STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

PETITION OF THE CITY OF EVANSVILLE, INDIANA, FOR AUTHORITY TO ISSUE BONDS, NOTES, OR OTHER OBLIGATIONS, FOR AUTHORITY TO INCREASE ITS RATES AND CHARGES FOR WATER SERVICE, AND FOR APPROVAL OF NEW SCHEDULES OF WATER RATES AND CHARGES.	)))))))	**CAUSE NO. 45545**

PUBLIC'S EXHIBIT NO. 5

TESTIMONY OF SCOTT A. BELL

ON BEHALF OF

THE INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

SEPTEMBER 3, 2021

Respectfully submitted

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CERTIFICATE OF SERVICE

This is to certify that a copy of the ***Public's Exhibit No. 5, Testimony of Scott A. Bell*** has been served upon the following counsel of record in the captioned proceeding by electronic service on September 3, 2021.

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TESTIMONY OF OUCC WITNESS SCOTT A. BELL
CAUSE NO. 45545
CITY OF EVANSVILLE

I. INTRODUCTION

Q: Please state your name and business address.

A: My name is Scott A. Bell, and my business address is 115 West Washington Street, Suite 1500 South, Indianapolis, Indiana 46204.

Q: By whom are you employed and in what capacity?

A: I am employed by the Indiana Office of Utility Consumer Counselor ("OUCC") as the Director of the Water/Wastewater Division. My qualifications and experience are set forth in Appendix A.

Q: What relief does the City of Evansville seek in this case?

A: The City of Evansville ("Petitioner" or "Evansville") is seeking Indiana Utility Regulatory Commission ("Commission") approval and authority to (1) issue bonds, notes or other obligations; and (2) increase rates and charges for water utility service.

Q: What is the purpose of your testimony?

A: Within its total requested borrowing authority, Petitioner requests authority to incur $30 million of debt from the Indiana State Revolving Fund ("SRF") Loan Program to construct a residuals management facility. Meanwhile, Petitioner is in the process of procuring a variance from the terms of its NPDES permit discharge limits that may require it to build that facility. My testimony discusses whether the $30 million for the residuals management facility should be authorized at this time. My testimony also discusses Evansville's decision to use a Guaranteed Savings Contract to construct the proposed new water treatment plant.

Q: What have you done to prepare your testimony?

A: I read Evansville's Petition and the testimonies of Lane T. Young, Executive Director of the Evansville Water and Sewer Utility ("EWSU"), Douglas L. Baldessari, CPA, Baker Tilly Municipal Advisors, LLC, Michael Labitzke, Director of the Program Management Office – EWSU, and Simon M. Breese, P. Eng., Vice President at AECOM. I also reviewed Petitioner's responses to OUCC discovery.

II. <u>WATER TREATMENT PLANT CONSTRUCTION</u>

Q: Did Evansville retain AECOM to evaluate its water treatment plant?

A: Yes. On page 2 of his testimony, Mr. Breese stated that AECOM was retained by Evansville "for the planning and design of the modernization of the water treatment plant." As a result, AECOM produced a document titled Water Treatment Plant Advanced Facility Plan ("WTPAFP") Alternatives Report, which is dated March 2021, for its evaluation of the Evansville water treatment plant. Mr. Breese sponsors the March 2021 WTPAFP and includes it as Attachment SMB-1 to his testimony.

Q: Is this the latest version of the WTPAFP?

A: No. On page 4 and 5 of his testimony, Mr. Breese briefly discusses *Section 10 – Residuals Management*, which "presents residuals management alternatives for the recommended treatment plant if the existing NPDES permits are unable to be renewed." However, in the March 2021 version of the WTPAFP, which is included as Attachment SMB-1, *Section 10 – Residuals Management* is not included. The OUCC has since procured a copy of a newer version of the WTPAFP, which is dated April 23, 2021. The April 23, 2021, version of the WTPAFP contains *Section 10 – Residuals Management* briefly discussed in Mr. Breese's testimony. A copy of *Section 10 – Residuals Management* is provided as Attachment SAB-

1.

Q: Does Petitioner's Preliminary Engineering Report reference the April 2021 WTPAFP?

A: Yes. On June 22, 2021, Petitioner filed with the Commission its Supplemental Workpaper 1, which is the Preliminary Engineering Report ("PER") for the proposed water treatment plant. In the introduction, Section 1.0, the PER states that AECOM submitted the April 2021 WTPAFP Alternatives Report to the Drinking Water State Revolving Fund on April 30, 2021, on behalf of Petitioner.

Q: Does the WTPAFP explain the alternatives AECOM considered for the rehabilitation or replacement of the existing water treatment plant ("WTP")?

A: Yes. AECOM considered four main alternatives and describes those alternatives in the WTPAFP. Based on the analysis described in the WTPAFP, AECOM recommended Alternative 2B, which is to construct a new 50 MGD water treatment plant on the site where the existing City garage is located.[1]

Q: What is the estimated construction cost of Alternative 2B?

A: According to Mr. Breese, the "estimated costs for the development of Alternative 2B are $151,000,000, including construction contingency but excluding engineering."[2]

Q: How did AECOM determine the estimated $151 Million cost for Alternative 2B?

A: Table 9-9 Plant Alternative 2B in the WTPAFP[3] provides the detailed construction cost estimates of $140,049,000 for Alternative 2B. This construction cost estimate includes $13,691,000 for the City's Maintenance Building Relocation and $3,602,000 for Additional Construction Contingencies (3%). AECOM included additional estimated costs for Construction Administration and Bidding (2.5%), Inspection and Materials Testing

[1] Breese Direct Testimony, pages 13-14.
[2] *Id.* at 15-16.
[3] Petitioner's Attachment SMB-1, pages 126-127

(2%), Interest Incurred Through Financing / Federal Regulatory (2.25%) and Permitting Fees and Legal Expenses (1%) to arrive at a total estimated project cost of $150,902,000 for its preferred Alternative 2B. (WTPAFP Table 10-3.)[4]

Q: In addition to the new $151 Million water treatment plant, is Petitioner seeking funding for the construction of a residuals management facility to address residual mercury levels by removing total suspended solids prior to discharge?

A: Yes, Petitioner is seeking SRF funding to construct a residuals management facility if necessary.[5] On page 15 of Mr. Breese's testimony, he stated that "if a new residuals management facility is required, this will add an estimated $30 Million to the estimated construction cost." The details for that cost estimate are located in Table 17 - Residuals Management Facility Project Costs in Petitioner's PER.[6] The estimated construction cost for the Residuals Management Facility is only $17,479,000. However, another $12 Million was added to the cost estimate including $4.37 Million for Estimating Contingency, $1.75 Million for Contractor General Conditions, $2.1 Million for Contractor Overhead and Profit, $524,000 for Escalation to Midpoint, $1.4 Million for Engineering and Permitting, $1.75 Million for Bidding, Construction Admin & Inspection, and $350,000 for testing and Commissioning. Including these additional costs takes the estimated Total Project Cost for the residuals management facility up to $29,714,000.

Q: Is $29,714,000 the only cost associated with the residuals management facility?

A: No. In the April 2021 version of the WTPAFP, page 132 of 144, AECOM estimates that the "Annual Dewatering O&M Cost" would be $1.21 Million per year or $36.3 Million over a 30-year period. The "Total 30-Year Life Cycle Cost" of the residuals management

[4] *Id.* at137
[5] The April 2021 version of the AECOM WTPAFP refers to the residuals management facility.
[6] Petitioner's Supplemental Workpaper 1 and Attachment SAB-1.

facility is estimated to be $73.3 Million. When adding the $73.3 Million 30-Year Life Cycle Cost to the Total 30-Year Life Cycle Cost for Plant Alternative 2B (New Surface Water Plant) of $230,923,000, the total project cost is estimated to be $304,184,000 over a 30-year period.

Q: Why would a residuals management facility be necessary?

A: A residuals management facility may be necessary to meet Evansville's NPDES Permit discharge limitations for mercury. On page 125 of the April 2021 WTPAFP, it states that mercury is present in the Ohio River in varying concentrations.[7] After the water is treated, Evansville discharges residuals containing mercury to the Ohio River through NPDES-permitted outfalls. Evansville's current NPDES permit, effective July 1, 2021, has both interim and final discharge limitations for mercury.

Q: Has Evansville submitted an Application for Renewal of NPDES Permit No. IN0043117, which included an Application for a Variance from Indiana Water Quality Standards for mercury?

A: Yes. On September 27, 2016, Evansville Water & Sewer Utility ("EWSU") submitted an Application for a Variance from Indiana Water Quality Standards for mercury.[8] In its 2016 Application for a Variance, Evansville indicated that it is requesting the variance because it cannot consistently attain the final NPDES Permit limits for mercury using existing control methods. Subsequently, on December 31, 2020, Evansville submitted an Application for Renewal of NPDES Permit No. IN0043117,[9] which incorporated the

[7] Evansville's source of supply is the Ohio River.

[8] Attachment SAB-2, Evansville Water & Sewer Utility Application for Renewal of NPDES Permit No. IN0043117 dated September 27, 2016. Due to the size of the entire application, only the first two pages of the 2016 Application for a Variance have been included in Attachment SAB-2. The 2016 Application for a Variance contains approximately 174 pages.

[9] Attachment SAB-3, Evansville Water & Sewer Utility Application for Renewal of NPDES Permit No. IN0043117 dated December 31, 2020. Only the first two pages of the December 31, 2020 Application for Renewal of NPDES Permit No. IN0043117 have been included in Attachment SAB-3.

September 2016 Individual Variance Application for mercury. Evansville has not received a formal response from IDEM to the 2016 Application for a Variance for mercury because IDEM was aware the City was investigating the use of an alternate water source and the possibility of modifying or replacing the water treatment plant.

Q: Does the December 31, 2020, Application for Renewal of NPDES Permit No. IN0043117 discuss the status of the Individual Variance Request for mercury?

A: Yes. Evansville provided the following status in its Application for Renewal:

> The current NPDES Permit, effective July 1, 2016, requires mercury monitoring of Outfalls 002, 004, and 005 bi-monthly in the months of February, April, June, August, October, and December. Interim mercury discharge limitations and a thirty-six (36) month compliance schedule exist in the current NPDES Permit. Interim limitations contain "monitor only" requirements for these outfalls.
>
> In September 2016, EWSU-WTP applied for an Individual Variance of Indiana Water Quality Standards for Mercury. Since that time, EWSU-WTP has been monitoring the effluent at Outfalls 002, 004 and 005 for mercury, reporting the data on the monthly monitoring reports and submitting compliance status reports every nine months as required under Part I.D. l of the NPDES Permit. Additionally, Part I.D.1 states the schedule of compliance shall not commence until a final determination on the mercury variance submittal is made by the Commissioner. To date, EWSU has not received a formal response to the Individual Variance application from the Indiana Department of Environmental Management (IDEM). EWSU-WTP reiterates the original determination that a variance from water quality standards that form the foundation for the effluent limitations is warranted under IC 13-14-8-8, IC 13-14-8-9, and 327 IAC 2-1-8.8. Therefore, the Individual Variance Application for mercury (dated September 2016) is incorporated herein by reference.

Q: Do you believe it is premature to approve funding ($30 Million) for a residuals handling facility that may not be necessary?

A: Yes. Evansville has a pending Individual Variance Application for mercury with IDEM, which if granted may eliminate the need to construct the $30 million residuals handling facility. Therefore, I believe it is premature to approve borrowing authority for a residuals handling facility that will be used to meet discharge standards Evansville is actively attempting to eliminate. As mentioned above, this variance application has been pending since 2016 and Petitioner has provided no evidence regarding if or when IDEM will grant or deny the variance application. Therefore, I believe any funding request should be removed from the proposed SRF debt until such time that a final determination has been made on the Variance Application for mercury. If the Variance Application is denied in the future, Petitioner should reevaluate all options for meeting the discharge limits and that may avoid the necessity of constructing and operating a residuals handling facility. If the construction of a residuals handling facility cannot be avoided, then Petitioner should request a sub-docket be opened to request authority to issue debt to fund the residuals handling facility.

Q: Could the cost to construct and operate a residuals handling facility affect the overall determination of what alternative Evansville should go forward with?

A: Yes. If it is determined that the continued use of only surface water would result in having to construct and operate a residuals handling facility to meet Petitioner's NPDES permit discharge limits, Evansville should reconsider the use of a groundwater supply that may avoid the cost of constructing and operating a residuals handling facility.

III. WATER TREATMENT PLANT CONSTRUCTION METHOD

Q: What method do most regulated municipal water utilities in the State of Indiana use to select a construction contractor to build water utility facilities?

A: It has been my experience that most regulated municipal water utilities, including Evansville, seeking Commission approval to complete capital projects use the public bidding procedures codified in the Public Work Projects Chapter, Ind. Code Ch. 36-1-12.

More specifically, Ind. Code § 36-1-12-4 provides the procedures for a board[10] to select the lowest responsible and responsive bidder for completing a public work project. Section 4(a) states that "this section applies whenever the cost of a public work project will be at least one hundred fifty thousand dollars ($150,000)." This statute provides a fair competitive process where a construction contract is awarded to the lowest responsive and responsible bidder.

Q: Does Ind. Code § 36-1-12-1(e) provide alternatives to the bidding procedures?

A: Yes. I.C. § 36-1-12-1(e) states that as an alternative to this chapter, the governing body of a political subdivision or its agencies may do the following:

> (1) Enter into a design-build contract as permitted under IC 5-30.
> (2) Participate in a utility efficiency program or enter into a guaranteed savings contract as permitted under IC 36-1-12.5.

Q: Did Mr. Breese describe the process Evansville would use to construct the proposed water treatment plant?

A: Mr. Breese does not state what method Evansville will employ to determine the entities that will construct the proposed water treatment plant. However, on page 137 of 276 of Mr. Breese's Attachment SMB-1 (the WTPAFP which is dated March 2021), the following statement is made:

> The project delivery method has not been determined at this time. However, to help control costs escalation and give better options for project financing, a design-build type of method with a guaranteed maximum price may give the most flexibility. It is not recommended to attempt to bid the work as individual contracts due to project complexity and the need for continuity between processes.

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[10] I.C. § 36-1-12-1.2(1) Definitions: "Board" means the board or officer of a political subdivision or an agency having the power to award contract for public work.

Q: Did Mr. Breese discuss how the design-build type of delivery method with a guaranteed maximum price may give the most flexibility?

A: No. I could not find any testimony from Mr. Breese discussing how the design-build type of delivery method with a guaranteed maximum price gives the utility the most flexibility.

Q: Did Mr. Breese discuss why he did not recommend that Evansville "bid the work as individual contracts"?

A: No. I could not find any testimony from Mr. Breese discussing why the WTPAFP does not recommend bidding the work as individual contracts.

Q: Did the OUCC seek clarification about the "design-build type of method" that was mentioned in the WTPAFP?

A: Yes. In Data Request ("DR") 3-1, the OUCC asked whether Evansville was "proposing to construct the proposed new water treatment plant ("WTP") as a design-build project pursuant to the provisions in Ind. Code § 5-30, Design-Build Public Works Projects?" Petitioner provided the following response:

> The Evansville Water and Sewer Utility ("EWSU") proposes to construct the proposed new water treatment plant ("WTP") as a Guaranteed Savings Contract pursuant to the provisions in Indiana Code 36-1-12.5.

Q: Has Petitioner entered into a Guaranteed Savings Contract for the construction of the new water treatment plant?

A: No. In response to OUCC DR 21-1, Evansville stated that the "Petitioner has not yet begun the process of soliciting for a Guaranteed Savings Contract Provider and, therefore, has not entered into a contract."

Q: Is the number of Guaranteed Savings Contract Providers limited?

A: Yes. In response to OUCC DR 21-3, Evansville identified the six firms that may be considered to provide construction services for the proposed new water treatment plant:

> Qualified GSC Providers carry both the Contractor's and Designer's certification in Indiana. The Indiana Department of Local Government Finance maintains the list of qualified providers. The complete list is

> available at their website: https://www.in.gov/dlgf/files/210617-GESC-Provider-list.pdf. Of the qualified providers, a subset operate in the field of water / wastewater construction. These firms are listed below and may be considered to provide construction services for the proposed new water treatment plant.
> • Bowen Engineering Corporation
> • F.A. Wilhelm Construction Company
> • Kokosing Industrial, Inc
> • Mac Construction & Excavating
> • Reynolds Construction, LLC
> • Thieneman Construction

Because Evansville has chosen to use a Guaranteed Savings Contract for the construction of the proposed new water treatment plant, it is limited to only these six firms to perform the construction. I do not take issue with whether any or all of these six contractors could construct the proposed water treatment plant. However, using a CGS *does* limit the pool of contractors to these six firms.

Q: Does the Public Work Projects Chapter, Ind. Code Ch. 36-1-12, provide for open bidding on municipal water projects?

A: Yes. Ind. Code § 36-1-12-4 provides the bidding procedures for public work projects that will be at least one hundred fifty thousand dollars ($150,000). This statute allows for the open competition from responsive and responsible bidders.

Q: Does Indiana Code Ch. 36-1-12.5 provide a method for selecting the Indiana Guaranteed Savings Contract provider?

A: I could not find specific language in Indiana Code Ch. 36-1-12.5 that describes the procedure municipal boards would use to select a Guaranteed Savings Contract provider. However, in response to OUCC DR 21-4, Evansville provided the following response on how it proposes to select the Guaranteed Savings Contract provider to construct the new water treatment plant:

> The process begins with the development of the Request for Qualifications. This defines the content to be submitted by proposers and the basis for

evaluation. The RFQ is publicly noticed two times, at least two weeks apart. Once received, the submittals are reviewed and scored by individuals on the selection committee. The committee will then meet and consolidate scores. If a preferred contractor is not apparent, the committee may elect to interview a short-list of candidate to make the final selection. Once selected, the GSC provider will begin working with the design team on pricing, equipment selection, and design reviews. The Guaranteed Maximum Price will be set between the 60 and 90% design points, at which EWSU and the GSC Provider enter into a contract. The GSC Provider works at risk until entering into the contract, providing EWSU an off ramp in the event that a GMP cannot be agreed to.

Q: What criteria will be used by Evansville to choose the firm that will provide construction services for the new water treatment plant?

A: In OUCC DR 21-5, the OUCC asked Petitioner to "state the criteria that will be used by Evansville to choose the firm that will provide construction services for the new water treatment plant." The OUCC also asked Petitioner to provide a scoring sheet if one existed. In response to OUCC DR 21-5, Evansville provided the following:

Submitters will be evaluated on the basis of the following:

- Background – This includes identification of corporate officers and company values, most recent audited financial report, identification of the responsible Professional Engineer, information on OSHA violations, information on disbarment, disqualification, and bankruptcy

- Project Team – Background additionally includes the identification of the leadership team including project principals, project manager, superintendents, project engineers, safety professionals, and others critical to the successful delivery of the project.

- References – This includes a list of projects and owners for whom the candidate has delivered other projects using GSC as well as non-GSC projects that are peer to the water plant

- Technical Approach – This is the candidate's approach to the construction of the project

- Project Implementation – This is the candidate's approach to project management including schedule

- Financial Approach – This is the candidate's approach to establishing the

> Guaranteed Maximum Price, to committing to no change orders, to using open book pricing, and to providing proof of bonding capacity
>
> - Guarantee Management – This is the candidate's approach to the identification of Conservation Measures for energy, O&M, and future capital avoidance
>
> The actual scoring matrix will be determined by the committee prior to advertising for the project. The following scoring matrix was used successfully by EWSU on its West WWTP Storage Basin GSC.

RFP Response Area	Percentage	Score
Background & Qualifications	10%	0 - 10
References	10%	0 - 10
Technical Approach	15%	0 - 15
Project Implementation	30%	0 - 30
Financial Approach	15%	0 - 15
Guarantee Management	20%	0 - 20
Total	100%	0 - 100

Q: Is Evansville going to consider competitive bids for the construction of the water treatment plant as one of the criteria for selecting an Indiana Guaranteed Savings Contract provider?

A: No. As indicated in its response to OUCC DR 21-5, a competitive bid for constructing the proposed water treatment plant is not one of the criteria that Evansville will use to evaluate a potential GSC Provider. The Guaranteed Maximum Price ("GMP") for the construction of the new water treatment plant will be negotiated by Evansville after it chooses one of the six Qualified GSC Providers.

Q: Did Evansville explain how limiting the pool of construction contractors to only those on the list of Indiana Guaranteed Savings Contract providers will provide a lower construction cost for the proposed water treatment plant?

A: No. Evansville provided the following response to OUCC DR 21-11:

> It is not limiting the pool of construction contractors, but the way the Petitioner and the Petitioner's Engineer works will select the contractor that produces the lowest cost on construction. The GSC process allows EWSU to bring the contractor on board concurrent with the design process. By

> engaging with the contractor during design, constructability is inherently incorporated into the design. The GSC Provider works in an open book fashion, being paid for time and materials with any unused budget remaining with EWSU. The GSC Provider works under a commitment of no contractor-initiated change orders for the agreed upon scope. This shifts the risk of under scoped or under valued work from EWSU to the contractor. The GSC Provider further works for a fixed fee, which means the contractor cannot receive more fee for work under the GMP as is possible in a bid. The combination of open book pricing, no change orders, and fixed fee means that EWSU will pay the actual cost of the project and nothing more.
>
> Note also that the general contractors included on the Guaranteed Savings Contract list licensed to work in Vanderburg County and working in the water/wastewater industry have earned the GSC Provider credential, as noted in Q-21-3. We are satisfied that the pool of candidates is amble (sic) to guarantee competition.

Q: Has Evansville provided any testimony indicating that the chosen GSC Provider would be working in "an open book fashion, being paid for time and materials with any unused budget remaining with EWSU"?

A: No. Except for the response to OUCC DR 21-11 provided above, Evansville's witnesses have not provided any testimony on whether the GSC Provider works in an "open book fashion" or how any remaining unused budget would be used by Evansville. If Evansville chooses to use the GSC to construct the new water treatment plant, any unused budget amount should be retained in a restricted account only to be used for capital projects such as main replacements. Petitioner should also be required to report, within 60 days of final completion of the project, whether any unused budget remains and how those funds will be used.

Q: Has Evansville identified and quantified the estimated savings generated by using a GSC rather than the public bid method of construction delivery?

A: No. In response to OUCC DR 21-10, Evansville objected to the OUCC's request:

> Petitioner objects to the request on the grounds and to the extent the request calls for speculation. The request requires Petitioner to speculate regarding the estimated savings associated with pursuing a publicly bid contract, which is a course of action Petitioner is not pursuing for purposes of

> constructing the new Water Treatment Plant.

Based on the objection, it appears that Evansville did not determine any savings that would be generated by using a GSC rather than a publicly bid project. However, Evansville did provide the following explanation:

> Subject to and without waiver of the foregoing objection, Petitioner responds as follows:
>
> In a public bid, the sole determiner of award is the bid price. Bidders are disincentivized from interpreting the construction documents in any way that would increase the bid price, this includes in ways that would produce a better project. As such, items that are not well defined or missing in the documents are corrected using a change order that adds to the bid price. A "good" bid project will have change orders of 3-5%. On a $100 million project, this equates to a $3-5 million dollar addition.
>
> In a GSC, the contractor accepts the risk of the design anomalies incorporating them wholly into the original price. As such, the GSC Guaranteed Maximum Price is the highest price the Petitioner will pay. Additionally, the Time & Materials plus Fixed Fee contracting means EWSU retains the money not spent on the project. It is common for GSC contracts to return 3-8% of their original contract values.

Q: Evansville's response to OUCC DR 21-10 is critical of the public bid method of construction delivery. Does Evansville publicly bid its other water utility capital improvements?

A: Yes. Evansville uses public bidding for other water utility capital improvement projects. Petitioner has not provided any testimony as to why public bidding is appropriate for other water utility's capital projects, but not for the completion of the new water treatment plant.

Q: If contractors know that a "good" bid project will have change orders of 3-5%, as explained in its answer to OUCC DR 21-10, how would a contractor get compensated for the cost of potential changes during construction.

A: If a contractor is going to be held to a GMP for the construction of a project, then the contractor will include the estimated cost of potential changes in the GMP for the project.

Q: Has Evansville identified and quantified the estimated savings generated by using a GSC rather than the Design-Build (Ind. Code Art. 5-30) method of construction delivery?

A: No. In response to OUCC DR 21-9, Evansville objected to the OUCC's request as follows:

> Petitioner objects to the request on the grounds and to the extent the request calls for speculation. The request requires Petitioner to speculate regarding the estimated savings associated with pursuing a Design-Build contract, which is a course of action Petitioner is not pursuing for purposes of constructing the new Water Treatment Plant.

Based on the objection, it appears that Evansville did not determine any savings that would be generated by using a GSC rather than a Design-Build method of completing the project. However, Evansville did provide the following explanation:

> Subject to and without waiver of the foregoing objection, Petitioner responds as follows: The selection of using GSC over Design-Build is not one of a savings difference. The Indiana Design-Build code contains a rigid structure that requires the Petitioner to develop the project concept using a criterion engineer and then to select a Design-Build team that includes the design engineer. In this arrangement, it is the contractor, as the Design-Builder, who selects the engineer, not EWSU as the owner. With the size, complexity, and visibility of this project, it was of paramount importance to EWSU to select and directly manage the Design Engineer. The GSC process allows Petitioner to retain authority over the Design Engineer while bringing the GSC Provider on board early to contributed to the constructability of the facility.
>
> GSC enables EWSU to budget for a design while Design-Build designs to a budget. The GSC process inherently includes iterations of pricing as the details of the project scope are refined. By having a contractor price the project at 30%, 50%, etc., EWSU is getting real construction prices and can manage both the scope and the budget. In a Design-Build, a price is submitted as a part of the selection, based on a concept. With that price then set, the scope of the project must yield to the price. The selection formula, while adjusted by qualifications, still favors a low price, increasing the risk that process and/or control critical elements have to be left for a "next phase." With a landmark project like this the water plant, that is a risk EWSU cannot accept.

Q: Evansville's response to OUCC DR 21-9 is critical of the Design-Build method of construction delivery. Are you aware of any other recent water treatment plants that were built using the Design-Build method of construction delivery?

A: Yes. Indiana-American Water Company, Inc. used the Design-Build method of construction delivery for the construction of new water treatment plants in Richmond and Warsaw, Indiana. River City Construction provided construction services for both facilities.

Q: Has Evansville identified the conservation measures that will be included in the design of the new water treatment plant and the estimated savings related to each conservation measure?

A: No. In response to OUCC DR 21-6, Petitioner provided the following:

> a. Conservation measures are defined by IC 36-1-12.5-1 (see below). The conservations measures that will be evaluated follow. The estimated savings from these conservation measures will be calculated when the design is at approximately 60% complete. This is because the calculations require details on process operation and equipment sizes such as energy draw (kW or hp), process operation time, details in change of operations from current.
>
> The new water plant contains all four types of conservation measures:
> • A facility alteration. The project is permanently altering the water treatment process by replacing the existing treatment system with a modern system
> • An alteration of a structure. The buildings on the water plant site are being altered in their use.
> • A technology upgrade. All components of the treatment process will be upgraded to current standards, including the individual treatment components, the instrumentation & control system, the electrical system, and the laboratory facilities.
> • Alteration to reduce energy or other operating costs. The new water plant will have a lower cost to operate and maintain due to the higher efficiencies and availability of components. The alteration also protect against the high cost of a water outage that would be incurred by the Petition and our customers when a catastrophic failure of the +100 year old system occurs.
>
> b. Conservation measures that may be implemented in the new water plant include:

- Insulation of the new buildings
- Installation of energy efficient doors and windows
- Installation of automated energy control system, such as occupancy sensors
- Installation of energy efficient HVAC systems
- Installation of high efficiency lighting
- Use of high efficiency pump motors
- Use of automated instrumentation and control systems to optimize operations

Note, the project does not expand the capacity of the system. As currently planned, the capacity of the new water plant is smaller than the original plant, reflecting the needs of our customers.

Q: Is it necessary to use a GSC to incorporate the above-mentioned conservation measures into the design of the water treatment plant?

A: No. Incorporating conservation measures into the design of the new water treatment plant can be achieved through a public bid, Design-Build or a GSC method of project delivery.

IV. RECOMMENDATIONS

Q: What are your recommendations?

A: I recommend the Commission order the following:

(1) Deny Evansville's inclusion of $30 million is its SRF debt financing for Residuals Management Facility due to the pending Application for a Variance from Indiana Water Quality Standards for mercury.

(2) Evansville reevaluate its decision to use a GSC in the construction of the proposed water treatment plant over other construction delivery methods.

(3) If Evansville chooses to use a GSC to construct the new water treatment plant, any unused budget amount should be retained in a restricted account only to be used for capital projects such as main replacements. Petitioner should also be required to report, within 60 days of final completion of the water treatment plant project, whether any unused budget amount remains and how those funds will be used.

Q: Does this conclude your testimony?

A: Yes.

APPENDIX A

Q: Please describe your educational background and experience.

A: I have a Bachelor of Science degree in Industrial Management, with a minor in Industrial Engineering from Purdue University. I began working for the Indiana Utility Regulatory Commission ("Commission") in 1988 as a Staff Engineer. In 1990, I transferred to the OUCC at the time of the reorganization of the Commission and the OUCC. In 1999, I was promoted to the position of Assistant Director and in 2005 I was promoted to the position of Director of the Water / Wastewater Division. During my term as Director, I have served on the Water Shortage Task Force, created by SEA 369 in the 2006 General Assembly and the Water Resources Task Force, created by HEA 1224 in the 2009 General Assembly. I am a member of the American Water Works Association ("AWWA") and have attended numerous utility related seminars and workshops including the Western Utility Rate Seminar sponsored by the National Association of Regulatory Utility Commissioners ("NARUC"). I also completed additional coursework regarding water and wastewater treatment at Indiana University-Purdue University at Indianapolis ("IUPUI").

Q: Have you previously testified before the Commission?

A: Yes. I have testified in many causes relating to telecommunications, natural gas, electric, water, and wastewater utilities. During the past twenty (20) years, I have testified exclusively on water and wastewater utility issues. Some of those issues included the reasonableness of cost of service studies, rate design, fair value, Replacement Cost New Less Depreciation ("RCNLD") studies, engineering-related operation and maintenance expenses, capital improvement projects, non-revenue water and water conservation.

10.0 Residuals Management

Mercury is present in the Ohio River at varying concentrations and a 2016 Report by Ramboll cited mercury levels between 1.57 and 59.24 ng/L, with an average concentration of 13.21 ng/L (Ramboll, 2016). The report also identified this mercury speciation as 85.4% insoluble and 14.6% dissolved. The existing WTP has four (4) NPDES-permitted outfalls discharging to the Ohio River which are effectively returning mercury to the river via residuals generated during filter backwashing and pretreatment sludge blow-down. Dissolved mercury passes straight through the treatment process and most of the mercury present in the discharge is insoluble and bound to suspended solids. Pretreatment sludge has a higher solids concentration and lower flow rate than filter backwash, resulting in higher mercury concentrations in those waste streams. Bimonthly sampling data from 2016 through 2020 indicated Outfalls 002 and 005 (sludge blow-down) averaged 45.6 ng/L and 61.4 ng/L, respectively, whereas Outfall 004 (backwash) averaged 27.3 ng/L. The bimonthly sampling has indicated peak mercury levels over 250 ng/L in pretreatment sludge. More recent sampling data (January 1, 2021 through April 7, 2021) is summarized in Table 10-1.

Table 10-1 Recent TSS and Mercury Sampling Results

Residual Stream	Avg. Flow (MGD)	TSS (mg/L)	TSS (ton/day)	Mercury (ng/L)
Outfall 002 (North Plant)	1.686	1,481	9.97	39.8
Outfall 004 (Backwash)	0.416	463	0.80	8.33
Outfall 005 (South Plant)	1.815	1,488	11.26	5.00
Blended Values	3.92	1,349	22.03	20.33

Mercury is expected to remain present in the residual streams with most of it being insoluble and bound to suspended solids. With the proposed plant (WTP Alternative 2b), the residuals are proposed to be combined into a single outfall and an estimate of solids loadings are taken as those reported as “Blended Values” in Table 10-1. EWSU currently has a mercury variance which allows for mercury and IDEM has requested any new plant consider TSS reduction if this variance is unable to be renewed.

This chapter discusses six options to address residual mercury levels by removing TSS prior to discharge including a ‘do-nothing’ option. Full compliance (no variance) would require mercury to consistently be below the US EPA standard of 12 ng/L, which is generally not considered viable given the levels in the river. However, a streamlined mercury variance can be obtained through IDEM if levels are below 30 ng/L and is therefore the primary goal of this evaluation. The alternatives discussed are as follows:

1. “Do nothing” option and renew or re-apply for current variance.
2. Use groundwater as the water source.
3. Rehabilitate the existing south plant for residuals dewatering and disposal.
4. Replace the river intake with riverbank filtration (RBF) collector wells.
5. Send residuals to the wastewater treatment plant for treatment and disposal.
6. Utilize dewatering bags for solids removal and disposal

10.1 Do Nothing

In this alternative, residuals from the new WTP would continue to discharge to the Ohio river and mercury concentrations would be like those experienced now. This would require renewal of, or reapplication for, the mercury variance which was previously applied for in 2016. The application included a report by Ramboll which provided justification for the variance including demonstrating a *de minimus* impact to the Ohio River with current operations since the plant was removing mercury from the river and returning directly back to the river. The report also discussed options for TSS reduction including sending residuals to the wastewater treatment plant (deemed non-viable) and a new dewatering facility at the WTP which had an estimated project cost of approximately $30 million. Aside from the financial burden, the residuals facility had other disadvantages including operational challenges (requiring additional EWSU employees) and the fact that the energy required for operation would release more mercury to the environment through fossil fuel consumption.

If a 'do nothing' option was selected, a new variance application would be submitted and contain evaluations and justifications like those presented in the 2016 variance application. The recent sampling data from 2021 (presented in Table 10-1) implies that a blended residuals stream is below the 30 ng/L required for a streamline variance. If this trend of reduced mercury continues, the 'do nothing' scenario is more viable. However, the risk of such a 'do nothing' option is that the variance will not be granted, or elevated mercury levels may return. If this occurs after construction of the new plant, EWSU would be required to provide reduction of mercury in the outfalls through an emergency type of project. Costs to implement such an alternative are the same as those presented in the recommended WTP (Alternative 2b) and presented in Chapter 9:

- Construction Cost: $140,049,000
- Total Project Cost: $150,902,000 (presented in Chapter 11)
- 30-Year Life Cycle Cost: $230,923,000

10.2 Groundwater Source

Groundwater (which contains little or no mercury) could potentially replace or supplement the surface water source and therefore eliminate or dilute mercury returning to the river. Use of groundwater was evaluated extensively in Chapter 8, and the overall findings were that a source providing 100% of the raw water demand was not viable due to limited aquifer transmissivity and subsequent hydraulic capacity of collector wells in the vicinity of the WTP. Due to limitations on available water per collector well, a "100% groundwater" option was not taken through a full evaluation. However, consideration for a WTP utilizing a 50/50 blend of groundwater and surface water was presented as the final Plant Alternative 3 in Chapter 9. In this scenario, membrane concentrate could potentially be used to dilute surface water residuals and lower mercury concentrations. Under normal operation (50/50 blend of source waters), a residuals blend of approximately 60% groundwater residual and 40% surface water residual is expected. Unfortunately, this is not enough dilution to reliably reduce mercury below the goal of 30 ng/L. Assuming no dissolved mercury is present in the groundwater, the surface water residual mercury needs to be below 70 ng/L to dilute the blend to 30 ng/L. Since previously observed high concentrations of surface water residuals mercury were in excess of 250 ng/L, this is not considered a reliable strategy. Furthermore, this is assuming there is zero dissolved mercury in the groundwater. Dissolved mercury from the river may eventually migrate to the collector well zones of influence and limit the dilution effectiveness. In fact, any dissolved mercury in the groundwater will be concentrated by a factor of 5 in the residuals stream due to the membrane softening process.

As discussed, using a 100% groundwater WTP is not viable due to the amount of collector wells required to meet the capacity. A high-level cost estimate for such an alternative is presented in Table 10-2 based on ten collector wells and extrapolation of costs estimated for the 50% groundwater WTP. Table 10-3 presents the estimated 30-year life cycle cost.

Table 10-2 High-Level Project Cost Estimate of 100% Groundwater WTP

Cost Component	Unit	Quantity	Unit Cost	Project Cost
Collector Wells, Conveyance, Power	EA	10	$5,200,000	$52,000,000
Metals Oxidation Systems	LS	1	$2,300,000	$2,300,000
Gravity Filtration Systems	LS	1	$22,000,000	$22,000,000
Membrane Softening Facility	LS	1	$38,500,000	$38,500,000
Clearwells & High Service Pumping	LS	1	$14,000,000	$14,000,000
Chemical Feed Facilities	LS	1	$7,000,000	$7,000,000
Residuals - Red Water Filtration System	LS	1	$3,600,000	$3,600,000
Plant Facilities - Admin, Maintenance, Etc.	LS	1	$4,000,000	$4,000,000
Construction Subtotal				**$143,400,000**
Land Acquisition / Utilities Allowance	LS			$5,000,000
Estimating Contingency	10%	Construction Subtotal		$14,340,000
Contractor General Conditions	10%	Construction Subtotal		$14,340,000
Contractor Overhead and Profit	12%	Construction Subtotal		$17,208,000
Escalation to Midpoint	3%	Construction Subtotal		$4,302,000
Engineering and Permitting	3.5%	Construction Subtotal		$5,019,000
Bidding, Construction Admin. & Inspection	4%	Construction Subtotal		$5,736,000
Testing and Commissioning	0.5%	Construction Subtotal		$717,000
Total Project Cost				**$210,062,000**

Table 10-3 Groundwater Source 30-Year Life Cycle Cost

Cost Component	Unit	Quantity	Cost	Annual Cost
Electricity - Well Pumps	kWh	8,114,453	$0.10	$811,445
Electricity - Membrane Feed Pumps	kWh	10,093,922	$0.10	$1,009,392
Electricity - Aerators	kWh	653,496	$0.10	$65,350
Electricity - High Service Pumps	kWh	8,000,165	$0.10	$800,016
Electricity - Misc. Process	kWh	980,244	$0.10	$98,024
Electricity - Building Systems	kWh	490,122	$0.10	$49,012
Membrane Replacement Annual Fund	LS	1	$577,500	$577,500
Chemical - Membrane Cleaning	LS	1	$50,000	$50,000

Cost Component	Unit	Quantity	Cost	Annual Cost
Chemical - Sodium Hypochlorite	lb	164,381	$0.81	$133,149
Chemical - Sodium Hydroxide	lb	1,826,460	$0.36	$657,526
Chemical - Fluoride	lb	82,191	$0.78	$64,109
Chemical - Corrosion Inhibitor	lb	273,969	$1.20	$328,763
Chemical - Antiscalant	lb	168,034	$2.15	$361,274
Residuals Disposal - Red Water Sludge	Ton	1,621	$150	$243,147
Collector Well Maintenance	LS	1	$30,000	$30,000
Aerator / Detention Tank Maintenance	LS	1	$10,000	$10,000
Membrane System Maintenance	LS	1	$50,000	$50,000
High Service Pump Maintenance	LS	1	$15,000	$15,000
Chemical Feed Maintenance	EA	5	$5,000	$25,000
Misc. Maintenance	LS	1	$15,000	$15,000
Annual O&M Cost				**$5,393,707**
Replacement Component	**Life (yrs)**	**$/Replace**	**# Replaced**	**30-Year Cost**
Well Pumps	20	$13,000,000	1	$13,000,000
Membrane Feed Pumps	15	$3,000,000	2	$6,000,000
Electrical Systems	20	$9,000,000	1	$9,000,000
Instrumentation / SCADA	20	$4,000,000	1	$4,000,000
Chemical Equipment	10	$3,500,000	2	$7,000,000
High Service Pumps	15	$4,800,000	2	$9,600,000
Misc. Equipment	10	$1,000,000	3	$3,000,000
Salvage Component (Remaining Life)	**Life (yrs)**	**Remain Life**	**Full Value**	**30-Year Salvage**
Well Pumps	20	10	$13,000,000	($4,333,000)
Membrane Feed Pumps	15	15	$3,000,000	($3,000,000)
Electrical Systems	20	10	$9,000,000	($3,000,000)
Instrumentation / SCADA	20	10	$4,000,000	($1,333,000)
Chemical Equipment	10	10	$3,500,000	($3,500,000)
High Service Pumps	15	15	$4,800,000	($4,800,000)
Misc. Equipment	10	10	$1,000,000	($1,000,000)
Alternative Cost Summary				**Cost Value**
Groundwater WTP Project Cost				$210,062,000
Alternative Cost Summary				**Cost Value**
Annual O&M Cost				$5,393,707
30-Year O&M Cost				$161,811,000
30-Year Replacement Costs				$51,600,000
30-Year Salvage Value				($20,966,000)
Total 30-Year Life Cycle Cost				**$402,507,000**

10.3 Residuals Management at South Plant

The Ramboll report discussed an option to construct a new thickening and dewatering facility with an estimated construction cost of approximately $30. This figure was based on a 2008 study by HNTB evaluating residuals dewatering (HNTB, 2008). With the new WTP, there are no plans for the existing WTP following commissioning and this alternative considers rehabilitating and repurposing of a portion of the existing south plant as a new dewatering facility. A description of the major components and activities associated with retrofitting this infrastructure for residuals management is summarized below and shown conceptually in Figure 10-1.

- Recycle all filter backwash waste to the head of the WTP (up to 10% of influent plant flow per US EPA backwash recycle regulations). This will ultimately direct all TSS to the pretreatment sludge waste stream. Although this does not reduce the solids loading, it does minimize the hydraulic capacity required of the residuals management facility. The 'blended value' from Table 10-1 was used as the basis for this evaluation (22 dry tons of solids per day sent to residuals dewatering).
- Pretreatment sludge from the new WTP will be pumped to the existing south secondary clarifiers via a new residuals pump station on the WTP site. Clarifier effluent is expected to contain less than 10 mg/L of TSS and will therefore consistently be below 30 ng/L of total mercury in the discharge to the river, allowing for a streamlined variance. It is likely that mercury levels will often be below 12 ng/L with this system (depending on dissolved mercury concentrations) but not consistently enough to waive the variance. One clarifier is adequately sized for normal operation and solids loading, and the second is utilized for redundancy.
- The existing sludge pump station at the south plant will be rehabilitated to pump thickened sludge from the clarifiers to a new 300,000 gallon above ground, bolted steel, glass-lined sludge storage tank with mechanical mixing. The purpose of the storage tank is to help dewatering operations by mitigating impacts of spikes in TSS loadings or hydraulic flow and allow for non-continuous operation.
- A new dewatering building will be constructed to house three thickened sludge transfer pumps, a polymer activation and feed system, two dewatering centrifuges, thickened solids screw conveyors discharging to a cake storage area, an electrical room, restroom, office, and other miscellaneous building features.
- Dewatered solids from the conveyor system will be stored adjacent to the dewatering building and feature a concrete pad covered by a pavilion structure. The pavilion area will be designed to accommodate maneuverability of a front-end loader to both move/mix solids and ultimately load and remove solids for final disposal.
- Dewatered solids will be hauled to a landfill for disposal. Thickener effluent and centrifuge centrate, or supernatant will be combined and sent to Outfall 005, which will be extended further into the river to conceal the plume.
- It is assumed that EWSU will need to hire five (5) additional full-time personnel (three performing primary operations and two for solids loading activities) to operate the facility at an average of 8 hours per day, 365 days per year.

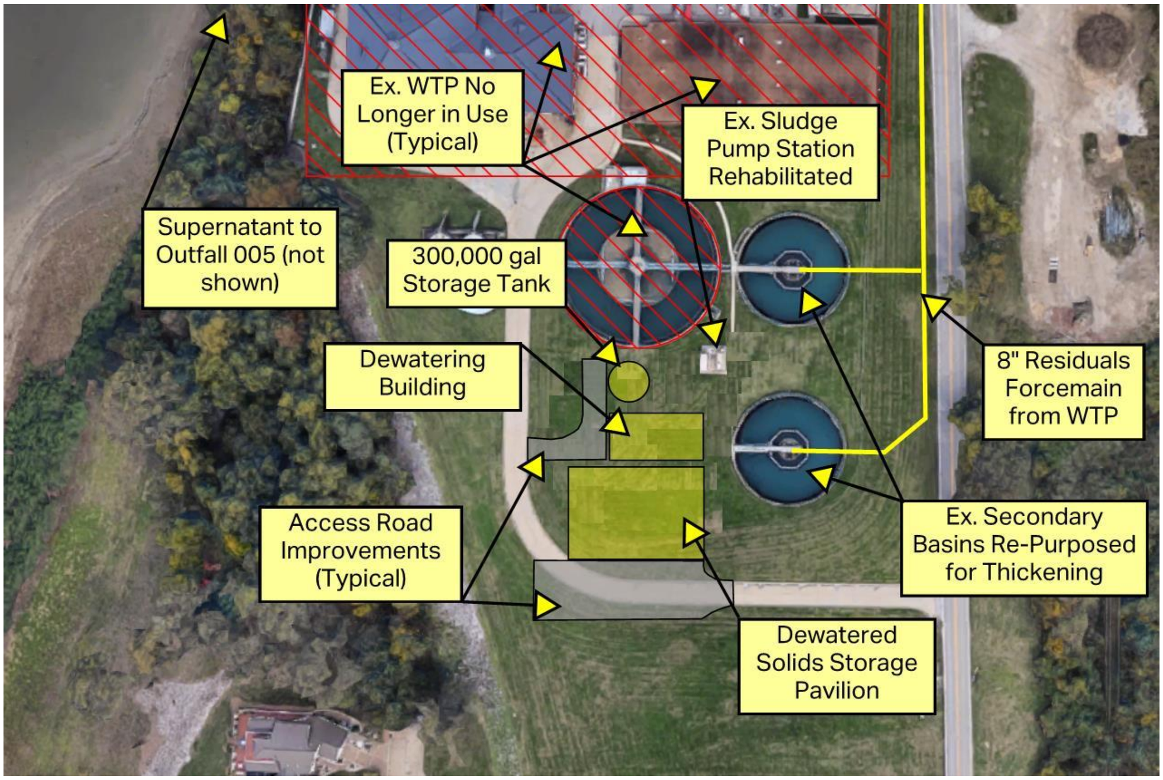

Figure 10-1 Conceptual Layout of South Plant Dewatering Facility

Table 10-4 presents the estimated total project cost for this option and provides separate itemization of the dewatering facility and the proposed WTP. Following this, Table 10-5 presents the 30-year life cycle cost of the complete system.

Table 10-4 Residuals Management Facility Project Costs

Dewatering Cost Component	Unit	Quantity	Unit Cost	Project Cost
Backwash Recycle - Pump Station Modifications	LS	1	$880,000	$880,000
Backwash Recycle - Influent Modifications	LS	1	$366,000	$366,000
Additional Forcemain Length	LF	140	$350	$49,000
Demolition (Clarifiers, Mechanisms)	LS	1	$800,000	$800,000
Sitework, Piping and Roadway Improvements	LS	1	$900,000	$900,000
New Thickening Clarifier Mechanism	EA	2	$928,000	$1,856,000
New Sludge Pumps	EA	2	$30,000	$60,000
Ex. Pump Station Miscellaneous Rehab	LS	1	$100,000	$100,000
300,000 Gallon Bolted Steel Tank	GAL	300,000	$1.75	$525,000
Thickened Sludge Mixers	LS	1	$150,000	$150,000
Thickened Sludge Transfer Pumps	EA	3	$30,000	$90,000
Dewatering Building	SF	3,600	$180	$648,000
Dewatering Centrifuge	EA	2	$1,700,000	$3,400,000
Polymer Activation and Storage System	LS	1	$100,000	$100,000
Screw Conveyor System	LS	1	$900,000	$900,000

Dewatering Cost Component	Unit	Quantity	Unit Cost	Project Cost
Cake Storage - Concrete	CY	590	$750	$443,000
Cake Storage - Pavilion	SF	8,800	$80	$704,000
Front End Loader	EA	2	$90,000	$180,000
Drain Pump Station / Sanitary	LS	1	$250,000	$250,000
Non-potable Water System	LS	1	$200,000	$200,000
Process Valves, Piping, and Supports	LS	1	$600,000	$600,000
Extension of Outfall 005	LS	1	$750,000	$750,000
Site Fencing	LF	1,200	$65	$78,000
Site Security	LS	1	$50,000	$50,000
HVAC and Plumbing	LS	1	$500,000	$500,000
Electrical and Control Systems	LS	1	$2,400,000	$2,400,000
Standby Generator	LS	1	$500,000	$500,000
Construction Subtotal				**$17,479,000**
Estimating Contingency	25%	Construction Subtotal		$4,370,000
Contractor General Conditions	10%	Construction Subtotal		$1,748,000
Contractor Overhead and Profit	12%	Construction Subtotal		$2,097,000
Escalation to Midpoint	3%	Construction Subtotal		$524,000
Engineering and Permitting	8%	Construction Subtotal		$1,398,000
Bidding, Construction Admin. & Inspection	10%	Construction Subtotal		$1,748,000
Testing and Commissioning	2%	Construction Subtotal		$350,000
Total Project Cost - Dewatering Addition Only				**$29,714,000**
Total Project Cost - New Plant (Alternative 2b)				$150,902,000
Total Project Cost - New Plant with Dewatering				**$180,616,000**

Table 10-5 Residuals Management Facility 30-Year Life Cycle Cost

Cost Component	Unit	Quantity	Cost	Annual Cost
Thickening Elec. (Drives, Mixers, Pumps)	kWh	524,257	$0.10	$52,400
Dewatering Elec. (Centrifuge, Conveyor)	kWh	1,494,690	$0.10	$149,500
Misc. Building Systems Elec.	kWh	200,779	$0.10	$20,100
Polymer Chemical	Pounds	120,620	$2.90	$349,800
Dewatered Solids Storage / Loading - Fuel	Gal	10,950	$4.00	$43,800
Landfill Tipping Fee	Dry Ton	8,041	$16.50	$132,700
Truck Hauling Fee (14 CY truck - 1/day)	Hauls	365	$100	$36,500
Additional Personnel (w/ Benefits)	FTE	5	$75,000	$375,000
Dewatering Equipment Maintenance	LS	1	$50,000	$50,000
Replacement Component	**Life (yrs)**	**$/Replace**	**# Life Cycles**	**30-Year Cost**
Residuals Pumps	15	$180,000	2	$360,000
Thickened Sludge Pumps	10	$60,000	3	$180,000
Thickened Sludge Transfer Pumps	7	$90,000	4	$360,000

Replacement Component	Life (yrs)	$/Replace	# Life Cycles	30-Year Cost
Thickener Drives/Mechanisms	20	$1,856,000	1	$1,856,000
Mixers	20	$150,000	1	$150,000
Dewatering Centrifuges	15	$3,400,000	2	$6,800,000
Screw Conveyors	20	$900,000	1	$900,000
Electrical Systems	20	$1,800,000	1	$1,800,000
Front End Loader	20	$180,000	1	$180,000
Salvage Component (Remaining Life)	**Life (yrs)**	**Remain Life**	**Full Value**	**30-Year Salvage**
Residuals Pumps	15	15	$180,000	($180,000)
Thickened Sludge Pumps	10	10	$60,000	($60,000)
Thickened Sludge Transfer Pumps	7	5	$90,000	($64,000)
Thickener Drives/Mechanisms	20	10	$1,856,000	($619,000)
Mixers	20	10	$150,000	($50,000)
Dewatering Centrifuges	15	15	$3,400,000	($3,400,000)
Screw Conveyors	20	10	$900,000	($300,000)
Electrical Systems	20	10	$1,800,000	($600,000)
Front End Loader	20	10	$180,000	($60,000)
Alternative Costs Summary				**Cost Value**
Dewatering System Project Cost				$29,714,000
Annual Dewatering O&M Cost				$1,209,800
Dewatering: 30-Year O&M Costs				$36,294,000
Dewatering: 30-Year Replacement Cost				$12,586,000
Dewatering: 30-Year Salvage Cost				($5,333,000)
Dewatering: Total 30-Year Life Cycle Cost				**$73,261,000**
WTP (Alternative 1): 30-Year Life Cycle Cost without Dewatering				$241,776,000
WTP (Alternative 1): 30-Year Life Cycle Cost with Dewatering				**$315,037,000**

10.4 Riverbank Filtration

This alternative considers replacing the surface water intake structure with water drawn from RBF collector wells. In an ideal scenario, the water quality available through RBF is very similar to river water quality but has very low TSS due to natural filtration through the ground prior to entering the treatment plant. However, RBF investigations were performed by Layne in 2019 and yielded underwhelming results due to limited transmissivity and poor water quality including high hardness and metals. In fact, many of the collector wells cited in Chapter 8 of this report are considered RBF wells. Given those results, it is expected that RBF would not fundamentally be any different than the previously discussed groundwater option in Section 10.2. That is, water would still include high hardness and metals and an excessive number of wells would be required. Therefore, the high-level costs estimated in Section 10.2 are expected to be approximately the same as this option.

10.5 Diversion to EWSU Wastewater Treatment Plant

This option considers diverting the WTP residuals to the EWSU East Wastewater Water Treatment Plant (WWTP) for dewatering and disposal. The WWTP is located less than a quarter mile from the new WTP so the logistics of conveying residuals are not complicated. However, sending the WTP sludge to the WWTP for treatment and disposal has many challenges from an operational and implementation perspective. A brief overview of the WWTP process and biosolids operation is summarized below:

- The average WWTP influent flow is approximately 14 MGD with typical TSS concentrations of 160 mg/L. The East WWTP also receives solids from the EWSU West WWTP.
- In 2020, the East WWTP processed (final dewatered solids to landfill) 3,454 dry tons which includes all solids from the West WWTP. This results in an average daily loading of 9.5 dry tons per day.
- The biosolids process currently involves primary clarifiers with anaerobic digestion. Primary sludge is not currently thickened but there are plans to do this in the future. Secondary sludge is thickened via two rotary drum thickeners and all sludge is dewatered via three centrifuges. All dewatered solids are sent to the landfill.
- The biosolids facility is currently staffed and operated 5 days per week. In 2020, there were 240 operational days which translates to an average daily production of 14.4 dry tons per day when operating.

Diverting the WTP residuals to the WWTP presents a major impact on both the wet stream and solids stream processes. Doing this creates a 330% increase in the dry tons per day of solids the WWTP plant would receive (increasing from 9.5 to 31.5 dry tons per day) and the primary challenges are discussed below.

a. The current WTP residuals flow is nearly 4 MGD and adding this to the WWTP baseline flow (average daily flow increase of nearly 30%) reduces capacity which could be detrimental, especially during wet weather events. Additionally, this is incredibly inefficient as all flow will pass through high-energy intermediate pumping and aeration / biological treatment processes which do nothing for removal of the inert TSS in the WTP residual. To mitigate this, a backwash recycle step must be implemented at the WTP, as considered in the residuals management facility in Section 10.3.
b. With backwash recycle, the decision is then whether to send residuals to the primary or secondary clarifiers. Sending to the primary clarifiers would destroy operations and efficacy of the anaerobic digesters as the WTP solids are inert and contain no volatiles. Sending to the secondary clarifiers would likely cause a similar inert dilution of solids needed for biological treatment but may be an option. However, to avoid inert dilution and disruption of biological treatment, it is recommended to construct a designated clarifier to thicken the WTP residuals.
c. The rotary drum thickener capacity would need expanded considerably to accommodate the drastic increase in solids and the space to do so is not available. The new thickeners to meet the expanded capacity would therefore need to be housed in a facility which is not integral with the existing equipment.

d. The dewatering centrifuge capacity would need to be expanded considerably and like the thickening equipment, space to do so is not available. Therefore, any new equipment would be installed in a facility which is not integral with the existing centrifuges.
e. The WWTP currently sends residuals to a landfill but is considering land application. If the WTP residuals were blended with biosolids, the product would be far too inert for land application and would eliminate any such possibility (let alone staying below the required mercury concentrations for land application). Therefore, an ability to separate the two dewatered streams would need to be included in the design.
f. The WWTP plant staffing and/or hours of operation would need to increase with the substantial increase in solids production.

The viable strategies to mitigate the hydraulic, biological, and operational issues described above effectively result in a stand-alone dewatering facility at the WWTP site. This is not fundamentally any different that the WTP residuals dewatering facility described in Section 10.3 at the existing south plant. The differences would be a longer forcemain is required to convey residuals and this would require new clarifiers rather than using existing tanks – both translating to higher project costs. Additionally, the amount of space available on the WWTP site poses construction challenges. Therefore, if a residuals dewatering facility is required, it is much more practical to construct this at the existing WTP site than to attempt to build a facility on the WWTP site.

10.6 Dewatering Bags

Dewatering bags are a geotextile product into which solids-latent water is pumped and the fabric acts as a filter retaining sediment within the bag while water passes through. Common applications for these are temporary sediment control measures at construction sites where water (commonly stormwater) is pumped out of pits or trenches, at smaller capacity water and wastewater treatment facilities for residuals dewatering, and at industrial facilities for sludge storage and management. Continuous use for larger capacity facilities is rare, as they have a large footprint and require a considerable amount of effort to remove once full involving use of front-end loaders or backhoes to rip apart the bags and load the contents into a truck to haul offsite. Bags are not reusable once they reach their maximum solids content. The bags are rarely located indoors due to footprint requirements, and in colder climates there can be issues with the solids and fill / drain piping freezing. Although they do pose some operational challenges, they are typically lower in capital cost than a mechanical dewatering system. This option considers their use at EWSU and a summary of the conceptual design parameters is provided below:

- The new WTP process and subsequent residuals loading is assumed to be the same as that described in Table 10-1 and Section 10.3. This was estimated as an average solids loading of 22.03 dry tons per day.
- Backwash recycle will be implemented at the new WTP to reduce the hydraulic loading to the bags and all sludge will be generated in the pretreatment basins. The costs used in Section 10.3 for the addition of backwash recycle system are included in this Option.
- It is assumed that the dewatering bag will achieve a final dewatered solids content of 20% having a specific gravity of 1.1 prior to needing disposal. This effectively results in a wet solids volume of about 11.9 cubic yards per day.

- It is assumed that polymer is fed at a rate of 15 pounds of polymer per dry ton of solids to achieve the 20% solids noted. A small polymer building with a restroom for personnel is included in the cost estimate.
- Individual dewatering tubes are assumed to be 60-feet in circumference with a length of 200 feet. Characteristics of such a dewatering tube are as follows:
  - Maximum fill height: 6.5 feet
  - Effective bag laydown width: 24 feet each
  - Volumetric capacity assuming 20% solids achieved: 424 cubic yards per bag.
- The average solids loading rate equates to filling 11 bags per year. Space for a total of 12 bags is provided in this alternative to allow for adequate time for individual bag filling, drying, and excavation and disposal.
- All bags are staged on a concrete containment pad which is designed to collect bag filtrate via a series of drains piped together in a common header and discharged to the river via Outfall 002, which will be extended to conceal the plume.

The location of the dewatering bags is proposed to be in place of the current north plant and 6.5 MG clearwell. This area will be demolished and redeveloped for the dewatering bag area following commissioning of the new WTP and is shown conceptually in Figure 10-2.

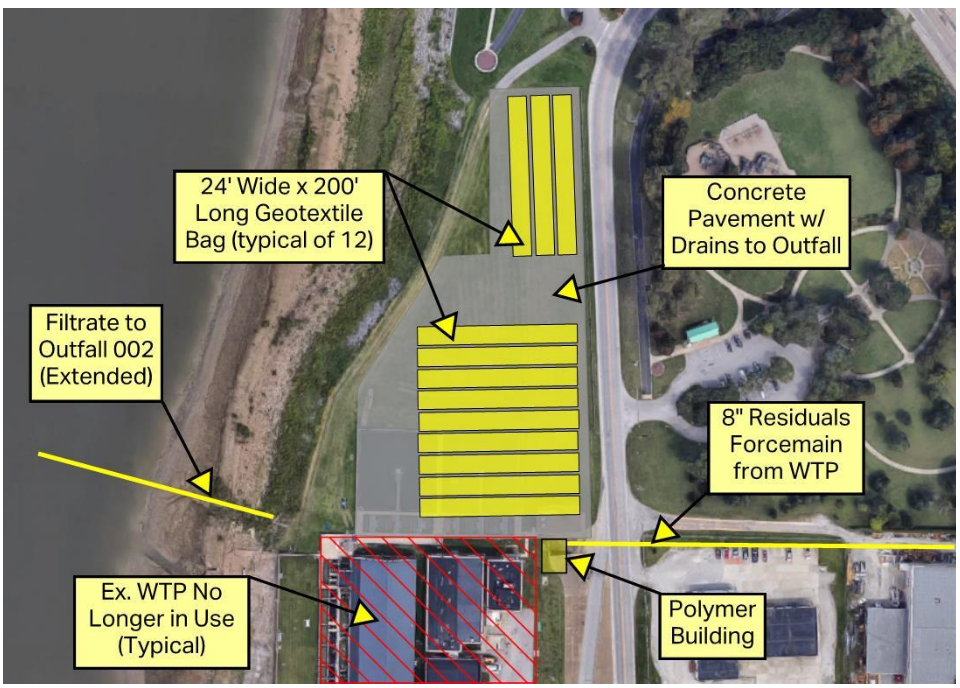

Figure 10-2 Conceptual Layout of Dewatering Bag Facility

Table 10-6 presents the estimated total project cost for this option and provides separate itemization of the bag dewatering facility and the proposed WTP. Following this, Table 10-7 presents the 30-year life cycle cost.

Table 10-6 Dewatering Bag Facility Project Costs

Dewatering Cost Component	Unit	Quantity	Unit Cost	Project Cost
Backwash Recycle - Pump Station Modifications	LS	1	$880,000	$880,000
Backwash Recycle - Influent Modifications	LS	1	$366,000	$366,000
Deduct: Reduced Forcemain Length	LF	220	$350	($77,000)
North Plant Demolition	LS	1	$150,000	$150,000
Controlled Density Fill - Clearwell & Basins	CY	44,600	$75	$3,345,000
Access Drives / Entrance	LS	1	$100,000	$100,000
Sitework Drainage and Grading	LS	1	$80,000	$80,000
Concrete Bag Staging Area	CY	4,300	$600	$2,580,000
Filtrate Containment Area Drain Piping	LF	2,800	$300	$840,000
Extension of Outfall 002	LS	1	$750,000	$750,000
Dewatering Bags (Initial Purchase)	EA	12	$8,000	$96,000
Dewatering Bag Fill Piping & Valves	LS	1	$250,000	$250,000
Piping Insultation & Freeze Protection	LS	1	$150,000	$150,000
Polymer Feed & Storage System	LS	1	$100,000	$100,000
Building - Restroom & Polymer Feed	SF	1,200	$180	$216,000
Front End Loader	EA	2	$90,000	$180,000
Site Fencing	LF	1,600	$65	$104,000
Construction Subtotal				**$10,110,000**
Estimating Contingency	25%	Construction Subtotal		$2,528,000
Contractor General Conditions	10%	Construction Subtotal		$1,011,000
Contractor Overhead and Profit	12%	Construction Subtotal		$1,213,000
Escalation to Midpoint	3%	Construction Subtotal		$303,000
Engineering and Permitting	8%	Construction Subtotal		$809,000
Bidding, Construction Admin. & Inspection	10%	Construction Subtotal		$1,011,000
Testing and Commissioning	2%	Construction Subtotal		$202,000
Total Project Cost - Dewatering Addition Only				**$17,187,000**
Total Project Cost - New Plant (Alternative 2b)				$150,902,000
Total Project Cost - New Plant with Dewatering				**$168,089,000**

Table 10-7 Dewatering Bag Facility 30-Year Life Cycle Cost

Cost Component	Unit	Quantity	Cost	Annual Cost
Electricity - Miscellaneous	kWh	66,900	$0.10	$6,700
Dewatering Bag Replacement	EA	11	$8,000	$88,000
Polymer Chemical	Pounds	120,620	$2.90	$349,800
Dewatered Solids Storage / Loading - Fuel	Gal	21,900	$4.00	$87,600
Landfill Tipping Fee	Dry Ton	8,041	$16.50	$132,700
Truck Haul Fee (14 CY truck)	Hauls	365	$100	$36,500
Additional Personnel (w/ Benefits)	FTE	5	$75,000	$375,000
Miscellaneous Maintenance	LS	1	$10,000	$10,000

Replacement Component	Life (yrs)	$/Replace	# Life Cycles	30-Year Cost
Residuals Pumps	15	$180,000	2	$360,000
Polymer System	20	$100,000	1	$100,000
Miscellaneous Building / Pavement	20	$15,000	1	$15,000
Front End Loader	20	$180,000	1	$180,000
Salvage Component (Remaining Life)	**Life (yrs)**	**Remain Life**	**Full Value**	**30-Year Salvage**
Residuals Pumps	15	15	$180,000	($180,000)
Polymer System	20	10	$100,000	($33,000)
Miscellaneous Building / Pavement	20	10	$15,000	($5,000)
Front End Loader	20	10	$180,000	($60,000)
Alternative Costs Summary				**Cost Value**
Dewatering System Project Cost				$17,187,000
Annual Dewatering O&M Cost				$1,086,300
Dewatering: 30-Year O&M Costs				$32,589,000
Dewatering: 30-Year Replacement Cost				$655,000
Dewatering: 30-Year Salvage Cost				($278,000)
Dewatering: Total 30-Year Life Cycle Cost				**$50,153,000**
WTP (Alternative 1): 30-Year Life Cycle Cost without Dewatering				$241,776,000
WTP (Alternative 1): 30-Year Life Cycle Cost with Dewatering				**$291,929,000**

10.7 Residuals Alternatives Summary and Recommendations

A summary the previously discussed residuals management options including costs, ranking and feasibility is provided in Table 10-8, followed by a discussion of the various advantages, disadvantages, and viability.

Table 10-8 Summary of Residuals Management Alternatives

Alternative	Project Cost	30-Year Life Cycle Cost	Rank	Feasible?
1. Do Nothing	$150,902,000	$241,776,000	1	Yes
2. Groundwater	$210,062,000	$402,507,000	NR	No
3. Dewatering Facility	$180,616,000	$315,037,000	2	Yes
4. Riverbank Filtration	(Approx. Same as 2)	(Approx. Same as 2)	NR	No
5. WWTP Diversion	Not Evaluated	Not Evaluated	NR	No
6. Dewatering Bags	$168,089,000	$291,929,000	3	Yes

- **Alternative 1 - Do nothing:** This is by far the lowest cost and allows the WTP to continue operating its residuals disposal practices as it does now. Discharging mercury originally pulled from the river results in a *de minimus* impact on the river. Additionally, the 2021 sampling results (Table 10-1) indicate the blended mercury levels are currently below 30 ng/L required for a streamlined variance. Furthermore, use of dewatering for TSS and mercury removal results in a net increase of mercury released to the environment due to transferring mercury from water to a landfill and release of mercury to the air from consumption of fossil fuels to power dewatering equipment.

- **Alternative 2 - Groundwater:** Use of groundwater was investigated extensively in Chapter 8 and an adequate supply was deemed unavailable. However, this Chapter considered a hypothetical scenario with additional collector wells and full use of groundwater. This results in high project costs and is not recommended if a mercury removal strategy must be implemented.
- **Alternative 3 - Dewatering Facility:** This option does add considerable operational efforts, energy use, and cost to the WTP project and life cycle, but is the recommended alternative if TSS and mercury in the residual stream must be removed.
- **Alternative 4 - Riverbank Filtration:** RBF was part of the groundwater investigation discussed in this report and is not believed to be capable of producing water which is any different than that discussed in Alternative 2.
- **Alternative 5 - Wastewater Plant Diversion:** An evaluation of the WWTP operational and biosolids characteristics quickly concluded this would effectively require a stand-alone dewatering facility at the WWTP. This is effectively no different than Alternative 3 although it would have a higher cost. Therefore, this option is not recommended, and costs were not further developed.
- **Alternative 6 -Dewatering Bags:** This option did result in a slightly lower project and life cycle cost than the dewatering facility considered in Alternative 3. However, dewatering bags are typically either for temporary use or implemented at smaller capacity water and wastewater treatment facilities in more rural communities. A facility like EWSU (22 dry tons per day of solids) is far too great of continuous solids production and the operational logistics of a dewatering bag facility lead to this option not being recommended.

LLOYD WINNECKE
MAYOR

EVANSVILLE WATER & SEWER UTILITY

ALLEN MOUNTS
DIRECTOR

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September 27, 2016

Indiana Department of Environmental Management
Office of Water Management
NPDES Permits Section
100 North Senate Avenue
Indianapolis, IN 46204

Subject: **Evansville Water and Sewer Utility – Water Treatment Plant**
Vanderburgh County, Indiana
Draft NPDES Permit No. IN0043117
Mercury Variance Application

Pursuant to discussions with the Indiana Department of Environmental Management (IDEM), Evansville Water and Sewer Utility - Water Treatment Plant (EWSU-WTP) is submitting a finalized request that draft permit conditions for mercury (i.e., final numerical WQBELs subject to a three-year compliance schedule) be revised to incorporate an individual mercury variance.

EWSU-WTP has determined that a variance from water quality standards that form the foundation for the effluent limitations are warranted under IC13-14-8-8, IC 13-14-8-9, and 327 IAC 2-1-8.8. Based on process knowledge and supporting intake and effluent data, there is no additive contribution of mercury to the source waters as part of the drinking water treatment process. Background levels of mercury in the source water from the Ohio River are the primary contributor of mercury to the system.

The enclosed variance application fully addresses the requirements detailed in 327 IAC 5-3-4.1(2) and is being submitted within ninety (90) days of the renewed permit effective date per the variance application timeline specified in 327 IAC 5-3-4.1(1).

Pursuant to 327 IAC 5-2-22, signature on this document attests to the following:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions regarding the variance application or any of the materials contained within, please contact me at (812)421-2120, ext. 2204 or via electronic mail at pkeepes@ewsu.com.

Sincerely,

Patrick Keepes

Water Superintendent
Evansville Water and Sewer Utility

LLOYD WINNECKE
MAYOR

LANE T. YOUNG
EXECUTIVE DIRECTOR

EVANSVILLE WATER & SEWER UTILITY

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(812) 436-7846 FAX (812) 436-7863

December 31, 2020

Indiana Department of Environmental Management
Office of Water Management
NPDES Permits Section
100 North Senate Avenue
Indianapolis, IN 46204

Subject: **Evansville Water and Sewer Utility – Water Treatment Plant**
Vanderburgh County, Indiana
Application for Renewal of NPDES Permit No. IN0043117

Enclosed is the Evansville Water and Sewer Utility - Water Treatment Plant (EWSU-WTP) application to renew existing NPDES Permit No. IN0043117. Pursuant to 327 IAC 5-3-2, EWSU-WTP is filing for reissuance at least 180 days prior to the expiration date (June 30, 2021) of the current NPDES Permit.

The Application Package includes the following:

- NPDES Public Water Supply Permit Application with associated materials
  - Site Location Map, Process Flow Diagram, and Facility Layout
  - Water Treatment Chemicals/Additives Information
  - Summary of Conventional DMR data
- List of Potentially Affected Persons

The data summary is based on the timeframe of July 2016 through October 2020.

<u>Status of Mercury Individual Variance Request</u>

The current NPDES Permit, effective July 1, 2016, requires mercury monitoring of Outfalls 002, 004, and 005 bi-monthly in the months of February, April, June, August, October, and December. Interim mercury discharge limitations and a thirty-six (36) month compliance schedule exist in the current NPDES Permit. Interim limitations contain "monitor only" requirements for these outfalls.

In September 2016, EWSU-WTP applied for an Individual Variance of Indiana Water Quality Standards for Mercury. Since that time, EWSU-WTP has been monitoring the effluent at Outfalls 002, 004 and 005 for mercury, reporting the data on the monthly monitoring reports and submitting compliance status reports every nine months as required under Part I.D.1 of the NPDES Permit. Additionally, Part I.D.1 states the schedule of compliance shall not commence until a final determination on the mercury variance submittal is made by the Commissioner. To date, EWSU has not received a formal response to the Individual Variance application from the Indiana Department of Environmental Management (IDEM). EWSU-WTP reiterates the original determination that a variance from water quality standards that form the foundation for the effluent limitations is warranted under IC13-14-8-8, IC 13-14-8-9, and 327 IAC 2-1-8.8. Therefore, the Individual Variance Application for mercury (dated September 2016) is incorporated herein by reference.

Status of Outfall Extension and Agreed Order

The NPDES Permit effective on July 1, 2016 included a requirement that ESWU-WTP extend Outfalls 002, 003, 004 and 005 from their existing locations and submerge the outfalls in the Ohio River to address the continuing narrative water quality criteria violations. A Construction Schedule for the visible discharge plume was included in Part I.E. of the Permit. The schedule required EWSU-WTP to initiate construction to extend and submerge the outfalls within 35 months from the effective date of the Permit (on or before June 1, 2019), and to complete construction no later than 40 months from the effective date of the Permit (on or before November 1, 2019). The Permit also included the following reopening clause at Part I.F.4:

> *This permit may be modified or alternately revoked and reissued after public notice and an opportunity for hearing to incorporate an alternate schedule that could extend the construction schedule beyond the 40-month requirement as specified in Permit Part I.E., or if the City decides to utilize an alternate water source, modify the existing water treatment plant, and/or build a new water treatment plant.*

When the Permit was issued effective July 1, 2016, IDEM was aware that the City was investigating utilization of an alternate water source, and due to the age and condition of the existing water treatment plant, was also investigating the possibility of modifying or replacing that plant. IDEM was also aware that Outfalls 002, 003, 004, and 005 may be eliminated, depending on the outcome of those investigations. If so, there would be no need for EWSU to extend and submerge those outfalls as required in the Construction Schedule detailed in Part I.E. As a result of these ongoing investigations, the City was not able to comply with the compliance schedule within the Permit and instead, relied in good faith on the availability of a reopener to extend the construction schedule or otherwise modify the Permit.

During the span of the existing Permit, EWSU-WTP has kept IDEM informed of all activities related to the outfalls, including the ongoing investigations into alternative water supplies and into whether the existing plant would need to be modified or replaced. In addition, the EWSU-WTP notified IDEM when it learned that the projected costs of a modified or new water treatment plant could not be funded through existing rates, so would require a new IURC rate case to be approved. Finally, the EWSU-WTP kept IDEM informed of its attempts to obtain a Nationwide Permit from the U.S. Army Corps of Engineers, which was not issued until February 2020.

In a letter dated July 2, 2019, IDEM determined that the appropriate mechanism for extending the existing compliance schedule beyond the 40-month deadline was through an Agreed Order. An Agreed Order was drafted by IDEM in May 2020. The original draft Agreed Order has since been modified. EWSU is currently reviewing a revised Agreed Order proposed by IDEM dated December 9, 2020.

Conclusion

In accordance with IC 13-18-20-12, an application fee of $50 is included to cover the Permit renewal application fee. If you have any questions regarding this application or any of the materials contained within, please contact Richard Glover at 812-421-2120 or rglover@ewsu.com.

Sincerely,

Richard Glover

Richard Glover
Water Production Manager
EWSU-WTP

cc: EWSU-WTP File
E. Foster (Ramboll)