Clean Water State Revolving Fund (CWSRF)

Engineering Report Outline

Effective May 1, 2016

Statement of Purpose

This document provides guidance to municipalities and others interested in receiving Clean Water State Revolving Fund (CWSRF) financial assistance and their consulting engineers on the requirements of an acceptable engineering report. This outline was created to promote the development of comprehensive engineering evaluations that communities can use to make informed decisions about infrastructure. Use of the outline will help to ensure that a submitted report satisfies CWSRF programmatic and technical requirements. While it is intended that all the items in the outline must be addressed for every project, the engineer's evaluation may determine that some elements of the outline do not apply to a project. Conversely, a report may need additional information before it can be found acceptable.

Engineering Report Preparation Standards

An engineering report shall be developed in accordance with the following standards whenever practicable:

1. Recommended Standards for Wastewater Facilities, Latest Edition - Policies for the Design, Review, and Approval of Plans and Specifications for Wastewater Collection and Treatment Facilities (commonly known as the 10 States Standards)
2. TR-16 Guides for the Design of Wastewater Treatment Works, Latest Edition- New England Interstate Water Pollution Control Commission
3. New York State Stormwater Management Design Manual, Latest Edition
4. New York State Design Standards for Intermediate Sized Wastewater Treatment Systems Statewide (2014) and Lake George Design Standards (2015)

There may be components described in the applicable standards that are pertinent to a project that are not addressed in this outline. The engineer preparing the report should ensure that applicable standards are addressed during the development of the report.

If seeking assistance from these federal agencies; Department of Agriculture – Rural Development, Environmental Protection Agency, Department of Homeland Security, and Housing and Urban Development, the engineering report may need to comply with the January 16, 2013 Engineering Report Interagency Memo (Bulletin 1780-2 found online at http://www.rd.usda.gov/publications/regulations-guidelines/bulletins/water-and-environmental)

CWSRF Engineering Report Outline

Please include the following main sections in the submitted report

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Executive Summary

Provide a brief description of the purpose of the report, need for the project, evaluations conducted, recommended alternative, and proposed course of action.

Project Background & History

1. Site Information

Describe the area(s) under consideration and include the following:

- Location (include maps with appropriate scale topographical features, legal boundaries, as well as photographs)
- Geologic conditions (soil type, depth to bedrock and groundwater, slope if significant)
- Environmental resources
- Floodplain considerations

2. Ownership & Service Area

Describe the ownership of the facilities and area(s) being served or to be served. Include details of the following:

- Outside users
    - Discuss any existing/required inter-municipal/private/industrial agreements
- Industrial discharges or hauled waste (e.g. source, volume, composition)
- Population trends and growth
    - U.S. Census or other data (include references) for the service area for at least the past two decades if available
    - Discuss any planned or anticipated development

3. Existing Facilities & Present Condition

Provide overview of major system components and include the following:

- General description & history of major system components
- Permit conditions & effluent discharge limits
- Compliance issues (e.g. - SPDES or other permit requirements, consent order, notice of violation, judicial order, EPA order)
- Design flows and waste loads (average and peak)
- Existing flows and waste loads (average and peak)
- Existing energy consumption (include energy audit results if available)
- Site layout / overall schematic drawing / photographs
- History of damage due to storm or flood impacts

Describe each unit process being evaluated and its present condition. Include the following:

- Existing capacity, age, conveyance, treatment, storage, and/or disposal capabilities
- Failure history and component limitations

4. Definition of the Problem

Describe the need for the project. Include any maps, photographs, or schematics as it relates to:

- Health, sanitation, and/or security

- Aging infrastructure
- Infiltration & inflow; CSO; SSO
    - Discuss LTCP or SSES requirements, as appropriate
- Reasonable growth
- Water, energy, and/or waste considerations (include audits, if available)
- Suitability for continued use
- Storm & flood resiliency (sea level rise, storm surge, potential for flooding impacts, or other extreme weather event)
- Compliance with accepted standards (federal, state, and local laws)

5. Financial Status[1]

Briefly provide information regarding sources of income, current rate schedules, other capital improvement programs, and status of existing debts and required reserve accounts.

Alternatives Analysis

Conduct a comprehensive analysis of each feasible alternative. Every report must evaluate a no-action alternative. All projects involving stormwater, including inflow abatement, must evaluate a green, or green/gray combination, infrastructure alternative.

As appropriate projects should evaluate the following alternatives:

- Repair or replacement versus new construction
- Regional consolidation opportunities
- Centralized versus decentralized (required for new systems), or a combination thereof (small cluster or individual systems)

Briefly discuss any alternatives considered that were found to be not technically feasible.

1. Description

Describe how each alternative will resolve the defined problem. Present the following information for each technically feasible alternative, as appropriate:

- Proposed preliminary design, design standards, sizing, and supporting calculations (include runoff reduction volume calculations for green infrastructure practices)
- Impact on existing facility (design average and peak flows and loads)
- Location map and/or schematic drawing
- Land requirements
- Environmental impacts & mitigation measures
    - Consider water quality and supply, noise levels, air quality, population growth, wetlands, floodplains, and other sensitive areas
- Discharge permit requirements (new/proposed and existing)
- Identify the water & energy efficiency measures used in each alternative

[1] A more detailed financial profile of the municipality will be required by EFC as part of the application for financial assistance. If this engineering report is to be utilized for other funding programs, more detailed financial information may be required by those programs.

    - Efficient water use, reuse, recapture, and conservation, and energy efficient design, and/or renewable generation of energy
    - Energy efficiency in accordance with Appendix A – Energy Efficiency Best Practices, Table 1: NYSERDA Summary of Baseline Standard Practices & Energy Efficient Designs - Wastewater Sector
- Storm & flood resiliency (sea level rise, storm surge, potential for flooding impacts, or other extreme weather event)
- Schedule and constructability

2. Cost Estimate

- Total project cost with construction, non-construction & contingency separated
    - Non-construction may include land/easement acquisition, legal, engineering, construction management, fiscal advisor, grant/loan administrator, etc.
- Annual operation & maintenance (O&M) cost considering personnel, administration, water purchase or waste treatment costs, insurance, energy cost (fuel or electric), process chemical, monitoring & testing, short-lived asset maintenance and replacement (see Appendix B for examples of short-lived assets), professional services, and residuals disposal. Include any income from energy generation or outside revenue.

3. Non-Monetary Factors

Include discussion of all relevant non-monetary factors such as increased recreational opportunities, increased local employment, aesthetics, improved habitat, reduced carbon footprint, climate resiliency, standardization, personnel impacts, permit issues, community objections, or wetland relocation.

Summary & Comparison of Alternatives

Provide a summary table of all feasible alternatives identifying any major differences, pros and cons, non-monetary factors, and costs.

- Provide a summary life cycle cost analysis for all technically feasible alternatives. A comprehensive life cycle cost analysis may be warranted for projects involving new infrastructure technologies. This analysis should convert capital, O&M, short-term assets, and salvage costs to present worth values. State the time period and the interest rate used in the evaluation.

- If the project objective is primarily energy efficiency, the payback period should be calculated and compared for each alternative (Appendix A– Energy Efficiency Best Practices, Table 2: Example Payback Period Calculation).

- For projects involving stormwater, including stormwater inflow to sewer systems, a justification and cost analysis must be provided if a green infrastructure component is not part of the recommended alternative.

Recommended Alternative

Identify the selected alternative and include:

- Basis of selection
- Cost estimate
- Project schedule
- Next steps (including descriptions of planned community engagement)
- Attach signed Engineering Report Certification (Appendix C)
- Attach signed Smart Growth Assessment (Appendix D)

Appendix A: Energy Efficiency Best Practices

New York State Energy Research and Development Authority (NYSERDA) has studied the energy usage for the wastewater treatment sector and identified certain practices and technologies that achieve performance and treatment requirements while also reducing the consumption of energy. These practices and technologies are identified in the NYSERDA Water and Wastewater Energy Management – Best Practices Handbook – September 2010, and are summarized below.

EFC endorses the reduction of energy usage at projects financed with CWSRF funds. The cost savings from employing these technologies generally outweigh the initial cost. As such, EFC expects the Engineering Reports for projects seeking CWSRF financial assistance to address the feasibility of employing technologies identified by NYSERDA. If the selected option within an Engineering or Design Report does not employ the preferred technology (or a technology that provides greater energy efficiency) identified by NYSERDA, the report should provide justification for not selecting the more energy efficient alternative.

Table 1: NYSERDA Summary of Baseline Standard Practices & Energy Efficient Designs Wastewater Sector

Operation Process	Standard Practice	Typical Energy Efficiency Measures*
Influent Pumping	On/Off Level Control and EPAct Motors	VFD with Control Loop; Premium Efficiency Motors
Primary Treatment	EPAct Motors; Timers on Sludge Draw-off	Premium Efficiency Motors; VFDs on Sludge Draw-off
Secondary Treatment	EPAct Motors	Premium Efficiency Motors
Fixed Film	EPAct Motors	Premium Efficiency Motors; Flow Control/VFDs on Recycle
Mechanical Aeration	EPAct Motors	Premium Efficiency Motors; Level Control on Effluent Weir
Diffuser System	Coarse or Medium Bubble Aeration	Fine Bubble Diffusers; Fine Bubble Diffusers with Mixers
Aeration Blowers	Multi-Stage Centrifugal Blowers with EPAct Motors	Premium Efficiency Motors; Inlet Flow Control
Aeration Blowers	Positive Displacement Blowers with EPAct Motors	Premium Efficiency Motors; VFDs
DO Control	Manual handheld DO Monitoring with Manual Adjustment	VFD with DO Control Loop; Start/ Stop Blowers; Control Air Output
WAS/RAS Pumps	Timed Operation and EPAct Motors	VFD with Control Loop; Premium Efficiency Motors
Tertiary Treatment	Flow Control Valves and EPAct Motors	VFD with Control Loop; Premium Efficiency Motors
Sludge Processing	EPAct Motors and case-by-case VFD designs	Premium Efficiency Motors
UV Disinfection	Medium Pressure UV Lamps	Low Pressure High Output Lamp Technology
Effluent Pumping	Flow Control Valves and EPAct Motors	VFD with Control Loop; Premium Efficiency Motors
Plant Water System	Constant Speed Pumps; System wide Pressure	VFD with Pressure Control; Booster Pumps at Specific Processes
Building Systems	Building Energy Code Compliant	Lighting, HVAC, etc. More Efficient than Building Energy Code

*Typical Energy Efficiency Measures were developed for standard conditions and run times. Actual recommendations are evaluated on a case by case basis.

The payback period should be calculated for energy efficient practices included in the recommended alternative and compared to the expected useful life of the equipment. If the project objective is primarily for energy efficiency, the payback period should be calculated for each alternative.

Table 2: Example Payback Period Calculation

Operation/Process: *Aeration Blowers*	**Baseline/Existing Standard Practice**	**Energy Efficiency Practice**
Annual Electric Use (kWh/yr.)	2,000,000	750,000
Annual Energy Cost ($)	$200,000	$75,000
Estimated Construction Cost	$1,000,000	$1,200,000
Annual Electric Savings (kWh/yr.)	1,250,000	
Annual Energy Savings ($/yr.)	$125,000	
Energy Savings (%)	62.5%	
Incremental Cost Increase ($)	$200,000	
Simple Payback (SPB) of Incremental Cost (yr)	1.6	
Expected Useful Life of Component (yr)	15	

Payback Period

$$= \frac{(incremental\ cost\ of\ EE\ measure[\$] + incremental\ O\&M\ cost\ of\ EE\ measure[\$])}{Energy\ Savings\ [\$/yr]}$$

Please see the 2012 CWSRF 10% Green Project Reserve Guidance for Determining Project Eligibility for further information about energy efficiency in CWSRF programs.

Appendix B: Examples of Short-Lived Assets

Treatment Related	Collection System Related
Pump	Pump
Pump Controls	Pump Controls
Pump Motors	Pump Motors
Chemical Feed Pumps	Trash Racks/Bar Screens
Membrane Filter Fibers	Sewer Line Rodding Equipment
Field & Process Instrumentation Equipment	Air Compressors
UV Lamps	Vaults, Lids & Access Hatches
Centrifuges	Security Devices & Fencing
Aeration Blowers	Alarms & Telemetry
Aeration Diffusers & Nozzles	Chemical Leak Detection Equipment
Trickling Filters, RBC's, etc.	
Belt Presses & Driers	
Sludge Collecting & Dewatering Equipment	
Level Sensors	
Pressure Transducers	
Back-up Power Generator	
Chemical Leak Detection Equipment	
Flow Meters	
SCADA Systems	

Appendix C: Engineering Report Certification (required)

Engineering Report Certification

To Be Provided by the Professional Engineer Preparing the Report

During the preparation of this Engineering Report, I have studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which assistance is being sought from the New York State Clean Water State Revolving Fund. In my professional opinion, I have recommended for selection, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation, and energy conservation, taking into account the cost of constructing the project or activity, the cost of operating and maintaining the project or activity over the life of the project or activity, and the cost of replacing the project and activity.

Title of Engineering Report:

Date of Report:

Professional Engineer's Name:

Signature:

Date:

Appendix D: Smart Growth Assessment Form (required)

Smart Growth Assessment Form

New York State Clean Water State Revolving Fund (CWSRF)

This form should be completed by the applicant's project engineer or other design professional.[2] Please refer to EFC's "Smart Growth Guidance".[3]

Applicant Information

CWSRF Applicant: CWSRF No.:

Project Name:

Is project construction complete? ☐ Yes, date: ☐ No

Project Summary: (provide a short project summary in plain language including the location of the area the project serves)

Section 1 – Screening Questions

1. Prior Approvals

1A. Has the project been previously approved for CWSRF financing? ☐ Yes ☐ No

1B. If so, what was the CWSRF project number(s) for the prior approval(s)? CWSRF No.:

Is the scope of the project substantially the same as that which was approved? ☐ Yes ☐ No

IF THE PROJECT WAS PREVIOUSLY APPROVED BY EFC'S BOARD AND THE SCOPE OF THE PROJECT HAS NOT MATERIALLY CHANGED, THE PROJECT IS **NOT** SUBJECT TO SMART GROWTH REVIEW. SKIP TO SIGNATURE BLOCK.

2. New or Expanded Infrastructure

2A. Does the project add a new wastewater collection or treatment system? ☐ Yes ☐ No
Note: A new infrastructure project adds wastewater collection or treatment where none existed previously

[2] If project construction is complete and the project was not previously financed through the CWSRF, an authorized municipal representative may complete and sign this assessment.
[3] Available at www.efc.ny.gov/smartgrowth

2B. Will the project result in an increase of the State Pollution Discharge Elimination System (SPDES) permitted flow capacity for an existing treatment system? *Note: An expanded infrastructure project results in an increase of the SPDES permitted flow capacity for the treatment system* ☐ Yes ☐ No

IF THE ANSWER IS "NO" TO BOTH "2A" AND "2B", THE PROJECT IS **NOT** SUBJECT TO FURTHER SMART GROWTH REVIEW. SKIP TO SIGNATURE BLOCK.

3. Court or Administrative Consent Orders

3A. Is the project expressly required by a court or administrative consent order? ☐ Yes ☐ No

3B. If so, have you previously submitted the order to NYS EFC? If not, please attach. ☐ Yes ☐ No

Section 2 – Additional Information Needed for Relevant Smart Growth Criteria

EFC has determined that the following smart growth criteria are relevant for CWSRF projects and that projects must meet each of these criteria to the extent practicable:

1. Uses or Improves Existing Infrastructure

1A. Does the project use or improve existing infrastructure? ☐ Yes ☐ No
Please describe:

2. Serves a Municipal Center
Projects must serve an area in either 2A, 2B or 2C to the extent practicable.

2A. Does the project serve an area **limited** to one or more of the following municipal centers?

i. A City or incorporated Village ☐Yes ☐No
ii. A central business district ☐Yes ☐No
iii. A main street ☐Yes ☐No
iv. A downtown area ☐Yes ☐No
v. A Brownfield Opportunity Area ☐Yes ☐No
(for more information, go to www.dos.ny.gov & search "Brownfield")
vi. A downtown area of a Local Waterfront Revitalization Program Area ☐Yes ☐No
(for more information, go to www.dos.ny.gov and search "Waterfront Revitalization")
vii. An area of transit-oriented development ☐Yes ☐No
viii. An Environmental Justice Area ☐Yes ☐No
(for more information, go to www.dec.ny.gov/public/899.html)
ix. A Hardship/Poverty Area ☐Yes ☐No
Note: Projects that primarily serve census tracts and block numbering areas with a poverty rate of at least twenty percent according to the latest census data

Please describe all selections:

2B. If the project serves an area located outside of a municipal center, does it serve an area located adjacent to a municipal center which has clearly defined borders, designated for concentrated development in a municipal or regional comprehensive plan and exhibit strong land use, transportation, infrastructure and economic connections to an existing municipal center? ☐Yes ☐No

Please describe:

2C. If the project is not located in a municipal center as defined above, is the area designated by a comprehensive plan and identified in zoning ordinance as a future municipal center? ☐Yes ☐No

Please describe and reference applicable plans:

Signature Block: By entering your name in the box below, you agree that you are authorized to act on behalf of the applicant and that the information contained in this Smart Growth Assessment is true, correct and complete to the best of your knowledge and belief.

Applicant:	Phone Number:
(Name & Title of Project Engineer or Design Professional or Authorized Municipal Representative)	
(Signature)	(Date)