

## 6.0 Collection System Rehabilitation 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 collection system rehabilitation and replacement. For projects in which replacement is proposed (e.g., a pump, sewer line), the ER/EID should clearly state that the replacement is 'like for like' and no upsizing is proposed, unless the diameter of the sewer is less than the State minimum diameter of 8-inches [15A NCAC 02T .0305 (i)(1); cf. 15A NCAC 02T .0303 (4)(B)]. If the project proposal includes upsizing either a pump station or a sewer line, utilize Section 4.0 Collection System Expansion. Some examples of collection system rehabilitation and replacement may be:

- Using cured-in-place pipe (CIPP) to line a gravity sewer that has significantly diminished carrying capacity due to root intrusion.
- Replacing a section of gravity sewer that is severely corroded, partially collapsed, or is otherwise at risk for failure.
- At a pump station, replacing pumps that have been in operation well past their design life, without increasing capacity.
- Replacing a stretch of 6-inch sewer in poor condition with 8-inch sewer to bring the pipe up to State standards.

This section only applies to projects similar to the above-listed examples. For projects involving the expansion of collection systems, see Section 4.0 Collection System Expansion. 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 I for the requirements in each section.

For Major ER/EIDss, 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 Collection System Expansion 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. System Condition
  - 2.2 . 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 Project Description
- 6.0. Environmental Information Document
- 7.0. Financial Analysis
- 8.0. Public Participation

## **6.1 Upfront Information**

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

## **6.2 Executive Summary**

Prepare the Executive Summary in accordance with Section 2.2.2.

## **6.3 Current Situation**

Before drafting the Need and Purpose statement as defined in Section 2.2.3, the reasons for the project must be determined. To do so, first characterize the current situation. The following sections discuss what should be included in the current situation.

### **6.3.1 System Condition**

Included in a description of the current situation is an appraisal of the condition of the collection system *within the sewershed* where the project will occur. This helps to establish the project need. Complete the following in accordance with the instructions within each section.

#### *6.3.1.1 Overview of System*

#### **Requirements**

Part of determining the condition of the sewer system is to gain an understanding of the size of the collection system and the size of the sewershed where the rehabilitation/replacement will

occur. Provide two figures. The first should be more of a vicinity figure that shows the LGU. In this figure, provide

- Basemapping as described in Section 2.1.5.
- The municipal limits of the LGU and/or county lines.
- Major roadways and waterbodies.
- Major interceptors and pump stations.
- The WWTP(s) which collect(s) wastewater from the entire system.
- The sewershed in which the proposed project will occur.<sup>1</sup>
- The project location.

In addition to including this figure, provide an additional figure that shows the following:

- Basemapping as described in Section 2.1.5.
- The municipal limits of the LGU and/or county lines.
- Major roadways and waterbodies.
- Collection system lines and pump stations within the sewershed.
- The direction of wastewater flow.
- The WWTP which receives the wastewater from the sewershed.
- The project location.

**Minor ERs/EIDs**

Please include these figures as part of Section 2.1 of the ER/EID.

*6.3.1.2 History of Overflows*

Sanitary sewer overflows (SSOs) are often indicators of the condition of a collection system. Follow the requirements below regarding SSOs.

**Requirements**

For SSOs, describe if any SSOs have happened over the past five years within the sewershed where the project will occur. Attach any information such as reported SSOs that show where these SSOs occurred.

Discuss whether the local government unit (LGU) is under a Special Order by Consent (SOC) or is currently negotiating one with the North Carolina Department of Environment and Natural Resources (DENR) Division of Water Quality (DWQ). Additionally, discuss any other special orders under which the LGU may be, such as an order for the U.S. Environmental Protection Agency (EPA). For any of these orders, provide such pertinent information as to why the special

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<sup>1</sup> Applies only if the project is located within a specific sewershed that is smaller than the LGU limits.

order was issued, deadlines by which the LGU must comply and/or any intermediate deadlines. Provide full copies of these orders in an appendix of the ER/EID.

Show all SSOs on a map. This map should also contain the same basemapping as the project location figure (see Section 2.1.5), the sewershed boundaries, the collection system lines and pump stations within the sewershed, the direction of wastewater flow, and the location of all SSOs that are keyed to Table 2.1.1 in Appendix G.

**Minor ERs/EIDs**

- Complete Table 2.1.1 in Appendix I and place it in the body of the ER/EID.
- Include the required map in the ER/EID with the appropriate map reference in the table.
- Provide all SSO reports for SSOs shown in the table in an appendix of the ER/EID. List the appendix reference in the table.
- Provide full copies of any special orders in an appendix of the ER/EID. List the appendix reference in the table.

Table E.8.1 in Appendix E shows an example of how this table would be completed.

**6.3.1.3 Unsewered Areas**

Complete this section as described below.

**Requirements**

Identify any locations within the sewershed that contain unsewered areas. Show this area on a map. The map should include the basemapping utilized for the Project Location map, the sewershed boundary, major sewers within the sewershed boundaries, and the boundaries of the unsewered area(s).

Additionally, discuss any water quality or public health problems associated with failing septic systems, single-family residence discharges (NCG550000), or single-family residence spray/drip irrigation systems within the sewershed. If applicable, include a letter from the county Health Department in which the LGU is located or the On-site Water Protection Section with the Division of Environmental Health. The letter must clearly state that the area contains failing septic systems, single-family residence discharges (NCG550000), or single-family residence spray/drip irrigation systems and must clearly describe the residences and/or businesses impacted by these failing septic systems as set forth in the CWSRF application guidance found on the IFS website. Clearly reference the letter in the appropriate appendix of the ER/EID. The location of these failing septic systems must be shown on the unsewered areas map discussed in the paragraph above.

**Minor ERs/EIDs**

- Complete Table 2.1.2 in Appendix I and place in the body of the ER/EID.
- Provide a map that meets the requirements above and place in the ER/EID. List the appropriate reference in the table.
- Place any failing septic system letters in an appendix of the ER/EID. List the appropriate reference in the table.

Table E.8.2 in Appendix E shows how this table would be completed.

**6.3.1.4 Collection System Issues**

**Requirements**

Describe in more detail any other issues associated with the sewershed where the project will occur. Include a description of the specific problems with the portion of the collection system to be replaced/rehabilitated. Include a discussion of any history of problems not covered in the information above.

**Minor ERs/EIDs**

- Complete Table 2.1.3 in Appendix I. Print this table and include it in the body of the ER/EID.
- Provide any supporting information in an appendix of the ER/EID. List the appropriate reference in the table.

**6.3.2 Rehabilitation/Replacement Prioritization**

Projects involving collection system rehabilitation and replacement are generally fall into one of three categories: (1) a full Sewer System Evaluation Survey (SSES) has already been completed for some part, if not all, of the collection system; (2) portions of what would be part of a SSES have been completed; or (3) no work toward prioritizing collection system components for rehabilitation/replacement has been completed. If a full SSES has been completed, follow the requirements discussed in Section 6.3.2.1. If portions of a SSES have been completed, follow the requirements discussed in Section 6.3.2.2. If no work toward prioritizing collection system components for rehabilitation/replacement has been completed, follow the requirements discussed in Section 6.3.2.3.

**6.3.2.1 SSES Completed**

When CCTV or direct observation has already been performed, the SSES can provide specific information concerning the location, nature and extent of the problem areas in a collection system. Follow the requirements below.

## **Requirements**

### **1. Summarize work accomplished.**

Provide a summary of the work accomplished with the SSES. The summary, with examples, should include:

If the LGU claimed SSES credit in the application, then the SSES must be included when the ER/EID is

1. How it was concluded there was a problem with excessive sewer flows in the sewer collection system;
2. How this conclusion concerning excessive flows was further narrowed to isolate the area(s) (sub-basins) where the flows were excessive (e.g., SSOs, manhole inspections, smoke-testing, etc.);
3. How specific gravity sewers were identified for further investigation (e.g., manhole inspections during/following a rain event, etc.);
4. How the specific problem(s) with a particular gravity sewers were identified (e.g., CCTV, visual inspection, etc.);
5. How the methodology, procedure, rationale, etc. was developed to prioritize the defects with gravity sewers and manholes;
6. How this rationale was applied to the results of the sewer survey;
7. How the area(s) for rehabilitation and/or replacement were prioritized; and
8. How the specific sewer line segments, manholes, etc. were selected for rehabilitation and/or replacement. The Summary should refer to specific pages in the SSES, as appropriate.

Once this summary is complete, then list the collection lines that have issues. Include in this listing (1) the gravity sewer location identification, (2) the gravity sewer diameter, (3) the sewer material, (4) the sewer age, (5) depth of cover, (6) problem, and (7) the sewer score.

Next, for each identified segment, complete (1) the score each segment received, (2) the recommended solution, and (3) the cost for the solution. Total the cost to complete the overall need. Highlight which segments are part of this project and then total the cost to rehabilitate/replace lines for the project only.

**Minor ERs/EIDs**

- Complete 2.1.4a (Section 6.3.2.1 only) in Appendix I for the summary of work accomplished with the SSES. Include this table in the body of the ER/EID.
- Complete Table 2.1.4b (Section 6.3.2.1 only) in Appendix I for a listing of problem gravity sewers identified as part of the SSES. Include this table in the body of the ER/EID.
- Complete Table 2.1.4c (Section 6.3.2.1 only) in Appendix I which shows the priority evaluation of the specific sewers and/or manholes needing. Include this table in the body of the ER/EID.
- In Table 2.1.4a, list the appendix where the SSES may be found. If necessary, the SSES may be submitted on CD or DVD.

**6.3.2.2 *Portions of SSES Completed***

Sometimes, while a full SSES may not have been performed, the LGU has completed some type of similar evaluation that allows them to prioritize the portions of the collection system in question for rehabilitation/replacement. For example, a LGU may have completed a CCTV analysis but not have formalized the results in an SSES. If this is the case, then describe (1) the work that has been completed, (2) where it was performed, (3) the methodology for determining prioritization, and (4) the results of the prioritization. List all segments in priority order and their costs. Total the costs. For items that will be rehabilitated/replaced as a part of the project, highlight these items and total the specific cost.

**Minor ERs/EIDs**

- Using Table 2.1.4 (Section 6.3.2.2 only) in Appendix I, discuss the information listed above. Place this table in the body of the ER/EID.
- Provide any supporting information in an appendix to the ER/EID. List the appropriate reference in the table.

**6.3.2.3 *No SSES Work Completed***

If a LGU has just begun to develop a systematic methodology to determine the condition of their collection system, they most likely have yet to perform a SSES. If no SSES components have been performed, the project usually includes inspections such as CCTV and/or smoke testing to develop a database of collection system condition and a methodology to rehabilitate/replace portions of the collection system in need of repair. “Find and fix” projects fall into this category.

**Requirements**

Describe the methodology the LGU will utilize to ascertain the condition of the collection system (e.g., based on CCTV, smoke testing), including which areas of the LGU will be analyzed first,

second, etc. Include a map showing the order of analysis. Then discuss how it will prioritize gravity sewers, force mains, and pump stations for rehabilitation/replacement. Include in this prioritization discussion information related to how the scoring system will be developed and will work. Discuss any work that will be performed as part of the project. A tabular listing of work to be performed is recommended. Include any additional information in an appendix of the ER/EID.

**Minor ERs/EIDs**

- Complete Table 2.1.4 (Section 6.3.2.3 only) for this section. Include this table in the body of the ER/EID.
- Include a map that shows the location and review order of different areas within the LGU. List the appropriate figure reference in the table.
- Include any supporting information in an appendix of the ER/EID. List the appropriate reference in the table.

**6.3.3 Current Wastewater Flow**

Knowing the current wastewater flow through the section of the collection system to be rehabilitated or replaced helps to establish the case that the project will indeed be a true rehabilitation/replacement project rather than an expansion project. Additionally, it helps to bolster the need for the project.

**Requirements**

Discuss the current capacity of the gravity sewer or firm pumping capacity of the pump station to be rehabilitated or replaced. Provide the calculations used to make this determination in an appendix to the ER/EID.

Additionally, provide the current peak flow that flows through the collection system component(s) (e.g., gravity sewer, force main, pump station) that will be rehabilitated/replaced as part of the project. Discussed the methodology used to attain this flow number. Note that methodologies may be related to pump drawdown tests and runtimes, metered flow, or estimated flow. List the peaking factor used to determine the flow and justify why each peaking factor was used. Supply sample calculations as part of the discussion so that the calculations can be duplicated. Provide any supporting information in an appendix of the ER/EID.

**Minor ERs/EIDs**

- Complete Table 2.2.1 and include the table 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.

## 6.4 Future Situation

Any project completed under this project should not include a growth in the capacity of the gravity sewer, pump station, and/or force main to be rehabilitated/replaced as part of the proposed project.<sup>2</sup> However, there may be cases where peak flow may increase due to development further up the sewershed from the project.

### **Requirements**

State the capacity of the gravity sewer(s) or the firm pumping capacity of the pump station(s) to be rehabilitated or replaced. Then provide the future peak flow at Year 20 of the proposed project. Compare this future peak flow to both the current peak flow and the current capacity. If flow increases/decreases will occur, provide the percentage increase/decrease. Describe the rationale for the future flows. If flows will increase, discuss the methodology used to determine projected flow. Include any calculations in an appendix of the ER/EID. If flows increase greater than ten percent, then, the Collection System Expansion workbook must be used to determine future flows both in the project sewershed and downstream of the project sewershed.

Note that projects with flow increases that will require expansion of a collection system capacity are not permissible under this section. If this is the case, Section 4 must be used.

### **Minor ERs/EIDs**

- Complete Table 3.1.1 in Appendix I and include this table in the body of the ER/EID.
- Provide all supporting documentation, including calculations, in an appendix to the ER/EID. List the appendix reference in the table.

## 6.5 Purpose and Need

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

## 6.6 Alternatives Analysis

### ***6.6.1 Alternatives Description***

The first part of the alternatives analysis 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 considered, and provides the groundwork related to the present worth analysis (see Section 2.2.4). For collection system rehabilitation and replacement projects, the following must be considered:

- No-Action Alternative

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<sup>2</sup> Note that there may be cases where an LGU has gravity lines less than eight inches diameter that must be replaced by 8-inch gravity sewer to meet State standards. If this is the case, then such projects are permissible under this section.

- Rehabilitation
- Replacement
- Combination of Rehabilitation and Replacement
- Preferred Alternative

**Requirements**

The details of what is needed for the description of the alternatives will be discussed in Sections 6.6.1.1 through 6.6.1.5 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, as needed, in Appendix I for each alternative. 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 gravity sewers (pipe slope, diameter, design flow, etc.), force mains (design flow, diameter, etc.), pumps (pumping capacity, etc.), and any other equipment in the collection system proposed for replacement or rehabilitation. For each feasible alternative, prepare a capital cost, operation and maintenance, and 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/EID.

#### *6.6.1.1 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.

#### *6.6.1.2 Rehabilitation*

Discuss whether or not rehabilitation is a feasible alternative. Describe the various methods that could be used to rehabilitate the collection system (piping and/or pump stations and force mains). In a figure, show where the rehabilitation for each alternative considered would occur. Each practicable alternative for rehabilitation should be a separate alternative. Provide the rationale as to whether the alternative by itself would be accepted or rejected.

#### *6.6.1.3 Replacement*

In this alternative, describe whether replacement is a feasible alternative. Discuss the various methods that could be used to replace portions of the collection system (piping and/or pump stations and force mains). In a figure, show where the replacement for each alternative considered would occur. Each practicable alternative for replacement should be a separate alternative. Provide the rationale as to whether the alternative by itself would be accepted or rejected.

#### *6.6.1.4 Combination of Rehabilitation and Replacement*

For this alternative, describe the various alternatives which would combine rehabilitation and replacement to meet previously identified needs. For instance, discuss those portions of the collection system which would be amenable to rehabilitation and thus be a more economical alternative to replacement. In other areas, the deterioration of gravity sewers may make rehabilitation unrealistic. Each practicable alternative for some combination of rehabilitation and replacement should be a separate alternative. Provide the rationale as to whether the alternative by itself would be accepted or rejected.

#### *6.6.1.5 Preferred Alternative*

The project selected as the preferred alternative may be different from the above alternatives. If it is not, simply state that one of the above alternatives is the preferred. If it is, then describe the preferred alternative in the same manner as discussed above. Provide the rationale as to why this alternative is the preferred alternative.

### **6.6.2 Present Worth Analysis**

Complete the present worth analysis in accordance with Section 2.2.4.

### **6.6.3 Alternatives Analysis Summary**

Complete the alternatives analysis in accordance with Section 2.2.5.

**6.7 Proposed Project Description**

Prepare the proposed project description in accordance with Section 2.2.6.

**6.8 Environmental Information Document**

Complete the environmental information document in accordance with Section 12.

**6.9 Financial Analysis**

Complete the financial analysis in accordance with Section 2.2.7.

**6.10 Public Participation**

Complete the public participation section in accordance with Section 2.2.9.