

**NORTH CAROLINA DEPARTMENT
OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WASTEWATER SECTION**

**EXPERIMENTAL WASTEWATER SYSTEM
APPROVAL**

EXPERIMENTAL WASTEWATER SYSTEM NO.: EWWS-93-1

ISSUED TO: Claude Halford House, Department of Forestry,
North Carolina State University, Box 8008,
Raleigh, N.C. 27695-8008

FOR: Evaluation of On-Site Wastewater Treatment Designs Integrating
Constructed Wetlands

DATE: December 9, 1993

In accordance with 15A NCAC 18A.1969, an application by Claude Halford House, North Carolina State University, for approval of an experimental system research and testing program for the evaluation of on-site wastewater treatment system designs integrating constructed wetlands has been found to meet standards to warrant approval. The following shall be met for system(s) installed in accordance with this experimental system protocol.

I. SYSTEM DESCRIPTION

A. General: Various combinations of interconnected artificially created upland and wetland environments, including:

Berm-wetland
Horizontal subsurface flow wetland
Vertical flow wetland
Vertical flow-horizontal flow wetland

B. Specific for this initial approval: Merchant's Mill Pond Site (Gates County):

Berm-wetland (150 square foot pressure does, lined, sand berm; 150 square foot horizontal subsurface flow wetland)
Horizontal subsurface flow wetland (264 square foot, TVA design)

Above subsystems each designed to handle 200 gallons per day, with equal doses to be delivered to each subsystem simultaneously.

II. SITE LOCATION/SELECTION:

- A. General: Preference to be given to sites that have existing properly functioning system which will serve as a non-experimental backup system, or to sites with an existing system that malfunction seasonally.

Specific to Merchant's Mill Pond site: System shall serve the existing ranger's quarters, and utilize the existing septic tank and pumping chamber and return all effluent to the existing ground absorption field.

III. DETAILED DESIGN CRITERIA:

- A. Merchant's Mill Pond Site: (Other future sites not yet specified)

Subsystem No. 1: Berm/wetland

6 x 25 square foot berm containing specially designed crushed brick, coarse sand and gravel layers, PVC liners, and sleeved pressure distribution system, followed by 20 x 15 square foot horizontal subsurface flow wetland cell, to be planted with wool grass and rush. Water level control structure at outlet and two tipping distribution boxes provided to regulate and monitor flow.

Horizontal subsurface flow wetland (following TVA design guidelines):

8 x 33 square foot horizontal subsurface flow wetland cell with pressure distribution system at inlet. Water level control structure at outlet and one tipping distribution box provided to facilitate flow regulation and monitoring.

IV. PERMITTING AND INSTALLATION:

A local health department may issue an improvement permit for an experimental system installed in accordance with this approval and the applicable provisions for .1969(4)(c). At this time, specific approval only applies to the proposed Merchant's Mill Pond experimental system.

Note that the installation shall be under the direct field supervision of the research organization (eg: North Carolina State University representatives).

The system must not be brought into service until the installation has been completed and approved by the health department, and experimental system operation permit (ESOP) has been issued. Prior to ESOP issuance, an executed agreement shall be provided to the health department between the funding source (Division of Soil and Water Conservation), land owner (Division of Parks and Recreation), and research organization (North Carolina State University), authorizing the proposed research to be carried out.

The health department must also be provided with assurance on how system operation and maintenance is to be performed, including designation of the management entity/certified subsurface operator prior to ESOP issuance.

V. OPERATION AND MAINTENANCE AND MONITORING:

Each system to be approved under this experimental system protocol is proposed to be monitored for its effectiveness in the treatment of nitrate, ammonium, total Kjeldahl nitrogen, total phosphorus, phosphate phosphorus, suspended solids, biochemical oxygen demand, pH and fecal coliform bacteria.

Monitoring is proposed to be carried out for a two-year period from each system to be installed.

Upon completion of research and evaluation at each test site, a written report is to be provided to the Division of Environmental Health summarizing the results of the monitoring and making recommendations upon the future use of the system.

Approved by: _____ Date: 12/9/93