



Randy E. Hayman, Water Commissioner

Michael S. Regan  
Administrator  
Environmental Protection Agency  
Office of Water  
1200 Pennsylvania Avenue NW  
Washington, DC 20460

February 8, 2024

Re: Water Quality Standards to Protect Aquatic Life in the Delaware River  
Docket ID No. EPA-HQ-OW-2023-0222

VIA ELECTRONIC MAIL

Dear Administrator Regan,

Via this letter, the Philadelphia Water Department (PWD) is submitting comments that were originally provided to DRBC regarding DRBC documents and work products that, in part, serve as the critical scientific and technical foundation of EPA's December 21, 2023 proposed rulemaking *Water Quality Standards to Protect Aquatic Life in the Delaware River* (Docket ID No. EPA-HQ-OW-2023-0222).

PWD is a member of DRBC's Water Quality Advisory Committee and participated throughout DRBC's work to assess the attainability of water quality standards for zones 3, 4, and upper zone 5 of the Delaware River prior to EPA's Administrator's Determination regarding proposed federal water quality standards for these zones. PWD expressed several concerns with the technical feasibility and cost estimates for the proposed modifications to PWD's Water Pollution Control Plants that were included in the DRBC/Kleinfelder reports in the attached PWD comment letters:

- PWD August 7, 2020 Letter to John Yagecic, DRBC, PWD comments on DRBC/Kleinfelder draft report *Nitrogen Reduction Cost Estimation Study: Plant Specific Cost Estimates*
- PWD May 30, 2023 Letter to John Yagecic, DRBC, PWD comments on DRBC/Kleinfelder draft report *Nitrogen Reduction Cost Estimation Study Addendum 2 Technical Memorandum*

PWD respectfully requests that EPA review and consider these previous comments on DRBC and Kleinfelder's technical reports as part of the official administrative record for the proposed rule.

Sincerely,

A handwritten signature in black ink that reads "Jason Cruz".

Jason Cruz  
Environmental Scientist  
Philadelphia Water Department



Randy E. Hayman, Water Commissioner

John Yagecic  
Manager, Water Quality Assessment  
Delaware River Basin Commission  
P.O. Box 7360, West Trenton, NJ 08628-0360

May 30, 2023

Dear Mr. Yagecic,

PWD appreciates the opportunity to provide comments on a May 2023 report entitled *Nitrogen Reduction Cost Estimation Study Addendum 2 Technical Memorandum* ("DO Addendum"). This technical memorandum was prepared by Kleinfelder Inc. under contract to DRBC as an addendum to a January 2021 *Nitrogen Reduction Cost Estimation Study* report. The DO Addendum evaluates additional capital and annualized cost estimates for seven selected wastewater treatment plants in the Delaware estuary to achieve effluent DO concentrations of 4, 5, or 6mg/L, assuming changes having been made to the wastewater plants to reduce effluent ammonia concentration as described in the 2021 *Nitrogen Reduction Cost Estimation Study* report.

As a municipal representative serving on DRBC's Water Quality Advisory Committee (WQAC), PWD has actively participated in DRBC's process to evaluate the attainability of changes to Aquatic Life Uses and Water Quality Standards (WQS) for DRBC zones 3, 4, and a portion of zone 5 as required by DRBC Resolution 2017-04. PWD reviewed and commented 8/7/2020 on the initial draft *Nitrogen Reduction Cost Estimation Study* prepared by Kleinfelder. PWD also submitted comments 12/2/2022 on DRBC's draft report *Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary* which included information from the Kleinfelder nitrogen reduction cost estimation report. Importantly, the Kleinfelder nitrogen reduction cost estimates were also used by DRBC to perform a draft evaluation of the socio-economic and utility financial impacts of proposed changes to wastewater treatment in DRBC's September 2022 draft report *Social and Economic Factors Affecting the Attainment of Aquatic Life Uses in the Delaware River Estuary*. Our most serious concern—that DRBC has failed to update costs to reflect recent unprecedented inflation in costs for construction, energy, materials, and chemicals—remains unaddressed in the DO addendum. The use of outdated 2019 dollars for cost estimates of nitrogen removal and increasing effluent DO levels greatly underestimates the true costs that would be borne by ratepayers to achieve lower levels of ammonia and increase DO in wastewater effluent. Moreover, our preliminary review of the DO Addendum has also raised several technical concerns which require further consideration, as described in our comments below. If DRBC has any questions regarding PWD's comments, please contact Jason Cruz ([jason.cruz@phila.gov](mailto:jason.cruz@phila.gov)).

Sincerely,

A handwritten signature in black ink, appearing to read "Marc Cammarata", is written over a light blue horizontal line.

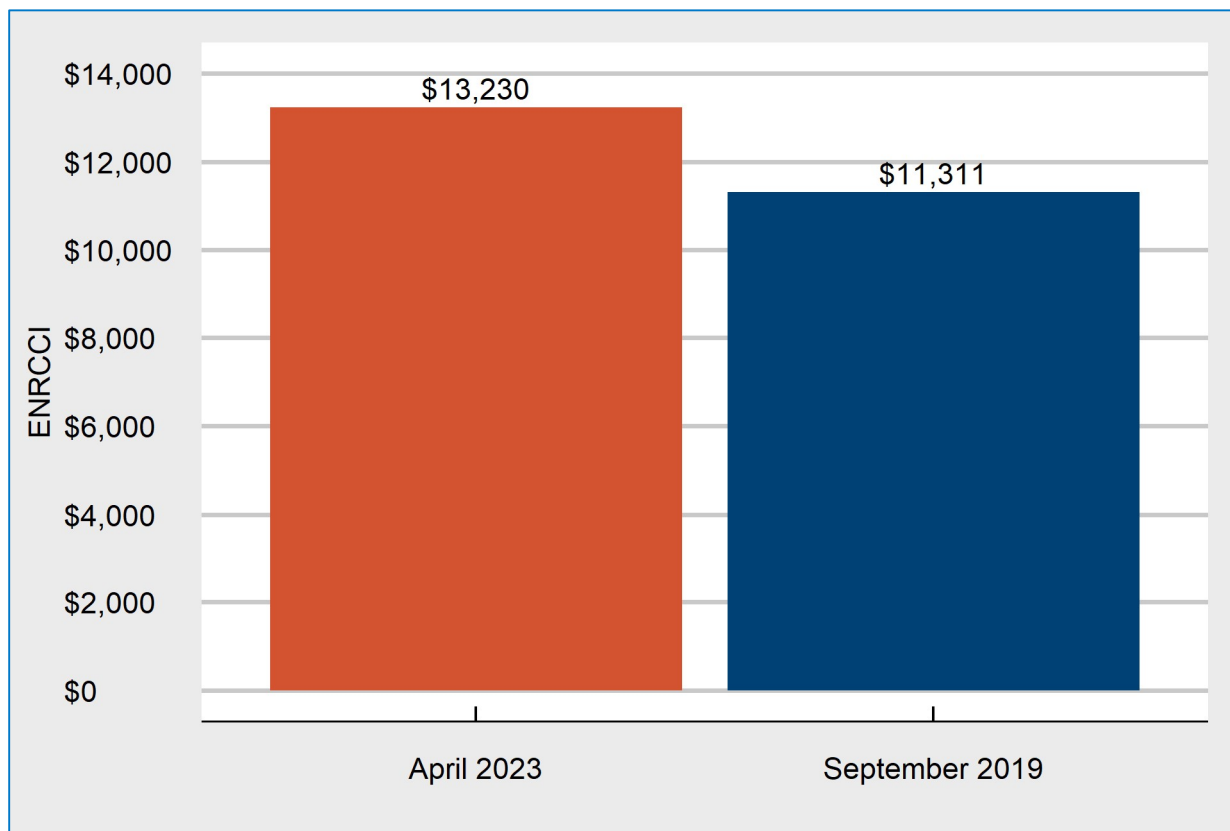
Marc Cammarata  
Deputy Commissioner  
Philadelphia Water Department  
1101 Market St. 4th Floor  
Philadelphia, PA 19107

CC: Melanie Garrow, Kelly Anderson, Jason Cruz (PWD); Namsoo Suk, Tom Amidon (DRBC)

## General Comments

**1.) As described in detail in PWD’s 12/2/2022 comments on DRBC’s draft Analysis of Attainability, which are attached as Appendix A and incorporated herein by reference, PWD continues to have serious concerns regarding DRBC’s use of 2019 dollars for estimating capital and operating costs of proposed changes to wastewater treatment. PWD requests that DRBC and/or Kleinfelder update cost estimates for effluent ammonia removal and DO increases as soon as possible to be consistent with present-day (*i.e.*, 2023) costs.**

Page two of the DO Addendum states “For consistency, DRBC requested that the cost estimates be in 2019 dollars”. While PWD understands that DRBC has sought to avoid making multiple adjustments and re-calculations of costs while in the draft phases of evaluations performed for Resolution 2017-04, it is imperative that these costs be updated as soon as possible to enable a fair and transparent evaluation of costs going forward. A review of annual average Engineering News Record Construction Cost Index (ENRCCI) values demonstrates that updating cost estimates is not a minor “finishing touch” to be applied when finalizing the draft Analysis of Attainability, as the ENRCCI has increased **17%** since the September 2019 value used by DRBC and Kleinfelder for cost estimations (Figure 1; [ENR Construction Cost Index History](#)).



**Figure 1.) Engineering News Record Construction Cost Index (ENRCCI) Comparison September 2019 vs April 2023.**

Driven by a global pandemic and major supply chain disruptions affecting many sectors of the US economy, the ENRCCI experienced an unprecedented increase of 8.4% from September 2020 to September 2021 and 5.7% from September 2021 to September 2022 (Figure 2; [ENR Construction Cost Index History](#)). As construction costs affect interpretations of the socio-economic and utility financial impacts of proposed changes to wastewater treatment, it is critically important for costs to be updated to reflect the very real and lasting effects of recent inflation on cost estimates.

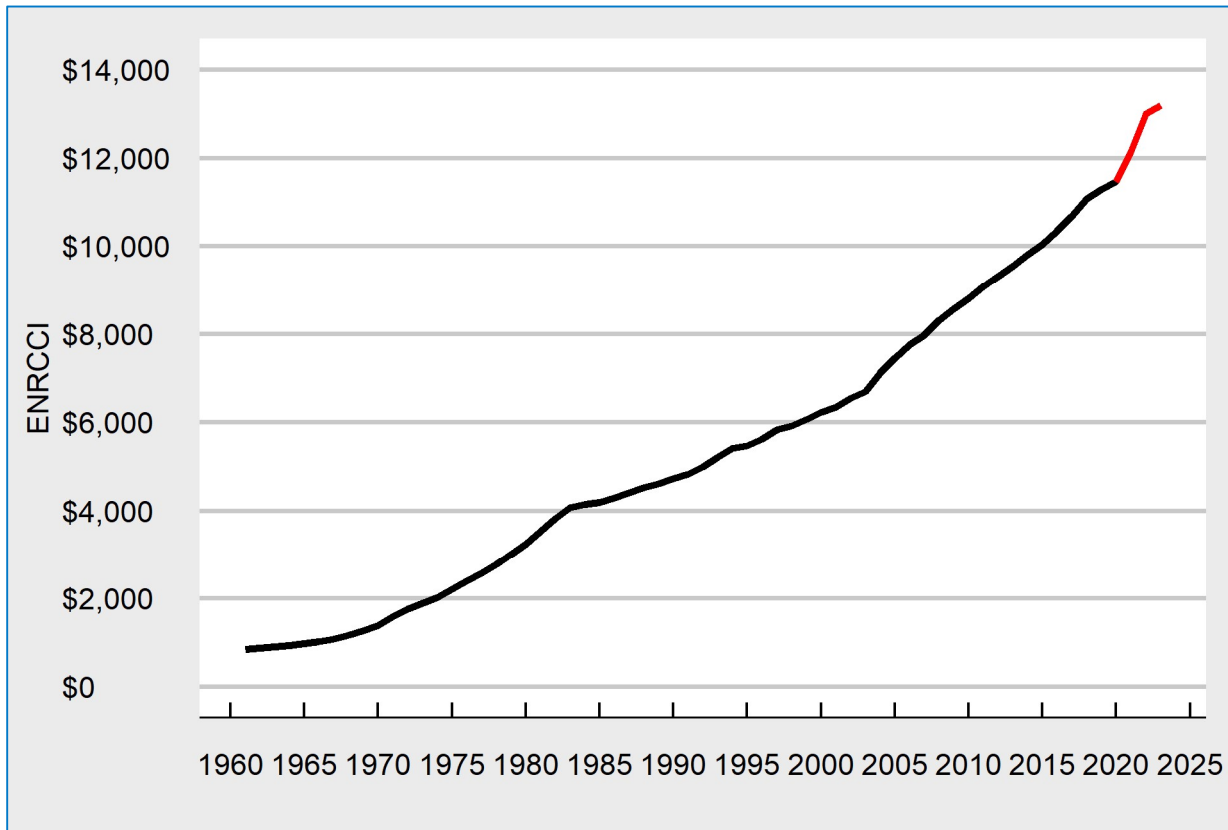


Figure 2.) Annual Average Engineering News Record Construction Cost Index 1960-2023. Red line segments indicate increases since 2019.

2.) The DO Addendum provides sizing and conceptual design information for wastewater plant modifications that would be needed to increase effluent DO levels under proposed ammonia reduction scenarios. Additional plant-specific investigation is needed prior to accepting the conclusions of the DO addendum for final cost estimation, ratepayer financial impact, or water quality modeling purposes.

3.) Some plant modifications proposed in the DO Addendum may cause interference with currently planned or future wastewater plant process changes needed to meet related or unrelated wastewater treatment objectives. Proposed modifications in the DO Addendum require further investigation to determine plant-specific feasibility and operability as well as compatibility with other plant projects and long-term planning.

**4.) The DO Addendum provides sizing and conceptual design for new post-aeration basins, construction of which would likely impose new hydraulic restrictions within plant flow paths. Hydraulic characteristics of proposed post-aeration basin designs need to be evaluated under existing and planned plant permitted and wet weather flows.**

**5.) PWD is concerned that proposed year-round operation of post-aeration facilities may be unnecessary.**

Much like the ammonia effluent limitations and reduction modifications proposed in DRBC's draft Analysis of Attainability and Kleinfelder Nitrogen Reduction Cost Estimation Study, the DO Addendum proposed approach for year-round effluent aeration is overly conservative and would require wastewater treatment plants to operate energy- and chemical-intense processes during times of the year when water quality conditions in the Delaware estuary are optimal for aquatic life.

**6.) Post-aeration basin designs proposed in the DO Addendum lack needed redundancy to provide aeration for the full plant flow under critical conditions when maintenance is needed.**

The DO Addendum proposes post-aeration basins and aeration equipment sufficient to raise DO for each of the DO effluent scenarios (*i.e.*, 4, 5, or 6mg/L) under permitted flow conditions. The Addendum further states that post-aeration basins would be "divided into two (2) sections such that half the tank can be taken out of service for maintenance". PWD interprets this design to lack needed redundancy to provide aeration for the full plant flow when maintenance is required, such as the need to clean or repair fine bubble diffuser membranes and associated piping. PWD suggests that the post-aeration basin size should be increased by 50% and divided into three equal-sized tanks in order to provide "n + 1" redundancy for situations in which one tank may need to be taken out of service for maintenance or repairs. Similarly, blowers should be specified to provide adequate process air for the full plant flow with one blower unit out of service.

**7.) Proposed blower buildings and other associated mechanical and electrical equipment in the DO Addendum need to be reviewed for consistency with PWD Climate-Resilient Planning and Design Guidance.**

Blower buildings proposed in the DO Addendum appear to assume "slab on grade" construction, which may not provide sufficient protection against inundation under current and/or projected sea level rise scenarios. Additional costs associated with elevating blower buildings, blowers, slide gate controls, etc. must be considered. In January 2022, PWD adopted official policy that requires use of the Department's Climate-Resilient Planning & Design Guidance in the planning, design, and construction of all PWD projects to the extent feasible. PWD's Climate Resilient Planning and Design Guidance document is available on PWD's website at <https://water.phila.gov/pool/files/climate-resilient-guidance.pdf>

## Facility-Specific Comments

### **8.) The conceptual layout for the SWWPCP does not align with Kleinfelder's proposed alternative of tertiary biologically active filter (BAF) treatment.**

From the technical memoranda entitled "Nitrogen Reduction Cost Estimation Study Generic Plant Capital Cost Estimates" and "Nitrogen Reduction Cost Estimation Study Plant Specific Cost Estimates", the high-purity oxygen aeration system would remain intact at these facilities and a tertiary BAF would be used for ammonia removal to achieve the desired 1.5 mg/L NH<sub>3</sub>-N effluent target. However, the spatial placement of the post-aeration tanks and blower building in the conceptual design is located between the aeration tanks and final settling tanks. This leads to an ambiguous process flow for the proposed expansion.

As currently laid out in the conceptual design, the process flow for the proposed expansion has the post-aeration tanks between the existing aeration and final settling tanks or after nutrient removal has occurred in the BAF system. If the former is the intention, the post-aeration basins would provide little benefit, as the existing treatment regime achieves DO concentrations far above the target concentrations; however, the introduction of a substantial backwash flow from BAF system may alter the DO concentrations leaving the aeration tanks. If the latter is the intention, then there would need to be substantial piping and pumping that is not accounted for in Kleinfelder's cost estimations. Given the description in the Addendum that the intent is for the post-aeration basins to be placed after biological nutrient removal in the process flow, this suggests that the latter is the intention of the conceptual layout. As such, the placement of the post-aeration tanks is far from optimal and would result in a gross underestimate of the capital and operating costs for SWWPCP.

### **9.) The conceptual site plan for PWD NEWPCP includes a proposed blower building location in a potential wetland and/or former sludge lagoon area.**

Siting new equipment in wetland and/or sludge lagoon areas may incur additional costs due to permitting, remediation and/or mitigation.

## Additional Comments

### **10.) Additional labor costs for fine bubble diffuser membrane maintenance must be considered.**

The DO Addendum proposes the use of fine bubble membrane diffusers for raising effluent DO under different scenarios. While fine bubble membrane diffusers have superior oxygen transfer efficiency, allowing for smaller aeration basins, labor for periodic maintenance for many thousands of individual diffusers must be considered as an additional cost.

### **11.) Additional plant-specific investigation of the energy consumption and greenhouse gas (GHG) emissions is needed to understand how these proposed changes will impact PWD's ability to meet its internal as well as City-wide goals related to energy use reduction and GHG emissions.**

**12.) PWD noticed two typographical errors in the cost worksheets that should be corrected:**  
Line # 11, under the heading “Unit Price & Other Items”: “Sheating and shoring”; PWD suggests should be “Sheeting and Shoring”

Line #23 under the heading “Subtotal Direct Costs”: “CG OH&P and General Conditions”; PWD interpreted “CG” as a misspelling of “GC” for general contractor, “OH” for overhead, “P” for profit. PWD suggests revision to “GC Overhead, Profit, and General Conditions”.



Randy E. Hayman, Water Commissioner

August 7, 2020

Philadelphia Water Department  
1101 Market Street, 6<sup>th</sup> Floor  
Philadelphia, PA 19107

Delaware River Basin Commission  
25 Cosey Road  
West Trenton, NJ 08628  
Attn: Mr. John R. Yagecic, P.E.

Dear Mr. Yagecic:

On behalf of the Philadelphia Water Department, we submit the attached comments on the draft report, Nitrogen Reduction Cost Estimation Study Plant Specific Cost Estimates, which was prepared by the consulting firm Kleinfelder Inc. ("Kleinfelder"), on behalf of the Delaware River Basin Commission ("DRBC") (the "Draft Report").

We sincerely appreciate the opportunity to submit these comments. Please do not hesitate to contact Jason Cruz at [Jason.Cruz@Phila.gov](mailto:Jason.Cruz@Phila.gov), should you have any additional questions or concerns. We are happy to schedule a virtual meeting with additional staff as necessary to resolve our comments.

Thank you for your time and attention.

Sincerely,

A handwritten signature in black ink that reads "Mary Ellen Senss".

Mary Ellen Senss  
Manager, Wastewater Treatment

cc: Jason Cruz, Philadelphia Water Department  
Marc Cammarata, Philadelphia Water Department  
Donna Schwartz, Philadelphia Water Department





Randy E. Hayman, Water Commissioner

The following comments are submitted by the Philadelphia Water Department (“PWD”) to the Delaware River Basin Commission (“DRBC”) on the draft report entitled Nitrogen Reduction Cost Estimation Study Plant Specific Cost Estimates (the “Draft Report”) prepared for DRBC by Kleinfelder Inc. (“Kleinfelder”).

### General Comments

1. Kleinfelder prepared a very professional report, clearly presenting the project goals and limitations of the concept-level estimate (AAE level 4) study that was tasked by DRBC.
2. As discussed at the meeting on September 18, 2018 with DRBC and PWD, PWD commissioned independent studies of the three PWD Water Pollution Control Plants (WPCPs) to meet treatment goals similar to those included in Kleinfelder’s Draft Report. PWD is currently finalizing the final reports from these studies, which are based on intensive sampling and process modeling. Upon completion, we look forward to sharing the results of the studies with DRBC to further refine the estimated costs for meeting the effluent goals for ammonia and total nitrogen (TN) at PWD WPCPs.
3. PWD believes that, in general, a deeper understanding of each of the plants and utility perspectives (e.g., more effluent quality data, a more detailed influent characterization, more detailed analysis) will uncover additional specific factors that could increase costs (i.e., the overall cost estimates may be too low).

### Comments on Regulatory Structure and Effluent Limits

4. PWD understands that the conceptual improvements and associated cost estimates in the Draft Report were based on achieving ammonia or TN effluent limits from May 1 through October 31 (described as the “summer season”). PWD suggests a more thorough investigation be conducted and documented on defining the summer season, considering observed DO levels in the Estuary. There may be significant cost savings associated with refining the seasonal period for which reductions in ammonia would be required to achieve higher levels of DO in the Estuary.
5. PWD suggests removal/replacement of the language “agreed upon” in reference to the ammonia and TN effluent levels selected by the DRBC, as the existing language could imply that the selected effluent levels were agreed upon by the dischargers. “Specified effluent levels” is suggested as a replacement. (*Refer to Page 1 of the Draft Report for context.*)
6. PWD understands that Kleinfelder used facility-reported effluent data collected 2016-2018 to determine existing plant flows and effluent quality for the purposes of specifying and sizing improvements. These data may not fully capture all environmental and operating conditions expected at the plants. Specific to PWD’s facilities, we have concerns about whether the PWD Northeast Water Pollution Control Plant (NEWPCP) could consistently achieve a monthly average effluent ammonia concentration of 10 mg-N/L from May 1 through October 31 without some capital investments in plant improvements to ensure compliance on a monthly average basis.



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### Comments on Technology Selection

7. PWD has investigated Integrated Fixed-Film Activated Sludge (IFAS) modification and concluded that is not an applicable technology for the Southeast Water Pollution Control Plant (SEWPCP) or NEWPCP as described in the Draft Report and previous Kleinfelder generic plant cost estimate report. The reasons that the technology is not applicable at these plants are as follows:
  - PWD's planning-level hydraulic grade line evaluations of SEWPCP and NEWPCP indicated that neither facility has sufficient head to account for headloss from screens for maintenance of IFAS media. Vendor feedback confirmed these findings.
  - PWD has found generally that for IFAS the length-to-width (L:W) ratio of the aeration basins should not exceed 1.5 and the maximum forward velocity should not exceed 35 m/hr. The SEWPCP and NEWPCP L:W ratios are 4 and 68, respectively. The observed SEWPCP and NEWPCP forward velocities range from 29 – 77 m/hr and 145 – 308 m/hr, respectively.

### Comments on Cost Estimation

8. PWD believes that additional solids handling equipment, such as digesters, may be needed at the Southwest Water Pollution Control Plant (SWWPCP) to accommodate expected increases in sludge from SEWPCP and SWWPCP. This was not considered in the Draft Report.
9. PWD has concerns about assumptions used for staffing needs in the Draft Report. Specifically, based on our own internal analyses, we believe many more than 1-2 additional staff would be required to operate and maintain Biologically Aerated Filters (BAFs) at SWWPCP.
10. PWD has concerns about the lack of consideration of the extensive laboratory analyses associated with the implementation of new treatment processes. PWD would be required to conduct pilot testing of a new treatment process prior to implementation, which would require extensive laboratory resources. Upon implementation, routine process testing would be required, which would mean increased laboratory resources as part of the plants' day-to-day sampling.
11. PWD has concerns about the conceptual aerial site plans for SWWPCP, specifically:
  - The areas around the main SWWPCP, including the proposed BAF placement area, have steep slopes and irregular topography. Therefore, extensive site preparation work, such as re-grading and earth movement, would need to be completed, the cost of which has not been considered.
  - Proposed denitrification filter placement would require land acquisition that may not be possible, as the land may belong to the adjacent Philadelphia International Airport. PWD suggests considering placement of denitrification filters elsewhere on the SWWPCP site/PWD property, which would also require extensive site preparation work as described above.
  - *(Refer to Pages 61-62 of the Draft Report for context.)*

### Comments on Plant-Specific Conditions

12. PWD believes that since SEWPCP is a retired HPOAS system with covered (concrete) aeration tanks, it would be more appropriate to evaluate it as an HPOAS system, or to consider it a special case.



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13. PWD believes that the proposed flow splits for nutrient removal to the standards proposed by the DRBC at SWWPCP are inadequate, as the higher ammonia concentrations at SWWPCP would likely require that a larger proportion of the flow would need to be treated in order to meet the targeted effluent limits (*Refer to Pages 2 and 17 of the Draft Report for context.*). For example:
  - Considering the values used by Kleinfelder in the Draft Report, SWWPCP has a monthly average effluent ammonia concentration of 20.72 mg-N/L.
  - For a 50% flow split, in order to achieve an effluent ammonia concentration of 10 mg-N/L, an ammonia concentration of -0.72 mg-N/L would be needed from the BAF facility, using a weighted average, which is not possible.
  - For a 75% flow split, in order to achieve an effluent ammonia concentration of 5 mg-N/L, an ammonia concentration of -0.24 mg-N/L would be needed from the BAF facility, using a weighted average, which is not possible.
  
14. PWD recommends revising the information on page 33 regarding SEWPCP and MLSS concentrations:
  - While bullet 3 implies that the existing activated sludge system at SEWPCP can operate at a MLSS of 3,000 mg/L, bullet 4 indicates that improvements need to be made to enable this operation.
  - Referring to SEWPCP, page 33, bullet 3, “operating the **existing** activated sludge system aeration tanks at a higher MLSS concentration of approximately 3,000 mg/L during the summer months”.
    - As it is written, this statement is misleading. The **existing** activated sludge system at SEWPCP operates at around 1,200 mg/L. Adverse process impacts could result from more than doubling the MLSS.
  - However, on bullet 4, improvements are suggested.
  
15. PWD has concerns about operating at a higher MLSS at the facilities. Specifically, running the facilities at a higher MLSS would increase the risk of losing biomass during peak flow; the facilities would need recovery time after each peak event, as all three of PWD’s WPCPs accept combined sewer flows. (*Refer to Page 33 of the Draft Report for context.*)
  
16. PWD advises against using data for SWWPCP prior to 2013. The Biosolids Recycling Center went online at SWWPCP in 2012 and sends its centrate and condensate to the head of the plant. PWD cannot confidently state that data prior to 2013 is representative of current conditions at SWWPCP. (*Refer to Page 41 of the Draft Report for context.*)

#### **Additional Comments on NEWPCP**

17. PWD would like clarification on whether Kleinfelder has identified an abandoned set of final sedimentation tanks at NEWPCP as the site for additional clarifiers at the facility. (*Refer to Page 121 of the Draft Report for context.*)
  
18. PWD notes that the second conceptual aerial site plan for NEWPCP has an error which needs to be corrected. Specifically, the arrow meant to indicate the chemical building was misplaced and should be pointing to the red box next to the Gravity Sludge Thickeners/digesters. (*Refer to Page 122 of the Draft Report for context.*)