

5.0 WWTP Equipment Repair and Replacement

The purpose of this section is to provide guidance on how to prepare an engineering report/environmental information document (ER/EID) for a project that involves wastewater treatment plant (WWTP) equipment repair and/or replacement. Some examples of WWTP equipment repair and/or replacement may be:

- Replacing a sludge belt filter press with another type of sludge dewatering system.
- Replacing an influent pump station that continuously needs maintenance with a new influent pump station.
- Repair of a belt filter press so that it operates appropriately.

This section only applies to projects similar to the above-listed examples. For projects involving widespread equipment replacement or repair such as that involved in a WWTP upgrade, especially to meet more stringent effluent limits or capacity constraints, then the guidance in Section 3.0 must be used. The following sections discuss what the ER/EID must include, and the outline of the ER/EID must follow the order presented in this section.

Some projects may qualify for Minor ERs/EIDs. (See Section 1.4.1 for the details of when these are allowed.) For Minor ERs/EIDs, complete the tables provided in Appendix H for the requirements in each section.

For Major ERs/EIDs, the guidance may allow alternative data, methodologies, and the way material is presented; *however, the format must always be followed*. Each subsection will advise if these are allowable.

- Alternative data sets other than those specified in this section may be proposed in certain subsections. In all cases, alternative data sets must be identified, discussed, justified and compared with the corresponding data set specified in the guidance. An acceptable rationale for the preferred alternative data set to the one specified in the guidance *must be provided* if it is to be approved.
- Alternative methodologies must be specified and discussed, and the findings compared with the findings based on the corresponding methodologies in the guidance. All alternative methodologies must include supporting data, calculations, assumptions and documentation so that results can be replicated.
- If material is presented in alternative manner, the required discussion must be in the body of the ER/EID. Supporting information (e.g., maps, calculations, supporting data, etc.) may be included in an appendix rather than the body of the ER/EID. A tabular display of the data is encouraged where practicable. Use of the worksheets found in the Wastewater Treatment workbook is encouraged.

As stated in Section 2, the report must follow the prescribed format in the guidance. ERs/EIDs for projects under this section must follow the format below:

- Upfront Information
- 1.0. Executive Summary
- 2.0. Current Situation
 - 2.1. WWTP Condition
 - 2.2. Historical and Current Wastewater Flow
- 3.0. Future Situation
- 4.0. Purpose and Need
- 5.0. Alternatives Analysis
 - 5.1. Alternatives Description
 - 5.2. Present Worth Analysis
 - 5.3. Alternatives Analysis Summary
 - 5.4. Proposed Project Description
- 6.0. Environmental Information Document
- 7.0. Financial Analysis
- 8.0. Public Participation

5.1 Upfront Information

Prepare the upfront information (e.g., Table of Contents, Appendices) in accordance with Section 2.2.1.

5.2 Executive Summary

Prepare the Executive Summary in accordance with Section 2.2.2.

5.3 Current Situation

Determining the current condition of the WWTP is important for two reasons. First, it provides information related to the overall condition of the WWTP and more specifically, the condition of the equipment that will be either repaired or replaced. Second, it helps to establish the need for the project. All information presented should correspond to the Owner's asset management plan and/or capital improvement plan (CIP). The following sections discuss what should be included in the analysis of the current situation.

5.3.1 Operations and Maintenance Plan

Requirements

Part of defining the current situation is characterizing the operations and maintenance (O&M) that occurs both at the WWTP in general and for the specific pieces of equipment that will be repaired and/or replaced as part of the project. Provide a summary of O&M procedures for the entire WWTP. Describe all O&M activities and frequency. After discussing the overall O&M occurring at the WWTP, discuss the specific current operations and maintenance activities associated with the equipment proposed for repair or replacement. If O&M activities are not conducted due to the condition of the equipment proposed for repair or replacement, provide more detail associated with this particular problem.

Describe the local government unit's (LGU's) O&M plan for the WWTP and discuss whether routine maintenance is performed in accordance with manufacturer's recommendations, standard industry practices, etc. Describe any premature failures (versus expected life) for the equipment that is being repaired and/or replaced. In addition, discuss the mechanism of the failure (e.g., lack of maintenance, improper design, unforeseen conditions) and how that mechanism will be mitigated with the proposed project.

Minor ERs/EIDs

- Complete Table 2.1.1 in Appendix H and place in the body of the ER/EID.
- Provide all supporting information in an appendix of the ER/EID. List the appendix reference in the table.

5.3.2 WWTP Condition

Part of determining the current situation also concerns ascertaining the current condition of the WWTP where the project will occur as well as other specific information related to the equipment at the WWTP. Follow the requirements discussed below.

5.3.2.1 General WWTP Condition

Requirements

Provide a project location figure prepared in accordance with Section 2.1.5 and reference the figure when discussing the WWTP general condition. It should contain the following:

- LGU limits
- Major waterbodies and roadways with appropriate labeling
- The service area boundaries with major interceptors and pump stations shown.
- The location of the WWTP.

Provide brief description of the WWTP's current condition and treatment processes for both the liquid treatment train and solids treatment train. Additionally, provide the average daily flow (ADF) of the WWTP for the past four years. Include information regarding the current capacity and the current flow at the plant and discuss the percent capacity currently used by the WWTP. Provide a copy of the limits pages in an appendix in the ER/EID and briefly discuss the permit in the body of the ER/EID.

Minor ERs/EIDs

- Complete Table 2.1.2 in Appendix H and place in the body of the ER/EID.
- Complete the Project Location Figure and place in the body of the ER/EID. List the appropriate reference in the table.
- Include any supporting information such as DMRs and special orders in an appendix to the ER/EID. List the appendix(ces) in the table.

5.3.2.2 WWTP Treatment Train Condition

Requirements

Once the general condition of the WWTP is described, focus the description more on the treatment train(s) where the specific piece(s) of equipment proposed for repair and/or replacement are located. Identify the treatment train as either the liquid treatment train or sludge treatment train. Limit the discussion to the sequence that involves the project. For example, the liquid treatment process would be summarized if the project involved replacing an influent pump station.

Provide a simple flow diagram that specifies each piece of equipment within the treatment train. Show the location of the problem piece(s) of equipment. Also, show the treatment train on an aerial photo or physical diagram of the WWTP with the problem piece(s) of equipment highlighted. For each component within the train(s), provide the following:

- Type of equipment
- Size of equipment
- Age of equipment
- Condition of equipment.
- Additional information as needed.

Condition should be determined as listed below.

- **Good.** The equipment shows little signs of wear and functions in an efficient manner with only routine maintenance. It shows minimal signs of corrosion and deterioration.
- **Fair.** The equipment shows some signs of wear and fails periodically. Some repair outside of routine maintenance is required to keep the equipment functioning. Minor upgrades provide reliability.
- **Poor.** The equipment shows signs of wear and fails on a regular basis. Repairs outside of routine maintenance occur frequently. The equipment shows excessive signs of corrosion that limits functionality. Upgrades are needed to provide reliability.

Supply additional information that would provide the review engineer with enough information to ascertain the overall condition of the specific treatment train where the project will occur. Include photos as needed. Provide any supporting information in an appendix to the ER/EID.

Minor ERs/EIDs

- Complete Table 2.1.3 in Appendix H and place in the body of the ER/EID.
- Provide any supporting information in an appendix of the ER/EID. List the appropriate appendix reference in the table.

5.3.2.3 *Specific Equipment Issues*

Requirements

Provide a detailed account of the attempts made to repair the equipment in question, including information regarding the time, efforts, and all attempts made to repair the equipment within the past five years or since the issue started, whichever is shorter, prior to submitting an application for funding.

Minor ERs/EIDs

- Complete Table 2.1.4 in Appendix H and include in the body of the ER/EID.
- Place all supporting information in an appendix to the ER/EID. List the appendix reference in the table.

5.3.3 *Historical and Current Wastewater Flow*

Requirements

One of the key components to describing the condition of the WWTP is the historical flow data. Typical flow data would consist of average daily flow (Q_{ADF} or ADF) and peak hourly flow ($Q_{PeakHour}$). Other parameters of use would consist of average daily flow-maximum month (Q_{ADF-MM}), maximum day flow (Q_{MaxDay}), and maximum hourly flow ($Q_{MaxHour}$). Judgment should be used when to supply flow data on a monthly basis. For example, a WWTP that receives the majority of its flow from a recreational area may provide flow data based on the seasonal period. Provide historical flow data, from the past four years. Year 4 should be the most recent year for which data are available. Provide any additional information as needed to explain any trends in the flows. All supporting information should be included in an appendix to the ER/EID.

Minor ERs/EIDs

- Complete Table 2.2.1 in Appendix H and include in the body of the ER/EID.
- Provide graph(s) that show the months along the X axis and flow in MGD along the Y axis for the parameter(s) in the table. List the appropriate figure reference in the table.
- Provide supporting information in an appendix to the ER/EID. List the appropriate appendix reference in the table.

Table E.7.1 in Appendix E shows an example of the table would be completed.

5.4 Future Situation

In addition to ascertaining the current situation, including the condition of the WWTP and specific piece(s) of equipment needing repair and/or replacement, it is important to gain an understanding of the future situation of the WWTP where the project will occur. Follow the requirements below for the completion of this section.

Requirements

Discuss the role the piece of equipment that will be repaired and/or rehabilitated will play in future improvements related to the WWTP. Describe any future expansion and/or upgrades of the WWTP, including whether or not the equipment will be utilized or abandoned. If it will be abandoned, provide the expected service life of the equipment. Additionally, justify the reasons as to why it will be abandoned rather than continue to be used. Provide any supporting information such as diagrams or plans in an appendix of the ER/EID.

If the expected life is less than 20 years, the actual service life of the equipment should be used in the financial evaluation of the project.

In addition to relating how the piece of equipment will fit into any future improvements at the WWTP, it is important to determine whether or not the equipment installed is properly sized for future flows. Provide the current ADF for the WWTP and the Year 1, Year 5, Year 10, Year 15, and Year 20 ADF. If the Year 20 ADF is an increase of ten percent or more of the current flows, then complete the tables as discussed in Sections 3.3 and 3.4.

Compare the ADFs for these years to the current capacity of the WWTP. If the percentage of capacity utilized will be greater than 80 percent, then discuss plans the WWTP has for expanding the WWTP in the near future to accommodate future flows. If the percentage of capacity utilized will be greater than 90 percent, then discuss when the WWTP will be expanded. Describe how the piece(s) of equipment to be repaired and/or replaced as part of the project will fit into the expansion (see first paragraph above).

Minor ERs/EIDs

- Complete Table 3.1 of Appendix H and include in the body of the ER/EID.
- Place all supporting information in an appendix of the ER/EID. List the appendix reference in the table.

Table E.7.2 in Appendix E shows an example of how this table would be completed.

5.5 Purpose and Need

Complete the Purpose and Need section in accordance with Section 2.2.3.

5.6 Alternatives Analysis

5.6.1 Alternatives Description

The first part of the alternatives analysis to be summarized in Section 2.2.5 consists of describing the alternatives considered for the project. Describing the alternative provides the opportunity to consider the impacts and benefits related to each alternative under consideration and provides the groundwork related to the present worth analysis (see Section 2.2.4). For WWTP equipment replacement and rehabilitation, the following must be considered:

- No-Action Alternative.
- Optimum operation of existing equipment.
- Repair of specific equipment.
- Alternative replacement equipment considered.
- Preferred Alternative.

Requirements

The details of what is needed for the description of the alternatives will be discussed in Sections 5.6.1.1 through 5.6.1.5 below.

Minor ERs/EIDs

- Each of the alternatives discussed in the sections below must be included by using Tables 5.1.1 through 5.1.7 in Appendix H.
- Each alternative description must include the following:
 - A description of each alternative as described in the sections below. Where appropriate, include figures and maps.
 - For feasible alternatives, include preliminary design information for the proposed project, including preliminary design criteria for all proposed unit processes and operations, detention times, aeration requirements, tank and pump sizes, sludge handling and biosolids disposal alternatives, etc. sufficient to evaluate the proposed project.
 - For feasible alternatives, the capital cost and present worth as derived from the present worth analysis.
 - For all alternatives, a discussion regarding why the alternative was accepted or rejected, including capital cost, present worth and environmental impacts.
- Place the tables for each alternative in the body of the ER/EID with all supporting information in an appendix.

Major ERs/EIDs

For major ERs/EIDs, include the information as discussed above in the requirements for minor ERs/EIDs. However, the information may be presented in narrative form. Supporting documentation must be included in an appendix to the ER/EIDs.

5.6.1.1 No-Action Alternative

For this alternative, discuss what would happen if the project were not built. In answering this question, describe the social, economic, and environmental impacts that would occur from not building the project. In the rationale, describe why this alternative was not chosen, including whether it was feasible to continue as discussed in the no-action scenario (e.g., not replacing equipment results in noncompliance that would make the no-action alternative infeasible).

5.6.1.2 Optimum Operation of Existing Equipment

In this description, discuss how the existing facilities could be optimized to improve performance without making any upgrades beyond those that would occur as a part of normal maintenance. Discuss what would happen to the WWTP if this alternative were implemented. In the rationale, describe why this alternative alone was rejected or accepted.

5.6.1.3 Repair of Specific Equipment

In this alternative, discuss the affect of specific repairs to the equipment. Discuss the validity for these repairs in detail and provide rationale for acceptance or rejection as the preferred alternative. Items considered routine maintenance (such as cleaning out aeration basins) are not acceptable alternatives and will not be funded.

5.6.1.4 Alternative Replacement Equipment Considered

Under this alternative, discuss the different types of equipment considered for the rehabilitation and/or replacement project. Each type of equipment or equipment combination must be its own separate alternative. For example the alternatives could consist of different configurations (e.g., influent pump station-dry well/ wet well, duplex/triplex, etc.) or treatment alternatives (e.g., solids dewatering – gravity belt / centrifuge, etc.) or cloth disc filters – deep bed filters. In the rationale, describe why the alternative(s) alone were accepted or rejected.

5.6.1.5 Preferred Alternative

The project selected as the preferred alternative may be a blend of the above alternatives. If the preferred alternative does not fit any of the alternatives discussed above, describe the preferred alternative by summarizing and referring back to any other alternative descriptions as necessary.

5.6.2 Present Worth Analysis

Complete the present worth analysis in accordance with Section 2.2.4.

5.6.3 *Alternatives Analysis Summary*

Complete the alternatives analysis in accordance with Section 2.2.5.

5.6.4 *Proposed Project Description*

Prepare the proposed project description in accordance with Section 2.2.6.

5.7 *Environmental Information Document*

Completed the environmental information document in accordance with Section 12.

5.8 *Financial Analysis*

Complete the financial analysis in accordance with Section 2.2.7.

5.9 *Public Participation*

Complete the public participation section in accordance with Section 2.2.9.