

RUS PRELIMINARY ENGINEERING REPORT - OUTLINE GUIDE

Reference: RUS Bulletin 1780-2 Preliminary Engineering Report – Water Facilities

Executive Summary

Summarize the current system facilities, problems, needs, alternatives considered, selected alternative, project cost and the public health benefits of the proposed project.

1. General
 - a. Project Description, including description of area under consideration for RD financial assistance
 - b. Environmental Considerations
 - c. Summary of Alternatives Considered
 - d. Recommended & Selected Alternative
2. Project Planning Area
 - a. Location
 - i. Project Planning Area (narrative description and map of boundaries)
 - ii. Project Service Area (narrative description and map of boundaries)
 - iii. Maps, Legal Boundaries, Topography, Major obstacles, etc.
 - b. Environmental Resources Present
 - i. Land Use/Important Farmland/Formally Classified Land
 - ii. Wetlands
 - iii. Floodplains: 500-year Base Flood Elevations@ building sites
 - iv. Cultural Resources
 - v. Biological Resources
 1. Threatened & Endangered Species; Migratory Birds; etc.
 - vi. Water Quality Issues
 - vii. Coastal Resources
 - viii. Socio-Economic/Environmental Justice Issues
 - ix. Miscellaneous Issues
 1. Air
 2. Noise
 3. Transportation
 - c. Population History, Growth Areas & Population Trends
3. Existing Facilities
 - a. Location Map, Site Plans, System Maps & Narrative Descriptions
 - b. History of System Elements
 - i. Discussion of age, date of construction or date of last upgrade or improvement
 - c. Conditions of Facilities
 - i. Water Audit – AWWA
 1. <http://www.awwa.org/Resources/WaterLossControl.cfm> for AWWA water Audit software

- 2. Quantification of Unaccounted for and Non-revenue water vs. water production delivered to the system.
 - ii. Hydraulic System Model Evaluation
 - 1. <http://www.epa.gov/nrmrl/wswrd/dw/epanet.html> for the EPANET2 hydraulic modeling software
 - iii. Compliance with Safe Drinking Water Act & applicable State requirements
 - d. Financial Status of Existing Facilities
 - i. Current Rate Schedule
 - ii. Annual Operations & Maintenance Costs – Detailed Breakdown
 - iii. Other Capital Improvement Programs
 - iv. Tabulation of Users by Monthly Usage Categories
 - 1. Determination of Equivalent Domestic Units (EDUs)
 - v. Existing Debts
 - vi. Reserve Accounts
4. Need for Project
- a. Health, Sanitation & Security\
 - i. Narrative
 - ii. Regulatory Agency Correspondence
 - 1. Non-compliance & Administrative Orders
 - b. System O&M
 - i. Narrative Description of Concerns
 - ii. Quantification of Unaccounted Water
 - iii. Management Adequacy
 - iv. Comprehensive Design Evaluation
 - c. Growth
 - i. Narrative of capacity necessary to meet reasonable 20-year growth projection
 - ii. Facilities needed to support reasonable growth demands
 - 1. Average Day | Maximum Day | Peak Hour Flow rates
 - iii. Phased Capital Improvements to meet incremental demands
 - iv. Number of new customers committed to support project
5. Alternative Considered
- a. Description of reasonable alternatives considered in providing solutions to meet identified needs
 - i. Building new facilities
 - ii. Optimizing operations of existing facilities
 - iii. Rehabilitation & upgrades to existing facilities
 - iv. Interconnection with other existing systems
 - v. Development of small cluster or individual facilities
 - b. Each Alternative shall be an integrated solution including:
 - i. Complete description of all elements associated with the Alternative
 - 1. Water supply sources
 - 2. Treatment requirements
 - 3. Storage requirements

- 4. Distribution system elements
 - ii. Design Criteria
 - 1. Parameters used to evaluate Alternative's ability to meet needs
 - iii. Map
 - 1. System map including locations of all facilities
 - iv. Environmental Impacts
 - 1. Description of **unique** direct and indirect impacts on resources for the specific alternative elements.
 - v. Land Requirements
 - 1. Identify site areas and easements required
 - 2. Status of land/easement acquisition (owned, to be acquired or leased)
 - vi. Construction Problems
 - 1. Discuss subsurface rock, high water table, limited site access, etc. affecting construction cost or facility operations
 - vii. Cost Estimates
 - 1. Construction: estimate projected cost at time of construction
 - 2. Non-Construction: All other elements of "Total Project Cost"
 - 3. Annual Operation & Maintenance
 - viii. Advantages/Disadvantages
 - 1. Narrative of how the alternative meets owner's need with respect to financial, managerial & operational resources
 - 2. Narrative of alternatives ability to complies with regulatory requirements
 - 3. Describe how alternative satisfies public and environmental concerns
6. Selection of an Alternative
- a. A Present Worth (Life Cycle Cost Analysis) of all feasible alternatives considered.
 - i. Total Capital Cost (Construction & Non-Construction)
 - ii. Present Worth of Annual O&M cost
 - iii. Present Worth of Salvage Values of facilities at end of Loan period or 20-year LCCA period.
 - iv. PW Analysis using "real" federal discount rate (from OMB Circular A-94 Appendix C)
 - v. Matrix/Tabular comparison of PW cost elements & Total PW value
 - b. Non-monetary factors considered to determine alternative selection with PW values within 5% of each other.
7. Proposed Project (Recommended Alternative)
- a. A fully developed description of the proposed project for construction
 - b. Project Design
 - i. Water supply source and site schematic
 - ii. Treatment Process Facilities
 - 1. Detailed Process description
 - 2. Site location & plan

3. Process waste disposal description
4. Design Capacity: Hydraulic & Contaminants
 - a. Annual Ave. Day | Maximum Day | Peak Hour Production
- iii. Storage Facilities
 1. Size: Total Volume | Usable Volume | Dimensions
 2. Type: Material of Construction
 3. Location: Site Plan | Existing Grade Elevation
 4. Max. HGL | High Water Level Elevation
- iv. Pumping Stations
 1. Size: Building dimensions/area | maximum pumping capacity | number & rated capacity of pump units
 2. Type: Conventional Construction | Prefabricated Factory Built
 3. Location: Site location & site plan | Existing Site Elevation
 4. Special Power requirements: Standby Generator | 3-Phase power availability
- v. Distribution System Improvements & Location
 1. General Location of line construction on overall system map
 2. Lengths, sizes and materials of line construction
 3. Pressure Reducing Station requirements, locations and design criteria.
- c. Total Project Cost Estimate
 - i. Itemized estimate & details of project cost elements at projected time of expenditure or project construction award date.
 1. Refer to Template and Table resource section for typical list of details
- d. Annual Operating Budget

Provide the Owner's most recent annual operating budget (Appendix)

 - i. Income: Estimates based on proposed rate structure
 1. Proposed rate schedule when facilities are completed
 - a. Separate existing customer revenues from proposed/future new customer revenues
 - b. Separate Residential from Non-residential customers and proposed rates for all categories of users
 2. Use 60 gallons per capital per day/ 4,500 gallons per residential connection per month in unless historical records support higher water consumption (Annual Average Day flow basis)
 3. Evaluate large water user customers' impact on economic viability of project. (i.e. impacts of loss of revenue)
 - ii. Operations & Maintenance Costs
 1. Most recent annual O&M cost details of existing system
 2. Projected annual O&M cost details of improved system (i.e. after construction of proposed alternative)
 3. Minimum details:
 - a. Salaries & Benefits

- b. Wholesale water purchase contracts
 - c. Taxes
 - d. Accounting & Auditing fee for services
 - e. Legal Fees
 - f. Interest on debt
 - g. Utility expenses (Power, telephone, gas, etc.)
 - h. Chemicals
 - i. Office supplies
 - j. Printing
 - k. Miscellaneous or Other Expenses
- iii. Debt Repayment
 - 1. Tabulate & describe existing debt/proposed debt from all sources
 - 2. Debt Service payment and term remaining
 - a. All RUS/RD financing shall be assumed Loan ONLY.
 - iv. Reserves
 - 1. Debt Service Reserve
 - a. Include as 1/10 of annual RUS Loan payment amount
 - 2. Short-Lived Asset Reserve
 - a. Provide a table of Short-Lived Assets
 - i. Assets, equipment and material expected provide a minimum of 5-yr useful service & not covered in Annual O&M expenses
 - ii. Provide 5-yr, 10-yr & 15-yr asset classes
 - iii. Provide current replacement/restoration cost of each asset
 - b. Develop an annual reserve amount necessary to provide funds sufficient to replace/restore assets over life of RUS Loan
- 8. Conclusions & Recommendations
 - a. Engineer's recommendation for additional studies if necessary
 - b. Project Schedule –Time Line – Implementation Plan
 - i. Procurement plan if multiple construction contracts
 - ii. Projection of time/duration of all activities to progress from Preliminary Design Phase through Post-Construction Phase/Warranty Inspection.
 - iii. Realistic time/duration estimates of all reviews and approvals required from local, state and federal agencies
 - iv. Realistic time/duration estimate to obtain all permits necessary to start construction
 - 9. Appendices
 - a. Include all documentation of studies, report, evaluations, modeling results, water audit documentation that support information presented in the body of the report.

Colorado Department of Public Health & Environment
Water Quality Control Division
Drinking Water Preliminary Engineering Report Guidance & Review Checklist Form

Name of Project:
 Applicant Name, Address & Phone Number:
 Consultant Name, Address & Phone Number:
 WQCD Project Manager:
 District Engineer:

Section (Suggested Outline)	Necessary Elements (Guidance)	Addressed on Page # (Applicant)	Complete (CDPHE Reviewer)
(1) Executive Summary	Summarize the system needs, selected alternative, and the public health benefits of the proposed project.		
(2) Planning Conditions	This section should contain an overview of the significant regional features defining the context of the report and proposed project. Displaying much of the information in map and tabular formats is highly recommended for ease of review and discussion.		
(2.1) Planning Area	Include map(s) of current and projected service area for the 20-year planning period; identify environmental features such as streams, lakes, wetlands, and floodplains for the <u>entire</u> planning area. <i>This documentation does not require field surveys and may be obtained from existing data sources such as the National Wetlands Inventory, FEMA and USGS. All or parts of this discussion may be referenced if covered in the Environmental Assessment Report in accordance with the National Environmental Policy Act (NEPA).</i>		
(2.2) Local and Regional Government Coordination	If the proposed project is within or near an urban growth boundary, address conformance with the boundary and any other planning limitations such as tap or water quantity/supply limitations.		
(2.3) Growth Areas and Population Trends	Summarize population projections for the project planning area for a 20-year period; compute and compare recent growth rates with projected growth rates; estimate increases in equivalent residential units (EQRs); identify specific areas of concentrated growth; and reference sources of this information.		
(2.4) Drinking Water Supply	Briefly summarize projected drinking water demands (average day, peak day and peak hour) for the project planning area for the 20-year planning period. Summarize flow reduction measures such as water conservation plan measures. Address the supply source(s) and primary water quality parameters of concern.		
(3) Description of Existing Facilities	This section should provide a description of the existing treatment and distribution facilities.		

Section (Suggested Outline)	Necessary Elements (Guidance)	Addressed on Page # (Applicant)	Complete (CDPHE Reviewer)
(3.1) Service Area Features	On the planning area map, identify the locations of existing drinking water treatment plants, water sources, major distribution lines, and storage facilities.		
(3.2) Facilities Layout and Description	Provide a process flow schematic layout and narrative description of existing treatment facilities including design capabilities and remaining useful life as compared to state design criteria. Describe present adequacy of water supply, storage, and distribution capabilities of any existing central facilities. Include current population and per capita flows (gpcd). Note the quantity of unaccounted for water (e.g., distribution system losses).		
(3.3) Financial Status and Users	Discuss the financial status of the drinking water system including O & M costs, existing debt, required reserve accounts, rate structure and other capital improvement programs. Also include a tabulation of volumes used by types of users (e.g., residential, commercial, industrial) for the most recent typical fiscal year.		
(3.4) Technical, Managerial and Financial (TMF) Capacity	Highlight TMF Capacity issues of concern as indicated by the TMF guidance for the State Revolving Fund program.		
(4) Project Purpose and Need	This section should document the applicable reasons for considering modifications to the existing facilities.		
(4.1) Health and Compliance	Include a discussion of the system's current compliance status with the "Colorado Primary Drinking Water Regulations" and its potential for acute or chronic health risks. Evaluate any other current or future drinking water quality and quantity issues including secondary MCLs.		
(4.2) Security	Summarize results of most recent vulnerability assessment.		
(4.3) Operation and Maintenance (O&M)	Identify applicable O&M issues such as operational constraints, water loss, and adequate controls.		
(4.4) Growth	Summarize quality and quantity concerns; considerations for consolidation and phased capacity; reasons for projected future growth during planning period; support by additional revenues and local and regional planning efforts. Note: projects designed solely to serve future development and population growth are not eligible for State Revolving Fund financing.		

Section (Suggested Outline)	Necessary Elements (Guidance)	Addressed on Page # (Applicant)	Complete (CDPHE Reviewer)
(5) Assessment of Alternatives	This section should contain a description of the reasonable alternatives (no action, blending, optimizing the current facilities, and interconnecting with other existing facilities) that were considered in planning a solution to meet the identified needs. If alternatives for upgrades or new treatment facilities alternatives are considered, include the EPA Best Available Technology (BAT) for contaminant(s) removed. <u>Complete assessments should be grouped by alternative and should include information requested in (5.1) through (5.8) below:</u>		
(5.1) Description	Describe and compare all feasible water treatment technologies, including new technologies that have been thoroughly tested and installed or piloted with successful operating and compliance track records, water supply sources, and the facilities, including distribution facilities (storage, transmission and pumping), associated with each alternative.		
(5.2) Design Criteria	State the design parameters, including the need to meet primary drinking water standards, used for evaluation purposes of each alternative. The parameters must comply with state regulatory requirements (Ref. WQCD Policy State of Colorado Design Criteria for Potable Water Systems.) <u>Address treatment residuals management and ultimate disposal methods and costs in detail.</u>		
(5.3) Environmental Impacts	Describe direct and indirect impacts <u>unique</u> to each alternative on floodplains, wetlands, wildlife habitat, historical and archaeological properties, etc., including any projected permits and certifications.		
(5.4) Land Requirements	Identify all necessary sites and easements, as well as permits and certifications, required for each alternative, and specify if the properties are currently owned, to be acquired, or leased by the applicant.		
(5.5) Construction Problems	Discuss concerns such as subsurface rock, high water table, limited access, or other conditions that may affect cost of construction or operation of a facility for each alternative.		
(5.6) Operational Aspects	Discuss, in general terms, the staffing requirements, certification level requirements (including distribution), and the expected basic operating configuration and process control complexities for each alternative.		
(5.7) Cost Estimates	Provide cost estimates for each alternative, including breakdowns for construction, non-construction, and annual operations and maintenance, as well as a present worth analysis for each alternative. A reasonable discount rate should be used for determining the present worth of the uniform series of O&M values (in today's dollars) and the salvage value.		
(5.8) Advantages/	Describe, in a narrative format, how each alternative		

Section (Suggested Outline)	Necessary Elements (Guidance)	Addressed on Page # (Applicant)	Complete (CDPHE Reviewer)
Disadvantages	affects the applicant’s current and future needs with respect to technical, managerial, and financial concerns; how each alternative complies with regulatory requirements; and how each alternative satisfies public and environmental concerns. Summarize, in a matrix rating system, the advantages and disadvantages of each alternative for clarity.		

(6) Selected Alternative	This section should contain the detailed description of the chosen alternative.		
(6.1) Justification of Selected Alternative	Demonstrate the recommended alternative is the most favorable based on monetary and non-monetary considerations covered in section 5 above. Address whether or not the technology is addressed in the CDPHE design criteria. If the EPA-BAT technology is not selected please include rationale.		
(6.2) Technical Description	Describe the major features – water source(s); schematic flow diagram of unit treatment processes; unit process sizes (including clearwell); treated water storage capacity; residual handling; treatment and distribution system operator requirements; design criteria – design flow, reserve capacity, process loading rates, treatment log removals, disinfection log removals; any other information pertinent or unique to treatment. Include a bulleted list of all project components and identify which are eligible or ineligible for State Revolving Fund assistance. For more information on determining eligibility please see the “State Revolving Fund Eligibility Assessment Guidance Document.” Also be sure to highlight components of the project designed specifically for any of the following purposes: water conservation, source water protection, or beneficial use of sludge.		
(6.3) Costs	Provide detailed project-related capital costs, operation and maintenance budget – staffing, training, materials, electricity, lab expenses, residual disposal, compliance monitoring etc.; replacement costs; projected increase in and total average monthly user charges; 20-year cash flow projection spreadsheet. If some components are ineligible for funding (see Section 6.2), identify specific costs associated with the eligible and ineligible components.		
(6.4) Project Implementation	Hold a public meeting with 30-day notice period and summarize outcome; financing recommendations; legal arrangements, intergovernmental agreements; project schedule and/or time required for completion of design and construction – substantial and final completion. Note that a separate Technical, Managerial, and Financial		

	(TMF) Capacity Review process will be required as part of the State Revolving Fund Program. Design approval, a monitoring plan, and vulnerability assessment are additional steps in the implementation process.		
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Prepared By: _____

Reviewed By: _____ Date: _____