LEHIGH COUNTY AUTHORITY

LCA Main Office:
1053 Spruce Road
Wescosville, PA 18106
610-398-2503

Agendas & Minutes Posted:
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BOARD MEETING AGENDA – February 25, 2019

1. Call to Order
   - NOTICE OF MEETING RECORDINGS

     Meetings of Lehigh County Authority's Board of Directors that are held at LCA's Main Office at 1053 Spruce Road, Wescosville, PA, may be recorded for viewing online at lehighcountauthority.org. Recordings of LCA meetings are for public convenience and internal use only and are not considered as minutes for the meeting being recorded, nor are they part of public record. Recordings may be retained or destroyed at LCA's discretion.
   - *Public Participation Sign-In Request*
2. Review of Agenda / Executive Sessions
3. Approval of Minutes
   - *February 11, 2019 Board meeting minutes*
4. Public Comments
5. Action / Discussion Items:

   FINANCE AND ADMINISTRATION
   - *Board of Directors – Nomination of Officers*

   WATER
   - *City Division Water Distribution & Sewer Collection System – 2018 Year in Review (Presentation)*

   WASTEWATER
   - *Allentown Division Wastewater Master Plan (Presentation and Discussion) (Attachment)*
6. Monthly Project Updates / Information Items (1st Board meeting per month)
7. Monthly Financial Review (2nd Board meeting per month) **– January 2019 report – to be distributed separately**
8. Monthly System Operations Overview (2nd Board meeting per month) **- January 2019 report attached**
9. Staff Comments
10. Solicitor's Comments
11. Public Comments / Other Comments
12. Executive Sessions
13. Adjournment

UPCOMING BOARD MEETINGS

Meetings begin at Noon at LCA's Main Office, unless noted otherwise below.

March 11, 2019	March 25, 2019	April 8, 2019

PUBLIC PARTICIPATION POLICY

In accordance with Authority policy, members of the public shall record their name, address, and discussion item on the sign-in sheet at the start of each meeting; this information shall also be stated when addressing the meeting. During the Public Comment portions of the meeting, members of the public will be allowed 5 minutes to make comments/ask questions regarding non-agenda items, but time may be extended at the discretion of the Chair; comments/questions regarding agenda items may be addressed after the presentation of the agenda item. Members of the public may not request that specific items or language be included in the meeting minutes.

REGULAR MEETING MINUTES
February 11, 2019

The Regular Meeting of the Lehigh County Authority was called to order at 12:02 p.m. on Monday, February 11, 2019, Vice Chairman Scott Bieber presiding. Other Members present at the commencement of the meeting were: Linda Rosenfeld, Jeff Morgan, Richard Bohner, Ted Lyons, and Deana Zosky. Chairman Brian Nagle was on the phone for the duration of the meeting. Authority Staff present were Liesel Gross, Brad Landon, Charles Volk, Ed Klein, John Parsons, Chris Moughan, Susan Sampson, Phil DePoe and Lisa Miller.

REVIEW OF AGENDA

Vice Chairman Bieber announced that today's Board meeting is being videotaped and streaming live and recordings will be posted to the Authority's website.

Liesel Gross noted there were no changes to the agenda but did note that the December 2018 Monthly Financial Review was previously emailed to the Board and a printed copy was distributed at today's meeting. There will also be an Executive Session after the regular meeting to discuss a matter of potential litigation.

APPROVAL OF MINUTES

January 28, 2019 Regular Meeting Minutes

Richard Bohner offered typographical corrections to the minutes. On a motion by Richard Bohner, seconded by Jeff Morgan, the Board approved the minutes of January 28, 2019 meeting as corrected (4-0). Ted Lyons, Deana Zosky and Linda Rosenfeld abstained.

PUBLIC COMMENTS

None.

ACTION AND DISCUSSION ITEMS

Preliminary 2020-2024 Capital Plan – Allentown Division

Liesel Gross announced that Phil DePoe will give a PowerPoint presentation of the plan, along with Chuck Volk, and also Ed Klein will review the financing for the preliminary 2020-2024 Allentown Division Capital Plan. Ms. Gross explained that the Allentown Division capital plan includes two categories of projects - funded and unfunded - and LCA and the City are discussing funding strategies to determine the best method to ensure the most important projects move into the funded category.

Phil DePoe reviewed the projects highlighting the largest funded projects. Deana Zosky questioned why the WWTP Interim Blending Pumping system is listed as a project when blending has not been approved by the regulatory agencies. Liesel Gross explained that this is a project directed and paid for by the City, who requested to have it in the Authority's plan should the regulatory authorities approve it. Ted Lyons asked how the project priorities are identified. Phil DePoe explained the detailed process the staff uses to prioritize projects.

Ed Klein reviewed the financial analysis for the City Division water and wastewater projects. Funding for these projects comes from operations and reserves. Mr. Klein also stated there is no borrowing

for this plan. Deana Zosky asked for an explanation of operating revenues and non-operating revenues and the expenses.

Phil DePoe reviewed the Allentown Division unfunded projects and their ranking highlighting the lease and regulatory projects. Some discussion followed regarding individual projects. Scott Bieber commented that if we raise the City Division rates, these unfunded projects could be funded. Liesel Gross agreed stating that several ideas are being discussed with the City as to what the priorities are and how the projects can get funded.

Deana Zosky asked for status of projects in relation to the master plan and asset management system. Chuck Volk explained that a lot of these projects come from the master plan and takes into account the age, what the impact would be if the equipment failed, and if it's a public hazard or an environmental hazard which is all taken into consideration when planning and prioritizing these projects. The risk categories are reviewed internally based on operating experience after receiving the advice from the consultants who prepared the plans.

Jennifer McKenna, City of Allentown Compliance Office, commented on the process and review of the City capital plan projects. Ms. McKenna also explained that the regulatory agencies have not officially weighed in on blending and that the City has not applied for approval yet. The approval for blending will be determined when application is made and that's why the City has asked for this project to remain in the capital plan. Deana Zosky strongly disagreed saying that the regulatory agencies have said they do not support blending and as a Board member, she does not feel that it's responsible to use ratepayers' money for anything that does not have the support of regulatory agencies.

Liesel Gross reviewed the distribution process of the capital plans and noted that any comments will be compiled along with any changes to the plans and brought to the Board in March.

MONTHLY PROJECTS UPDATES / INFORMATION ITEMS

Vice Chairman Bieber announced that the Nomination of Officers will take place at the next Board meeting of February 25, 2019 and that Norma Cusick is serving as the nominating committee so Board members should contact her in regard to their interest in an officer position.

Liesel Gross noted that for the February 25, 2019 meeting there will be a discussion regarding the Allentown Division Wastewater Master Plan and also, there will be a team of maintenance supervisors from one department within the Authority's operations group to give a report of accomplishments for 2018.

MONTHLY FINANCIAL REVIEW

Ed Klein gave an overview of the December 2018 financial report, highlighting variances between budgeted expenses and actual or forecasted expenses. He noted the distribution of the December 2018 report was delayed due to finalizing year-end figures, and the annual audit is kicking off this month.

STAFF COMMENTS

None.

SOLICITOR'S COMMENTS

None.

PUBLIC COMMENTS / OTHER COMMENTS

None.

Vice Chairman Bieber called a recess at 12:59 p.m. The meeting reconvened at 1:08 p.m.

EXECUTIVE SESSION

An Executive Session was held at 1:08 p.m. to discuss potential litigation.

The Executive Session ended at 2:17 p.m.

ADJOURNMENT

There being no further business, the Vice Chairman adjourned the meeting at 2:17 p.m.

Richard H. Bohner
Secretary

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MEMORANDUM

TO: LCA Board of Directors
FROM: John Parsons, Chief Operating Officer
DATE: February 15, 2019
RE: Kline's Island Wastewater Treatment Plant Master Plan

As part of the lease requirements with the City of Allentown, LCA is required to perform Master Plans for the Kline's Island Wastewater Treatment Plant (KIWWTP) at intervals of five years with the initial report to be completed in 2018. Five firms were approached about providing a proposal for the 2018 project. The firms were: AECOM, Arcadis, CH2M, Kleinfelder and Hazen and Sawyer. Kleinfelder had the lowest cost proposal and were well-qualified for the job. Subsequently, they were awarded the project.

The Master Plan evaluated the current condition of the Kline's Island Wastewater Treatment Plant infrastructure, identify prioritized projects which will reduce risk, improve service reliability, and improve operational efficiency. The Master Plan included the following three specific tasks:

> Task 1 – Condition Assessment. D'Huy Engineering, Inc (DEI) was subcontracted by Kleinfelder to perform an on-site inspection of the major plant systems and structures. Baseline conditions were established to include an estimation of the physical condition and criticality rating of each unit process. A risk score was then determined based on the physical condition and criticality rating.
>
> Task 2 – Process Optimization. Kleinfelder evaluated the capacity of the unit processes and the regulatory preparedness of the facility. Other evaluations included operational issues associated with the plant's ability to meet current and anticipated regulatory requirements.
>
> Task 3 – Capital Improvements Plan. Using the results of Tasks 1 and 2, a prioritized capital improvements plan (CIP) was developed collaboratively between Kleinfelder, D'Huy and LCA. The CIP addresses both short-term and long-term needs during the entire 50 year lease. The CIP includes opinions of probable construction costs.

We have attached the CIP section of the Master Plan for your review. Should any of you wish to see the entire Master Plan, we can provide that as well. Mr. Tim Bradley, PE, who was the Project Manager for Kleinfelder during this project, will be presenting the findings of the Master Plan at the Board Meeting on February 25, 2019. Specific questions pertaining to the Master Plan can be answered at that time.

Respectfully,

John Parsons, Chief Operating Officer

KLEINFELDER
Bright People. Right Solutions.

LEHIGH COUNTY AUTHORITY

KLINE'S ISLAND WASTEWATER TREATMENT PLANT

MASTER PLAN

CAPITAL IMPROVEMENT PLAN

PREPARED BY:

KLEINFELDER, INC.

IN ASSOCIATION WITH

D'HUY ENGINEERING, INC.

JANUARY 2019

Research Park, 321 Wall Street, Princeton, NJ 08540 **p |** 609.924.8821 **f |** 609.924.8831

PRI18R88674

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1.0 BACKGROUND AND OBJECTIVE

The Lehigh County Authority (LCA) leases and operates the Kline's Island Wastewater Treatment Plant (KIWWTP), which is owned by the City of Allentown. LCA has established a Strategic Plan defining its vision, mission, values and goals, including specific goals related to capital asset management, operations and financial management, and environmental & regulatory compliance. In keeping with its Strategic Plan goals, LCA engaged Kleinfelder to develop a Master Plan for the KIWWTP.

The KIWWTP Master Plan assesses the current condition of the KIWWTP infrastructure (excluding the piping network that conveys wastewater to the KIWWTP) and identifies prioritized projects to enable continued reliable permit compliance into the future, reduce operational risks, enhance operational efficiency, and addresses previously identified operational issues. It also identifies improvements that would be needed to address several potential regulatory changes that may or may not occur in the future. The prioritized projects form the basis for the Capital Improvement Plant (CIP).

The CIP encompasses a 50-year planning period to address the short-term needs (1-10 years), mid-term needs (10-25 years), and long-term needs (25-50 years) of the KIWWTP so that LCA can continue to provide effective treatment which reliably achieves the permitted effluent limits and does so in a financially responsible manner over the full term of its lease.

The Master Plan does not address capacity expansion beyond the permitted capacity of 40 million gallons per day (mgd) or wet-weather improvements that may be necessary if the Regional Flow Management Strategy does not sufficiently remove infiltration and inflow to the extent required to reduce sanitary sewer overflows (SSOs) to an acceptable level.

2.0 MASTER PLAN DEVELOPMENT APPROACH

The KIWWTP Master Plan was developed by performing the following tasks:

- Task 1 – Condition Assessment: D'Huy Engineering, Inc. (DEI), under a subcontract agreement with Kleinfelder, performed an onsite inspection of major systems and structures at the KIWWTP. Additionally, DEI reviewed LCA's asset list identifying the installation and refurbishment dates of process equipment and structures, and reviewed the findings of the Corrosion Probe, Inc. (CPI) Condition Assessment Report of the settling

tanks (primary, intermediate and final) and the plastic media trickling filters submitted to LCA in December of 2016. Utilizing the onsite inspection and CPI information, a baseline condition was established including estimating a physical condition rating of each unit process, establishing a criticality rating for each unit process and determining a resulting risk score for each of these unit processes. A condition assessment workshop was held on July 26, 2018, with Kleinfelder and LCA to discuss the preliminary findings prior preparation of a draft Condition Assessment Report dated September 2018. LCA subsequently provided comments on the draft Condition Assessment Report which were addressed to prepare the final Condition Assessment Report dated November 2018, presented in Appendix A.

- Task 2 – KIWWTP Process Assessment: Kleinfelder evaluated the current wastewater characteristics of the flow entering the KIWWTP and the performance of the KIWWTP under average and peak flow conditions and utilized this information to assess the treatment and hydraulic conveyance capacity of each component of the KIWWTP and the capacity and performance limiting components of the KIWWTP. Kleinfelder also performed regulatory preparedness evaluations to assess the cost impact of several potential regulatory changes and evaluated the cost impact to address several specific operational issues. A Process Assessment Workshop was held with LCA on August 14, 2018, to discuss the preliminary evaluations prior to preparation of the draft Process Assessment Report dated October 2018. LCA subsequently provided comments on the draft Process Assessment Report which were addressed to prepare the final Process Assessment Report dated November 2018, which is presented in Appendix B.

- Task 3 – Capital Improvement Plan: A Capital Improvement Plan Workshop was held on October 16, 2018, with representatives from LCA, Kleinfelder and DEI. The primary objectives of the workshop were to (1) build consensus on the phase in which each Task 1 and Task 2 improvement should be implemented, and (2) establish the logical consolidation of improvements that should be implemented in Phase 1 through individual construction contracts. During this workshop it was agreed that the improvements identified through the regulatory preparedness evaluations are event driven (i.e. a result of a regulatory change) rather than time driven and cannot be accurately placed in one of the three time-driven phases, i.e., 0-10 years, 10-25 years and 25-50 years. Therefore, the consensus of the group was that these improvements would be identified in a separate

event-driven category in the CIP. The CIP presents a budgetary capital cost estimate for each improvement.

3.0 CIP OVERVIEW

As further described in the Condition Assessment Report (Appendix A), a rating system based on U.S. Environmental Protection Agency (EPA) asset management principles were utilized to the evaluate the risk rating of twenty-nine (29) unit process and three (3) non-process buildings at the KIWWTP. The resulting risk ratings were then used to prioritize the identified improvement needs. To ensure cost efficient implementation, the individual improvements were segregated into four (4) project types: Masonry, Structural, HVAC, and Electrical and Mechanical process. A total of fourteen (14) projects are recommended for near-term (0-10 years) implementation. A detailed Project Proposal was prepared for each of the fourteen (14) individual projects. Each Project Proposal presents the following information:

- Problem Statement and Identification
- Operational Costs and Benefits of Proposed Project
- Financial Costs and Benefits of Proposed Project
- Alternatives Analysis, if Appropriate
- Preliminary Scope of Work
- Coordination Needs and Issues
- Time Requirements
- Project Implementation Schedule

Budgetary capital cost estimates were developed in 2018 dollars at an Engineering News Record (ENR) twenty city construction cost index of 11,170 and are prepared at a level of detail consistent with an American Association of Cost Estimating (AACE) Level 4 estimate, which is the appropriate level for the study phase of a project. Budgetary capital cost estimates include a 30% contingency and 18% for design, permitting and construction administration services. The budgetary capital cost estimates in 2018 dollars were escalated at 3% per year to the mid-point of each implementation phase. The budgetary capital costs for event-driven improvements are in 2018 dollars.

Consistent with LCA's Request for Proposals, Project Proposals were not prepared for the mid-term and long-term improvements. Budgetary capital cost estimates for these projects were

prepared at a higher level than the near-term improvements due to the greater uncertainty associated with projects to be implemented 10 to 50 years in the future.

An essential consideration in structuring the CIP was the desire to avoid triggering the Special Protection Waters (SPW) requirements of the Delaware River Basin Commission (DRBC) to the greatest extent possible. Based on a No Measurable Change Analysis performed by DRBC in 2014, when triggered, the SPW regulations will require that the KIWWTP achieve new effluent limitations for nitrate-nitrogen (NO_3-N), total nitrogen (TN) and total phosphorus (TP) and a more stringent effluent limit for the currently regulated parameter, ammonia-nitrogen (NH_3-N).

Compliance with these new and more stringent effluent limits would require a costly upgrade to the KIWWTP as well as a significant increase in annual operation and maintenance costs.

Compliance with the SPW regulations are triggered when a WWTP undergoes "substantial alterations or additions," which are defined as follows by the DRBC:

> *Substantial Alterations or Additions are those additions and alterations resulting in: (a) a complete upgrade or modernization of an existing wastewater treatment plant, including substantial replacement or rehabilitation of the existing wastewater treatment process or major physical structures such as headworks, settling tanks, and biological/chemical treatment and filtration tanks, whether conducted as a single phase or a multi-phased project or related projects; or (b) a new load or increased flow or loading from an existing facility that was not included in a NPDES permit or docket effective on the date of SPW designation. Among other projects, modifications made solely to address wet weather flows; and alterations that are limited to changes in the method of disinfection and/or the addition of treatment works for nutrient removal are not deemed to be "Substantial Alterations or Additions."*

Based on the above definition, Kleinfelder believes that the fourteen (14) projects proposed for the near-term phase (0-10 years) would not trigger SPW requirements, and that it is possible that the improvements proposed for the mid-term phase (10-25 years) and long-term phase (25-50 years) may not trigger SPW requirements, depending upon how implementation of the individual improvements is sequenced during years 10 through 50 and whether DRBC views in-kind equipment replacement to maintain the functional integrity of the KIWWTP as a substantial

alteration or addition, when in fact, each of these improvements would fall under the federal definitions at 40 CFR 35.2005 related to operation and maintenance activities. The relevant federal definitions related to operation and maintenance activities are presented below.

> *Operation and Maintenance:* Activities required to assure the dependable and economical operation of treatment works.
>
> *Maintenance:* Preservation of functional integrity and efficiency of equipment and structures. This includes preventive maintenance, corrective maintenance and replacement of equipment as needed.
>
> *Replacement:* Obtaining and installing equipment, accessories, or appurtenances which are necessary during the design or useful life, whichever is longer, of the treatment works to maintain the capacity and performance for which such works were designed and constructed.

In Kleinfelder's opinion, it would seem illogical to characterize an operation and maintenance activity as a substantial alteration or addition; however, there is no guarantee that DRBC will share this view as it relates to in-kind replacement of process equipment that is at the end of its service life and must be replaced to ensure the continued functional integrity of the KIWWTP, or the repair of treatment-related structures that are needed for the same purpose.

Regarding the operational issues evaluated in the Process Assessment Report (Appendix B), it is believed that the following improvements would likely be viewed by DRBC as substantial alterations or additions and would therefore trigger SPW requirements:

1. Replacement of the four (4) 70-feet-diameter 1928 final clarifiers with a single 140-feet-diameter final clarifier;
2. Implementation of a new anaerobic digestion process to produce class A biosolids;
3. Construction of a leachate storage tank.

Therefore, Kleinfelder recommends that these improvements not be considered for implementation until and unless the SPW regulations are triggered at a future date for another reason. However, Kleinfelder believes that the following operation issues evaluated in the Process Assessment Report would not trigger SPW requirements:

1. Disinfection with sodium hypochlorite rather than chlorine gas to enhance safety

2. Rehabilitation of the Drainage Lift Station

Therefore, these improvements have been included in the CIP.

Regarding the regulatory preparedness evaluations presented in the Process Assessment Report, one of the potential regulatory changes considered – Pennsylvania Department of Environmental Protection (PADEP) revokes its prior approval allowing LCA to filter plant effluent samples before conducting whole effluent toxicity (WET) testing – could result in the need for improvements of sufficient magnitude to trigger SPW requirements. As further described in the Process Assessment Report, the approval to filter effluent samples prior to WET testing was granted many years ago based on an analysis demonstrating that filamentous bacteria were adversely impacting WET testing results. If this approval was revoked, and if filamentous bacteria are still present, compliance with the WET effluent limits would require that an effluent filtration system be installed, which would be a substantial alteration to the KIWWTP. Regarding the presence of filamentous bacteria, it is noted that some WET testing was performed by LCA in 2016 when the draft National Pollutant Discharge Elimination System (NPDES) permit was under review. Based on the limited WET testing at that time, there was no evidence of filamentous bacteria. Therefore, subject to the results of longer-term testing over the full range of operating conditions experienced during a typical year, it is possible that effluent filtration would not be needed if PADEP revokes its prior approval allowing LCA to filter effluent samples before conducting WET testing. However, if long-term testing indicates that filamentous bacteria are present under certain operating conditions and would prevent reliable compliance with the WET effluent limits throughout the year, effluent filtration may be required to ensure reliable compliance with the WET effluent limits. Because of the encouraging findings of the limited testing performed in 2016, the effluent filtration system has not been included in the CIP. However, the Process Assessment Report recommends that LCA consider initiating 12 months of testing for filamentous bacteria. If this testing indicates that filamentous bacteria will be present under certain operating conditions that are unavoidable, effluent filters should be added to the CIP, but as an event-driven improvement rather than a time-driven improvement.

Two (2) of the potential regulatory changes considered in the regulatory preparedness evaluations – PADEP reduces the monthly average chlorine residual effluent limit to a value less than the current limit of 0.5 mg/L or eliminates the current instantaneous maximum fecal coliform effluent limits in the summer months – would result in the need for improvements that would likely not trigger SPW requirements. In the first of these two potential regulatory scenarios, the addition of

a dechlorination system would be required to meet the lower chlorine residual effluent limit while enabling sufficient chlorine to be dosed to meet the existing fecal coliform effluent limits. Under the second potential regulatory scenario, the addition of a dechlorination system would also be required to enable sufficient chlorine to be dosed to reliably achieve the monthly geometric mean effluent limits at all time while not exceeding the current chlorine residual effluent limits. Implementing dechlorination would be a relatively minor improvement requiring the installation of chemical storage tanks and feed pumps in an existing building. Because PADEP had proposed reducing the current chlorine residual effluent limit in the 2016 draft NPDES permit, it is possible that dechlorination will be required in the future. Therefore, installation of a dechlorination system is included in the CIP, but as an event-driven improvement rather than a time-driven improvement.

4.0 PROJECT DESCRIPTIONS

4.1 Near-Term Projects (0-10 Years)

The Project Proposals for the recommended near-term improvements (1-10 years) follow and have been further characterized as improvements that should be implemented in years 0-5 and years 5-10. The "financial costs" presented in the Project Proposals are budgetary capital cost estimates that have escalated from 2018 dollars by 3% per year to the midpoint of the recommended 0-5 year or 5-10 year implementation period. The budgetary costs presented in the individual Project Proposals are also presented in the consolidated CIP in Appendix C.

Project Proposal No. 1 – Main Pump Station Improvements

Problem statement and identification	The Main Pump Station is critical to plant performance and the ability to maximize wet-weather flow into the KIWWTP. The existing pumps are 50 years old and approaching the end of their useful service life. These pumps were previously planned to be replaced as part of the blending project improvements. Valves and piping are corroded and predate the 1965 upgrade. Replacement of the valves and piping is required to allow maintenance to occur while simultaneously keeping the pumping station operational.
Operational costs and benefits of proposed project	Pump replacement will provide improved equipment reliability and reduced long-term maintenance costs.
Financial costs and benefits of proposed project	$2,542,000
Alternatives analysis, if appropriate	Improved flow matching ability should be evaluated during design.
Preliminary scope of work	Replacement of two 200-hp constant speed pumps and two 150/100-hp two-speed pumps; 20-inch suction piping, 20-inch discharge piping, 24-inch discharge knife gate valves,

	20-inch isolation gate valves and pump control valves. Addition of VFDs for all four pumps.
Coordination needs and issues	The combination of the main and auxiliary sewage pump stations allows a phased pump replacement project.
Time requirements	Design and construction is estimated at 12-18 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 2 – Auxiliary Pump Station Improvements

Problem statement and identification	The Auxiliary Pump Station is critical to plant performance and the ability to maximize wet-weather flow into the KIWWTP. The pump station, discharge and check valves are approaching the end of their useful service life and require replacement to maintain satisfactory pump station operation.
Operational costs and benefits of proposed project	The valve replacement project will provide added plant pumping reliability by enabling the isolation of one pump while the remaining pump is operational. Reduced valve maintenance cost is also a beneficial result of the project.
Financial costs and benefits of proposed project	$1,191,000
Alternatives analysis, if appropriate	None
Preliminary scope of work	Replacement of the 36-inch suction valves, and 30-inch check and discharge isolation valves.
Coordination needs and issues	The combination of the main and auxiliary sewage pump stations allows a phased pump replacement project.
Time requirements	Design and construction is estimated at 12-16 months.
Project implementation schedule	This project should be implemented in the 5-10 year period.

Project Proposal No. 3 – Sludge Thickening/Digestion Improvements

Problem statement and identification	This project consists of three separate but inter-related improvements that will enhance the thickening of primary and secondary sludge and thereby maximize anaerobic digester capacity. ***Primary Sludge Digester Feed Line Replacement:*** The existing lines have experienced failure due to blockages and continuously build-up with grease, increasing line pressure on the primary sludge pumps resulting in the need to pump "thin" primary sludge to the anaerobic digesters, which has an adverse impact on digester capacity. Replacement with new glass-lined ductile iron piping and cleanout structures will reduce line pressure and enable thicker primary sludge to be pumped to the digesters, thereby increasing digester capacity. ***Thickener Tank #3 Collector Mechanism Replacement***: The equipment is severely corroded. The collector mechanism is original to the tank that was constructed in 1984.To enable the LCA to safely and reliably thicken trickling filter sludge prior to anaerobic digestion, the collector

	mechanism, drive, walkway and weir plates in Thickener Tank #3 require replacement. ***Digester/Dewatering Building Piping Replacement***: Sections of digester overflow drain line piping and sludge feed piping in the Dewatering Building are in poor condition due to corrosion and struvite build-up. To enable the LCA to reliably dewater solids thereby maintaining proper digester and dewatering operation, the piping requires replacement.
Operational costs and benefits of proposed project	The new glass-lined pipe will reduce maintenance costs associated with flushing and jetting the lines and the reduced line pressure will reduce maintenance costs associated with the primary sludge pumps energy costs for pumping and will reduce the risk of line breaks. The new collector mechanism will provide enhanced reliability of the thickening process and will reduce maintenance costs, Removal of the flow constraints due to struvite build-up will provide better flow conditions for digester drain and feed lines and will reduce pump discharge pressures. Replacement of the deteriorated pipe will prevent leaks due to section failures and emergency maintenance.
Financial costs and benefits of proposed project	$1,455,000
Alternatives analysis, if appropriate	Pipe routing options will be considered during design.
Preliminary scope of work	Project scope will entail: (1) the excavation an installation of over 2,800 feet of buried sludge piping installed in 1974. The buried pipe will parallel the existing lines from the primary sludge pumping station (PSPS) to the digesters and will include inlet type cleanout structures like the existing pipeline; (2). the demolition and replacement of the existing collector mechanism, drive and walkway inside the thickening tank. The project will also include the replacement of the tank weirs with new fiberglass weirs. Miscellaneous repair of the existing concrete tank would also be part of the scope of work; and (3) the replacement of the existing pipe with glass-lined ductile iron pipe to reduce the incidence of grease and struvite accumulations. Also included is the replacement of several valves in the digester feed piping.
Coordination needs and issues	(1) The new digester feed line will be installed adjacent to the existing lines. Coordination with plant staff will be required when final connections are made to the PSPS and the digesters, (2). The collector mechanism replacement would require coordination between the Contractor and plant operations. Sludge typically directed to this tank would need to be diverted to Thickening Tanks #1 & 2 for the duration of the replacement, (3) If alternate pipe routes are available, for the replacement digester/dewatering piping, new pipe can be installed with minimal impact on plant operation. However, there are several areas where this will not be practical, and field coordination between the Contractor and operations will

	be required to temporarily remove units from service while new piping is installed.
Time requirements	Design and construction is estimated at 12-15 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 4 – PMTF Effluent Flushing Line Replacement

Problem statement and identification	The effluent flushing water line which provides flushing water to suppress foam in the PMTF effluent which would otherwise cause erroneous level measurements in the PMTF wet well. I t is also used for housekeeping of the PMTF basin. If this line were to fail, LCA would experience temporary loss of chlorination of the plant effluent and gravity thickeners because EFW is also utilized to produce chlorine solution at the chlorine injectors.
Operational costs and benefits of proposed project	This service line is critical for chlorination of the plant effluent and therefore for achieving permit compliance. It is also critical for enabling reliable level measurement at the PMTF wet well for pump control. Replacement of the line will also reduce the risk of emergency repair costs.
Financial costs and benefits of proposed project	$172,000
Alternatives analysis, if appropriate	N/A
Preliminary scope of work	The 4-inch ductile iron line would be replaced with a stainless steel rolled groove piping system with isolation valves and hose hydrants. The new line will run along the interior face of the basin wall parallel to the existing line.
Coordination needs and issues	The existing line would be kept in service while the new line is installed, limiting the down time and coordination issues with operations.
Time requirements	Design and construction is estimated at 6-8 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 5 – Odor Control Unit 24 Replacement

Problem statement and identification	The Odor Control Building is in poor condition and should be replaced to protect the odor control equipment. This equipment is important for minimizing odors outside of the plant, which can result in complaints from local businesses and residents.
Operational costs and benefits of proposed project	Minimal impact on operational costs. The replacement of the electrical mounting board and disconnects along with new chemical feed pumps will provide added reliability. Reduced maintenance costs associated with equipment failures due to weather-related premature aging. Increased reliability of equipment due to protection from the weather. Less incidence of odor complaints.

Financial costs and benefits of proposed project	$387,000
Alternatives analysis, if appropriate	Construction of a new building near the existing building while keeping the existing equipment in service could be considered during design.
Preliminary scope of work	The building will be replaced with a precast, insulated concrete panel structure. The existing electrical, water softening system piping and chemical feed pumps will be replaced with new equipment. The building will be similar in design layout to the existing enclosure.
Coordination needs and issues	Temporary chemical feed system and electrical power will be required to provide odor control while the new building is constructed on the existing concrete pad. Coordination with plant operation will be required to maintain a functioning odor control facility.
Time requirements	Design and construction is estimated at 10-12 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 6 – Convert to Sodium Hypochlorite Disinfection

Problem statement and identification	The chlorination equipment (chlorinators, evaporators and related piping) has reached the end of its useful service life and requires replacement at an estimated cost of $610,000. Conversion to sodium hypochlorite disinfection would eliminate the risks associated with chlorine gas disinfection and the estimated implementation cost is approximately $160,000 less than the estimated cost to replace the existing equipment.
Operational costs and benefits of proposed project	The annual chemical cost for sodium hypochlorite will be approximately $67,000 per year greater than for chlorine gas; however, a significant portion of the additional chemical cost will be offset by the risk management and maintenance costs of operating the existing system which LCA has estimated to be approximately $50,000 per year
Financial costs and benefits of proposed project	$487,000
Alternatives analysis, if appropriate	The alternative analysis is described in the Process Assessment Report and summarized in the Problem Statement above.
Preliminary scope of work	Install two sodium hypochlorite storage tanks and chemical feed pumps in the Chlorine Storage Building as shown in the Conceptual Plan in the Process Assessment Report. Install related chemical feed piping and a mixing system at the dose location

Coordination needs and issues	Need to ensure that sufficient disinfection capability is available at all times during construction by sequencing installation of the new storage tanks and equipment.
Time requirements	Design, permitting, bidding and construction is estimated at 12-15 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 7 – Masonry Restoration

Problem statement and identification	This project involves the restoration of deteriorated brick and CMU joints on several of the pump stations and buildings at the KIWWTP. The project is necessary to deter water intrusion into unit masonry walls, which has caused significant structural deterioration of both masonry and support steel.
Operational costs and benefits of proposed project	There are no foreseen operational impacts. Benefits include deterring further deterioration of facilities and extending useful service life of the structures.
Financial costs and benefits of proposed project	$1,703,000
Alternatives analysis, if appropriate	N/A
Preliminary scope of work	This work will include low pressure power washing to clean masonry surfaces, replacement of cracked brick, area-specific brick pointing, cast stone head joint pointing, lintel replacement at several openings, flashing replacement if required at lintels, expansion joint sealant replacement and masonry water-proofing.
Coordination needs and issues	N/A. This work can be performed around and during plant operations.
Time requirements	Design and construction is estimated at 12-15 months.
Project implementation schedule	This project should be implemented in the 5-10 year period.

Project Proposal No. 8 – PMTF Steel Rehabilitation

Problem statement and identification	The lower steel girts and connections as well as the tower support steel column anchors require repair. A lack of redundancy should any units suffer a failure could impact the LCA's ability to meet their permitted treatment requirements. If one unit is out of service due to steel failure, a release of partially treated wastewater could occur.
Operational costs and benefits of proposed project	The PMTFs are a critical treatment unit process, and failure of one of the trickling filters would adversely impact treatment capabilities.
Financial costs and benefits of proposed project	$1,121,000

Alternatives analysis, if appropriate	N/A
Preliminary scope of work	Project scope will include replacement of the girt to column connections, the evaluation of coating the lower level girts to prevent further material loss, and design and installation of a new column base attachment detail. The steel girts have experienced some minimal material loss; however, the girt to column connections are in poor condition, and the anchor bolts at several of the tower column anchors are completely deteriorated. The anchor bolts and girt connections need to be addressed to prevent failure.
Coordination needs and issues	The work on the structural steel would be phased to maintain three trickling filters in operation at all times. This work would be coordinated with plant staff.
Time requirements	Design and construction is estimated at 12-15 months.
Project implementation schedule	This project should be implemented in the 5-10 year period.

Project Proposal No. 9 – HVAC Equipment Replacement

Problem statement and identification	Many of the plant boilers, air handling units (AHUs), HVAC units and exhaust fans in several buildings are non-operational or beyond the typical 20-year equipment useful service life and require replacement. Ventilation requirements for certain facilities are mandated by NFPA 820 and create unnecessary risk to operations personnel if non-operable. Additionally, proper air flow in corrosive environments lowers the incidence of corrosion, which can lower the incidence of premature equipment failure.
Operational costs and benefits of proposed project	These are direct replacements of existing plant equipment, therefore resulting in no additional operating costs. There will be an increased air quality associated with several of the buildings with the new air handlers. There should be reduced maintenance costs with the new equipment
Financial costs and benefits of proposed project	$1274,000
Alternatives analysis, if appropriate	N/A
Preliminary scope of work	Project scope will be the replacement of the main pump house steam boiler, the two hot water boilers in the basement of the Dewatering Building used for digested sludge process heating and the Dewatering Building unit on the ground floor level used for heating the dewatering building. Also included in the HVAC upgrades are the replacement of three ventilation air handlers in the Intermediate Pumping Station from the 1974 plant upgrade, two HVAC units in the Digester Control Building (1965 and 1974) and an HVAC unit that serves the basement of the Dewatering Building (1965). The project will also include the replacement of several small building exhaust fans dating to 1974.

Coordination needs and issues	There is minimal coordination concern for plant operations. The boiler work would be scheduled for the summer when heating is not required. The two units that heat the digested sludge process would be phased to maintain required plant process hot water. The combination ventilation/heating air handlers would also be phased during the non-heat season.
Time requirements	Design and construction is estimated at 10-12 months.
Project implementation schedule	This project should be implemented in the 5-10 year period.

Project Proposal No. 10 – 480V Motor Control Center Replacement

Problem statement and identification	Various 480V electrical motor control centers (MCCs) throughout the plant have exceed their useful service life and should be replaced since a loss of power to key process mechanical components may affect the LCA's ability to both maintain treatment levels mandated in their permit and their ability to meet the requirements of the administrative order.
Operational costs and benefits of proposed project	An increase in operational reliability would be associated with new motor control centers and breakers. Reduction in maintenance costs as older more failure prone equipment is replaced with newer equipment.
Financial costs and benefits of proposed project	$3,232,000
Alternatives analysis, if appropriate	N/A
Preliminary scope of work	The project scope is the replacement of MCCs and breakers that were installed prior to the 2008 480V electrical upgrade project to the Main Pump House and Dewatering Buildings. The following MCCs are slated for replacement: Nos. 6 & 7 (IPS), Nos. 8 & 9 (PSPS), Nos. 12 & 13 (APS), No. 14 (PST Odor Control Building), No. 15 (OCU 13 building) and No. 4 (Effluent Pump Station Control Building). Additional scope may include a new MCC electrical enclosure near Final Pump Stations 2 & 3, which would enable the outdated electrical equipment in both pump stations to be replaced and raised from the lower levels of the pump stations where they are subject to flooding. The replacement of the MCC in the lower level of FPS 4 should be evaluated for replacement as well. The VFDs associated with PE pumps #9, 10, & 11 and PMTF effluent pumps # 12, 14, & 16 will be replaced with new VFDs.
Coordination needs and issues	The replacement of the MCCs in their existing locations pose both construction coordination and operational concerns. The design will require phased construction as well as temporary power provisions during construction. This sequencing has been accounted for in the installation portion of the Capital Cost Estimate.
Time requirements	Design and construction is estimated at 15-18 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 11 – Concrete Restoration

Problem statement and identification	Several unit process concrete structures have deteriorated concrete and require restoration. Ignoring the repair of these concrete structures will adversely affect the reliability of the associated unit process and thereby increase the risk of failure of a unit process which may affect the LCA's ability to meet their effluent permit requirements.
Operational costs and benefits of proposed project	No operating cost impacts. Concrete repair of the structures will ensure continued long-term operation of the unit processes.
Financial costs and benefits of proposed project	$336,000
Alternatives analysis, if appropriate	N/A
Preliminary scope of work	The scope will require identifying the failed areas in detail, developing concrete repair procedures and suitable repair materials, products and methods. Deteriorated, delaminating concrete will be removed to expose existing reinforcing steel to determine extent of cross-sectional material loss. The areas of concrete joint sealant failure will be identified, and the existing sealant will be removed and replaced.
Coordination needs and issues	Coordination will be required to remove process units from service, allowing the restoration work to be completed.
Time requirements	Design and construction is estimated at 8-10 months.
Project implementation schedule	This project should be implemented in the 5-10 year period.

Project Proposal No. 12 – Unit Process Equipment Painting

Problem statement and identification	To maximize service life and to maintain service reliability, clarifier tank mechanisms, walkways, overflow weirs and launders are slated for painting. Failure of a clarifier mechanism, particularly those in the Intermediate Settling Tanks, would affect LCA's ability to meet the hydraulic loading on the plant during high flows, thereby jeopardizing the ability to meet effluent permit requirements.
Operational costs and benefits of proposed project	There is no impact on operational costs since this is considered maintenance-related work. The major benefit is increase in the equipment service life.
Financial costs and benefits of proposed project	$2,245,000
Alternatives analysis, if appropriate	N/A
Preliminary scope of work	This work includes sandblasting and painting of all steel structures in the following tanks: Elutriation sludge storage tanks; Thickener Tanks 1, 2 & 4; Intermediate Settling Tanks (1998) and Final Settling Tanks 7 & 8 (1974) and Final Tanks 9 & 10 (1998). Additional scope items include painting piping, bolts, and meters in both the Main Flow and Rock Media Trickling Filter Venturi meter pits. There is also some minor

	painting work associated with the truck loading canopies' structural steel columns at the Dewatering Building.
Coordination needs and issues	Due to plant process flow conditions limiting the number of tanks out of service, this would be a multi-year phased project.
Time requirements	Design and construction is estimated at 22-24 months.
Project implementation schedule	This project should be implemented in the 5-10 year period.

Project Proposal No. 13 – Drainage Lift Station Rehabilitation

Problem statement and identification	The drainage lift station (DLS) receives stormwater runoff generated from the southern portion of the KIWWTP site and pumps it into Outfall 001 downstream of the Parshall Flume. The DLS is 40 years old and in need of significant rehabilitation so that it can continue to reliably prevent flooding of the site during storm conditions.
Operational costs and benefits of proposed project	Rehabilitation of the DLS will reduce the current effort to maintain the DLS in operation.
Financial costs and benefits of proposed project	$699,000
Alternatives analysis, if appropriate	As described in the Process Assessment Report, a total of three alternatives were evaluated, resulting in the recommendation to rehabilitate the existing DLS.
Preliminary scope of work	The scope of work includes elimination of the existing dry well and modifying the existing wet well to accommodate new submersible vertical turbine pumps and replacement of the existing electrical equipment related to the DLS.
Coordination needs and issues	Stormwater drainage will need to be temporarily re-routed during construction
Time requirements	Design and construction is estimated at 9-12 months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

Project Proposal No. 14 – Final Clarifiers No. 1 – No. 4 Rehabilitation

Problem statement and identification	Final Clarifiers No. 1 – 4 are nearly 90 years old and in severe need of rehabilitation. LCA would prefer to replace these clarifiers with a single new 140 feet diameter final clarifier but this improvement would trigger SPW requirements at significant additional cost. Therefore, Final Clarifiers No. 1 – 4 must be rehabilitated to ensure reliable performance and to maximize flow through the KIWWTP.
Operational costs and benefits of proposed project	Rehabilitation of these clarifiers will reduce the current effort and cost to maintain the exiting clarifier equipment.
Financial costs and benefits of proposed project	$3,262,000

Alternatives analysis, if appropriate	As previously noted, LCA would prefer to replace these clarifiers with a single larger unit but the cost would be excessive due to the triggering of SPW requirements
Preliminary scope of work	The scope of work includes replacement of sludge collectors, drives, bridges, weirs and troughs as well as grout replacement at floor of each tank, repair of bricked masonry at the 1931 weir openings, and miscellaneous concrete repair.
Coordination needs and issues	Final clarifiers No. 1 – 4 will need to be sequentially rehabilitated. However, the feasibility of rehabilitating two clarifiers at a time will be evaluated during design
Time requirements	Design and construction is estimated at 15 – 20 months. months.
Project implementation schedule	This project should be implemented in the 0-5 year period.

4.2 Mid-Term Improvements (10-25 Years)

The recommended mid-term capital improvements are presented in the table below. The budgetary capital costs presented in this table have been escalated to 2036 dollars as described in Section 3.0. The consolidated CIP in Appendix C also presents a summary of these costs. The need for each of these improvements is driven by service life considerations.

Mid-Term CIP (10-25 years)

Unit Process	Recommended Improvements	Budgetary Capital Cost
Headworks	Replace Screens Nos. 1 & 2 and Helico Screenings Press	$766,000
Auxilary Pumping Station APS	Replace pump Nos. 5 & 6 and associated VFDs	$766,000
Aerated Grit Chamber	Replace coarse bubble aeration diffusers & piping and overhead crane & hoist	$426,000
PSTs cover replacement	Replace existing PST aluminum dome covers	$3,405,000
PST Odor Control Sytem	Replace scrubber towers, Replace scrubber fans	$936,000
Intermediate Pumping Station (PE Pumps)	Replace Pump Nos. 7, 8, 10	$1,022,000
Intermediate Pumping Station (PMTF Pum	Replace Pump Nos. 13, 14, 15	$1,022,000
Plastic Media Trickling Filters (PMTF) Rotary distributors	Replace distributors and media	$1,362,000
PMTF Odor Control System 13	Replace Scrubber 1A/1B, 3B	$1,277,000
PMTF Odor Control System 24	Replace Scrubbers 2B, 4B	$851,000
ISTs Clarifier Mechanisms	Painting of equipment, Overhaul	$255,000
Intermediate Sludge Pumping Station	Replace Pump Nos. 1 & 2	$204,290
Rock Media Trickling Filter (RMTF) Improvements	Replace distribution piping and end valves and overhaul siphon bell chambers	$6,010,000
FSTs 7-10	Tank repairs; replace mechanism, drive, weirs, baffles and walkway	$3,745,000
Effluent Pump Station	Replace Pump Nos. 1,2,3,4,5	$681,000
Thickening Tanks 1, 2, 4	Painting of equipment	$205,000
Thickening Tank Odor Control Systems	Replace Scrubber Towers, Replace OCU Fans Nos. 1 & 2, and Nos. 3 & 4	$936,000
Sludge Transfer and Feed Pumps	Replace Pump Nos. 1,2,4	$153,000
Elutriation Tanks	Painting of equipment; tank overhaul	$136,000
Anaerobic digesters	Painting of equipment	$306,000
Belt Filter Press Building	Replace BFP No. 1, 2 and 3	$5,380,000

4.3 Long-Term Improvements (25-50 Years)

The recommended long-term capital improvements are presented in the table below. The budgetary capital costs presented in this table have been escalated to 2056 dollars as described in Section 3.0. The consolidated CIP in Appendix C also presents a summary of these costs. The need for each of these improvements is driven by service life considerations.

Long-Term CIP (25-50 years)

Unit Process	Recommended Improvements	Budgetary Capital Cost
Main Flow Venturi Meter	Replace venturi and flow metering	$154,000
Primary Settling Tanks (PSTs)	Rehab tanks/replace clarifer mechanisms	$6,765,000
PST Odor Control Sytem	Replace odor control scrubbers and fans	$1,691,000
Primary Sludge Pumping Station	Replace pump Nos. 1,2,3,4,5,6	$2,152,000
Intermediate Pumping Station (PE Pumps)	Replace Pump Nos. 9, 11	$1,230,000
Intermediate Pumping Station (PMTF Pum	Replace Pump Nos. 12, 16	$1,230,000
Plastic Media Trickling Filters (PMTF)	Replace four tanks	$43,000,000
PMTF Odor Control System 13	Replace Scrubbers 3A	$769,000
PMTF Odor Control System 24	Replace Scrubbers 2A, 4A	$1,537,000
ISTs Clarifier Mechanisms and Flow Distribution Chamber	Replace mechanisms and chamber weir gates	$5,227,000
RMTF - Venturi	Replace venturi flow tube and metering system	$154,000
Final Settling Tanks 1-4	Rehab/Overhaul	$4,305,000
Final Settling Tanks 5 & 6	Rehab/overhaul	$2,460,000
Final Settling Tanks 7 & 8	Rehab/overhaul	$3,075,000
Final Settling Tanks 9 & 10	Rehab/overhaul	$3,690,000
Final Sludge Pumping Station 1	Rehab/overall Pump Station	$554,000
Final Sludge Pumping Station 2	Rehab/Overhaul Pump station.	$554,000
Final Sludge Pumping Station 3	Rehab/Overhaul Pump station.	$554,000
Final Sludge Pumping Station 4	Rehab/Overhaul Pump station.	$554,000
Chlorine Building	Replace Sodium Hypochlorite Feed Pumps and Mixers	$154,000
Chlorine Contact Tank	Rehab tank, replace sluice gates	$554,000
Thickening Tank 1	Overhaul/rehab tanks	$769,000
Thickening Tank 2	Overhaul/rehab tanks	$769,000
Thickening Tank 3	Overhaul/rehab tanks	$769,000
Thickening Tank 4	Overhaul/rehab tanks	$769,000
Sludge Transfer and Feed Pumps	Replace pump No. 3	$92,000
Polymer System	Replace polymer mixing/transfer pumps	$308,000
Elutriation Tanks	Overhaul tank Nos. 1 & 2	$1,230,000
Anaerobic Digester 1	Replace mixing system and relief valves; Replace floating cover and waste gas burners	$4,612,000
Anaerobic Digester 2	Replace mixing system and relief valves; Replace floating cover and waste gas burners	$4,612,000
Anaerobic Digester 3	Replace mixing system and relief valves; Replace floating cover and waste gas burners	$4,612,000

4.4 Event-Driven Capital Improvements

The event-driven capital improvements resulting from the regulatory preparedness evaluations are presented in the table below. The budgetary capital costs presented in this table are in 2018 dollars. These improvements are not included in the consolidated CIP in Appendix C.

Event-Driven Capital Improvements

Event	Recommended Improvements	Budgetary Capital Cost
PADEP revokes prior approval to filter effluent samples prior to WET testing and filamentous bacteria are still present in the plant effluent during certain operating conditions and must be filtered to enable reliable WET compliance	Construction of effluent filtation system and low lift pumping station	$14,585,000
PADEP imposes a more stringent chlorine residual effluent limit necessitating the implementaiton of either dechlorination or UV disinfection. Based on an evaluation of alternatives, dechlorination is the lowest cost alternative	Implement a sodium bisulfite storage and feed system for dechlorination	$355,000
PADEP eliminates the instantaneous maximum fecal coliform effluent limitation necessitating the implementation of either dechloriination or UV disinfection. Based on an evaluation of alternatives, dechlorination is the lowest cost alternative	Implement a sodium bisulfite storage and feed system for dechlorination	$355,000
DRBC's SPW Requirements are triggered due to substantial alterations or additions to the KIWWTP and the grandfathering provisions of the SPW regulations are revoked, resulting in the need for the entire plant flow to achieve SPW requirements.	As a mimimum, the unlikely scenario that DRBC revokes the grandfathering provisions of the SPW regulations would result in the need to implement a denitrification filter, low lift pumping station, TP removal improvements, and a dechlorination system. If a significantly more stringent ammonia-nitrogen limit is imposed in the winter months, additional improvements to increase nitrification capacity would also be required.	$44,200,000
DRBC's SPW Requirements are triggered due to substantial alterations or additions to the KIWWTP and the grandfathering provisions of the SPW regulations remain in effect, resultng in the need for only the plant flow above that which exisited in 2004 (31.6 mgd) to achieve SPW requirements.	This scenario was evaluated by AECOM in March 2016 during development of the Act 537 Plan Update and in conjunction with a potential 4 mgd expansion of the KIWWTP. The recommended improvements included chemically enhanced primary treatment, replacement of a poriton of the rock media of the RMTF with plastic media, and sidestream treatment of solids processing recycle streams. Three scenarios for rock media replacement were considered resulting in total costs ranging from 19.7 million to 32.1 million. To establish a budgetary cost to achieve SPW requirements without expansion of the KIWWP, the 19.7 mgd cost in 2916 dollars will be utilized, escalated at 3% per year to a corresponding 2018 budgetary cost.	$20,900,000

5.0 OTHER RECOMMENDATIONS

In addition to the capital improvements recommended in Section 4.0, it is recommended that LCA perform the studies described below.

1. ***IPS Electrical System Study***. As described in the Capacity Assessment Report, the hydraulic capacity-limiting component of the KIWWTP is the Intermediate Pumping Station (IPS), which during recent storm events has only been able to pump 83 to 84 mgd, which is less than the IPS's theoretical firm capacity of 86.4 mgd. The reduced capacity is attributed to overheating of electrical system components, primarily the variable frequency drives, which is occurring at flows greater than 83 to 84 mgd. Therefore, it is recommended that LCA undertake a study to evaluate the electrical system components associated with the IPS and identify the improvements needed to restore the IPS firm capacity to at least 86.4 mgd. It may also be desirable to evaluate the cost to increase IPS firm capacity beyond 86.4 mgd.

2. ***Filamentous Bacteria Study***. As previously described in Section 3.0, if PADEP revokes its prior approval to allow filtering of the effluent sample prior to WET testing, and if filamentous bacteria are still present, a costly effluent filtration and low lift pumping station will be required to enable WET compliance, and moreover, the process of constructing these new facilities would likely trigger SPW requirements. As also previously described in Section 3.0, limited testing performed in 2016 when the draft NPDES permit was under review indicated that there was no evidence of filamentous bacteria. Therefore, subject to the results of longer term testing over the full range of operating conditions experienced during a typical year, it is possible that effluent filtration will not be needed if PADEP revokes its prior approval allowing LCA to filter effluent samples before conducting WET testing. Because it is unusual for a regulatory agency to allow filtering of samples prior to WET testing, Kleinfelder believes there is a reasonable potential for PADEP to revoke its prior approval allowing effluent samples to be filtered before WET testing. Therefore, it is recommended that LCA consider initiating 12 months of testing to evaluate whether filamentous bacteria are still present under certain operating conditions, and if they are present, if they are still adversely impacting WET test results. This testing would enable LCA to accurately conclude whether revoking the prior approval to filter effluent samples prior to WET testing would result in the need to construction an effluent filtration system.

3. ***Anaerobic Digestion Capacity Study Update***. As further described in the Process Assessment Report, the anaerobic digesters are currently limited in capacity to approximately 34 mgd, which is 6 mgd less than the permitted capacity of 40 mgd. Because anaerobic digesters must achieve a minimum specific detention time, a significant contributing factor to this reduced capacity is that the primary sludge concentration currently being pumped to the digesters is "thinner" than it could be because of the issues with the primary sludge digester feed line described in Project Proposal No. 3. This "thinner" primary sludge results in a higher flow rate of primary sludge to the anaerobic digesters, which reduces digester detention time and thus its capacity. Following replacement of this line, it is anticipated that LCA will be able to pump a significantly thicker primary sludge to the anaerobic digesters, which will result in a lower flow rate of primary sludge and a corresponding increase in digester detention time and an increased capacity. Therefore, following implementation of Project Proposal No. 3, it is recommended that an Anaerobic Digestion Capacity Study Update be performed to formally assess the impact of this improvement on the capacity of the existing anaerobic digesters. If the resulting capacity is still significantly less than the permitted capacity of 40 mgd, the study should be expanded to evaluate options to increase digester capacity to 40 mgd for planning purposes. The options that could be considered in such an evaluation include: (1) gravity thickening of primary sludge prior to anaerobic digestion; (2) construction of an additional mesophilic anaerobic digester, either with the same shape as the existing anaerobic digesters or egg-shaped digesters; and (3) integration of a thermal hydrolysis process (THP) with the existing anaerobic digesters to increase capacity while also producing Class A biosolids. As part of this study, any option that retains the existing anaerobic digesters should include the evaluation of improved mixing systems to replace the existing Perth gas mixing systems serving the existing digesters.

APPENDIX A

CONDITION ASSESSMENT REPORT

APPENDIX B

PROCESS ASSESSMENT REPORT

APPENDIX C

CIP SCHEDULE AND PROJECT COSTS

Project	Near Term		Mid Term	Long Term
	Years 0-5 2021 Dollars	Years 5-10 2026 Dollars	Years 10-25 2036 Dollars	Years 25-50 2056 Dollars
Project Proposal No. 1 - Main Pump Station Improvments	$2,542,000			
Project Proposal No. 2 - Auxiliary Pump Station Improvements		$1,191,000		
Project Proposal No. 3 - Sludge Thickening/Digestion Improvements	$1,454,000			
Project Proposal No. 4 - PMTF Effluent Flushing Water Line Replacement	$172,000			
Project Proposal No. 5 - Odor Control Unit 24 Replacement	$387,000			
Project Proposal No. 6 - Convert to Sodium Hypochlorite Disinfection	$487,000			
Project Proposal No. 7 - Masonry Restoration		$1,703,000		
Project Proposal No. 8 - PMTF Steel Rehabilitation		$1,121,000		
Project Proposal No. 9 - HVAC Equipment Replacement		$1,274,000		
Project Proposal No. 10 - 480V Motor Control Center Replacement	$3,232,000			
Project Proposal No. 11 - Concrete Restoration		$336,000		
Project Proposal No. 12 - Unit Process Equipment Painting		$2,245,000		
Project Proposal No. 13 - Drainage Lift Staton Rehabilitation	$699,000			
Project Proposal No. 14 - Final Clarifers No. 1 - 4 Rehabilitation	$3,262,000			
Headworks Improvements			$766,000	
Auxilary Pumping Station Improvements			$766,000	
Aerated Grit Chamber Improvements			$426,000	
PSTs Cover Replacement			$3,405,000	
PST Odor Control Sytem Improvements			$936,000	
Intermediate Pumping Station (PE Pumps) Improvements			$1,021,000	
Intermediate Pumping Station (PMTF Pumps) Improvements			$1,021,000	
Plastic Media Trickling Filters (PMTF) Rotary Distributor Improvements			$1,362,000	
PMTF Odor Control System 13 Improvements			$1,277,000	
PMTF Odor Control System 24 Improvements			$851,000	
ISTs Clarifier Mechanisms Improvements			$255,000	
Intermediate Sludge Pumping Station Improvements			$204,000	
Rock Media Trickling Filters (RMTFs) Improvements			$6,010,000	
FSTs 7-10 Improvements			$3,745,000	
Effluent Pump Station Improvements			$681,000	
Thickening Tanks 1, 2, 4 Improvements			$204,000	
Thickening Tank Odor Control Systems Improvements			$936,000	
Sludge Transfer and Feed Pumps Improvements			$153,000	
Elutriation Tanks Improvements			$136,000	
Anaerobic Digesters Improvements			$306,000	
Belt Filter Press Building Improvements			$5,380,000	
Main Flow Venturi Meter Improvements				$154,000
Primary Settling Tanks (PSTs) Improvements				$6,765,000
PST Odor Control Sytem Improvements				$1,691,000
Primary Sludge Pumping Station Improvements				$2,152,000
Intermediate Pumping Station (PE Pumps) Improvements				$1,230,000
Intermediate Pumping Station (PMTF Pumps) Improvements				$1,230,000
Plastic Media Trickling Filters (PMTF) Improvements				$43,047,000
PMTF Odor Control System 13 Improvements				$769,000
PMTF Odor Control System 24 Improvements				$1,537,000
ISTs Clarifier Mechanisms and Flow Distribution Chamber Improvements				$5,227,000
RMTF - Venturi Improvements				$154,000
Final Settling Tanks 1-4 Improvements				$4,305,000
Final Settling Tanks 5 & 6 Improvements				$2,460,000
Final Settling Tanks 7 & 8 Improvements				$3,075,000
Final Settling Tanks 9 & 10 Improvements				$3,690,000
Final Sludge Pumping Station 1 Improvements				$553,000
Final Sludge Pumping Station 2 Improvements				$553,000
Final Sludge Pumping Station 3 Improvements				$553,000
Final Sludge Pumping Station 4 Improvements				$553,000
Chlorine Building Improvements				$154,000
Chlorine Contact Tank Improvements				$553,000
Thickening Tank 1 Improvements				$769,000
Thickening Tank 2 Improvements				$769,000
Thickening Tank 3 Improvements				$769,000
Thickening Tank 4 Improvements				$769,000
Sludge Transfer and Feed Pumps Improvements				$92,000
Polymer System Improvements				$307,000
Elutriation Tanks Improvements				$1,230,000
Anaerobic Digester 1 Improvements				$4,612,000
Anaerobic Digester 2 Improvements				$4,612,000
Anaerobic Digester 3 Improvements				$4,612,000
Total	**$ 12,235,000**	**$ 7,870,000**	**$ 29,841,000**	**$ 98,946,000**

Lehigh County Authority

System Operations Review - January 2019

Presented: February 25, 2019

Critical Activities	System	Description	Jan-19	2019 Totals	2018 Totals	Permit
			Daily Avg (MGD)	Daily Avg (MGD)	Daily Avg (MGD)	Daily Max (MGD)
Water Production	Allentown	Total	20.64	20.64	21.48	39.0
		Schantz Spring	8.00	8.00	6.90	9.0
		Crystal Spring	3.88	3.88	3.88	4.0
		Little Lehigh Creek	8.76	8.76	10.69	30.0
		Lehigh River	0.00	0.00	0.02	28.0
	Central Lehigh	Total	8.69	8.69	9.46	19.04 MGD Avg
		Feed from Allentown	6.83	6.83	6.74	7.0 MGD Avg 10.5 MGD Max
		Well Production (CLD)	1.86	1.86	2.71	8.54 MGD Avg
		Sum of all (12) other Suburban Water Systems	0.18	0.18	0.18	1.71 Sum of all wells
Wastewater Treatment		Kline's Island	41.62	41.62	36.08	40.0
		Pretreatment Plant	6.50	6.50	5.46	5.75 (design capacity)
		Sum of all (5) other Suburban WW Systems	0.22	0.22	0.20	0.36

		Jan-19	2019 Totals	2018 Totals	2017 Totals
Precipitation Totals (inches)		4.70	4.7	66.96	50.18
Compliance Reports Submitted to Allentown		29	29	285	291
Notices of Violation (NOVs)	(Allentown + Suburban)	0	0	1	3
Sanitary Sewer Overflows (SSOs)/Bypasses	(Allentown + Suburban)	4	4	78	22
Main Breaks Repaired	Allentown	7	7	33	19
	Suburban	1	1	23	12
Customer Service Phone Inquiries	(Allentown + Suburban)	2,145	2,145	26,440	27,313
Water Shutoffs for Non-Payment	(Allentown + Suburban)	62	62	1,838	1,577
Injury Accidents	(Allentown + Suburban)	1	1	14	8
Emergency Declarations	Allentown	0	$0	(5) @ $76,469	(2) @ $51,235
	Suburban	0	$0	(1) @ $21,197	(1) @ $72,554

Significant Repairs: On January 22, 2019, a hole was discovered near the top of the vertical shell of the 280,000 gallon Arcadia water storage tank. This was the second such occurrence on this tank and the hole was repaired ASAP by a contractor. The repair still needs to be painted when appropriate weather conditions allow.

Description of NOVs and/or SSOs: There were four (4) bypasses during January. Three of them occurred at Heidelberg Heights WWTP. The Heidelberg Heights bypasses occurred on January 1-4, January 20-21 and January 24-28. The fourth bypass occurred at Lynn Township WWTP on January 24-25. There were no recorded SSOs in either of the Allentown or suburban systems during January. There were no NOV's issued to any LCA system during January, 2019.

Other Highlights: Nothing to report.

Western Lehigh Interceptor High Flow Emergency Project

Status as of 2/18/2019

The Iron Run Trunk Line (IRTL) between the Industrial Pretreatment Plant (PTP) and Manhole (MH) U6, is the main area of recurring SSOs that led to the development of this project. MH U6 is located ~1,100' WSW of the intersection of Trexlertown Road and Hamilton Boulevard. The total distance televised in this reach was 7,115', and includes 93 manholes. In this section, LCA has identified 18 defects, the majority of which are joint leaks, along with heavy sediment in many locations. This entire area is referred to as Phase I.

With the assistance of Arcadis, remediation specifications for the IRTL Phase I have completed and were sent to five (5) perspective contractors who had indicated they would be interested in bidding. The contractors included: Video Pipe, Standard Pipe, National Water Main, Specialty Sewer, and Michels. A pre-bid meeting was held on 1/29/2019 but only Video Pipe was in attendance. Bids were due on 2/15/2019 but only Video Pipe and Standard Pipe submitted bids. The two (2) bids are currently under review before an award can be made.

Phase II of the project will be between MH U6 and the Spring Creek Pump Station (SCPS). This area has been very difficult to CCTV because of high levels even during times when the PTP was holding back flow. As of 2/18/19, approximately half of Phase II has been CCTV'd. There is a distinct possibility that the contractor for Phase II will need to bypass a large area between U6 and SCPS to allow for CCTV recon and for any required spot repairs. Specifications for Phase II will be developed and distributed in late February/early March.

Phase III will be on the Spring Creek Line from SCPS down to Meter Station 5. In order to CCTV this area, we will need to wait for the stop logs to be installed and the stop gate to be repaired in SCPS in order to divert all flow into the force main. Both of these tasks were scheduled multiple times, but those attempts were all postponed due to weather. The tasks were in-progress during the weeks of 2/11/19 and 2/18/19 and they are expected to be completed in late February.