GUIDANCE FOR THE PREPARATION OF ENGINEERING REPORTS

April 2005

Note: The front page or cover of the engineering report *must* be signed and sealed by an Engineer licensed to practice in North Carolina.

A. Summary, Conclusion, Recommendation

Summarize the problem or need and the solution, along with any major technical or environmental issues.

B. Current Situation

1. If a proposed project involves an existing treatment, collection, or other system, the following items, as applicable, should be addressed in detail:

   - Identify the length and/or inch-miles of gravity sewers/interceptors.
   - Identify the age and condition of sewers, associated pump stations, and any important appurtenances.
   - Provide a general history of overflows and bypasses.
   - Identify all un-sewered areas within the city or town limits and any related public health or water quality problems. (SRF-funded projects only).
   - Describe the size and type of each unit within the existing treatment process.
   - Identify the capabilities and deficiencies of each unit process, in both the liquid and the sludge trains.
   - Provide a copy of the NPDES limits pages and advise of the ability to comply with the existing limitations.
   - Provide a copy of any SOC that applies to the facility and summarize any
   - construction requirements with the appropriate schedules.
   - Documentation of failing septic systems with a letter from the County Health Department.

2. Population and Demographics:

   - Identify the current service population (or the population at the time the proposed facility will start operation) for the subject project area. If multiple treatment facilities are involved, the populations should be broken down by tributary service area.

   - Compare service population with total population.

3. Infiltration/Inflow (I/I):

   - Evaluate Infiltration/Inflow to determine if they are excessive using the following screening criteria:

   (a) Infiltration is the average daily flow of the three wettest consecutive months minus the expected flow. Expected flow is based on water billing records minus a consumptive loss of 10 to 15 percent. Infiltration greater than 3000 gallons per day per inch-mile (gpdim) of pipe is considered excessive.

(b) Inflow is typically estimated from flow records following a one-inch rain event. The rain event used for the analysis should be preceded by at least five dry weather days. Inflow is considered excessive if non-industrial instantaneous peak flows at the wastewater treatment plant, following a one-inch rain, exceed 275 gpd per capita served. This figure represents total flow; do not subtract the baseline or dry weather flow.

4. Wastewater Flows:

- Provide an estimate of current wastewater flows using the following criteria:

(a) Residential flow should be based on water billing records minus a 10% consumptive loss.
(b) Commercial flow should be based on water billing records minus a 10% consumptive loss.
(c) Industrial flow should be based on dual metering to determine consumptive losses.
(d) Flow commitments should be taken into consideration as current flows.
(e) Non-excessive I/I as defined above.

C. Future Situation

- Provide 20-year population projections. The Office of State Planning provides population data for each county and municipality that can be accessed on the Internet at: *http://www.demog.state.nc.us*. Other data may be used if available.
- Provide 20-year flow projections using the following criteria:

(a) Provide current flows, including non-excessive I/I, and any planned industrial flows with a Letter of Intent as justification.
(b) Provide 20-year residential flows based on population projections. Typically, this flow value is based on 70 gpd per capita of projected growth in residential population.
(c) Provide 20-year commercial growth based on population projections. Typically, this flow value is based on 15 gpd per capita of projected growth in residential population.
(d) 10% Industrial Reserve based on 10% of design wastewater flows, excluding Infiltration/Inflow.

Note: Alternative flow projection methodologies will be reviewed and approved on a case-by-case basis.

- Provide speculative or actual effluent limitations, when applicable, to support the design assumptions. Speculative limits can be obtained from DWQ's Surface Water Protection Section.
- If a recipient desires to construct a facility larger than necessary for the 20-year planning needs, the following items must be included in the Engineering Report:

(a) A demonstration that the facility is capable of operating properly at both the current and design flows.

(b) A detailed cost estimate for the proposed design and the 20-year design. These cost estimates will be used to develop a Reserve Capacity Cost Ratio (RCCR) factor which is applied to the total project cost to determine the total eligible cost.

D. Alternatives Analysis

1. The Engineering Report *must* evaluate the following alternatives:

   - No action
   - Optimum operation of existing facilities
   - Land Application (Slow rate, conventional spray irrigation), or reuse.
   - Regional System
   - Upgrade and/or Expansion of Existing Facilities *with* Conjunctive Reuse of Reclaimed Water

Any other feasible, environmentally sound alternatives should also be included in the alternatives Analysis.

2. Biosolids disposal alternatives should also be evaluated, when applicable. Provide sludge production calculations and how the solids will comply with pathogen and vector attraction reduction in CFR 40 Part 503.

3. The engineering report must include descriptions, diagrams, and preliminary design criteria for all proposed unit processes, pump stations, and interceptor sewers.

4. Provide an analysis of the potential open space and recreational opportunities associated with the project (SRF funded projects only).

5. Typically, collection systems are only eligible to address documented failing septic systems.

6. If interceptors are proposed for transmission the following alternatives must also be addressed:

   - Alternate Routes
   - Pump station(s) and Force Main(s)
   - On-site treatment systems

E. Present Worth Analysis

1. The cost effectiveness of the selected alternative must be demonstrated through a present worth analysis.

2. The analysis must be based on a 20-year planning period, and use the current EPA discount rate (4.875% as of 10-1-06) with the appropriate compound interest factors.

3. Each feasible alternative must be included in the present worth analysis. The land application alternative **must** be included in the present worth analysis.

4. The analysis must include the following items:

   (a) Detailed breakdown of capital costs, including the costs associated with patent fees, costs for engineering, start-up services, operation and maintenance manual, land and easements, etc.
   (b) Itemize these costs and include them in the present worth analysis. (For projects funded through the SRF program, the cost of land is generally not eligible. Exceptions are made for land application sites, land application sites for biosolids, and lagoon storage of wastewater.)
   (c) Annual operation and maintenance costs and present worth of those costs.
   (d) Present worth of replacement costs.
   (e) Present worth of salvage value.
   (f) A 2% closing fee (SRF projects only).

F. User Charges and Financial Capability

- Provide both current and expected user charges for a typical residential customer using 5,000 gallons per month. The user charges must be sufficient to repay the Loan. General funds may not be pledged for repayment.
- Expected revenue from user charges should be based on the first year's billable flow. Anticipated disbursements/expenses should include the first year's principal and interest payments, and the first year's operation and maintenance cost.
- Identify all other sources of funding if the total project cost exceeds the anticipated funding amount.
- The expected user charge must be based on an SRF loan with an interest rate of 4%. This is the maximum that the interest rate can be in the SRF program.
- The SRF loan is typically a simple interest loan with a declining annual payment.

Note: Receipt of loans is contingent on the review and approval of the proposed loan by the Local Government Commission.

G. Public Participation (Note: This Section Is Applicable to SRF and non-Categorical Exclusion (CE) STAG Projects only)

1. One public hearing, with a 2-week notification, is required. A copy of the Engineering Report should be available for review by the public at least 2 weeks prior to the public hearing.
2. Place an advertisement for the hearing in a newspaper having local area circulation. The advertisement should:

   - Identify the time and location of the public hearing.
   - Advise when and where a copy of the Engineering Report can be reviewed.
   - Provide a brief description of the proposed project.
   - Advise how much funding is required and identify the source of funding.

3. The information presented during the public hearing **must**:

   - Identify the problem.
   - Discuss the selected alternative.
   - Identify the amount of the anticipated loan or grant.
   - Discuss any required inter-local agreements.

- **Identify the effect this project will have on the monthly sewer bill for a typical residential user of 5000 gallons per month.**

4. Provide a summary of the hearing.
5. Provide an affidavit of publication of the hearing notice.

Note: Public meetings in early stages of the project development are encouraged. These meetings can be regular town board meetings in which the project is discussed. If conducted, include a summary of these meetings in the Engineering Report.

H. Environmental Assessment

1. For projects funded through State loans, and some SRF projects, a full inter-agency environmental review is not necessary if the project falls below the following minimum criteria contained in 15A NCAC 1C.0408(2)(a), which are listed below. However, each Engineering Report *must* include an EA. The depth and breadth of the EA will be determined in part by whether the project is above (more detailed EA) or below (less detailed EA) these criteria:

   (a) Relocation of discharge points within the same river basin;
   (b) New discharge facilities with a proposed permitted expansion of less than 500,000 gallons per day and producing an instream waste concentration of less than 33 percent during the 7-day 10-year low flow conditions;
   (c) Expansion of an existing discharge facility of less than 500,000 gallons per day additional flow;
   (d) New surface irrigation, high rate infiltration, or subsurface waste water systems with a proposed permitted capacity not exceeding 100,000 gallons per day;
   (e) Reclaimed water utilization systems with reclaimed water utilization being the sole disposal option with a proposed permitted capacity not exceeding 200,000 gallons per day;
   (f) New reclaimed water utilization sites with a proposed permitted capacity not to exceed 500,000 gallons per day when the reclaimed water utilization system is required for compliance with any other wastewater disposal permit;
   (g) New reclaimed water utilization sites with a proposed permitted capacity not to exceed 1,000,000 gallons per day when the reclaimed water utilization system is not required for compliance with any other wastewater disposal permit;
   (h) New reclaimed water utilization distribution lines;
   (i) New permits or modification to existing permits for land application of residuals utilization, where less than 10 acres not previously permitted is prior converted within three years or will be converted from a non-plantation forested area to application area;
   (j) New or expanding surface disposal sites disposing less than 3000 dry tons of residuals per year;
   (k) Gravity sewer extensions with less than three miles of new lines or lines of less than 18 inches in diameter; and
   (l) New or expanding individual pump stations and associated force mains with a proposed permitted capacity of less than 1750 gallons per minute.

2. The N.C. Department of Administration's Environmental Assessment Guidelines should be used to develop the Environmental Assessment required for the Engineering Report as based on the determination of the scope required in Step 1: **http://www.nccgl.net/fap/eaguide.htm**

3. Links for additional information:
   a. Floodplains: **http://www.ncfloodmaps.com/default_swf.asp**
   b. State Historic Preservation Office: **http://www.hpo.dcr.state.nc.us/**
   c. U.S. Army Corps of Engineers – Wilmington Office: **http://www.saw.usace.army.mil/**
   d. Federally-protected species: **http://nc-es.fws.gov/es/specieslistjan2003.pdf**
   e. State-protected species: **http://www.ncnhp.org/Images/Other Publications/2004 Rare Animal List.pdf**

4. **Maps** - Provide the following maps/figures of the entire project area, *in addition to or in lieu of the exhibits required as a part of the Environmental Assessment Guidance in Section H.2 above*. Each map should show the specific location(s) of the proposed project, in the EA:

   (a) USGS Quad map(s):
      (i) Figure 1 – A reproducible 8 ½" x 11" map showing the site of the proposed project, and any significant features such as wetlands, parks, historic sites, etc.
      (ii)* Figure 2 – A reproducible map with each proposed stream and/or wetland crossing labeled by number. Provide an accompanying table that lists each crossing, the diameter sewer that will be installed at the locations, the installation method used to install the sewer, and the amount of environmental impact at each crossing. Please total the acreage of impact for the entire project.
   (b)* Soil survey map(s)
   (c)* Wetland delineation map(s) – This information can be obtained from the U.S. Fish & Wildlife Service's National Wetlands Inventory: **http://wetlands.fws.gov/**

   * Note: Items 4(a)(ii), (b), and (c), above pertain to SRF and non-categorical exclusion STAG funded projects only.

5. **Guidance for Implementing Environmental Justice** - The U.S. Environmental Protection Agency (EPA) defines Environmental Justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."
Executive Order 12898 - *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* - requires the applicant to determine what impact the proposed project will have on minority and low-income populations. This objective must be accomplished before a Finding of No Significant Impact (FNSI) can be issued for an applicant to receive financial assistance from the State Revolving Fund (SRF). The task of accomplishing this objective involves the following:

a. Identify and document the existence of all minority and low-income populations in the service area or such populations that exist in proximity to the service area. This data can be obtained at the following website: **http://quickfacts.census.gov/qfd/states/37000lk.html** Please include Census maps showing areas where minorities and low-income populations are located in and around the project area. These can be obtained at the following website: **http://www.epa.gov/enviro/ej/**

b. If minority and/or low-income populations exist, an explanation must be provided if there are disparities in the provision and location of sewer treatment and transport facilities between the general population and the minority and/or low-income populations.

c. The report needs to document if the minority and/or low-income populations have suffered historically from environmental management/public facilities such as sites for wastewater treatment, sludge disposal, land treatment, landfills, recycling centers, incinerators, hazardous/nuclear disposal, and prisons. If the minority and/or low-income populations are impacted by the proposed plan, did the citizens have the opportunity to participate in the decision-making process? If the subject populations have not participated in the decision-making process, additional public participation efforts may be required.

d. If the minority and/or low-income populations are impacted disproportionately and adversely, the applicant may need to reevaluate alternatives and develop mitigative measures to minimize adverse impacts.

Implementing Environmental Justice will require the applicant to obtain information about demographic data, census maps, land-use data, pollution sources, infrastructure facilities, health characteristics, air quality, and surface and groundwater contamination. The local planning department and public library should be able to provide essential information to initiate the process. EPA has a website which provides information about the development and commitment to Environmental Justice - **http://www.epa.gov/compliance/environmentaljustice/index.html**

I. Submittals

For projects that are above the Minimum Criteria in Section H.1, STAG projects that do not qualify for a CE, and all SRF funded projects, submit nineteen (19) copies of the Engineering Report. For projects that are below the Minimum Criteria in Section H.1, and STAG projects that qualify for a CE, submit six (6) copies of the Engineering Report.