REUSE FEASIBILITY ANALYSIS

EPD Guidance Document
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Georgia Environmental Protection Division
Watershed Protection Branch

Guidance Document
Reuse Feasibility Analysis

Developed by the Georgia Environmental Protection Division (EPD)
To support the "Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion"

August 2007

This guidance document is intended for entities in the 24-county area of Georgia's coast addressed in the "Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion", located in Sub-Regions 1, 2 and 3, that are:

- Private Industrial Transient and Non-Transient Non-Community Water Systems (TNCWS and NTNCWS) with an Operating Permit and a Water Withdrawal Permit;
- Private Industrial Transient and Non-Transient Non-Community Water Systems (TNCWS and NTNCWS) with ONLY an Operating Permit;
- Public Community Water Systems (CWS) with Water Withdrawal and/or Operating Permits;
- Governmentally Owned or Operated Public Drinking Water Systems with an Operating Permit; or
- Governmentally Owned or Operated Transient Non-Community (TNCWS) or Non-Transient Non-Community Public Water Systems (NTNCWS) with either an Operating Permit and/or a Withdrawal Permit.

It is designed to allow a water system to analyze the technical and economic feasibility of providing a reuse system. If feasible, water systems are required to use reuse water to meet current and/or future non-potable water supply needs.

When to use this guidance document: For most groundwater withdrawal permittees in the coastal counties of Georgia, a special condition of all new or modified withdrawal permits will be an assessment of the feasibility of using reuse water in order to minimize withdrawals from the Floridan aquifer. This assessment shall be conducted in accordance with these guidelines and reported to the Division's District Office for concurrence no later than 24 months from the permit issue date. This assessment is not part of your permit application.

Permittees in the Red and Yellow Zones of Sub-Region 1 and Sub-Region 2 must adopt ordinances requiring all new developments served by public and private sewage systems to install purple pipe reuse lines. Copies of the adopted ordinances must be submitted to Division's District Office for concurrence no later than 24 months from the permit issue date.

How to use this guidance document: This guidance consists of two parts. Part 1 provides a brief description of reuse systems, and an overview of the criteria you will need to consider in determining the feasibility of a reuse system. Part 2 provides a step-by-step process by which you can evaluate the feasibility of reuse for your utility. A companion Guidance Document, "*Guidelines for Water Reclamation and Urban Water Use"(Reuse Guidance)*, available on line at http://www.gadnr.org/cws, is referenced and should be consulted when completing Part 2. When you have completed your reuse feasibility study, please submit the study along with the forms in Part 2 to the appropriate EPD District Office (Brunswick or Savannah) no later than 24 months after the date of your permit issuance. Contact information for the Coastal District offices can be found at http://www.gaepd.org/Documents/wpb.html.

EPD contact: If you have any questions, or require additional information, please contact the EPD Engineering and Technical Support Program, at 404-675-6232. As the 2006 Coastal Plan is implemented, EPD welcomes feedback from permittees regarding this guidance document.

Part 1: Summary of Coastal Permitting Plan Requirements

The Coastal Georgia Water and Wastewater Permitting Plan for Managing Salt Water Intrusion (2006 Coastal Plan) was developed to describe the goals, policies and actions by which the Environmental Protection Division (EPD) will manage groundwater resources in the 24-county area of coastal Georgia. The primary focus of the Plan is halting the intrusion of salt water into the Upper Floridan aquifer. Management strategies that consider conservation and reuse were developed as means of minimizing groundwater withdrawals and extending the life of the Upper Floridan aquifer.

As part of the 2006 Coastal Plan, all non-agricultural permittees must conduct a reuse feasibility study in accordance with these guidelines and the EPD "*Guidelines for Water Reclamation and Urban Water Use"* available on the EPD website referenced below. Reuse refers to the use of reclaimed water as a substitute for other water sources. Reclaimed water is highly treated wastewater that has been treated to urban water reuse standards, meets the treatment criteria as specified in the Guidelines, and is delivered to a reuse area or a designated user. Common beneficial uses of reclaimed water include irrigation of golf courses, residential and commercial landscaping, greenspace, parks, athletic fields, and roadway medians. Reclaimed water can also be used for industrial purposes including cooling water and other uses such as concrete mix water. Please refer to *Guidelines for Reclamation and Urban Water Reuse* for additional guidance and design criteria for reuse systems. That document is a valuable companion publication to this one, and is available on line at http://www.gaepd.org/Documents/Techguide_wpb.

The 2006 Coastal Plan requires installation of purple pipe reuse systems for all new developments served by public and private sewage systems in the Sub-regions where salt-water intrusion poses the greatest threat; specifically, Sub-Region 1 Red and Yellow Zones and Sub-Region 2. In these areas, local governments must adopt ordinances to provide for reuse water systems; however, some local flexibility will be necessary. In those Sub-regions where salt-water intrusion is not an imminent threat, permittees must conduct re-use feasibility studies as a condition of their permit. Golf courses in the coastal counties and field or container nurseries may have access to reclaimed water and should do the reuse feasibility study described here. EPD recognizes that use of reclaimed water for irrigation of sod farms or non-food crop farms (such as cotton) is typically not feasible, and will not require a re-use feasibility study. However, if reuse water is available to these farms, every effort should be made to assess the feasibility of using it. Food crop farms will not be required to assess reuse feasibility at this time.

This guidance document, along with *Guidelines for Reclamation and Urban Water Reuse*, discusses principal topics that a local government or water system must consider in their feasibility analysis. These topics are presented in three categories: technical considerations, economic considerations, and environmental considerations. In Part II, a form is provided to help local governments or water systems perform a step-by-step reuse feasibility analysis, taking the considerations listed in Part I into account. For industrial groundwater withdrawals, economic feasibility will be assessed on a case-by-case basis.

A. Technical Criteria for Consideration

The following criteria are some of the main technical considerations for evaluating the feasibility of a reuse system. For more detailed technical guidance, please consult the EPD "*Guidelines for Water Reclamation and Urban Water Use".*

1. **Purple pipe distribution lines**. Reuse water requires separate distribution lines. All reuse piping and pipelines must be color-coded with Pantone Purple 522 using stable pigment. All valves, fire hydrants, and outlets must also be tagged and color-coded purple to differentiate reclaimed water from potable water. All reclaimed water valves and outlets must be appropriately tagged or labeled "Do Not Drink" together with the equivalent standard international symbol to warn the public and employees that the water is not intended for drinking.

2. **Wastewater Treatment.** Reclaimed water must be treated to urban water reuse standards. Specific treatment limits are:

- Biochemical Oxygen Demand (BOD5) ≤5 mg/l
- Total Suspended Solids (TSS) ≤ 5 mg/l
- Fecal Coliform ≤ 23 per 100 ml monthly geometric mean, 100 per 100 ml maximum per sample.
- pH 6-9 standard units
- Turbidity ≤ 3 NTU
- Detectable disinfectant residual at the delivery point (strongly recommended)

3. **Operator standards.** A reuse facility's operator in responsible charge must be Class I. Operation of reclaimed water systems requires on-site operation by a Class II or higher operator 8 hours per day, 7 days per week. If the operator can monitor from a remote location and receive immediate notification for alarms, a reduced schedule for on-site operation by a Class II or higher operator may be considered on a case-by-case basis.

4. **Storage.** Storage ponds or tanks must be provided for water that does not meet the treatment criteria (reject water), or for times when there is a surplus supply. There needs to be storage capacity for at least three days of flow for reject water, and provisions for returning this reject water to the facility for further treatment or for sending it to a separate disposal site must be incorporated into the system. Ponds exclusively for reject water must be separated from reuse storage. Surplus water can be stored in tanks or specially designed ponds. Water must meet the standards in number 2 above at the point of delivery to the end user.

5. **Public warning signs**. Because of the risk of exposure, the public must be notified of the use of reclaimed water. This can be accomplished by the posting of advisory signs in areas where reuse is practiced, notes on golf course scorecards, mailings, or by other methods.

B. Economic Criteria for Consideration

The following criteria are some of the main economic considerations for evaluating the feasibility of a reuse system.

1. **Customer base and wastewater availability.** As previously mentioned, the typical uses for reclaimed water are golf courses, residential and commercial landscaping, greenspace, parks, athletic fields, and roadway medians. Most coastal Georgia communities, especially those that are growing, will have some or all of these as potential customers. However, there must be enough wastewater generated by a community to not only supply customers, but to make the cost of a reuse system feasible.

2. **Cost of installing a second distribution system.** If the cost of the reuse option is greater than 2% of the current per capita income for the community, then the reuse option will not be required. However, other factors such as lack of assimilative capacity in receiving streams for wastewater may require the community to consider reuse options that have greater costs.

3. **Location and magnitude of projected population growth.** Providers must consider the location of existing treatment facilities compared to growth areas. It is typically more cost effective to install a new reuse system before new development occurs as new sewer lines are installed than to install a system in an established area.

4. **Impact on future growth limits.** Limited water supplies in the future may limit economic growth in some parts of coastal Georgia. Similarly, limited assimilative capacities in coastal receiving waters may prohibit future wastewater discharges. Use of reclaimed water may allow for more sustained growth in those areas where long-term water supplies and discharges may be a problem.

C. Environmental Criteria for Consideration

1. **Impact on Floridan aquifer.** The main environmental consideration for evaluating the feasibility of a reuse system is its potential impact on reducing Floridan aquifer withdrawals. A substantial amount of water used by communities is for outside landscape irrigation. In some cities, outdoor use of water in summer may increase total water use by more than 40%. Reuse water greatly reduces that amount, and will thus decrease groundwater withdrawals. This could significantly prolong the sustainable yield of the Floridan aquifer in coastal Georgia. In addition, the summer use peak requires additional potable water production and distribution infrastructure. Reducing these peaks may extend the life of the potable water system and reduce drinking water treatment costs.

2. **Impacts of construction**. Building reuse pipelines through environmentally sensitive areas such as marshlands must be addressed, and efforts to mitigate these impacts must be considered.

Part 2: Reuse Feasibility Evaluation Form

This document and form should serve as step-by-step guides in the development of your Reuse Feasibility Evaluation report. Please provide the maps and other information requested, and complete the form in the space provided. Most of the information needed can be obtained from your wastewater treatment operator. If you need more space than provided here, please attach additional pages to this form. Submit your Reuse Feasibility Evaluation report along with the requested maps, this completed form, and any additional pages or documentation to the appropriate EPD District Office (Brunswick or Savannah) no later than 24 months after the date of your permit issuance.

A. Scope of the Project Area

Please provide maps of :

1. Your City or County boundaries, water and sewer districts, limited service areas, and areas of new or anticipated development.
2. The location of nearby wastewater treatment facilities, supply lines, collection lines, any existing reuse lines, and treated wastewater outfall location(s).

B. Existing Collection, Treatment, and Distribution

1. Current wastewater treatment capability

   a. What is the community's NPDES permit number? _____
   b. What is the permitted discharge for this permit? _____
   c. What is the name of the receiving water? _____
   d. What are the current permit limits for the following?

      1) BOD_5 _____
      2) NH_3-N _____
      3) DO _____
      4) TRC _____
      5) Total P _____
      6) Fecal col. _____
      7) TSS _____

   e. Indicate which of the treatment methods are currently used (please check)

      1) Clarification _____
      2) Coagulation _____
      3) Filtration _____
      4) Disinfection _____
      5) Aeration _____
      6) Membrane bioreactors _____

C. Future Conditions

1. Please provide population projections for the entire project area and (if necessary) sub-areas or service areas. For guidance in developing population projections, please refer

to EPD Guidance Document "Method For Determining Future Water Demand Needs For Public/Private Water Systems", available at

2. What types of developments and potential reuse customers are available or expected in your service area?

3. Provide a map showing areas where potential reuse customers are most likely to be located. You may include this under "Scope of the Project Area" above.

D. <u>Reuse Analysis</u>

The permittee or user must develop wastewater reuse scenarios, including the "no action" scenario. The analysis should include the following considerations. Use the "Criteria for Consideration" listed in Part I above, as well as the companion EPD Guidance Document "*Guidelines for Water Reclamation and Urban Water Use"*, available at http://www.gadnr.org/cws.

1. Environmental Impacts

   Describe any environmental impacts that may preclude the use of reclaimed water, and how you could address these impacts.

2. Technical Issues

   Describe any technical issues that may preclude the use of reclaimed water and how you could address these issues.

3. Water Withdrawal Savings

   Reuse is intended to minimize the use of potable water or groundwater for irrigation. What is your expected reduction in potable use and/or groundwater withdrawal as a result of installing a reuse system? _____ gpd.

   Please note that inefficient irrigation or a use that would not normally occur (such as irrigation of pine trees or vacant lots) is considered to be disposal, not beneficial reuse. Thus, it would not be considered water withdrawal savings.

4. Wastewater Treatment and Disposal

   Would installation of a reuse irrigation system enhance your wastewater treatment and disposal capacity? Please describe how it would, or would not, affect your current wastewater treatment needs.

5. Economic Analysis

   An economic analysis must be performed to demonstrate the affordability of the reuse project for the community or facility. The analysis may compare the project cost with the current per capita income. If the cost of the project is greater than 2% of the current per capita income, then the reclaimed water project will not be required. However, other factors may offset reuse costs, and make reuse an economically feasible option. (For example, lack of assimilative capacity in receiving streams for wastewater may require expensive treatment, which could exceed the costs of a reuse system). Please attach any supporting calculations or documentation.

   Different methods of economic analysis for reuse systems are acceptable. Most likely, the specific factors you will have to consider are:

   - Project Costs (Annualized Capital and Annual Operating Costs)
   - Capital Costs
   - Assumed Type of Financing (Revenue Bonds, GEFA loans, etc.)
   - Interest Rate (expressed as a decimal)
   - Time Period of Financing (years)
   - Annualization Factor
   - Annualized Capital Cost
   - Total Annualized Operations and Maintenance Costs (Power, Staffing, Monitoring, Inspection, etc.)
   - Current per Capita Income
   - Population Served
   - Total Community Income

An example method for performing an economic analysis using these factors is shown below:

a. Project Costs (Annualized Capital and Annual Operating Costs)
Capital Costs _____ (x)

b. Assumed Type of Financing
(Revenue Bonds, GEFA loans, etc.) _____

c. Interest Rate (expressed as a decimal) _____ (I)

d. Time Period of Financing (years) _____ (n)

e. Annualization Factor = $(I/[(1+I)^n - 1)]) + I$ _____ (y)

f. Annualized Capital Cost (x times y) _____

g. Total Annualized Operations and Maintenance Cost s _____
(Power, Staffing, Monitoring, Inspection, etc.)

h. Total Project Costs _____

i. Current per Capita Income
(from US Census data (djusted to the current year for inflation)
_____

j. Population Served _____

k. Total Community Income:
(Per Capita Income) times (population) _____

l. [(Project Cost)/(Total Community Income)]*100% **_____**

E. <u>Selected Project</u>

Identify and describe the reuse project you selected based on the analysis you performed. Discuss your reasons for the selection. If you chose the "no action" scenario and will not be installing a reuse system, please explain why.