effluent limit of about 0.3 to

0.5 milligrams per liter (mg/L) or less could be implemented in one of GWA's future permits. Because of the uncertainties surrounding the timing of future nutrient limits, assumptions were made in this facilities plan to evaluate the treatment processes.

Stabilized biosolids from the GWA WWTP are considered Class B and are disposed on land application sites. Regulations for sludge application on agricultural was enacted in August 2011 that limits stockpiling of sludge at the same site to 30 days. There are no current or anticipated regulatory initiatives that would restrict GWA's ability to continue beneficial reuse of biosolids generated at the WWTP.

ES.06 EVALUATION OF EXISTING FACILITIES AND SCREENING ALTERNATIVES

Significant upgrades in capacity at the GWA WWTP are not anticipated to meet the future average and peak design flows and loadings to the plant. However, specific unit processes are in need of upgrading to maintain treatment efficiency and to better provide capacity. The alternative technology evaluations include the following:

1. Influent Pump Station
2. Activated Sludge Treatment
3. Digested Biosolids Dewatering
4. Cogeneration and High-Strength Waste Codigestion

Additional improvements were identified that were not subject to alternative analysis and were included as common needs.

ES.07 ALTERNATIVE ANALYSIS

A. Influent Pump Station Alternatives Analysis

Two alternatives were analyzed for replacement of the existing influent pumps.

Alternative IPS-1: Install three new dry-pit submersible pumps in the existing dry well.

Alternative IPS-2: Modify existing wet well for prerotational suction intake, and provide four new dry-pit centrifugal pumps.

This project also includes a new conditioned motor control center (MCC) space, replacement of the existing variable frequency drives, and replacement of the plug valve and sluice gate hydraulic operators with electric operators.

These two alternatives were considered equal on a total present worth basis. Alternative IPS-2, with the prerotation basins, is the recommended alternative because of the nonmonetary factors associated with the prerotation basin to maintain a lower wet well level.

B. Activated Sludge Alternatives Analysis

Four activated sludge alternatives were reviewed in this analysis:

Alternative AS-1: Two-Stage HPOAS and continued cryogenic oxygen generation.

Alternative AS-2: Single-stage HPOAS and continued cryogenic oxygen generation.

Alternative AS-3: Single-stage air activated sludge and new aeration blowers.

Alternative AS-4: Single-stage integrated fixed film activated sludge (IFAS) and new aeration blowers.

Each of the alternatives assumes a design to meet a future phosphorus and TN limits of 0.5 mg/L and 10 mg/L, respectively. To meet the future TN limit, biological nitrogen removal (BNR) is assumed. For phosphorus removal, chemical phosphorus removal (CPR) and biological phosphorus removal (BPR) were considered. BPR testing was conducted in November 2012 to evaluate the ability for GWA to achieve BPR, which indicated insufficient volatile fatty acids are available for BPR at the time of the testing. For this reason, BPR was excluded as an option and CPR was included for all the activated sludge alternatives. Additional BPR testing is recommended to confirm these results.

A separate analysis for bioaugmentation as a side stream add-on process for Alternative AS-2 is also included. Bioaugmentation would include separate biological treatment of recycled dewatering filtrate and produce supplemental nitrifiers with the objective of increasing nitrification performance and reducing ammonia loading to the main biological process.

From the total present worth analyses, Alternatives AS-3 and AS-4 have significantly greater capital costs than Alternatives AS-1 and AS-2. Because of the good operating condition of the cryogenic plant, it is recommended this high purity oxygen (HPO) system be maintained. In the near term, Alternative AS-2 has fewer pieces of equipment which will provide maintenance benefits over Alternative AS-1.

At the time of this report, the ability of the GWA WWTP to reliably nitrify while operating the activated sludge facilities in single-stage has not been fully evaluated. After evaluation of the single-stage operation, GWA could consider potentially improving nitrification with modifications to the last stage of the aeration basins which would increase the pH. Bioaugmentation could be implemented to potentially improve nitrification and reduce the ammonia loading to the activated sludge process as well.

When the actual TP and/or TN nutrient limits are known, the single-stage HPOAS should be further evaluated to incorporate BNR. Large scale pilot testing by converting one of activated sludge trains to include denitrification is recommended.

The recommended Alternative AS-2 is separated into the following projects because of differing priorities:

- Intermediate Pump Station Modifications
- UNOX Deck Control Improvements
- Activated Sludge Final Stage Modifications
- Cryo Building MCC and PLC Replacement
- Denitrification Modifications
- Bioaugmentation

C. Digested Biosolids Dewatering

The following two digested biosolids dewatering alternatives were considered:

Alternative BD-1: Install two new BFPs in the Dewatering Building.

Alternative BD-2: Install one new centrifuge and maintain one existing BFP.

The dewatering performance of Alternative BD-1 and Alternative BD-2 are 18 percent and 25 percent, respectively. This results in the centrifuge with Alternative BD-2 providing biosolids disposal savings compared to Alternative BD-1. Additionally, biosolids storage building costs are impacted by the selection of this alternative because of the dewatering performance differences. Because of the nonmonetary considerations and potential saving in biosolids storage costs, Alternative BD-2 is recommended.

D. Codigestion and Cogeneration Analyses

Biogas produced from anaerobic digestion at the GWA WWTP is used in the plant boilers to heat the digestion process and any excess is flared.

This alternative analysis evaluations the potential for codigestion of high strength waste (HSW) and cogeneration. was also evaluated because of potential revenue from the additional biogas generation. HSW could provide revenue from HSW tipping fees, improved volatile solids (VS) destruction, and potential reduction of grease loads to the collection system.

As a part of this study, the following codigestion and cogeneration alternatives are discussed and evaluated:

Alternative CC-1a: Convert one or more of the existing natural gas engines to use biogas for electricity production and heat recovery. Digest municipal sludge only (no codigestion).

Alternative CC-1b: Convert one or more of the existing natural gas engines to use biogas for electricity production and heat recovery. Construct HSW receiving station for codigestion up to the loading limit of the existing digestion facilities.

Alternative CC-2a: Install new internal combustion engines to use biogas for electricity production and heat recovery. Digest municipal sludge only (no codigestion).

Alternative CC-2b: Install new internal combustion engines to use biogas for electricity production and heat recovery. Construct HSW receiving station for codigestion up to the loading limit of the existing digestion facilities.

Each of these alternatives includes a reciprocating gas engine, which requires biogas to be treated for hydrogen sulfide, siloxanes, and moisture removal. The total present worth analysis also evaluated three different biogas production rates which were used for the applicable alternatives. From the total present worth analysis, cogeneration is not considered favorable at this time. This is mainly the result of the very low electrical rates currently paid by GWA. Reevaluation of these alternatives is recommended in future planning efforts and as electrical costs increase.

E. Common Needs

In addition to these alternative analyses, this section also reviews other recommended improvements at the WWTP. These project elements are developed and described based on the technology selections of the major alternative analyses presented above. These additional project elements include:

- LCSTF Equipment Upgrades
- Hauled Waste Receiving
- Screenings Washer and Compactor
- Peak Flow Storage
- Chemical Phosphorus Removal
- Effluent Filtration
- Disinfection
- Sludge Thickening
- Liquid Biosolids Storage
- Dewatered Biosolids Storage
- Plant Utilities
- HVAC System Replacement
- Electrical Service, Backup, and Redundancy
- Remote Site Communication
- Site Lighting
- MCC Replacement
- PLC Replacements
- Electronic O&M Manual

The chemical phosphorus removal, effluent filtration, disinfection, and sludge thickening projects are described in greater detail below.

1. Chemical Phosphorus Removal (CPR)

As previously discussed in the activated sludge alternatives analysis, CPR is assumed to be required for each of the activated sludge alternatives. Costs are included in the plan for a new CPR Building located near the Pump and Electrical Building. Because of the significance in chemical costs and the uncertainty of the future phosphorus limit, CPR jar testing, BPR testing, and pilot testing are recommended before design of CPR.

2. Effluent Filtration

Effluent filtration improvements to the existing deep bed filters are needed because of hydraulic issues with flow distribution, high maintenance, and significant filter recycle flows to influent pump station. This plan includes costs for replacement of the ten deep bed filters with disc filters and evaluated four different manufacturers of this equipment. The opinions of probable cost for this project are within 5 percent of each other for the three manufacturers evaluated (Nova Water Technologies, Siemens, and Kruger), and review of these three disc filter units is recommended during design.

3. Disinfection

The existing UV disinfection equipment is nearing 20 years in service, which is beyond the normal life of such equipment. In addition, newer UV equipment is more energy-efficient, uses fewer UV lamps, and has longer lamp life. Five different options including horizontal, vertical, and inclined-style UV systems were considered for replacement of the existing system. The Xylem-Wedeco Duron equipment (both arrangements), Ozonia Aquaray 3X equipment, and the TrojanUV 3000 Plus equipment are considered equal on a cost basis because the total present worths are within 10 percent. Further evaluations of the different equipment on a nonmonetary basis is recommended during design.

4. Sludge Thickening

Currently, primary sludge, carbo WAS, and nitro WAS are cothickened in the single gravity thickener, and thickened sludge is pumped from the gravity thickener to the anaerobic digesters. Sludge withdrawal piping issues require the gravity thickener to be operated to produce a lower-than-desired sludge thickness. The thickness of the feed sludge to the anaerobic digesters is an important parameter in the overall operations of the plant. The solids concentration dictates the volume of sludge pumped to the digesters, the energy required to heat the sludge, and the hydraulic retention time (HRT) within the digesters. Feeding the digesters with thicker sludge reduces the energy required and increases the digestion performance because of longer HRTs in the digesters. Therefore, for the purpose of this analysis, the feed sludge to the digesters is desired to have a solids concentration of 3.5 percent, minimum, although 5.0 percent is preferred.

The recommended plan includes the following stepwise approach to improve the thickening operations at the plant. This approach also develops future options to provide better flexibility to the plant.

- *Phase 1–Install solids density meters to control gravity thickener underflow*: The plant will investigate whether the density meters provide the required monitoring and control to consistently achieve a 3.5 percent solids feed to the digesters.

- *Phase 2–Install New Thickened Sludge Suction Piping/New Building*: This phase includes a sludge pumping structure to be constructed immediately adjacent to the gravity thickener to significantly shorten the suction piping. Underground sludge piping improvements would also provide redundant sludge lines across the site.

- *Phase 3–Utilize the Gravity Belt Thickener (GBT) for WAS Thickening*: This scenario would include using the existing GBT to thicken WAS only and would allow the gravity thickener to be used for primary sludge. The existing filter backwash storage tank may be repurposed as a WAS holding tank upstream of the GBT, or, if the filter backwash storage tank is not available, the WAS pumps could feed the GBT directly.

ES.08 RECOMMENDED PLAN AND ENVIRONMENTAL IMPACT SUMMARY

A. Recommended Plan Summary and Opinion of Capital Costs

The recommended plan includes modifications to many portions of the existing GWA LCSTF and WWTP. The recommended alternatives and common needs projects are summarized in Table ES.08-1 along with the implementation schedule and opinions of probable cost. The opinions of capital costs are also projected to the planned project year cost by applying a construction inflation rate of 3 percent annually. Table ES.08-1 also proposes combining several projects because of priorities for implementation and potential cost savings that could be achieved with related projects. The proposed site plan for the recommended projects at the WWTP are shown in Figure ES.08-1.

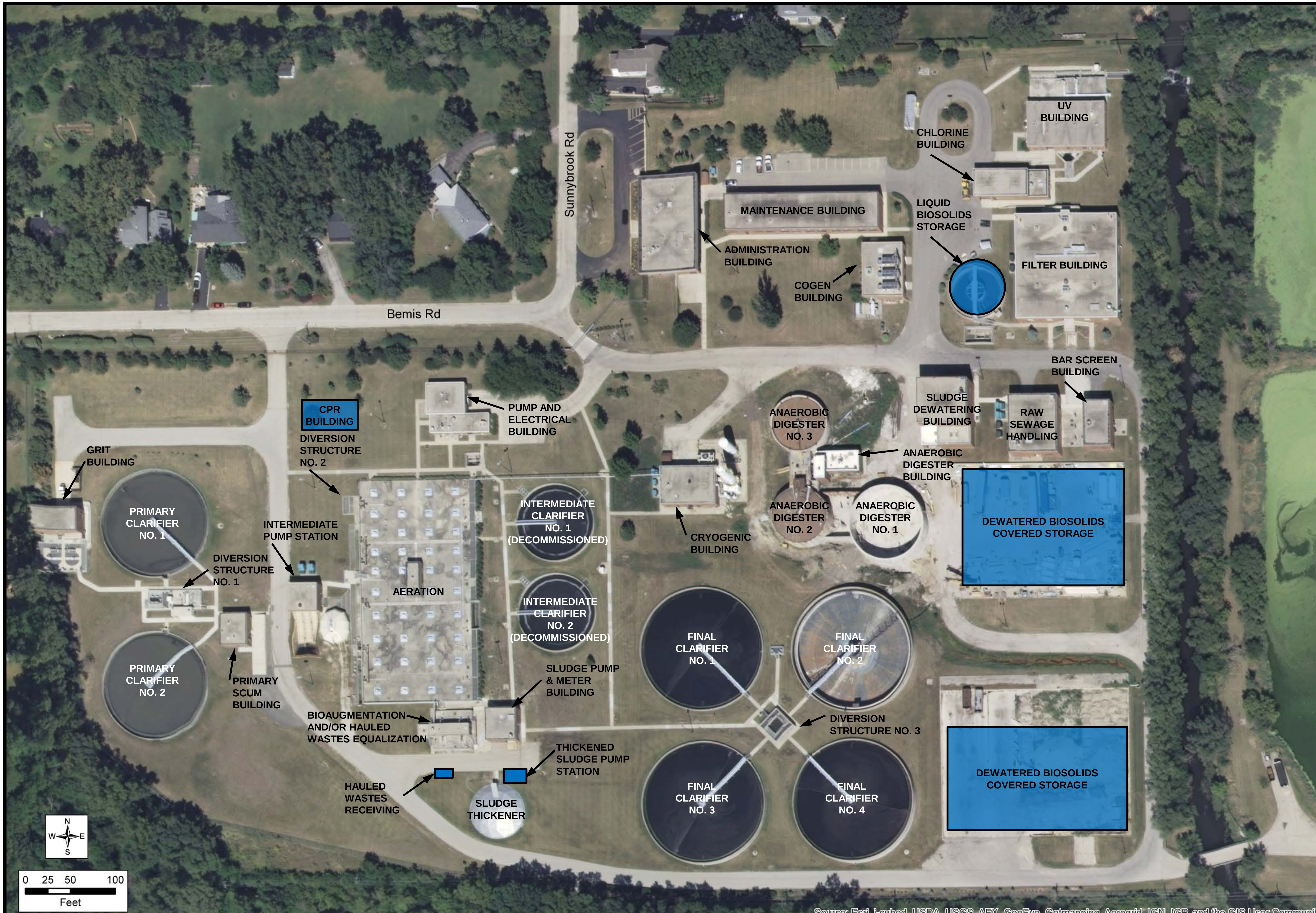
B. Project Financing

The opinions of capital costs for each of the recommended improvements are summarized in Table ES.08-1. The opinions of capital costs are also projected to the planned project bid year cost by applying a construction inflation rate of 3 percent annually. A more detailed capital plan is included in Appendix F.

The WWTP improvements are anticipated to be funded through capital fund contributions by the Glen Ellyn and Lombard. The Effluent Filtration, UV Disinfection, and Biosolids Storage project is anticipated to be funded by a low-interest loan from the IEPA, Table ES.08-2. The existing LSCTF project debt service will have a final payment in 2015, the existing Biosolids Improvements Project debt service will have a final payment in 2016, and, in 2026, the existing Digester Improvements Project debt service will have its final payment due. A debt service payment of $980,000 was estimated based on the current fiscal year 2013 IEPA interest rate of 1.93 percent and a 15-year term.

C. Fiscal Impact Analysis

Through staging the projects over the planning period, the customer communities will have a gradual change in their rates. Glen Ellyn and Lombard provide annual contributions to the GWA capital fund, which will be used to fund these projects. The residential user charges of Glen Ellyn and Lombard are determined by their respective community. An average annual capital fund increase of 10 percent is planned to fund the recommended projects.



WWTP RECOMMENDED PLAN

FACILITIES PLAN
GLENBARD WASTEWATER AUTHORITY
DUPAGE COUNTY, ILLINOIS

STRAND ASSOCIATES®

FIGURE ES.08-1
1278.047

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TABLE ES.08-1 OPINIONS OF PROJECT COST AND IMPLEMENTATION SCHEDULE

Project Year	Project	Opinion of Probable Cost[1]	Project Year Projected Cost[2]
2014	Valley View Pump Station	$ 2,047,000	$ 2,108,000
	LCSTF Clarifier Mechanism Replacement	277,000	285,000
	2014 Total		**$ 2,393,000**
2015	Remote Site Communication	$ 160,000	$ 170,000
	2015 Total		**$ 4,956,000**
2016	Screening and Influent Pumping Improvements:		
	Screening Building HVAC Replacement	$ 18,000	$ 20,000
	Influent Pump Replacement and Improvements	4,115,000	4,497,000
	Effluent Filtration, UV Disinfection Project, and Biosolids Storage		
	Effluent Filtration	6,982,000	7,629,000
	UV Disinfection	2,330,000	2,546,000
	Dewatered Biosolids Covered Storage	2,456,000	2,684,000
	IEPA Loan Project Subtotal		**$ 12,859,000**
	2016 Total		**$ 17,376,000**
2017	Electronic O&M Manual	$ 300,000	$ 338,000
	2017 Total		**$ 338,000**
2018	Activated Sludge Improvements Project:		
	Intermediate Pump Station Modifications	$ 1,423,000	$ 1,650,000
	UNOX Deck Control Improvements	368,000	427,000
	Activated Sludge Final Stage Modifications[4]	218,000	253,000
	2018 Total		**$ 2,330,000**
2019	Hauled Wastes Receiving Phase 1	$ 238,000	$ 284,000
	Sludge Thickening Phase 2 Improvements[3]	873,000	1,042,000
	Sludge Thickening Phase 3 Improvements[5]	560,000	669,000
	2019 Total		**$ 1,995,000**
2020	Biosolids Dewatering Equipment Replacement	$ 2,292,000	$ 2,819,000
	Liquid Biosolids Storage Improvements[6]	1,850,000	2,275,000
	2020 Total		**$ 5,094,000**
2021	Chemical Phosphorus Removal[7]	$ 601,000	$ 761,000
	2021 Total		**$ 761,000**
2022	Electrical Improvements:		
	Grit Building MCC Replacement	$ 200,000	$ 261,000
	Cryo Building MCC and PLC Replacement	251,000	327,000
	Electrical Service, Backup, and Redundancy	1,480,000	1,931,000
	PLC Replacements	750,000	979,000
	Site Lighting	230,000	300,000
	2022 Total		**$ 3,798,000**

Project Year	Project	Opinion of Probable Cost[1]	Project Year Projected Cost[2]
2023	LCSTF and WWTP Lagoon Dredging	$ 1,000,000	$ 1,344,000
	LCSTF Screening Improvements	1,000,000	1,344,000
	2023 Total		**$ 2,688,000**
2024	LCSTF Grit Removal Improvements	$ 2,510,000	$ 3,474,000
	LCSTF Grit Building HVAC Replacement	18,000	25,000
	2024 Total		**$ 3,499,000**
2025	Plant Utilities Yard Piping Improvements	$ 985,000	$ 1,404,000
	2025 Total		**$ 1,404,000**
2026	Hauled Wastes Receiving Phase 2[8]	$ 336,000	$ 493,000
	Bioaugmentation[9]	1,459,000	2,143,000
	2026 Total		**$ 2,636,000**
2027-31	**No Projects Planned**		
2032	Denitrification Modifications[7]	$ 1,322,000	$ 2,318,000
	2032 Total		**$ 2,318,000**

1 The opinion of probable cost is based on fourth quarter 2012 costs. Includes construction, engineering, and contingency.
2 Costs are projected with an inflation factor of 3 percent based on 2012 annual Engineering News Record construction cost index increase.
3 This project is assumed to occur with Sludge Thickening Phase 3 Improvements.
4 The activated sludge final stage modifications project to potentially improve nitrification may be required at an earlier date depending on activated sludge performance. An additional study and pilot testing could be conducted to verify the effects of opening the final stage on nitrification before this project.
5 This cost assumes direct WAS pumping to the GBT without WAS storage.
6 This project assumes the backwash filter clarifier is available to be repurposed for liquid biosolids storage.
7 The implementation schedule for this project could change because of the uncertainty of future regulatory requirements and its timing. Additional study and pilot testing may be required.
8 Equalization of hauled wastes may not be required.
9 Bioaugmentation may not be required.

	Cost Opinion[1]
Construction	$ 9,876,000
Contingency (10%)	988,000
Design Technical Services	835,000
Construction Technical Services	1,160,000
Total	$ 12,859,000

[1] Costs are inflated to construction year 2016 dollars with an inflation factor of 3 percent based on 2012 annual Engineering News Record construction cost index increase.

Table ES.08-2 Effluent Filtration, UV Disinfection, and Biosolids Storage Project Cost Opinion

D. Project Implementation Schedule

The preliminary project implementation schedule for the Effluent Filtration, UV Disinfection, and Biosolids Storage project is presented in Table ES.08-3.

Submit Facilities Plan to IEPA	June 2013
IEPA Approval of Facilities Plan	October 2013
Submit Design to IEPA	October 2014
Submit IEPA Loan Application	October 2014
IEPA Approval of Design	January 2015
Advertise for Bids	February 2015
Construction Bid Date	March 2015
Construction Start Date	May 2015
Construction Completion	May 2017

Table ES.08-3 Effluent Filtration, UV Disinfection, and Biosolids Storage Project Implementation Schedule

E. Environmental Impact Summary

Construction will be located within the existing site limits. No known threatened or endangered species would be adversely affected by the proposed project. In addition, there are no known significant adverse impacts to waterways, wetlands, or other resources. The Applicant Environmental Checklist and other correspondence are included in Appendix G.

SECTION 1
INTRODUCTION

This section describes the purpose and scope of the facilities plan and the location of the study area. It also summarizes previous and related studies and reports. A list of definitions and abbreviations is provided as an aid to the reader.

1.01 PURPOSE AND SCOPE

This study was conducted to develop an overall wastewater management plan for the Glenbard Wastewater Authority (GWA) to meet anticipated future growth as well as the anticipated state and federal water quality protection requirement, and the specific focus of this planning activity included influent pumping station, the activated sludge system operation, nutrient removal, effluent filtration, ultraviolet (UV) disinfection, and biosolids management. The existing and potential new treatment facilities are evaluated for their ability to serve the GWA sewer service area for a period of 20 years through year 2033. The Illinois Environmental Protection Agency (IEPA) Facilities Planning Checklist is included in Appendix A.

1.02 LOCATION OF STUDY

The Glenbard Wastewater Authority (GWA) provides wastewater treatment for the communities of Glen Ellyn, Lombard, and adjacent unincorporated areas.

The GWA facilities planning area (FPA), within which GWA will continue to provide wastewater treatment services, is shown in Figure 1.02-1. This facilities plan assumes the population growth occurs within the current FPA.

1.03 RELATED STUDIES AND REPORTS

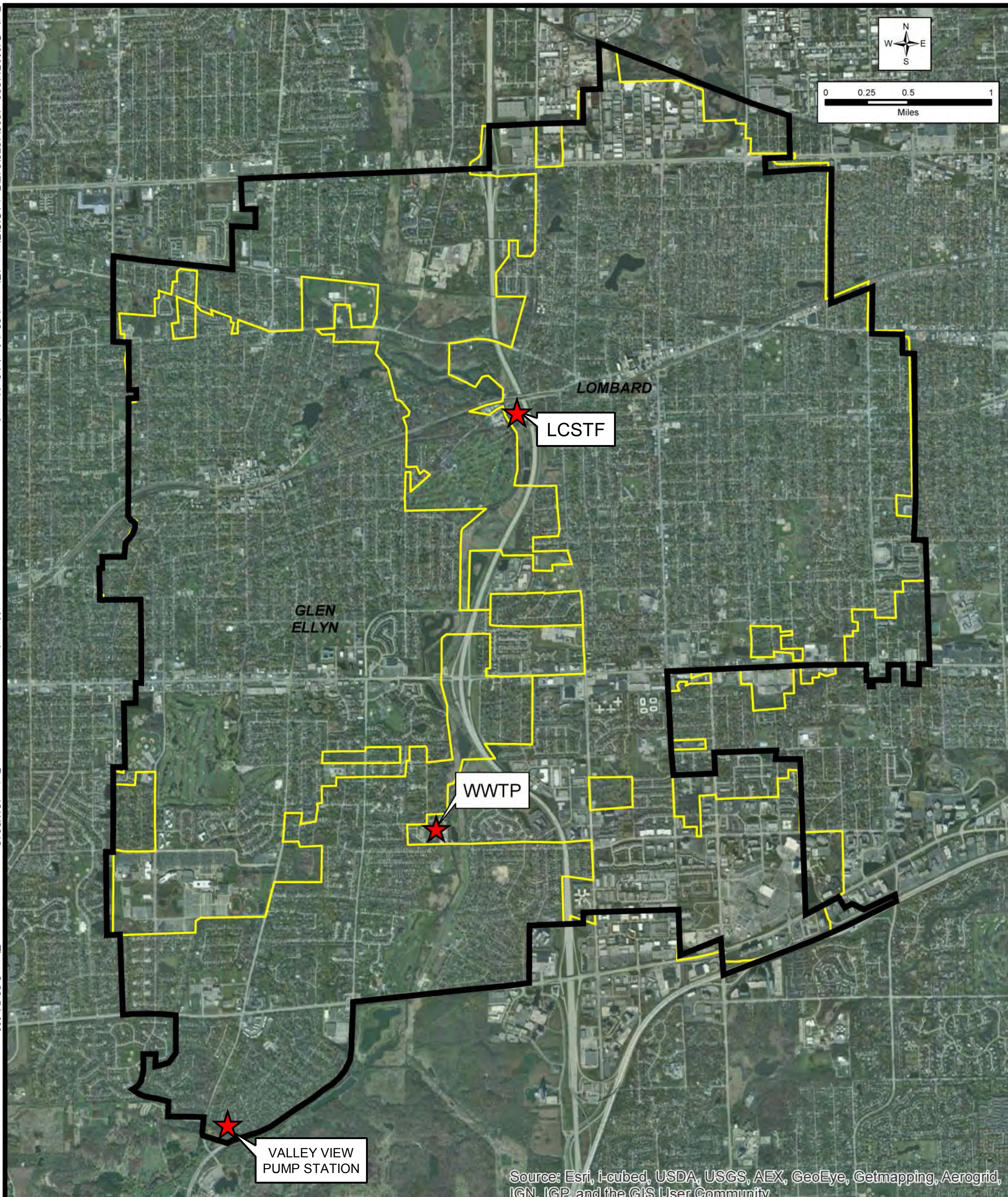
The following studies and reports were used in the preparation of this plan.

1. *Intermediate Pump Station Alternatives Evaluation,* Strand Associates, Inc.®, 2012.
2. *Asset Analysis and Cost Allocation Study,* Baxter and Woodman, Inc., 2011.
3. *Facility Plan Amendment-Anaerobic Digester Improvements*, Strand Associates, Inc.®, 2007.
4. *Facilities Plan*, Strand Associates, Inc.®, 2006.
5. *Sanitary Sewer Evaluation Study,* RJN Group, Inc., 2003
6. *Facility Plan,* Camp Dresser and McKee Inc., 1999.
7. *High Flow Study,* Rezek, Henry, Meisenheimer and Gende, Inc., 1991.
8. *Long Range Planning Study,* Rezek, Henry, Meisenheimer and Gende, Inc., 1989.

1.04 ABBREVIATIONS

AS	activated sludge
AT-3	Aeration Tank 3
ATAD	autoheated thermophilic aerobic digestion
BAR	bioaugmentation reaeration/regeneration
BD	biosolids dewatering

BFP	belt filter press
BOD	biochemical oxygen demand
BOD_5	five-day biochemical oxygen demand
BNR	biological nutrient removal
BPR	biological phosphorus removal
BTU/hr	British Thermal Units/hour
BTU/scf	British Thermal Units/standard cubic feet
Carbo	first-stage high purity oxygen carbonaceous aeration basins
$CBOD_5$	five-day carbonaceous biochemical oxygen demand
CC	cogeneration and codigestion
cfm	cubic feet per meter
cfs	cubic feet per second
cfu	colony forming units
CHP	combined heat and power
CMAP	Chicago Metropolitan Area for Planning
CMOM	Capacity, Management, Operation, and Maintenance
COD	chemical oxygen demand
col/100 mL	colonies (bacteria) per 100 milliliters
CPR	chemical phosphorus removal
CSO	combined sewer overflow
CWA	Clean Water Act
DAF	design average flow
DMF	design maximum flow
DO	dissolved oxygen
DRSCW	DuPage River Salt Creek Workgroup
E. coli	Escherichia coli
FPA	facilities planning area
FOG	fat, oils, and grease
ft	feet
ft^2	square feet
ft^3	cubic feet
ft^3/day	cubic feet per day
ft^3/lb	cubic feet per pound
ft^3/min	cubic feet per minute
GBT	gravity belt thickener
gcd	Gallons per capita per day
gpd	gallons per day
gpd/ft^2	gallons per day per square feet
GWA	Glenbard Wastewater Authority
hp	Horsepower
HPO	high purity oxygen
HPOAS	high purity oxygen activated sludge
HRT	hydraulic retention time
HSW	high-strength waste



FACILITIES PLANNING AREA

FACILITIES PLAN
GLENBARD WASTEWATER AUTHORITY
DUPAGE COUNTY, ILLINOIS

STRAND ASSOCIATES®

FIGURE 1.02-1
1278.047

HVAC	heating, ventilation, and air conditioning
IAWA	Association of Wastewater Agencies
IEPA	Illinois Environmental Protection Agency
IFAS	integrated fixed film activated sludge
I/I	infiltration/inflow
in	inch
IPS	influent pump station
FPA	facilities planning area
gpm	gallons per minute
GWA	Glenbard Wastewater Authority
kW	kilowatt
kWh	kilowatt hours
I/I	infiltration/inflow
lbs	pounds
lb/day	pounds per day
lb/day/ft^2	pounds per day/square feet
LCSTF	Lombard Combined Sewerage Treatment Facility
LED	light-emitting diode
LV	low voltage
μ/W	micrograms
max	maximum
mg/L	milligrams per liter
mgd	million gallons per day
mL	milliliters
MBBR	moving bed bioreactor
MCC	motor control center
min	minimum
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
MPN	most probable number
MV	medium voltage
NASS	Northern Area Sanitary Sewer
NH_3-N	ammonia nitrogen
Nitro	second-stage nitrification aeration tanks
NPDES	National Pollutant Discharge Elimination System
NPW	nonpotable water
NRI	North Regional Interceptor
O&M	operation and maintenance
OTE	oxygen transfer efficiency
PCBs	polychlorinated Biphenyls
pcd	pounds per capita per day
psig	pounds per square inch gauge
PHF	peak hourly flow
PRE	primary sedimentation tank effluent

PRI	primary sedimentation tank influent
PRS	primary sludge
RAS	return activated sludge
RTU	remote telemetry units
SCADA	supervisory control and data acquisition
scfm	standard cubic feet per minute
sec/cm^2	seconds per cubic meter
SOR	surface overflow rate
SRI	South Regional Interceptor
SRT	solids retention time
SS-HPOAS	single-stage high purity oxygen-activated sludge treatment
SSES	sewer system evaluation survey
SSO	sanitary sewer overflow
ST	sludge thickening
SWD	side water depth
TDH	total dynamic head
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TS	total solids
TS-HPOAS	two-stage high purity oxygen-activated sludge treatment
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
UV	ultraviolet
UVT	ultraviolet transmittance
VFD	variable frequency drive
VS	volatile solids
VSA	vacuum swing adsorption
VSR	volatile solids reduction
VSS	volatile suspended solids
WAS	waste activated sludge
WLA	waste load allocation
WQBEL	water quality-based effluent limits
WWTP	wastewater treatment plant

SECTION 2
EXISTING WASTEWATER CONVEYANCE FACILITIES

The 2006 Facilities Plan included a detailed description of the wastewater conveyance facilities owned and operated by the GWA, as well as a discussion of previous, current, and planned evaluations. That information is updated herein, and a summary of ongoing conveyance system projects and planned future investigations are presented below. A detailed analysis of the GWA conveyance facilities is beyond the scope of this facilities plan. Several components of the Lombard Combined Sewerage Treatment Facility (LCSTF), however, have been identified as requiring replacement within the facilities planning period and are discussed further in Sections 6 and 7. The recommended improvements to the Valley View Pump Station (VVPS) are included in this section.

2.01 BACKGROUND

Each customer community served by GWA owns and maintains a locally owned collection system. The entire collection system is comprised of separate sanitary sewers with the exception of portions of Lombard, which has combined sewers. GWA owns and operates the major interceptors that convey wastewater from the customer communities to the GWA WWTP which include the North Regional Interceptor (NRI) and the South Regional Interceptor (SRI). The GWA also owns and maintains five pumping stations–the St. Charles Road, Hill Avenue, Sunny Side, Valley View, and SRI Pump Stations.

The NRI, SRI, and the 22nd Street gravity interceptor (owned by Lombard) all discharge to a junction chamber east of the existing lagoons on the east side of the East Branch of the DuPage River. Wastewater then flows from the junction chamber under the lagoons and the DuPage River via a 60-inch gravity sewer to the headworks of the GWA WWTP. The West Glen Ellyn Interceptor owned by Glen Ellyn enters the plant site from the west and discharges directly to the headworks of the treatment plant. The Sunny Side Pump Station is a small pumping station located at the GWA WWTP site and serves a few homes adjacent to the plant site.

2.02 NRI CONVEYANCE FACILITIES

The NRI extends approximately 20,500 feet to the north of the plant and serves Lombard, the northern portion of Glen Ellyn, and Glen Ellyn Heights. The NRI is constructed entirely of prestressed concrete cylinder pipe ranging in size from 18 inches in diameter at the upstream end to 66 inches in diameter at its termination near the GWA WWTP.

The St. Charles Road pump station, which was upgraded in 2011 to increase the capacity of the station, receives gravity flows from the northwest portion of the Village of Glen Ellyn and from a portion of Glen Ellyn Heights, served by DuPage County. A 2,700-foot-long, 18-inch-diameter prestressed concrete cylinder pipe force main from the St. Charles Road pump station discharges into the upper end of the NRI.

2.03 LCSTF FACILITIES

The LCSTF receives peak wet weather flows from a portion of the Village of Lombard. Three combined sewers in Lombard (30-inch-diameter Northern Area, 54-inch-diameter North Lombard, and 108-inch-diameter Central Lombard) discharge to the NRI. Flow regulators on each of these combined sewers divert flows in excess of 2.5 times dry weather flow to the LCSTF for treatment.

Excess flows from the 30-inch Northern Area Sanitary Sewer (NASS) basin is discharged to the Hill Avenue pump station, which pumps to the LCSTF. Excess flows from the regulators on the 54-inch North Lombard and 108-inch Central Lombard interceptor sewers flow to the LCSTF by gravity. The LCSTF was constructed at the same time as the Glenbard Wastewater Treatment Plant. The LCSTF was originally designed to provide primary treatment and disinfection for flows up to 58 mgd. The LCSTF is owned by the Village of Lombard but is operated and maintained by the GWA. Effluent from the facility is discharged to the East Branch of the DuPage River.

According to the 2002 GWA CSO Operational Plan, the LCSTF includes the following facilities: combined sewage first flows through an automatic mechanically cleaned coarse bar screen to remove large debris prior to entering the pump station, which contains four pumps [19.3 mgd each at 33 feet total dynamic heat (TDH)]. Three of the pumps operate on automatic with the fourth available for operation in hand as needed. Flow is pumped through a magnetic flow meter into two aerated, mechanically cleaned grit tanks designed for 29 mgd each, where heavy inorganic material is removed. The screened material and grit are disposed of in a landfill. Liquid sodium hypochlorite is added at the discharge end of the grit tanks before the flow enters two 145-foot-diameter clarifiers. The clarifiers provide detention time for disinfection as well as sedimentation. During peak flows, the detention time in the clarifier is about one hour. Before clarified effluent enters the receiving stream (Outfall 001), it is dechlorinated with sodium thiosulfate. Effluent samples are collected daily when the plant is in operation and tested for fecal coliform, pH, chlorine residual, BOD_5, and suspended solids. Organic solids that have settled to the bottom of the clarifiers are discharged to the NRI for treatment at the main WWTP.

The National Pollutant Discharge Elimination System (NPDES) effluent limits for the LCSTF is presented in Table 2.03-1. The LCSTF is currently operating under an NPDES permit that became effective December 1, 2006, and expired on November 30, 2011. A copy the NPDES Permit is included in Appendix A.

Outfall 001 (Lombard Combined Sewage Treatment Facilities Outfall)		
	Notes	**Concentration Limits (mg/L)**
Parameter		Average Monthly
Fecal Coliform	Daily maximum shall not exceed 400 per 100 mL	
pH	Shall be in the range of 6 to 9 Standard Units	
Chlorine Residual		0.75

Table 2.03-1 NPDES Effluent Limitations for LCSTF

Flows in excess of the 58 mgd capacity of the LCSTF are diverted to two lagoons. The lagoons have a design capacity of 14.5 mgd. The excess flows are stored in these lagoons until the level exceeds the elevation of the lagoon outfall weir. At this point, the flow begins to discharge to the receiving stream through Outfall 002. This discharge will continue as long as the lagoon liquid level is above the outfall weir. Effluent samples are collected daily. The samples are tested for coliform, pH, chlorine residual, BOD_5, and suspended solids. When the flow to the Lombard CSO treatment facilities begins to subside, the wastewater stored in the lagoons will automatically be discharged to the Lombard CSO treatment facilities for treatment.

There are several other gravity sewer connections on the NRI including the 36-inch Wilson Avenue Interceptor, 36-inch and 15-inch Roosevelt Road Interceptors, and the 10-inch Maryknoll Interceptor.

2.04 SRI CONVEYANCE FACILITIES

The SRI extends approximately 15,000 feet to the south of the GWA plant and serves Citizen's Utilities. The SRI is constructed mainly of prestressed concrete cylinder pipe ranging in size from 18 inches in diameter at the upstream end to 30 inches in diameter at its termination near the GWA SRI pumping station.

The SRI portion of the Glenbard intercepting sewer system includes the VVPS and force main, which discharges to the upstream end of the SRI. The VVPS receives gravity flows from the area south of Butterfield Road. In addition, there are seven gravity sewer connections on the SRI serving Citizen's Utility. The SRI discharges to the SRI Pump Station, which was constructed in 1992. Three submersible pumps, each with a rated capacity of 950 gpm at 25 ft TDH, are located at the station. The SRI Pump Station is located near the southeast corner of the GWA WWTP site.

2.05 PREVIOUS CONVEYANCE SYSTEM EVALUATIONS AND PROJECTS

GWA previously conducted comprehensive studies on the NRI and SRI to identify, quantify and mitigate the impacts of wet weather flows. The NRI Conveyance Capacity Study (2001) and the SRI Conveyance Capacity Study (2003) included physical inspections, flow metering and hydraulic computer (SWMM) flow modeling of the NRI and SRI. Flow metering near the downstream end of the NRI, 22nd Street and West Glen Ellyn Interceptors was also conducted as part of the SRI Study. The recommendations from these studies are summarized in the 2006 Facilities Plan.

A. St. Charles Road Pump Station Upgrades

In 2010 the St. Charles Road Pump Station was upgraded from a capacity of 7.5 mgd to 10.6 mgd and converted from a wet well/dry to a submersible pump station. The upgrades included the replacement of four 50 hp (2,400 gpm @ 56 feet total dynamic head [TDH]) dry pit centrifugal pumps with two 34 hp dry weather (1,580 gpm @ 55 feet TDH) and three 215 hp wet weather (5,800 gpm @ 85 feet TDH) submersible pumps. The firm capacity of the upgraded pump station with two wet weather pumps operating is 10.6 mgd, which is roughly equivalent to the 10-year rainfall event. The maximum projected flow tributary to the pump station is 15.24 mgd; however the station capacity was limited to 10.6 mgd, so the capacity of the 18-inch force main and downstream 18-inch gravity sewers are not exceeded. Because of the wide range of flows to the pump station two dry weather pumps were installed that are capable of pumping twice the average daily flow. Variable frequency drives were installed on all pumps to improve the energy efficiency of the pump station.

In addition to the pump upgrades, several other upgrades were completed as a part of the project. A new wet well and valve vault were constructed adjacent to the existing wet well, which was kept service. Wastewater flow metering was added via a magnetic flow meter located in a metering manhole downstream of the pump station discharge. Emergency bypass connections were installed in the wet well and force main to allow for connection of a portable pump. A surge relief valve was installed in the valve vault to protect the 2,700 feet of force main from surge pressures. Two basket bar screens were installed at the discharge point of the two influent sewers to remove large debris from the system. A building was constructed to house the 600 kW diesel-powered standby generator, fuel tank, and electrical equipment.

2.06 VVPS UPGRADES

The existing VVPS was constructed in 1977 and serves a portion of the Village of Glen Ellyn. The pumping station is owned and operated by the Glenbard Wastewater Authority (GWA). Because of the age of the VVPS (35+ years), maintenance activities associated with the facilities have been increasing. The pumps and controls are located in a dry pit, which requires confined space entry procedures to perform routine maintenance. The dry pit has limited space, making maintenance difficult. The plug valves used to isolate the pumps are inoperable and cannot be easily accessed for replacement. For these reasons, GWA staff determined that the station is in need of upgrades.

A. Purpose and Scope

The scope of the evaluation for VVPS alternatives and a recommended plan includes:

- Performing preliminary design evaluations to identify alternate means of upgrading the existing pumping station to meet a firm capacity of 1,540 gpm or 2.2 mgd.
- Completing preliminary equipment selection and developing proposed station layout and opinion of probable construction costs.
- Preparing an Engineering Report for submittal to the Illinois Environmental Protection Agency (IEPA).

B. Existing Pumping Station

The VVPS is located on a 0.27-acre parcel south of Arbor Lane in unincorporated DuPage County. Flow enters the approximately 24 foot-deep, 8-foot-diameter wet well from 15-inch and 10-inch gravity sewers from the north and west, respectively. The discharge from the station is conveyed via an approximately 6,190 foot long, 10-inch force main to the GWA SRI.

The VVPS has two 75 hp, two-speed pumps, each of which is rated at 1,540 gallons per minute (gpm) at 76 feet of head. The VVPS is designed for a firm capacity of 1,540 gpm and based on discussions with GWA staff one pump is able to convey all flow tributary to the VVPS. Pumps are operated using an ultrasonic level transmitter, which has replaced the bubbler system originally installed with the pumps. The pumps have four operating levels, low speed pump on, low speed to high speed, high speed to low speed, and pump off. Alternation of the lead pump occurs via an electronic alternator after the lead pump stops. A level transducer is used to measure and transmit wet well levels to the wastewater treatment plant (WWTP) via a telemetry system.

To estimate the VVPS capacity a wet well draw down test was completed January 10, 2013 by measuring the time required to pump a known wet well volume with one pump operating at full speed. A "high wet well level" and "low wet well level" were determined utilizing the read out from the level transducer. The high wet well level corresponded to the invert of the lowest incoming sewer and the low wet well level the top of the benching in the wet well. The wet well level was allowed to fill several inches above the high wet well level elevation prior to pump operation to allow time for the pumps to ramp up to full speed before the high wet well level was reached. The drawdown test results indicate the pump station is operating at approximately 1,270 gpm. The pumping pressure is not known since there are no gauges installed or locations available to easily install gauges on the force main.

To determine the theoretical head required at 1,270 gpm and 1,540 gpm, a hydraulic analysis of the force main was completed. At 1,270 gpm, the total dynamic head (TDH) required based on the pump curve is approximately 83 feet, which is higher than the pumps rated TDH of 76 feet, and between the theoretical head calculated assuming a low friction factor (74 feet) and high friction factor (96 feet). At 1,540 gpm the TDH required is much higher than the pumps rated TDH of 76 feet. Using the maximum Illinois Environmental Protection Agency (IEPA) allowed friction factor the calculated TDH is approximately 116 feet at a flow rate of 1,540 gpm. For the St. Charles Road Pumping Station project a slightly more conservative friction factor was applied that would result in a TDH of approximately 136 feet for the VVPS. The new pumps for VVPS are designed for 1,540 gpm @ 138 feet TDH.

Electrical power to the site is supplied by Commonwealth Edison. The 480-volt feed is supplied via an overhead feed from lines located on the south east corner of the site. Emergency power is supplied by a 100 kW diesel generator with a 500-gallon outdoor, aboveground, double-walled storage tank with an average fuel consumption of 8.4 gallons/hour, which provides 60 hours maximum continuous runtime. The generator is 30+ years old and is housed in a small building located on the east side of the site. The size of the building makes it difficult to perform routine maintenance on the generator.

A review of current flood mapping (DFRM–Panel 0154A, Dated July 7, 2010) indicates the 100-year floodplain elevation at the pump station site is approximately 673.0. The majority of the site is located below elevation 673.0 with the highest location being the wet well top slab with an elevation of approximately 673.0. The site generally slopes down from the wet well top slab towards the fence line. Compensatory storage will be required to compensate for fill in the floodplain for the new generator building. During periods of heavy rain, surface water impacts the site as the water level rises in the East Branch of the DuPage River. There is a drainage ditch on the east side of the site that conveys flow to the river during smaller events. During large rain events, the river level rises and begins to back up the drainage ditch and impact the low areas on the site.

C. Existing Flow Rates

The tributary area for the VVPS includes approximately 850 parcels with no commercial or high density housing located in the tributary area. There remains very little undeveloped land in the tributary areas; therefore, the existing flow rates to the VVPS are not expected to change because of development.

Flow metering was conducted in 2012, by others, in the sewershed tributary to the VVPS. The following flows were metered:

Low Hour Flow	126 gpm
Average Dry Weather Flow	169 gpm
Peak Hourly Flow	213 gpm

The flow metering was conducted during a period of very dry weather with no major storm events. Based on discussions with plant staff, during periods of wet weather, flows to the station increase significantly, but one pump is able to convey all flow. The projected peak design flow to the VVPS is assumed to be the existing VVPS design capacity of 1,540 gpm.

D. Alternative Analysis

1. General Design Concepts

The following general design concepts were considered for all alternatives evaluated. These general design concepts are intended to improve the overall operation and flexibility of the upgraded station.

a. All controls are to be located above ground in a new building.

b. A new emergency power generator will be provided and housed in the new building with a diesel storage tank located below the generator.

c. All electrical equipment will be housed in a separate room within the generator building. The room will be cooled with fans.

d. A new station bypass connection will be installed to the existing force main to allow GWA staff to utilize portable pumps to convey flows when necessary.

e. A magnetic flow meter will be installed in a precast manhole to meter pump station flows.

f. Communication from the site to the WWTP will be converted from telemetry to radio or cellular. The telemetry system is considered to be outdated and is not fully supported by the utility company.

g. A dry well will be installed separate from the wet well using a square precast structure.

h. Compensatory storage will be required and potentially installed on the east side of the site. The storage volume required is 1.5 times the amount of fill placed in the floodplain.

i. A surge relief valve will be installed in the dry well and piped back to the wet well.

j. A yard hydrant will be provided on the site.

In addition to the above general design concepts, it will be important to maintain the operation of the existing station as much as possible during construction. Maintaining the operation of the existing station minimizes the potential for operational problems and overflows during wet weather events. Some bypass pumping will be required during the course of the upgrade.

2. Pumping Station Upgrade Alternatives

All alternatives had to be able to pump a wide range of flows. As stated above, the average daily flow is 169 gpm and the peak design flow rate is 1,540 gpm. The existing force main is 10-inch-diameter, which requires a flow of approximately 500 gpm to maintain a velocity of 2 feet per second (ft/s) in the force main, which is required by IEPA to maintain a cleansing velocity. In cases where continuous flow can be maintained by use of variable speed pumping, lower velocities down to about 1 ft/s (approximately 250 gpm) may be considered. Considering the above flow rates several pump station alternatives were evaluated:

PS-1. Two-Pump Station–This alternative involves installing two new pumps with or without variable frequency drives (VFDs) in a new 10-foot-diameter wet well, with a capacity 1,540 gpm, each. The pumps flow rate at the minimum operating speed is approximately 600 gpm, which results in pump cycling during periods of average daily flow. If pumps are operated without VFDs (1,540 gpm) and with VFDs (at flow rate of 600 gpm), the approximate number of pump starts per hour will be approximately 4.4 and 3.5, respectively, at the average daily flow rate of 169 gpm. The installation of VFDs does not reduce the pump starts per hour significantly from constant speed operation. The costs of VFDs and soft starts were compared, and because of significantly lower costs, soft starts will be installed for the pumps.

PS-2. Three-Pump Station–This alternative involves installing three new pumps with two pumps having a combined capacity of 1,540 gpm. The pumps flow rate at the minimum operating speed is approximately 500 gpm, which is only 100 gpm lower than the two pump station option. Pump cycling will be required during periods of average daily flow.

PS-3. Three-Pump Station–Two Wet Weather Pumps–One Dry Weather Pump–This alternative includes installation of two pumps to convey wet weather flows and one pump to convey dry weather flows. Ideally the dry weather flow pump would be designed to pump twice the average daily flow, or 340 gpm, which does not maintain a velocity of 2 ft/s in the force main, but would maintain a velocity greater than 1 ft/s which is typically acceptable for pumping at a constant rate. However, the pump would still cycle to meet average daily flow rates.

All alternatives evaluated require pump cycling to meet daily average flow rates. Alternatives PS-2 and 3 have substantial additional capital costs associated with addition of a third pump.

The following general wet well upgrade alternatives were considered as a part of the alternatives process:

WW-1. New submersible pump station using the existing wet well–This alternative includes reusing the existing 8-foot-diameter wet well and installing two new submersible pumps. This alternative includes removing the existing concrete fillets in the wet well and installing a new top slab to allow for pump installation and retrieval. As a part of the alternative, the wet well operating volume was evaluated for a submersible pump station and found to be inadequate to meet pump cycling requirements. This alternative also presents constructability concerns since the existing wet well would need to be bypassed for an extended period of time while the fillets are removed, and whether is uncertain if the wet well walls or base slab will be damaged by the removal of the fillets.

WW-2. Installation of a new submersible pump station using a new precast wet well–This alternative considers the installation of a new 10-foot-diameter precast wet well and rerouting of the existing influent sewers. The new wet well will be installed while the existing wet well remains in service. Bypass pumping should be reduced significantly with this alternative. Several alternate layouts are feasible with the alternative and discussed below. The wet well will be sized to reduce the amount of pumps starts per hour to less than six during average daily flows and less than twelve at the highest pump cycle flow of 770 gpm.

3. Permitting Requirements

a. Building Code Requirements–The VVPS is located within unincorporated DuPage County. DuPage County was contacted to discuss code requirements for diesel fuel storage tanks. The following is a summary of the requirements:

   a. Outdoor Installation–Maximum storage tank size is 300 gallons. A variance is required for tanks over 300 gallons.

   b. Indoor installation–No maximum tank size requirement. Fire protection is not required according to DuPage County code and Lisle/Woodridge fire district.

b. DuPage County Stormwater Permitting–Portions of the existing site are located within the 100-year floodplain and require a DuPage County Flood Plain submittal. Postconstruction stormwater management facilities will not be required if less than 2,500 square feet of net impervious area is added. The site is located outside of the 50-foot wetland buffer required by DuPage County. The site is located inside the floodplain buffer and mitigation will be required.

c. Water Service–Permitting through Illinois American Water Company will be required for the water service.

d. Illinois Department of Natural Resources–An EcoCAT clearance letter dated December 27, 2012, has been obtained with construction activity restricted during March through June. We spoke with the IDNR and the restriction will be waived based on supplementary information provided to IDNR on January 21, 2013.

e. Illinois Environmental Protection Agency–Schedule F (Lift Station) and Schedule P (erosion control) permits will be required.

f. Milton Township–Milton township owns the roadway and storm sewer system adjacent to the Valley View site. No permits are required from Milton Township, however, specific township requirements will need to be incorporated into the bid documents.

4. Recommended Alternative and Opinion of Probable Cost

Alternative PS-1 with a new wet well, Alternative WW-2, is recommended based on constructability and a lower opinion of probable cost. The proposed project includes installation of two 85 hp submersible pumps, a valve vault, emergency bypass connections, and magnetic flow metering. In addition to the pump station upgrades, a building will be constructed to house a 150 kW diesel powered standby generator, fuel tank, and electrical equipment. The opinion of probable cost for this project is $2,047,000 and is presented in Table 2.06-1.

		Installed Cost
Capital Costs[1]		
A. Equipment and Facilities		
2-85 hp Flygt Submersible Pumps NP-3202	$	145,000
150 kW Generator	$	95,000
Precast Structures (Wetwell, Valve Vault, Meter MH, Bypass MH)	$	120,000
Generator Building	$	240,000
Subtotal A (Structures and Equipment)	$	600,000
B. Ancillary Captial Costs		
Mechanical and Underground Pipe	$	165,000
HVAC	$	50,000
Site Work/Excavation	$	220,000
Demolition/Bypass Pumping/Dewatering	$	45,000
Electrical and Controls	$	330,000
Subtotal B	$	810,000
Total (A & B Subtotals)	$	1,410,000
Contractors General Conditions @ 10%	$	141,000
Subtotal C	$	1,551,000
Contingencies @ 10%	$	155,000
Total Construction Costs	**$**	**1,706,000**
Technical Services @ 20%	$	341,000
Total Project Costs	$	2,047,000

1

[1]Costs based on 2nd Quarter 2013

Table 2.06-1 Preliminary Opinion of Probable Cost

SECTION 3
EXISTING WWTP FACILITIES

3.01 BACKGROUND

This section includes a summary of existing units and capacities, discusses NPDES permit requirements, and summarizes the GWA WWTP performance. The description of the LCSTP and summary of the LCSTP NPDES permit requirements are included in Section 2.

3.02 DESCRIPTION OF EXISTING FACILITIES

The GWA WWTP was constructed in 1977. A number of projects in the past 20 years have replaced or modified portions of the WWTP facilities. The basis of design and size of the major unit processes are presented in Table 3.02-1. The WWTP is rated for an annual average flow of 16.02 mgd and a maximum daily flow of 47 mgd, which are reflected in the NPDES permit (Appendix B). A site plan of the GWA WWTP is shown in Figure 3.02-1.

Figure 3.02-2 includes a process flow schematic for the GWA WWTP. Treatment consists of deep mechanical fine screening, pumping, grit removal, primary sedimentation, two-stage high purity oxygen-activated sludge treatment (TS-HPOAS), intermediate clarification, final clarification, granular media filtration, and UV disinfection. The treated effluent is discharged to the East Branch of the DuPage River. Primary and waste activated sludge (WAS) is cothickened in a gravity thickener and then pumped to the anaerobic digesters before dewatering and land application.

The *2011 Asset Analysis and Cost Allocation Study* reviewed the existing GWA mechanical, electrical, and heating, ventilation, and air conditioning (HVAC) assets.

A. Liquid Treatment

Screening is provided by two deep mechanical bar screens that were installed in 2006. The screened wastewater is pumped from the headworks facilities to the vortex grit removal tanks (2004) located on the west side of the site. After primary clarification, the primary effluent flows to the activated sludge facilities.

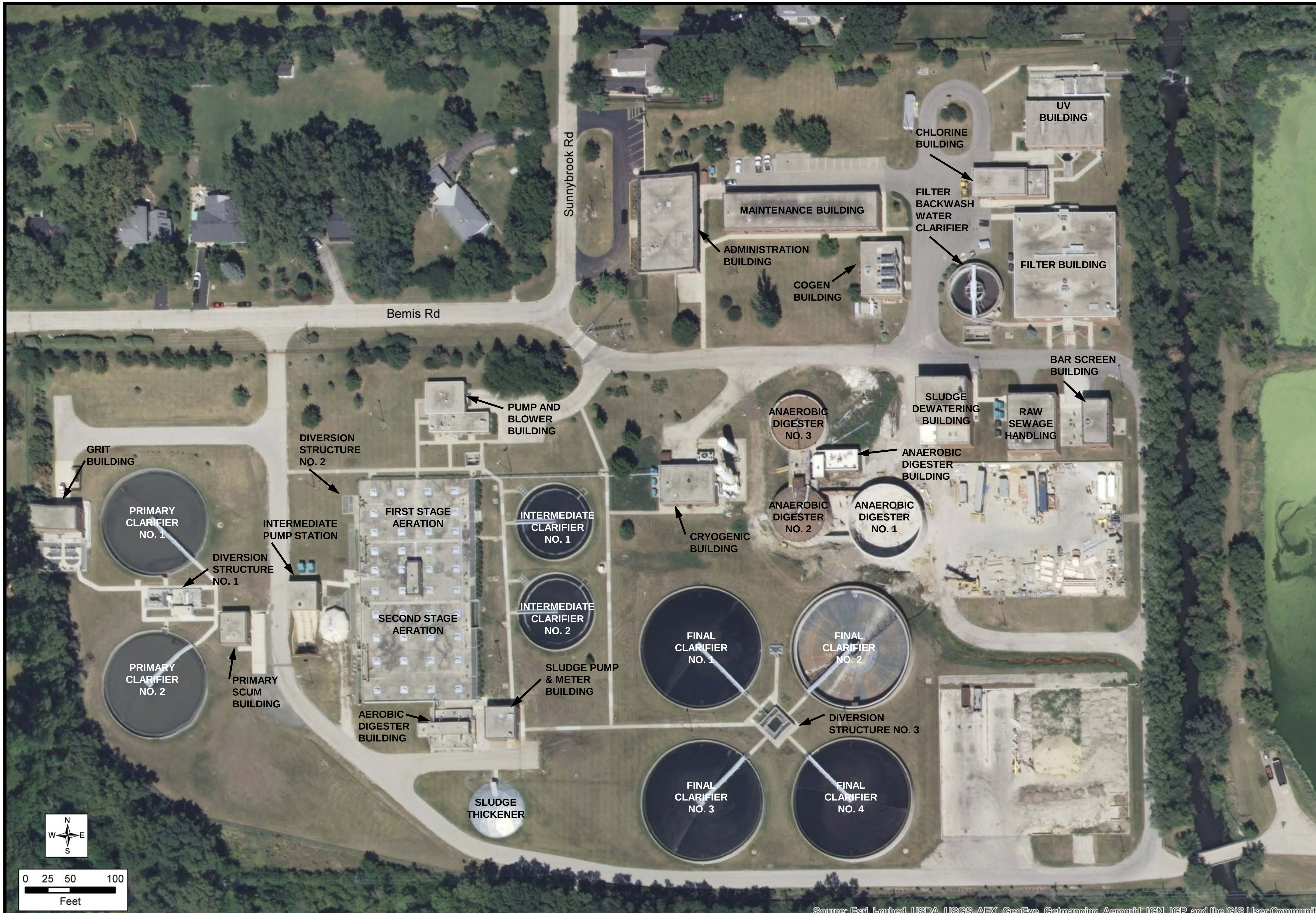
The existing activated sludge facilities include first-stage high purity oxygen carbonaceous aeration basins (Carbo), intermediate clarification, intermediate screw pumping station, second-stage nitrification aeration tanks (Nitro), and final clarification. Historically, the WWTP has operated in a two-stage mode with all flows less than about 16 mgd discharged to the Carbo stage and remaining flows in excess of 16 mgd diverted to the Nitro stage. The two Carbo stage aeration basins discharge to two intermediate clarifiers. Settled sludge from the intermediate clarifiers is returned to the head of the Carbo trains. At the intermediate pump station, the intermediate clarifier overflow and Nitro return activated sludge (RAS) are blended and then pumped to the head of the eight Nitro trains. Oxygen is produced with a cryogenic high-purity oxygen system to all ten trains of covered aeration basins, each with four basins per train. The final clarifier effluent flows to the granular media filters. The UV system, which was installed in 1995, disinfects the final effluent.

TABLE 3.02-1

UNIT PROCESS SIZES AND DESIGN CRITERIA

Item	Design Parameter
Mechanical Bar Screens	
Number of Units	2
Bar Spacing	3/16 inches
Capacity Each, mgd	47
Screenings Handling Type, Number of Units	Washer Compactor, 2
Raw Sewage Pumps	
Number of Pumps	3
Type	Centrifugal, VFD
Rated Capacity of Each Unit, mgd	22.5
TDH, feet	65
Motor hp, each	350
Capacity @ High Wet Well Level and Two Pumps Running, mgd[1]	44.6
Grit Removal System	
Number of Grit Basins	2
Type	Vortex
Grit Collector Capacity Each, mgd	23.5
Number of Grit Pumps	2
Grit Pump Capacity Each, gpm	250
Type of Grit Washer	Vortex
Number of Grit Washers	2
Primary Clarifiers	
Number of Units	2
Diameter, feet	110
SWD, feet	10
Surface Overflow Rate (SOR), gpd/ft^2	
@ 16 mgd	844
@ 47 mgd	2,470
Peak Flow Capacity, mgd (Based on 1,800 gpd/ft^2 SOR)	34.2
Weir Overflow Rate, gpd/ft.	
@ 47 mgd	68,000

[1] From 1991 High Flow Study



WWTP SITE PLAN

FACILITIES PLAN
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FIGURE 3.02-1
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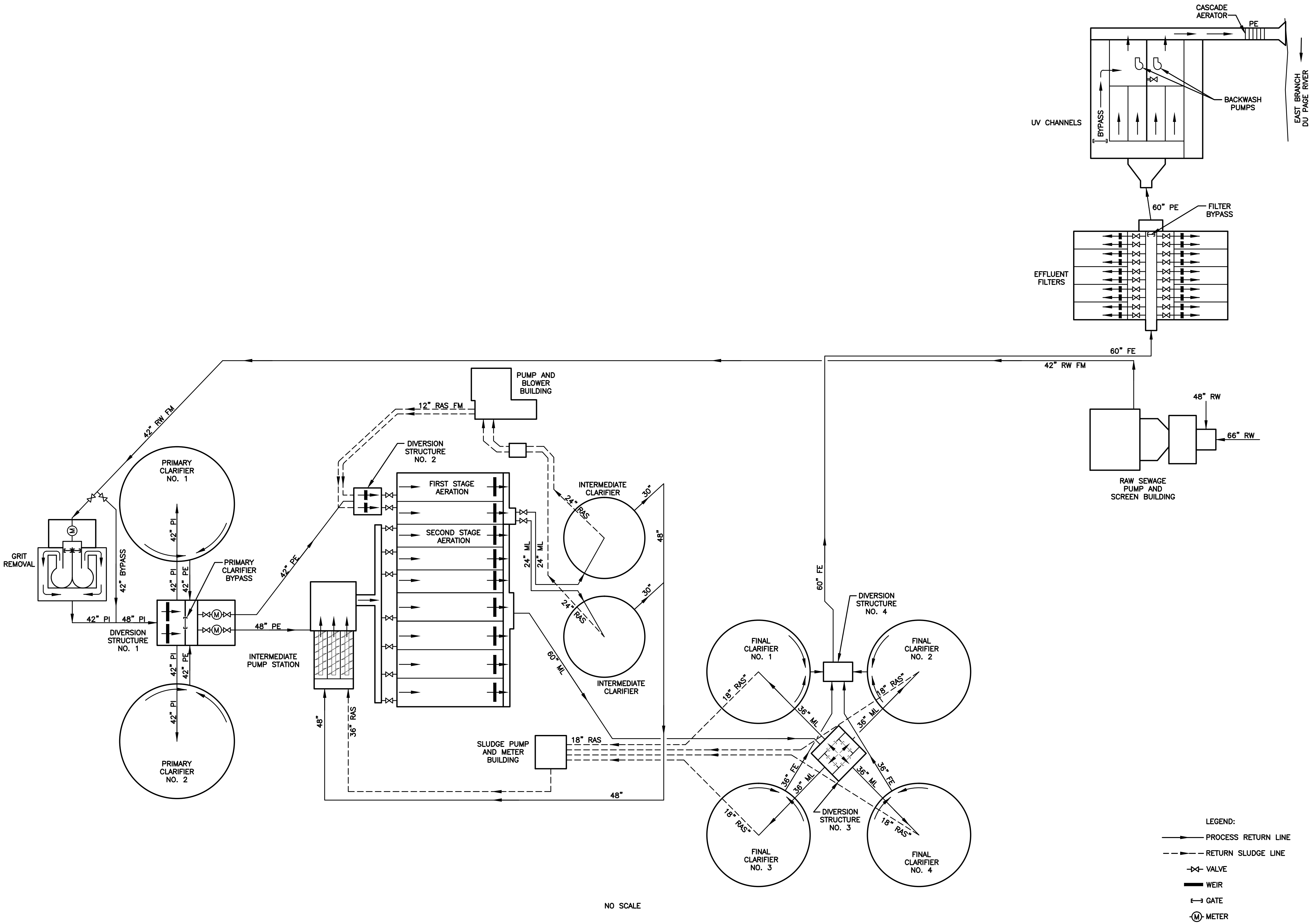

PROCESS FLOW SCHEMATIC

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FIGURE 3.02-2
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Item	Design Parameter
Primary Sludge Pumps	
Number of Units	2
Type	Progressing Cavity
Capacity Each, gpm	300
TDH, feet	125
hp, each	30
Carbonaceous Aeration Trains	
Train 1	
Volume, gallons	337,000
Dimensions, feet	127 x 25 x 14.17 (SWD)
Number of Mixers	4
Mixer Motor hp Each	30, 15, 10, 7.5
Train 2	
Volume, gallons	269,000
Dimensions, feet	127 x 20 x 14.17 (SWD)
Number of Mixers	4
Mixer Motor hp Each	25, 10, 7.5, 7.5
Total Carbonaceous Volume, gallons	606,000
Maximum Flow to Carbonaceous Stage, mgd	16
Design MLSS, mg/L @ 10°C	3,350
F/M @ 10°C, lbs BOD/lb MLSS/day	0.7
Influent BOD, lbs/day	11,850
Intermediate Clarifiers	
Number of Units	2
Diameter, feet	85
SWD, feet	12
SOR, gpd/ft^2	
@ 9.1 mgd	802
@ 17 mgd	1,498
Peak Hour Flow Capacity, mgd	11.3
(Based on 1,000 gpd/ft^2 for AS at peak hour–IEPA Code)	
Weir Overflow Rate, gpd/ft @ 17 mgd	31,800
Intermediate Pumping Station	
Number of Units	3
Type	Screw, 7 feet diameter
Capacity Each, gpm	12,500
TDH, feet	22
hp, each	125

Item	Design Parameter
Carbo RAS Pumps	
Number of Units	4
Type	Centrifugal
Capacity Each, gpm	1,800
TDH, feet	36
Carbo WAS Pumps	
Number of Units	1
Type	Submersible
Average, gpm	~100
Nitrification Aeration Trains	
Number of Trains	8
Trains 3, 4, and 5	
Volume Each, gallons	280,000
Dimensions Each, feet	127 x 20 x 14.73 (SWD)
Number of Mixers Each Train	4
Mixer Motor hp Each Train	15, 7.5, 7.5, 7.5
Trains 6, 7, 8, 9, and 10	
Volume Each, gallons	350,000
Dimensions Each, feet	127 x 25 x 14.73 (SWD)
Number of Mixers Each Train	4
Mixer Motor hp Each Train	20, 10, 7.5, 7.5
Total Volume, gallons	2,590,000
Design MLSS @ 10°C, mg/L	6,200
Cryogenic Oxygen Plant	
Maximum Capacity, tons/day	32
Minimum Stable Operating Capacity, tons/day	20 to 23
Compressor Motor hp	700
Final Clarifiers	
Number of Units	4
Diameter, feet	135
SWD, feet	14
Surface Overflow Rate, gpd/ft^2	
@ 16 mgd	279
@ 47 mgd	818
Solids Loading, lbs/ft^2/day.@ 16 mgd, RAS=8 mgd, and 5,500 mg/L MLSS	19.2
Peak Hour Capacity, mgd (800 gpd/ft^2 for Nitrification Stage)	46
Weir Overflow rate, gpd/ft @ 47 mgd	27,700

Item	Design Parameter
Nitro WAS Pumps	
Number of Units	2
Granular Media Filters	
Number of Units	10
Dimensions of Each Filter, feet	
Length	37
Width	18
Filtration Rate, gpm/ft^2	
@ 16 mgd	1.68
@ 47 mgd (all units in service)	4.91
Peak Flow Capacity, mgd @ 5 gpm/ft^2, With One Unit Out of Service	43.2
Filter Backwash Pumps	
Number of Units	2
Type	Vertical Turbine
Capacity each, gpm	8,000
TDH, feet	16
hp, each	75
Mud Well (Spent Backwash) Pumps	
Number of Units	2
Type	Centrifugal
Capacity, gpm	1,600
TDH, feet	28
Filter Backwash Water Clarifier	
Number of Units	1
Diameter, feet	55
SWD, feet	13.6
SOR, gpd/ft^2	600
UV Disinfection	
Number of Channels	4
Number of Banks/Channel	2
Number of Lamps/Bank	288
Total Number of Lamps	2,304
Rated Hydraulic Capacity per Channel, mgd	14.3

Item	Design Parameter
Gravity Sludge Thickener	
Number of Units	1
Diameter, feet	55
SWD, feet	10
Design Solids Loading Rate, lbs/day/ft^2	600
Design Overflow Rate, gpd/ft^2	600
GBT Feed Pumps	
Number of Units	2
Type	Progressing Cavity
Capacity, gpm	375
TDH, feet	48
hp, each	25
GBT	
Number of Units	1
Capacity, gpm	375
GBT Thickened Sludge Pumps	
Number of Units	1
Type	Progressing Cavity
Capacity, gpm	125
TDH, feet	47
hp, each	25
Anaerobic Digester No. 1	
Type	Primary
Cover Type	Floating Holder
Diameter	80 ft
SWD	23.5 ft
Volume	933,000 gallons
Anaerobic Digester No. 2	
Type	Primary
Cover Type	Floating Holder
Diameter	60 ft
Side Water Depth	23.5 ft
Volume	525,000 gallons

Item	Design Parameter
Anaerobic Digester No. 3	
Type	Secondary
Cover Type	Floating Gas Holder
Diameter	60 ft
Side Water Depth	18.5 ft
Volume	375,000 gallons
Sludge Recirculation Pumps	
Number of Units	3
Type	Progressing Cavity
Capacity, gpm	360
TDH, feet	35
hp, each	15
Digester Sludge Transfer Pumps	
Number of Units	2
Type	Centrifugal
Capacity, gpm	350
TDH, feet	30
hp, each	10
Combination Boiler/Heat Exchangers	
Number	2
Capacity Each, million BTU/hr	1.5
Digester Mixing Pumps	
Type	Dry Pit Horizontal
Anaerobic Digester No. 1	
Number	2
Capacity Each, gpm	2,290
Anaerobic Digester No. 2 and No. 3	
Number	2 (1 per digester)
Capacity Each, gpm	3,024
Digested Sludge Transfer Pumps	
Number of Units	2
Type	Progressing Cavity
Capacity, gpm	160
TDH, feet	126
hp, each	15

Item	Design Parameter
Digested Sludge Transfer Tanks	
Number	2
Capacity Each, gallons	35,000
Belt Filter Press Feed Pumps	
Number of Units	3
Type	Progressing Cavity
Sludge Dewatering	
Type	Belt Filter Press
Number of Units	2
Size, meters	2.2
Electrical Generators	
Number of Units	3
Capacity Each, kW	815

B. Residuals Management

Residuals management at the WWTP includes gravity thickening, gravity belt thickener (not currently used), anaerobic digestion, and BFP dewatering. A schematic of the existing residuals management facilities is shown in Figure 3.02-3.

Primary sludge is directed to the gravity thickener to cothicken with Carbo and Nitro WAS. WAS generated from the Carbo and Nitro stages is fed to the gravity thickener. With the 2002 Biosolids Improvement Project, a gravity belt thickener (GBT) was installed in the Sludge Dewatering Building to thicken WAS, though it is not normally used.

As shown in Figure 3.02-3, primary sludge and WAS stabilization is provided by anaerobic digestion with two primary digesters and one secondary digester. The 2007 Anaerobic Digestion Improvements project included the addition of the second primary anaerobic digester. Two combination heat exchanger-boiler units provide heating for the digesters through combustion of digester biogas and supplemented by purchased natural gas.

Digested sludge from the secondary digester is transferred to two 35,000-gallon transfer tanks (TST 1 and TST 2). Sludge is pumped from the transfer tanks to either of the two BFPs for dewatering. Normally, dewatered cake is placed in 28-cubic-yard containers and disposed of on agricultural land and incorporated within 24 hours or one working day. Dewatered cake is stored on-site during winter months when direct disposal is not allowed. The GWA has a long-term contract with a private company for removal, transportation, and disposal of digested biosolids.

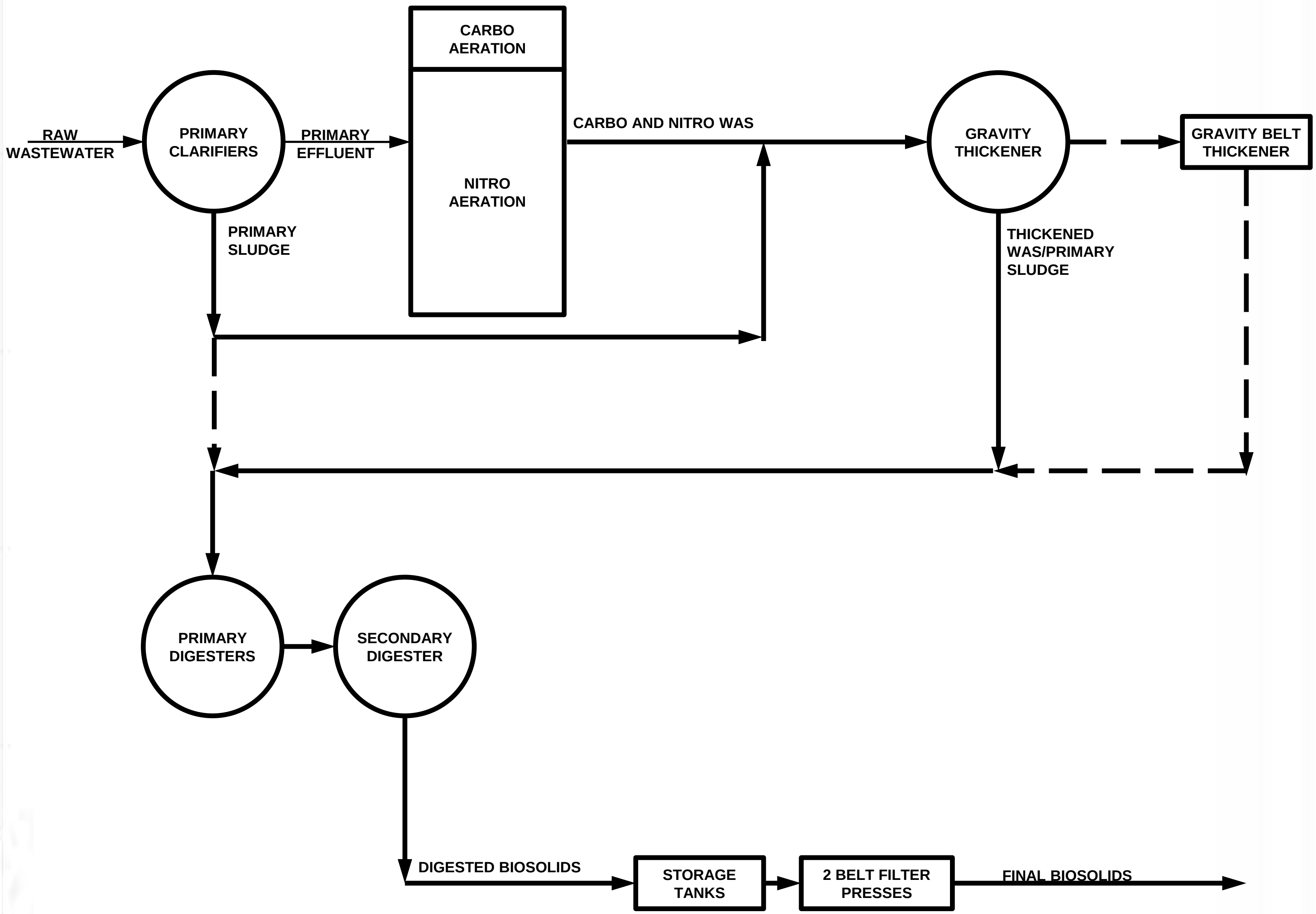
3.03 NPDES PERMIT REQUIREMENTS

Required NPDES effluent limits for the GWA WWTP are presented in Table 3.03-1. The GWA WWTP is currently operating under an NPDES permit that was issued on August 24, 2006, and expired on September 30, 2011. A copy the NPDES Permit is included in Appendix B. The anticipated future effluent limits are discussed in Section 5.

Outfall 001 (WWTP Outfall)						
	Load Limits (lb/day) DAF (DMF) [a]			Concentration Limits (mg/L)		
Parameter	Average Monthly	Weekly Average	Daily Maximum	Average Monthly	Weekly Average	Daily Maximum
$CBOD_5$	1,336 (3,920)		2,672 (7,840)	10		20
Suspended Solids	1,603 (4,704)		3,207 (9,408)	12		24
Ammonia Nitrogen:						
April – October	200 (588)		401 (1,176)	1.5		3.0
November – February	534 (1,568)		1,657 (4,861)	4.0		12.4
March	361 (1,058)	909 (2,665)	1,657 (4,861)	2.7	6.8	12.4
Dissolved Oxygen	Shall not be less than 6 mg/L.					
pH	Shall be in the range of 6 to 9 Standard Units.					
Fecal Coliform	Daily Maximum shall not exceed 400 per 100 mL (May through October).					

[a] Load limits are based on design average flow (DAF) = 16.02 mgd and design maximum flow (DMF) = 47 mgd.

Table 3.03-1 NPDES Effluent Limitations for GWA WWTP



SOLIDS SCHEMATIC

FACILITIES PLAN
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FIGURE 3.02-3
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3.04 EXISTING FLOWS AND LOADINGS

A. Existing Influent Flows and Loadings

A summary of average daily flows for the period 2009 through July 2012 is shown in Table 3.04-1. Additionally, Table 3.04-1 includes a review of plant influent loadings, primary effluent loadings, and primary removal performance for BOD and total suspended solids (TSS).

	Influent Wastewater						Primary Effluent Loadings			
	Flow		BOD		TSS					
Year	Annual Average (mgd)	Max. Month (mgd)	Annual Average (lbs/day)	Max. Month (lbs/day)	Annual Average (lbs/day)	Max. Month (lbs/day)	BOD (lbs/day)	Percent Removal	TSS (lbs/day)	Percent Removal
2009	14.0	19.8	14,457	17,185	16,187	18,531	8,589	41%	6,667	59%
2010	12.7	19.4	14,722	16,576	16,266	20,361	8,290	44%	6,305	61%
2011	13.1	18.7	16,262	19,011	17,973	20,856	7,828	52%	6,376	65%
2012	10.7	11.9	14,775	17,169	17,032	21,009	6,973	53%	5,962	65%
Average	12.6		15,054	17,486	16,865	20,189	7,920	47%	6,327	62%

Table 3.04-1 Summary of Influent Wastewater and Primary Effluent Data for BOD and TSS

The BOD primary removal efficiency has averaged approximately 47 percent for 2009 through July 2012, which is higher than the typical range of 25 to 35 percent. The TSS percent removal is within the range of typical primary TSS removal performance at 62 percent removal.

The influent loadings for ammonia are summarized in Table 3.04-2.

	Ammonia	
Year	Annual Average (lb/day)	Max. Month (lbs/day)
2009	1,887	2,436
2010	1,623	1,799
2011	2,216	2,847
2012	1,855	2,086
Average	1,895	2,292

Table 3.04-2 Summary of Influent Wastewater Ammonia Data

B. Existing Digester Loadings

Using data from January 2009 through July 2012, the maximum month to average annual volatile solids (VS) loading to digestion ratio was determined to be approximately 1.15:1. Annual average and maximum month VS loadings and detention times to the two primary digesters are shown in Table 3.04-3. The average annual and maximum month detention times in all three digesters are also shown in Table 3.04-3. The annual average digester influent percent VS is 81 percent.

	Primary Digesters				Total Digestion
	VS Load (lbs/day)	Per Volume VS Loading (lbs VS/ft^3/d)	Flow (gpd)	Detention Time (days)	Detention Time (days)
Annual Average	12,900	0.07	54,400	26.8	33.7
Maximum Month	14,800	0.08	66,000	22.1	27.8

Table 3.04-3 Digester Loading Summary

3.05 WASTEWATER TREATMENT PERFORMANCE

The Glenbard WWTP has met applicable five-day carbonaceous biochemical oxygen demand ($CBOD_5$), TSS, ammonia, and fecal coliform discharge limits during the past three years. Ammonia limits have been met during the past three years except for two days in April 2010 because of a biological upset. Tables 3.05-1, 3.05-2, and 3.05-3 summarize the average monthly effluent $CBOD_5$, TSS, and ammonia, respectively, from the WWTP.

	Effluent CBOD (mg/L)			
	2009	2010	2011	2012
January	2.0	2.7	3.6	2.9
February	2.8	3.0	3.9	2.2
March	1.7	3.0	3.7	2.6
April	1.7	3.2	3.2	2.1
May	3.2	2.1	2.0	1.8
June	2.1	2.3	2.0	2.3
July	1.7	1.6	1.7	1.9
August	2.0	2.0	1.6	
September	1.3	1.3	1.1	
October	1.4	1.2	1.6	
November	2.2	2.1	2.4	
December	3.1	2.4	2.2	
Maximum Month	**3.2**	**3.2**	**3.9**	**2.9**

Table 3.05-1 Summary of Effluent $CBOD_5$ Data

	Effluent TSS (mg/L)			
	2009	**2010**	**2011**	**2012**
January	1.3	2.9	6.1	4.4
February	2.4	2.1	7.4	3.6
March	1.3	2.6	5.6	3.6
April	2.0	2.3	5.2	3.0
May	5.3	2.2	3.4	2.5
June	2.8	1.9	3.2	4.0
July	2.0	1.6	2.7	2.8
August	2.3	2.5	2.4	
September	2.2	2.6	1.9	
October	2.5	3.4	2.3	
November	2.8	3.4	2.9	
December	4.9	4.7	2.8	
Maximum Month	**5.3**	**4.7**	**7.4**	**4.4**

Table 3.05-2 Summary of Effluent TSS Data

	Effluent Ammonia (mg/L)			
	2009	**2010**	**2011**	**2012**
January	0.10	0.14	0.15	0.05
February	0.85	0.46	0.87	0.06
March	0.79	0.50	0.38	0.03
April	0.30	1.45	0.18	0.04
May	0.13	0.08	0.14	0.04
June	0.08	0.03	0.06	0.03
July	0.04	0.03	0.05	0.03
August	0.07	0.03	0.25	
September	0.04	0.03	0.04	
October	0.05	0.03	0.10	
November	0.18	1.19	0.24	
December	0.35	0.04	0.06	
Maximum Month	**0.85**	**1.45**	**0.87**	**0.06**

Table 3.05-3 Summary of Effluent Ammonia Data

SECTION 4
WASTE LOAD AND FLOW FORECASTS

4.01 POPULATION PROJECTIONS

The GWA serves the communities of Glen Ellyn and Lombard and adjacent unincorporated areas including Glen Ellyn Heights (DuPage County) and Citizen Utilities Company's Valley View service area. Except for small areas served by other utilities, GWA services all of the areas within the current Glen Ellyn and Lombard corporate limits.

A. Summary of Previous Planning Reports

The following discussion summarizes the Facility Planning reports prepared for GWA.

The Glenbard Wastewater Treatment Facilities were placed into operation in 1981 with a design year of 2000. The *1989 Long Range Planning Study* by Rezek, Henry, Meisenheimer and Gende, Inc. projected future flows and loadings for ultimate development within the FPA based on a population equivalent of 109,125. The Glenbard Wastewater Treatment Facilities ultimate design flows and loadings from the *1989 Long Range Planning Study* are shown in Table 4.01-1.

Average Daily Flow, mgd	16.02
Peak Daily Flow, mgd	> 41.0[1]
BOD, lbs/day	13,625
TSS, lbs/day	19,292
NH_3N, lbs/day	1,684
Sludge Projection, tons/day	7.69

[1] Rated for 47 mgd in current NPDES permit.

Table 4.01-1 Glenbard Wastewater Treatment Facilities Ultimate Design Flows and Loadings-*1989 Long Range Planning Study*

The *1991 High Flow Study by Rezek*, Henry, Meisenheimer and Gende, Inc. projected a 57.34 mgd peak flow from computer modeling of a five-year frequency storm. This report along with the *1989 Long Range Planning Study* recommended rerating the WWTP capacity to 16.02 mgd design average flow. The IEPA accepted this recommendation and the current NPDES permit rates the WWTP at 16.02 mgd design average flow and 47 mgd peak capacity.

B. Population Projections

Glen Ellyn and Lombard historic populations and Chicago Metropolitan Area for Planning (CMAP) projected populations for the year 2040 are shown in Figure 4.01-1. The population growth between 2000 and 2010 for both Glen Ellyn and Lombard was approximately 2 percent over this period. Design Year 2033 Glen Ellyn and Lombard population projections were interpolated from the 2010 US Census populations and the 2040 CMAP projected populations. The 2011 population equivalent and 2033 design year projected population equivalents for the GWA service area were estimated based on populations from US Census, CMAP, and the 2006 Facilities Plan.

Summarized in Table 4.01-2 are the 2005 and 2027 population equivalents from the *2006 Facilities Plan*, as well as the 2011 and 2033 population equivalents estimated for this report. Although the populations for Glen Ellyn and Lombard decreased in 2011 from the 2005 estimated populations in the 2006 Facilities Plan, the 2011 population of the unincorporated areas was assumed to be equal to the volumes in the 2006 Facilities Plan, and the unincorporated areas population of 7,493 in the *2006 Facilities Plan* for the year 2027 is assumed to be the same for the 2033 design year of this report. Current and design year population equivalents for College of DuPage and Yorktown Shopping Center are assumed to be equal to the 2005 and 2027 population equivalents of the *2006 Facilities Plan*, respectively. Currently GWA does not serve any large industrial dischargers, and neither Glen Ellyn nor Lombard expect significant industrial growth in their communities. The Year 2033 projected population within the GWA service area has not changed from the 2006 Facilities Plan.

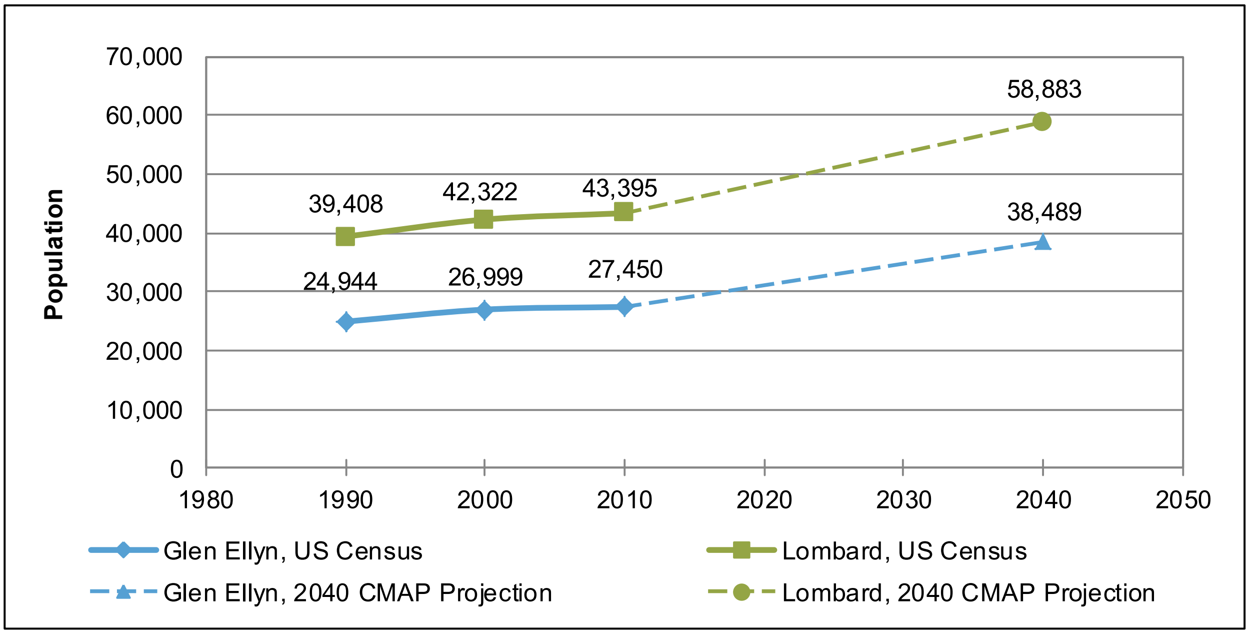


Figure 4.01-1 Historic and Projected Populations for Glen Ellyn and Lombard

	Year 2005 (2006 FP)	Year 2027 (2006 FP)	Year 2011 Estimate[1]	Design Year 2033[2]
Village of Glen Ellyn	28,000	32,291	27,648	35,872
Village of Lombard	45,000	50,618	43,462	55,161
Unincorporated Areas	13,200	7,493	13,200	7,493
College of DuPage	3,500	4,200	3,500	4,200
Yorktown Shopping Center	5,000	5,000	5,000	5,000
Unforeseen Commercial/Industrial		9,523		1,399
Total Population Equivalent	94,700	109,125	92,810	109,125

[1]US Census 2011 population estimate for Glen Ellyn and Lombard.
[2]Glen Ellyn and Lombard populations interpolated from US Census 2011 population estimate and CMAP 2040 population forecast.

Table 4.01-2 Existing and 20-Year Projected Population

4.02 FUTURE FLOWS AND LOADINGS

A. Future Influent Flows and Loadings

Future plant flows were based on existing flows plus an allowance for future population equivalents. Monthly average flows during dry weather periods are shown in Table 4.02-1.

Dry Weather Period	Flow (mgd)
September 2009	8.81
October 2010	8.04
November 2010	8.95
June 2012	8.81
Average	8.65

Table 4.02-1 Average Flows During Dry Weather Periods

Based on an average daily dry weather flow of 8.65 mgd and an existing population equivalent of 92,810, the existing per capita dry weather flow would be about 93 gallons per capita per day (gcd). The average daily flow for years 2009, 2010, and 2011 is 13.27 mgd, and the existing per capita average daily flow is 143 gcd. The average daily flow from future growth was assumed to be at an average rate of 143 gcd. The resultant projected design average flow is 15.60 mgd. Because the calculated design average flow is less than 3 percent of the existing rated design average flow of 16.02 mgd, a design average flow of 16.02 mgd is recommended.

Date	Flow (mgd)
February 27, 2009	36.89
March 8, 2009	40.51
December 25, 2009	37.72
July 24, 2010	40.58
Average	38.93

Table 4.02-2 Maximum Daily Flows

The existing maximum daily flows received at the Glenbard WWTP are shown in Table 4.02-2. The average of the four highest average daily flows from 2009 through July 2012 is 38.93 mgd. For future growth; 100 gcd is assumed because the FPA is fully developed and, therefore, additional I/I is not anticipated.

During high flows, the influent pumping station typically operates at a higher wet well level, which surcharges the influent sewer. The influent flow meter is located in the Grit Removal Building, which is downstream of the influent pump station. The average peaking factor of peak hourly flow over the daily flow for selected high flow days is 1.16. The resultant design peak hourly flow is 47.0 mgd using the design year maximum day flow of 40.56 mgd.

Existing average BOD, TSS, and ammonia per capita loadings, summarized in Table 4.02-3, are based on the annual average loadings presented in Tables 3.04-1 and 3.04-2 and an existing population equivalent of 92,810. The existing average per capita loadings for BOD, TSS, and ammonia are about 0.16, 0.18, and .020, respectively. However, future loadings were projected based on typical BOD, TSS, and total Kjeldahl nitrogen (TKN) per capita values of 0.17, 0.20, and 0.035, respectively. A typical per capita value of 0.007 is used for future phosphorus loadings.

	Current Average (lbs/day)	Per Capita Day (pcd)
BOD[1]	15,054	0.16
TSS[1]	16,865	0.18
NH_3N[2]	1,895	0.020

[1]BOD and TSS average loadings from Table 3.04-1.
[2]NH_3N average loading from Table 3.04-2.

Table 4.02-3 Per Capita Loadings

The design flows and loadings are summarized in Table 4.02-4 and are equivalent to loading projections developed in the *2006 Facilities Plan*.

Population Equivalent	109,125
Population Increase From 2011	16,315
Current Daily Average Flow (mgd)	13.27
Projected Additional Growth @ 143 gcd (mgd)	2.33
Projected Design Average Flow (mgd)	15.60
Recommended Design Average Flow (mgd)	**16.02**
Current Maximum Day Flow (mgd)	38.93
Projected Additional Growth @ 100 gcd (mgd)	1.63
Design Maximum Daily Flow (mgd)	**40.56**
Design Maximum Hourly Flow (mgd)	**47.00**
Design BOD @ 0.17 pcd (lbs/day)[1]	**18,600**
Design TSS @ 0.20 pcd (lbs/day)[1]	**21,800**
Design NH_3N @ 0.035 pcd (lbs/day)[1]	**3,800**
Design Phosphorus @ 0.007 pcd (lbs/day)[1]	**800**

[1] Rounded to the nearest hundred.

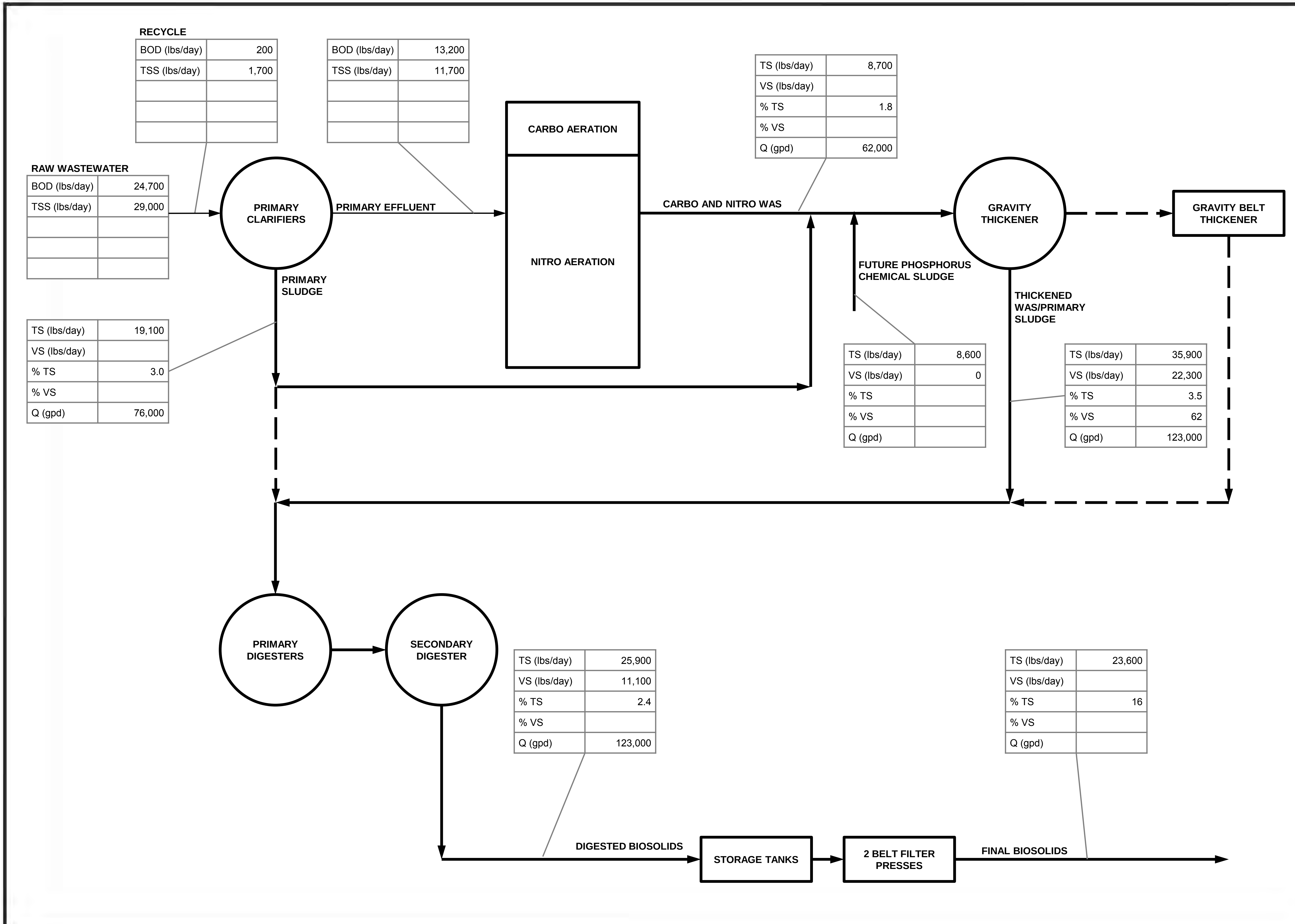
Table 4.02-4 Projected Design Flows and Loadings

B. Future Digester Loadings

A sludge mass balance was prepared for the future maximum monthly condition. A population equivalent of 109,125 was assumed, and the future maximum monthly to annual average ratio was assumed to be 1.33:1. The current plant is designed for a population equivalent of 109,125. The maximum monthly to annual average ration of 1:33 is more typical than the calculated current value at 1:15. It was also assumed chemical phosphorus removal (CPR), with anticipated higher sludge quantities, would be included.

For purposes of this report, it was assumed phosphorus limits would be imposed at GWA within about 10 years. The average plant influent phosphorus is about 6.6 mg/L, based on six samples collected in 2003 and 2004. Assuming alum would be used for phosphorus removal, total sludge solids may increase by about 8,600 lbs/day (*2006 Facilities Plan*). Alum addition would not increase the projected VS loading. The mass balance is shown in Figure 4.02-1.

The maximum month VS loading to the primary digester in 2033 is projected to be 22,300 lbs/day, which would be about 0.11 lbs/day/ft^3. The projected 2033 VA loading is less than the 24,300 lbs/day VA loading used for the 2007 Anaerobic Digestion Improvements design. The hydraulic or solids detention time would be about 14.9 days.



SOLIDS MASS BALANCE-DESIGN YEAR MAXIMUM MONTH

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FIGURE 4.02-1
1278.047

SECTION 5
REGULATORY AND NPDES PERMITTING ISSUES

This section examines current and expected regulatory issues and the anticipated impact on future NPDES permit requirements.

5.01 REGULATORY AND NPDES PERMITTING ISSUES

Permit limits and regulatory standards are revised as society's understanding of its environmental impact grows. Implementation of new permit limits and regulatory standards can require substantial changes in WWTP operations and treatment facility needs. New regulations affect effluent limits and the disposal of sludge or biosolids, among other things. The purpose of this section is to discuss regulatory initiatives now under consideration, review their impact on the GWA WWTP, and recommend provisions that should be included in any proposed WWTP modifications to address these future regulatory concerns.

A. Pending Sanitary Sewer Overflow and Bypass Rules

The Clean Water Act (CWA) contains a strict prohibition against sanitary sewer overflows (SSOs). In January 2001, the United States Environmental Protection Agency (USEPA) administrator signed a new SSO rule. However, it was never published and is still under debate. The proposed SSO rule resulted from extensive dialogue with the regulated community, which is ongoing. The rule contains provisions for capacity management operation and maintenance (CMOM) programs and an SSO monitoring and reporting scheme for collection system permittees. Under the rules being considered, wet weather excess flow discharges and other WWTP "bypasses" may not be allowed unless the permittee determines there is no feasible alternative.

The IEPA has placed requirements for no feasible alternative determinations in recent draft permits for facilities that have had wet weather issues or excess flow outfalls. This provision would have required permittees to prepare and implement a plan to evaluate and eliminate discharges from excess flow outfalls or provide an economic analysis demonstrating that no feasible alternative exists. The Illinois Association of Wastewater Agencies (IAWA) strongly objected to these requirements on the basis that they are a major change in policy that has not been through proper rulemaking processes including public notice and comment. The IAWA has also presented the case that excess flow outfalls are intentional treatment systems designed to meet secondary treatment effluent limits and are, therefore, not "bypasses" as defined by the CWA. Other commenters have cited an October 27, 2011, memorandum from the USEPA that encourages cost-effective solutions to wet weather issues. As of mid-October 2012, the IEPA has not issued any final permits containing the no feasible alternative requirements and has indicated that it will not be incorporating these requirements in permits. This is in response to a February 8, 2012, letter from USEPA Region 5 to IEPA (Appendix C) that indicates for separate sanitary sewer systems the no feasible alternative analysis is not required if secondary effluent limitations are included for the excess flow outfall.

B. National Nutrient Strategy

In December 2000, the USEPA published recommended regional water quality criteria with the goal of reducing the impact of excess nutrient discharges to the nation's waterbodies. The parameters represent both causal criteria [total phosphorus (TP) and total nitrogen (TN)] as well as physical/biological responses (chlorophyll *a* and turbidity). The goal was for the USEPA to work with the states to adopt the recommended criteria or to develop more regionally specific water quality criteria for nutrients. States were expected to adopt or revise water quality standards by 2004, but this schedule has been revised several times to allow states more time to develop rules. At the time of writing this report, most states, including Illinois, have not yet adopted new water quality standards for nutrients. The USEPA is now pushing states to enforce existing state narrative water quality standards for algae, aquatic plants, and similar offensive conditions at least until numeric nutrient criteria are developed.

The GWA WWTP discharges to East Branch of the DuPage River in the DuPage River watershed, located in Ecoregion VI as defined by the USEPA. The USEPA's baseline water quality criteria for rivers in this ecoregion are presented in Table 5.01-1. Note that a criterion is the allowable concentration of a substance in the waterbody. Permit limits will sometimes be higher than a criterion because consideration can be given to dilution of the effluent with the receiving water body. In the case where the receiving water body's background water quality is higher than the criterion, or upstream flow is zero, the permit limit may be set at the criterion.

Parameter	Nutrient Criteria
TP	76.25 μg/L
TN	2.18 mg/L
Chlorophyll *a*	2.7 μg/L
Turbidity	6.36 NTU

Table 5.01-1 USEPA Recommended Nutrient Criteria for Rivers in Ecoregion VI

C. Illinois Nutrient Strategies and Status

The Illinois Nutrient Standards Workgroup has convened to develop nutrient standards. Numeric water quality standards for TP and TN have been considered; however, there appear to be poor correlations between nutrient concentrations and biological conditions in many Illinois waterbodies. Therefore, the Workgroup proposed several scenarios. One of these scenarios that appeared to be gaining traction includes a categorical effluent phosphorus limit for WWTPs of around 1 milligram per liter (mg/L) TP, with lower limits for WWTPs discharging to waters that exhibit nutrient-related problems such as excessive algae or diurnal swings in dissolved oxygen (DO) concentrations.

In January 2011, the USEPA sent the IEPA a letter regarding the impact of WWTP effluent nutrients on water quality. The letter stated that IEPA failed to determine whether the discharge of nutrients from several WWTPs was causing or contributing to violations of Illinois' narrative offensive condition standard at s. IAC 302.203. This standard is as follows:

> "Waters of the State shall be free from sludge or bottom deposits, floating debris, visible oil, odor, plant or algal growth, color or turbidity of other than natural origin. The allowed mixing provisions of Section 302.102 shall not be used to comply with the provisions of this Section."

The IEPA responded to USEPA's letter on November 2, 2011. In the response, the IEPA stated that it is doing or will do the following:

Step 1

1. General

   a. The IEPA is enforcing its numeric TP water quality standard for reservoirs and lakes.

b. The IEPA is implementing 1 mg/L effluent standards for TP for new and expanding publicly owned WWTPs 1 mgd and above and industrial sources discharging at least 25 pounds of TP a day.

c. The IEPA is incorporating waste load allocations (WLAs) or conditions into WWTP permits where a total maximum daily load (TMDL) exists. Some of these have resulted in TP or nitrate limits at WWTPs.

d. The IEPA is enforcing its antidegradation analysis requirements for WWTPs that are expanding, and some of these have resulted in WWTP TP limits and/or TN goals.

2. Algae-Impaired Streams

   a. The IEPA will develop TMDLs for waterbodies that are on the state's 303(d) impaired waters list for not meeting the offensive condition standards. This may result in WLAs for nutrients and corresponding effluent limits in permits.

   b. Where data are not yet sufficient to develop a TMDL, the IEPA may require a WWTP that is a major source of nutrients to collect more data for use in a TMDL, and the permit may contain a reopener clause allowing the IEPA to incorporate limits or conditions based on the eventual TMDL. The IEPA may consider including a 1 mg/L limit or lower in the permit.

   c. The IEPA may include a condition in a permit to evaluate the operation of biological phosphorus removal (BPR) or other WWTP modifications; an economic analysis would be used to determine what level of nutrient removal is affordable for the community.

<u>Step 2</u>

1. The IEPA and the Stakeholder Workgroup will continue to establish new regulations addressing nutrients by late 2012 or later. The IEPA is working toward establishing a new narrative standard for "cultural eutrophication" that is linked to aquatic life impact and uses measureable parameters such as DO. The IEPA may also include other specific parameters like DO flux and chlorophyll *a*. The presence of cultural eutrophication would trigger a technology-based TP limit for WWTPs that are a significant source.

2. The IEPA may establish technology-based TP limits for existing plants undergoing expansion and TP limits for WWTPs undergoing significant upgrade without expansion.

3. The IEPA will establish an approach for protecting streams that presently have low TP concentrations.

Step 3

1. The IEPA will continue to work toward developing scientifically defensible numeric criteria for streams and rivers from which WWTP water quality-based effluent limits (WQBELs) can be calculated.

There is current debate on the appropriate technology-based TP limit. A limit of approximately 1 mg/L has been proposed but may be considered too high by the IEPA. Based on experience in other states, it is possible the technology-based limit could be as low as 0.1 mg/L.

IEPA is now placing effluent TN and TP monitoring requirements in reissued NPDES permits in preparation for new TMDLs and narrative and numeric standards.

D. Impaired Waters and TMDL Impacts

The CWA provides special authority for restoring polluted or impaired waters. For waterbodies that appear on the list of impaired waters [303(d) list], the CWA mandated development of the maximum amount of a specific pollutant that a waterbody can receive and still meet water quality standards, referred to as the TMDL. A TMDL also allocates the maximum amount of each identified pollutant of concern that can be contributed from both NPDES permitted discharges and nonpoint (surface runoff) sources.

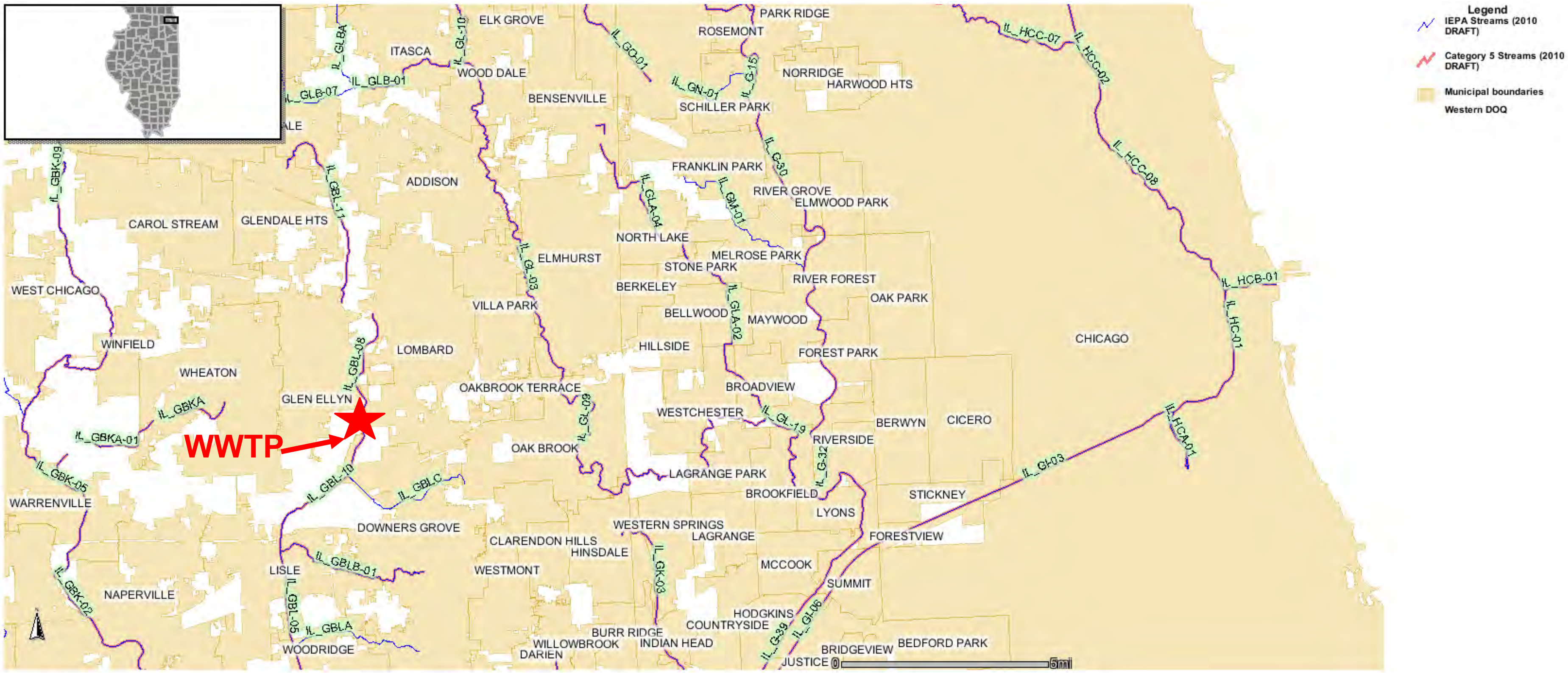
Figure 5.01-1 shows the water bodies in the vicinity of the GWA WWTP that are on the 2010 impaired waters list. Table 5.01-2 lists the water bodies on the 2010 impaired waters list at or downstream of the GWA WWTP outfall. For the East Branch of the DuPage River segments listed in Table 5.01-2, the addition of DO to impairment segment IL_GBL-02 is the only proposed change in the draft 2012 list.

Water Body Name	IEPA ID	Impaired Use(s)	Impairment Causes(s)
Receiving Stream Segment			
East Branch of the DuPage River	IL_GBL-10	Aquatic Life	Arsenic, Dieldrin, Hexachlorobenzene, Methoxychlor, pH, Phosphorus (Total)
		Fish consumption	PCBs
		Primary Contact Recreation	Fecal Coliform
Downstream Segment			
East Branch of the DuPage River	IL_GBL-05	Aquatic Life	TSS Phosphorus (Total)
		Fish consumption	Polychorinated Biphenyls (PCBs)
East Branch of the DuPage River	IL_GBL-02	Aquatic Life	Arsenic, Methoxychlor, Phosphorus (Total)
		Fish consumption	PCBs

Table 5.01-2 Impaired Waters in the Vicinity of the GWA WWTP Outfall

FIGURE 5.01-1

IMPAIRED WATERS IN THE VICINITY OF GWA WWTP



Source: IEPA Web site

Several TMDLs were developed for the East Branch of the DuPage River and were approved by USEPA in 2004. The impairments considered in the TMDLs are shown in Figure 5.01-2. The addition of DO for segment IL_GBL-02 to the draft 2012 303d list is not expected to impact GWA because the 2004 TMDL report included this segment in the model.

The 2004 TMDLs resulted in the formation of a watershed-based group, the DuPage River Salt Creek Workgroup (DRSCW), that is working toward DO, total dissolved solids (TDS)/chloride, and other water quality improvements in the Salt Creek and East and West Branch DuPage River watersheds. The IEPA has agreed to postpone more stringent biochemical oxygen demand (BOD) and ammonia limits at WWTPs as long as the group continues to make good progress toward water quality goals. The IEPA's 2004 *Permit Link Document* for these watersheds outlines this approach and allows other actions to be implemented and monitored such as dam removal, stream or impoundment aeration, stream restoration, and stormwater best management practices. These projects are likely much more cost-effective for municipalities compared to constructing related improvements at the WWTPs. Most of these projects are more beneficial to the receiving streams than WWTP improvements because they tend to address physical habitat and biological conditions in addition to water chemistry. In the East Branch of the DuPage River watershed, a feasibility study was completed in 2008 to help identify the best projects and a copy can be found on the IEPA Web site at the following address: http://www.epa.state.il.us/water/tmdl/implementation/dupage-river/stream-do-improvement-fs-east-br-dupage.pdf. A copy of the Permit Link Document is located on the IEPA Web site at the following address: http://www.epa.state.il.us/water/tmdl/stakeholders/tmdl-npdes-link-paper.pdf.

TABLE 2-1
Segments of the East Branch of the DuPage River That This TMDL Report Addresses and Identified Potential Causes of Impairment

Segment	TDS/ Conductivity	Chloride	DO
GBL 05	X	X	X
GBL 10		X	X
GBL 08			X

TDS, total dissolved solids.

Source: IEPA Web site

Figure 5.01-2 Table 2-1 From *IEPA Total Maximum Daily Loads for the East Branch of the DuPage River, Illinois–Final Report,* October 2004

The 2004 TMDL report provided two alternatives to meet the DO TMDL including one alternative with reduced point source limits for CBOD and ammonia and a second alternative with the current permit limits along with removing existing dams and/or in-stream aeration. The 2008 feasibility study by DRSCW recommended the removal of the Churchill Woods Dam, located upstream of GWA WWTP, and this project was completed in 2011. Reduced CBOD and ammonia limits are not anticipated because of the DRSCW projects and DO monitoring.

The IEPA is now in the process of completing fecal coliform TMDLs to address impairments in East Branch of the DuPage River. The DRSCW is actively involved in contributing data and reviewing TMDL workproduct.

The GWA is a member of the DRSCW. We recommend continued participation because of the DRSCW's focus on low-cost, high-impact projects, its "voice" with the IEPA, and its ability to obtain significant grant funding.

As noted in Paragraph C above, the IEPA has considered imposing TP limits in NPDES permits where discharge is to a phosphorus-impaired stream, particularly for expanding WWTPs and possibly for those undergoing a major upgrade. This may be a consideration in one of GWA's future permit reissuances.

E. Antidegradation Analysis

Within the USEPA's framework of water quality criteria, the nation's waterbodies are to be protected through compliance with water quality standards. All water quality standards are composed of the following:

1. Designated uses.
2. Instream water quality criteria (both numeric and narrative) required to support the designated use.
3. An antidegradation policy intended to prevent waterbodies that do meet water quality criteria from deteriorating beyond their current condition.

For the 20-year design period considered in this report, the projected average annual design flow is equal to the previously established design average daily flow. Therefore, the design average flow will remain at 16.02 mgd and an antidegradation analysis is not required.

F. Anticipated NPDES Permit Requirements for 2012

The current NPDES permit was issued in 2006 with an expiration date of 2011. The permits limits are listed in Section 3 and the permit is included in Appendix B.

The Outfall 001 NPDES effluent limits for $CBOD_5$, TSS, and NH_3-N are not expected to change. Monthly monitoring for TP and TN with no effluent limits for these parameters is anticipated.

The LCSTP limits are not expected to change in the reissued permit.

G. Future Nutrient Limits

Nutrient limits for TN and TP are not anticipated in the next permit cycle. However, it is likely that effluent nutrient limits will be imposed within the 20-year planning period of this facilities plan. Limits could be contained in the 2017 reissued permit and a three-year or longer compliance schedule may be included.

TP is a concern because of the impaired status of the East Branch of the DuPage River. Based on current IEPA thinking and experience from other states, an effluent limit of about 0.3 to 0.5 mg/L or less could be implemented in one of GWA's future permits.

The other major nutrient concern for discharges to the Mississippi River Basin is hypoxia in the Gulf of Mexico related to TN loadings. The WWTP is within the Mississippi-Atchafalaya River Basin. Hypoxic zones are low in DO and are incapable of supporting desirable natural marine life. Fish and other mobile aquatic species are forced to migrate from hypoxic areas, and less mobile species may experience considerable die-off. Based on TN effluent goals that are already in place for several Illinois WWTPs, a TN effluent limit of 10 mg/L or less could be implemented at GWA.

Section 6 includes a discussion of the activated sludge alternatives to meet a future effluent TP and TN limits of 0.5 mg/L and 10 mg/L, respectively. However, it should be noted there are uncertainties surrounding the timing of future nutrient limits, as well as the magnitude of any future limits. For all process alternatives evaluated, the impacts required to construct future nutrient removal facilities and operations will be carefully considered and flexibility for physical adaptation will be included.

H. Future Ammonia Limits

The USEPA has proposed more stringent draft ammonia water quality criteria because of toxicity to sensitive fresh water mussel and snail species in the Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia–Freshwater report. This includes both acute and chronic criteria, affecting maximum day, weekly average, and monthly average limits. These revisions may result in more stringent ammonia limits for GWA within the 20-year planning period. More stringent ammonia limits could be contained in the 2017 reissued permit and a three-year or longer compliance schedule may be included.

Strand contacted IEPA for GWA's estimated limits based on the proposed USEPA ammonia criteria. The estimated limits, Table 5.01-3, are based on sampling of the East Branch of the DuPage River at Route 34 Bridge monitoring station. This monitoring station is located approximately 4 miles downstream of the GWA WWTP outfall. Included in Appendix D is the IEPA ammonia worksheet. The effluent ammonia data from January 2009 through July 2012 are shown with the existing limits and estimated future limits for the daily maximum, weekly average, and 30-day average in Figures 5.01-3, 5.01-4, and 5.01-4, respectively. For this observed period, the WWTP was in a two-stage activated sludge operation.

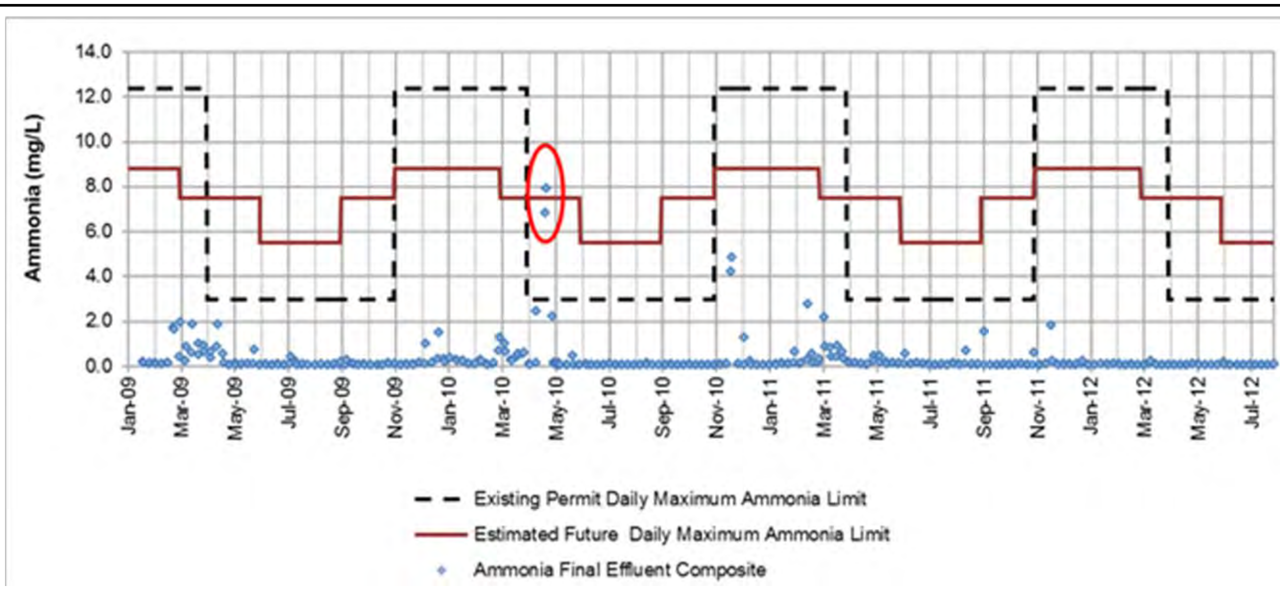
Based on the effluent data for this period, the month of March could be a concern for meeting the estimated future weekly average and 30-day average ammonia limits. It is recommended the WWTP employ operational strategies to meet the estimated ammonia limits over the next several years. Conversion to single-stage operation is unlikely to improve nitrification, and therefore, maintaining the flexibility to operate in two-stage is recommended. Additional activated sludge tankage and/or conversion to air activated sludge may be required if the WWTP cannot demonstrate meeting these estimated limits.

The pH and temperature have a significant effect on the ammonia limits. The background ammonia concentration has a negligible impact on the limits because the East Branch of the

DuPage River is effluent-dominated at this location. A sampling program measuring pH and temperature at a location closer to the outfall to determine limits rather than using the monitoring station data 4 miles downstream could be beneficial for GWA. IEPA was contacted regarding performing a sampling plan closer to the WWTP outfall. The representative from IEPA was unsure if a sampling plan would be allowed but said GWA could discuss with IEPA further. Scott Twait or Bob Mosher from IEPA, Division of Water Pollution Control, Water Quality Standards Section can be contacted at 217-558-2012

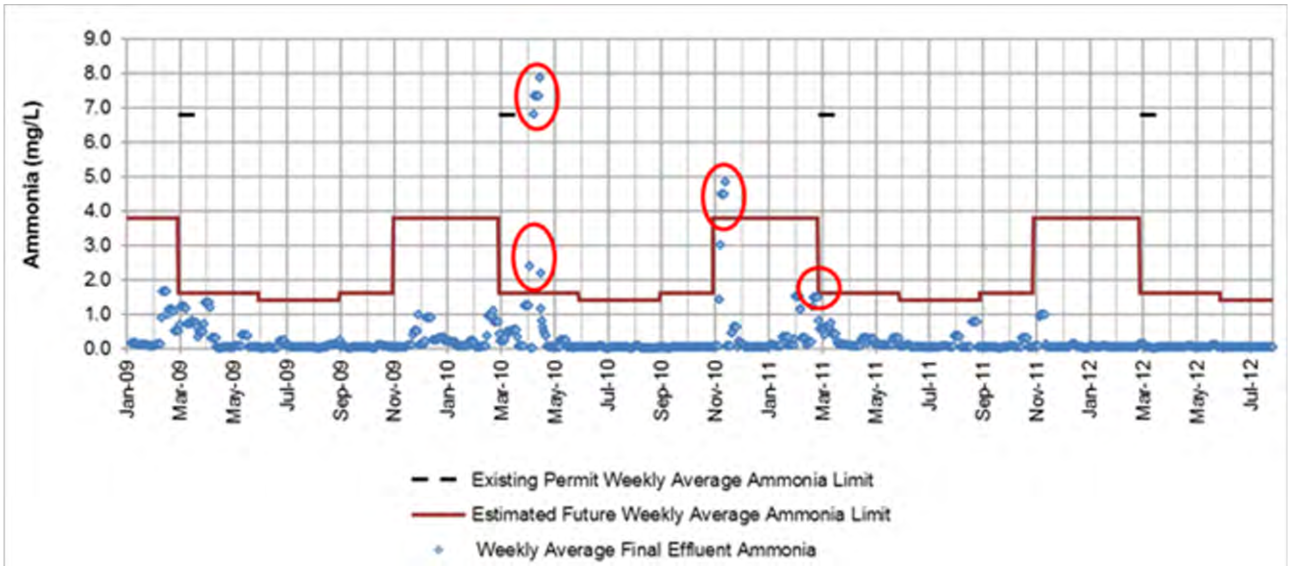
Month	Existing Permit Limits (mg/L) Daily Maximum	Existing Permit Limits (mg/L) Weekly Average	Existing Permit Limits (mg/L) 30-Day Maximum	Estimated Future Limits (mg/L) Daily Maximum	Estimated Future Limits (mg/L) Weekly Average	Estimated Future Limits (mg/L) 30-Day Maximum
January	12.4	-	4.0	8.8	3.5	1.4
February	12.4	-	4.0	8.8	3.5	1.4
March	12.4	6.8	2.7	7.5	1.6	0.6
April	3.0	-	1.5	7.5	1.6	0.6
May	3.0	-	1.5	7.5	1.6	0.6
June	3.0	-	1.5	5.6	1.3	0.5
July	3.0	-	1.5	5.6	1.3	0.5
August	3.0	-	1.5	5.6	1.3	0.5
September	3.0	-	1.5	7.5	1.6	0.6
October	3.0	-	1.5	7.5	1.6	0.6
November	12.4	-	4.0	8.8	3.5	1.4
December	12.4	-	4.0	8.8	3.5	1.4

Table 5.01-3 Existing Permit and Estimated Future Ammonia Limits



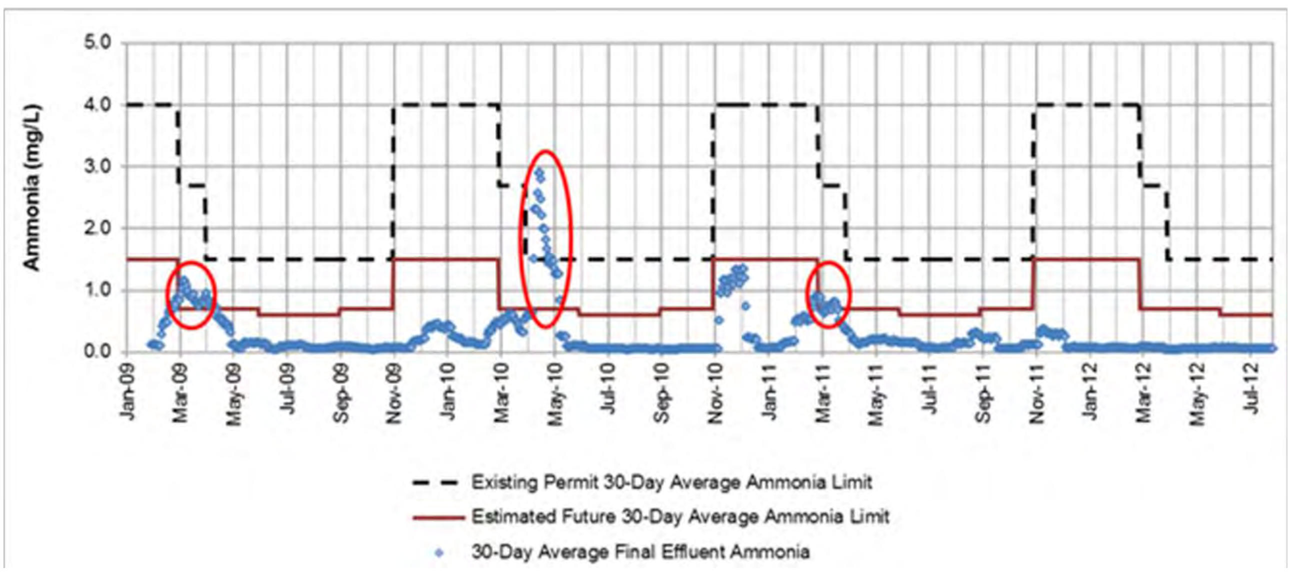
Note: A biological upset occurred in April 2010.

Figure 5.01-3 Daily Maximum Effluent Ammonia Limits



Note: A biological upset occurred in April 2010.

Figure 5.01-4 Weekly Average Effluent Ammonia Limits



Note: A biological upset occurred in April 2010.

Figure 5.01-5 30-Day Average Effluent Ammonia Limits

I. Biosolids Disposal and Beneficial Reuse

Stabilized biosolids from the GWA WWTP are considered Class B based on the fecal coliform level. The biosolids are currently dewatered and disposed on land application sites. Regulations for sludge application on agricultural land were enacted in August 2011 that limits stockpiling of sludge at the same site to 30 days. There are no current or anticipated regulatory initiatives that would restrict GWA's ability to continue beneficial reuse of biosolids generated at the WWTP.

Regional farmers have accepted Class B biosolids and the majority of municipal WWTPs in the area produce Class B. However, there is a trend in some parts of the country toward Class A biosolids production. Class A biosolids are produced through an approved method, such as lime stabilization or certain temperature phased anaerobic digestion systems, or produced using similar processes and verified by testing for pathogens. Fecal coliform levels must be less than 1,000 most probable number (MPN) per gram total solids. Producing Class A biosolids would provide the GWA with more options for distribution of biosolids (for example, marketing the biosolids for use on residential lawns and gardens) and lower reporting requirements. Since Class A is not required and is more costly than Class B, it does not need to be considered by GWA unless problems arise with the existing practices or the market conditions are more favorable for Class A.

J. Recreational Use Standards

Following several studies and a previous round of draft standards and public comments, the USEPA published draft recreational use criteria in January 2011 and public comments were due in February 2011. The USEPA is recommending that *Escherichia coli* (*E. coli*) or enterococci be used as indicator organisms in lieu of fecal coliform. If the standards are finalized by USEPA, Illinois will eventually adopt associated statewide standards. If *E. coli* is used, the standard would be on the order of 126 colony-forming units (cfu) per 100 milliliters (mL) as a geometric mean with a threshold value of 235 cfu/100 mL. The threshold value would need to be met 75 percent of the time. If the new standards are adopted in Illinois, the IEPA will begin replacing fecal coliform limits with the new limits when it reissues permits.

In general, WWTPs that currently meet their fecal coliform limits are expected to meet the new limits. However, a review of several WWTPs conducted by the Wisconsin Section Central States Water Environment Association in 2004 found that facilities using chlorine disinfection and the IDEXX method for *E. coli* analysis tended to have higher *E. coli*/fecal coliform ratios and could possibly have more problems showing compliance. This was thought to be because the IDEXX method may recover more chlorine-stressed *E. coli* organisms than other test methods. Facilities that used ultraviolet disinfection had lower *E. coli*/fecal coliform ratios in their effluents.

SECTION 6
EVALUATION OF EXISTING FACILITIES AND SCREENING ALTERNATIVES

This section evaluates the ability of the existing WWTP to treat the projected future flows and loadings (developed in Section 4) while meeting the anticipated future NPDES permit requirements presented in Section 5. Where applicable, treatment alternatives are identified for detailed evaluation and consideration in Section 7.

6.01 SUMMARY OF EXISTING FACILITIES AND PLANT NEEDS

Significant upgrades in capacity at the GWA WWTP are not anticipated to meet the future average and peak design flows and loadings to the plant. However, specific unit processes are in need of upgrading to maintain treatment efficiency and to better provide capacity. Each unit process is discussed below, and where upgrading is recommended, the alternatives that will be further considered in Section 7 are identified and discussed briefly.

A. Influent Screening

The influent screens and screenings handling facilities were installed in 2007 and are working well. No upgrades or modifications to these facilities are recommended except replacement of the screenings washer/compactor, which will be included as a common need.

B. Influent Pump Station

Based on the 2006 facilities planning report, the existing dry-pit influent pump station (IPS) has a firm capacity of about 45 mgd when the wet well is surcharged significantly. Based on observations by plant staff, however, the influent sewer surcharges at times, indicating that the influent flows to the station exceed 45 mgd. These pumps were installed in 1977 and rehabilitated in 2001, and therefore, replacement should be considered. In addition, the existing hydraulic controls for the influent gates and influent pump valves are obsolete, and maintenance of this system is difficult and expensive. The existing pumps are controlled from VFDs that were installed in 1993 and are reaching the end of their useful life. VFD replacement options will be considered, including creation of a dedicated conditioned space for the motor control equipment. In addition, the existing pumps and hydraulic system are not submersible and would be inoperable and could be damaged if the dry well flooded. Therefore, this facilities plan will evaluate the following alternatives for upgrading the station with new pumps to deliver 47 mgd of firm pumping capacity without wet well surcharging:

Alternative IPS-1: Install new dry-pit submersible pumps in the existing dry well. Provide new controls and electric actuators in lieu of the existing hydraulic actuators. Consideration will be given to including two smaller pumps with three large pumps to better match pump output with the range of flows.

Alternative IPS-2: Convert the IPS to a vortex-induced/prerotational pumping station. This option would retrofit the existing station to include three prerotational type pumps to utilize the three influent chambers existing at the pump station.

The influent pumping station will have a firm capacity of 47 mgd to match the existing design peak flow of the plant. It is noted that continuing I/I reduction within the customer communities was recommended in the 2006 Facilities Plan and continues to be recommended in this facilities plan.

C. Grit Removal

The vortex grit traps and associated grit washing equipment were installed in 2005 and are operating well. No upgrades or modifications to these facilities are recommended.

D. Primary Clarification

The primary clarifier mechanisms were replaced within the last 10 years and generally perform well. Primary clarifier treatment efficiencies are higher than typical for municipal treatment plants, which is likely the result of higher sludge pumping rate. Primary sludge is pumped with progressive cavity pumps at a continuous rate of about 360 gallons per minute (gpm) to the gravity thickener for cothickening primary sludge and WAS. This high rate of primary sludge pumping is conducted to reduce the sludge blanket and sludge thickness, which has created high primary sludge pump discharge pressures and significant maintenance requirements associated with rotor/stator wear as a result of these high pressures. This high rate of pumping also reduces/eliminates the need for “freshening” water being added to the sludge thickener. Potential modifications to the primary sludge handling facilities are discussed in the Sludge Thickening section below.

E. Activated Sludge Treatment

The activated sludge facilities discussed herein include the carbonaceous BOD aeration basins (carbo tanks), the intermediate clarifiers, the intermediate/return activated sludge (RAS) pumping station, the nitrogenous BOD removal basins (nitro tanks), and the final clarifiers. WAS pumping from the intermediate and final clarifiers is discussed in the Sludge Thickening section below.

These facilities have adequate capacity to meet the future design loadings to the plant; however, the following drivers warrant consideration of process variations:

1. The existing two-stage system is complex and equipment intensive, which requires more maintenance and operator attention.

2. Future phosphorus and nitrogen limits will likely require significant modifications to the existing facilities. HPOAS systems are not traditionally used for biological nutrient removal (BNR) because of the high-rate conditions requiring high dissolved oxygen concentrations. BNR applications require anaerobic and anoxic zones within the activated sludge basins, which can be challenging to attain. In addition, because the GWA cryogenic oxygen generation plant cannot be turned down adequately, the GWA activated sludge DO levels are very high.

It is noted that nutrient limits are not currently in place and may not be implemented for several years. In addition, the specific nutrient limits are not known at this time. Therefore, this report does not recommend a specific activated sludge alternative, but rather demonstrates the feasibility of each alternative to meet the anticipated future effluent nutrient limits. For the purpose of this facilities plan, we have assumed future effluent phosphorus and TN limits of 0.5 and 10 mg/L, respectively.

The following activated sludge (AS) alternatives are investigated:

Alternative AS-1: Continue two-stage HPOAS operations. This option would include improvements to the intermediate clarifiers and related sludge removal system as well as an upgrade to the intermediate pumping/RAS pumping station. Cryogenic oxygen generation would continue.

Alternative AS-2: Convert to single-stage HPOAS, including discontinuing the use of the intermediate clarifiers. The intermediate/Nitro RAS pumping station would be modified to pump RAS only, although under this scenario the capacity of the station could provided for forward flow as well in the event that that plant converted back to two-stage HPOAS. Cryogenic oxygen generation would continue.

Alternative AS-3: Convert to single-stage air activated sludge. New aeration blowers and diffusion equipment would be provided and an expansion of the aeration basins would also be needed.

Alternative AS-4: Convert to single-stage integrated fixed film activated sludge (IFAS) or moving bed bioreactor (MBBR) activated sludge to reduce the aeration basin volume associated with air activated sludge. New aeration blowers and diffusion equipment would be provided, and an expansion of the aeration basins may also be needed.

The following activated sludge alternative will be investigated as an add-on technology and is not an independent alternative:

Bioaugmentation: Incorporate side stream in-situ bioaugmentation to provide a more stable nitrifying system for the activated sludge alternatives (AS-2 through AS-4). This would include construction of new aeration basin (or repurposing of an existing basin) to treat the dewatering return flows, which are very high in ammonia and contribute significant ammonia loadings to the WWTP. This return flow would be treated in a new or reconfigured basin and some RAS would be added to this basin. Because of the very high ammonia concentrations, the bacterial populations that grow are high in nitrifiers, which augment the forward flow treatment with improved nitrifier concentrations and would make the process more stable at the lower solids retention time (SRT) available within the existing activated sludge basins. Several variations of this process exist and have been successfully demonstrated, including denitrification systems before discharging back to the forward flow.

F. Anaerobic Digestion

The anaerobic digestion facilities were upgraded with a third digester in 2007. The digestion capacity is adequate for the future design loadings, and upgrades are not anticipated in the near future. However, related considerations are evaluated herein and include biogas storage to improve overall biogas use, codigestion of high-strength wastes (HSW) including a HSW receiving and storage station, and potential biogas cogeneration facilities to generate electricity and heat from biogas. These evaluations are discussed under the Cogeneration and High-Strength Waste Codigestion section presented below.

G. Digested Biosolids Dewatering

Digested biosolids are dewatered on two BFPs before on-site storage in an uncovered storage area. The BFPs were installed in 1991 and will be in need of replacement within the 20-year planning period evaluated herein. Numerous technologies exist that could be used at the plant including BFPs, centrifuges, screw presses, rotary fan presses, and a new technology termed the Dehydris™ Twist dewatering system. Screw presses and rotary fan presses are normally used at smaller WWTPs because of their limited throughput capacity and will not be further evaluated. The Dehydris™ Twist system has no installations in the United States at municipal WWTPs, and based on our initial evaluations at other facilities, the capital cost is significantly higher than competing technologies. The process produces a drier cake than either BFPs or centrifuges, however, resulting in lower disposal costs for trucking. Pilot testing of this technology should be considered if GWA would like to consider it further. For the purposes of this planning, the following biosolids dewatering (BD) alternatives will be considered:

Alternative BD-1: Install new BFPs within the existing solids building.

Alternative BD-2: Install one new centrifuge within the existing solids building and use one existing BFP as a backup.

H. Cogeneration and High-Strength Waste Codigestion

The plant has had natural gas cogeneration facilities using three 800-kilowatt (kW) internal combustion gas engines installed in the 1980s, and these engines also provide backup power to the plant. These engines are rarely used. GWA currently has a very low electrical rate [less than $0.04/per kilowatt hours (kWH)] locked in for the short term, and natural gas prices are also very low currently. Therefore, the current economic drivers for cogeneration are not significant. However, GWA is interested in receiving HSW and injecting these directly into the anaerobic digesters (termed codigestion). The benefits of codigestion include:

1. GWA would receive tipping fees for the HSW, which are normally in the range of $0.01 to $0.10 per gallon.

2. Codigestion has been shown to improve volatile solids (VS) destruction of municipal sludge in many circumstances.

3. The additional biogas provides additional renewable fuel for potential cogeneration.

4. If the customer communities bring their fat, oils, and grease (FOG) wastes to the HSW receiving station, there is a dual benefit of reducing grease loads to the collection system and codigestion of FOG wastes in the digesters.

Therefore, the following cogeneration and codigestion (CC) combinations of alternatives will be evaluated:

Alternative CC-1a: Convert one or more of the existing natural gas engines to use biogas for electricity production and heat recovery. Digest municipal sludge only (no codigestion).

Alternative CC-1b: Convert one or more of the existing natural gas engines to use biogas for electricity production and heat recovery. Construct HSW receiving station for codigestion up to the loading limit of the existing digestion facilities.

Alternative CC-2a: Install new internal combustion engines to use biogas for electricity production and heat recovery. Digest municipal sludge only (no codigestion).

Alternative CC-2b: Install new internal combustion engines to use biogas for electricity production and heat recovery. Construct HSW receiving station for codigestion up to the loading limit of the existing digestion facilities.

Note that for Alternatives CC-1b and 2b, which include codigestion of HSW, an alternate access road to the plant would be beneficial to limit truck traffic down Bemis Road. This access road is being evaluated by a third party firm, and the costs of the access road will not be considered in this analysis since the access road is desired regardless of whether HSW codigestion occurs.

6.02 COMMON WWTP NEEDS

Performance and upgrade requirements of certain processes and facilities at the treatment facility are independent of the alternatives previously discussed. These elements require replacement or modification regardless of the treatment alternatives selected. These project elements are identified below and evaluated in Section 7.

A. LCSTF Equipment Upgrades

The LCSTF mechanical screen, grit collectors, and clarifier mechanisms are original equipment to the 1982 construction and are beyond their expected service life.

B. Hauled Wastes Receiving Facilities

GWA would like to have the ability to receive septage, FOG, landfill leachate, and materials (hereinafter collectively referred to as “hauled wastes”) at the plant. Such facilities would allow GWA to provide a needed service in the area as well as to generate additional revenue from tipping fees. Hauled waste receiving facilities could use a portion of the ATAD tanks, and for the purpose of this planning effort, we have assumed that such facilities may be installed in a phased approach, which could be expanded and improved over time if the need or demand dictates. A plan for installing these facilities is included in Section 7.

C. Screenings Washer and Compactor

As discussed previously, replacement of the screening washer and compactor is included in the plan.

D. Peak Flow Storage

As noted previously, the influent flows to the IPS, along with the high recycle flows from the existing deep bed filters, exceed the existing capacity of the IPS. The two lagoons located immediately east of the WWTP could be cleaned and converted to raw wastewater storage lagoons. These lagoons would serve to store wastewater temporarily until influent flows decrease, and would then be drained back to the plant for full treatment.

This analysis is reserved for a future planning study for the following reasons. First, replacing the effluent filters with a new style filter should reduce the amount of recycle flow by more than 90 percent, which will increase the actual forward flow pumping of influent wastewater by this same amount and should reduce surcharging in the collection system. Second, a noted previously, reduction of I/I from the collection systems within the customer communities will reduce peak flows to the plant.

D. Chemical Phosphorus Removal

The ability of the GWA WWTP to meet future phosphorus limits will be discussed in the activated sludge alternatives analysis. Additionally, the potential for BPR is evaluated and discussed in the activated sludge alternative analysis. If all the activated sludge alternative are expected to have identical CPR demand, CPR will be included as a common need.

E. Effluent Filtration

The deep bed effluent filters are in need of hydraulic improvements. The ten filters do not receive equal flow distribution and have become maintenance intensive. In addition, during wet weather flows, the recycle flows from the filters to the IPS are typically more than 10 mgd, which significantly reduces the forward flow capacity of the IPS. This style of filter is still commonly used at municipal WWTPs; however, newer technology has become more favored because of reduce space requirements, simpler maintenance, and improved performance. This plan develops the costs to replace the existing deep bed filters with disc filters. Multiple alternatives are available and will be considered in the analyses.

F. Disinfection

The existing UV disinfection equipment was installed in 1995. The manufacturer went out of business soon thereafter, which has made purchasing replacement parts for the equipment both expensive and difficult. The existing equipment is nearing 20 years in service, which is beyond the normal life of such equipment. In addition, newer UV equipment is more energy-efficient, uses fewer UV lamps, and has longer lamps life. Horizontal, vertical, and inclined UV systems will be considered.

G. Sludge Thickening

Currently, primary sludge, carbo WAS, and nitro WAS are cothickened in the single gravity thickener, and thickened sludge is pumped from the gravity thickener to the anaerobic digesters. The sludge withdrawal line from the gravity thickener is long and includes numerous bends, elbows, and tees. Because of this, the solids concentration of the thickener underflow needs to be managed to maintain a lower-than-desired thickness. When the thickened sludge becomes too thick, the sludge is difficult to remove. The maximum thickened sludge concentration that can effectively be managed is not known at this time. However, the plant is in the process of installing a solids density meter to monitor solids underflow concentrations and automate the thickened sludge removal operations.

In addition to the gravity thickener, a gravity belt thickener (GBT) was added to the plant within the last 10 years, but this equipment has never been used for WAS thickening following startup. According to plant staff, significant odors were created in the GBT room during thickening. The odors were likely caused by septic sludge resulting from the cothickening of primary sludge and WAS in the gravity thickener upstream of the GBT. Normally, WAS storage includes aeration facilities to avoid potential odor issues from WAS thickening on GBTs.

The thickness of the feed sludge to the anaerobic digesters is an important parameter in the overall operations of the plant. The solids concentration dictates the volume of sludge pumped to the digesters, the energy required to heat the sludge, and the hydraulic retention time (HRT) within the digesters. Feeding the digesters with thicker sludge reduces the energy required and increases the digestion performance because of longer HRTs in the digesters. Therefore, for the purpose of this analysis, the feed sludge to the digesters is desired to have a solids concentration of 3.5 percent, minimum, although 5.0 percent is preferred.

The plant would like to continue cothickening primary sludge and WAS in the gravity thickener prior to digestion, as this provides a cost-effective and simple method of sludge thickening when it is working correctly. Therefore, the sludge thickening analyses included in Section 7 develops an approach to improve the thickening operations in a step-wise manner.

H. Liquid Biosolids Storage

The plant currently dewaters digested biosolids by pumping directly from Digester No. 3 to the belt filter presses. Digester No. 3 does not have a large liquid level operating range, which requires more frequent dewatering than would otherwise be necessary. One option to improve the flexibility of the dewatering and digestion operations is to add liquid biosolids storage downstream of the digesters and upstream of the dewatering operations. An obvious liquid biosolids storage tank is the filter backwash storage tank located adjacent to the existing tertiary filter building. The filter backwash storage tank is not is not in regular service, so this tank is available. Section 7 explores this option in more detail.

I. Dewatered Biosolids Storage

The current operations include on-site biosolids cake storage to truck trailers for hauling to land application sites. Long-term storage is provided by storing the cake on two open concrete pads at the plant site. This facilities plan includes a covered cake storage area on the existing pad area to reduce issues related to rewetting of dewater solids during storage.

J. Plant Utilities

Plant staff have noted deficiencies in the existing nonpotable water systems and natural gas system at the GWA WWTP. Allowances are included in the capital budgets developed in Section 7 to improve the capacity of these systems.

K. HVAC System Replacement

Several buildings have aging HVAC equipment that is need of replacement. Costs for this equipment replacement are included in the capital plan.

L. Electrical Service, Backup, and Redundancy

The electrical power distribution system is served from a single connection to the local electric utility's distribution system. In the event of loss of utility supply, three on-site 800 kW natural gas generators can produce ample power to serve the facility. The facility has two medium voltage underground distribution circuits, and either circuit can be used to serve all critical plant loads–from the utility or from the generators. However, the two underground circuits share common duct banks and common manholes. Thus, a single event could cause failure of both underground circuits. Alternatives to mitigate these single points of failure will be considered in the analyses.

While all the critical plant loads are connected to both medium voltage underground distribution circuits, the Main Cryogenic Compressor and the Administration Building do not have redundant step-down transformers. Thus, a single failure of the step-down transformer to these loads will result in loss of critical power. Alternatives for a redundant transformer or back-up 480 V supply to these two critical loads will be addressed in the analyses.

A previous power system study has identified that the protective devices in the supply to the Sludge Dewatering Building and the Digester Building are not appropriately rated to interrupt a worst-case short-circuit event. Appropriate equipment replacement will be addressed in the analyses.

As part of the facility's existing maintenance and testing plan, plant staff periodically performs cable testing on the distribution network. The cables being tested must be isolated from the system prior to testing, and the act of cable disconnection (determination) is very time-consuming. Plant staff have expressed an interest in adding disconnect switches to specific circuits to reduce man-hours required to perform the cable testing. Alternatives for more efficient cable testing will be developed in the analyses.

M. Remote Site Communication

Rates have increased for the leased lines used to communicate with remote sites in the collection system. This plan evaluates other options for remote site communication.

N. Site Lighting

The site lighting is aging and appear to be corroding. Replacement of the site lighting is included in the capital plan.

O. Motor Control Center (MCC) Replacement

Several MCCs are original equipment and their replacement is including in this plan.

P. Programmable Logic Controller (PLC) Replacement

Several PLCs are original equipment and their replacement is included in this plan.

Q. Electronic O&M Manual

The development of an O&M manual with reference information for processes, equipment, operations, controls, and maintenance is included in the plan.

SECTION 7
WASTEWATER TREATMENT ALTERNATIVES EVALUATIONS

This section presents the analyses of alternatives identified in Section 6 as well as the other recommended common project elements discussed in Section 6.

7.01 INTRODUCTION

The design flows and loadings that provide the basis for the alternative analysis presented in this section were developed in Section 4. Section 5 presents a summary of anticipated regulatory initiatives that may impact GWA's NPDES permit. Section 6 described the deficiencies of the existing WWTP to meet the future design conditions and anticipated NPDES permit limits and identified treatment alternatives recommended for evaluation. This section evaluates the treatment alternatives identified in Section 6 on the basis of capital costs, annual O&M costs, 20-year present worth costs, nonmonetary issues, and environmental issues. These alternative technology evaluations include the following:

1. Influent Pump Station
2. Activated Sludge Treatment
3. Digested Biosolids Dewatering
4. Cogeneration and High-Strength Waste Codigestion

In addition to these alternative analyses, this section also reviews other recommended improvements at the WWTP. These project elements are developed and described based on the technology selections of the major alternative analyses presented above. These additional project elements include:

1. LCSTF Equipment Upgrades
2. Hauled Wastes Receiving
3. Screenings Washer and Compactor
4. Peak Flow Storage
5. Chemical Phosphorus Removal
6. Effluent Filtration
7. Disinfection
8. Sludge Thickening
9. Liquid Biosolids Storage
10. Dewatered Biosolids Storage
11. Plant Utilities
12. HVAC Replacement
13. Electrical Service, Backup, and Redundancy
14. Remote Site Communication
15. Site Lighting
16. Motor Control Center (MCC) Replacement
17. Programmable Logic Controller (PLC) Replacements
18. Electronic O&M Manual

7.02 INFLUENT PUMP STATION ALTERNATIVES ANALYSIS

A. Description of Alternatives

Two alternatives were analyzed for replacement of the existing influent pumps.

Alternative IPS-1: Install three new dry-pit submersible pumps in the existing dry well.

Alternative IPS-2: Modify existing wet well for prerotational suction intake, and provide four new dry-pit centrifugal pumps.

For both alternatives, the existing hydraulically operated wet well slide gates and influent pump plug valves will be replaced and provided with electric actuators and controls. Pump sizing is based on a peak flow of 47 mgd of firm pumping capacity without wet well surcharging.

Alternative IPS-1–This alternative includes the use of submersible dry pit pumps for dry well flood protection. This option is the most similar to the existing option with three identically sized pumps. The electrical cost difference of this alternative to a four-pump arrangement or a five pumps arrangement (three larger sized pumps and two smaller sized pumps) could be evaluated during design. At the current electrical rate of $0.04/kWh, however, a small pump arrangement is not considered to be cost effective. The following elements are included:

1. Replace existing pumps with three submersible dry-pit pumps and install new piping as necessary. Each pump would have a capacity of 23.5 mgd to provide 47 mgd of firm capacity.
2. Replace existing VFDs, MCCs, and PLCs.
3. Construct a new dedicated conditioned space for the motor control equipment on the first floor of the existing influent pump station.
4. Replace existing hydraulically operated plug valves with electrically operated actuators and controls. Temporary bypass pumping is assumed to be required for replacement of the pump discharge valves.
5. Replace sluice gate hydraulic operators with electric operators (7 total).

Alternative IPS-2–The prerotation basin required for this alternative is the main difference between Alternative IPS-1 and Alternative IPS-2. Prerotation allows the pump to operate at lower flows without the need for a VFD. VFDs are included in this alternative, however, to provide flow control. The prerotation also assists in wet well cleaning because of its low wet well level drawdown capability. Oil-cooled immersible pump motors that can operate in dry and submerged conditions for flood protection are recommended for these pumps. However, the manufacturer has indicated immersible motors are not available to handle the design flows with only three pumps. For this reason, this alternative assumes an arrangement with four pumps and the suction piping of the four pumps manifolded to the three wet wells (Figure 7.02-1). The following elements are included:

1. Replace existing pumps with four dry-pit pumps and install new piping as necessary. These dry-pit pumps would have immersible motors. Each pump would have a capacity of approximately 15.7 mgd to provide 47 mgd of firm capacity.
2. Install prerotation basins in each of the three existing wet wells. The wet well floor will have approximately one foot of concrete placed on top of the existing elevation to provide the prerotation basin low point at the suction bell. Raising the floor elevation also requires the wet well sluice gates and wall openings to be raised.

3. Replace existing VFDs, MCCs, and PLCs.

4. Construct a new dedicated conditioned space for the motor control equipment on the first floor of the existing influent pump station.

5. Remove existing hydraulically operated plug valves. All new valves will have electric operators.

6. Replace sluice gate hydraulic operators with electric operators (7 total). Modify stems for raising the wet well gate elevations for the prerotation basins. Temporary bypass pumping is required for this work.

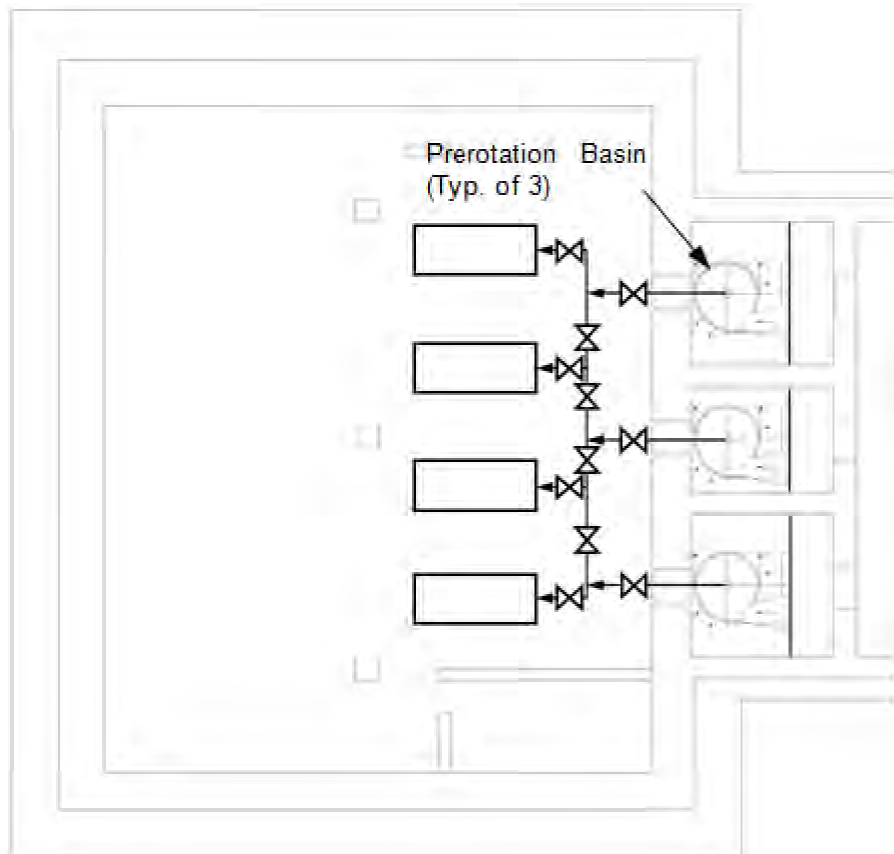


Figure 7.02-1 Preliminary Influent Pump Station Layout Alternative IPS-2 Prerotation Basins and Pumps

B. <u>Monetary Comparisons</u>

Monetary comparisons include capital costs for equipment and structures and operation and maintenance costs for labor, power, and maintenance. Labor costs are assumed at $40 an hour and are evaluated as a comparison between the alternatives of the expected level of efforts. Power costs are assumed at $0.04 per kilowatt-hour.

	Alternative	
	IPS-1 Submersible	IPS-2 Prerotation
Opinion of Capital Costs	**$ 3,602,000**	**$ 4,115,000**
Annual O&M Costs		
Relative Labor[1]	$ 3,000	$ -
Maintenance	$ 21,000	$ 23,000
Power	$ 77,000	$ 74,000
Subtotal Opinion of Annual O&M[2]		
Present Worth of O&M	$ 1,158,000	$ 1,113,000
Present Worth of Future Equipment	$ -	$ -
Present Worth of Salvage	$ (16,000)	$ (34,000)
TOTAL OPINION OF PRESENT WORTH[2]	**$ 4,744,000**	**$ 5,194,000**
Percent of Lowest (Present Worth Basis)	**100%**	**109%**

[1] Estimated relative labor cost for wet well cleaning.
[2] Project life = 20 years; discount rate = 6 percent.
[3] Refer to Appendix E for further opinion of cost details.

Table 7.02-1 Influent Pumping Station Opinion of Present Worth Summary[3]

The total present worth values between the alternatives are within 10 percent of each other, so these alternatives are considered equal on a cost basis.

C. Nonmonetary Considerations

Alternatives IPS-1 and IPS-2 were evaluated with respect to these criteria. A subjective numerical value was assigned for each category for comparison of the alternatives. Table 7.02-2 presents a summary of nonmonetary factors and scores for the treatment alternatives. A score of +1 is a positive nonmonetary consideration, a score of 0 is a neutral consideration, and a score of -1 is a negative consideration.

	Alternative	
Nonmonetary Evaluation Factor	**Submersible IPS-1**	**Prerotation IPS-2**
Reliability	+1	+1
Ease of Operation/Complexity	0	0
Ease of Maintenance	+1	+1
Ease of Construction	+1	-1
Interceptor Capacity	0	+1
First Flush Interceptor Cleaning	0	+1
Wet Well Cleaning	-1	+1
Total Nonmonetary Score	2	4

Table 7.02-2 Nonmonetary Evaluations of Influent Pump Station Alternatives

The following nonmonetary factors were evaluated for the influent pump station alternatives.

- Reliability
- Ease of Operation/Complexity
- Ease of Maintenance
- Ease of Construction
- Interceptor Capacity
- First Flush Interceptor Cleaning
- Wet Well Cleaning

Reliability–Both of these alternatives include pumps that are common for WWTPs and are considered equally reliable.

Ease of Operation/Complexity–Operational ease relates to the level of effort required for the system to function as intended. Alternative IPS-1 is the most similar to the existing operation, so a neutral score is provided.

Ease of Maintenance–The prerotation basin of Alternative IPS-2 does not provide an additional maintenance burden. The pump maintenance for the alternatives are considered equal.

Ease of Construction–Installation of the prerotation basins and raising the wet well sluice gates will require a longer bypass pumping duration for Alternative IPS-2 compared to Alternative IPS-1.

Interceptor Capacity–During wet weather events, the interceptors are frequently surcharged. Previous planning recommended maintaining a wet well level below the North Regional Interceptor invert elevation. Alternative IPS-2, because of the prerotation, could provide a lower operating wet well level. For this reason, Alternative IPS-2 is provided a positive score.

First Flush Interceptor Cleaning–The low wet well operating level of Alternative IPS-2 also allows for the ability for interceptor cleaning which could reduce first flush solids during wet weather events.

Wet Well Cleaning–The prerotation basin of Alternative IPS-2 could draw down the wet well to a few inches and allows for better wet well cleaning performance than Alternative IPS-1.

D. Recommended Alternative

On a monetary basis, the two alternatives are considered equal. Alternative IPS-2, with the prerotation basins, is the recommended alternative because of the nonmonetary factors including potentially increased interceptor capacity, interceptor cleaning, and wet well cleaning.

7.03 ACTIVATED SLUDGE ALTERNATIVES ANALYSIS

The GWA WWTP activated sludge facilities were discussed in Section 3. Since the summer of 2012, GWA has operated the activated sludge facilities in a single-stage operation rather than a two-stage process. Modifications are underway that will allow the two carbo trains to operate in the single-stage activated sludge mode with the eight nitro trains.

Currently, oxygen is provided by an on-site cryogenic plant. Replacement of the cryogenic plant with leased on-site vacuum swing adsorption (VSA) equipment was reviewed. The VSA equipment would be owned, operated, and installed by the oxygen supplier. Leasing costs for the VSA exceed the current operating and maintenance costs of the cryogenic plant, so the VSA was not evaluated further in this facilities plan. Another option for consideration is for hauled liquid oxygen to be supplied, which at current prices of approximately $75/ton of oxygen, would have an annual cost less than the VSA on-site oxygen generation plant lease. These alternatives should be evaluated in more detail when the cryogenic plant is required to be replaced.

A. Description of Alternatives

Four activated sludge alternatives will be reviewed in this analysis:

Alternative AS-1: Two-Stage HPOAS and continued cryogenic oxygen generation.

Alternative AS-2: Single-stage HPOAS and continued cryogenic oxygen generation.

Alternative AS-3: Single-stage air activated sludge and new aeration blowers.

Alternative AS-4: Single-stage IFAS and new aeration blowers.

A separate analysis for bioaugmentation as a side stream add-on process is also included.

Each of the alternatives assumes a design to meet a future phosphorus and TN limits of 0.5 mg/L and 10 mg/L, respectively. To meet the future TN limit, biological nitrogen removal is assumed. For phosphorus removal, CPR and BPR were considered.

BPR testing was conducted in November 2012 to evaluate the ability for GWA to achieve BPR, and the results are summarized in Figure 7.03-1. The BPR testing includes two samples; the first with the raw wastewater, and a second, control, sample that includes raw wastewater with sodium acetate addition. The sodium acetate in the second sample is a volatile fatty acid (VFA), which is required for biological phosphorus release. The difference in the phosphorus release between the wastewater sample including sodium acetate and the sample including only wastewater indicates insufficient VFAs are available for BPR at the time of the testing. Additional BPR testing is recommended to confirm these results are representative.

Fermentation of primary sludge could provide additional VFAs to improve BPR. Fermentation could be done in the existing primaries, existing sludge thickener, or a newly constructed fermenter tank. Odor control would be required for a fermentation tank because the of the adjacent residential areas. Because of the odor concerns and significant cost, fermentation is not included as a part of this plan.

Based on the BPR testing, CPR is assumed to be required for all the activated sludge alternatives. CPR improvements are included as a common project element in Section 7.06, because the chemical demand and capital costs are considered equal among the four activated sludge alternatives,

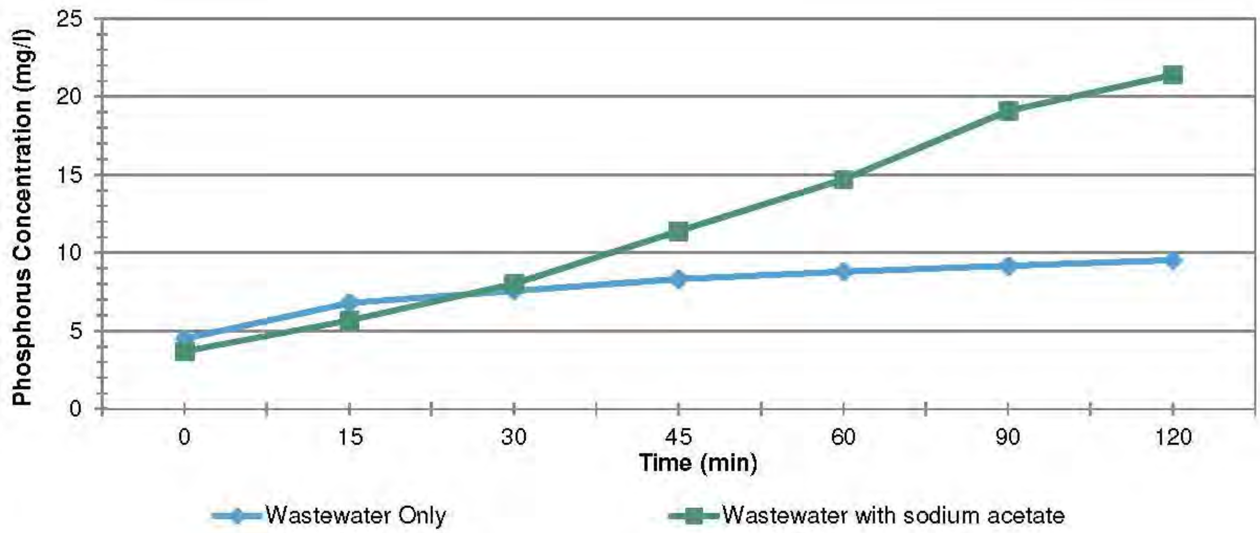


Figure 7.03-1 Phosphorus Release Comparison (November 2012)

Alternative AS-1–This alternative includes maintaining the existing system as two-stage HPOAS. Modifications to meet future limits are included in this alternative. The existing cryogenic system is assumed to be maintained by annual turnarounds and more extensive turnarounds every five years. The existing aerators are assumed to be maintained and replaced as necessary with the annual operations budget. The following elements are included in this alternative:

1. Reconfigure the eight nitrogenous trains to provide anoxic zones with new mixers. Primary effluent would be fed to the nitrogenous train to provide supplemental BOD for denitrification reactions. Large scale pilot testing is recommended.

2. Install nitrate recycle station, pumps, and recycle piping, for the eight nitrogenous trains.

3. Modify the first stage deck (anoxic zone) and the final nitrification stage deck in each of the eight nitrogenous trains. The final stage would be modified for stripping dissolved carbon dioxide, which will increase the pH and could promote an increased nitrifier growth rate. Modifications would include the addition of a vent to open the stage to the atmosphere, mechanical modifications to the air monitoring system, oxygen supply piping modifications, and the addition of piping and an isolation valve to shut off oxygen migration.

4. Install new weirs and troughs in the intermediate clarifiers.

5. Apply tank lining system to interior of intermediate clarifiers.

6. Sandblast and paint intermediate clarifier equipment. Replacement of the intermediate clarifiers mechanisms is assumed to be required in approximately 10 years.

7. Replace carbo RAS pumps and WAS pumps in the Pump and Electrical Building, also known as Building T.

8. Modify sludge piping from the intermediate clarifier to the carbo RAS pumps and remove t-valves for improved solids handling.

9. Replace Intermediate Pump Station pumps. Two options, (1) in-kind screw pumps and (2) conversion to a prerotation type submersible pump station, were recommended in the previous 2012 Intermediate Pump Station Alternatives Evaluation report by Strand to replace the existing intermediate pump station pumps. Both of these options had comparable opinions of capital costs.

10. Provide structural and electrical improvements to the Intermediate Pump Station.

11. Replace Cryo Building MCCs, PLCs, and UNOX system controls.

Alternative AS-2–This alternative includes operating the existing system as single-stage HPOAS. Modifications to meet future limits are included in this alternative. The following elements are included:

1. Reconfigure all 10 trains to provide anoxic zones including new anoxic mixers. Large scale pilot testing is recommended.

2. Install nitrate recycle station, pumps, and recycle piping for the 10 trains.

3. Modify the first stage deck (anoxic zone) and the final nitrification stage deck in each train. The final stage would be modified for stripping dissolved carbon dioxide, which will increase the pH and could promote an increased nitrifier growth rate. Modifications would include the addition of a vent to open the stage to the atmosphere, mechanical modifications to the air monitoring system, oxygen supply piping modifications, and the addition of piping and an isolation valve to shut off oxygen migration.

4. Decommission intermediate clarifiers.

5. Remove carbo RAS pumps and carbo WAS pumps. This portion of the Pump and Electrical Building could be repurposed (see cogeneration and high-strength waste alternatives discussed in this section).

6. Replace Intermediate Pump Station pumps to serve as the RAS pump station. With this alternative, this station would only pump RAS flow, so the pumping capacity could be reduced from the existing two-stage operation. For planning purposes, however, the station is assumed to provide capacity for forward flow as well in the event that the activated sludge process is converted back to two-stage HPOAS.

7. Provide structural and electrical improvements to the Intermediate Pump Station.

8. Replace Cryo Building MCCs, PLCs and UNOX system controls.

Alternative AS-3–This alternative represents a significant change from the HPO system to a more conventional air activated sludge system. The average design BOD_5 loading rates of approximately 23 lbs BOD/1,000 ft^3/day were used to develop the required additional aeration basin volumes. The following elements are included:

1. Construct a 2.8-million-gallon aeration basin addition. The addition would extend 110 feet to the east from the existing tanks and would maintain the existing 15.25-foot side water depth (SWD). Replace effluent mixed liquor piping to accommodate the new tanks. Temporary piping and pumping of mixed liquor are required for a portion of this work. Underground electrical feed lines will also need to be rerouted for the new tank construction.

2. Reconfigure the existing first two stages in each train to anoxic zones including new anoxic mixers. Large scale pilot testing is recommended.

3. Install nitrate recycle station, pumps, and recycle piping for the 10 trains.

4. Install new fine bubble membrane diffusers and DO probes for automated DO control in the existing and new aeration basins including new air piping.

5. Construct a new Blower Building near the Pump and Electrical Building and install five high speed turbo blowers.

6. Replace intermediate pump station pumps to serve as the RAS pump station. Three pumps with 8 mgd capacity each are assumed for capacity to pump RAS only.

7. Demolish intermediate clarifiers to accommodate the new aeration basins.

8. Remove carbo RAS and carbo WAS pumps.

9. Demolish the cryogenic system. The Cryo Building can be repurposed.

10. Demolish concrete deck, surface aerators, oxygen piping, controls, and ancillary oxygen equipment.

Alternative AS-4–This alternative is similar to Alternative AS-3 (conversion to air activated sludge) except that IFAS is used to reduce the volume of aeration required. The following elements are included.

1. Construct a 1.3-million-gallon aeration basin addition. The addition would extend 52 feet to the east from the existing tanks and would maintain the existing 15.25-foot SWD. Replace effluent mixed liquor piping to accommodate the new tanks. Temporary piping and pumping of mixed liquor are required for a portion of this work. Underground electrical feed lines will also need to be rerouted for the new tank construction.

2. Reconfigure the first two existing stages in each train to anoxic zones including new anoxic mixers.

3. Install nitrate recycle station, pumps, and recycle piping for the 10 trains.

4. Install new medium bubble membrane diffusers in the existing and new aeration basins including new air piping.

5. Install screens for IFAS system in existing and new aeration basins.

6. Construct a new Blower Building near the Pump and Electrical Building and install five high speed turbo blowers

7. Replace intermediate pump station pumps to serve as the RAS pump station. As with Alternative AS-3, three pumps with 8 mgd capacity each are assumed.

8. Demolish the intermediate clarifiers for the aeration basin addition

9. Remove carbo RAS and carbo WAS pumps.

10. Demolish the cryo system. The Cryo Building can be repurposed.

11. Demolish concrete deck, surface aerators, oxygen piping, controls, and ancillary oxygen equipment.

B. Monetary Comparisons

The total present worth of the activated sludge alternatives is presented in Table 7.03-1. The opinions of probable capital costs for Alternatives AS-1 and AS-2 are significantly less than the capital costs of Alternative AS-3 and Alternative AS-4. Alternatives AS-2, single stage HPOAS, is the lowest total present worth costs.

	Alternative			
	AS-1 Two Stage HPOAS	AS-2 Single Stage HPOAS	AS-3 Air Activated Sludge	AS-4 IFAS
Opinion of Capital Costs	**$ 4,653,000**	**$ 3,582,000**	**$ 17,451,000**	**$ 24,303,000**
Annual O&M Costs				
Relative Labor	$ 63,000	$ 62,000	$ 41,000	$ 36,000
Maintenance	$ 171,000	$ 164,000	$ 58,000	$ 108,000
Power	$ 312,000	$ 284,000	$ 207,000	$ 285,000
Subtotal Opinion of Annual O&M[1]	$ 546,000	$ 510,000	$ 306,000	$ 429,000
Present Worth of O&M	$ 6,263,000	$ 5,850,000	$ 3,510,000	$ 4,921,000
Present Worth of Future Equipment	$ -	$ -	$ -	$ -
Present Worth of Salvage	$ (109,000)	$ (84,000)	$ (733,000)	$ (468,000)
TOTAL OPINION OF PRESENT WORTH[1]	**$ 10,807,000**	**$ 9,348,000**	**$ 20,228,000**	**$ 28,756,000**
Percent of Lowest (Present Worth Basis)	**116%**	**100%**	**216%**	**308%**

[1] Project life = 20 years; discount rate = 6 percent.
[2] Refer to Appendix E for further opinion of cost details.

Table 7.03-1 Activated Sludge Treatment Opinion of Present Worth Summary[2]

C. Nonmonetary Considerations

Nonmonetary issues should be considered when evaluating alternatives, which include:

- Treatment reliability
- Operation and process complexity
- Ease of maintenance
- Ease of construction
- Ability to provide nutrient removal

Alternatives AS-1 through AS-4 were evaluated with respect to these criteria. A subjective numerical value was assigned for each category for comparison of the alternatives. Table 7.03-2 presents a summary of nonmonetary factors and scores for the treatment alternatives.

Nonmonetary Evaluation Factor	Alternative			
	AS-1	AS-2	AS-3	AS-4
Treatment Reliability	0	0	+1	+1
Ease of Operation/Complexity	-1	+1	+1	-1
Ease of Maintenance	-1	0	+1	-1
Ease of Construction	+1	+1	-1	-1
Provide Nutrient Removal	0	0	+1	+1
Total Nonmonetary Score	-1	2	3	-2

Table 7.03-2 Nonmonetary Evaluations of Activated Sludge Treatment Alternatives

Treatment Reliability–A reliable system experiences fewer problems and unplanned expenditures. The biological treatment processes are of specific concern with higher peak flows because of low hydraulic residence times and the high ratio of peak to average flow. These can lead to solids washout, incomplete nitrification, and performance instability. Therefore, Alternative AS-1 and AS-2 received a positive score because of the aeration basin addition.

Ease of Operation/Complexity–Operational ease relates to the level of effort required for the system to function as intended. The two-stage operation of Alternative AS-1 requires more processes to monitor than the other alternatives. Alternative AS-4 received a negative score because of media replacement compared to Alternative AS-3.

Ease of Maintenance–The level of ease to perform maintenance on the equipment is considered lower for Alternative AS-1 than the other alternatives because of the additional equipment with this alternative associated with the two-stage activated sludge operation.

Ease of Construction–The ability to construct the selected alternative while still maintaining plant operations should be considered. Alternatives AS-3 and AS-4 received a negative score because of the bypass pumping, electrical relocation, and other work associated with the construction of additional basin volume.

Ability to Provide Nutrient Removal–GWA WWTP will likely be subject to more stringent nutrient limits in the future. The ability of the selected treatment system to meet these limits is an important consideration. Alternatives AS-1, AS-2, and AS-4 would require large scale pilot testing to incorporate BNR. Alternative AS-3, conventional air activated sludge, would likely provide reliable BNR.

D. Bioaugmentation

This discussion is for a side-stream bioaugmentation process to improve the nitrifying ability for all the alternatives, but specifically for Alternative AS-2 since single-stage HPO is not traditionally used for nitrification. This process would include separate biological treatment of recycled dewatering filtrate and produce supplemental nitrifiers for the main biological process. Bioaugmentation could provide the following benefits to the activated sludge process:

- Provides equalization of dewatering filtrate return flows.
- Reduces the ammonia loading to the main activated sludge process.
- Provides more stable nitrification because of additional nitrifiers fed from bioaugmentation.
- Provides a source of seed nitrifiers in the event of peak flow solids washout or biological upsets.

The current annual average BFP filtrate flow is approximately 42,000 gpd. Typically, the filtrate has an ammonia concentration of approximately 700 mg/L and concentrations up to 1,000 mg/L have been recorded. BFP filtrate ammonia loading represents approximately 18 percent of the total influent ammonia loading.

Bioaugmentation processes such as the Aeration Tank 3 (AT-3, Figure 7.03-2) and the Bioaugmentation Reaeration/Regeneration (BAR, Figure 7.03-3) could be used. Both of these processes were developed to nitrify dewatering filtrate and provide supplemental nitrifiers for the main activated sludge process stream. The main difference is that in the AT-3 process, only a portion of the

RAS is pumped to the bioaugmentation basin, and in the BAR process, all the RAS is pumped to this basin.

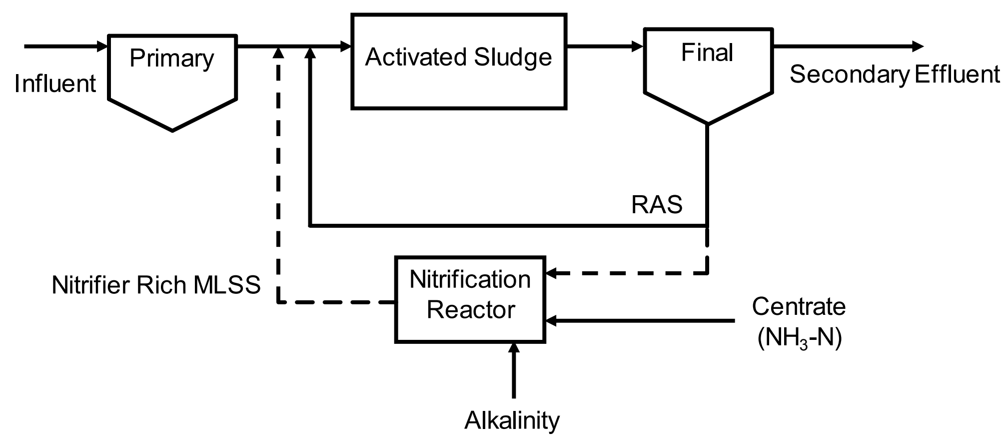


Figure 7.03-2 Bioaugmentation–AT-3 Schematic

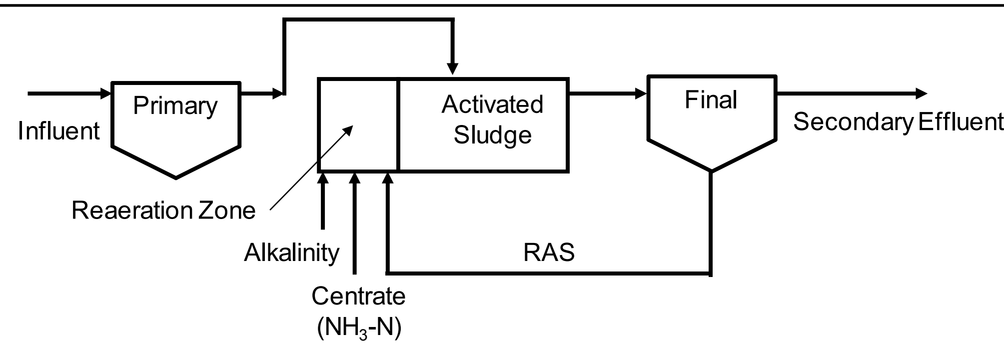


Figure 7.03-3 Bioaugmentation–BAR Schematic

For incorporation of an AT-3 bioaugmentation process to the GWA WWTP, dewatering filtrate would be pumped from the dewatering building to the bioaugmentation aeration basin. Both of the existing ATAD basins, not in operation, could be converted to AT-3 bioaugmentation basin. The existing cryogenic plant provides excess oxygen that can provide bioaugmentation aeration with the existing oxygen supply piping to the ATAD basins. A portion of RAS from the mainstream process would be pumped from the Intermediate Pump Station (RAS pump station) to the bioaugmentation basin. In addition to providing seed nitrifiers, the RAS reduces the temperature of the dewatering filtrate and provides alkalinity. The bioaugmentation basin effluent (high in nitrifiers) can be continuously added by gravity to the main process aeration tanks. For this process, CPR of the main process stream is assumed.

In contrast, the BAR process would require a more significant modification of the mainstream process than the AT-3 process. The BAR process returns the dewatering filtrate to an initial reaeration zone with all the main stream RAS. For GWA, this process would likely require a volume equivalent to about two of the existing aeration basins to be converted to RAS reaeration. The ATAD basins could be available for this process, but additional volume would be required. Because the AT-3 is considered to have less constructability concerns, the BAR process was not evaluated further. The BAR process could be evaluated further if GWA proceeds with a bioaugmentation project.

A preliminary cost opinion was developed for the AT-3 process and is based on Alternative AS-2. Included in the costs are the following elements:

1. Convert both existing ATAD basins (260,000 gallons) into a bioaugmentation aeration basins. Existing weir elevations would need to be raised to allow for gravity flow to the main stream aeration basins. The ATAD basins could be modified to operate as two basins, as it is currently, or as one basin with four stages.

2. For Alternative AS-2, the existing oxygen supply line can be used for bioaugmentation. Replacement of the existing surface aerators is assumed. The final stage could be open to the air and include a mixer similar to Alternatives AS-1 and AS-2 to increase the pH and could reduce alkalinity addition.

3. Install two new dewatering filtrate pumps in the Sludge Dewatering Building, using one of the existing sludge transfer tanks. Install new underground piping to deliver the dewatering filtrate from the Sludge Dewatering Building to the bioaugmentation aeration basin. One of the existing sludge holding tanks at the Dewatering Building could be used as a dewatering filtrate pump station.

4. The main process RAS feed to the bioaugmentation basins could be pumped from the Intermediate Pump Station. If screw pumps are installed, a submersible pump could be installed to pump bioaugmentation feed RAS. With a prerotation or submersible RAS pump station, a branch piping feed to the bioaugmentation basin could be installed with a control valve and flow meter.

5. Install underground piping to deliver bioaugmentation mixed liquor effluent to the aeration basin influent channel.

6. Install alkalinity addition chemical storage tanks and chemical feed system. A portion of the existing ATAD Building could be used if only tote storage of chemical is required. If bulk storage is required, however, construction of a separate building is required. Pilot testing is recommended to determine the alkalinity chemical demand. Tote storage and use of the existing ATAD Building alkalinity addition are assumed for the purposes of this plan.

The preliminary opinion of probable cost for an AT-3 bioaugmentation system is $1,459,000. See Appendix E for further details of the opinion of probable cost.

E. Conclusions

Alternatives AS-3 and AS-4 have significantly greater capital costs than Alternatives AS-1 and AS-2 and, because of the good operating condition of the cryogenic plant, it is recommended this HPO system be maintained. The air activated sludge alternatives could be reevaluated when the cryogenic plant requires replacement. In the near term, Alternative AS-2 will provide maintenance benefits over AS-1 including removal of the carbo intermediate clarifiers, carbo RAS pumps, and carbo WAS pumps.

At the time of this report, the ability of the GWA WWTP to reliably nitrify while operating the activated sludge facilities in the single stage has not been fully evaluated. After evaluation of the single-stage operation, GWA could consider potentially improving nitrification with modifications to the last stage of the aeration basins which would increase the pH. Bioaugmentation could be implemented to potentially improve nitrification and reduce the ammonia loading to the activated sludge process as well. A detailed study and pilot testing are recommended before considering bioaugmentation. The cost of a bioaugmentation project, however, could exceed short-term costs to change the activated sludge process back to a two-stage activated sludge operation.

The activated sludge alternative analysis assumed limits of 0.5 mg/L for TP and 10 mg/L for TN. When the actual TP and/or TN nutrient limits are known, the single-stage HPOAS should be further evaluated to incorporate BNR. Large scale pilot testing by converting one of activated sludge trains to include denitrification is recommended.

The recommended Alternative AS-2 is separated into multiple projects because of differing priorities and are summarized in Table 7.03-3. Section 8 includes an implementation schedule for these projects.

Project	Cost Opinion	
Intermediate Pump Station Modifications	$	1,423,000
UNOX Deck Control Improvements	$	368,000
Activated Sludge Final Stage Modifications	$	218,000
Cryo Building MCC and PLC Replacement	$	251,000
Denitrification Modifications	$	1,322,000
Bioaugmentation	$	1,459,000

Table 7.03-3 Activated Sludge Projects

7.04 DIGESTED BIOSOLIDS DEWATERING

A. Description of Alternatives

The following dewatering alternatives are considered for the GWA WWTP.

Alternative BD-1–Install two new BFPs within the existing solids dewatering facility. This alternative includes replacing the existing BFPs with new BFP equipment, which would require few modifications to the solids dewatering facility. The performance from a new BFP is expected to be better than the existing BFPs (18 to 20 percent cake solids versus 15 to 16 percent). The existing polymer system and conveyors would be reused and require minor modifications. Polymer use for the new system is anticipated to be 15 pounds of polymer per dry ton solids. The capacity of the new BFPs would be approximately 240 gpm total with an operating time of approximately 8 to 9 hours a day for three days per week. Costs for installation of two new BFPs with PLC control systems are summarized in Table 7.04-1.

Alternative BD-2–Install one new centrifuge and maintain one existing BFP in the existing solids dewatering facility. This alternative includes replacing one BFP with a centrifuge while maintaining the second BFP as an emergency backup. Based on previous experience with centrifuges, we expect 25 percent solids with a maximum of 20 pounds polymer per dry ton of solids. The centrifuge alternative may require additional structural support for the more concentrated centrifuge load, an overhead crane for maintenance, conveyor replacement, piping modifications, and polymer system modifications. It is anticipated that the majority of the polymer system will be reused; however, additional pump capacity may be required. The capacity of the new centrifuge would be approximately 250 gpm with an operating time of approximately 8 to 9 hours a day for three days per week. Costs for installation of one new centrifuge with control system are summarized in Table 7.04-1.

B. Monetary Comparisons

Table 7.04-1 is a comparison of the capital costs and present worth analysis for the two alternatives. The BFP alternative has the lowest capital cost and opinion of present worth. The centrifuge provides biosolids disposal savings. Biosolids storage building costs are impacted by the selection of this alternative because of the dewatering performance differences. The biosolids storage project costs, however, are included in the common needs in Section 7.06 and are not included in this monetary analysis because the biosolids storage project is expected to be installed before a the biosolids dewatering project. As discussed further in Section 7.06, the centrifuge alternative BS-2 could reduce to building size and, therefore, the overall cost of the centrifuge option compared to the belt filter press option.

	Alternative	
	BD-1 Two New BFPs	**BD-2 One New Centrifuge**
Opinion of Total Construction Capital Costs	**$ 1,820,000**	**$ 2,292,000**
Annual O&M Costs		
Power Requirements ($0.04/kWh)	$ 400	$ 6,000
Polymer Requirements[1]	$ 40,000	$ 53,000
Biosolids Disposal	$ 146,000	$ 116,600
Maintenance and Supplies	$ 20,000	$ 20,000
Subtotal Opinion of Annual O&M	**$ 206,400**	**$ 195,600**
Present Worth of O&M[4]	$ 2,367,000	$ 2,244,000
TOTAL OPINION OF PRESENT WORTH[4]	$ 4,187,000	$ 4,536,000
Percent of Lowest (Present Worth Basis)	**100%**	**108%**

[1] Chemical requirements based on $2.00 per pound of polymer.
[2] Biosolids disposal is based on a cost of $22 per wet ton.
[3] Maintenance and supplies are approximately 2 percent of equipment cost.
[4] Project life = 20 years; discount rate = 6 percent.

Table 7.04-1 Biosolids Dewatering Alternatives Opinion of Present Worth Summary

C. Nonmonetary Considerations

Five nonmonetary factors were considered in this evaluation. They include wash water use, odor control, room environment, cleanup effort, and operator familiarity. Each alternative was given a score 1, 0, or -1 for each of the factors, with 1 as the most favorable alternative and -1 as the least favorable alternative. The alternative with the highest nonmonetary score is the most favorable alternative. The nonmonetary evaluation is shown in Table 7.04-2. Alternative BD-2 has a significantly higher nonmonetary score primarily because of the centrifuge enclosure. Even though labor savings are not included in the monetary analysis, Alternative BD-2 with the centrifuge would require less labor to operate than Alternative BD-1 with the BFP. Because of the reduced operator demand of Alternative BD-2, operator responsibilities could be focused elsewhere if this alternative is selected.

	Alternative	
	BD-1 Two New BFPs	**BD-2 One New Centrifuge**
Wash Water Use	-1	+1
Odor Control	-1	+1
Room Environment	-1	+1
Cleanup Effort	-1	+1
Operator Familiarity	+1	-1
Total	**-3**	**+3**

Table 7.04-2 Dewatering Nonmonetary Evaluation

D. Recommended Alternative

Although Alternative BD-1 has a lower total present worth than Alternative BD-2, the nonmonetary benefits of Alternative BD-2 are significantly greater than Alternative BD-1. Because of the nonmonetary considerations and potential saving in biosolids storage costs, Alternative BD-2 is recommended.

7.05 CODIGESTION AND COGENERATION ANALYSES

A. Existing Sludge and Biogas Production Data Summary

The GWA provided approximately 45 months of biosolids data from January 1, 2009, to September 30, 2012. The data provides pumping volumes as well as total and volatile solids (VS) concentrations for cothickened PRS, Carbo WAS, and Nitro WAS. A summary of the biosolids data is presented in Table 7.05-1. The total digester feed loadings have remained very stable over the last several years, averaging approximately 54,000 gpd and 15,700 pounds per day (lbs/day).

Year	PRS+WAS+NITRO (gpd)	Total Digester Feed (lbs/day)	Volatile Solids Percentage (%VS)	Volatile Solids Loading (lbs/day)
2009	53,800	15,300	81	12,440
2010	54,300	15,420	81	12,490
2011	54,200	16,450	80	13,090
2012	52,100	15,610	83	12,910
Average	53,600	15,700	81	12,730

Table 7.05-1 Sludge Data Summary

Biogas production at the plant is measured but is not recorded. Using the data presented in Table 7.05-1, an approximation of the amount of biogas produced through anaerobic digestion can be calculated. Sludge entering the WWTP contains fixed solids and VS. A percentage of the VSS is removed by the anaerobic digestion process and creates biogas. The amount of biogas generated from anaerobic digestion is typically 12 to 18 cubic feet per pound (ft^3/lb) VS destroyed. For the purpose of this report, we have assumed an average biogas production of 15 ft^3/lb of VS destroyed. Table 7.05-2 summarizes the volatile biosolids loading to the digesters and estimated volume of biogas produced. The percent volatile solids reduction is approximately 60 percent based on the Van Kleeck equation. The average biogas production from 2009 to September 2012 is estimated to be 90 cubic feet per minute (ft^3/min). A third digester was started up in 2009, and it appears biogas production has increased each year since the new digester became operational. The 2033 projected biogas production from municipal sludge only, assuming a VS loading of 16,800 lbs/day and a VSR reduction of 60 percent, is approximately 130 ft^3/min.

Year	PRS+WAS+NITRO (lbs VS/day)	DSL (lbs VS/day)	Total VS Destroyed (lbs VS/day)	Supernatant[1] (lbs VS/day)	VSR (%)	Biogas[3] Production (ft^3/min)
2009	12,440	4,670	7,790	22	59	81
2010[2]	12,490	4,150	8,360	22	*	87
2011	13,090	4,310	8,800	22	61	91
2012	12,910	3,410	9,520	22	61	99
Average	12,730	4,140	8,620	22	60	90

[1] Supernatant VS data is based on limited data samples.
[2] VSR is based on the average VSR from 2009 because of a data gap from June 3, 2009 to March 1, 2011.
[3] Biogas production based on 15 ft^3/lb of VS destroyed.

Table 7.05-2 Digestion Performance Summary

B. Biogas Quality Summary

The GWA uses biogas to fuel boilers without any conditioning other than gross moisture removal using condensate traps. Sampling of the biogas has been completed by GWA to determine the concentration of the various constituents. The results of the sampling are summarized in Table 7.05-3 and indicate the biogas has relatively low concentrations of hydrogen sulfide and high concentrations of siloxanes, which will likely require treatment if biogas is to be used for cogeneration.

Year	Hydrogen Sulfide (ppmV)	Siloxanes (ppmV, Si)	Carbon Dioxide Mol %	Methane Mol %
12/18/2008	302	8.72	36.9	61.2
05/31/2012	Not Sampled	10.85	36.9	62.2

Table 7.05-3 Biogas Quality Sampling Results

C. High Strength Waste (HSW) and Codigestion Capacity Analysis

GWA has accepted some landfill leachate and may enter into a long-term contract to accept more leachate. Currently, GWA does not accept HSW such as septage, grease, food wastes, and other HSW. Common HSW feed stocks are from beverage plants, cheese plants, and other food processing plants, as well as grease trap wastes from restaurants and similar facilities. Many WWTPs with anaerobic digesters have begun accepting HSW because of potential revenue from the additional biogas generation and tipping fees for HSW acceptance. In many areas, there is a considerable market for WWTPs to receive HSW and codigest the material with normal municipal sludge. The following Midwest communities/Districts are either currently accepting or are constructing facilities to accept HSW for codigestion (not a complete list): Milwaukee MSD, Fond du Lac, Sheboygan, Stevens Point, and Janesville, Wisconsin, and Dubuque and Des Moines, Iowa. Many other WWTPs are considering the opportunities available to accept HSW.

The GWA WWTP has primary digester capacity available to accept HSW as indicated below. The three existing anaerobic digesters, Digesters No. 1, No. 2, and No. 3, have a volume of 124,700 ft^3, 70,200 ft^3, and 50,100 ft^3, respectively (approximately 1,830,000 gallons total). Typical digester capacity is estimated by assuming the digestion system can be loaded at 80 to 100 lbs VS/1,000 ft^3/day for a total loading capacity of approximately 19,500 lbs VS/day for the two primary digesters. Converting Digester No. 3 to a primary digester increases the loading capacity to approximately 24,500 lbs VS/day.

The current digester loading (sum of primary, Carbo, and Nitro sludge) is approximately 12,700 lbs VS/day, which equates to an excess loading capacity of approximately 6,800 lbs VS/day (existing system), and 11,800 lbs VS/day if all three digesters are operated as primary digesters. In addition, at some facilities it has been demonstrated that codigestion actually improves the VSR of municipal sewage sludge feed solids, resulting in the ability to load the digesters at even higher VS loading rates.

This available digester capacity can be used for codigesting HSW. The organic loading value of HSW is typically measured in terms of BOD or chemical oxygen demand (COD) rather than volatile solids, since HSW is often very soluble with low solids content. Typical HSW COD values are above 20,000 mg/L and can be in excess of 1,000,000 mg/L for very concentrated material such as glycerin or sugar wastes. To estimate the volume of HSW that could be trucked into the plant, as well as the potential additional biogas generation, the following assumptions have been made:

1. Available digester capacity can be loaded at 100 lbs COD/1,000 ft^3/day.

2. The HSW has a COD of approximately 60,000 mg/L. In reality, the COD concentration could vary between 10,000 mg/L and several hundred thousand mg/L (or more).

3. COD reduction in digesters is approximately 80 percent.

4. Approximately 5.5 ft^3 of methane per lb COD removed will be generated.

Based on a COD concentration of 60,000 mg/L, the volume of HSW that can be accepted is approximately 18,000 and 32,000 gpd for two and three primary digesters, respectively. These additional HSW loadings would be anticipated to generate approximately 35 ft^3/min of additional biogas using only the two existing primary digesters and approximately 60 ft^3/min of additional biogas if all three digesters are used as primary digesters. This represents an increase of biogas of approximately 40 and 67 percent, respectively. Therefore, with HSW codigestion, the total estimated biogas production from the digesters is approximately 125 and 150 ft^3/min of biogas, respectively, assuming full loading of two primary digesters or three primary digesters. If higher strength wastes are brought into the plant, these biogas production rates would increase.

Numerous options are available to accept HSW. HSW can be received directly at the plant without any pretreatment by direct discharge into a manhole or wet well. A coarse bar screen can be added to a manhole to remove large debris. Packaged receiving equipment is commonly used to accept HSW, especially high solids wastes such as septage, and typically includes a rock trap, flow meter, fine screen, sampling, screenings washing, and screenings discharge to a dumpster. Automation options that require haulers to enter an access code or swipe a card to gain access to the plant are also available for such packaged receiving stations.

The GWA has a couple options to accept HSW. The ATAD basins could be used, but these are currently being evaluated for use as dewatering storage and bioaugmentation facilities. If the intermediate clarifiers are taken out of service (convert to single-stage HPO versus two-stage HPO), which is likely, the Pump and Electrical Building RAS/WAS wet well could be used for HSW receiving. At the Pump and Electrical Building, the two existing belowgrade wet wells (current Carbo RAS/WAS pump station wet well) adjacent to the building have a total volume of approximately 16,000 gallons, which is a sufficient volume to meet the near-term HSW receiving needs. If HSW receiving needs increase above 16,000 gpd, an additional wet well can be constructed adjacent to the existing wet well. HSW pumping equipment would be housed in the basement of the Pump and Electric Building in the space currently occupied by the Carbo RAS pumps.

Space is available for packaged HSW receiving equipment (if determined to be needed) in the blower room located in the Pump and Electric Building. The roof would need to be raised in the vicinity of the equipment to provide adequate clearance for maintenance. Piping would be installed to allow direct discharge to the anaerobic digesters or the influent sewer (connection at MH-18).

D. Codigestion and Cogeneration Alternatives Analysis

Biogas from anaerobic digestion at the GWA WWTP is used in the plant boilers to heat the digestion process or is flared. However, the GWA is interested in accepting high strength waste to generate additional revenue from tipping fees and increase biogas production, as well as potential cogeneration from biogas.

As a part of this study, the following codigestion and cogeneration alternatives are discussed and evaluated:

1. Alternative CC-1a–Convert one or more of the existing natural gas engines to use biogas for electricity production and heat recovery. Digest municipal sludge only (no codigestion).

2. Alternative CC-1b–Convert one or more of the existing natural gas engines to use biogas for electricity production and heat recovery. Construct HSW receiving station for codigestion up to the loading limit of the existing digestion facilities.

3. Alternative CC-2a–Install new internal combustion engines to use biogas for electricity production and heat recovery. Digest municipal sludge only (no codigestion).

4. Alternative CC-2b–Install new internal combustion engines to use biogas for electricity production and heat recovery. Construct HSW receiving station for codigestion up to the loading limit of the existing digestion facilities.

All the above alternatives involve a reciprocating gas engine, which requires biogas to be treated for hydrogen sulfide (required to lengthen the life of the downstream siloxane media), siloxanes, and moisture removal. Proposed equipment locations for biogas treatment (all alternatives) and a new internal combustion engine (Alternatives CC-2a and CC-2b only) are shown in Figures 7.05-1 and 7.05-2. Common gas conditioning requirements are provided in the following list:

a. Lower Heating Value 600 British Thermal Units/standard cubic feet (BTU/scf).

b. Biogas compression to 3 to 5 pounds per square inch (psi).

c. Hydrogen sulfide removal to less than 500 to 1,000 parts per million (ppm).

d. Siloxane removal to less than 0.6 µg/BTU (Lower Efficiency Engine) or 0.25 µg/BTU (Higher Efficiency Engine).

e. Moisture removal to about 50 percent relative humidity at 80 °F.

Each alternative is described in detail along with a description of the various biogas treatment systems. The potential locations for equipment installations are also identified.

1. Alternative CC-1a–Utilize Biogas with Existing Engine(s) for Municipal Sludge Only

This alternative involves modifying one of the three existing reciprocating natural gas engines (815 kW each) for biogas service. The engine would need to handle larger volumes of fuel because of the greater percentage of carbon dioxide in biogas, as well as higher levels of contaminants. Heat would be recovered off the engine and the exhaust in the form of hot water.

Based on information received from the engine manufacturer, this alternative is not likely feasible at the current and projected future gas flow rates without HSW codigestion. The minimum biogas flow rate is 142 ft^3/min. Currently, the WWTP generates an average of 90 to 100 ft^3/min of biogas, which is well below the minimum gas flow required. This alternative will not be evaluated any further as a part of this report.

2. Alternative CC-1b–Utilize Biogas with Existing Engine(s) for Municipal Sludge and HSW

This alternative involves modifying an existing reciprocating natural gas engine for use on biogas as described in Alternative CC-1a and also includes the addition of high strength waste receiving for codigestion. As described previously, accepting high strength has the potential to increase gas production to 150 ft^3/min (or more) if the existing digester loading capacity if fully utilized and the existing secondary digester is converted to a primary digester. Biogas conditioning will be required to remove hydrogen sulfide (required to lengthen the life of downstream siloxane media), siloxanes, and moisture. A monetary evaluation of this alternative is presented later in this section.

3. Alternative CC-2a–Utilize Biogas with New Engine(s) for Municipal Sludge Only

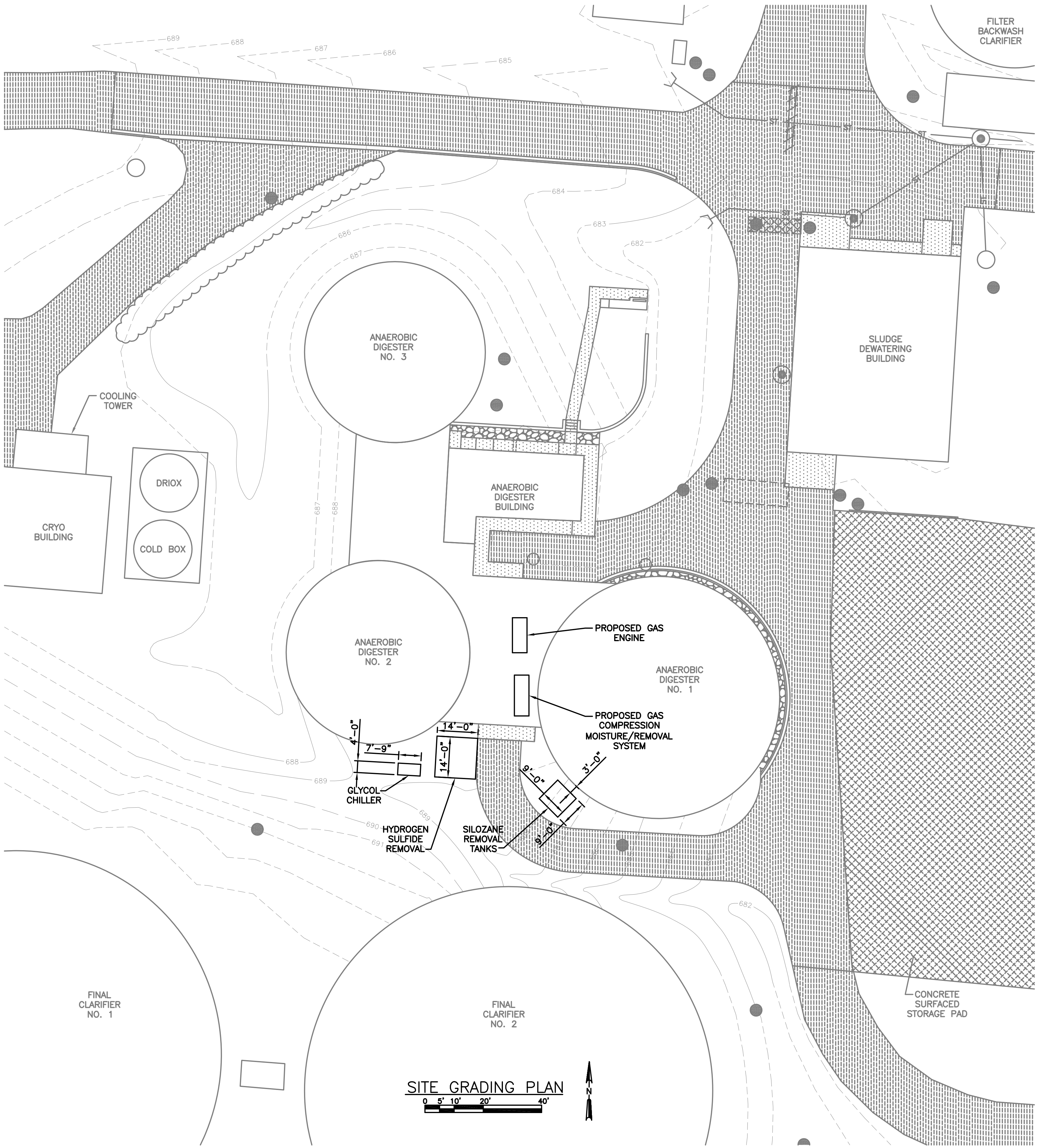
This alternative involves installation of a new gas engine dedicated to cogeneration utilizing biogas as the fuel source. For this alternative, HSW receiving facilities will not be constructed. Based on projected future digester VS loadings, the future design biogas production from municipal sludge would be approximately 130 ft^3/min.

For this analysis, a 600 kW gas engine was considered for the 100 and 125 ft^3/min gas flow rates. A 475 kW engine with a lower capital cost was evaluated, but because of lower electrical efficiencies and overall capacity, it was not included in the analysis. An 800 kW engine was also evaluated; however, the minimum gas flow rate required is 102 ft^3/min (50 percent load), which is currently higher than the average daily gas flow rate. These engines all have different electrical and heat recovery efficiencies as well as long-term maintenance requirements and anticipated longevity. If this alternative is selected as the preferred alternative, a more detailed comparison should be made between these and other manufacturers' engines.

4. Alternative CC-2b–Utilize Biogas with New Engine(s) for Municipal Sludge and HSW

This alternative involves installation of a new gas engine dedicated to cogeneration utilizing biogas as a fuel source and the installation of HSW receiving facilities. This alternative has the potential to produce at least 150 ft^3/min of biogas if the existing secondary digester is converted to a primary digester and the full digester loading capacity is utilized. HSW has been shown to improve volatile solids reduction in municipal sludge, which could increase gas flows above 150 ft^3/min.

For this analysis, a 600 kW engine was used for the 100, 125, and 150 ft^3/min gas flow rates. Note, the 600 kW engine utilizes 137 ft^3/min of biogas at full load requiring gas in excess of 137 ft^3/min to be flared or taken to the boiler. If biogas production increases substantially beyond 137 ft^3/min, a second 600 kW unit would be purchased to utilize all biogas generated and provide a second unit to maintain cogeneration while a unit is down for maintenance.



LEGEND:

- EXISTING ASPHALT PAVEMENT
- EXISTING CONCRETE PAVEMENT
- EXISTING SIDEWALK
- EXISTING CONCRETE STOOP/APRON
- EXISTING STONE MULCH OVER GEOTEXTILE FABRIC

COGENERATION PROPOSED EQUIPMENT LOCATIONS

FACILITIES PLAN
GLENBARD WASTEWATER AUTHORITY
DUPAGE COUNTY, ILLINOIS

STRAND ASSOCIATES®

FIGURE 7.05-1

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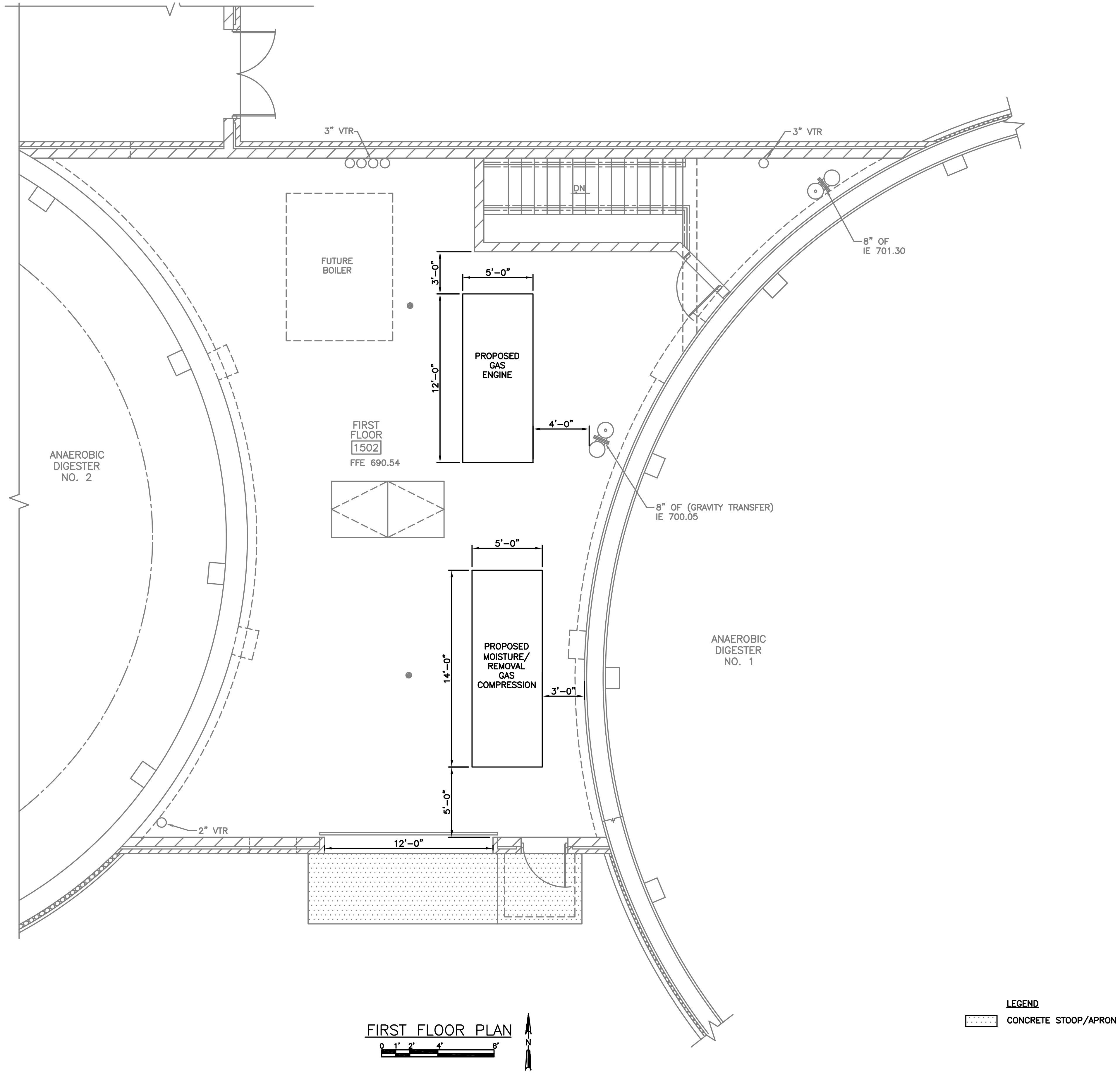

COGENERATION PROPOSED EQUIPMENT LOCATIONS

FACILITIES PLAN
GLENBARD WASTEWATER AUTHORITY
DUPAGE COUNTY, ILLINOIS

STRAND ASSOCIATES®

FIGURE 7.05-2
1278.047

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Similar to Alternative CC-2a, 475 kW and 800 kW engines were evaluated and found not be as cost-effective at current and projected gas flow rates. If this alternative is selected as the preferred alternative, a more detailed comparison should be made between these and other manufacturers' engines.

E. Biogas Conditioning

Currently, GWA does not treat digester gas for removal of any contaminants other than limited moisture removal. Based on the biogas quality data and the maintenance issues with the boilers, some additional biogas conditioning equipment is recommended for all the biogas use alternatives described.

Before final design of any improvements, we recommend additional biogas testing to better define hydrogen sulfide and siloxane concentrations. Previous testing indicated that siloxanes had increased between 2008 and 2012. However, these observations are based on only two samples. We recommend samples to be collected at least annually better define actual biogas characteristics. Additionally, hydrogen sulfide should be sampled to confirm hydrogen sulfide levels have not changed significantly.

Included in the following is a brief description of the biogas conditioning equipment that may be used here.

1. Hydrogen Sulfide Removal

Hydrogen sulfide is removed from biogas using either biological or chemical removal systems. Biological removal systems convert hydrogen sulfide to sulfate (SO^4), which is then discharged into the plant return flow. Chemical systems rely on chemical reactions and stabilization of reduced sulfur with oxidizing compounds typically impregnated in an inorganic, nonreactive media. Biological systems have higher capital and lower O&M costs and become economically feasible as hydrogen sulfide concentrations and gas flows increase. Chemical systems (i.e., iron sponges and other proprietary media systems) have lower capital costs, but they require routine media removal and replacement resulting in higher O&M costs. Based on the low hydrogen sulfide concentrations, a chemical system was evaluated for this report.

2. Siloxane Removal

Siloxanes are removed from biogas using activated carbon or similar proprietary media. The media is housed in a steel vessel and requires periodic replacement depending on the vessel size, operating pressure, and siloxane concentration in the biogas. Hydrogen sulfide and moisture removal are required upstream to lengthen the life of the siloxane media.

3. Moisture Removal

Moisture removal is an important process as it impacts the efficiency of downstream siloxane removal as well as the efficiencies of the gas utilization equipment. Generally, dry biogas provides a better fuel than a moist gas. A glycol-chilled system for moisture removal system is required for the gas engine combined heat and power (CHP) systems considered in this report.

These systems are typically installed as skid-mounted systems as part of the overall conditioning system.

4. Biogas Conditioning Equipment Locations

The digester gas equipment is currently located in the digester control building. The digester control building houses the digested sludge recirculation pumps, digested sludge mixing pumps, belt filter press feed pumps, grinders, boilers, and other sludge processing equipment and piping. Space is available on the first floor of the digester control building between Digesters No. 1 and No. 2 to house the gas compression and moisture removal equipment and one gas engine. The equipment required for hydrogen sulfide and siloxane removal would be housed outside on the south side of the digester complex. Electrical equipment will be housed in the existing MCC room and will require consolidation of existing control panels to provide the required space. Approximate locations for the gas conditioning and cogeneration equipment are shown in Figures 7.05-1 and 7.05-2.

F. Digester Gas Holding Capacity Increases

Currently GWA uses the gas holding cover on Digester No. 3 to store biogas generated by the digestion process. Cogeneration at the plant will likely require additional biogas storage because of the higher rate of use of the biogas. Therefore, for the cogeneration alternatives, we have included additional biogas storage capacity. This capacity would likely be provided by including a new gas holding cover on Digester No. 2. The cover could be a steel gas holding cover, similar to the cover on Digester No. 3, or a membrane-style cover. Membrane covers are more expensive but provide considerably more storage over a given tank than steel gas holders provide. Alternatively, a separate gas holding cover could be installed on a separate liquid biosolids storage tank. For example, if the filter backwash holding tank were repurposed as a liquid biosolids storage tank, it could include a membrane gas holding cover to provide additional biogas storage as well.

For the purpose of this analyses, we have assumed a membrane-style cover would be provided on Digester No. 2. The capital costs for the cover are included in the cogeneration and codigestion analyses.

G. Monetary Comparisons

Opinion of probable costs were developed for the alternatives previously described assuming three different biogas production rates of 100, 125, and 150 ft^3/min as noted in Table 7.05-4. The gas flow rates are representative of the approximate current gas production, gas production with two digesters at full loading capacity, and gas production with three digesters at full loading capacity, respectively. Table 7.05-4 shows a summary of the of the alternatives evaluated at various gas flow rates.

	Gas Flow Rates (ft^3/min)		
Alternatives	**100**	**125**	**150**
Alt. CC-1a	Not Evaluated[1]	Not Evaluated[1]	Not Evaluated[2]
Alt. CC-1b	Not Evaluated[1]	Not Evaluated[1]	Evaluated
Alt. CC-2a	Evaluated	Evaluated	Not Evaluated[2]
Alt. CC-2b	Evaluated	Evaluated	Evaluated[3]

[1] Minimum turndown for existing gas engines is 142 ft^3/min.
[2] HSW acceptance required to produce 150 ft^3/min.
[3] One 600 kW engine assumed with a gas requirement of 137 ft^3/min.

Table 7.05-4 Alternatives Evaluated

Table 7.05-5 includes an opinion of present worth cost analyses for the alternatives and gas flow rates evaluated. The tables list the opinion of installed equipment costs for each alternative and opinion of annual O&M expenses. Budgetary equipment costs were obtained from manufacturers for the gas conditioning and biogas use equipment. Cost allowances are included for site, mechanical, and electrical costs associated with the equipment installation. Details pertaining to the capital costs are included in Appendix E. Additional considerations are listed as follows:

1. The annual cost for gas conditioning (150 ft^3/min capacity) includes costs for the moisture removal/gas compression equipment, chemical hydrogen sulfide removal system, and siloxane media replacement.

2. The line item for relative equipment maintenance includes $5,000/year credit for reduced boiler maintenance and a $0.02/kW O&M cost for the gas engines.

3. The line item for power use is for the gas conditioning skid compressor and chiller.

4. Tipping fees were assumed to be $0.025 per gallon.

5. Projected tipping fee revenues assume existing digester loading capacity is used for HSW. The analysis does not reduce the amount of HSW that can be accepted if municipal solids loadings increase during the study period and use existing digester capacity.

6. Digester cover costs included for gas flow alternatives of 125 and 150 ft^3/min.

7. Digester No. 3 is a secondary digester for 100 and 125 ft^3/min biogas flow rates and is converted to primary digester with a new heat exchanger for a 150 ft^3/min biogas flow rate.

TABLE 7.05-5

COGENERATION AND HSW CODIGESTION OPINION OF PRESENT WORTH SUMMARY
GAS FLOW RATE = 100 FT^3/MIN

	Alt. CC-1a	Alt. CC-1b[1]	Alt. CC-2a		Alt. CC-2b	
	Existing Engines	Existing Engines with HSW	New Engines		New Engines with HSW	
Biogas Gas Flow Rate	**Not Feasible**	**150 SCFM**	**100 SCFM**	**125 SCFM**	**125 SCFM**	**150 SCFM**
Opinion of Total Construction Capital Costs[2]		**$ 4,489,000**	**$ 3,969,000**	**$ 5,299,000**	**$ 5,931,000**	**$ 6,337,000**
Cost Adder for 200 ft^3/min Gas Cond. Equip. (Cost not included in Capital Costs Above)		$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000
Annual O&M Costs						
Gas Conditioning Equipment		$ 43,000	$ 29,000	$ 36,000	$ 36,000	$ 43,000
Gas Engine Equip. Maintenance		$ 73,000	$ 66,000	$ 88,000	$ 88,000	$ 100,000
Electrical Savings ($0.04/kWH)		$ (155,000)	$ (142,000)	$ (186,000)	$ (186,000)	$ (210,000) [3]
Power Use ($0.04/kWH)		$ 9,000	$ 6,000	$ 8,000	$ 8,000	$ 9,000
Tipping Fee Revenue		$ (287,000) [5]	$ -	$ -	$ (164,000) [4]	$ (287,000) [5]
Subtotal Opinion of Annual O&M (Savings)		**$ (317,000)**	**$ (41,000)**	**$ (54,000)**	**$ (218,000)**	**$ (345,000)**
Direct Payback		14 Years	97 Years	98 years	27 years	18 years
Present Worth of O&M[6]		$ (3,636,000)	$ (470,000)	$ (619,000)	$ (2,500,000)	$ (3,957,000)
TOTAL OPINION OF PRESENT WORTH[6]		**$ 853,000**	**$ 3,499,000**	**$ 4,680,000**	**$ 3,431,000**	**$ 2,380,000**
Percent of Lowest (Present Worth Basis)		**100%**	**410%**	**549%**	**402%**	**279%**

Notes:
[1]Minimum required gas flow is 142 ft^3/min.
[2]Gas conditioning equipment with 150 ft^3 capacity included
[3]Electrical savings is based on 137 ft^3/min and 600 BTU/ft3.
[4]Based on $0.025/gallon and 18,000 gallons per day of HSW
[5]Based on $0.025/gallon and 31,400 gallons per day of HSW
[6]Project life = 20 years; discount rate = 6 percent.

1. 100 ft^3/min BioGas Flow

Alternative CC-2a is the only feasible alternative for this biogas flow rate and a present worth cost analysis is included in Table 7.06-4. Alternative CC-2b includes construction of HSW receiving facilities, which are not required for a gas flow rate of 100 ft^3/min. Alternatives CC-1a and 1b were not considered for this gas flow rate because the minimum gas flow required for continuous operation of a converted G3516 engine to utilize biogas is 142 ft^3/min.

2. 125 ft^3/min Biogas Flow

Alternative CC-2b has the lowest opinion of present worth cost for a gas flow rate of 125 ft^3/min because of increased revenue from tipping fees when compared to Alternative CC-2a. Note, the tipping fee revenue is assumed to be $0.025/gallon and generally ranges from $0.01 to $0.10/gallon. A market study is recommended to investigate local interest, demand, and potential fees for high strength waste receiving facilities. Additionally, an electrical unit cost of $0.04/kWh was included, which is likely to increase in the future. This would improve the economic payback of the alternatives. Alternatives CC-1a and 1b were not considered for this gas flow rate because the minimum gas flow required for continuous operation of a converted G3516 engine is 142 ft^3/min.

3. 150 ft^3/min Biogas Flow

Alternative CC-1b has the lowest opinion of present worth cost for a gas flow rate of 150 ft^3/min because of decreased capital costs associated with converting an existing G3516 gas engine to an engine that can utilize biogas. This alternative also includes the conversion of Digester No. 3 to a primary digester and construction of HSW receiving facilities. Note, Alternative CC-1b requires GWA to begin accepting HSW to increase gas production to 142 ft^3/min before the existing engine could be utilized continuously and, therefore, may not be a feasible alternative. Alternatives CC-1a and CC-1b were not considered for this gas flow rate because HSW facilities are required to increase gas flow to 150 ft^3/min. Alternative CC-2b does not utilize all biogas for this alternative as the capacity of the engine is 137 ft^3/min. A second engine could be purchased to utilize gas flow above 137 ft^3/min or excess gas can be flared or used in a boiler. It was assumed that excess gas would be flared in the present worth analysis.

As discussed above, the tipping fees for HSW were assumed to be $0.025/gallon and electrical savings are based on $0.04/kWh. If a market study demonstrates high demand and fees for HSW, an 800 kW engine could be considered in lieu of the 600 kW engine to utilize up to 183 ft^3/min of biogas. A drawback of a new 800 kW engine is the minimum required gas flow is approximately 102 ft^3/min, which is above the current gas production rate of approximately 90 to 100 ft^3/min.

An additional design consideration is upsizing the gas conditioning system to treat flows up to 200 ft^3/min to provide additional capacity for gas production beyond these projections. Upsizing the system would add approximately $75,000 in additional capital costs but provides additional capacity if HSW acceptance improves volatile solids destruction and increases gas flow beyond the projected 150 ft^3/min gas flow rate.

H. Nonmonetary Considerations

Because of the similarity of the alternatives, there are only a couple of nonmonetary considerations when comparing the alternatives.

1. Alternatives CC-1a and CC-1b do not require the installation of a new gas engine, which allows the space planned for the engine in the digester control building to be utilized for alternative uses.
2. Alternatives CC-1a and CC-2a do not require the installation of HSW receiving facilities, which allows the space planned for the facilities to be available for alternative uses.
3. Alternatives CC-2a and CC-2b do not use an existing generator, which allows the existing generators to remain as dedicated standby power sources for the WWTP.

I. Conclusions

The codigestion and cogeneration alternatives are not recommended at this time as the economic return is not favorable. This is mainly the result of the very low electrical rates currently paid by GWA. Reevaluation of these alternatives is recommended in future planning efforts and as electrical costs increase.

7.06 OTHER RECOMMENDED PLAN ELEMENTS

This section reviews other recommended plan elements. These recommended improvements are based on a number of criteria, including equipment age and maintenance issues, process reliability issues, and similar concerns. The following elements are discussed:

- LCSTF Equipment Upgrades
- Hauled Waste Receiving
- Screenings Washer and Compactor
- Peak Flow Storage
- Chemical Phosphorus Removal
- Effluent Filtration
- Disinfection
- Sludge Thickening
- Liquid Biosolids Storage
- Dewatered Biosolids Storage
- Plant Utilities
- HVAC System Replacement
- Electrical Service, Backup, and Redundancy
- Remote Site Communication
- Site Lighting
- MCC Replacement
- PLC Replacements
- Electronic O&M Manual

Each element is further discussed. Section 8 presents the overall project implementation schedule as well as a financial impact summary for these improvements.

A. LCSTF Equipment Upgrades

1. Screening

The LCSTF includes one 58 mgd capacity coarse mechanical bar screen and one manual bar screen. The existing screen is original equipment and was rehabilitated in 2009. This screen is beyond its expected service life and replacement with a fine screen recommended. The opinion of probable cost for replacement of the mechanical screen with a fine screen including channel modifications to retrofit the new screen is $1,000,000. A detailed hydraulic evaluation is required during design.

2. Grit Removal

The LCSTF currently has two aerated grit removal tanks with equipment that is beyond their expected service life. Conversion to a vortex grit removal system is recommended to replace the equipment and improve grit removal performance. Two 18-foot-diameter, 30 mgd capacity vortex grit removal tanks would be required. The two newly constructed circular tanks could be partially installed in the existing tanks with the influent and discharge channels installed in the existing tanks. The opinion of probable cost including contractor's general conditions, contingencies, and technical services is $2,510,000

3. Clarifier Mechanisms

The LCSTF includes two 145-foot-diameter clarifiers which have original mechanisms. In 2011, the weirs were replaced with concrete outboard weir and the clarifier mechanism skimmer arms were modified. In January 2013, Walker Process inspected the clarifier equipment and determined the drives do not need to be replaced. This project assumed replacement of the clarifier mechanisms only. The opinion of probable cost for replacement of the LCSTF clarifier mechanisms including contractor's general conditions, contingencies, and technical services is $277,000. Alternatively, the mechanisms could be rehabilitated.

B. Hauled Waste Receiving

GWA currently does not have dedicated facilities to receive and handle hauled wastes at the plant. Many plants are currently including such facilities to enable additional revenue to be generated through tipping fees. At plants with anaerobic digestion, high-strength waste can be injected directly to the digesters to increase biogas production, which can then be used to generate electricity and heat. Previously in this report, the potential for HSW receiving, codigestion, and cogeneration was investigated and determined to not be cost-effective at this time. However, it is still feasible to accept hauled wastes at the plant, and this section defines how that could be done in a phased approach:

- Phase *1–Construct Receiving Catch Basin with Manual Bar Rack*: The initial project incudes construction of a simple receiving station near the gravity thickener and ATAD tanks to allow the plant to accept relatively low strength hauled wastes such as leachate, holding tank wastes, and possibly septage. A channel with manually cleaned bar rack would be included to remove large solids, and the channel would be connected via sewer to the West Glen Ellyn interceptor and ultimately discharge to the influent wet well. The receiving station could include a fenced area with monitoring/metering station to measure volumes of hauled wastes received with each load.

- *Phase 2–Utilize ATAD Basin(s) for Hauled Waste Equalization*: In the future, if hauled waste volumes and/or loadings dictate the need to equalize the loadings to the plant, one or more of the ATAD tanks could be used to receive, store, and mix the hauled wastes. The channel described in Phase 1 would be designed to flow into the ATAD tank(s). Mixing could be provided for the tanks if the type of hauled wastes require mixing, and a pumping system would be needed to deliver the hauled wastes from the ATAD tank(s) to the West Glen Ellyn interceptor.

	Opinion of Project Cost
Phase 1-Receiving Catch Basin and Bar Rack	$ 238,000
Phase 2-Hauled Wastes Equalization	$ 336,000

Table 7.06-1 Hauled Wastes Receiving Opinions of Probable Project Cost

C. Screenings Washer and Compactor

Replacement of the existing screenings washer/compactor is recommended. The opinion of cost to provide one washer/compactor in-kind replacement including contractor's general conditions, contingencies, and technical services is $195,000. This equipment is assumed to be replaced through the annual capital replacement budget.

D. Peak Flow Storage

The LCSTF has two lagoons for peak flow storage. These lagoons likely require sludge dredging and repairs to the lagoon in the next 10 years. A study is recommended to evaluate the condition of the lagoons and determine the sludge quantity. The study could require further investigations including a survey of lagoon sludge depth, sludge samples, liner evaluation, berm evaluations, and soil borings.

The GWA WWTP has two lagoons with an approximate storage volume of 5.8 million gallons that could be converted for peak flow storage and equalization. Similar to the LCSTF lagoons, these lagoons will require evaluation of the sludge quantity, condition of the liner, and subgrade conditions. In 2009, a contractor had inspected the lagoons and estimated a removal 19,000 cubic yards of material. Based on $19 per cubic yard, the opinion of probable cost for lagoon dredging is $361,000.

For capital planning purposes, a total cost for dredging at the LCSTF and WWTP lagoons is assumed to be $1,000,000. More detailed project costs should be developed in the next facilities plan after evaluations of the lagoons at both facilities are completed.

E. Chemical Phosphorus Removal

As previously discussed in the activated sludge alternatives analysis, CPR is assumed to be required for each of the activated sludge alternatives. The capital and operating costs for CPR are considered equal for each of the activated sludge alternatives, and, therefore, is presented as a common element in this plan.

The pH suppression of ferric chloride and alum phosphorus removal chemicals could be a concern for nitrification in conjunction with the lower pH associated with HPO (Alternatives AS-1 and AS-2). The costs included herein assume sodium aluminate may be required in lieu of the more common ferric chloride or alum. Sodium aluminate, in addition to phosphorus removal, would provide alkalinity. Jar testing is required for selection between ferric chloride, alum, and sodium aluminate as well as determining the site-specific chemical demand.

The CPR project would include the following elements:

1. Construct new CPR building for bulk storage and pumping. The CPR Building could be located near the Pump and Electrical Building.

2. Install bulk storage tanks and CPR pumps.

3. Install CPR piping from the CPR Building to the application points. Multiple application points are assumed for flexibility of chemical addition.

4. Install phosphorus monitoring equipment for CPR chemical feed control.

The opinion of probable construction cost and O&M costs for the CPR project are summarized in Table 7.06-2. Because of the significance in chemical costs and the uncertainty of the future phosphorus limit, CPR jar testing, BPR testing, and pilot testing are recommended before design of CPR.

Opinion of Capital Costs	**$ 601,000**
Annual O&M Costs	
Relative Labor	$ 4,000
Maintenance	$ 2,000
Power	$ 1,000
Phosphorus Removal Chemical ($1.40/gal)	$ 1,022,000
Subtotal Opinion of Annual O&M	**$ 1,029,000**

Table 7.06-2 CPR Opinion of Probable Cost

F. Effluent Filtration

Each of the disc filter units would be installed in an existing deep bed effluent filter. The new disc filters do not require all ten of the existing deep bed filters. The remaining deep bed effluent filters could remain in service for additional redundancy or could be removed along with the associated equipment. For planning purposes, costs for demolition of all tanks are included for each of the evaluated disc filter units. The effluent filtration project would include the following elements:

1. Demolish the existing deep bed effluent filters to accommodate the new disc filters.
2. Demolish remaining deep bed effluent filters and ancillary equipment including the blowers and compressors.
3. Provide structural modifications to the existing deep bed effluent filter basins for disc filter equipment.
4. Install new disc filter equipment, associated piping, and walkways.
5. Repurpose the existing filter backwash basin, possibly for WAS storage. The remaining filter basins could be reserved for future filter units.

The equipment filtration systems are summarized in Table 7.06-3, and their respective opinions of capital cost are summarized in Table 7.06-4. The IEPA 370 code for filtration requires a filtration rate of 5 gpm/ft^2 at peak hourly flow with one unit out of service. The Nova Water Technologies disk filter is a higher rate system that operates at a filtration rate greater than 15 gpm/ft^2 at peak hourly flows. Because this filtration rate exceeds the IEPA 370 code, further review is required.

The opinion of probable cost for this project are within 5 percent of each other for the Nova Water Technologies, Siemens, and Kruger disc filter equipment. The project cost opinion for the Ashbrook Simon-Hartley equipment is significantly greater than the other three. Of the equipment evaluated, the Kruger Hydrotech Disc Filter has the lowest opinion of capital cost. Because of the design differences between the Nova Water Technologies, Siemens, and Kruger disc filter equipment, review of these three is recommended during design. For planning purposes, the lowest capital cost of these three manufacturers, Kruger, is used in Section 8. Additionally, future phosphorus limits could impact the selected equipment for this effluent filtration project. Pilot testing of a disc filter unit with CPR could be done to measure CPR potential.

	Nova Water Technologies Ultrascreen Disk Filter	Kruger Hydrotech Disc Filter	Siemens Forty-X Disc Filter	Ashbrook Simon-Hartley Iso-Disc[1]
Number of Filter Units	5	5	7	14
Existing Basins Used	5	5	7	7
Filter Rate at 14.5 mgd (all units), gpm/ft^2	4	1	1	1
Filter Rate at 47 mgd (One Out of Service) gpm/ft^2	15	5	5	5

[1] One existing basin out of service includes two Iso-Disc units

Table 7.06-3 Comparison of Disc Filter Systems

	Nova Water Technologies Ultrascreen Disk Filter	Kruger Hydrotech Disc Filter	Siemens Forty-X Disc Filter	Ashbrook Simon-Hartley Iso-Disc
Opinion of Probable Cost				
Disc Filter Equipment	$ 3,012,000	$ 2,798,000	$ 2,966,000	$ 4,485,000
Structural Modifications and Demolition	$ 844,000	$ 819,000	$ 1,009,000	$ 1,023,000
Mechanical and Electrical	$ 1,349,000	$ 1,349,000	$ 1,367,000	$ 1,367,000
Contractor General Conditions	$ 416,000	$ 397,000	$ 427,000	$ 550,000
Construction Total	$ 5,621,000	$ 5,363,000	$ 5,769,000	$ 7,425,000
Contingencies (10%)	$ 562,000	$ 536,000	$ 534,000	$ 688,000
Technical Services	$ 1,083,000	$ 1,083,000	$ 1,083,000	$ 1,083,000
Total Opinion of Probable Cost	$ 7,266,000	$ 6,982,000	$ 7,386,000	$ 9,196,000
Percent of Lowest Opinion of Probable Cost	104%	100%	106%	132%

Table 7.06-4 Disc Filter Systems Opinions of Probable Cost

G. Disinfection

Horizontal, vertical, and inclined-style UV systems were considered for replacement of the existing system. A summary of each system and the opinion of probable cost for each system are found in Tables 7.06-5 and Table 7.06-6, respectively. These new systems require significantly fewer lamps compared to the existing system, which has 2,304 lamps. The TrojanUV 3000Plus equipment can be installed in three of the existing channels with new concrete baffle walls at the equipment. The Xylem Wedeco Duron equipment could be installed either in a four-channel or two-channel arrangement. The two-channel arrangement for the Xylem Wedeco Duron equipment requires two of the existing channels to be widened to accommodate the equipment. The four-channel arrangement for the Xylem Wedeco Duron equipment can be installed in the four existing channels with baffle walls at the equipment. The TrojanUV Signa and Ozonia Aquaray 3X equipment requires channel modifications to provide a deeper and wider channels.

	TrojanUV-3000Plus	TrojanUV-Signa	Xylem Wedeco-Duron (2-Channel)	Xylem Wedeco-Duron (4-Channel)	Ozonia-Aquaray 3X
Lamp Orientation	Horizontal	Inclined	Inclined	Inclined	Vertical
Channels	3	2	2	4	2
Banks per Channel	2	2	3 (6 modules)	3 (3 modules)	2 (4 modules)
Total Banks	6	4	6	12	4
Total Modules	-	-	12	12	8
Total Lamps	480	108	144	144	288
Flow Capacity Per Channel (mgd)	16	24	24	24	24
Channel Modifications Required	No	Yes	Yes	No	Yes

Table 7.06-5 Comparison of UV Disinfection Systems

	TrojanUV-3000Plus	TrojanUV-Signa	Xylem Wedeco-Duron (2-Channel)	Xylem Wedeco-Duron (4-Channel)	Ozonia-Aquaray 3X
Opinion of Capital Costs					
UV Equipment Cost	$ 1,317,000	$ 1,492,000	$ 1,300,000	$ 1,300,000	$ 872,000
Structural Costs	$ 44,000	$ 428,000	$ 85,000	$ 80,000	$ 369,000
Electrical Costs	$ 272,000	$ 272,000	$ 272,000	$ 272,000	$ 272,000
Contractor General Conditions	$ 131,000	$ 175,000	$ 133,000	$ 132,000	$ 121,000
Contingencies	$ 176,000	$ 237,000	$ 179,000	$ 178,000	$ 163,000
Technical Services	$ 361,000	$ 495,000	$ 361,000	$ 361,000	$ 495,000
Total Opinion of Capital Cost	$ 2,301,000	$ 3,099,000	$ 2,330,000	$ 2,323,000	$ 2,292,000
Annual O&M Costs					
Power Costs	$ 5,000	$ 7,000	$ 6,000	$ 6,000	$ 9,000
Annual Replacement Costs	$ 20,000	$ 9,000	$ 10,000	$ 10,000	$ 18,000
Present Worth of O&M	$ 287,000	$ 184,000	$ 184,000	$ 184,000	$ 310,000
Total Opinion of Present Worth[1]	$ 2,584,000	$ 3,230,000	$ 2,505,000	$ 2,497,000	$ 2,558,000
Percent of Lowest (Present Worth Basis)	103%	129%	100%	100%	102%

[1] Project life = 20 years; discount rate = 6 percent.

Table 7.06-6 UV Disinfection Systems Opinions of Present Worth

UVT can have a significant impact on the cost of the system and testing should be conducted during design. The evaluated systems in Table 7.06-3 are based on a UVT of 65 percent, which was used for the design of the original UV system.

The lowest opinion of total present worth is the Xylem Wedeco Duron UV equipment. The highest opinion of total present worth is the TrojanUV Signa equipment, and this unit on a cost basis is not recommended. The Xylem-Wedeco Duron equipment (both arrangements), Ozonia Aquaray 3X equipment, and the TrojanUV 3000 Plus equipment are considered equal on a cost basis because the total present worths are within 10 percent. The Xylem-Wedeco Duron and TrojanUV 3000Plus equipment is easier to construct than Ozonia Aquaray 3X because less channel modifications are required. Further evaluation of the Xylem-Wedeco Duron, Ozonia Aquaray 3X, and TrojanUV 3000Plus equipment nonmonetary factors is recommended during design.

H. Sludge Thickening

The justification for sludge thickening improvements was developed in Section 6. The following presents a stepwise approach to improve the thickening operations at the plant. This approach allows the plant to optimize, to the extent practical, the current practice of cothickening in the gravity thickener. This approach also develops future options to provide better flexibility to the plant. The costs associated with this approach are included in Table 7.06-7. However, these costs would only be necessary if the solids density meter control is not successful.

- *Phase 1–Install Solids Density Meters to Control Gravity Thickener Underflow*: As noted, the plant would like to continue cothickening primary sludge and WAS in the gravity thickener. However, under current conditions the underflow concentration is fairly thin, resulting in high hydraulic loadings to the digesters. The plant will investigate whether the density meters provide the required monitoring and control to consistently achieve a 3.5 percent solids feed to the digesters.

- *Phase 2–Install New Thickened Sludge Suction Piping/New Building*: The existing suction withdrawal piping from the gravity thickener follows a relatively long and tortuous path to the thickened sludge pumps. To improve these conditions, it may be feasible to install a new suction pipe from the thickener to the sludge pumps, but this could be a challenging project and may not solve the problem. Therefore, a better option would be to construct a small below-grade sludge pumping structure immediately adjacent to the gravity thickener to significantly shorten the suction piping. The existing thickened sludge pumps would be relocated to this new structure, and a new thickened sludge force main would be constructed to connect to an existing 6-inch line in the yard to provide dual sludge lines to the digesters. The installation of this line would also enable the plant to pump primary sludge directly from the primary clarifiers to the digesters separately from the thickener underflow. This would provide improved flexibility to separately thicken primary sludge and WAS and would also provide redundant sludge lines across the site.

- *Phase 3–Utilize the GBT for WAS Thickening*: This scenario would include using the existing GBT to thicken WAS only and would allow the gravity thickener to be used for primary sludge, which is more common by today's standards than gravity thickening of WAS. Under this future scenario, the existing filter backwash storage tank may be repurposed as a WAS holding tank upstream of the GBT. This tank would require aeration to avoid septic conditions and severe odors in the GBT room. The existing WAS pumps in the Sludge Pump and Metering Building would be replaced to pump WAS to the gravity thickener, GBT, or WAS storage tank. Alternatively, the existing filter backwash storage tank could be repurposed for other uses such as liquid biosolids storage, which is further discussed in Paragraph I below. If the filter backwash storage tank is not available for WAS storage, the WAS pumps could feed the GBT directly. The cost opinions for the options Phase 3 with WAS storage and Phase 3 with direct WAS pumping to the GBT are included in Table 7.06-6 as Phase 3a and Phase 3b, respectively.

	Opinion of Project Cost
Phase 1-Gravity Thickener Sludge Density Meter Control	$ -
Phase 2-Thickened Sludge Pump Station and Piping Improvements	$ 873,000
Phase 3a-GBT WAS Thickening Improvements (with WAS storage)	$ 1,226,000
Phase 3b-GBT WAS Thickening Improvements (direct pumping to GBT)	$ 560,000

Table 7.06-7 Sludge Thickening Opinions of Probable Project Cost

I. Liquid Biosolids Storage

The plant currently dewaters biosolids 7 days per week and about 5 to 6 hours per day. Adding liquid storage facilities for digested biosolids would allow the plant to dewater biosolids less frequently and would also improve flexibility for the digestion and dewatering operations. In addition, the storage tank could be fitted with a membrane biogas storage cover to provide both biosolids and biogas storage improvements. A membrane-type cover would be recommended in this case to allow the liquid level in the tank to vary from empty to full. The best option at the plant for such a tank would be the existing filter backwash storage tank. This tank is not in regular use and is available. However, as noted in Paragraph K above, this tank may be repurposed for WAS holding, depending on the success of the interim sludge thickening operations and modifications implemented. Therefore, the decision as to which use is best for filter backwash storage tank should be made in the future based on the plant's experience with the sludge thickening operations. The opinion of probable cost for this project is $1,850,000.

J. Dewatered Biosolids Storage

Covering of the biosolids storage pads is considered to prevent precipitation from wetting the dewatered biosolids. Two storage buildings will be located to cover the existing storage pads. A building area of approximately 72,000 ft^2 is assumed based on projected future biosolids production including future chemical phosphorus removal sludge, 150 days of storage in accordance with IEPA 370, and a biosolids stack height of 4 feet. At $35 per square foot plus contingencies, contractor's general conditions, and technical services, the opinion of probable construction cost is $3,800,000 for covered biosolids storage.

This cost could be reduced if a centrifuge is installed, as described in biosolids dewatering Alternative BD-2, because of the increased dewatering performance. The centrifuge could likely produce 25 percent TS, which would reduce the biosolids volume to be stored by approximately 36 percent, and, as a result, the biosolids storage building footprint and cost would be proportionally reduced. A building area required for future biosolids production at 25 percent TS, and a 4 foot stack height is approximately 46,000 ft^2. Also note that the stack height would likely be greater than 4 feet if the biosolids concentration is 25 percent. However, since this material is not available to measure, we have assumed a 4-foot stack height for planning purposes. The opinion of probable construction cost of covered storage assuming centrifuge dewatering is $2,456,000. This cost is included in Section 8 because Alternative BD-2 is recommended.

K. Plant Utilities

Replacement of the nonpotable water (NPW) systems was evaluated for the GWA WWTP including new NPW yard piping and yard hydrants. The opinion of probable cost for the GWA WWTP NPW yard piping replacement is $925,000. Additionally, the opinion of probable cost for replacement of the GWA WWTP site natural gas piping is approximately $60,000.

L. HVAC System Replacement

Several HVAC systems have been identified as exceeding its expected life and is in need of replacement. The costs presented only include replacement of the equipment and does not include replacement of ductwork, insulation, or piping. The Screenings Building has four explosion-proof electric forced air heaters, the Grit Building has two explosion-proof electric forced air heaters, and the LCSTF has four explosion-proof electric forced air heaters that require replacement. In the Administration Building, the chiller, duct heater, and the building controls are in need of replacement. The HVAC equipment replacement in each of these buildings would likely coincide with other projects that include work in these buildings. The Administration Building HVAC replacement is assumed to be included in the annual capital replacement budget. The opinions of probable cost for each of these buildings are included in Table 7.06-8.

	Opinion of Project Cost
Screenings Building HVAC Replacement	$ 18,000
Grit Building HVAC Replacement	$ 9,000
LCSTF Grit Building HVAC Replacement	$ 18,000
Administration Building HVAC Replacement	$ 120,000

Table 7.06-8 HVAC Equipment Replacement Opinions of Probable Cost

M. Electrical Service, Backup, and Redundancy

The main facility electric distribution system to the individual buildings consists of two underground Medium Voltage (MV) distribution circuits. Either MV circuit can be used to serve all critical plant loads. However, these two underground circuits share common duct banks and three common manholes, which introduce common points of failure to both circuits. The two circuits can be made independent by adding a new duct bank and by adding two pad-mounted switchgear enclosures near each existing manhole. In addition, most of the existing MV cabling is approaching the end of its expected life and should be scheduled for replacement.

There are also two areas that do not have redundant step-down transformers: the Main Cryogenic Compressor and the Administration Building. Redundant transformers and 480 V feeders to the areas should be considered. The Main Cryogenic Compressor Service Entrance/Starter is at the end of its useful life and should be scheduled for replacement.

Finally, cable testing efforts require significant de-termination of cabling. Addition of circuit breakers at the Low Voltage (LV) terminals of the step-down transformers would reduce cable testing efforts.
An opinion of probable cost is shown in Table 7.06-9.

	MV Grid Separation and MV Cable Replacement	Cryogenic Compressor Redundant Supply and New Service	Admin Building Redundant Supply	Isolation Breakers at Transformer LV Terminals for Cable Testing
Material Cost	$ 350,000	$ 170,000	$ 80,000	$ 180,000
Total Opinion of Probable Cost	$ 830,000	$ 250,000	$ 160,000	$ 240,000

Table 7.06-9 Electric Power Distribution Upgrade Opinions of Probable Cost

N. Remote Site Communication

GWA currently uses leased-line (telephone) telemetry to communicate with nine remote sites. Recently, GWA has experienced a sharp increase in rates for the leased lines. While leased lines have generally been reliable, outages can be lengthy if the phone company is not responsive. Therefore, given the increase in rates, it may be prudent to consider radio communication for the remote sites. A general opinion of probable cost for conversion to radio communication is $7,000 to $11,000 per site, plus $10,000 for a radio path survey and $12,000 for design fees. Six of the remote sites are flowmeter remote telemetry unit (RTU) sites that would likely require very tall antenna towers for reliable communication. Thus, given the likely objection of nearby residents, an on-demand cell phone based alternative could be considered for these six sites. The on-demand communication would store the flow metering data and upload to the SCADA system several times daily. On-demand communication equipment costs and cell phone charges will be approximately $90 per month. For the purposes of planning, cellular on-demand communication is assumed for the six remote metering sites and radio communication equipment is assumed for the remaining three sites. An allowance of $160,000 is included in the capital plan in Section 8 for this project.

O. Site Lighting

Many of the existing poles used for site lighting are corroded, which reduces their ability to withstand high winds. The poles should be scheduled for replacement. At the time of pole replacement, we recommend that the wiring be replaced and that the site lighting fixtures be converted to light-emitting diode (LED). LED fixtures more efficiently disperse the light, which allows fixture wattages to be reduced and/or fixture spacing to be increased. A new site lighting design should be performed to incorporate energy-saving control features available with LED lamps. The site lighting design may result in elimination or reduction of lighting in some areas and addition of lighting in other areas. A general opinion of probable cost for new lighting and associated poles, wiring, and controls is $5,000 to

$7,000 per pole. Overall, a cost of $160,000 to $230,000 should be expected. There are currently some funding opportunities through the Department of Commerce and Economic Opportunity that will help to offset the cost.

P. MCC Replacement

MCCs in the Grit, Cryo, and Raw Sewage Pumping Buildings are original equipment and should be scheduled for replacement. The cost opinions for replacement of the MCCs in the Cryo and Raw Sewage Pumping Buildings are included with the electrical costs for recommended process improvements in those buildings noted elsewhere in this facilities plan.

Our opinion of probable cost of replacement of the Grit MCC is $200,000.

Q. PLC Replacements

PLCs throughout the facility are Allen-Bradley-type SLC, which is no longer a supported platform in the Allen-Bradley PLC family. Over the next several years, maintenance and replacement parts will become difficult commodities to procure. Thus, to ensure that the control schemes are relatively current and serviceable, the PLCs should be scheduled for replacement with ControlLogix PLCs. The cost opinions for replacement of the PLCs in the Cryo and Raw Sewage Pumping Buildings are included with the electrical costs for recommended process improvements in those buildings noted elsewhere in this facilities plan. The costs for PLC replacement associated with other buildings and processes will range from $25,000 to $50,000 per application. Assuming the quantity of PLCs is approximately 20, an overall budget of $750,000. This opinion does not include programming, which has historically been performed by GWA personnel.

R. Electronic O&M Manual

The electronic O&M manual project includes the preparation of written introduction, process, and utility sections of the GWA WWTP facility. The individual process section include written descriptions and information for processes, equipment, operations, controls, and maintenance. The document will be provided as a hard copy and as an electronic copy in Adobe Portable Document Format (pdf) or equivalent. Preliminary opinion of services for the preparation of the electronic O&M manual is $300,000. The final cost of services for preparing the electronic O&M manual will vary depending on the detail and scope desired.

SECTION 8
RECOMMENDED PLAN AND FISCAL IMPACT ANALYSIS

Previous sections of this report presented background information, described and evaluated the GWA WWTP projected flows and loadings, and reviewed alternatives necessary to meet the projected needs at the LCSTF and WWTP. This section presents a summary of the proposed modifications to the GWA LCSTF and WWTP, an overall cost summary, preliminary financing plan for the proposed improvements, and the fiscal impact of the recommended plan on the GWA's customers.

8.01 RECOMMENDED PLAN SUMMARY

The recommended plan includes modifications to many portions of the existing GWA LCSTF and WWTP. The recommended alternatives and common needs projects are summarized in Table 8.03-1 along with the implementation schedule and opinions of probable cost. Table 8.02-1 also proposes combining several projects based on project need and potential cost savings that could be achieved with related projects. Figure 8.01-1 presents the preliminary site plans for the recommended improvements at the WWTP. The preliminary design conditions for the recommended plan are summarized in Tables 8.01-2 and 8.01-3 for the LCSTF and WWTP, respectively. A brief summary of the recommended improvements for each project are summarized below.

A. Valley View Lift Station

This project includes the following:

1. Replace existing pumps with two submersible pumps, and install a valve vault, emergency bypass connections, and magnetic flow metering.

2. Construct a building and install a 100 kW diesel-powered standby generator, fuel tank, and electrical equipment.

B. Remote Site Communication

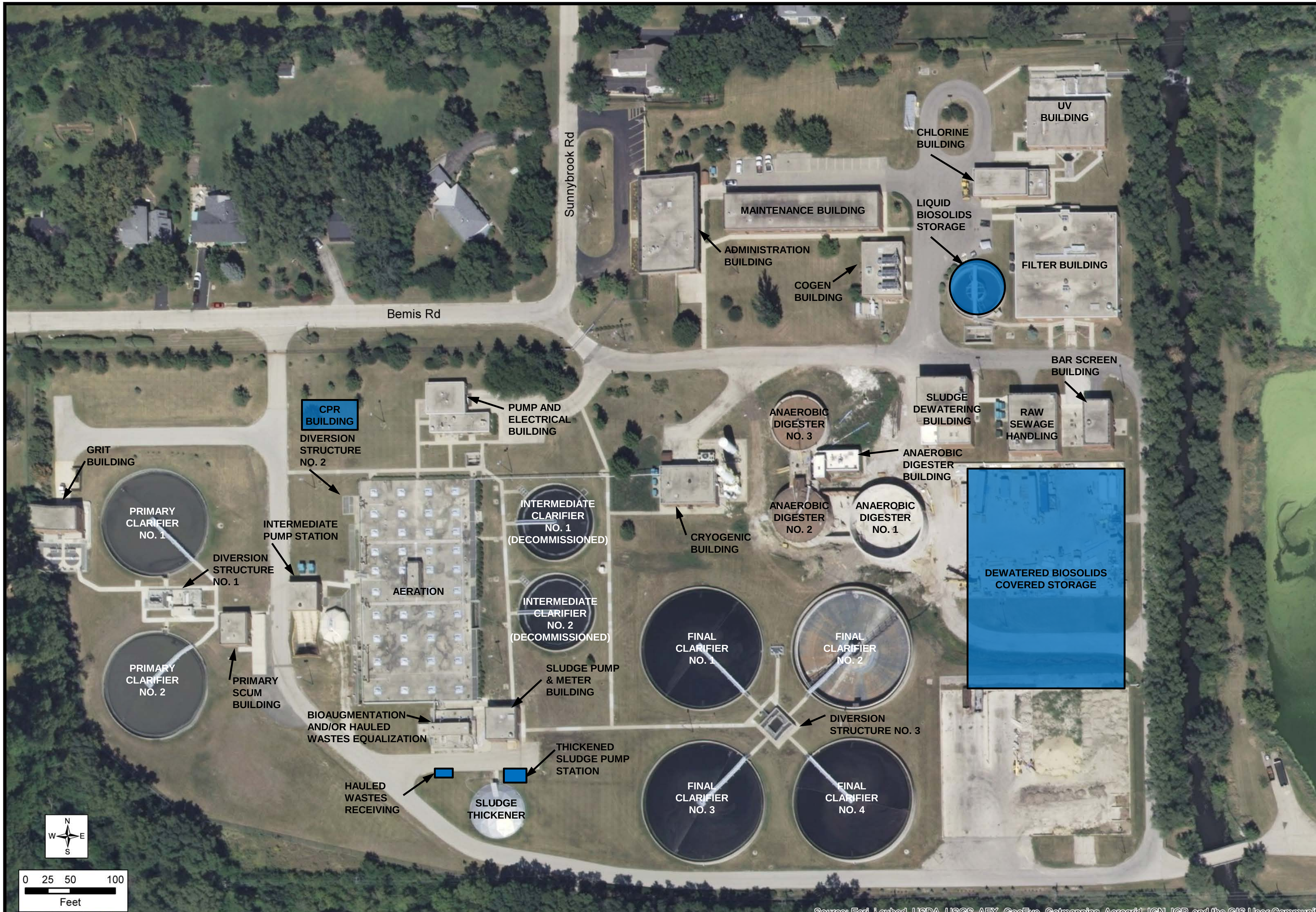
This project includes installation of radio communication equipment at three pump stations, on-demand cell phone communication at six flowmeter RTU sites, and SCADA integration.

C. LCSTF Screening Improvements

The existing mechanical coarse screen will be replaced with a new mechanical fine screen with this project as well as modifications to the screen channel to accommodate the narrower mechanical fine screen.

TABLE 8.01-1–LCSTF UNIT PROCESS–PRELIMINARY DESIGN CRITERIA

Item	Design Parameter
Design Year	2033
Flows and Loadings	
Maximum Hour Flow (mgd)	58
Mechanical Fine Screen (LCSTF Screening Improvements Project)	
Number of units	1
Size of Openings	1/4 inch
Capacity (mgd)	58
Grit Removal (LCSTF Grit Removal Improvements Project)	
Number of units	2
Type	Vortex
Capacity, each (mgd)	30
Final Clarifiers (LCSTF Clarifier Mechanism Replacement Project)	
Number of units	2
Diameter (feet)	145



WWTP RECOMMENDED PLAN

FACILITIES PLAN
GLENBARD WASTEWATER AUTHORITY
DUPAGE COUNTY, ILLINOIS

STRAND ASSOCIATES®

FIGURE 8.01-1
1278.047

Path: S:\MAD\1200--1299\1278\047\Data\GIS\Figures\Figure 3.02-1 Site Plan 11x17.mxd User: danc Date: 9/17/2012 Time: 11:12:12 AM

TABLE 8.01-2–WWTP UNIT PROCESS–PRELIMINARY DESIGN CRITERIA

Item	Design Parameter
Design Year	2033
Flows and Loadings	
Average Annual Flow (mgd)	16.02
Maximum Day Flow (mgd)	40.56
Maximum Hour Flow (mgd)	47.00
Average BOD Load (lbs/day)	18,600
Maximum Month BOD Load (lbs/day)	24,700
Average TSS Load (lbs/day)	21,800
Maximum Month TSS Load (lbs/day)	29,000
Average NH_3N Load (lbs/day)	3,800
Average Phosphorus Load (lbs/day)	800
Mechanical Bar Screens	
Number of Units	2
Bar Spacing	3/16 inches
Capacity Each, mgd	47
Screenings Washer and Compactor	
Number of Units	1
Raw Sewage Pumps (2018 Upgrades Project)	
Number of Pumps	4
Type	Centrifugal, VFD
Wet Well Type	Prerotational
Rated Capacity of Each Unit, mgd	15.7
TDH, feet	65
Firm Capacity, mgd	47
Grit Removal System	
Number of Grit Basins	2
Type	Vortex
Grit Collector Capacity Each, mgd	23.5
Number of Grit Pumps	2
Grit Pump Capacity Each, gpm	250
Type of Grit Washer	Vortex
Number of Grit Washers	2
Primary Clarifiers	
Number of Units	2
Diameter, feet	110
SWD, feet	10
Surface Overflow Rate, gpd/ft^2	
@ 16 mgd	844
@ 47 mgd	2,470
Peak Flow Capacity, mgd (Based on 1,800 gpd/ft^2 SOR)	34.2
Weir Overflow Rate, gpd/ft.	
@ 47 mgd	68,000

Item	Design Parameter
Primary Sludge Pumps	
Number of Units	2
Type	Progressing Cavity
Capacity Each, gpm	300
Activated Sludge	
Mode of Operation	Single-Stage HPO
Train 1	
Volume, gallons	337,000
Dimensions, feet	127 x 25 x 14.17 (SWD)
Number of Mixers	4
Mixer Motor hp Each	30, 15, 10, 7.5
Train 2	
Volume, gallons	269,000
Dimensions, feet	127 x 20 x 14.17 (SWD)
Number of Mixers	4
Mixer Motor hp Each	25, 10, 7.5, 7.5
Trains 3, 4, and 5	
Volume Each, gallons	280,000
Dimensions Each, feet	127 x 20 x 14.73 (SWD)
Number of Mixers Each Train	4
Mixer Motor hp Each Train	15, 7.5, 7.5, 7.5
Trains 6, 7, 8, 9, and 10	
Volume Each, gallons	350,000
Dimensions Each, feet	127 x 25 x 14.73 (SWD)
Number of Mixers Each Train	4
Mixer Motor hp Each Train	20, 10, 7.5, 7.5
Total Activated Sludge Volume, gallons	3,196,000
Intermediate Clarifiers	
Number of Units (Decommission)	2
Diameter, feet	85
Intermediate/RAS Pump Station Pumps (2018 Upgrades Project)	
Number of Units	3
Type	Determine at Design
Capacity Each, gpm	12,500
Nitrate Recycle Pump Station Pumps (Denitrification Modifications Project)	
Number of Units	3
Type	Determine at Design
Capacity Each, gpm	Determine at Design
Carbo RAS Pumps (Decommission)	
Number of Units	4
Type	Centrifugal
Carbo WAS Pumps (Decommission)	
Number of Units	1
Type	Submersible

Item	Design Parameter
Cryogenic Oxygen Plant	
Maximum Capacity, tons/day	32
Minimum Stable Operating Capacity, tons/day	20 to 23
Compressor Motor hp	700
Chemical Phosphorus Removal (Chemical Phosphorus Removal Project)	
Phosphorus Removal Chemical	Determine with jar testing
Bulk Storage, gallons	
Bioaugmentation (Bioaugmentation Project, if required)	
Volume, gallons (Repurposed ATAD tanks less volume for hauled wastes, if used)	60,000 to 120,000
Final Clarifiers	
Number of Units	4
Diameter, feet	135
SWD, feet	14
Surface Overflow Rate, gpd/ft^2	
@ 16 mgd	279
@ 47 mgd	818
Solids Loading, lbs/ft2/day.@ 16 mgd, RAS=8 mgd, and 5,500 mg/L MLSS	19.2
Peak Hour Capacity, mgd (800 gpd/^{ft2} for nitrification stage)	46
Weir Overflow rate, gpd/ft @ 47 mgd	27,700
WAS Pumps (Sludge Thickening Phase 3 Improvements Project)	
Number of Units	2
Effluent Filtration (2018 Upgrades Project)	
Number of New Disc Filter Units	5 to 7
Dimensions of Each Filter Basin, feet	
Length	37
Width	18
Filtration Rate, gpm/ft^2	
@ 14.5 mgd	1
@ 47 mgd (One unit out of service)	5
Filter Backwash Pumps (2018 Upgrades Project)	
Number of Units	2
Spent Backwash Pumps (2018 Upgrades Project)	
Number of Units	2
UV Disinfection (2018 Upgrades Project)	
Number of Channels (Modify existing depending on selected equipment)	-
Gravity Sludge Thickener	
Number of Units	1
Diameter, feet	55
SWD, feet	10
Design Solids Loading Rate, lbs/day/ft2	600
Design Overflow Rate, gpd/ft2	600

Item	Design Parameter
Thickened Sludge Pumps (Sludge Thickening Improvements)	
Number of Units (relocate existing pumps to new Thickened Sludge Pump Station)	2
Type	Progressing Cavity
Capacity, gpm	375
TDH, feet	48
hp, each	25
Gravity Belt Thickener (GBT)	
Number of Units	1
GBT Thickened Sludge Pumps	
Number of Units	1
Type	Progressing Cavity
Capacity, gpm	125
TDH, feet	47
hp, each	25
Anaerobic Digester No. 1	
Type	Primary
Cover Type	Floating Holder
Diameter	80 ft
Side Water Depth	23.5 ft
Volume	933,000 gallons
Anaerobic Digester No. 2	
Type	Primary
Cover Type	Floating Holder
Diameter	60 ft
Side Water Depth	23.5 ft
Volume	525,000 gallons
Anaerobic Digester No. 3	
Type	Secondary
Cover Type	Floating Gas Holder
Diameter	60 ft
Side Water Depth	18.5 ft
Volume	375,000 gallons
Liquid Biosolids Storage (Liquid Biosolids Storage Improvements Project)	
Number of Units (Repurposed Filter Backwash Water Clarifier)	1
Diameter, feet	55
Cover Type	Membrane
Volume, gallons	240,000
Liquid Biosolids Transfer Pumps–Filter Building (Liquid Biosolids Storage Improvements Project)	
Number of Units	2
Capacity Each, gpm (match centrifuge)	250
Sludge Recirculation Pumps	
Number of Units	3
Type	Progressing Cavity
Capacity, gpm	360
TDH, feet	35
hp, each	15
Digester Sludge Transfer Pumps	

Item	Design Parameter
Number of Units	2
Type	Centrifugal
Capacity, gpm	350
TDH, feet	30
hp, each	10
Combination Boiler/Heat Exchangers	
Number	2
Capacity Each, million BTU/hr	1.5
Digester Mixing Pumps	
Type	Dry Pit Horizontal
Anaerobic Digester No. 1	
Number	2
Capacity Each, gpm	2,290
Anaerobic Digester No. 2 and No. 3	
Number	2 (1 per digester)
Capacity Each, gpm	3,024
Digested Sludge Transfer Pumps	
Number of Units	2
Type	Progressing Cavity
Capacity, gpm	160
TDH, feet	126
hp, each	15
Digested Sludge Transfer Tanks	
Number (One repurposed to TWAS Storage)	1
Capacity Each, gallons	35,000
TWAS Storage (Sludge Thickening Phase 3)	
Number (Repurposed Digested Sludge Transfer Tank)	1
Capacity Each, gallons	35,000
Biosolids Dewatering Feed Pumps–Anaerobic Digester	
Number of Units	3
Type	Progressing Cavity
Sludge Dewatering BFP (Biosolids Dewatering Equipment Replacement Project)	
Number of Units (One unit removed)	1
Size, meters	2.2
Sludge Dewatering Centrifuge (Biosolids Dewatering Equipment Replacement Project)	
Number of Units	1
Capacity, gpm	250
Dewatered Biosolids Covered Storage (2018 Upgrades Project)	

Item	Design Parameter
Average Biosolids Cake @ 25% Solids, ft^3/week (includes phosphorus sludge)	6,840
Storage Capacity (days)	150
Volume Required @ 25% Solids, ft^3	146,600
Stacking Height (feet)	4
Required Area, ft^2 (includes working area)	46,000
Hauled Wastes Equalization (Hauled Wastes Receiving Phase 2, if required)	
Volume, gallons (Repurposed ATAD Tanks, size to be determined at design)	20,000-60,000
Electrical Generators	
Number of Units	3
Capacity Each, kW	815

D. LCSTF Grit Removal Improvements

The Grit Removal Improvements project includes the following:

1. Construct two new vortex grit removal system tanks, associated channels, and equipment. The two 18-foot-diameter tanks will be constructed at the location of the existing two aerated grit removal tanks.

2. Replace the existing explosion proof unit heaters.

E. LCSTF Clarifier Mechanism Improvements

This project replaces the two 145-foot-diameter clarifier mechanisms. The existing clarifier drives are considered to be in acceptable condition and will be reinstalled.

F. LCSTF and WWTP Lagoon Dredging

The LCSTF and WWTP lagoons requires additional investigations including lagoon sludge depth, sludge sampling, liner evaluation, berm evaluation, and soil borings. This project assumes only sludge removal of two LCSTF lagoons and two WWTP lagoons.

G. Hauled Wastes Receiving Phase 1

Leachate, holding tank wastes, and septage receiving project includes a catch basin and manual bar rack to be constructed near the gravity thickener and ATAD tanks and a sewer connected to the West Glen Ellyn interceptor in the yard.

H. Hauled Wastes Receiving Phase 2

If volumes or loadings dictate the need for this project, an ATAD tank will be converted into a hauled wastes equalization tank including mixing and pumping system.

I. Screening and Influent Pumping Improvements

1. Screening Building HVAC Replacement

   Replace the four existing explosion-proof unit heaters.

2. Influent Pump Station Improvements

   a. Construct a new dedicated conditioned space for the motor control equipment, install new VFDs, and replace the MCCs.

   b. Replace existing pumps with four dry-pit pumps and install prerotation basins in each of the three existing wet wells.

c. Replace the existing hydraulically operated plug valves. All new valves will have electric operators.

d. Replace sluice gate hydraulic operators with electric operators (7 total). Modify stems for raising the wet well gate elevations for the prerotation basins. Temporary bypass pumping is required for this work.

J. Intermediate Pump Station Modifications

1. Replace Intermediate Pump Station pumps. The station would only pump RAS in single-stage operation, but it is assumed to provide capacity for forward flow as well in the event that the activated sludge process is converted back to two-stage HPOAS.

2. Provide structural and electrical improvements to the Intermediate Pump Station.

K. Activated Sludge Improvements

1. UNOX Deck Control Improvements

Replace and upgrade controls and valves on the UNOX deck.

2. Activated Sludge Final Stage Modifications

Modify the final nitrification stage deck in each train for stripping dissolved carbon dioxide, which will increase the pH and could promote an increased nitrifier growth rate. Modifications would include the addition of a vent to open the stage to the atmosphere, mechanical modifications to the air monitoring system, oxygen supply piping modifications, and the addition of piping and an isolation valve to shut off oxygen migration.

L. Bioaugmentation

The bioaugmentation project converts the ATAD basins to a side-stream bioaugmentation process to improve the nitrification ability of the single-stage HPOAS process. A study with a detailed evaluation of the bioaugmentation process is recommended before design. The project includes conversion of the ATAD basins into bioaugmentation basins, surface aerator replacement, installation of an alkalinity addition system, installation of dewatering filtrate pumps in the Sludge Dewatering Building, and installation of associated underground RAS, centrate, and bioaugmentation mixed liquor piping.

M. Denitrification Modifications

1. Reconfigure all ten trains to provide anoxic zones including new anoxic mixers. Large scale pilot testing is recommended.

2. Install nitrate recycle station, pumps, and recycle piping for the 10 trains.

3. Modify the first stage deck to an anoxic zone. Modifications would include the addition of a vent to open the stage to the atmosphere, mechanical modifications to the air monitoring system, oxygen supply piping modifications, and the addition of piping and an isolation valve to shut off oxygen migration.

N. Chemical Phosphorus Removal

This project includes construction of a new CPR building for bulk storage and pumping located near the Pump and Electrical Building, CPR piping, and control equipment. Evaluations that should be conducted when the phosphorus limit is known include CPR jar testing to select the phosphorus removal chemical and site specific chemical demand, BPR testing, and pilot testing.

O. Effluent Filtration, UV Disinfection, and Biosolids Storage Project

The effluent filtration, UV disinfection, and dewatered biosolids covered storage improvements are combined as a single project because of similar priorities for implementation and vicinity of these projects.

1. Effluent Filtration

Conversion from the existing deep bed effluent filtration to disc filters includes demolition of the deep bed filter basins for installation of the new filter units (five basins required for the Kruger Hydrotech Disc Filter), structural modifications to the disc filter basins, new walkways over the disc filter basins, and piping changes. The disc filter manufacturers should be further evaluated during design.

2. UV Disinfection

This portion of the project includes replacement of the existing UV disinfection equipment with a new disinfection system and the associated structural modifications to retrofit new equipment to the channels. Further evaluation of the Xylem-Wedeco Duron, Ozonia Aquaray 3X, and TrojanUV 3000Plus equipment nonmonetary factors is recommended during design.

3. Dewatered Biosolids Covered Storage

This project includes the construction of a 46,000 ft^2 building for dewatered biosolids storage located at the existing dewatered biosolids storage pads.

P. Sludge Thickening Phase 2 Improvements

This project is an option if the Phase 1 sludge thickening with the solids density meters does not consistently achieve a 3.5 percent solids feed to the digesters. The Phase 2 sludge thickening improvements includes a new thickened sludge pump station located at the gravity sludge thickener, relocation of the existing thickened sludge pumps to the new pump station, and connection of a new sludge force main to the existing 6-inch line in the yard.

Q. Sludge Thickening Phase 3 Improvements

This project provides additional sludge thickening flexibility with the modifications to allow GBT thickening of WAS only and gravity thickening of primary sludge only. For this plan, the filter backwash tank is assumed to be used for liquid biosolids storage rather than WAS storage. Further evaluation may be required during design to decide if WAS storage is required. This project includes new WAS pumps, and piping modifications in the Sludge Dewatering Building.

R. Sludge Thickening and Biosolids Improvements

1. Liquid Biosolids Storage Improvements

Liquid biosolids storage would allow the plant to dewater biosolids less frequently and would also improve flexibility for the digestion and dewatering operations. The liquid biosolids storage project includes conversion of the filter backwash tank for liquid biosolids storage and installation of a membrane cover, underground sludge piping, digester gas piping, and centrifuge feed pumps at the Filtration Building.

2. Biosolids Dewatering

The Biosolids Dewatering project replaces one of the existing BFPs with a centrifuge. The remaining BFP will serve as an emergency backup.

S. Nonpotable Water and Natural Gas Yard Piping Improvements

The nonpotable water and natural gas yard piping at the WWTP will be replaced with this project.

T. Electrical Improvements

This project includes replacement of the following:

1. Grit Building MCC replacement
2. Cryo Building MCC and PLC replacement
3. Electrical Service, Backup, and Redundancy
    a. MV grid separation and MV cable replacement
    b. Cryogenic compressor redundant supply and new service entrance/starter
    c. Administration Building redundant supply
    d. Isolation breakers at transformer LV terminals for cable testing
4. PLC replacements
5. Site lighting replacement

T. Electronic O&M Manual

The electronic O&M manual project includes the preparation of a written document including individual process descriptions and information for processes, equipment, operations, controls, and maintenance.

8.02 FUTURE NUTRIENT REMOVAL CONSIDERATIONS

The potential for future TP and TN discharge limits and their impact on treatment processes was discussed in Sections 5, 6, and 7. The biological treatment system selected for the recommended plan is amenable to modification for the purpose of meeting future nutrient limits. Consideration will be given to potential modifications during design of the aeration tanks.

If future lab-scale assessment determines potential for BPR, the activated sludge system could be evaluated further to promote phosphorus removal by converting a portion of the first stage of the aeration basins to an anaerobic zone. Achieving an anaerobic zone may be difficult, however, because of the high purity oxygen process and limited control of the cryogenic plan oxygen generation. This plan assumes TP limits are 0.5 mg/L, there is inadequate potential for BPR, and chemical phosphorus removal addition is required. A new chemical building with chemical storage tanks and feed pumps will be constructed. To reliably remove phosphorus to 0.5 mg/L, the WWTP would likely also require upgrades to the existing sand filters with cloth media, which is also included in the plan.

Modification of the WWTP to meet future TN limits of 10 mg/L would require the reconfiguration of the aeration basins to implement a process that removes nitrogen using one or more anoxic zones. Simultaneous nitrogen and phosphorus removal could also be achieved by implementing anaerobic, anoxic, and aerobic zones in the biological treatment system. If TN limits are lower, such as 3 mg/L, additional tankage and supplemental carbon addition would likely also be required.

8.03 FUTURE AMMONIA LIMIT CONSIDERATIONS

More stringent ammonia limits could be contained in the 2017 reissued permit and a three-year or longer compliance may be included. Maintaining the flexibility to operate in two-stage is recommended. Additional activated sludge tankage and/or conversion to air activated sludge may be required if the WWTP cannot demonstrate meeting these estimated limits

8.04 OPINION OF CAPITAL COSTS AND PROJECT FINANCING

The opinions of capital costs for each of the recommended improvements are summarized in Table 8.04-1. Each project is listed on the year of anticipated bidding. The opinions of capital costs are also projected to the planned project bid year cost by applying a construction inflation rate of 3 percent annually. A more detailed capital plan is included in Appendix F.

The WWTP improvements are anticipated to be funded through capital fund contributions by the Glen Ellyn and Lombard. The Effluent Filtration, UV Disinfection, and Biosolids Storage project in 2016 is anticipated to be funded by a low-interest loan from the IEPA, Table 8.04-2. The existing LSCTF project debt service will have a final payment in 2015, the existing Biosolids Improvements Project debt service will have a final payment in in 2016, and, in 2026, the existing Digester Improvements Project debt service will have its final payment due. A debt service payment for the Effluent Filtration, UV Disinfection, and Biosolids Storage project of $980,000 was estimated based on the current fiscal year 2013 IEPA interest rate of 1.93 percent and a 15-year term.

TABLE 8.04-1–OPINIONS OF PROJECT COST AND IMPLEMENTATION SCHEDULE

Project Year	Project	Opinion of Probable Cost[1]	Project Year Projected Cost[2]
2014	Valley View Pump Station	$ 2,047,000	$ 2,108,000
	LCSTF Clarifier Mechanism Replacement	277,000	285,000
	2014 Total		**$ 2,393,000**
2015	Remote Site Communication	$ 160,000	$ 170,000
	2015 Total		**$ 4,956,000**
2016	Screening and Influent Pumping Improvements:		
	Screening Building HVAC Replacement	$ 18,000	$ 20,000
	Influent Pump Replacement and Improvements	4,115,000	4,497,000
	Effluent Filtration, UV Disinfection Project, and Biosolids Storage		
	Effluent Filtration	6,982,000	7,629,000
	UV Disinfection	2,330,000	2,546,000
	Dewatered Biosolids Covered Storage	2,456,000	2,684,000
	IEPA Loan Project Subtotal		**$ 12,859,000**
	2016 Total		**$ 17,376,000**
2017	Electronic O&M Manual	$ 300,000	$ 338,000
	2017 Total		**$ 338,000**
2018	Activated Sludge Improvements Project:		
	Intermediate Pump Station Modifications	$ 1,423,000	$ 1,650,000
	UNOX Deck Control Improvements	368,000	427,000
	Activated Sludge Final Stage Modifications[4]	218,000	253,000
	2018 Total		**$ 2,330,000**
2019	Hauled Wastes Receiving Phase 1	$ 238,000	$ 284,000
	Sludge Thickening Phase 2 Improvements[3]	873,000	1,042,000
	Sludge Thickening Phase 3 Improvements[5]	560,000	669,000
	2019 Total		**$ 1,995,000**
2020	Biosolids Dewatering Equipment Replacement	$ 2,292,000	$ 2,819,000
	Liquid Biosolids Storage Improvements[6]	1,850,000	2,275,000
	2020 Total		**$ 5,094,000**
2021	Chemical Phosphorus Removal[7]	$ 601,000	$ 761,000
	2021 Total		**$ 761,000**
2022	Electrical Improvements:		
	Grit Building MCC Replacement	$ 200,000	$ 261,000
	Cryo Building MCC and PLC Replacement	251,000	327,000
	Electrical Service, Backup, and Redundancy	1,480,000	1,931,000
	PLC Replacements	750,000	979,000
	Site Lighting	230,000	300,000
	2022 Total		**$ 3,798,000**

Project Year	Project	Opinion of Probable Cost[1]	Project Year Projected Cost[2]
2023	LCSTF and WWTP Lagoon Dredging	$ 1,000,000	$ 1,344,000
	LCSTF Screening Improvements	1,000,000	1,344,000
	2023 Total		**$ 2,688,000**
2024	LCSTF Grit Removal Improvements	$ 2,510,000	$ 3,474,000
	LCSTF Grit Building HVAC Replacement	18,000	25,000
	2024 Total		**$ 3,499,000**
2025	Plant Utilities Yard Piping Improvements	$ 985,000	$ 1,404,000
	2025 Total		**$ 1,404,000**
2026	Hauled Wastes Receiving Phase 2[8]	$ 336,000	$ 493,000
	Bioaugmentation[9]	1,459,000	2,143,000
	2026 Total		**$ 2,636,000**
2027-31	**No Projects Planned**		
2032	Denitrification Modifications[7]	$ 1,322,000	$ 2,318,000
	2032 Total		**$ 2,318,000**

1 The opinion of probable cost is based on fourth quarter 2012 costs. Includes construction, engineering, and contingency.
2 Costs are projected with an inflation factor of 3 percent based on 2012 annual Engineering News Record construction cost index increase.
3 This project is assumed to occur with Sludge Thickening Phase 3 Improvements.
4 The activated sludge final stage modifications project to potentially improve nitrification may be required at an earlier date depending on activated sludge performance. An additional study and pilot testing could be conducted to verify the effects of opening the final stage on nitrification before this project.
5 This cost assumes direct WAS pumping to the GBT without WAS storage.
6 This project assumes the backwash filter clarifier is available to be repurposed for liquid biosolids storage.
7 The implementation schedule for this project could change because of the uncertainty of future regulatory requirements and its timing. Additional study and pilot testing may be required.
8 Equalization of hauled wastes may not be required.
9 Bioaugmentation may not be required.

	Cost Opinion[1]
Construction	$ 9,876,000
Contingency (10%)	988,000
Design Technical Services	835,000
Construction Technical Services	1,160,000
Total	$ 12,859,000

[1] Costs are inflated to construction year 2016 dollars with an inflation factor of 3 percent based on 2012 annual Engineering News Record construction cost index increase.

Table 8.04-2 Effluent Filtration, UV Disinfection, and Biosolids Storage Project Cost Opinion

8.05 FISCAL IMPACT ANALYSIS

Through staging the projects over the planning period, the customer communities will have a gradual change in their rates. Glen Ellyn and Lombard provide annual contributions to the GWA capital fund, which will be used to fund these projects. The residential user charges of Glen Ellyn and Lombard are determined by their respective community. An average annual capital fund increase of 10 percent is planned to fund the recommended projects; see Table 8.05-1.

Fiscal Year	Total Capital Fund Contributions	Percentage Increase
2014	$ 2,700,000	13%
2015	$ 2,970,000	10%
2016	$ 3,267,000	10%
2017	$ 3,594,000	10%
2018	$ 3,953,000	10%
2019	$ 4,358,000	10%
2020	$ 4,783,000	10%
2021	$ 5,262,000	10%
2022	$ 5,788,000	10%
2023	$ 6,366,000	10%
2024	$ 7,033,000	10%

Table 8.05-1 Capital Fund Increase

8.06 PROJECT IMPLEMENTATION SCHEDULE

Table 8.06-1 includes a preliminary project implementation schedule for the Effluent Filtration, UV Disinfection, and Biosolids Storage improvements project. In addition, the schedule assumes an approximate three-month review and approval duration by the IEPA for the facilities plan.

Submit Facilities Plan to IEPA	June 2013
IEPA Approval of Facilities Plan	October 2013
Submit Design to IEPA	October 2014
Submit IEPA Loan Application	October 2014
IEPA Approval of Design	January 2015
Advertise for Bids	February 2015
Construction Bid Date	March 2015
Construction Start Date	May 2015
Construction Completion	May 2017

Table 8.06-1 Effluent Filtration, UV Disinfection, and Biosolids Storage Project Implementation Schedule

8.07 ENVIRONMENTAL IMPACT SUMMARY

The IEPA Environmental Checklist and associated correspondence to the various agencies are included in Appendix G. No difficulties are anticipated with the process of obtaining IEPA confirmation of the environmental status of the project. The Valley View Pump Station project and LCSTF projects are planned to be funded through the GWA capital fund. The GWA WWTP projects are planned to be funded through the GWA capital fund except for the Effluent Filtration, UV Disinfection, and Biosolids Storage project, which is anticipated to be financed through an IEPA low interest loan.

A. Rare and Endangered Species

The IDNR's EcoCAT system was used to confirm there were no occurrences of wetlands, listed endangered or threatened species, Illinois Natural Area Inventory Sites, dedicated Illinois Nature Preserves, or registered Land and Water reserves in the vicinity of the LCSTF and WWTP project sites. This information is included in Appendix G. The wetland review and consultation were terminated by the IDNR for the LCSTF and WWTP, and it is anticipated that no further IDNR coordination will be needed unless wetlands or other features are identified in the vicinity in the future. The consultation with IDNR's EcoCAT is valid for two years, so projects implemented in 2015 and later will require a new consultation.

B. Historical and Cultural Resources

1. Land Use

The Valley View Pump Station, GWA LCSTF, and WWTP projects include work on the existing sites, which are owned by the GWA.

2. Cultural and Historic Resources

A letter for the LCSTF and WWTP sites was sent to the Illinois Historic Preservation Agency (IHPA) regarding the potential effect of the projects on historic properties. No issues are anticipated. The letters sent to IHPA are included in Appendix G.

C. Air and Water Quality

1. Air Quality: Air quality should not be impacted by the proposed projects.
2. Lakes: No lakes would be directly impacted by the proposed projects.
3. Rivers: The GWA WWTP discharges to the East Branch of the DuPage River. Because the proposed WWTP design will incorporate new equipment and more efficient treatment processes, the WWTP should have improved effluent characteristics and treatment reliability.
4. Groundwater: The proposed modifications would not be expected to impact groundwater quantity or quality.

D. Recreational Areas

No parks, shorelands, or other recreational areas are anticipated to be directly impacted by the proposed projects.

E. Floodplains

The modifications and construction at the Valley View Pump Station, LCSTF, and GWA WWTP would be above 100-year floodplain elevations. The tops of tank walls and the ground floors of buildings will be constructed 1 foot above the 100-year floodplain elevation or higher.

F. Other Sensitive Environmental Areas

The proposed Valley View Pump Station, LCSTF, and WWTP construction does not infringe on any known existing wetlands. There should be no further action necessary regarding wetlands impacts to the Valley View Pump Station, LCSTF, and WWTP sites.

The proposed projects are not expected to have a negative impact on flora or fauna. Impacts of construction would be temporary in nature. Disturbed vegetation would be restored during construction and would return rapidly.

APPENDIX A
IEPA FACILITIES PLANNING SUBMITTAL CHECKLIST

IEPA - Facilities Planning Submittal Checklist
For Projects Seeking Assistance Under the ARRA of 2009

Before the Agency will begin review of a Facilities Plan, **ALL of the items below** comprising the basic minimum requirements of a Facilities Plan must be included and the **page number(s) of ALL items** noted.
If any of the basic information is not provided the planning and loan application will be returned.

Facilities planning should contain all pertinent information detailed in emergency rules filed to implement provisions of the American Recovery and Reinvestment Act of 2009. Loan applicants should be familiar with their planning responsibilities as detailed in those rules and as derived from Ill. Adm. Code 35, Sections 365.520 and 530.

Loan Applicant: Glenbard Wastewater Authority

Agency Use: L17

Consulting Engineer: Strand Associates, Inc. Phone: (608) 251-4843

Project Description: The Glenbard Wastewater Authority (GWA) Facilities Plan proposes several WWTP projects over the next 20 years. These projects include modifications to the existing plant to meet the anticipated flows and loadings as well as the anticipated state and federal water quality protection requirements. The modifications should result in increased treatment reliability and improved effluent quality. The design average flow for the GWA WWTP is not proposed to be increased.

Page(s)	
4-1, 4-2	Loan applicant's background information including location, historical population, makeup of customer base, conditions effecting growth, and 20 year design population/customer base.
1-1	Map(s) of existing FPA boundaries and discussion of any necessary modifications. Note: FPA boundary modifications entail additional requirements, review and sign-offs.
Sections 2, 3, and 6	Detailed description of the EXISTING collection system and treatment facilities, along with a clear identification for the need of the proposed project(s).
NA	Where applicable, information regarding an anti-degradation analysis pursuant to Ill. Adm. Code 35 Section 302.105 for a new or modified NPDES Permit.
2-2, 3-9, and Section 5	Discussion of existing and proposed NPDES Permit limits.
Section 7	Detailed discussion of the chosen alternative's capability to maintain compliance with all applicable laws and regulations in addition to addressing the identified system need(s).
8-2 through 8-8	Basis of Design for Chosen Alternative. The preliminary engineering data should include, to the extent appropriate, flow diagrams, unit process descriptions, detention times, flow rates, unit capacities, etc. to demonstrate that the proposed project will be designed in accordance with 35 Ill. Adm Code 370.

Page(s)

8-18 Inventory of environmental impacts of chosen alternative and a discussion of the measures required during design and construction to mitigate or minimize negative environmental impacts.

Note: The IEPA Loan Applicant Environmental Checklist must be signed by the loan applicant's authorized representative and submitted to the Agency with all applicable sign-offs before a final Planning approval can be issued.

Reproducible 8.5 x 11 inch map(s) showing the project(s) location(s) relative to the community.

Figure 1.02-1

Section 7 Detailed cost estimate for the alternative selected, including both capital and O, M & R costs over the 20-year planning period. The estimate should include cost items for design engineering, construction engineering, bidding, legal, construction and contingency.

8-14 through 8-18 Implementation plan for the proposed project including the anticipated construction schedule, the financial schedule, including necessary financial arrangements for assuring adequate annual debt service and O,M & R coverage requirements and a description of the dedicated source of revenue necessary for loan repayment. List any other funding involved in the project.

8-17 Detailed description of the existing residential rate structure, average water consumption or the basis for billing, current average monthly residential bill, any proposed rate changes and the proposed average monthly residential bill as a result of the project(s).

<u>Three Copies</u> of the Facilities Plan and related documents should be submitted to:

Infrastructure Financial Assistance Section (IFAS)
Illinois Environmental Protection Agency
1021 North Grand Ave. East
P.O. Box 19276
Springfield, IL 62794-9276

IFAS will distribute the planning documents to the appropriate Agency staff for review, comment and approval. IFAS will contact the loan applicant if further information is needed.

APPENDIX B
2006 NPDES PERMIT NOS. IL0021547 AND IL0022471

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 – (217) 782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601 – (312) 814-6026

ROD R. BLAGOJEVICH, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217/782-0610

August 24, 2006

SEP - 8 2006

Glenbard Wastewater Authority
21 W 551 Bemis Road
Glen Ellyn, Illinois 60137

Re: Glenbard Wastewater Authority
NPDES Permit No. IL0021547
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.

The Agency has begun a program allowing the submittal of electronic Discharge Monitoring Reports (eDMRs) instead of paper Discharge Monitoring Reports (DMRs). If you are interested in eDMRs, more information can be found on the Agency website, http://epa.state.il.us/water/edmr/index.html. If your facility is not registered in the eDMR program, a supply of preprinted paper DMR Forms for your facility will be sent to you prior to the initiation of DMR reporting under the reissued permit. Additional information and instructions will accompany the preprinted DMRs upon their arrival.

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 Abel Haile at the telephone number indicated above.

Sincerely,

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:ALD:AAH:06050901.bah

Attachment: Final Permit

cc: Records
Compliance Assurance Section
Des Plaines Region
NIPC

NPDES Permit No. IL0021547

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: September 30, 2011

Issue Date: August 24, 2006
Effective Date: October 1, 2006

Name and Address of Permittee:

Glenbard Wastewater Authority
21 W. 551 Bemis Road
Glen Ellyn, Illinois 60137

Facility Name and Address:

Glenbard Wastewater Authority
21 W. 551 Bemis Road
Glen Ellyn, Illinois 60137
(DuPage County)

Receiving Waters: East 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 standard conditions and attachments 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.

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:AAH:06050901.bah

NPDES Permit No. IL0021547

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall

Load limits computed based on a design average flow (DAF) of 16.02 MGD (design maximum flow (DMF) of 47 MGD).

Excess flow facilities (if applicable) shall not be utilized until the main treatment facility is receiving its maximum practical flow.

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:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS MG/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**	1336 (3920)		2672 (7840)	10		20	2 Days/Week	Composite
Suspended Solids	1603 (4704)		3207 (9408)	12		24	2 Days/Week	Composite
Dissolved Oxygen	Shall not be less than 6 mg/L						2 Days/Week	Grab
pH	Shall be in the range of 6 to 9 Standard Units						2 Days/Week	Grab
Fecal Coliform***	Daily Maximum shall not exceed 400 per 100 mL (May through October)						5 Days/Week	Grab
Ammonia Nitrogen as (N)								
April-October	200 (588)		401 (1176)	1.5		3.0	2 Days/Week	Composite
Nov. - Feb.	534 (1568)		1657 (4861)	4.0		12.4	2 Days/Week	Composite
March	361 (1058)	909 (2665)	1657 (4861)	2.7	6.8	12.4	2 Days/Week	Composite

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous BOD_5 ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 8.

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 daily maximum.

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

Dissolved oxygen shall be reported on DMR as minimum.

NPDES Permit No. IL0021547

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

Parameter	Sample Frequency	Sample Type
Flow (MGD)	Continuous	
BOD_5	2 Days/Week	Composite
Suspended Solids	2 Days/Week	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.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

Special Conditions

a. Carry out independent inspection and monitoring procedures at least once per year, which will determine whether each significant industrial user (SIU) is in compliance with applicable pretreatment standards;

b. Perform an evaluation, at least once every two (2) years, to determine whether each SIU needs a slug control plan. If needed, the SIU slug control plan shall include the items specified in 40 CFR § 403.8 (f)(2)(v);

c. Update its inventory of Industrial Users (IUs) at least annually and as needed to ensure that all SIUs are properly identified, characterized, and categorized;

d. Receive and review self monitoring and other IU reports to determine compliance with all pretreatment standards and requirements, and obtain appropriate remedies for noncompliance by any IU with any pretreatment standard and/or requirement;

e. Investigate instances of noncompliance, collect and analyze samples, and compile other information with sufficient care as to produce evidence admissible in enforcement proceedings, including judicial action;

f. Require development, as necessary, of compliance schedules by each industrial user for the installation of control technologies to meet applicable pretreatment standards; and,

g. Maintain an adequate revenue structure for continued operation of the Pretreatment Program.

2. The Permittee shall issue/reissue permits or equivalent control mechanisms to all SIUs prior to expiration of existing permits or prior to commencement of discharge in the case of new discharges. The permits at a minimum shall include the elements listed in 40 CFR § 403.8(f)(1)(iii).

3. The Permittee shall develop, maintain, and enforce, as necessary, local limits to implement the prohibitions in 40 CFR § 403.5 which prohibit the introduction of specific pollutants to the waste treatment system from <u>any</u> source of nondomestic discharge.

4. In addition to the general limitations expressed in Paragraph 3 above, applicable pretreatment standards must be met by <u>all industrial users</u> of the POTW. These limitations include specific standards for certain industrial categories as determined by Section 307(b) and (c) of the Clean Water Act, State limits, or local limits, whichever are more stringent.

5. The USEPA and IEPA individually retain the right to take legal action against any industrial user and/or the POTW for those cases where an industrial user has failed to meet an applicable pretreatment standard by the deadline date regardless of whether or not such failure has resulted in a permit violation.

6. The Permittee shall establish agreements with all contributing jurisdictions, as necessary, to enable it to fulfill its requirements with respect to all IUs discharging to its system.

7. Unless already completed, the Permittee shall within <u>six (6) months</u> of the effective date of this Permit submit to USEPA and IEPA a proposal to modify and update its approved Pretreatment Program to incorporate Federal revisions to the general pretreatment regulations. The proposal shall include all changes to the approved program and the sewer use ordinance which are necessary to incorporate the regulations commonly referred to as PIRT and DSS, which were effective November 16, 1988 and August 23, 1990, respectively. This includes the development of an Enforcement Response Plan (ERP) and a technical re-evaluation of the Permittee's local limits.

8. The Permittee's Pretreatment Program has been modified to incorporate a Pretreatment Program Amendment approved on October 1, 1996. The amendment became effective on the date of approval and is a fully enforceable provision of your Pretreatment Program.

Modifications of your Pretreatment Program shall be submitted in accordance with 40 CFR § 403.18, which established conditions for substantial and nonsubstantial modifications.

NPDES Permit No. IL0021547

Special Conditions

B. Reporting and Records Requirements

1. The Permittee shall provide an annual report briefly describing the permittee's pretreatment program activities over the previous calendar year. Permittees who operate multiple plants may provide a single report providing all plant-specific reporting requirements are met. Such report shall be submitted no later than April 28th of each year, and shall be in the format set forth in IEPA's POTW Pretreatment Report Package which contains information regarding:

a. An updated listing of the Permittee's industrial users.

b. A descriptive summary of the compliance activities including numbers of any major enforcement actions, (i.e., administrative orders, penalties, civil actions, etc.), and the outcome of those actions. This includes an assessment of the compliance status of the Permittee's industrial users and the effectiveness of the Permittee's Pretreatment Program in meeting its needs and objectives.

c. A description of all substantive changes made to the Permittee's Pretreatment Program. Changes which are "substantial modifications" as described in 40 CFR § 403.18© must receive prior approval from the Approval Authority.

d. Results of sampling and analysis of POTW influent, effluent, and sludge.

e. A summary of the findings from the priority pollutants sampling. As sufficient data becomes available the IEPA may modify this Permit to incorporate additional requirements relating to the evaluation, establishment, and enforcement of local limits for organic pollutants. Any permit modification is subject to formal due process procedures pursuant to State and Federal law and regulation. Upon a determination that an organic pollutant is present that causes interference or pass through, the Permittee shall establish local limits as required by 40 CFR § 403.5(c).

2. The Permittee shall maintain all pretreatment data and records for a minimum of three (3) years. This period shall be extended during the course of unresolved litigation or when requested by the IEPA or the Regional Administrator of USEPA. Records shall be available to USEPA and the IEPA upon request.

3. The Permittee shall establish public participation requirements of 40 CFR 25 in implementation of its Pretreatment Program. The Permittee shall at least annually, publish the names of all IU's which were in significant noncompliance (SNC), as defined by 40 CFR § 403.8(f)(2)(vii), in the largest daily paper in the municipality in which the POTW is located or based on any more restrictive definition of SNC that the POTW may be using.

4. The Permittee shall provide written notification to the Deputy Counsel for the Division of Water Pollution Control, IEPA, 1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 within five (5) days of receiving notice that any Industrial User of its sewage treatment plant is appealing to the Circuit Court any condition imposed by the Permittee in any permit issued to the Industrial User by Permittee. A copy of the Industrial User's appeal and all other pleadings filed by all parties shall be mailed to the Deputy Counsel within five (5) days of the pleadings being filed in Circuit Court.

C. Monitoring Requirements

1. The Permittee shall monitor its influent, effluent and sludge and report concentrations of the following parameters on monitoring report forms provided by the IEPA and include them in its annual report. Samples shall be taken at quarterly intervals at the indicated reporting limit or better and consist of a 24-hour composite unless otherwise specified below. Sludge samples shall be taken of final sludge and consist of a grab sample reported on a dry weight basis.

STORET CODE	PARAMETER	Minimum reporting limit
01097	Antimony	0.07 mg/L
01002	Arsenic	0.05 mg/L
01007	Barium	0.5 mg/L
01012	Beryllium	0.005 mg/L
01027	Cadmium	0.001 mg/L
01032	Chromium (hex - grab not to exceed 24 hours)*	0.01 mg/L
01034	Chromium (total)	0.05 mg/L
01042	Copper	0.005 mg/L
00718	Cyanide (grab) (weak acid dissociable)*	5.0 ug/L

SPECIAL CONDITION 11. 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 12. The Permittee shall conduct biomonitoring of the effluent from Discharge Number(s) 001.

Biomonitoring

1. 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:

   a. Fish - 96 hour static LC_{50} Bioassay using fathead minnows (Pimephales promelas).

   b. Invertebrate 48-hour static LC_{50} Bioassay using Ceriodaphnia.

2. Testing Frequency - The above tests shall be conducted using 24-hour composite samples unless otherwise authorized by the IEPA. Samples must be collected in the 18th, 15th, 12th, and 9th month prior to the expiration date of this Permit.

3. Reporting - Results shall be reported according to EPA/821-R-02-012, Section 12, Report Preparation, and shall be submitted to IEPA, Bureau of Water, Compliance Assurance Section 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.

4. Toxicity Reduction Evaluation - Should the results of the biomonitoring program identify toxicity, the IEPA may require that the Permittee prepare a plan for toxicity reduction evaluation and identification. This plan shall be developed in accordance with Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants, EPA/833B-99/002, and 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 13. 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 23 for a period of at least five (5) years from the date of this Permit.

Special Conditions

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.

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 14. This Permit may be modified to include alternative or additional final effluent limitations pursuant to an approved Total Maximum Daily Load (TMDL) Study or upon completion of an alternate Water Quality Study.

SPECIAL CONDITION 15. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) 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 may choose to submit electronic DMRs (eDMRs) instead of mailing paper DMRs to the IEPA. More information, including registration information for the eDMR program, can be obtained on the IEPA website, http://www.epa.state.il.us/water/edmr/index.html. The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 15th day of the following month, unless otherwise specified by the permitting authority.

Permittees not using eDMRs 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
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: Compliance Assurance Section, Mail Code # 19

(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.

(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.

(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) 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.

(d) 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.

(e) 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 times; 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) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit to be reported within 24 hours;

The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

(f) Other noncompliance. The permittee shall report all instances of noncompliance not reported under paragraphs (12)(c), (d), or (e), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12)(e).

(g) 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) Transfer of permits. A permit may be automatically transferred to a new permittee if:

(a) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;

(b) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage and liability between the current and new permittees; and

(c) 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.

(14) 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.

(15) 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 discharger 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.

(16) 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:

(1) User charges pursuant to Section 204(b) of the Clean Water Act, and applicable regulations appearing in 40 CFR 35;

(2) Toxic pollutant effluent standards and pretreatment standards pursuant to Section 307 of the Clean Water Act; and

(3) Inspection, monitoring and entry pursuant to Section 308 of the Clean Water Act.

(17) 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.

(18) 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.

(19) 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.

(20) 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 $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, or 308 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.

(21) 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 permit 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.

(22) 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 shall, 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.

(23) 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.

(24) In case of conflict between these standard conditions and any other condition(s) included in this permit, the other condition(s) shall govern.

(25) 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.

(26) 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.

NPDES Permit No. IL0022471

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: November 30, 2011

Issue Date: October 27, 2006
Effective Date: December 1, 2006

Name and Address of Permittee:

Glenbard Wastewater Authority
21W551 Bemis Road
Glen Ellyn, Illinois 60137

Facility Name and Address:

Lombard Combined Sewage Treatment Facilities
Illinois Route 53 and Hill Avenue
Lombard, Illinois 60148
(DuPage County)

Receiving Waters: East 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 standard conditions and attachments 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.

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:ALD:MRA:06081403.bah

NPDES Permit No. IL0022471

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 Combined Sewage Treatment Facilities Outfall

These flow facilities shall not be utilized until the main treatment facility is receiving its maximum practical flow.

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:

		CONCENTRATION LIMITS mg/L		
Parameter		Monthly Average	Sample Frequency	Sample Type
Total Flow (MG)	See Below		Continuous When Discharging	
BOD_5			Daily When Discharging	Grab
Suspended Solids			Daily When Discharging	Grab
Fecal Coliform	Daily Maximum Shall Not Exceed 400 per 100 mL		Daily When Discharging	Grab
pH	Shall be in the range of 6 to 9 Standard Units		Daily When Discharging	Grab
Chlorine Residual		0.75	Daily When 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.

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

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.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws, regulations, or judicial orders. 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 3 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 in the event of operational, maintenance or other problems resulting in possible effluent deterioration.

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. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 7. This Permit may be modified to include requirements for the Permittee on a continuing basis to evaluate and detail its efforts to effectively control sources of infiltration and inflow into the sewer system and to submit reports to the IEPA if necessary.

SPECIAL CONDITION 8. 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 9. 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 23 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.

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 10.

AUTHORIZATION OF
COMBINED SEWER AND TREATMENT PLANT DISCHARGES

The IEPA has determined that at least a portion of the collection system consists of combined sewers. References to the collection system and the sewer system refer only to those parts of the system which are owned and operated by the Permittee unless otherwise indicated. The Permittee is authorized to discharge from the overflow(s)/bypass(es) listed below provided the diversion structure is located on a combined sewer and the following terms and conditions are met:

Discharge Number	Location	Receiving Water
002	Old Lagoon Outfall	East Branch of DuPage River
003	90-Inch CSO Bypass	East Branch of DuPage River

Treatment Requirements

1. All combined sewer overflows and treatment plant bypasses shall be given sufficient treatment to prevent pollution and the violation of applicable water quality standards. Sufficient treatment shall consist of the following:

    a. All dry weather flows, and the first flush of storm flows shall meet all applicable effluent standards and the effluent limitations as required for the Glenbard Wastewater Authority Main STP outfall (NPDES No. IL0021547);

    b. Additional flows, but not less than ten times the average dry weather flow for the design year, shall receive a minimum of primary treatment and disinfection with adequate retention time; and,

    c. Additional flows, shall be treated to the extent necessary to comply with applicable water quality standards and the federal Clean Water Act, including any amendments made by the Wet Weather Water Quality Act of 2000.

2. All CSO discharges authorized by this Permit shall be treated, in whole or in part, to the extent necessary to prevent accumulations of sludge deposits, floating debris and solids in accordance with 35 Ill. Adm. Code 302.203 and to prevent depression of oxygen levels below the applicable water quality standards.

3. Overflows during dry weather are prohibited. Dry weather overflows shall be reported to the IEPA pursuant to Standard Condition 12(e) of this Permit (24 hour notice).

4. The collection system shall be operated to optimize transport of wastewater flows and to minimize CSO discharges.

5. The treatment system shall be operated to maximize treatment of wastewater flows.

Nine Minimum Controls

6. The Permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994. The nine minimum controls are:

    a. Proper operation and maintenance programs for the sewer system and the CSOs (Compliance with this Item shall be met through the requirements imposed by Paragraph 8 of this Special Condition);

    b. Maximum use of the collection system for storage (Compliance with this Item shall be met through the requirements imposed by Paragraphs 1, 4, and 8 of this Special Condition);

    c. Review and modification of pretreatment requirements to assure CSO impacts are minimized (Compliance with this Item shall be met through the requirements imposed by Paragraph 9 of this Special Condition);

Special Conditions

d. Maximization of flow to the POTW for treatment (Compliance with this Item shall be met through the requirements imposed by Paragraphs 4, 5, and 8 of this Special Condition);

e. Prohibition of CSOs during dry weather (Compliance with this Item shall be met through the requirements imposed by Paragraph 3 of this Special Condition);

f. Control of solids and floatable materials in CSOs (Compliance with this Item shall be met through the requirements imposed by Paragraphs 2 and 8 of this Special Condition);

g. Pollution prevention programs which focus on source control activities (Compliance with this Item shall be met through the requirements imposed by Paragraph 6 of this Special Condition, **See Below**);

h. Public notification to ensure that citizens receive adequate information regarding CSO occurrences and CSO impacts (Compliance with this Item shall be met through the requirements imposed by Paragraphs 7 and 12 of this Special Condition); and,

I. Monitoring to characterize impacts and efficiency of CSO controls (Compliance with this Item shall be met through the requirements imposed by Paragraphs 10 and 11 of this Special Condition).

A pollution prevention plan (PPP) shall be developed by the Permittee unless one has already been prepared for this collection system. Any previously-prepared PPP shall be reviewed, and revised if necessary, by the Permittee to address the items contained in Chapter 8 of the U.S. EPA guidance document, Combined Sewer Overflows, Guidance For Nine Minimum Controls, and any items contained in previously-sent review documents from the IEPA concerning the PPP. Combined Sewer Overflows, Guidance For Nine Minimum Controls is available online at **http://www.epa.gov/npdes/pubs/owm0030.pdf**. The PPP (or revised PPP) shall be presented to the general public at a public information meeting conducted by the Permittee within nine (9) months of the effective date of this Permit. The Permittee shall submit documentation that the pollution prevention plan complies with the requirements of this Permit and that the public information meeting was held. Such documentation shall be submitted to the IEPA within twelve (12) months of the effective date of this Permit and shall include a summary of all significant issues raised by the public, the Permittee's response to each issue, and two (2) copies of the "CSO Pollution Prevention Plan Certification" one (1) with original signatures. This certification form is available online at **http://www.epa.state.il.us/water/permits/waste-water/forms/cso-pol-prev.pdf**. Following the public meeting, the Permittee shall implement the pollution prevention plan within one (1) year and shall maintain a current pollution prevention plan, updated to reflect system modifications, on file at the sewage treatment works or other acceptable location and made available to the public. The pollution prevention plan shall be submitted to the IEPA upon written request.

Sensitive Area Considerations

7. Pursuant to Section II.C.3 of the federal CSO Control Policy of 1994, sensitive areas are any water likely to be impacted by a CSO discharge which meet one or more of the following criteria: (1) designated as an Outstanding National Resource Water; (2) found to contain shellfish beds; (3) found to contain threatened or endangered aquatic species or their habitat; (4) used for primary contact recreation; or, (5) within the protection area for a drinking water intake structure.

The IEPA has tentatively determined that none of the outfalls listed in this Special Condition discharge to sensitive areas. However, if information becomes available that causes the IEPA to reverse this determination, the IEPA will notify the Permittee in writing. Within three (3) months of the date of notification, or such other date contained in the notification letter, the Permittee shall submit two (2) copies of either a schedule to relocate, control, or treat discharges from these outfalls. If none of these options are possible, the Permittee shall submit adequate justification at that time as to why these options are not possible. Such justification shall be in accordance with Section II.C.3 of the National CSO Control Policy.

Operational and Maintenance Plans

8. The IEPA reviewed and accepted a CSO operational and maintenance plan "CSO O&M plan" on June 26, 2000 prepared for this sewerage system. The Permittee shall review and revise, if needed, the CSO O&M plan to reflect system changes.

Special Conditions

The CSO O&M plan shall be presented to the general public at a public information meeting conducted by the Permittee within nine (9) months of the effective date of this Permit. The Permittee shall submit documentation that the CSO O&M plan complies with the requirements of this Permit and that the public information meeting was held. Such documentation shall be submitted to the IEPA within twelve (12) months of the effective date of this Permit and shall include a summary of all significant issues raised by the public, the Permittee's response to each issue, and two (2) copies of the "CSO Operational Plan Checklist and Certification", one (1) with original signatures. Copies of the "CSO Operational Plan Checklist and Certification" are available online at **http://www.epa.state.is.us/water/permits/waste-water/forms/cso-checklist.pdf**. Following the public meeting, the Permittee shall implement the CSO O&M plan within one (1) year and shall maintain a current CSO O&M plan, updated to reflect system modifications, on file at the sewage treatment works or other acceptable location and made available to the public. The CSO O&M plan shall be submitted to the IEPA upon written request.

The objectives of the CSO O&M plan are to reduce the total loading of pollutants and floatables entering the receiving stream and to ensure that the Permittee ultimately achieves compliance with water quality standards. These plans, tailored to the local governments's collection and waste treatment systems, shall include mechanisms and specific procedures where applicable to ensure:

a. Collection system inspection on a scheduled basis;

b. Sewer, catch basin, and regulator cleaning and maintenance on a scheduled basis;

c. Inspections are made and preventive maintenance is performed on all pump/lift stations;

d. Collection system replacement, where necessary;

e. Detection and elimination of illegal connections;

f. Detection, prevention, and elimination of dry weather overflows;

g. The collection system is operated to maximize storage capacity and the combined sewer portions of the collection system are operated to delay storm entry into the system; and,

h. The treatment and collection systems are operated to maximize treatment.

Sewer Use Ordinances

9. The Permittee, within six (6) months of the effective date of this Permit, shall review and where necessary, modify its existing sewer use ordinance to ensure it contains provisions addressing the conditions below. If no ordinance exists, such ordinance shall be developed and implemented within six (6) months from the effective date of this Permit. Upon completion of the review of the sewer use ordinance(s), the Permittee shall submit two (2) copies of a completed "Certification of Sewer Use Ordinance Review", one (1) with original signatures. Copies of this certification form can be obtained online at **http://www.epa.state.is.us/water/permits/waste-water/forms/sewer-use.pdf**. The Permittee shall submit copies of the sewer use ordinance(s) to the IEPA upon written request. Sewer use ordinances are to contain specific provisions to:

a. prohibit introduction of new inflow sources to the sanitary sewer system;

b. require that new construction tributary to the combined sewer system be designed to minimize and/or delay inflow contribution to the combined sewer system;

c. require that inflow sources on the combined sewer system be connected to a storm sewer, within a reasonable period of time, if a storm sewer becomes available;

d. provide that any new building domestic waste connection shall be distinct from the building inflow connection, to facilitate disconnection if a storm sewer becomes available;

e. assure that CSO impacts from non-domestic sources are minimized by determining which non-domestic discharges, if any, are tributary to CSOs and reviewing, and, if necessary, modifying the sewer use ordinance to control pollutants in these discharges; and,

f. assure that the owners of all publicly owned systems with combined sewers tributary to the Permittee's collection system have procedures in place adequate to ensure that the objectives, mechanisms, and specific procedures given in Paragraph 8 of this Special Condition are achieved.

The Permittee shall enforce the applicable sewer use ordinances.

Long-Term Control Planning and Compliance with Water Quality Standards

10. a. Pursuant to Section 301 of the federal Clean Water Act, 33 U.S.C. § 1311 and 40 CFR § 122.4, discharges from the CSOs, including the outfalls listed in this Special Condition and any other outfall listed as a "Treated Combined Sewage Outfall", shall not cause or contribute to violations of applicable water quality standards or cause use impairment in the receiving waters. In addition, discharges from CSOs shall comply with all applicable parts of 35 Ill. Adm. Code 306.305(a), (b), (c), and (d).

b. Based on available information, it appears that the CSOs authorized in this Permit meet the criteria of Section II.C.4.a.i of the federal CSO Control Policy of 1994 (Policy), not more than four overflow events per year, and are presumed to meet the water quality-based requirements of the federal Clean Water Act. Pursuant to Section I.C.1 and Section II.C.9 of the Policy, the Permittee shall develop a post-construction water quality monitoring program adequate to verify compliance with water quality standards and to verify protection of designated uses in the receiving water(s) and to ascertain the effectness of CSO controls. This program shall contain a plan that details the monitoring protocols to be followed, including any necessary effluent and ambient monitoring, and if appropriate, other monitoring protocols such as biological assessments, whole effluent toxicity testing, and sediment sampling. This plan shall be submitted to the IEPA and be presented to the public at an informational meeting within nine (9) months of the effective date of this Permit. Within twelve (12) months of the effective date of this Permit, the Permittee shall submit a summary of all significant issues raised by the public, the Permittee's response to each issue, and two (2) copies of the final plan (revised following the public meeting, if necessary) implementing the post-construction monitoring program. The post-construction monitoring plan shall be implemented within six (6) months of the date of IEPA approval. The Permittee shall respond to an IEPA review letter in writing within ninety (90) days of the date of such an initial review letter and within thirty (30) days of any subsequent review letter(s), if any. Within thirty (30) months of the approval of the plan, the results shall be submitted to the IEPA along with recommendations and conclusions as to whether or not the discharges from any of the CSOs (treated or untreated) authorized by this Permit are causing or contributing to violations of applicable water quality standards or causing use impairment in the receiving water(s).

c. Should the results of the post-construction water quality monitoring plan or if information becomes available that causes IEPA to conclude that the discharges from any of the CSOs (treated or untreated) authorized to discharge under this Permit are causing or contributing to violations of water quality standards or are causing use impairment in the receiving water(s), the IEPA will notify the Permittee in writing. Upon receiving such notification, the Permittee shall develop and implement a CSO Long-Term Control Plan (LTCP) for assuring that the discharges from the CSOs (treated or untreated) authorized in this Permit comply with the provisions of Paragraph 10.a above. The LTCP shall contain all applicable elements of Paragraph 10.d below including a schedule for implementation and provisions for re-evaluating compliance with applicable standards and regulations after complete implementation. Two (2) copies of the LTCP shall be submitted to the IEPA within twelve (12) months of receiving the IEPA written notice. The LTCP shall be:

1. Consistent with Section II.C.4.a.i of the Policy; or,
2. Consistent with either Section II.C.4.a.ii, Section II.C.4.a.iii, or Section II.C.4.b of the Policy and be accompanied by data sufficient to demonstrate that the LTCP, when completely implemented, will be sufficient to meet water quality standards.

Special Conditions

d. Pursuant to the Policy, the required components of the LTCP include the following:

1. Characterization, monitoring, and modeling of the Combined Sewer System (CSS);
2. Consideration of Sensitive Areas;
3. Evaluation of alternatives;
4. Cost/Performance considerations;
5. Revised CSO Operational Plan;
6. Maximizing treatment at the treatment plant;
7. Implementation schedule;
8. Post-Construction compliance monitoring program; and
9. Public participation.

Following submittal of the LTCP, the Permittee shall respond to any initial IEPA review letter in writing within ninety (90) days of the date of such a review letter, and within thirty (30) days of any subsequent review letter(s), if any. Implementation of the LTCP shall be as indicated by IEPA in writing or other enforceable mechanism.

Monitoring, Reporting and Notification Requirements

11. The Permittee shall monitor the frequency of discharge (number of discharges per month) and estimate the duration (in hours) of each discharge from each outfall listed in this Special Condition. Estimates of storm duration and total rainfall shall be provided for each storm event.

For frequency reporting, all discharges from the same storm, or occurring within 24 hours, shall be reported as one. The date that a discharge commences shall be recorded for each outfall. Reports shall be in the form specified by the IEPA and on forms provided by the IEPA. These forms shall be submitted to the IEPA monthly with the DMRs and covering the same reporting period as the DMRs. Parameters (other than flow frequency), if required in this Permit, shall be sampled and reported as indicated in the transmittal letter for such report forms.

12. A public notification program in accordance with Section II.B.8 of the federal CSO Control Policy of 1994 shall be developed employing a process that actively informs the affected public. The program shall include at a minimum public notification of CSO occurrences and CSO impacts, with consideration given to including mass media and/or Internet notification. The Permittee shall also consider posting signs in waters likely to be impacted by CSO discharges at the point of discharge and at points where these waters are used for primary contact recreation. Provisions shall be made to include modifications of the program when necessary and notification to any additional member of the affected public. The program shall be presented to the general public at a public information meeting conducted by the Permittee. The Permittee shall conduct the public information meeting within nine (9) months of the effective date of this Permit. The Permittee shall submit documentation that the public information meeting was held, shall submit a summary of all significant issues raised by the public and the Permittee's response to each issue and shall identify any modifications to the program as a result of the public information meeting. The Permittee shall submit the public information meeting documentation to the IEPA and implement the public notification program within twelve (12) months of the effective date of this Permit. The Permittee shall submit copies of the public notification program to the IEPA upon written request.

13. If any of the CSO discharge points listed in this Special Condition are eliminated, or if additional CSO discharge points, not listed in this Special Condition, are discovered, the Permittee shall notify the IEPA in writing within one (1) month of the respective outfall elimination or discovery. Such notification shall be in the form of a request for the appropriate modification of this NPDES Permit.

Summary of Compliance Dates in this CSO Special Condition

14. The following summarizes the dates that submittals contained in this Special Condition are due at the IEPA (unless otherwise indicated):

Submission of CSO Monitoring Data (Paragraph 11)	15th of every month
Elimination of a CSO or Discovery of Additional CSO Locations (Paragraph 13)	1 month from discovery or elimination

Special Conditions

Control (or Justification for No Control) of CSOs to Sensitive Areas (Paragraph 7)	3 months from IEPA notification
Certification of Sewer Use Ordinance Review (Paragraph 9)	6 months from the effective date of this Permit
Implement Post-Construction Monitoring Plan (Paragraph 10) **No Submittal Due with this Milestone**	6 months from the date of IEPA plan approval
Conduct Pollution Prevention, OMP, Post-Construction Plan Monitoring Plan and PN Public Information Meeting (Paragraphs, 6, 8, 10 and 12) **No Submittal Due with this Milestone**	9 months from the effective date of this Permit
Submit Pollution Prevention Certification, OMP Certification, Post-Construction Monitoring Plan and PN Information Meeting Summary (Paragraphs, 6, 8, 10 and 12)	12 months from the effective date of this Permit
Submit CSO Long-Term Control Plan (Paragraph 10)	12 months from the date of IEPA notification
Submit Results of Post-Construction Monitoring Plan (Paragraph 10)	30 months from the date of IEPA Plan Approval

All submittals listed in this Special Condition can be mailed to the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: CSO Coordinator, Compliance Assurance Section

All submittals hand carried shall be delivered to 1021 North Grand Avenue East.

Reopening and Modifying this Permit

15. The IEPA may initiate a modification for this Permit at any time to include requirements and compliance dates which have been submitted in writing by the Permittee and approved by the IEPA, or other requirements and dates which are necessary to carry out the provisions of the Illinois Environmental Protection Act, the Clean Water Act, or regulations promulgated under those Acts. Public Notice of such modifications and opportunity for public hearing shall be provided.

SPECIAL CONDITION 11. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) 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 may choose to submit electronic DMRs (eDMRs) instead of mailing paper DMRs to the IEPA. More information, including registration information for the eDMR program, can be obtained on the IEPA website, http://www.epa.state.il.us/water/edmr/index.html.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 15th day of the following month, unless otherwise specified by the permitting authority.

Special Conditions

Permittees not using eDMRs 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
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: Compliance Assurance Section, Mail Code # 19

Attachment H

Standard Conditions

Definitions

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

gency means the Illinois Environmental Protection Agency.

rd means the Illinois Pollution Control Board.

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

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

EPA means the United States Environmental Protection Agency.

y 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 total mass of the pollutant discharged over the day. For pollutants with limitations ressed in other units of measurements, the "daily discharge" is calculated as the average asurement of the pollutant over the day.

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

erage Monthly Discharge Limitation (30 day average) means the highest allowable erage 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.

erage Weekly Discharge Limitation (7 day average) means the highest allowable erage 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.

st Management Practices (BMPs) means schedules of activities, prohibitions of practices, intenance procedures, and other management practices to prevent or reduce the pollution 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.

quot 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.

Hour Composite Sample means a combination of at least 8 sample aliquots of at least 0 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

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

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 quot or the volume of each aliquot is proportional to either the stream flow at the time of mpling 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 requirement.

(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. 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, 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. This period may be extended by request of the Agency 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.

(e) 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.

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.

(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) **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.

(d) **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.

(e) **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) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit to be reported within 24 hours.

The Agency may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

(f) **Other noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs (12)(c), (d), or (e), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12)(e).

(g) **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.

Transfer of permits. A permit may be automatically transferred to a new permittee if:

(a) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;

(b) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage and liability between the current and new permittees; and

(c) 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.

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.

(15) 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.

(16) 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.

(17) 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.

(18) 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.

(19) 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.

(20) 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 $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, or 308 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.

(21) 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 permit 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.

(22) 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 shall, 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.

(23) 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.

(24) In case of conflict between these standard conditions and any other condition(s) included in this permit, the other condition(s) shall govern.

(25) 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.

(26) 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.

(Rev. 3-13-98)

APPENDIX C
USEPA WET WEATHER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

FEB 08 2012

REPLY TO THE ATTENTION OF:
WN-16J

Marcia T. Willhite, Chief
Bureau of Water
Illinois Environmental Protection Agency
Post Office Box 19276
Springfield, Illinois 62794-9276

Subject: Clean Water Act Permitting Requirements Pertinent to Peak Wet Weather Flow Facilities in Illinois

Dear Ms. Willhite:

This letter is in response to questions that have been raised regarding Clean Water Act (CWA) requirements for municipal National Pollutant Discharge Elimination System (NPDES) permits authorizing discharges from wet weather flow facilities.

Section 301(b)(1)(B) of the CWA and 40 C.F.R. § 122.44(a)(1) require that NPDES permits for discharges from Publicly Owned Treatment Works (POTW) contain effluent limitations based upon secondary treatment as defined by the Administrator. The Administrator has established effluent limitations based upon secondary treatment at 40 C.F.R. Part 133. Discharges of waste streams that have entered the headworks of a POTW Treatment Plant are considered to be discharges from a POTW, regardless of whether the waste streams come from sanitary sewers or combined sewers. Consequently, all discharges of waste streams that enter the headworks of a POTW Treatment Plant must be subject to secondary effluent limitations, including discharges of such waste streams through wet weather flow facilities. Section 301(b)(1)(c) requires that NPDES permits in these scenarios also include any additional effluent limitations necessary to meet water quality standards.

Sanitary sewers serving a municipal sewage treatment plant are also considered to be part of the POTW. Consequently, secondary effluent limitations, as well as any additional effluent limitations necessary to meet water quality standards, must be included in NPDES permits for discharges from wet weather flow facilities in communities served by sanitary sewers, whether or not those discharges occur prior to the headworks of a POTW Treatment Plant.

As an alternative to including secondary effluent limitations, some state NPDES permitting authorities have chosen to prohibit such discharges, but also include permit provisions that limit state enforcement of violations of the prohibition if certain specified conditions, like those in the U.S. Environmental Protection Agency's bypass regulation at 40 CFR 122.41(m)(4), have been met. Such an alternative approach is acceptable to the EPA, provided that the permit is clear that such permit provisions simply represent a prospective exercise of state enforcement discretion, not an authorization to discharge. If the

Illinois EPA chooses to take this approach, EPA recommends that it also include provisions requiring the permittee to perform a "no feasible alternatives." Specifically, the EPA recommends that the Illinois EPA include something like the following provision in any such permits:

"The Permittee shall prepare and implement a plan to identify, evaluate, and select feasible alternatives to prevent and eliminate discharges from the wet weather flow facility or provide an analysis demonstrating that no feasible alternative exists which is consistent with 40 C.F.R. § 122.41(m)(4). The plan shall consider all feasible alternatives to prevent and eliminate such discharges including, individually and in combination, the elimination of excessive infiltration and/or inflow into the upstream collection systems, improved operational measures, and/or increasing the capacity and effectiveness of the wastewater treatment plant and sewer system. Evaluation of the financial feasibility of each alternative evaluated shall be completed consistent with the EPA Combined Sewer Overflow – Guidance for Financial Capability Assessment and Schedule Development (832-B-97-004). A Final Analysis Report identifying any feasible alternatives for reducing and eliminating such discharges shall be submitted within two (2) years from the effective date of this permit to the Illinois EPA to the below address for approval with a copy provided to EPA, at the address below. The Final Analysis Report must also include an alternative(s) selection and a project implementation schedule with project completion dates that are as expeditious as possible, and provide an estimate of the expected results of project completion.

The Permittee shall submit the analysis described above in accordance with the following schedule:

Progress Report-	*6 months from effective date of permit*
Interim Report on System Characterization and Financial Capability Analysis(FCA)-	*12 months from effective date of permit*
Interim Report of Evaluation of Alternatives and Potential Measures to Reduce and Eliminate Discharges; and updated FCA-	*18 months from effective date of permit*
Final Analysis Report-	*24 months from effective date of permit*

All reports shall be submitted to Illinois EPA 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

A copy of the Final Report shall be provided to EPA at the following address:

U.S. Environmental Protection Agency
Region 5, Water Division
77 West Jackson Blvd.
Chicago, Illinois 60604-3590
Attention: NPDES Programs Branch (WN-16J)"

We also note that combined sewer overflows (CSOs)—which are defined by the EPA's Combined Sewer Overflow (CSO) Control Policy as "the discharge from a combined sewer system at a point prior to the POTW Treatment Plant"—are not considered to be discharges from a POTW and so are not subject to the CWA's secondary treatment requirements. Instead, NPDES permits for CSOs must include effluent limitations that reflect best available technology economically achievable and best conventional technology (BAT/BCT). BAT/BCT limits for CSOs must be established on a best professional judgment (BPJ) basis by the permitting authority in accordance with 40 CFR 125.3. NPDES permits for CSOs also must include any additional effluent limitations necessary to meet water quality standards. Finally, Section 402(q)(1) of the CWA requires that NPDES permits for CSOs "shall conform to" the EPA's CSO Policy. That Policy, in turn, provides that communities with CSOs are to develop Long Term Control Plans for addressing their CSOs.

We hope that this letter will assist the Illinois EPA in issuing future NPDES permits for discharges from wet weather treatment facilities. Please contact Patrick Kuefler, at (312) 353-6268, if you have any questions.

Sincerely,

Tinka G Hyde

Tinka G. Hyde
Director, Water Division

cc: Amy Dragovich, IEPA
Al Keller, IEPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JAN 21 2011

REPLY TO THE ATTENTION OF:
WN-16J

Marcia Willhite, Chief
Bureau of Water
Illinois Environmental Protection Agency
Post Office Box 19276
Springfield, Illinois 62794-9276

Dear Ms. Willhite:

As you are aware, point source discharges of phosphorus and nitrogen (nutrients) to surface water can cause aquatic plants and algae to become a nuisance, produce toxic cyanobacteria, and increase water treatment costs. In addition, plant and algal respiration and decomposition can reduce oxygen below levels that are safe for fish and aquatic life. The U.S. Environmental Protection Agency has become increasingly concerned about the impact of nutrients on water quality, including impacts downstream from outfall locations.

EPA recently reviewed our files for more than 20 Illinois point sources (list enclosed). The files generally contain permit applications, fact sheets, and National Pollutant Discharge Elimination System (NPDES) permits for the sources. In all cases, the review indicated that the Illinois Environmental Protection Agency (Illinois EPA) did not evaluate permit application data to determine whether the discharge of nutrients may cause or contribute to an excursion beyond the water quality criteria at 35 Ill. Adm. Code 302.203 (providing that waters of the State shall be free from, among other conditions, plant or algal growth of other than natural origin), 35 Ill. Adm. Code 302.205 (pertaining to phosphorus in certain reservoirs and lakes), or 35 Ill. Adm. Code 302.206 (pertaining to dissolved oxygen)[1].

Sections 301 and 402 of the Clean Water Act (CWA) require NPDES permits to include effluent limitations as needed for discharges to meet water quality standards. The regulation at 40 CFR § 122.44(d), made applicable to states by 40 CFR § 123.25(a), implements these sections by requiring a permit-issuing agency to: (1) determine whether point source discharges will cause, have a reasonable potential to cause, or contribute to an excursion beyond applicable water quality criteria; and (2) set water quality-based effluent limitations in permits when the agency makes an affirmative determination. The regulation applies whether the relevant criteria are expressed numerically or in a narrative fashion. For narrative criteria including, but not limited to, the criterion at 35 Ill. Adm. Code 302.203, the regulation provides three methods for setting numeric effluent limitations in permits:

[1] The criterion at 35 Ill. Adm. Code 302.210, providing that waters shall be free from substances in concentrations that alone or in combination with others that are toxic or harmful to human health, or to animal, plant, or aquatic life, may also apply when evaluating nutrients.

1. Calculate a criterion based on a proposed State criterion or an explicit State policy or regulation interpreting its narrative criterion;
2. Set the limit based on EPA's CWA section 304(a) recommended criteria supplemented, where necessary, by other relevant information; or
3. Set the limit on an indicator parameter.

EPA expects that Illinois EPA will follow 40 CFR § 122.44(d) when it develops permits for nutrient discharges. Specifically, Illinois EPA must: (1) determine whether nutrient discharges will cause, have a reasonable potential to cause, or contribute to an excursion beyond the criteria in 35 Ill. Adm. Code 302.203 or 302.205 in proximate and downstream waters; and (2) set nutrient effluent limitations which are derived from and comply with 35 Ill. Adm. Code 302.203 and 302.205, as applicable, when it makes an affirmative determination. In addition, Illinois EPA must: (1) determine whether nutrients, either alone or in combination with carbonaceous biochemical oxygen demand (CBOD) and ammonia, will cause, have a reasonable potential to cause, or contribute to an excursion beyond the criteria in 35 Ill. Adm. Code 302.206 in proximate and downstream waters; and (2) set nutrient effluent limitations which, either alone or in combination with limits on CBOD, ammonia, and/or dissolved oxygen, are derived from and comply with 35 Ill. Adm. Code 302.206 when it makes an affirmative determination.

Currently, we are working with you on permits for certain of the treatment plants operated by the Metropolitan Water Reclamation District for Greater Chicago. Beginning not later than July 1, 2011, EPA will review additional NPDES permits under section 402(d) of the CWA and 40 CFR § 123.44 to confirm that Illinois EPA is fulfilling the requirements described above. Under these provisions, EPA can provide comments or recommendations on, or object to, NPDES permits. A State cannot issue a permit in the face of an EPA objection. On December 20, 2010, EPA's NPDES Programs Branch and Illinois EPA's Permits Section agreed to the major permits that EPA would review in federal fiscal year 2011. In addition to these permits, we ask Illinois EPA to provide to EPA for review any permits it develops after June 30, 2011, for new or expanding major dischargers of nutrients.

When making determinations, 40 CFR § 122.44(d) requires permit-issuing agencies to use procedures that account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, and, where appropriate, the dilution of the effluent with the receiving waters. EPA asks Illinois EPA to establish procedures that it will use when making determinations relative to nutrient discharges and 35 Ill. Adm. Code 302.203, 302.205, and 302.206, and to provide a draft of the procedures to EPA for review by April 15, 2011. In addition to addressing the topics identified in the first sentence of this paragraph, we ask that the procedures identify the method that Illinois EPA will use to set effluent limits based on a numeric expression of the 35 Ill. Adm. Code 302.203 criterion. Through a review and subsequent dialogue, we hope to reach agreement with Illinois EPA on the final procedures and method, thereby reducing the possibility that EPA may object to Illinois EPA permits. Within 30 days, please confirm that Illinois EPA will provide draft procedures and a method by the date requested.

In 2003, Illinois EPA said it would recommend that the Illinois Pollution Control Board adopt, by 2008, numeric nutrient criteria for waters other than reservoirs and lakes. Illinois EPA subsequently revised that commitment to December 2010. To date, Illinois EPA has not submitted numeric nutrient criteria recommendations to the Board. It appears that Illinois will not be in a position to propose or adopt numeric nutrient criteria in the near future.

EPA is committeed to working with Illinois EPA to protect Illinois waters from nutrient pollution. The enclosed materials may be helpful in this regard. If you have any questions, please contact me or Kevin Pierard, Chief, NPDES Programs Branch, at (312) 886-4448.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosures

Some References for Setting Nutrient Effluent Limitations

Permits, practices or rules

U.S. EPA Region 1 NPDES Program
Draft NPDES permits and fact sheets:
http://www.epa.gov/region1/npdes/draft_permits_listing_ma.html
Final NPDES permits and fact sheets:
http://www.epa.gov/region1/npdes/permits_listing_ma.html

Michigan DNRE

Phosphorus Limits and Implementation in Michigan. Power point presentation at Region 5-State NPDES meeting, May 4, 2010.

Sorrano, et al., 2008. *A framework for developing ecosystem-specific nutrient criteria: Integrating biological thresholds with predictive modeling.* Limnol. Oceanogr., 43(2): 773-787.

Wisconsin DNR
Chapter NR 217 Wisconsin Administrative Code, Effluent Standards and Limitations For Phosphorus. http://legis.wisconsin.gov/rsb/code/nr/nr217.pdf

Ohio EPA
Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams. Ohio EPA Technical Bulletin MAS/1999-1-1, available at: http://www.epa.state.oh.us/portals/35/documents/assoc_load.pdf

Models

Dynamic models

SPARROW:
http://water.usgs.gov/nawqa/sparrow/

AQUATOX:
http://www.epa.gov/waterscience/models/aquatox/

Klamath River TMDL Models:
http://www.swrcb.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/100927/staff_report/04_Ch3_Analytic_Approach.pdf

CE-QUAL-W2:
http://www.ecy.wa.gov/biblio/0403006.html

Physical models

MERL:

http://www.gso.uri.edu/merl/merl.html

Steady-State models

Great Bay:

http://des.nh.gov/organization/divisions/water/wmb/coastal/documents/gb_nitro_load_analysis.pdf

BATHTUB:

http://www.wes.army.mil/el/elmodels/emiinfo.html

http://cwam.ucdavis.edu/pdfs/BATHTUB.pdf

QUAL 2K:

http://www.epa.gov/athens/wwqtsc/html/qual2k.html

http://www.epa.gov/athens/wwqtsc/QUAL2K.pdf

Vollenweider:

http://www.lwa.org/des_report/htm/vollenweiderphosphorusloadingandsurfaceoverflowraterelationship.htm

Water quality criteria:

EPA Gold Book Quality Criteria For Water 1986:

http://www.epa.gov/waterscience/criteria/goldbook.pdf

EPA recommended CWA Section 304(a) numeric nutrient criteria:

http://water.epa.gov/scitech/swguidance/waterquality/standards/criteria/aqlife/pollutants/nutrient/

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 • (217) 782-2829
James R. Thompson Center, 100 West Randolph, Suite 11-300, Chicago, IL 60601 • (312) 814-6026

PAT QUINN, GOVERNOR

217-782-1654

November 2, 2011

Ms. Tinka Hyde
U.S. Environmental Protection Agency
Regions 5-W-15J
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Re: Illinois EPA's Approach to Nutrient Discharges

Dear Ms. Hyde:

Illinois EPA has been working extremely hard over the last several months to develop potential approaches in tackling the issue of nutrients. In January 2011, USEPA sent the Agency a letter regarding the impact of nutrients on water quality and impacts downstream from effluent discharges. The letter stated that Illinois EPA had failed to determine if the discharge of nutrients from point sources was causing or contributing to violations of Illinois' water quality standards pertaining to offensive conditions, dissolved oxygen and phosphorus in lakes or receiving waters.

In March 2011, the Agency and USEPA met and Illinois EPA followed up with a March 18, 2011 letter stating that the Agency would focus on those 303(d)-listed waters for which direct observations indicated that the offensive conditions standard was not being met (e.g. unnaturally excessive plant or algal growth). The agency also made clear that waters on the 303(d) list for which non-standard based assessment guidelines (e.g., total phosphorus > 0.61 mg/L) was used to identify nutrients as a potential cause of impairment would not part of Illinois EPA's focus.

Given the complexity of the issues involved, the Agency appreciates the extra time Region 5 has given the Agency to work towards developing potential approaches to addressing nutrients. The Agency held a stakeholders meeting in May 2011 and recently met with Region 5 staff in late August to discuss various approaches the Agency could utilize is addressing nutrients in Illinois waters. Over the past several months, the Agency has identified 3 steps to address the discharge of nutrients.

Current activities:

Step one consists of what the Agency is **currently** doing and what additional things we will do in the near- term to address nutrients through operational measures and regulations. These approaches allow the Agency to maximize our current tools, so nutrient issues can be addressed immediately, while working toward long term goals.

Rockford • 4302 N. Main St., Rockford, IL 61103 • (815) 987-7760
Elgin • 595 S. State, Elgin, IL 60123 • (847) 608-3131
Bureau of Land – Peoria • 7620 N. University St., Peoria, IL 61614 • (309) 693-5462
Collinsville • 2009 Mall Street, Collinsville, IL 62234 • (618) 346-5120
Des Plaines • 9511 W. Harrison St., Des Plaines, IL 60016 • (847) 294-4000
Peoria • 5415 N. University St., Peoria, IL 61614 • (309) 693-5463
Champaign • 2125 S. First St., Champaign, IL 61820 • (217) 278-5800
Marion • 2309 W. Main St., Suite 116, Marion, IL 62959 • (618) 993-7200

First, the Agency has a numeric phosphorus water quality standard, not to exceed 0.05 mg/L, applies in any reservoir or lake with a surface area of 8.1 hectares (20 acres) or more, or in any stream at the point where it enters any such reservoir. (See 35 Ill. Adm. Code 302.205). Also, a 1 mg/L not-to exceed limit applies to discharges to lakes and tributaries to lakes. (See 35 Ill. Adm. Code 304.123).

Secondly, the Agency is using effluent standards for phosphorus as required under 35 Ill. Adm. Code 304.123. The regulation establishes an effluent limit of 1 mg/L average that applies to new and expanding POTWs 1 MGD and above and industrial sources discharging at least 25 pounds per day.

Thirdly, the Agency is also incorporating waste load allocations or conditions into NPDES permits of point source dischargers where an approved TMDL exists. The Agency has currently approved TMDLs for dissolved oxygen since this has a numeric standard, and has 18 more under development. One such approved TMDL for dissolved oxygen, the Sangamon River/Lake Decatur Watershed TMDLs, has resulted in a phosphorus waste load allocation in a point source discharger's NPDES permit. We also have lake and stream nitrate TMDLs for waters impaired for public water supply use. The Agency is incorporating TMDL based nitrate allocations in permits at the time of renewal.

Fourthly, under the Agency's antidegradation analysis (See 35 Ill. Adm. Code 302.105) the Agency is required to assure that antidegradation assessments explicitly address the potential for loading increases of phosphorus and nitrogen to harm receiving waters. Facilities are required to demonstrate whether removal of phosphorus and nitrogen is both technically feasible and economically reasonable. An affirmative finding of nutrient removal capability then results in phosphorus permit limits and nitrogen removal design criteria.

Each of these four regulatory tools are operational measures the Agency is currently taking. Some of these tools have been available for many years and others, such as the 2006 phosphorus effluent standard and the 2002 antidegradation regulation, have been added relatively recently. The results of these measures is illustrated in an accounting of facilities with existing NPDES permits with nutrient limits. Forty-five major municipal facilities, twenty minor municipal facilities and four industrial facilities have phosphorus permit limits as a result of implementation of one of the above regulatory tools. Additionally, seven of the major municipals and four of the minor municipals also have a permit condition recognizing that the facility has been designed to remove nitrogen and contain a numeric nitrogen effluent goal.

With respect to dissolved oxygen, all facilities treating deoxygenating wastes, where either the dilution ratio (stream flow to effluent flow) is less than 5:1 or where there is downstream dissolved oxygen impairment, receive a permit limit for dissolved oxygen set at the water quality standard. This water quality based permit limit ensures that a low dissolved oxygen effluent will not lower the stream dissolved oxygen below the water quality standard through the blending of effluent and receiving stream water , and encourages many facilities to provide aeration to the final effluent. In streams that have physical features that allow excess algae growth, (low velocity, impounded, unshaded, streams with suitable substrate) dissolved oxygen may be depressed during pre-dawn hours, (but not during the late morning or afternoon hours) and may violate the water quality standard if phosphorus is high enough to foster algae growth. This condition (the dissolved oxygen signature indicating excess algae growth) indicates that phosphorus is contributing to low dissolved oxygen in the impaired stream. Point source dischargers determined to be causing or contributing to the excess algae condition will be regulated for phosphorus via the narrative water quality standard, as described further in the "New Tools" section.

Enhancement to Current Activities:
In addition to continuing the Agency's current approaches mentioned above, the Agency will develop nutrient TMDLs for waterbodies that are listed as impaired on the 303(d) list for not meeting the offensive condition standards (i.e., unnaturally excessive plant or algal growth or "algae impaired"). Under this approach, the Agency would select watersheds that are listed as impaired due to excessive algae or plant growth of unnatural origin from point as well as non-point sources. The Agency's initial focus in a watershed selection process would be on those with point sources whose NPDES permits are due for renewal in a couple of years or are already before the Agency for its final action. This TMDL will focus on point source contributions of nutrients to the algae impaired segment as well as the necessary load reductions or best management practices that will bring the impaired segment back into compliance with the narrative standard. Upon approval of the TMDL, consistent with the TMDL findings, the Agency would incorporate nutrient limits or conditions in point sources NPDES permits.

Where data necessary to immediately develop a nutrient TMDL is lacking, an interim approach is needed. Under this interim-watershed approach, the Agency would review existing data and information on watershed or waterbodies to determine if the point source in question is a significant source of nutrients to the impaired waters. If the data or information necessary to make this determination is lacking, the Agency would incorporate monitoring of additional parameters in the effluent and/or the receiving stream as a condition of the NPDES permit. The permittee would be required to provide monitoring results to the Agency in a specified period of time. The available data as well as the newly gathered data and information would then be used in the development of the nutrient TMDL. This approach is designed to expedite the development of the nutrient TMDL in algae impaired waters. The availability of all relevant data and information necessary for the development of a nutrient TMDL will shorten the timeframe as well as help streamline the TMDL development process. To implement the requirements of the TMDL, the Agency would also include a re-opener clause in the permit that would allow the Agency to incorporate permit limits or conditions based on the approved nutrient TMDL.

Currently, Fox River, East Branch DuPage River, and Salt Creek watersheds are being studied by a diverse coalition of stakeholders. The main objective of these studies is to develop site specific management tools for point and non-point sources through watershed models. The ultimate objective of these management tools is to bring the impaired segment back into compliance with applicable water quality standards.

Fox River watershed study participants include Friends of the Fox River, Sierra Club, Fox River Water Reclamation District (Elgin), Fox Metro Water Reclamation District (Aurora), Fox River Ecosystem Partnership, Illinois Environmental Protection Agency, Northeastern Illinois Planning Commission, as well as representatives from Algonquin, Aurora, Batavia, Crystal Lake, Elgin, Geneva, Island Lake, Kane County, Lake in the Hills, St. Charles, and Yorkville. Of the 100 miles of the Fox River listed as impaired, fifty-five miles is due to aquatic algal growth (algae impaired). As of September 30, 2011, the two-year monitoring efforts carried out by the Illinois State Water Survey have been completed and final model development will begin later this month. There are 90 NPDES facilities in this watershed. To date, the IEPA has provided the workgroup $869,923 for study development. Phase I was funded by IEPA and Phases II and III were mostly funded by IEPA with additional money provided by locally raised funds. The East Branch DuPage River and Salt Creek Watershed study groups are making their program consistent with the plans and goals established by a coalition of local stakeholders. For a detailed description of the studies, please go to the following links:

Salt Creek Watershed
Total Maximum Daily Loads for Salt Creek, IL
Illinois EPA, October 2004
http://www.epa.state.il.us/water/tmdl/report-status.html

Stream Dissolved Oxygen Improvement Feasibility Study for Salt Creek
DuPage River Salt Creek Workgroup, September 2009
http://www.drscw.org/dissolvedoxygen.html

East Branch DuPage River Watershed
Total Maximum Daily Loads for East Branch of the DuPage River, IL
Illinois EPA, October 2004
http://www.epa.state.il.us/water/tmdl/report-status.html

Stream Dissolved Oxygen Improvement Feasibility Study for East Branch of the DuPage River
DuPage River Salt Creek Workgroup (DRSCW), December 2008
http://www.drscw.org/dissolvedoxygen.html

Churchill Dam Removal and Channel Habitat Restoration Project at Churchill Woods Forest Preserve
DuPage County Forest Preserve, DuPage County Stormwater Management, DRSCW (2011)
http://www.dupageforest.com/page.aspx?id=4294967553
http://www.dupageco.org/EDP/Stormwater_Management/Projects/1195/

For these watersheds, the Agency, consistent with the findings of these on-going studies, would incorporate limits or conditions in NPDES permits of point sources in these watersheds to address the offensive conditions standard.

Where the existing data and information on watersheds and waterbodies demonstrate that the point source in question is a significant source of nutrients to the algae impaired water, the Agency will consider incorporating nutrient limits in the permit. One approach the Agency may consider is to include a phosphorus permit limit of not higher than 1 mg/L.

The Agency can also include conditions in permits to evaluate the operation of biological phosphorus removal. This would require the Permittee to evaluate its ability to achieve a lower phosphorus effluent concentration. The evaluation would include the identification of operational modifications and/or capital expenditures necessary to achieve several alternative concentrations and an economic analysis consistent with Interim Economic Guidance for Water Quality Standards that would be required for each alternative. The evaluation has to be submitted to the Agency within 12-24 months of the effective date of the permit. This approach will be used to see if the Permittee can alter operations of existing tankage and equipment and to evaluate new construction and will also be included in NPDES permits and any minor permit that discharges to impaired streams that are impaired for algae or unnatural plant growth.

New tools:

Step two is **currently** underway, as well, and it consists of the Agency working with stakeholders to establish new regulations addressing nutrients. This approach will take at least a year or longer as the Agency continues to work with stakeholders and eventually files a regulatory package with the Illinois Pollution Control Board. The Agency is working towards establishing a new narrative standard for "cultural eutrophication" that is firmly linked to aquatic life impact and which uses measurable parameters such as dissolved oxygen. The Agency is working internally to see what other specific parameters (i.e., DO flux and chlorophyll a) to consider along with dissolved oxygen. The new standard would prohibit "cultural eutrophication" and the presence of such would trigger a technology-based phosphorus limit on discharges that significantly contribute to "cultural eutrophication".

The Agency will also be working with stakeholders to help identify parameters defining cultural eutrophication, appropriate technology-based limits for existing dischargers that are upstream of waters that exhibit cultural eutrophication and what is a "significant contribution" of phosphorus to downstream waters that would allow identification of dischargers in need of phosphorus control. The Agency is also considering establishing new technology based phosphorus limits for existing plants undergoing expansion, and phosphorus limits for plants undergoing a significant upgrade without an expansion. The Agency is working with stakeholders to determine what constitutes a significant upgrade.

Finally in step 2, the Agency will be working to establish an approach for "low" phosphorus streams to protect these waters from new sources of phosphorus loading.

Longer Term:
Illinois EPA continues to work with USEPA and stakeholders on developing scientifically defensible numeric criteria for flowing waters from which WQBELS's could be calculated.

If you have any questions or comments regarding the above, please contact me or Sanjay Sofat of my staff.

Sincerely,

Marcia T. Willhite

Marcia T. Willhite
Chief
Bureau of Water

APPENDIX D
IEPA AMMONIA WORKSHEET–FUTURE AMMONIA CRITERIA

Ammonia Worksheet

Discharger: **Glenbard Wastewater Authority** NPDES: ________ Date: 6/20/13

Receiving Stream: East Branch of the DuPage River

Calculation of the total ammonia (as N) water quality standard

pH and temperature values used in calculation

	pH 50th %ile	pH 75th %ile	temp 75th %ile
Spring/Fall	7.59	7.71	19.7
Summer	7.55	7.71	23.3
Winter	7.52	8.06	8.5

Total ammonia (as N) water quality standard

	Chronic (50th %ile)	Chronic (75th %ile)	Acute (75th %ile)
Spring/Fall	0.596	0.525	7.54
Summer	0.491	0.416	5.59
Winter	1.306	0.679	8.75

Data Source: AWQMN station, GBL-10, East Branch DuPage River, at Rt. 34 Bridge, for the dates Jan. 2006 to Dec. 2010.

Note: Calculation of total ammonia (as N) water quality standards are based on the algorithms found at 35 IAC 302.212(b) and recommended water quality based limits for ammonia are derived pursuant to methodologies outlined at 35 IAC Part 355.
Spring/Fall constists of March - May, September - October.
Summer consists of June - August.
Winter consists of November - February.

Chronic Wasteload Allocation

Ce= [Cds(Qus+Qe)-CusQus] / Qe

Effluent Flow (Qe):	24.79 cfs	16.02 mgd DAF
Upstream 7Q10:	5 cfs	Source: ISWS map of the Northeastern Region.
7Q10 for dilution (Qus):	2.5 cfs	
background concentrations:		
spring/fall	0.290 mg/L	Source: AWQMN station, GBL-10, East Branch DuPage River, at Rt. 34 Bridge, for the dates Jan. 2006 to Dec. 2010.
summer	0.130 mg/L	
winter	0.200 mg/L	

wasteload allocation:			
spring/fall	***0.6***	mg/L	(based on 75th percentile pH and mixing)
summer	***0.5***	mg/L	(based on 75th percentile pH and mixing)
winter	***1.4***	mg/L	(based on 75th percentile pH and mixing)

Note: Chronic wasteload allocations are calculated using a steady-state mass balance approach and procedures found at 35 IAC 355.203.

Acute Wasteload Allocation

Ce= S(Cds-Cus)+Cus

(Note: Insufficient stream width for discharge induced mixing.)

predicted stream width:	ft.			
diameter of outfall pipe (d):	ft.	wasteload allocation: spring/fall	***7.5***	mg/L
maximum ZID radius (x):	0 ft.	summer	***5.6***	mg/L
S = 0.3 (x/d) =		winter	***8.8***	mg/L

Note: Acute wasteload allocations are determined using the jet-momentum equation found in USEPA's Technical Support Document for predicting near-field mixing characteristics. Outfall pipe diameters are based on Manning's equation and n=0.013.

WQBELs Recommended:

Daily Maximum:	**spring/fall**	**7.5 mg/L**
	summer	**5.6 mg/L**
	winter	**8.8 mg/L**
30-day Average:	**spring/fall**	**0.6 mg/L**
	summer	**0.5 mg/L**
	winter	**1.4 mg/L**
Weekly Average*:	**spring/fall**	**1.6 mg/L**
	summer	**1.3 mg/L**
	winter	**3.5 mg/L**

* Note: Weekly average limits are based on the subchronic standard which is defined as 2.5 times the chronic limit at 35 IAC 302.212(b)(3) and Part 355.

APPENDIX E
ALTERNATIVES ANALYSES–OPINION OF COSTS

Glenbard Wastewater Authority

Facilities Plan

Table E-1 20-Year Total Present Worth: Alternative IPS-1, Three Submersible Dry-Pit Pumps

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Influent Pump Station						
Dry-Pit Pumps (3 Pumps, submersible)	$ 891,000	$ -	20	$ -	$ -	$ -
Plug Valves & Electronic Actuators	$ 450,000	$ -	20	$ -	$ -	$ -
Slide Gate Electronic Actuators	$ 63,000	$ -	20	$ -	$ -	$ -
Structural Modifications	$ 16,000	$ -	40	$ -	$ 8,000	$ 2,500
Electrical Room Structural	$ 85,000	$ -	40	$ -	$ 42,500	$ 13,300
Bypass Pumping	$ 30,000	$ -	20	$ -	$ -	$ -
Demolition	$ 15,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 1,550,000					
Sitework (0%)	$ -					
Mechanical (10%)	$ 155,000					
HVAC[1]	$ 52,000					
Underground Piping (0%)	$ -					
Electrical and Controls[2]	$ 690,000					
Subtotal	$ 2,447,000					
Contractors General Conditions @ 8%	$ 196,000					
Contingencies @20%	$ 489,000					
Total Construction Costs	$ 3,132,000					
Technical Services @ 15%	$ 470,000					
Total Construction Capital Costs	$ 3,602,000			$ -	$ 50,500	$ 15,800
Present Worth	$ 3,602,000			$ -		$ 16,000

Estimated Annual O&M Costs	
Relative Labor ($40/hr)	$ 3,000
Relative Maintenance	$ 21,000
Relative Power Use ($0.04/kWH)	$ 77,000
Total	$ 101,000
Present Worth of O&M	$ 1,158,000

Summary of Present Worth Costs	
Capital Cost	$ 3,602,000
O&M Cost	$ 1,158,000
Salvage Value	$ (16,000)
TOTAL PRESENT WORTH	**$ 4,744,000**

1 HVAC for the new electrical room only.
2 Electrical and controls includes new MCCs, PLCs, equipment electrical installation, pump VFDs, and plug valve and gate controls.

Glenbard Wastewater Authority
Facilities Plan
Table E-2 20-Year Total Present Worth: Alternative IPS-2, Four Dry-Pit Pumps and Prerotation

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Influent Pump Station						
Dry-Pit Pumps (4 Pumps, immersible)	$ 865,000	$ -	20	$ -	$ -	$ -
Plug Valves & Electronic Actuators	$ 535,000	$ -	20	$ -	$ -	$ -
Slide Gate Electronic Actuators	$ 63,000	$ -	20	$ -	$ -	$ -
Structural Modifications	$ 70,000	$ -	40	$ -	$ 35,000	$ 10,900
Prerotation Basins and Wet Well	$ 60,000	$ -	40	$ -	$ 30,000	$ 9,400
Electrical Room Structural	$ 85,000	$ -	40	$ -	$ 42,500	$ 13,300
Bypass Pumping	$ 50,000	$ -	20	$ -	$ -	$ -
Demolition	$ 22,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 1,750,000					
Sitework (0%)	$ -					
Mechanical (15%)[1]	$ 263,000					
HVAC[2]	$ 52,000					
Underground Piping (0%)	$ -					
Electrical and Controls[3]	$ 730,000					
Subtotal	$ 2,795,000					
Contractors General Conditions @ 8%	$ 224,000					
Contingencies @20%	$ 559,000					
Total Construction Costs	$ 3,578,000					
Technical Services @ 15%	$ 537,000					
Total Construction Capital Costs	$ 4,115,000			$ -	$ 107,500	$ 33,600
Present Worth	$ 4,115,000			$ -		$ 34,000

Estimated Annual O&M Costs	
Relative Labor ($40/hr)	$ -
Relative Maintenance	$ 23,000
Relative Power Use ($0.04/kWH)	$ 74,000
Total	$ 97,000
Present Worth of O&M	$ 1,113,000

Summary of Present Worth Costs	
Capital Cost	$ 4,115,000
O&M Cost	$ 1,113,000
Salvage Value	$ (34,000)
TOTAL PRESENT WORTH	**$ 5,194,000**

1 A mechanical piping factor of 20% is assumed versus as 10% becuase of the additonal suction piping and valves.
2 HVAC for the new electrical room only.
3 Electrical and controls includes new MCCs, PLCs, equipment electrical installation, pump VFDs, and plug valve and gate controls.

Glenbard Wastewater Authority
Facilities Plan
Table E-3 20-Year Total Present Worth: Alternative AS-1, Two-Stage HPOAS

Discount Rate = 6.00%

	Initial Capital Cost		Future Capital Cost		Service Life	Replacement Cost (P.W.)		20 yr Salvage Value		Salvage Value (P.W.)	
A. Aeration Basins & UNOX Deck											
Structural Modifications	$	65,000	$	-	40	$	-	$	32,500	$	10,100
Nitrate Recycle Station and Pumps	$	250,000	$	-	40	$	-	$	125,000	$	39,000
Anoxic Mixers (8)	$	225,000	$	-	20	$	-	$	-	$	-
B. Intermediate Clarifiers											
T-Valve Removal and Piping Modifications[1]	$	60,000	$	-	20	$	-	$	-	$	-
Tank Lining System	$	77,000	$	-	20	$	-	$	-	$	-
New Weirs/Troughs	$	20,000	$	-	20	$	-	$	-	$	-
Equipment Painting	$	95,000	$	-	20	$	-	$	-	$	-
Replace Mechanisms (year 10 cost)	$	-	$	255,000	20	$	142,400	$	127,500	$	39,800
C. Intermediate Pump Station											
Demolition	$	52,000	$	-	20	$	-	$	-	$	-
Pumps (3 at 18 mgd capacity each)	$	532,000	$	-	20	$	-	$	-	$	-
Structural Modifications	$	126,000	$	-	40	$	-	$	63,000	$	19,600
D. Pump and Electrical Building											
Demolition	$	16,000	$	-	20	$	-	$	-	$	-
CRAS and CWAS Pumps (4)	$	140,000	$	-	20	$	-	$	-	$	-
Subtotal	$	1,658,000									
Sitework (8%)	$	133,000									
Mechanical (10%)	$	166,000									
HVAC	$	-									
Underground Piping/Bypass Pumping[2]	$	259,000									
Electrical and Controls[3]	$	945,000									
Subtotal	$	3,161,000									
Contractors General Conditions @ 8%	$	253,000									
Contingencies @ 20%	$	632,000									
Total Construction Costs	$	4,046,000									
Technical Services @ 15%	$	607,000									
Total Construction Capital Costs	$	4,653,000				$	142,400	$	348,000	$	108,500
Present Worth	$	4,653,000				$	142,000			$	109,000

Estimated Annual O&M Costs		
Relative Labor ($40/hr)	$	63,000
Relative Maintenance	$	171,000
Relative Power Use ($0.04/kWH)	$	312,000
Total	$	546,000
Present Worth of O&M	$	6,263,000

Summary of Present Worth Costs		
Capital Cost	$	4,653,000
O&M Cost	$	6,263,000
Salvage Value	$	(109,000)
TOTAL PRESENT WORTH	**$**	**10,807,000**

1 See Underground Piping/Bypass Pumping for other carbo RAS withdawl costs.
2 Underground piping installation for carbo RAS line from intermediate clarifiers to Pump and Electrical Building including control valves and flow meters.
3 Electrical and Controls cost includes $329,000 for Intermediate Pump Station work, $120,000 for the Cyro Building MCCs, $50,000 for Cyro Building PLCs, $250,000 for UNOX controls and automation, and a 40% factor of new mixer and nitrate recycle equipment cost.

Glenbard Wastewater Authority
Facilities Plan
Table E-4 20-Year Total Present Worth: Alternative AS-2, Single-Stage HPOAS

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Aeration Basins & UNOX Deck						
Structural Modifications	$ 165,000	$ -	40	$ -	$ 82,500	$ 25,700
Nitrate Recycle Station and Pumps	$ 250,000	$ -	40	$ -	$ 125,000	$ 39,000
Anoxic Mixers (10)	$ 257,000	$ -	20	$ -	$ -	$ -
B. Intermediate Clarifiers						
Decommission Clarifiers	$ 20,000	$ -	20	$ -	$ -	$ -
C. Intermediate Pump Station						
Demolition	$ 52,000	$ -	20	$ -	$ -	$ -
Pumps (3 at 8 mgd capacity each)	$ 327,000	$ -	20	$ -	$ -	$ -
Structural Modifications	$ 126,000	$ -	40	$ -	$ 63,000	$ 19,600
D. Pump and Electrical Building						
Demolition CRAS/WAS Pumps	$ 16,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 1,213,000					
Sitework (8%)	$ 97,000					
Mechanical (10%)	$ 121,000					
HVAC[1]	$ -					
Underground Piping/Bypass Pumping	$ -					
Electrical and Controls[1]	$ 1,002,000					
Subtotal	$ 2,433,000					
Contractors General Conditions @ 8%	$ 195,000					
Contingencies @ 20%	$ 487,000					
Total Construction Costs	$ 3,115,000					
Technical Services @ 15%	$ 467,000					
Total Construction Capital Costs	$ 3,582,000			$ -	$ 270,500	$ 84,300
Present Worth	$ 3,582,000			$ -		$ 84,000

Estimated Annual O&M Costs	
Relative Labor ($40/hr)	$ 62,000
Relative Maintenance	$ 164,000
Relative Power Use ($0.04/kWH)	$ 284,000
Total	$ 510,000
Present Worth of O&M	$ 5,850,000

Summary of Present Worth Costs	
Capital Cost	$ 3,582,000
O&M Cost	$ 5,850,000
Salvage Value	$ (84,000)
TOTAL PRESENT WORTH	**$ 9,348,000**

1 Electrical and Controls cost includes $329,000 for Intermediate Pump Station work, $120,000 for the Cyro Building MCCs, $50,000 for Cyro Building PLCs, $250,00 0for Cryo Building controls and automation, $50,000 for final stage modifcations, and a 40% factor of new mixer and nitrate recycle equipment cost.

4 Assumes 2,500 gallons per day to meet a 0.5 mg/L phosphorus limit.

Glenbard Wastewater Authority
Facilities Plan
Table E-5 20-Year Total Present Worth: Alternative AS-3, Air Activated Sludge

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Aeration Basins & UNOX Deck						
Existing Basin Demolition and Structural	$ 360,000	$ -	40	$ -	$ 180,000	$ 56,100
New Aeration Basins (2.8 million gallons)	$ 3,390,000	$ -	40	$ -	$ 1,695,000	$ 528,500
Aeration Equipment	$ 476,000	$ -	20	$ -	$ -	$ -
Nitrate Recycle Station and Pumps	$ 250,000	$ -	40	$ -	$ 125,000	$ 39,000
Anoxic Mixers (10)	$ 257,000	$ -	20	$ -	$ -	$ -
B. Intermediate Clarifiers						
Demolition for New Tank Construction	$ 150,000	$ -	20	$ -	$ -	$ -
C. Intermediate Pump Station						
Demolition	$ 52,000	$ -	20	$ -	$ -	$ -
Pumps (3 at 8 mgd capacity each)	$ 327,000	$ -	20	$ -	$ -	$ -
Structural Modifications	$ 126,000	$ -	40	$ -	$ 63,000	$ 19,600
D. Cryogenic Building						
Demolition	$ 160,000	$ -	20	$ -	$ -	$ -
E. Pump and Electrical Building						
Demolition CRAS/WAS Pumps	$ 16,000	$ -	20	$ -	$ -	$ -
F. Blower Building						
Structural	$ 575,000	$ -	40	$ -	$ 287,500	$ 89,600
New Blowers (5)	$ 1,794,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 7,933,000					
Sitework (8%)	$ 635,000					
Mechanical (10%)	$ 793,000					
HVAC[1]	$ 38,000					
Underground Piping/Bypass Pumping (10%)[2]	$ 793,000					
Electrical and Controls[3]	$ 1,664,000					
Subtotal	$ 11,856,000					
Contractors General Conditions @ 8%	$ 948,000					
Contingencies @ 20%	$ 2,371,000					
Total Construction Costs	$ 15,175,000					
Technical Services @ 15%	$ 2,276,000					
Total Construction Capital Costs	$ 17,451,000			$ -	$ 2,350,500	$ 732,800
Present Worth	$ 17,451,000			$ -		$ 733,000

Estimated Annual O&M Costs	
Relative Labor ($40/hr)	$ 41,000
Relative Maintenance	$ 58,000
Relative Power Use ($0.04/kWH)	$ 207,000
Total	$ 306,000
Present Worth of O&M	$ 3,510,000

Summary of Present Worth Costs	
Capital Cost	$ 17,451,000
O&M Cost	$ 3,510,000
Salvage Value	$ (733,000)
TOTAL PRESENT WORTH	**$ 20,228,000**

1 HVAC for new Blower Building.
2 Underground piping installation for effluent ML replacement and phosphorus removal checmical lines.
3 Electrical and Controls cost includes $329,000 for Intermediate Pump Station work, relocated site electrical for new tank construction, plus a 40% factor on the equipment cost for new mixers, nitrate recycle equipment,and blowers.

Glenbard Wastewater Authority
Facilities Plan
Table E-6 20-Year Total Present Worth: Alternative AS-4, IFAS

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Aeration Basins & UNOX Deck						
Existing Basin Demolition and Structural	$ 480,000	$ -	40	$ -	$ 240,000	$ 74,800
New Aeration Basins (1.3 million gallons)	$ 1,574,000	$ -	40	$ -	$ 787,000	$ 245,400
Aeration and IFAS Equipment	$ 6,826,000	$ -	20	$ -	$ -	$ -
Nitrate Recycle Station and Pumps	$ 250,000	$ -	40	$ -	$ 125,000	$ 39,000
Anoxic Mixers (10)	$ 257,000	$ -	20	$ -	$ -	$ -
B. Existing Intermediate Clarifiers						
Demolition	$ 150,000	$ -	20	$ -	$ -	$ -
C. Intermediate Pump Station						
Demolition	$ 52,000	$ -	20	$ -	$ -	$ -
Pumps (3 at 8 mgd capacity each)	$ 327,000	$ -	20	$ -	$ -	$ -
Structural Modifications	$ 126,000	$ -	40	$ -	$ 63,000	$ 19,600
D. Cryogenic Plant						
Demolition	$ 160,000	$ -	20	$ -	$ -	$ -
E. Pump and Electrical Building						
Demolition CRAS/WAS Pumps	$ 16,000	$ -	20	$ -	$ -	$ -
F. Blower Building						
Structural Modifications	$ 575,000	$ -	40	$ -	$ 287,500	$ 89,600
Blowers (5)	$ 1,794,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 12,587,000					
Sitework (8%)[1]	$ 635,000					
Mechanical[1]	$ 793,000					
HVAC[1]	$ 38,000					
Underground Piping & Bypass Pumping[1]	$ 793,000					
Electrical and Controls[1]	$ 1,664,000					
Subtotal	$ 16,510,000					
Contractors General Conditions @ 8%	$ 1,321,000					
Contingencies @ 20%	$ 3,302,000					
Total Construction Costs	$ 21,133,000					
Technical Services @ 15%	$ 3,170,000					
Total Construction Capital Costs	$ 24,303,000			$ -	$ 1,502,500	$ 468,400
Present Worth	$ 24,303,000			$ -		$ 468,000

Estimated Annual O&M Costs	
Relative Labor ($40/hr)	$ 36,000
Relative Maintenance	$ 108,000
Relative Power Use ($0.04/kWH)	$ 285,000
Total	$ 429,000
Present Worth of O&M	$ 4,921,000

Summary of Present Worth Costs	
Capital Cost	$ 24,303,000
O&M Cost	$ 4,921,000
Salvage Value	$ (468,000)
TOTAL PRESENT WORTH	**$ 28,756,000**

1 An equivalent cost to Alternative AS-3 is assumed.

Glenbard Wastewater Authority
Facilities Plan
Table E-7 Capital Costs: Bioaugmentation

		Initial Capital Cost
A. ATAD Tanks		
Demolition	$	19,000
New Surface Aerators/Mixers	$	140,000
Alkalinity Addition System	$	22,000
Structural Modifications	$	122,000
B. Sludge Dewatering Building		
Demolition	$	12,000
Dewatering Filtrate Pumps	$	62,000
Filtrate Pump Station Structural Modifications	$	52,000
C. Intermediate Pump Station		
Submersible RAS Pump	$	36,000
Subtotal	$	465,000
Sitework (15%)	$	70,000
Mechanical (20%)	$	93,000
HVAC (0%)	$	-
Underground Piping/Bypass Pumping	$	136,000
Electrical and Controls (40%)	$	186,000
Subtotal	$	950,000
Contractors General Conditions @ 8%	$	76,000
Contingencies @ 20%	$	190,000
Total Construction Costs	$	1,216,000
Technical Services @ 20%[1]	$	243,000
Total Construction Capital Costs	$	1,459,000

1 A 20% technical services factor is assumed because an additional detailed study is required.

Glenbard Wastewater Authority
Facilities Plan
Table E-8 20-Year Total Present Worth: Alternative BD-1,Two New Belt Filter Presses

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
Two New Belt Filter Presses with PLCs	$ 929,000	$ -	20	$ -	$ -	$ -
Demolition	$ 50,000	$ -	20	$ -	$ -	$ -
Conveyors	$ 75,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 1,054,000					
Piping/Mechanical	$ 50,000					
Electrical	$ 100,000					
HVAC (0%)	$ -					
Sitework (0%)	$ -					
Subtotal	$ 1,204,000					
Contractor's General Conditions @ 8%	$ 96,000					
Total Construction Costs	$ 1,300,000					
Contingencies & Technical Services @ 40%	$ 520,000					
Total Capital Costs	$ 1,820,000	$ -		$ -	$ -	$ -
Present Worth	$ 1,820,000			$ -		$ -
Estimated Annual O&M Costs						
Overtime Labor	$ -					
Power	$ 400					
Polymer	$ 40,000					
Biosolids Disposal	$ 146,000					
Maintenance and Supplies	$ 20,000					
Total	$ 206,400					
Present Worth of O&M	$ 2,367,000					
Summary of Present Worth Costs						
Capital Cost	$ 1,820,000					
Replacement	$ -					
O&M Cost	$ 2,367,000					
Salvage Value	$ -					
TOTAL PRESENT WORTH	**$ 4,187,000**					
Annualized PW	$ 365,000					

Notes:
All costs are fourth quarter 2012 dollars.
Present worth is calculated on a 20-year basis at discount rate shown.

Glenbard Wastewater Authority
Facilities Plan
Table E-9 20-Year Total Present Worth: Alternative BD-2, One New Centrifuge

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
One New Centrifuge with a common PLC	$ 1,011,000	$ -	20	$ -	$ -	$ -
Demolition	$ 30,000	$ -	20	$ -	$ -	$ -
Overhead Crane	$ 50,000	$ -	20	$ -	$ -	$ -
Additional Structural Supports	$ 100,000	$ -	20	$ -	$ -	$ -
Conveyors	$ 50,000	$ -	20	$ -	$ -	$ -
Subtotal	$ 1,241,000					
Piping/Mechanical	$ 75,000					
Electrical	$ 200,000					
HVAC (0%)	$ -					
Sitework (0%)	$ -					
Subtotal	$ 1,516,000					
Contractor's General Conditions @ 8%	$ 121,000					
Total Construction Costs	$ 1,637,000					
Contingencies & Technical Services @ 40%	$ 655,000					
Total Capital Costs	$ 2,292,000	$ -		$ -	$ -	$ -
Present Worth	$ 2,292,000			$ -		$ -

Estimated Annual O&M Costs	
Overtime Labor	$ -
Power	$ 6,000
Polymer	$ 53,000
Biosolids Disposal	$ 116,600
Maintenance and Supplies	$ 20,000
Total	$ 195,600
Present Worth of O&M	$ 2,244,000

Summary of Present Worth Costs	
Capital Cost	$ 2,292,000
Replacement	$ -
O&M Cost	$ 2,244,000
Salvage Value	$ -
TOTAL PRESENT WORTH	**$ 4,536,000**
Annualized PW	$ 395,000

Notes:
All costs are fourth quarter 2012 dollars.
Present worth is calculated on a 20-year basis at discount rate shown.

Glenbard Wastewater Authority
Facilities Plan
Table E-10 20-Year Total Present Worth: Alternative CC-1b -Gas Engine Cogeneration System, High Strength Waste- 150 SCFM Biogas Flow Rate

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Equipment						
Gas Conditioning Equipment	$ 768,000	$ -	20	$ -	$ -	$ -
Gas Engine Cogeneration System	$ 270,000	$ -	20	$ -	$ -	$ -
Paralleling Switchgear	$ -	$ -	20	$ -	$ -	$ -
Digester No. 3 Additional Equipment	$ 300,000	$ -	20	$ -	$ -	$ -
Biogas Storage	$ 690,000	$ -	20	$ -	$ -	$ -
Digester Gas Safety Equipment	$ 125,000	$ -	20	$ -	$ -	$ -
High Strength Waste Receiving Facilities	$ 329,000	$ -	20	$ -	$ -	$ -
Subtotal A	$ 2,482,000					
B. Ancillary Captial Costs						
Site Work (2% of Subtotal A)	$ 50,000					
Mechanical (15% of Subtotal A)	$ 372,000					
Electrical and Controls (15% of Subtotal A)	$ 372,000					
Subtotal B	$ 794,000					
Total (A & B Subtotals)	$ 3,276,000					
Contractors General Conditions @ 8%	$ 262,000					
Total Construction Costs	$ 3,538,000					
Contingencies and Technical Services @ 35%	$ 1,238,000					
Total Construction Capital Costs	$ 4,776,000					
Present Worth	$ 4,776,000					

Estimated Annual O&M Costs	
Gas Conditioning Equip. O&M and Media Replacem	$ 43,000
Relative Equipment Maintenance[2]	$ 73,000
Electrical Savings ($0.04/kWH)[3]	$ (155,000)
Power Use ($0.04/kWH)[4]	$ 9,000
Tipping Fee Revenue[5]	$ (287,000)
Total	$ (317,000)
Present Worth of O&M	$ (3,636,000)

Summary of Present Worth Costs	
Capital Cost	$ 4,776,000
O&M Cost	$ (3,636,000)
TOTAL PRESENT WORTH	**$ 1,140,000**

Notes:
[1] Includes biological hydrogen sulfide removal O&M, siloxane media, and moisture removal/compression skid maintenance.
[2] Includes scheduled gas engine overhauls and $5,000 credit for eliminating boiler maintenance.
[3] Electrical savings is based on 150 scfm and 600 BTU/ft^3.
[4] Power required for gas conditioning skid compressor and chiller.
[5] Based on $0.025/gallon and 31,400 gallons/day of HSW

Glenbard Wastewater Authority
Facilities Plan
Table E-11 20-Year Total Present Worth: Alternative CC-2a - Gas Engine Cogeneration System
100 SCFM Biogas Flow Rate

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Equipment						
Gas Conditioning Equipment	$ 768,000	$ -	20	$ -	$ -	$ -
Gas Engine Cogeneration System	$ 727,785	$ -	20	$ -	$ -	$ -
Paralleling Switchgear	$ 442,395	$ -	20	$ -	$ -	$ -
Digester No. 3 Additional Equipment	$ -	$ -	20	$ -	$ -	$ -
Biogas Storage	$ -	$ -	20	$ -	$ -	$ -
Digester Gas Safety Equipment	$ 125,000	$ -	20	$ -	$ -	$ -
High Strength Waste Receiving Facilities	$ -	$ -	20	$ -	$ -	$ -
Subtotal A	$ 2,063,000					
B. Ancillary Captial Costs						
Site Work (2% of Subtotal A)	$ 41,000					
Mechanical (15% of Subtotal A)	$ 309,000					
Electrical and Controls (15% of Subtotal A)	$ 309,000					
Subtotal B	$ 659,000					
Total (A & B Subtotals)	$ 2,722,000					
Contractors General Conditions @ 8%	$ 218,000					
Total Construction Costs	$ 2,940,000					
Contingencies and Technical Services @ 35%	$ 1,029,000					
Total Construction Capital Costs	$ 3,969,000					
Present Worth	$ 3,969,000					
Estimated Annual O&M Costs						
Gas Conditioning Equip. O&M and Media Replacem	$ 29,000					
Relative Equipment Maintenance[2]	$ 66,000					
Electrical Savings ($0.04/kWH)[3]	$ (142,000)					
Power Use ($0.04/kWH)[4]	$ 6,000					
Tipping Fee Revenue[5]	$ -					
Total	$ (41,000)					
Present Worth of O&M	$ (470,000)					
Summary of Present Worth Costs						
Capital Cost	$ 3,969,000					
O&M Cost	$ (470,000)					
TOTAL PRESENT WORTH	**$ 3,499,000**					

Notes:
[1] Includes biological hydrogen sulfide removal O&M, siloxane media, and moisture removal/compression skid maintenance.
[2] Includes scheduled gas engine overhauls and $5,000 credit for eliminating boiler maintenance.
[3] Electrical savings is based on 100 scfm and 600 BTU/ft^3.
[4] Power required for gas conditioning skid compressor and chiller.
[5] Based on $0.025/gallon

Glenbard Wastewater Authority
Facilities Plan
Table E-12 20-Year Total Present Worth: Alternative CC-2a - Gas Engine Cogeneration System
125 SCFM Biogas Flow Rate

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Equipment						
Gas Conditioning Equipment	$ 768,000	$ -	20	$ -	$ -	$ -
Gas Engine Cogeneration System	$ 727,785	$ -	20	$ -	$ -	$ -
Paralleling Switchgear	$ 442,395	$ -	20	$ -	$ -	$ -
Digester No. 3 Additional Equipment	$ -	$ -	20	$ -	$ -	$ -
Biogas Storage	$ 690,000	$ -	20	$ -	$ -	$ -
Digester Gas Safety Equipment	$ 125,000	$ -	20	$ -	$ -	$ -
High Strength Waste Receiving Facilities	$ -					
Subtotal A	$ 2,753,000					
B. Ancillary Captial Costs						
Site Work (2% of Subtotal A)	$ 55,000					
Mechanical (15% of Subtotal A)	$ 413,000					
Electrical and Controls (15% of Subtotal A)	$ 413,000					
Subtotal B	$ 881,000					
Total (A & B Subtotals)	$ 3,634,000					
Contractors General Conditions @ 8%	$ 291,000					
Total Construction Costs	$ 3,925,000					
Contingencies and Technical Services @ 35%	$ 1,374,000					
Total Construction Capital Costs	$ 5,299,000					
Present Worth	$ 5,299,000					
Estimated Annual O&M Costs						
Gas Conditioning Equip. O&M and Media Replacem	$ 36,000					
Relative Equipment Maintenance[2]	$ 88,000					
Electrical Savings ($0.04/kWH)[3]	$ (186,000)					
Power Use ($0.04/kWH)[4]	$ 8,000					
Tipping Fee Revenue[5]	$ -					
Total	$ (54,000)					
Present Worth of O&M	$ (619,000)					
Summary of Present Worth Costs						
Capital Cost	$ 5,299,000					
O&M Cost	$ (619,000)					
TOTAL PRESENT WORTH	**$ 4,680,000**					

Notes:
[1] Includes biological hydrogen sulfide removal O&M, siloxane media, and moisture removal/compression skid maintenance.
[2] Includes scheduled gas engine overhauls and $5,000 credit for eliminating boiler maintenance.
[3] Electrical savings is based on 125 scfm and 600 BTU/ft^3.
[4] Power required for gas conditioning skid compressor and chiller.
[5] Based on $0.025/gallon

Glenbard Wastewater Authority
Facilities Plan
Table E-13 20-Year Total Present Worth: Alternative CC-2b - Gas Engine Cogeneration System, High Strength Waste- 125 SCFM Biogas Flow Rate

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
A. Equipment						
Gas Conditioning Equipment	$ 768,000	$ -	20	$ -	$ -	$ -
Gas Engine Cogeneration System	$ 727,785	$ -	20	$ -	$ -	$ -
Paralleling Switchgear	$ 442,395	$ -	20	$ -	$ -	$ -
Digester No. 3 Additional Equipment	$ -	$ -	20	$ -	$ -	$ -
Biogas Storage	$ 690,000	$ -	20	$ -	$ -	$ -
Digester Gas Safety Equipment	$ 125,000	$ -	20	$ -	$ -	$ -
High Strength Waste Receiving Facilities	$ 329,000	$ -	20	$ -	$ -	$ -
Subtotal A	$ 3,082,000					
B. Ancillary Captial Costs						
Site Work (2% of Subtotal A)	$ 62,000					
Mechanical (15% of Subtotal A)	$ 462,000					
Electrical and Controls (15% of Subtotal A)	$ 462,000					
Subtotal B	$ 986,000					
Total (A & B Subtotals)	$ 4,068,000					
Contractors General Conditions @ 8%	$ 325,000					
Total Construction Costs	$ 4,393,000					
Contingencies and Technical Services @ 35%	$ 1,538,000					
Total Construction Capital Costs	$ 5,931,000					
Present Worth	$ 5,931,000					

Estimated Annual O&M Costs	
Gas Conditioning Equip. O&M and Media Replacem	$ 36,000
Relative Equipment Maintenance[2]	$ 88,000
Electrical Savings ($0.04/kWH)[3]	$ (186,000)
Power Use ($0.04/kWH)[4]	$ 8,000
Tipping Fee Revenue[5]	$ (164,000)
Total	$ (218,000)
Present Worth of O&M	$ (2,500,000)

Summary of Present Worth Costs	
Capital Cost	$ 5,931,000
O&M Cost	$ (2,500,000)
TOTAL PRESENT WORTH	**$ 3,431,000**

Notes:
[1] Includes biological hydrogen sulfide removal O&M, siloxane media, and moisture removal/compression skid maintenance.
[2] Includes scheduled gas engine overhauls and $5,000 credit for eliminating boiler maintenance.
[3] Electrical savings is based on 125 scfm and 600 BTU/ft^3.
[4] Power required for gas conditioning skid compressor and chiller.
[5] Based on $0.025/gallon and 18,000 gallons/day of HSW

Glenbard Wastewater Authority
Facilities Plan
Table E-14 20-Year Total Present Worth: Alternative CC-2b -Gas Engine Cogeneration System, High Strength Waste, Paralleling Switchgear- 150 SCFM Biogas Flow Rate

Discount Rate = 6.00%

	Initial Capital Cost	Future Capital Cost	Service Life	Replacement Cost (P.W.)	20 yr Salvage Value	Salvage Value (P.W.)
Capital Costs						
A. Equipment						
Gas Conditioning Equipment	$ 768,000	$ -	20	$ -	$ -	$ -
Gas Engine Cogeneration System	$ 727,785	$ -	20	$ -	$ -	$ -
Paralleling Switchgear	$ 442,395	$ -	20	$ -	$ -	$ -
Digester No. 3 Additional Equipment	$ 300,000	$ -	20	$ -	$ -	$ -
Biogas Storage	$ 690,000	$ -	20	$ -	$ -	$ -
Digester Gas Safety Equipment	$ 125,000	$ -	20	$ -	$ -	$ -
High Strength Waste Receiving Facilities	$ 329,000	$ -	20	$ -	$ -	$ -
Subtotal A	$ 3,382,000					
B. Ancillary Captial Costs						
Site Work (2% of Subtotal A)	$ 68,000					
Mechanical (15% of Subtotal A)	$ 507,000					
Electrical and Controls (15% of Subtotal A)	$ 507,000					
Subtotal B	$ 1,082,000					
Total (A & B Subtotals)	$ 4,464,000					
Contractors General Conditions @ 8%	$ 357,000					
Total Construction Costs	$ 4,821,000					
Contingencies and Technical Services @ 35%	$ 1,687,000					
Total Construction Capital Costs	$ 6,508,000					
Present Worth	$ 6,508,000					
Estimated Annual O&M Costs						
Gas Conditioning Equip. O&M and Media Replacem	$ 43,000					
Relative Equipment Maintenance[2]	$ 100,000					
Electrical Savings ($0.04/kWH)[3]	$ (210,000)					
Power Use ($0.04/kWH)[4]	$ 9,000					
Tipping Fee Revenue[5]	$ (287,000)					
Total	$ (345,000)					
Present Worth of O&M	$ (3,957,000)					
Summary of Present Worth Costs						
Capital Cost	$ 6,508,000					
O&M Cost	$ (3,957,000)					
TOTAL PRESENT WORTH	**$ 2,551,000**					

Notes:
[1] Includes biological hydrogen sulfide removal O&M, siloxane media, and moisture removal/compression skid maintenance.
[2] Includes scheduled gas engine overhauls and $5,000 credit for eliminating boiler maintenance.
[3] Electrical savings is based on 137 scfm and 600 BTU/ft^3.
[4] Power required for gas conditioning skid compressor and chiller.
[5] Based on $0.025/gallon and 31,400 gallons/day of HSW

Glenbard Wastewater Authority
Facilities Plan
Table E-15 Capital and O&M Costs for CPR

	Initial Capital Cost
A. CPR Building	
Structural	$ 120,000
CPR Pumps and Storage Tanks	$ 115,000
Subtotal	$ 235,000
Sitework (8%)	$ 19,000
Mechanical	$ 12,000
HVAC	$ 24,000
Underground Piping/Bypass Pumping (25%)	$ 59,000
Electrical and Controls (25%)	$ 59,000
Subtotal	$ 408,000
Contractors General Conditions @ 8%	$ 33,000
Contingencies @ 20%	$ 82,000
Total Construction Costs	$ 523,000
Technical Services @ 15%	$ 78,000
Total Construction Capital Costs	$ 601,000
Present Worth	$ 601,000
Estimated Annual O&M Costs	
Relative Labor ($40/hr)	$ 4,000
Relative Maintenance	$ 2,000
Relative Power Use ($0.04/kWH)	$ 1,000
Phosphorus Removal Chemical ($1.40/gal)[1]	$ 1,022,000
Total	$ 1,029,000

1 Assumes 2,000 gallons per day to meet a 0.5 mg/L phosphorus limit.

Glenbard Wastewater Authority
Facilities Plan
Table E-16 Sludge Thickening Phase 2, Thickened Sludge Pump Station and Piping Improvements

		Capital Cost
A. Thickened Sludge Pump Station		
Building-Structural	$	254,000
Relocation of GBT Feed Pumps	$	35,000
Subtotal A	$	289,000
B. Ancillary Captial Costs		
Site Work	$	10,000
Mechanical (30% of Subtotal A)	$	87,000
HVAC (10% of Subtotal A)	$	29,000
Underground Piping	$	101,000
Electrical and Controls (25% of Subtotal A)	$	72,000
Subtotal B	$	299,000
Total (A & B Subtotals)	$	588,000
Contractors General Conditions @ 10%	$	59,000
Total Construction Costs	$	647,000
Contingencies and Technical Services @ 35%	$	226,000
Total Construction Capital Costs	$	873,000

Glenbard Wastewater Authority
Facilities Plan
Table E-17 Sludge Thickening Phase 3a, GBT WAS Thickening Improvements with WAS Storage

		Capital Cost
A. Capital Costs		
Convert Filter Backwash Tank to WAS Storage[1]	$	120,000
Replace WAS Pumps	$	115,000
New WAS GBT Feed Pumps in Filter Building[1]	$	105,000
New TWAS Transfer Pumps in Dewatering Building	$	105,000
Convert Sludge Holding to TWAS Storage	$	15,000
Subtotal A	$	460,000
B. Ancillary Captial Costs		
Site Work[1]	$	20,000
Mechanical (30% of Subtotal A)	$	138,000
Underground Piping[1]	$	115,000
Electrical and Controls (20% of Subtotal A)	$	92,000
Subtotal B	$	365,000
Total (A & B Subtotals)	$	825,000
Contractors General Conditions @ 10%	$	83,000
Total Construction Costs	$	908,000
Contingencies and Technical Services @ 35%	$	318,000
Total Construction Capital Costs	$	1,226,000

Glenbard Wastewater Authority
Facilities Plan
Table E-18 Sludge Thickening Phase 3b, GBT WAS Thickening Improvements with WAS Direclty to GBT

		Capital Cost
A. Capital Costs		
	$	-
Replace WAS Pumps	$	115,000
New TWAS Transfer Pumps in Dewatering Building	$	105,000
Convert Sludge Holding to TWAS Storage	$	15,000
Subtotal A	$	235,000
B. Ancillary Captial Costs		
Site Work[1]		
Mechanical (30% of Subtotal A)	$	71,000
Underground Piping[1]		
Electrical and Controls (30% of Subtotal A)	$	71,000
Subtotal B	$	142,000
Total (A & B Subtotals)	$	377,000
Contractors General Conditions @ 10%	$	38,000
Total Construction Costs	$	415,000
Contingencies and Technical Services @ 35%	$	145,000
Total Construction Capital Costs	$	560,000

Glenbard Wastewater Authority
Facilities Plan
Table E-19 Liquid Sludge Storage and Gas Holding

		Capital Cost
A. Capital Costs		
Convert Filter Backwash Tank to Liquid Biosolids Storage	$	50,000
Membrane Gas Holder	$	640,000
New Dewatering Feed Pumps in Filter Building	$	105,000
Subtotal A	$	795,000
B. Ancillary Captial Costs		
Site Work	$	20,000
Mechanical (30% of Subtotal A)	$	239,000
Underground Piping	$	92,000
Electrical and Controls (15% of Subtotal A)	$	119,000
Subtotal B	$	450,000
Total (A & B Subtotals)	$	1,245,000
Contractors General Conditions @ 10%	$	125,000
Total Construction Costs	$	1,370,000
Contingencies and Technical Services @ 35%	$	480,000
Total Construction Capital Costs	$	1,850,000

Glenbard Wastewater Authority
Facilities Plan
Table E-20 Dewatered Sludge Storage

		Capital Cost
A. Capital Costs		
Covered Storage Structure ($35/ft^2)	$	1,610,000
Subtotal A	$	1,610,000
B. Ancillary Captial Costs		
Site Work (4% of Subtotal A)	$	81,000
Mechanical	$	-
Underground Piping	$	-
Electrical and Controls	$	55,000
Subtotal B	$	136,000
Total (A & B Subtotals)	$	1,746,000
Contractors General Conditions @ 8%	$	140,000
Total Construction Costs	$	1,886,000
Contingencies (10%)	$	189,000
Total Construction and Contingencies	$	2,075,000
Technical Services	$	381,000
Total Construction Capital Costs	$	2,456,000

APPENDIX F
GWA FUND 40 CAPITAL PLAN

GLENBARD WASTEWATER AUTHORITY FUND 40 CAPITAL PLAN

REVENUE in Thousands $	Footnotes	FY(2013)	FY(2014)	FY(2015)	FY(2016)	FY(2017)	FY(2018)	FY(2019)	FY(2020)	FY(2021)	FY(2022)	FY(2023)	FY(2024)
		Estimated	Budgeting	Planning	Planning	Planning	Planning	Planning	Planning	Planning	Planning	Planning	Planning
Proceeds from Borrowing		0	0	0	6648	6012	0	0	0	0	0	0	0
Investment Income		7	10	12	14	17	20	20	20	20	20	20	20
Glen Ellyn Conn Fees		35	25	25	25	25	25	25	25	25	25	25	25
Lombard Conn Fees		30	25	25	25	25	25	25	25	25	25	25	25
Interfund Tranfer From Fund 41		0	210										
Interfund Tranfer From Fund 42		0	311										
Interfund Tranfer From Fund 43		0	142										
Interfund Tranfer From Fund 44		0	110										
Interfund Tranfer From Fund 45		0	29										
Interfund Tranfer From Fund 46		0	91										
Interfund Tranfer From Fund 47		0	23										
EnerNoc Demand Response Program	1	3	8	38	36	48							
Leachate Revenue	2	113	117	117	117	117	117	117	117	117	117	117	117
Cell Tower Revenue	3	27	24	24	24	24	24	24	24	24	24	24	24
Miscellaneous Revenue		70	10	10	10	10	10	10	10	10	10	10	10
Capital Fund Contribution - Glen Ellyn		758	1318	1443	1587	1746	1921	2118	2324	2557	2812	3093	3417
Capital Fund Contribution - Lombard		843	1382	1527	1680	1848	2032	2240	2459	2705	2976	3273	3616
Total Capital Fund Contribution	4	***1601***	***2700***	***2970***	***3267***	***3594***	***3953***	***4358***	***4783***	***5262***	***5788***	***6366***	***7033***
TOTAL REVENUE		1886	3835	3221	10166	9872	4174	4579	5004	5483	6009	6587	7254
EXPENSES in Thousands $		**FY(2013)**	**FY(2014)**	**FY(2015)**	**FY(2016)**	**FY(2017)**	**FY(2018)**	**FY(2019)**	**FY(2020)**	**FY(2021)**	**FY(2022)**	**FY(2023)**	**FY(2024)**
Debt Service Payments:		**Estimated**	**Budgeting**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**
CSO Project Debt Payment (P&I) -	5	74	74	37									
BIP Project Debt Payment (P&I)	6	380	379	379	190								
Ana Digester Project Debt Payment (P&I)	7	589	596	596	596	596	596	596	596	596	596	596	596
Sand Filter Project Debt Payment (P&I)							980	980	980	980	980	980	980
Debt Service Subtotal		**1043**	**1049**	**1012**	**786**	**596**	**1576**	**1576**	**1576**	**1576**	**1576**	**1576**	**1576**
Capital Improvements													
Rolling Stock	8	145	111	92	103	110	134	157	146	138	34	74	130
Small Capital Projects	9	100	109	100	100	100	100	100	100	100	100	100	100
Infastructure Improvements	10	700	429	200	300	300	300	300	300	300	300	300	300
Roof Replacements - Updated based on Repl. Schedule	11	165	61	57	200	100	69	0	0	0	0	0	0
Plant Equipment Rehabilitation	12	30	300	300	300	300	300	300	300	300	300	300	300
Oxygen System Rehabilitation		100			400								
Facility Plan		90					120					150	
Digester Improvement Project - FY13 Mediated		405											
Valley View Pump Station	13												
Engineering		124	181										
Construction			1704										
Remote Site Communication													
Engineering				26									
Construction				144									
LCSTF Clarifier Mechanism Replacement	14												
Engineering			35										
Construction			250										
Screening Building HVAC Replacement													
Engineering					3								
Construction					17								
Influent Pump Replacement and Improvements	15												
Engineering			241		228	228							
Construction					1900	1900							
Intermediate Pump Station Modifications													
Engineering						107	149						
Construction							1394						
UNOX Deck Control Improvements													
Engineering						28	38						
Construction							361						
Final Stage Modifications													
Engineering						16	23						
Construction							214						
O&M Manual Update						338							
Sand Filter Upgrade Project - Bundle with UV and Storage													
Engineering				496	344	344							
Construction (IEPA Loan)					3223	3223							
UV Disinfection Upgrade - Bundle with Sand Filter and Storage													
Engineering				165	115	115							
Construction (IEPA Loan)					1075	1075							
Biosolids Covered Storage- Bundle With Sand Filter and UV													
Engineering						174	121	121					
Construction (IEPA Loan)							1134	1134					
Hauled Wastes Receiving Phase 1													
Engineering							18	26					
Construction								240					
Primary / Waste Activated Sludge Thickening Phase 2 & 3													
Engineering							111	154					
Construction								1446					
Biosolids Dewatering Equipment Replacement													
Engineering								183	127	127			
Construction									1191	1191			
Liquid Biosolids Storage Improvements													
Engineering								148	103	103			
Construction									961	961			
Chemical Phosphorus Removal													
Engineering									49	68			
Construction										643			
Grit Building MCC Replacement													
Engineering										17	22		
Construction											221		
Cryo Building MCC and PLC Replacement													
Engineering										21	29		
Construction											277		
Elect. Service, Backup & Redundancy Projects													
Engineering										126	174		
Construction											1631		
PLC Replacements													
Engineering										64	88		
Construction											827		
Site Lighting													
Engineering										20	27		
Construction											253		
Stormwater Plant Lagoon Dredging													
Engineering													
Construction												1344	
Stormwater Plant Barscreen Upgrade													
Engineering											87	121	
Construction												1136	
Stormwater Plant Grit Collection Upgrade and HVAC													
Engineering												226	313
Construction													2960
Project Total		1859	3421	1580	8308	8458	4586	4309	3277	4179	4370	3751	4103
IFT/DEBT SERVICES / PROJ TOTAL		2902	4470	2592	9094	9054	6162	5885	4853	5755	5946	5327	5679
Cash on Hand 5/1		3410	2394	1759	2388	3460	4278	2290	984	1135	863	925	2185
Gain/Loss FY		(1016)	(635)	629	1072	818	(1988)	(1306)	151	(272)	63	1260	1575
Cash on Hand 4/30		2394	1759	2388	3460	4278	2290	984	1135	863	925	2185	3760

APPENDIX G
ENVIRONMENTAL CHECKLIST

Loan Applicant: Glenbard Wastewater Authority
L17#: ________

IEPA Loan Applicant Environmental Checklist

Checklist must be signed by loan applicant's Authorized Representative (not engineering consultant)

ALL loan applicants must provide items 1 and 2 below – Items 3-6 are specific to conditions of project.

---

1) National Historic Preservation Act, Section 106 sign-off:
Circle one: **Attached** **OR** **Date requested**________

---

2) Provide record of consultation with Illinois Department of Natural Resources Office of Realty and Environmental Planning regarding compliance with Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act and Illinois Interagency Wetlands Protection Act.
Circle one: **EcoCAT printout** **DNR Letter** **Date DNR consultation requested:**________

OR ________ **Project exempt from consultation per Title 17 Ill. Adm. Code Parts 1075 and 1090**

---

3) ____**Yes** _x__**No** Project involves construction in or near a stream bank (includes stream/river crossing), floodway and/or wetland.
IF YES: By signing below applicant certifies they will comply with the Rivers, Lakes & Streams Act.

IF YES: Comments from the Army Corps of Engineers are:
Circle one: **Attached** **OR** **Date requested**________

---

4) ____**Yes** _x__**No** Project involves conversion of prime agricultural land to other uses.
IF YES - Description and map of the area to be converted along with a discussion of the necessity of utilizing prime agricultural land for the project must be provided in planning.

---

5) ____**Yes** _x__**No** Project includes growth resulting in more than a 30% reserve capacity in the present or proposed service.
IF YES - Prior to planning approval a detailed discussion in the planning documents must be provided documenting potential secondary impacts of the proposed project.

WASTEWATER PROJECTS ONLY

6A) _x__**Yes** ____**No** Project is within jurisdiction of a Designated Water Quality Management Agency such as Chicago Metropolitan Agency for Planning (CMAP), Greater Egypt Regional Planning & Development Commission (GERPDC) or Southwestern Illinois Planning Commission (SIPC).
IF YES - Comments from the appropriate agency regarding the project, growth projections and **Facility Planning Area modifications (if applicable)** are:
Circle one: **Attached** **OR** **Date requested** 6/26/2013

6B) ____**Yes** _x__**No** A change in the Facility Planning Area is proposed
IF YES - Comments from Illinois Department of Agriculture regarding the FPA change are required:
Circle one: **Attached** **OR** **Date requested**________

Specific contact information for the various offices and agencies which must be contacted, as well as the sources for further information, is detailed within the instruction guide for this checklist.

Signed: ____________________ Date: 6/24/2013
Loan Applicant's Authorized Representative

IEPA Loan Applicant Environmental Checklist – Instructions

Prior to Project/Facility Plan approval, a loan applicant must satisfy the IEPA that it will comply with various State and Federal enactments for protection of historical/cultural resources, recreational areas, wetlands, floodplains and stream banks, rare and endangered species, prime agricultural land, air and water quality and other sensitive environmental areas. This requirement can be satisfied by providing the information required on this IEPA checklist. **The checklist must be submitted to IEPA and signed by the loan applicant's Authorized Representative. Instructions for completing the checklist follow.**

1) Historical/Cultural Resources - National Historic Preservation Act, Section 106

A sign-off from the Illinois Historic Preservation Agency's (IHPA) State Historic Preservation Officer (SHPO) must be submitted. In requesting a sign-off, you must indicate that the project will be funded through the IEPA loan program and therefore will require a federal Section 106 Sign-off (this will also satisfy the State Agency Historic Preservation Protection Act of 1990). The sign-off may be unconditional, or it may be conditional upon the applicant agreeing to incorporate measures to protect or recover historic or archeological resources.

More information via the internet: www.illinoishistory.gov/ps/rcdocument.htm

Direct the request for SHPO review to:

Illinois State Historic Preservation Agency
Attn: **(*See list below for appropriate person)**
Preservation Services Division
1 Old State Capitol
Springfield, Illinois 62701

***DAVID HALPIN**
Adams, Boone, Brown, Bureau, Carroll, Cass, DeKalb, DeWitt, Ford, Fulton, Grundy, Hancock, Henderson, Henry, Iroquois, Jo Daviess, Kane, Kankakee, Kendall, Knox, LaSalle, Lee, Livingston, Logan, Marshall, Mason, McDonough, McHenry, McLean, Menard, Mercer, Ogle, Peoria, Piatt, Putnam, Rock Island, Schuyler, Stark, Stephenson, Tazewell, Warren, Whiteside, Will, Winnebago, Woodford.

***JOE PHILLIPPE**
Alexander, Bond, Calhoun, Champaign, Christian, Clark, Clay, Clinton, Coles, Cook, Crawford, Cumberland, Douglas, DuPage, Edgar, Edwards, Effingham, Fayette, Franklin, Gallatin, Greene, Hardin, Hamilton, Jackson, Jasper, Jefferson, Jersey, Johnson, Lake, Lawrence, Macon, Macoupin, Madison, Marion, Massac, Monroe, Montgomery, Morgan, Moultrie, Perry, Pike, Pope, Pulaski, Randolph, Richland, Saline, Sangamon, Scott, Shelby, St. Clair, Union, Vermilion, Wabash, Washington, Wayne, White, Williamson.

2) Threatened & Endangered Species, Natural Areas, Wetlands - Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act, Illinois Interagency Wetland Policy Act

If the project will result in a change in existing environmental conditions per Title 17 Ill. Adm. Code Section 1075.30(a) or result in an adverse impact to a wetland per Section 1090.20, it must be reviewed by the Illinois Department of Natural Resources (IDNR) Office of Realty and Environmental Planning for potential adverse effects to protected natural resources. (NOTE: IDNR reviews are **not** required for equipment purchase or replacement, or rehabilitation of existing structures) Loan applicants should submit the project via IDNR's EcoCAT website at: http://dnrecocat.state.il.us/ecopublic/. Applicants must then provide to IEPA either:

- An EcoCAT review report which states that consultation under Part 1075 is terminated and that the wetland review under Part 1090 is terminated,
- A letter from IDNR terminating the 1075 consultation and the 1090 wetland review because adverse effects are unlikely, or

- A letter from IDNR detailing any measures which must be taken to avoid, minimize or mitigate adverse effects. These measures must be incorporated into the project specifications.

Loan applicants may contact IDNR in writing:

Illinois Department of Natural Resources
Division of Ecosystems and Environment
One Natural Resources Way
Springfield, Illinois 62702-1271

3) Construction in Floodways, Wetlands, and on Stream Banks (including stream crossings)

Illinois Lakes, Rivers, and Streams Act & Section 404 of the Federal Clean Water Act
Projects involving piping construction across defined waterways, or construction in floodways, wetlands, or any body of water, require the applicant to certify to IEPA that the project will comply with the Illinois Lakes, Rivers, and Streams Act. These same projects may ultimately also require a U.S. Army Corps of Engineers Section 404 Permit.

The requirements to receive a permit for work under the jurisdiction of IDNR – Office of Water Resources are available on the IDNR website at: http://dnr.state.il.us/owr/resman/permitprogs.htm

Or by writing:

Illinois Department of Natural Resources – Office of Water Resources
Division of Resource Management
2050 West Stearns Road
Bartlett, Illinois 60103
847/608-3100
(Projects in Cook, Lake, McHenry, DuPage, Kane and Will Counties)

Illinois Department of Natural Resources – Office of Water Resources
Downstate Regulatory Programs Section
One Natural Resources Way
Springfield, Illinois 62702-1271
217/782-3863
(Projects in remainder of the State)

At the same time, comments should be sought from the Corps to determine whether a 404 Permit is needed. **Attachment A** to this guidance will provide you with a map and address to help you determine the appropriate Army Corps of Engineers District Office for your project.

4) Conversion of Prime Agricultural Land to Other Uses

If the project involves conversion of prime agricultural land to other uses, a description and map of the area to be converted along with a discussion of the necessity of utilizing prime agricultural land for the project must be provided.

5) Secondary Environmental Impacts

Projects which include an allowance for more than 30% reserve growth capacity in the present or projected service area must attach or include in planning documents a discussion of the potential secondary impacts of the proposed project(s) such as changes in the rate, density, type of development or use of open space, floodplain, or prime agricultural land. Also, the impacts of sensitive ecosystems due to induced growth must be evaluated and appropriate measures for mitigation proposed if necessary.

6A) Designated Water Quality Management Agency (DWQMA) Consultation/Sign-off.

This is applicable only to wastewater or sewer projects located in one of the DWQMA Areas (See **Attachment B** - applicable counties and contact info below). Loan applicants should contact the DWQMA to request comments on the scope of the proposed project and the future growth anticipated for the service area. For projects which propose a change in a Facility Planning Area a sign-off must be obtained from the DWQMA, indicating that the proposed project is not in conflict with the Water Quality Management Plan. Request comments and sign-offs as necessary from:

Chicago Metropolitan Agency for Planning (CMAP)
233 South Wacker Drive
Suite 800
Chicago, Illinois 60606
(312) 454-0400 FAX (312) 454-0411
www.chicagoareaplanning.org

Counties: Cook, DuPage, Kane, Kendall, Lake, McHenry, Will

Greater Egypt Regional Planning & Development Commission
3000 West DeYoung St.
Suite 800B-3
Marion, Illinois 62959
(618) 997-9351 FAX (618) 997-9354

Counties: Franklin, Gallatin, Hamilton, Hardin, Jefferson Jackson, Perry, Pope, Saline Williamson

Southwestern Illinois Planning Commission
2511 Vandalia Street
Collinsville, Illinois 62234-5034
(618) 344-4250 FAX (618) 344-4253

Counties: Bond, Clinton, Madison Monroe, Randolph, St. Clair, Washington

6B) Proposed Change to Facility Planning Area Boundaries

Consultation with the Illinois Department of Agriculture (IDOA) is required for wastewater projects requesting a change in the boundaries of a Facility Planning Area. Details on the information required by IDOA can be accessed on the internet at:

http://www.agr.state.il.us/Environment/LandWater/FPAboundarychangerequest.pdf

Or by writing or calling:

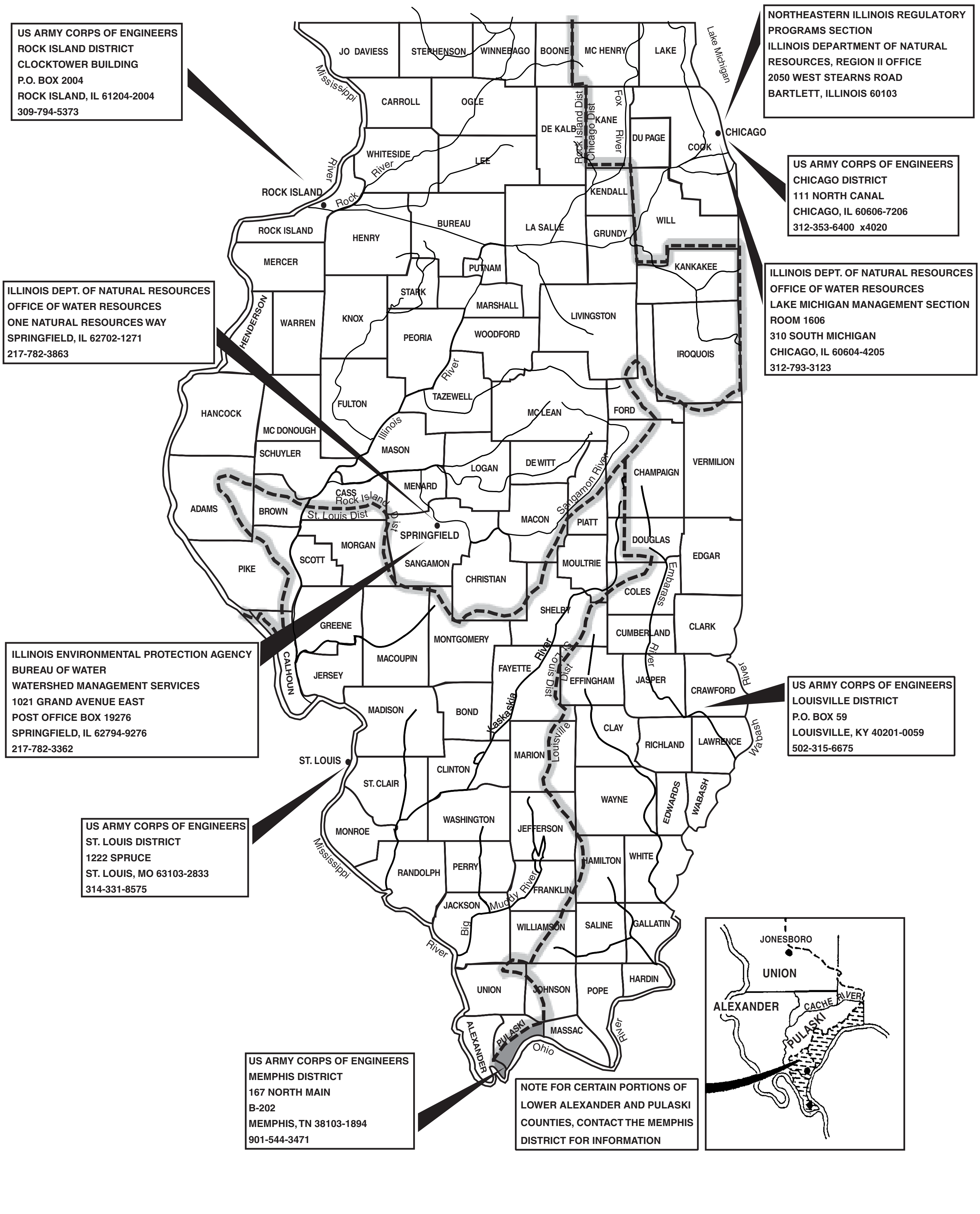
Illinois Department of Agriculture
Bureau of Land and Water Resources
P.O. Box 19281
State Fairgrounds
Springfield, IL 62794-9281

217-785-4389

Guidance on information required by IEPA in Facility Planning Reports concerning a requested modification to a Facility Planning Area boundary is available. If you have any questions regarding this package, please contact the IEPA Infrastructure Financial Assistance Sections at 217/782-2027.

Attachment A

REGULATORY JURISDICTIONAL BOUNDARIES



ATTACHMENT B

Chicago Metropolitan Agency for Planning (CMAP) Counties: Cook, DuPage, Kane, Kendall, Lake, McHenry, Will

Southwestern Illinois Planning Commission Counties: Bond, Clinton, Madison, Monroe, Randolph, St. Clair, Washington

Greater Egypt Regional Planning & Development Commission Counties: Franklin, Jackson, Jefferson, Perry, Williamson

Illinois Historic
Preservation Agency

FAX 217/782-8161

1 Old State Capitol Plaza • Springfield, Illinois 62701-1512 • www.illinois-history.gov

DuPage County PLEASE REFER TO: IHPA LOG #009060513
Lombard
SW of Hill Road and SR 53
Section:12-Township:39N-Range:10E
IEPA LOAN
Waste water treatment plant improvements-Glenbard Wastewater Authority

June 11, 2013

Philip B. Severson
Strand Associates
910 West Wingra Drive
Madison, WI 53715

Dear Mr. Severson:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

Illinois Historic
Preservation Agency

FAX 217/782-8161

1 Old State Capitol Plaza • Springfield, Illinois 62701-1512 • www.illinois-history.gov

DuPage County PLEASE REFER TO: IHPA LOG #008060513
Glen Ellyn
21 W 551 Bemis Road
Section:24-Township:39N-Range:10E
IEPA LOAN
Waste water treatment plant improvements-Glenbard Wastewater Authority

June 11, 2013

Philip B. Severson
Strand Associates
910 West Wingra Drive
Madison, WI 53715

Dear Mr. Severson:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

February 11, 2013

Phil Severson
Strand Associates, Inc.
910 West Wingra Drive
Madison, WI 53715

RE: Glenbard Wastewater Authority Lombard Combined Sewage Treatment Facility
Project Number(s): 1309435
County: DuPage

Dear Applicant:

This letter is in reference to the project you recently submitted for consultation. The natural resource review provided by EcoCAT identified protected resources that may be in the vicinity of the proposed action. The Department has evaluated this information and concluded that adverse effects are unlikely. Therefore, consultation under 17 Ill. Adm. Code Part 1075 and 1090 is terminated.

Consultation for Part 1075 is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary. Consultation for Part 1090 (Interagency Wetland Policy Act) is valid for three years.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database and the Illinois Wetlands Inventory at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project’s implementation, you must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Tracy Evans
Division of Ecosystems and Environment
217-785-5500

February 11, 2013

Phil Severson
Strand Associates, Inc.
910 West Wingra Drive
Madison, WI 53715

RE: Glenbard Wastewater Authority WWTP
Project Number(s): 1309431
County: DuPage

Dear Applicant:

This letter is in reference to the project you recently submitted for consultation. The natural resource review provided by EcoCAT identified protected resources that may be in the vicinity of the proposed action. The Department has evaluated this information and concluded that adverse effects are unlikely. Therefore, consultation under 17 Ill. Adm. Code Part 1075 and 1090 is terminated.

Consultation for Part 1075 is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary. Consultation for Part 1090 (Interagency Wetland Policy Act) is valid for three years.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database and the Illinois Wetlands Inventory at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project’s implementation, you must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Tracy Evans
Division of Ecosystems and Environment
217-785-5500

Strand Associates, Inc.®
910 West Wingra Drive
Madison, WI 53715
(P) 608-251-4843
(F) 608-251-8655

June 26, 2013

Ms. Dawn Thompson
Chicago Metropolitan Agency for Planning
233 South Wacker Drive
Suite 800
Chicago, IL 60606

Re: Glenbard Wastewater Authority Facilities Plan

Dear Ms. Thompson:

We respectfully submit the enclosed Glenbard Wastewater Authority Facilities Plan for review and comment. When requesting loan assistance through the Illinois Environmental Protection Agency, comments from the Chicago Metropolitan Agency for Planning (CMAP) are required prior to facilities planning approval for projects within CMAP's Designated Water Quality Management Agency jurisdiction.

The proposed projects include modifications to the existing wastewater treatment plant and Lombard Combined Sewage Treatment Facility to meet the anticipated flows and loadings as well as the anticipated state and federal water quality protection requirements. The modifications included in these projects should result in increased treatment reliability and improved effluent quality. A modification to the Facility Planning Area is not proposed as part of the Facilities Plan, nor is the design average flow at the facility proposed to be increased.

If you have any questions, please contact me at (608) 251-4843 or troy.stinson@strand.com.

Sincerely,

STRAND ASSOCIATES, INC.®

Troy W. Stinson

Troy W. Stinson, P.E.

Enclosure

c (w/o enc): Erik Lanphier, Glenbard Wastewater Authority Wastewater Manager

TWS:plh\S:\MAD\1200--1299\1278\047\Wrd\Facilities Plan (In Process)\Appendix\G-Env Checklist\Old\CMAP Review Request.docx