

## 4.0 Collection System Expansion

The purpose of this section is to provide guidance on how to prepare an engineering report (ER)/environmental information document (EID) for a project that involves the expansion of collection systems. Some examples of collection system expansions may be:

- Constructing a collection system to serve an area containing failing septic systems.
- Reconstructing a failing collection system with slightly larger-diameter lines to reduce infiltration/inflow problems while accommodating planned growth.<sup>1</sup>
- Extending a collection system to accommodate new growth.
- Constructing a pipeline to remove a point source discharge from service and transfer the flow downstream to a regional wastewater treatment plant (WWTP).

This section applies to projects similar to the above-listed examples. For projects proposing the rehabilitation and/or replacement of collection system equipment, see Section 6.0. The outline of the ER/EID must follow the order presented in this section, and the following subsections describe and discuss what the ER/EID must include.

Some projects may qualify as a Minor ER/EID. (See Section 1.4.1 for the details of when these are allowed.) For Minor ERs/EIDs, complete the tables provided in Appendix G for the requirements in each section. For calculations discussed throughout this section, worksheets provided in the workbook titled Collection System Expansion must be utilized and the information reported in the appropriate tables. This workbook is available in the Toolbox.

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.)

It is strongly recommended that as the ER/EID is prepared, the Consultant and Owner meet with IFS to discuss population and/or flow projections well before proceeding to the next steps, which will help determine the alternatives to be analyzed.

may be included in an appendix<sup>1</sup> 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 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
  - 3.1. Collection System Condition
  - 3.2. Current Population
  - 3.3. Current Wastewater Flow
- 3.0. Future Situation
  - 3.4.1. Population Projections
  - 3.4.2. Flow Projections
  - 3.4.3. Future Situation Downstream of Project
- 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

#### **4.1 Upfront Information**

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

#### **4.2 Executive Summary**

Prepare the Executive Summary in accordance with Section 2.2.2.

#### **4.3 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.

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<sup>1</sup> This collection system expansion example does not apply to pipeline that is expanded to meet the minimum design criteria.

### **4.3.1 Collection System Condition**

This section will determine the potential issues related to the actual condition of the system. The information presented in this section will provide part of the basis for the need and purpose of the project. Review the following sections and complete the requirements as discussed.

#### **4.3.1.1 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 expansion 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>2</sup>
- The project location.

If the project is a connection to take a point source offline and send wastewater to another point source, then show on the figure above both the point source to be removed and the point source to where the wastewater will be send. Additionally, note that the sewershed will be the entire service area of the point source.

In addition to including this figure, if the collection system expansion will occur in a sewershed that is smaller than the entire service area, then 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.

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<sup>2</sup> Applies only if the project is located within a specific sewershed that is smaller than the LGU limits.

**Major ERs/EIDs**

Please include these figures as part of Section 2.1 of the ER/EID. Additionally, text may be provided to provide more explanation regarding the collection system.

**4.3.1.2 General Overflow History**

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 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 G and place it in the body of the ER/EID.
- Include the required map in the ER/EID with the appropriate map reference in Table 2.1.1.
- 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.6.1 in Appendix E shows an example of how this table would be completed.

**Major ERs/EIDs**

Describe any SSOs and special orders as discussed in this section. Show all SSOs on a map and provide SSO reports in an appendix of the ER/EID. Provide full copies of any special orders in an appendix of the ER/EID.

**4.3.1.3 Unsewered Areas**

Points may be claimed on a funding application due to failing septic tanks that may be within an unsewered area. 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).

If the project received priority based on serving failing septic tanks, then the purpose and need of the project must *primarily* be that scope. Additional facilities beyond that scope may not be eligible expenses.

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 failing septic systems were claimed for funding points (e.g., CWSRF funding), 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 G and place in the body of the ER/EID.
- Provide a map that meets the requirements above and place in the ER/EID. Provide the appropriate reference in Table 2.1.2.
- Place any failing septic system letters in an appendix of the ER/EID.

Table E.6.2 in Appendix E shows how this table would be completed.

**Major ERs/EIDs**

Include information related to unsewered areas and failing septic systems as discussed above. A map showing the unsewered areas must be provided. If failing septic systems are present, then the map must show the location of these failing septic systems and any pertinent letters from the county health department.

**4.3.2 WWTP Condition**

Though peripheral to collection system expansions, the general condition of the WWTP to which the wastewater flows is important to ascertain because it helps determine if the WWTP is capable of handling expanded flow or if its current condition will prevent that.

**Requirements**

Describe the condition of the WWTP that will accept the flow from the sewershed where the project occurs. This description should be a general description of (1) the basic process; (2) whether the WWTP is in good working order, and (3) the trend in flows.

Provide the average daily flow in million gallons per day (MGD) for the past four years and its current flow. DMRs must be provided in an appendix of the ER/EID.

Last, include in this discussion any Notices of Violation (NOV) that the WWTP might have incurred over the past five years. Additionally, if there are any special orders such as a SOC, discuss the pertinent information as to why the special order was put into place, the final completion deadline, and any intermediate deadlines.

**Minor ERs/EIDs**

- For the current condition of the WWTP, complete Table 2.1.3 in Appendix G and include in the body of the ER/EID.
- If NOVs or special orders are listed, provide full copies of these NOVs or special orders in an appendix of the ER/EID. Reference the appendix in the table.
- Include DMR records for the past four years in an appendix of the ER/EID. Reference the appendix in the table.

Table E.6.3 in Appendix E shows how this table would be completed.

**Major ERs/EIDs**

Describe the WWTP condition as discussed in this section. Include DMRs in an appendix of the ER/EID as well as any NOVs or special orders that the WWTP might have incurred.

### **4.3.3 Current Population**

Current population provides the basis for future population and may supply part or all of the need for the project. The report may employ different methodologies to determine current population. Utilize Section 4.3.3.1 for situations where the project is occurring in a very small, concentrated area where no future population growth is anticipated. For example, if a sewer line were being extended to serve a subdivision of 100 homes that have failing septic systems, then this section would be utilized. This section would not be appropriate to use for a service area that is partially developed and anticipated to grow. For those types of collection system expansion projects that contain large service areas or are expected to grow, utilize Section 4.3.3.2.

#### **4.3.3.1 Method 1 – Limited Service Areas**

This method would be used for new sewers that will serve existing development (e.g. failing septic tanks) because it may be more appropriate to assess current population by looking at current residences rather than broader approaches. This methodology must be used for small, collector-type sewer lines (less than 200 connections). Based on best professional judgment, it may be used for smaller lines that serve between 201 and 500 connections but may not be used for lines that serve greater than 501 or greater connections. Follow Steps 1 through 3 to obtain the inputs for Table 1 Current Population Method 1.

#### **Requirements**

##### **1. Determine the total number of dwelling units in the LGU.**

Provide the number of dwelling units by number of bedrooms for the LGU using U.S. Census data by linking to the [Fact Finder](#) on the U.S. Census Bureau’s site. Find the data by using “Bedrooms” for the search topic and selecting the appropriate LGU in the “state, county, or place” box. Select table B25041 from the search results. Add zero- or one-bedroom dwellings with the number of two-bedroom dwellings in the table. Use five-year estimates only for 2010.

##### **2. Provide the total population for the LGU.**

Provide the total population for the applicable LGU for 2010 using U.S. Census [North Carolina QuickFacts](#) page as a starting point.<sup>3</sup>

##### **3. Provide the number of dwelling units in the service area.**

Use the most recent LGU billing records or other appropriate method such as aerial photography, Geographic Information System (GIS) data, and windshield surveys to estimate the number of dwelling units in the project’s service area.

From the inputs determined per the above instructions, calculate the the persons per dwelling unit in the LGU.

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<sup>3</sup> Use 2010 population estimates only.

**Minor ERs/EIDs**

- Use Table 2.2.1 (Method 1) of the Collection System Expansion workbook found in the Toolbox. Print the table and place in the body of the ER/EID
- Printouts of U.S. Census information must be placed in an appendix of the ER/EID with an appropriate reference in the table. Reference the appropriate appendix in the table.

Table E.6.4 in Appendix E shows an example of how this table would be completed.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All supporting information, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

4.3.3.2 *Method 2 – Large Service Area*

This method would be used for collection system expansion projects that serve a larger service area (501 or greater connections). Additionally, based on best professional judgment, it may be used for service areas with between 201 and 500 service connections. For example, if a large interceptor were being replaced and expanded, then this method would be utilized to determine current population. Additionally, if a portion of the service area were undeveloped, then this method would be utilized to determine current population as a basis for future population numbers. For larger, interceptor type sewers, use the steps below to determine current population.

**1. Provide the total population for the LGU.**

Provide the total population for the LGU for 2010 using [U.S. Census data](#). 2010 estimates only should be used.

**2. Provide the population density per square mile.**

Provide the number of persons per square mile based on [U.S. Census](#) data. Select the LGU in the search box and locate the “Geography Quick Facts” at the bottom to find the number of persons per square mile.

From the inputs determined per the above instructions, the persons per dwelling unit in the LGU, current population in the service area and current population in the service area will be calculated in Table 1.

### 3. Provide the size of the LGU.

Using the U.S. Census website, find the size of the LGU, which is located under “Geography Quick Facts” at the bottom of the webpage.

### 4. Provide the size of the WWTP and sewershed service areas.

Using GIS or other appropriate mapping method, estimate the square mileage of the WWTP service area and the sewershed service area within the WWTP service area for the project. If the sewershed service area is not different than the WWTP service area, then the size of the WWTP service area that is within the sewershed service area is 100 percent. Note that service area size may differ from the size of the LGU.

WWTP Service Area – The area of the LGU served by the WWTP.

Sewershed Service Area – The area of the WWTP service area that contains the project. Note that for major sewer interceptors, this may be the entire WWTP service area.

#### **Minor ERs/EIDs**

- If using Method 2, complete Table 2.2.1 (Method 2) in the Collection System Expansion workbook found in the Toolbox. Print this table and place it in the body of the ER/EID.
- Provide supporting information from the U.S. Census website in an appendix of the ER/EID. Reference the appropriate appendix in the table.

Table E.6.6 in Appendix E shows how this table would be completed.

#### **Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

#### **4.3.4 Current Wastewater Flow**

Part of describing the current condition of the collection system to be expanded is characterizing the flow both in the sewershed and downstream of the sewershed. Two methods may be used to determine current wastewater flow. Flow may be determined via metering or via estimation. This section of the guidance describes the methodologies used in either scenario.

#### 4.3.4.1 *Metered Wastewater Flow*

In certain, limited situations, determining current wastewater flow may be done by utilizing a flow meter.

##### **Requirements**

##### **1. Determine sewershed flow.**

Utilize a flow meter to determine the average daily flow from the sewershed.

##### **2. Determine WWTP flow.**

Also, determine the average daily of the WWTP. This information should have already been determined in Table 2.1.3 (see Section 4.3.2). Include DMRs in an appendix of the ER/EID to verify the flow.

##### **3. Calculate percent of flow from sewershed.**

Using the information gathered from the first two steps, calculate the percentage of flow to the WWTP that comes from the sewershed where the project will occur.

##### **4. Estimated residential and commercial flow.**

Provide estimates in percentage of the amount of flow in the sewershed where the project will occur that is related to residential and commercial users. For example, a flow from a sewershed may be 80 percent residential and 20 percent commercial. In an appendix, provide billing records as supporting information to these estimates.

##### **Minor ERs/EIDs**

- Complete Table 2.3.1 in the Collection System Expansion workbook found in the Toolbox. Chose Metered from the pulldown menu and enter data in the appropriate cells. Print this table and place it in the body of the ER/EID.
- Provide supporting information in an appendix of the ER/EID and list the reference in the table.
- On the figure discussed in Section 4.3.1.1, show the location of the meter.

Table E.6.6 shows how this table would be completed for current flows using metered flow.

##### **Major ERs/EID**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

#### 4.3.4.2 *Current Wastewater Flow Via Pump Run Times*

In certain situations, such as if a pump is at the bottom of the sewershed and pumps wastewater from the entire sewershed where the project will occur, it is possible to determine current wastewater flow via pump run times.

##### **Requirements**

##### **1. Complete a pump drawdown test.**

Completed the pump drawdown test to determine the rate at which the pumps within the pump station pump.

##### **2. Determine pump runtimes.**

Record pump runtimes using SCADA or other methodologies. If using SCADA, provide the documentation of runtimes in an appendix of the ER/EID. If using other methodologies, in an appendix of the ER/EID, describe the methodology used and the calculations to reach the pump runtime conclusion.

##### **3. Calculate current flow as peak flow.**

Using the information gathered in the first two steps, calculate the flow in gallons per minute and multiply by a peaking factor. As a default, use a peaking factor of 2.5. Provide a justification for the peaking factor used.

##### **Minor ERs/EIDs**

- Complete Table 2.3.1 in the Collection System Expansion Workbook found in the Toolbox. Select Pump Runtime from the pulldown menu and enter data in the appropriate cells. Print this table and place it in the body of the ER/EID.
- Provide supporting information in an appendix of the ER/EID and list the reference on the table.

Table E.6.7 shows an example of how this table would be completed for current flow using pump runtimes.

##### **Major ERs/EID**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

#### 4.3.4.3 *Current Wastewater Flow Estimation for Limited Service Areas (Method 1)*

In some situations, the flow may be estimated by utilizing information known about the number of dwelling units and the population within the service area. Use this method for limited service areas only. Note that this methodology is a continuation of current population for limited service areas (see Section 4.3.3.1).

##### **Requirements**

##### **1. Calculate the number of bedrooms within the Census place or county.**

Using the information collected from U.S. Census data as described in Section 4.3.3.1, calculate the total number of bedrooms per dwelling unit within the Census place or county. Then calculate the number of bedrooms per dwelling unit within the Census place or county.

##### **2. Calculate flow per dwelling unit.**

Multiply the bedroom per dwelling unit result by 120, which is the flow per bedroom in gallons per day per bedroom, as listed in the regulations ([15A NCAC 02T .0114](#)), to determine the flow per dwelling unit.

##### **3. Calculate the estimated peak flow in the service area.**

Multiply the flow per dwelling unit by the number of dwelling units in the service area and the peaking factor to determine the estimated current flow in the service area. As a default, use a peaking factor of 2.5. Provide a justification for the peaking factor used in this calculation.

##### **Minor ERs/EIDs**

- Complete Table 2.3.1 found in the Collection System Expansion workbook in the Toolbox. Use the pulldown menu to select Method 1 – Limited Service Area. The worksheet will calculate the estimated flow. Print this table and include it in the body of the ER/EID.
- Provide all supporting information in an appendix of the ER/EID and supply the appropriate reference in the table.

Table E.6.8 in Appendix E shows how to complete this table using Method – Limited Service Area.

##### **Major ERs/EID**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

#### 4.3.4.4 *Current Wastewater Flow Estimation for Large Service Areas (Method 2)*

In many cases, a collection system expansion project may serve a large service area where it may be impossible to determine flow via one of the methods above. If that is the case, utilize this methodology to estimate current flows. This method would be used in conjunction with the current population estimation as discussed in Section 4.3.3.2.

##### **Requirements**

##### **1. Calculate residential and commercial flow in the sewershed.**

Determine residential flow in the sewershed by determining water usage based on water billing records from residential connections *within the sewershed* and calculating a 10 percent consumptive loss. Then, determine water usage based on water billing records from commercial connections *within the sewershed* and calculate a 10 percent consumptive loss. If water billing records are ambiguous in showing the amount of water used in the calculations for current flow estimations, then provide the calculations in an appendix of the ER/EID.

Include copies of water billing records in an appendix of the ER/EID. Highlight the data used for current flow estimation. If the documentation is too large for hard copies, a CD containing the data may be submitted instead.

##### **2. Calculate industrial flow.**

Determine industrial flow *from within the sewershed* based on dual metering. Dual metering for industries is required because sometimes, industries may obtain their water supply from other sources than an LGU. Include hard copies of industrial flow metering in an appendix of the ER/EID.

Dual Metering – Metering at an industry that monitors both water coming in and wastewater going out.

##### **3. Include flow commitments.**

Part of the current wastewater flow for a sewershed includes residential, commercial, and industrial flows that have been officially committed. For example, within a sewershed, a developer may be planning a 1,200-unit residential development that also has 12 commercial parcels.

Because flow commitments are counted as current flow, they may not be included in future flow projections.

This flow would be considered to be committed if the developer has sent documentation to the LGU that has been approved by the LGU confirming the number of residential and commercial units and when the development will be constructed.

Include these flows as part of the current flow calculation *only if these committed flows are within the sewershed where the project will occur*. Include correspondence that shows the commitments for each individual development in an appendix of the ER/EID.

#### 4. Calculate Inflow/Infiltration

In many instances, a collection system may be experiencing inflow/infiltration (I/I) issues that must be accounted for in current flow estimations. Inflow/infiltration may be estimated using either WWTP flow information only or both WWTP and water usage records. Equation 4.1 shows the I/I estimation using WWTP information only, and Equation 4.2 shows I/I estimation using both WWTP and water usage records. If the sewershed where the project will occur is a percentage of the WWTP's overall sewershed, then multiply the percentage of land area covered by the sewershed by the overall I/I estimate.

$$I/I = Q_{WWTP-ADF} - Q_{WWTP-MinADF}$$

- I/I= Infiltration/Inflow
- $Q_{WWTP-ADF}$ = Average of the average monthly flow over the most recent four-year period of record at the WWTP
- $Q_{WWTP-MinADF}$ = Average of the minimum monthly flows over the most recent four years of record at the WWTP

**Equation 4.1. Inflow/Infiltration Estimation Using WWTP Information Only**

$$I/I = Q_{WWTP-ADF} - (WU_{Total} - CL)$$

- I/I= Inflow/Infiltration
- $Q_{WWTP-ADF}$ = Average of the average monthly flows over the most recent four-year period of record at the WWTP
- $WU_{Total}$ = Average water use for residential, commercial, and industrial users over the same recent four-year period used for the WWTP.
- CL= Consumptive loss of 10 percent

**Equation 4.2. Inflow/Infiltration Estimation Using WWTP and Water Usage Records**

#### 3. Calculate current peak flow.

Add the calculations from Steps 1 through 4 together to determine total current flow to the WWTP to be constructed, expanded, and/or modified as shown in Equation 4.3.

**Minor ERs/EIDs**

- Use Table 2.3.1 in the Collection System Expansion workbook found in the Toolbox. Use the pulldown menu to select Method 2 – Large Service Area. Print this table and place it in the body of the ER/EID.
- Provide supporting information in an appendix of the ER/EID and supply the appropriate reference in the table.
- Provide any letters related to flow commitments in an appendix of the ER/EID.

Table E.6.9 in Appendix E shows an example of how this table would be completed using Method 2 – Large Service Area.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

$$ADF_{Current} = [(ADF(Water)_{Residential} - (ADF(Water)_{Residential} \times 10\%)] + [ADF(Water)_{Commercial} - (ADF(Water)_{Commercial} \times 10\%)] + ADF_{Industrial} + FC + I/I) \times \%LGU_{WWTP-SA} \times \%WWTPSA_{SS-SA}] \times PF$$

- ADF<sub>Current</sub>= Current average daily wastewater flow at WWTP
- ADF(Water)<sub>Residential</sub>= Current average daily water flow for residential customers.
- ADF(Water)<sub>Commercial</sub>= Current average daily water flow for commercial customers
- ADF Industrial= Average daily industrial flow with dual metering
- FC= Flow commitments
- I/I= Inflow/Infiltration
- %LGU<sub>WWTP-SA</sub>= Percent of the LGU within the WWTP service area
- %WWTPSA<sub>SS-SA</sub>= Percent of the WWTP service area within the sewershed service area
- PF= Peaking Factor, default is 2.5

**Equation 4.3. Current Flow Estimate Calculation**

## **4.4 Future Situation**

After characterizing the current situation in terms of collection system and WWTP condition, current population, and current flows; determine the future situation. This is important because the future situation will help establish the need for the project and will help size the collection system accurately. This section discusses what the Infrastructure Finance Section (IFS) needs to review in terms of population projections and flow projections.

### **4.4.1 Population Projections**

The life of most projects is expected to be 20 years which is also the terms of loans made by IFS. Follow the steps below to determine population projections. If the service area spans multiple counties, complete the table for each county and summarize the tables in an overall table.

#### **Requirements**

##### **1. Provide the Current LGU population and service area population.**

Use the current LGU population and service area population as determined by either Method 1 or Method 2. If using the Future Population table provided in the Collection System Expansion workbook found in the Toolbox, then use the pulldown menu to select Method 1 or Method 2. The correct data will appear in the cell.

##### **2. Determine the 2010 county population.**

For Year 1 (year 2010), use [U.S. Census QuickFacts](#) page and select the county for the total county population. Use only 2010 estimates.

##### **3. Calculate percentage of population.**

The population projections will be based on two parameters, the percentage of the county population that is located in the LGU and the percentage of the LGU that is located in the service area.<sup>4</sup> To provide the basis for this calculation, divide the 2010 LGU population by the 2010 county population. Then divide the service area estimated population by the 2010 LGU population.

##### **4. Determine population estimates using State Data Center (SDC) data.**

Determine the year in which construction of the project begin. This is the implementation year. Then, using information from the [State Data Center](#), determine the population projections for the next 20 years. Select “Annual County Populations”. If using the Collection System Expansion workbook found in the Toolbox, enter this information into the Future Population worksheet. There may be cases where the SDC data might not extend the full 20 years. If this is the case,

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<sup>4</sup> Note that the service area considered for Method 1 – Limited Service area should be the percent of the service area in the LGU while the service area for Method 2 – Large Service area will be the % LGU in the WWTP service area multiplied by the % WWTP service area in the sewershed service area.

then determine the difference between the last two years of the estimate. Then add that difference for each needed year.

## **5. Calculate the future LGU and service area populations.**

Use the percentage of LGU in the county and the percentage of the LGU in the service area to determine future service area population. If using the Collection System workbook found in the Toolbox, this information will be automatically calculated.

If the service area spans multiple counties, then complete separate tables for each county. Complete a summary table showing the projected population for each county and sum the total future population for the counties and LGU(s) involved. Most importantly, show the total future service area population.

### **Special Situation**

In some instances, a LGU may want to install a major interceptor that is sized for flows beyond 20 years. For example, a growing LGU may want to install an interceptor sized for flows beyond the 20 years required by this guidance to avoid having to dig up good pipe to install a larger line. In this situation, the population projections may be extended up to 50 years. Justify why this population projection is warranted.

Since population projections usually are not beyond 20 years, to determine population projection up to 50 years, take the difference between the population projections for Year 19 and Year 20. Add that to Year 20 to attain Year 21. Then add that constant to Year 21 to attain Year 22 and so forth. If using the Future Population worksheet in the Collection System Expansion workbook, extend the spreadsheet to Year 50 and provide the justification in a footnote to the table.

## **6. Provide alternative population projections from other sources (if proposed).**

### **Requirements**

Other sources of data such as municipal population estimates, comprehensive plans, or projections based on connections may be used to determine future population so long as the same window used for the SDC populations above is used. To calculate the service area number, multiply the LGU future population by the percentage of the service area in the LGU.<sup>5</sup> If multiple data sources are used, show the results of each source in the table as discussed below and provide supporting information in the appendices of the ER/EID. Additionally, justify the use of this data as an additional data set to be used along with the SDC data. If no alternate population data set is proposed in lieu of the SDC, then skip this step and move to Section 4.4.2.

It is strongly recommended that as the ER/EID is prepared, the Consultant and Owner meet with IFS to discuss population projections before proceeding to the next steps, which will help determine the alternatives to be analyzed.

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<sup>5</sup> See Footnote 4.

**Minor ERs/EIDs**

- Use Table 3.4.1 in the Collection System workbook found in the Toolbox. Select the appropriate current population methodology from the pulldown menu and enter the required information. Print this page and place it in the body of the ER/EID.
- Provide supporting information verifying the population projections for other population methodologies used.

Table E.6.10 in Appendix E shows how this table would be completed for Method 1 – Limited Service Area, and Table E.6.11 shows how this table would be completed for Method 2 – Large Service Area.

**Major ERs/EIDs**

It is recommended to utilize the spreadsheets found in the Wastewater Treatment workbook; however, it is understood that alternative methodologies may be used to calculate population projections. If this is the case, then the methodology used must be described and the results shown in the body of the ER/EID. Include all assumptions and calculations in an appendix of the ER/EID.

**4.4.2 Flow Projections**

Determining future peak flow is critical to ensuring that the proposed project is properly sized to accommodate future flows. Since population projections determine flows, ensure that the appropriate population projection was utilized as discussed in Section 4.4.1. The following sections describe how to determine flows based on the four current flow determinations that were used (see Section 4.3.4).

**4.4.2.1 Metered Flow**

**Requirements**

If using metered flow as discussed in Section 4.3.4.1, use the residential and commercial percentage splits. For current residential flow, multiply the metered flow by the residential percentage. For commercial flow, multiply the commercial flow by the commercial percentage. Use Equation 4.4 to calculate the projected flows using metered flow. If an alternative population and flow projection was utilized as the population and flows used in the alternatives analysis, provide a justification as to why this was used over the flow projection developed based on the methodologies described in this guidance.

**Special Situation**

In some instances, a LGU may want to install a major interceptor that is sized for flows beyond 20 years. For example, a growing LGU may want to install an interceptor sized for flows beyond the 20 years required by this guidance to avoid having to dig up good pipe to install a larger line. In this situation, the flow projections may be extended up to 50 years. Justify why this flow projection is warranted. Calculated flows up to Year 50 by utilizing the formulas and/or alternative methodologies extended out to Year 50. If using the Collection System Expansion worksheet, extend the spreadsheet to Year 50 and copy down the appropriate formulas.

$$Q_i = \left( \left[ \left( \frac{Q_{Cur} \times \%Q_{Res}}{Pop_{Cur}} \right) (Pop_i - Pop_{Cur}) \right] + \left[ \left( \frac{Q_{Cur} \times \%Q_{Com}}{Pop_{Cur}} \right) (Pop_i - Pop_{Cur}) \right] + IR \left[ Q_{Cur} + \left( \frac{Q_{Cur} \times \%Q_{Res}}{Pop_{Cur}} \right) (Pop_i - Pop_{Cur}) + \left( \frac{Q_{Cur} \times \%Q_{Com}}{Pop_{Cur}} \right) (Pop_i - Pop_{Cur}) \right] \right) \times PF$$

- Qi= Flow at Year I
- Q<sub>IY</sub>= Flow for the Implementation Year
- Pop<sub>i</sub>= Population at Year i
- %Q<sub>Res</sub>= Percent of flow that is residential
- Pop<sub>Cur</sub>= Population for the Current Year
- %Q<sub>Com</sub>= Percent of flow that is commercial
- IR= Industrial Reserve (10%)
- PF= Peaking Factor, default is 2.5

**Equation 4.4. Calculation of Projected Flows using Metered Current Flow**

**Minor ERs/EIDs**

- Use Table 3.4.2 in the Collection System Expansion workbook found in the Toolbox. Use the pull-down menu to select the method used for current flow estimation. The table will calculate the flow projections. Print the table and place it in the body of the ER/EID.
- Provide any supporting information related to alternative flow methodologies in an appendix of the ER/EID and list the appendix reference on the table.

Table E.6.12 shows how this table would be completed for any method used.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

4.4.2.2 *Pump Station Runtime*

**Requirements**

For this type of flow estimation, the current estimated flow will be based on pump station runtimes. The projected flow will then be calculated by using Equation 4.5 to determine future flows. If an alternative population and flow projection was utilized as the population and flows used in the alternatives analysis, provide a justification as to why this was used over the flow projection developed based on the methodologies described in this guidance.

$$Q_{Design} = (Q_{Current} + Q_{Res}(Pop_{Year} - Pop_{Cur}) + Q_{Com}(Pop_{Year} - Pop_{Cur}) + Q_{IR}[Q_{Current} + (Q_{Res}[Pop_{Year} - Pop_{Cur}] + (Q_{Com}[Pop_{Year} - Pop_{Cur}]))] \times PF$$

- Q<sub>Design</sub>= Design Flow for Implementation Year plus 20 years
- Q<sub>Current</sub>= Current average daily flow for WWTP (Section 3.3.3)
- Q<sub>Res</sub>= Design Residential flow (70 gpd/capita)
- Q<sub>Com</sub>= Design Commercial Flow (15 gpd/capita)
- Q<sub>IR</sub>= Industrial Reserve (10%)
- Pop<sub>Year</sub>= Population for year of projected flow
- Pop<sub>Cur</sub>= Population for current year
- PF= Peaking Factor, default is 2.5

**Equation 4.5. Flow Projection Calculation**

**Minor ERs/EIDs**

- Use Table 3.4.2 of the Collection System Expansion workbook found in the Toolbox. Select the current flow estimation method used. The spreadsheet will then compute future flows. Print this table and place it in the body of the ER/EID.
- If alternative methodologies were used and selected as the preferred future flow, provide supporting information in an appendix of the ER/EID. List the appendix where this information may be found in the table.

Table E.6.13 in Appendix E shows how this table would be completed.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

**4.4.2.3 Method 1 – Limited Service Area**

For current flows estimated via this methodology, it is important to note that this methodology is to be used for smaller subdivisions where it may be assumed that the area is built out and will not increase in population (e.g., flow). Therefore, future flows are estimated to be zero, and all future flows will be the current flow. If an alternative population and flow projection was utilized as the population and flows used in the alternatives analysis, provide a justification as to why this was used over the flow projection developed based on the methodologies described in this guidance.

**Minor ERs/EIDs**

- Complete Table 3.4.2 in the Collection System Expansion workbook found in the Toolbox. Select Method 1 – Limited Service Area. The spreadsheet will complete the calculation. Print this table and place it in the body of the ER/EID.
- Provide any supporting information related to alternative flow projections in an appendix of the ER/EID and list the appropriate reference in the table.

Table E.6.14 in Appendix E shows an example of how this table would be completed.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

**4.4.2.4 Method 2 – Large Service Area**

For this type of flow projection, current flows are based on the methodology used to estimate flows across large service areas. Utilize Equation 4.5 to calculate future flows. If an alternative population and flow projection was utilized as the population and flows used in the alternatives analysis, provide a justification as to why this was used over the flow projection developed based on the methodologies described in this guidance.

**Minor ERs/EIDs**

- Complete Table 4.1.1 in the Collection System Expansion workbook found in the Toolbox. Select Method 2 – Large Service Area. The spreadsheet will complete the calculation. Print this table and include it in the body of the ER/EID.
- Provide any supporting information related to alternative flow projections in an appendix and list the appropriate reference in the table.

Table E.6.15 shows how this table would be completed for this methodology.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

**4.4.3 Interceptors of Multiple Diameters**

Some interceptors that may be installed as the proposed project may have multiple diameters as they move from upstream to downstream. For example, if a major interceptor is being replaced that receives flow from the majority of a LGU's service area, then, the further downstream the interceptor, the larger the diameter needed. Figure 4.1 shows a conceptual diagram of this situation. Using the following steps, determine the flows coming into the pipe to compare to the designed capacity.

*Note: This table does not need to be completed if the pipe being installed is of one diameter.*

**1. Determine sub-sewersheds.**

Create a figure that shows the proposed project. The figure should have each of the differing pipe diameters shown as a separate component. Using these differing diameters, delineate sub-sewersheds. Note that one of the sub-sewersheds must show the flow entering the interceptor at the very top of the interceptor (e.g., Subsewershed A in Figure 4.1). The figure should include the basemapping discussed in Section 2.1.5 for the project location figure. Then, determine the percentage of the sewershed that is in each sub-sewershed.

**1. Determine the pipe capacity for each diameter.**

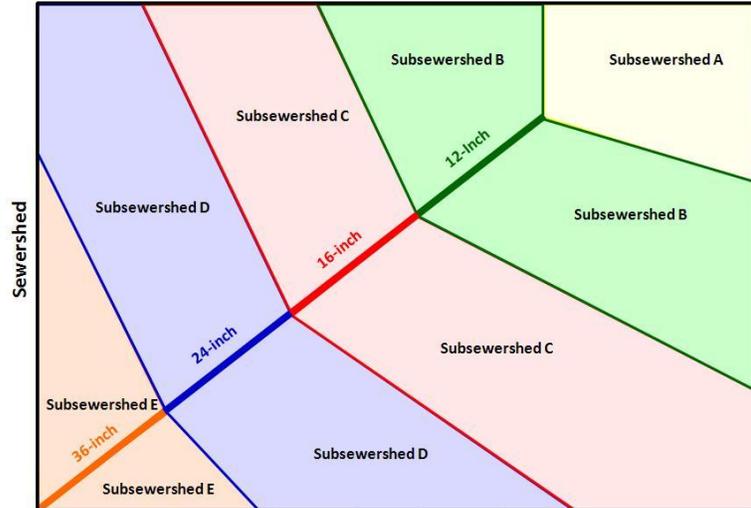
Calculate the capacity for each diameter of pipe that receives flow from each sub-sewershed. Provide calculations in an appendix of the ER/EID. List out both diameter of the pipe and the capacity.

**2. Determine the percentage of sewershed in the sub-sewershed.**

Using GIS or other methodology, delineate the sub-sewersheds to determine the percentage of the sewershed area within the sub-sewershed. Do this for each sub-sewershed.

**3. Determine future flow for each sub-sewershed.**

Using the preferred projected flow (based on SDC population projections or other population projections), calculate the future flow at the current flow and Year 1, Year 5, Year 10, Year 15, and Year 20 for each sub-sewershed by multiplying the future flow for the entire sewershed for each year by the percentage of the sewershed that is in the sub-sewershed. Be sure, when calculating future flow for downstream sub-sewersheds, to include the flow from the immediate up-stream sub-sewershed. For example, when calculating flow in Sub-sewershed B, flow should be the flow coming into Sub-sewershed B plus the flow from Sub-sewershed A. Then the flow in Sub-sewershed C should be the flow coming into Sub-sewershed C plus the flow from Sub-sewershed B.



**Figure 4.1. Conceptual Diagram of Multiple-Diameter Interceptors**

**4. Determine whether capacity is sufficient.**

Compare the flow at the years stated above for each sub-sewershed to the capacity of the pipe for each sub-sewershed. If the flow is greater than the capacity, then discuss what will be done to ensure that the pipe has sufficient capacity.

**Minor ERs/EIDs**

- Complete Table 3.4.3 in the Collection System Expansion workbook found in the Toolbox. Be sure to select the population projection and flow projection methodologies used. Print this table and include it in the body of the ER/EID.
- Provide a copy of the sub-sewershed figure in the ER/EID.
- Provide calculations for the pipe diameter capacity in an appendix of the ER/EID. List the appendix reference on the table.

Table E.6.17 in Appendix E provides an example of how this table would be completed.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

**4.4.4 Future Situation Downstream of Project**

Not only is it important to understand the flows that come from the proposed project, but it is also important to consider the flows that are downstream of the proposed project to ensure that the capacity exists to take on the additional project flows. This includes both flows tributary flows into the downstream interceptor and flows to the WWTP. This section discusses the methodology used to determine if the infrastructure downstream of the project will have the capacity to take on additional flows.

**Requirements**

**1. Describe the components that are downstream of the project.**

Create a figure that shows the entire sewershed for the WWTP. On the figure, show the location of the proposed project, the sewershed in which the proposed project resides, the downstream pipe leading to the WWTP, and the location of the WWTP. Delineate and label any sewersheds that are tributary to the downstream pipe. The basemapping should be similar to what is utilized for the project location figure (see Section 2.1.5).

**2. Determine peak flow from the project sewershed.**

Utilizing information collected during the current and projected flow analyses, list this information for the current year, Year 1, Year 5, Year 10, Year 15, and Year 20 of the project.

**3. Determine peak flow from tributary sewersheds.**

It is critical that the pipe downstream from the project sewershed be able to accommodate not only flows from the project sewershed but flows from sewersheds tributary to the pipe. List out each of the sewershed, ensuring that the name of the sewershed corresponds to that shown on the figure. Then enter the current flow and the flows for the years listed in the previous step. Total these tributary flows. Last, add these tributary flows to the flow from the project sewershed.

If using the Downstream Flow worksheet in the Collection System Expansion workbook, fill in "0" if there will be no development in a certain year. For example, a sewershed might not have additional flow until Year 5. If that is the case, then the Current Year and Year 1 cells should have a "0" entered, and then Year 5 on should contain the amount of flow within that particular sewershed.

**4. Calculate the capacity of the downstream pipe.**

Calculate the downstream pipe capacity, and compare the capacity to the projected flows from the years mentioned above. If the projected flows are greater than the pipe's capacity, then

discuss plans that the LGU will implement to ensure that capacity will be available (e.g., expansion of downstream pipe in the near future, implementation of an aggressive I/I remediation plan).

Include in an appendix the calculations used to determine the downstream pipe's capacity and any supporting calculations. Additionally, provide documentation regarding the projected flows in the sewersheds tributary to the downstream pipe. For example, comprehensive plans may show development patterns of these areas. Likewise, specific developments such as residential developments or shopping centers may occur in these sewersheds. Information about these proposed developments would be placed in an appendix of the ER/EID.

### **5. Determine future capacity of the WWTP.**

Determine the percentage of the WWTP's total service area that is served by the downstream pipe's service area and the project. This may be the case if a WWTP has two influent pump stations. If the downstream pipe's service area is the only service area of the WWTP, then enter 100 percent.

Estimate the total WWTP average daily flow by dividing the total flow in the downstream pipe without the proposed project's flow as calculated above by the percentage of the service area that is in the downstream pipe's sewershed. Then estimate the total WWTP flow with the proposed project by utilizing the same calculation. Divide these flows by the capacity of the WWTP to determine the percentage of capacity utilized both with tributary flow only and then with both tributary flow and project flow considered.

If any of these results is 80 percent or greater, then discuss any intent the LGU has to begin planning for a WWTP expansion to accommodate these additional flows. Note that plans may be an aggressive I/I reduction program to gain capacity lost due to I/I. If any of these results is 90 percent or greater, discuss when the LGU plans to expand the WWTP to accommodate these additional flows.

#### **Minor ERs/EIDs**

- Complete 4.4.3 in the Collection System Expansion workbook found in the Toolbox. Print this table and include it in the body of the ER/EID.
- Include downstream pipe capacity calculations in an appendix of the ER/EID and provide the appropriate appendix reference in the table.
- Include supporting information regarding tributary flow estimates in an appendix of the ER/EID and provide the appropriate appendix reference in the table.

Table E.6.17 in Appendix E shows an example of how this table would be completed.

**Major ERs/EIDs**

Alternative methodologies may be used. If an alternative methodology is used, then it must be explained in the body of ER/EID, and the results must be presented. All backup data, methodologies used, assumptions made, and calculations must be provided in an appendix of the ER/EID.

**4.5 Purpose and Need**

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

**4.6 Alternatives Analysis**

**4.6.1 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 collection system expansions, the following must be considered:

- No-Action Alternative.
- Optimum Operation of Existing Facilities (Pump Stations only)
- Route Alignment and Pipe Material Alternatives.
- Pump Configuration (Pump Stations only).
- Preferred Alternative.

**Requirements**

The details of what is needed for the description of the alternatives will be discussed in Sections 4.6.1.1 through 4.6.1.6 below.

**Minor ERs/EIDs**

- Each of the alternatives discussed in the sections below must be included by using Tables 6.1.1 through 6.1.7, in Appendix G, as needed, for each alternative.
- Each alternative description must include the following:
  - A description of each alternative as discussed in Sections 4.6.1.1 through 4.6.1.5. Where appropriate, include figures and maps and provide the appropriate figure reference in the table.
  - For feasible alternatives, include preliminary design criteria, pipe diameter, pipe length, etc.
  - 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. Reference the appendix in the tables.

**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.

*4.6.1.1 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.

*4.6.1.2 Optimum Operation of Existing Facilities(Pump Stations only)*

In this description, discuss how pumps within the sewershed could be optimized to provide better performance without additional maintenance beyond normal maintenance. In the rationale, describe why this alternative was accepted or rejected as a stand-alone alternative, including its feasibility.

#### **4.6.1.3**      *Pipe Materials, and Alignment Alternatives (Collection Lines only)*

Consider at least two types of pipe materials that could be utilized in the expansion of the collection system. It is at the discretion of the LGU and their consultant to include more pipe materials. Examine how using different pipe materials could impact the project in terms of cost, environmental safety, and life expectancy. Discuss the material(s) under consideration as well as the pros and cons of each material. Alternatives for material may be bid as alternatives. If one type of material was completely eliminated from consideration, provide the rationale for rejection. Otherwise, provide the rationale as to why a certain material was used.

Consider at least two route alignments that could be utilized to implement the project. It is at the discretion of the LGU and their consultant to include additional alignments. Consider various route alignments to reduce both cost and environmental impact. In this section, discuss each routing alignment. Show each alignment on a figure that includes major roadways and waterbodies. Additionally, discuss whether piping of different materials would be used at different location. Each major combination of alignment and materials must be considered as a separate alternative. If one alignment was completely eliminated from consideration, provide the rationale for rejection. Otherwise, provide the rationale as to why a certain route or alignment was used.

For example, Materials A and B might be considered for a project as well as Routes C and D. Then this alternative analysis would result in four alternatives as follows: (1) Material A and Route C, (2) Material B and Route C, (3) Material A and Route D, and (4) Material B and Route D.

#### **4.6.1.4**      *Pump Configuration (Pump Stations only)*

For pump stations and force mains, consider how the pumps would be configured to obtain the performance needed. Consider such items as pump size, peaking factor, and firm capacity. Ensure that the force main would be properly sized to handle future flows. At least two configurations must be considered. Only the alternatives that are the most practicable need to be discussed and must be considered as separate alternatives. For each, provide the rationale for acceptance or rejection of that alternative alone.

#### **4.6.1.5**      *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.

For example, a collection system may consist of different routes and pump station rotations and be a combination of force mains: Pump Station A and Route A, and Pump Station B and Route B. These two alternatives would be discussed and the Preferred Alternative selected from them.

#### **4.6.2**      *Present Worth Analysis*

Complete the present worth analysis in accordance with Section 2.2.4.

**4.6.3**            *Alternatives Analysis Summary*

Complete the alternatives analysis summary in accordance with Section 2.2.4.

**4.6.4**            *Proposed Project Description*

Complete the proposed project description in accordance with Section 2.2.6.

**4.7**                **Environmental Information Document**

Complete the environmental information document in accordance with Section 12.<sup>6</sup>

**4.8**                **Financial Analysis**

Complete the financial analysis in accordance with Section 2.2.7. For projects where a small service area is added, the number of connections would be the number of connections as described in Section 2.2.7 plus the number of new connections from that small service area.

**4.9**                **Public Participation**

Complete the public participation section in accordance with Section 2.2.9.

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<sup>6</sup> IFS has the right to request additional environmental impact analysis if it is deemed necessary during ER/EID review.