

I. GENERAL. A Preliminary Engineering Report should clearly describe the owner's present situation, analyze alternatives, and propose a specific course of action, from an engineering perspective. The level of effort required to prepare the report and the depth of analysis within the report are proportional to the size and complexity of the proposed project. This guide describes the content of a Preliminary Engineering Report. The layout of the guide is one possible format. Other formats that contain this information are possible and acceptable.

The proposed project needs to be cost-effective, to be technically feasible, to reflect the capabilities and desires of the system's owners, and to be constructed and operated in an environmentally responsible manner. This guide is for the preparation of Preliminary Engineering Reports for wastewater systems financed by any of the following agencies, either alone or in any combination:

Vermont Department of Environmental Conservation
Vermont Community Development Program's Community Development Block Grants
USDA Rural Utilities Service

II. PROJECT PLANNING AREA. Describe the area under consideration. The project planning area may be larger than the service area determined to be economically feasible. The description should include information on the following:

A. Location. Maps, photographs, and sketches. These materials should indicate legal and natural boundaries, major obstacles, elevations, etc.

B. Environmental resources present. Describe the environmental resources in the project planning area. Include maps, photographs, studies and narrative. These materials should provide information on the location and significance of important land resources (farmland, forest land, wetlands and 100/500 year floodplains, including stream crossings), historic sites, endangered species/critical habitats, hazardous waste sites, and other environmental resources that must be considered in project planning. Also include documentation of any preliminary environmental public notices.

C. Growth areas and population trends. Specific areas of concentrated growth should be identified. Population projections for the project planning area and concentrated growth areas should be provided for the project design period (20 years). These projections should be based on historical records with justification from recognized sources.

D. Flows. A preliminary flow analysis appropriate to the nature of the proposed project needs to be provided for both the initial year and the design year. The analysis will cover flows, waste loadings, and effluent limitations.

III. EXISTING FACILITIES. Describe the existing facilities, including at least the following information:

A. Location map. Provide a schematic layout and general service area map (may be identified on project planning area maps).

B. History.

C. Condition of facilities.

Describe

- present condition
- status of sewer/unsewered areas in municipality
- suitability for continued use
- adequacy of current facilities
- if there are any existing central facilities, the treatment, storage, and disposal capabilities
- can the existing facilities take the additional flows without expansion or upgrade?
- Also, describe compliance with Clean Water Act and other applicable State requirements.

Include a discussion of effluent limitations that will apply.

- existing WWTF if new flow 'fits'
- advanced if new flow requires additional removals
- per Indirect Discharge rules for subsurface alternatives.

Determine if excessive infiltration and inflow exists. Evaluate the alternative of removal of excessive infiltration and inflow, as appropriate.

D. Financial status of any operating central facilities. Provide information regarding current rate schedules and a tabulation of users by billing usage categories. Provide annual operating and maintenance cost (O&M) and revenue received for the last three fiscal years. Give status of existing debts and reserve accounts.

IV. NEED FOR PROJECT. Describe the needs in the following order of priority:

A. Health and safety. Describe concerns and include relevant regulations and correspondence from/to Federal, and State regulatory agencies.

B. System Performance. Describe the concerns and indicate those with the greatest impact. Investigate infiltration and inflow, management adequacy, performance and operations limitations, and problem elimination prior to adding additional capacity.

C. Growth. Describe the reasonable growth capacity that is necessary to meet needs during the planning period. Facilities proposed to be constructed to meet future growth needs should generally be supported by additional revenues. Consideration should be given to designing for phased capacity increases. Provide number of new customers committed to this project.

AFTER PARTS I THROUGH IV HAVE BEEN DEVELOPED, REVIEW THE RESULTS WITH THE OWNER AND FUNDING AGENCIES. ALSO REVIEW WITH THEM THE ALTERNATIVES TO BE EVALUATED.

V. EVALUATION OF ALTERNATIVES. This section should contain a description and comparison of the reasonable alternatives that were considered in planning a solution to meet the identified need.

Alternatives include:

- no action
- types of treatment processes
- WWTF vs. on-site individual or community
- flow reduction and optimizing performance vs. expansion.
- locations of facilities
- types of collection systems.
- a feasible alternative may be a combination of central facilities and management of on-site facilities or only the latter.
- upgrading O&M and efficiency of existing facilities

Evaluation of indirect discharge may be needed to obtain a permit for a direct discharge.

Evaluate opportunities to reduce the use of energy.

Factors to be included in determining reasonable alternatives include, but are not limited to, the proposed action's size and scope, state of the technology, economic considerations, legal and socioeconomic concerns, availability of resources, and the time frame in which the identified need must be fulfilled.

The description should include the following information on each alternative:

- A. Description. Describe the facilities associated with the alternative.
- B. Design criteria. State the design parameters (preliminary basis of design) used for evaluation purposes. Describe the relationship between capacity of the alternative and needs and future growth.
- C. Site Plan. Map. Schematic layout.
- D. Environmental impacts. Describe how the alternative affects the environmental resources that are present in the project area. Describe any steps taken to avoid, minimize, and mitigate any potential effects caused by the alternative.
- E. Land requirements. Identify sites and easements required. Further specify whether these properties are currently owned, to be acquired, or leased. Also discuss the availability and estimated costs of these proposed sites and easements.
- F. Construction conditions. Discuss concerns such as subsurface rock, high water table, limited access, hazardous substances, or other conditions which may affect cost of construction or operation of facility.
- G. Cost estimates (Separate estimates for collection and treatment).
 - 1. Construction cost estimate by contract.
 - 2. Total project cost.
 - 3. Annual Operation and Maintenance.
 - 4. Present Worth, based on the Federal discount rate for water resources projects, determined annually by the Bureau of Reclamation.

H. Advantages/disadvantages. Describe the specific alternative's ability to meet the owner's needs within its financial and operational resources, comply with regulatory requirements, compatibility with existing comprehensive area-wide development plans, and satisfy public and environmental concerns. A matrix rating system could be useful in displaying the information.

I. Evaluation of principal alternatives. If there is more than one feasible alternative at this point, evaluate to select the cost-effective project; considering technical feasibility, operational complexity, legal and managerial implementability, and environmental impacts of alternatives as appropriate.

AFTER PART V HAS BEEN DEVELOPED, HOLD A SECOND REVIEW WITH THE OWNER AND FUNDING AGENCIES. THE REVIEW WILL COVER THE ANALYSIS OF THE ALTERNATIVES AND THE ALTERNATIVE TO BE RECOMMENDED.

VI. PROPOSED PROJECT (RECOMMENDED ALTERNATIVE). This section should contain a fully developed description of the proposed project based on the preliminary description under the evaluation of alternatives.

At least the following information should be included:

A. Project basis of design. The basis of design will meet the requirements of all regulatory agencies.

1. Treatment. Describe process in detail and identify location of plant and site of any discharges. Include a facility layout plan, a flow schematic, and a brief narrative of each treatment component. Discuss a municipal pretreatment program in accordance with 35.907. Include discussions of power supply and emergency power. Discuss handling of biosolids and residuals.

2. Pumping Stations. Identify size and type of building; pump and motor flow, horsepower, and TDH; site location; any special power requirements; and emergency power.

3. Collection System Layout. Identify general location of line improvements: lengths, sizes and key components.

4. Hydraulic Calculations. These should be provided in sufficient detail to assure that the selected layout will work and that pump station sizes are approximately correct.

5. Environmental aspects of the selected plan. Provide this information in the stand-alone section of the Preliminary Engineering Report called the Environmental Report. This section will include any mitigation measures to be implemented. It will also document any public environmental notices and public hearings.

6. Surveys and borings. Include results of the surveys and borings on the chosen site, if surveys and borings are required.

7. Permits. Provide an analysis of required permits and the schedule for obtaining each for the recommended alternative.

8. Schedule. Provide a proposed project schedule.

B. Cost estimate. Provide an itemized estimate of the project cost based on the anticipated period of construction. Include development and construction, land and rights, legal, engineering, interest, equipment, contingencies, refinancing, and any other costs associated with the proposed project. (For projects containing both water and waste disposal systems, provide a separate cost estimate for each system.)

C. Annual operating budget.

1. Income. Provide a rate schedule. Project income realistically, based on user billings, wastewater treatment contracts, and other sources of income. In the absence of other reliable information, for budget purposes, base wastewater generation on 60 gallons per capita per day, or 150 gallons per residential-sized connection per day, or 4,500 gallons per residential-sized connection per month. When large users are projected, the report should include facts to substantiate such projections and evaluate the impact of such users on the economic viability of the project. The number of users should be based on equivalent dwelling units, which is the level of service provided to a typical rural residential dwelling.

2. Operations and Maintenance Costs. Project costs realistically. In the absence of other reliable data, base on actual costs of other existing facilities of similar size and complexity. Include facts in the report to substantiate operation and maintenance cost estimates. Include salaries, wages, taxes, accounting and auditing fees, legal fees, bonding, interest, utilities, gasoline, oil and fuel, insurance, repairs and maintenance, supplies, chemicals, testing, office supplies and printing, and miscellaneous.

3. Capital Improvements. This includes any sinking fund or any capital improvement program in use by the applicant.

4. Debt Repayments. Describe existing and proposed project financing from all sources. At least one scenario involving RUS funding shall be for loan only. Other scenarios may involve loans and grants based on discussions with RUS.

VII. CONCLUSIONS AND RECOMMENDATIONS. Provide any findings and recommendations that should be considered in development of the project. These may include:

- recommendations for special studies
- identification of the need for special coordination
- a recommended plan of action to expedite project development, etc.

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