

# PROCEDURES AND INFORMATION REQUIRED FOR APPROVAL OF LARGE SUBSURFACE WASTEWATER SYSTEMS

## DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

*Division of Environmental Health*

*On-Site Wastewater Section*

*1642 Mail Service Center*

*Raleigh, NC 27699*

*(919) 733-2895*

*Fax (919) 715-3227*

## PREAPPLICATION, APPLICATION AND DESIGN FLOW CONFIRMATION

### 1. **Preapplication:**

Applicant and local health department (LHD) hold preapplication conference to review and transmit application forms, checklists<sup>+</sup>, guidance documents<sup>+</sup> and rules<sup>+</sup>, and to discuss project, information needs, field and review requirements and projected time frames. Applicant's consultant(s) should to attend and On-Site Wastewater Section (OSWS) Regional Staff may attend upon request by either party.

### 2. **Application for Improvement Permit (Site Approval):**

#### a. Applicant Submits completed application to LHD, including

- Project title,
- property location shown on plat or boundary survey, PIN number and locator map
- name/address/phone/fax/E-Mail numbers for owner, agent, engineer and soils consultant
- whether the proposed system is new, a repair, an expansion, a replacement, or modification to an existing system
- description and location of water supplies (existing and proposed) and surface waters
- description and location of facilities (existing and proposed) to be served by system, occupancy and projected use patterns
- list of wastewater sources, water use fixtures (points of wastewater entry into system), and projected wastewater characteristics (e.g. provide wastewater quality data for any non-domestic sources), and description of projected flow patterns
- description and location of wastewater system components (existing and proposed)
- proposed phasing schedule for facilities and system components

<sup>+</sup>-checklists, guidance documents and rules can be accessed on-line from the OSWS HomePage, at [www.deh.enr.state.nc.us/oww](http://www.deh.enr.state.nc.us/oww)

**2. Application for Improvement Permit (Site Approval) cont'd:**

- projected wastewater design flow rate(s) for each system component and phase of development, and basis for determining (by applicant's engineer)
  - documentation showing that both the wastewater system and the facility are under the ownership or control of the person owning the facility, or an owner's association and tri-party agreement shall be provided
- b. LHD reviews application for completeness and requests in writing additional information as needed from Applicant. Incomplete applications shall be returned.

**3. System Wastewater Design Flow Confirmation:**

- a. The LHD shall review and confirm prescribed system design flow rates when established in accordance with Rule .1949(a) or Table No I of Rule .1949(b). Otherwise, the applications shall be forwarded by the LHD to OSWS Central office for review and design flow confirmation.
- b. The OSWS-Central office shall review and confirm prescribed system design flow rates when established based on flow and wastewater characteristic data, use of water conserving fixtures in accordance with Rule .1949(c), or flow equalization, and for facilities not identified in Rule .1949(a) or Table No. I of Rule .1949(b).

[Completeness of application for design flow determination by OSWS shall be evaluated and response given within 10 working days of receipt. If application is incomplete, response shall include request for additional information, and review and response to revised submittal shall be done within 10 working days of its receipt.]\*

## SYSTEM, SOIL AND SITE EVALUATIONS

**4. Existing System Component Evaluation:**

- a. Applicant's consultants, with LHD's assistance and surveillance, shall inspect existing system components initially proposed to remain in use.
- b. Existing component dimensions, capacities, adequacy/suitability for proposed continued use (with justification), and needed repairs or modifications to be incorporated into the system engineering design shall be identified by applicant's consultants and concurred with by the LHD. OSWS Regional or Central office staff may assist with the necessary field review upon request by either party.

5. **Soil/Site Evaluations:**

- a. Applicant's consultants prepare proposed site plan based on a boundary survey prepared by a registered land surveyor, to include:
- all corners of property and property line boundaries relevant to system design
  - wells/water supply sources (existing and proposed) within property or within 500 feet of any proposed drainfield(s) and repair area(s) and within 100 feet of all other system components
  - existing water lines within property and within 20 feet of any projected system component
  - surface waters with their water quality classifications, designated wetlands, and existing storm drainage features
  - existing roads and structures
  - locations of any existing wastewater system components, drainfields/repair areas
  - areas being proposed for facilities and system components
  - preliminary topographic map (with at least five foot contour intervals) for areas to be evaluated for drainfields and repair areas.

**As soon as available and prior to field evaluation by the LHD, two copies of the proposed site plan shall be provided to the LHD**

- b. Applicant's soil scientist field evaluates soil/site conditions within proposed drainfield and repair area and prepares report which shall include the following (see note and item "c" below pertaining to need to inform LHD and OSWS Regional Soil Specialist when field work is being scheduled and to request for them to concurrently do any necessary verification of field work):
- Soil profile descriptions **which are legible** (including information on slope, landscape position, texture, structure, clay mineralogy, depth, wetness conditions, and restrictive horizons) for pits or a combination of pits and soil borings made at each site for the initial drainfield(s) and repair area(s). Site(s) shall be gridded and field staked at 50 foot intervals to enable profile description locations to be identified in the field and on the site plan. Intervals between profile descriptions and the relative use of borings versus pits proposed to be made by the soil scientist shall be pre-approved by the LHD with concurrence by the OSWS Regional Soil Specialist on a site specific basis. Locations of pits and borings shall be shown on the site plan.
  - Delineation of sites which are suitable, provisionally suitable, or unsuitable for different types of wastewater systems (e.g.: conventional, shallow conventional, LPP, etc.) Delineate in sufficient detail on the site plan to enable location in the field.
  - Recommended LTAR for conventional, LPP, or other proposed system with justifying references.
  - Soil/site-based recommendations for drainfield design and site modifications (e.g.: maximum trench depth, fill depth, surface/subsurface drainage needs, etc.).

**5. Soil/Site Evaluations cont'd:**

- Soil chemical data for sites proposed to receive wastewater from non-domestic sources, including pH, cation exchange capacity, percent base saturation and background metal and cation (sodium, potassium, calcium and magnesium) levels, if the wastewater is expected to contain concentrations of these elements greater than domestic underwater.
- For sites originally classified unsuitable, written documentation indicating that the proposed system can reasonably be expected to function satisfactorily, in accordance with Rule .1948(d).

**The applicant's Soil Scientist shall inform the LHD and Regional Soil Specialist at least two weeks in advance when field work is being scheduled at least two weeks in advance.**

- c. LHD field evaluates site, with assistance as needed from the OSWS Regional Soil Specialist (including field work concurrent with applicant's soil scientist's field work) to verify soil scientist's evaluation and compliance with applicable rules. LHD prepares evaluation report, including results from independent check borings/pits, using DEH form 2601 (form is available on-line; show locations of borings/pits on site plan).

**As soon as available, one copy of the LHD soil/site evaluation shall be provided to the Applicant, and one copy provided to the OSWS-Regional Soil Specialist.**

**SITE LOADING CAPACITY ANALYSIS, LAYOUT AND IMPROVEMENT  
PERMIT ISSUANCE**

**6. Applicant's registered land surveyor prepares field topographic map:**

- a. Shall include site or sites for all proposed drainfields and repair areas with at least two-foot contour intervals (for level sites, spot elevations at 50 foot grid intervals shall suffice).

Alternately, proposed lateral lines for initial system and repair can be field-located, flagged, and surveyed in on the site plan.

- b. Relative elevations along property lines and as needed to evaluate hydraulic gradient between field sites and adjacent property lines shall be shown on the topo map or site plan.

**7. Site-Specific Information on Site Loading Capacity and Assessment of Groundwater Impact:**

- a. Applicant's soil scientist or hydrogeologist collects sufficient field information and prepares report showing how performance requirements of Rule .1946(4) shall be met, provides substantiation for proposed LTAR and assessment of projected compliance with groundwater standards, including justification.

**7. Site-Specific Information on Site Loading Capacity and Assessment of Groundwater Impact cont'd:**

**The applicant's Soil Scientist or geologist shall inform the LHD and Regional Soil Specialist at least two weeks in advance when field work is being scheduled. The LHD should be on-site during the collection of field information.**

- b. Site-specific information shall typically include:
- In-situ hydraulic conductivity measurements in the most restrictive horizon within two feet of the trench bottom to support selected LTAR.
  - Logs from deep borings (usually 10-20 feet deep) identifying restrictive layers, relevant changes in texture and density, and aquifer boundaries
  - In-situ lateral hydraulic conductivity measurements of effective shallow aquifer
  - Groundwater mounding analysis (level sites) or wastewater conveyance capacity analysis (sloping sites)
  - Contaminant transport assessment showing compliance with groundwater standards at property lines or at any water supply sources within or adjacent to property.

**8. Revised Site Plan and System Layout:**

- a. Applicant's engineer and land surveyor prepares revised site plan and system layout (at scale not to exceed one inch equals 50 feet), including:
- All relevant features required to be shown in the initially proposed site plan (refer to item No. 5a above), and any proposed revisions.
  - Proposed structures, roads, drainage features, water supply wells, water lines, and any underground utilities or utility rights-of-way
  - Delineation of designated wetlands, and elevations of 10-year and 100-year flood plains in the vicinity of any system component, and source of data
  - Locations of any existing or proposed sediment control and storm water management system components.
  - Proposed location and field-verified layout of new drainfield(s) and repair field(s) and proposed alterations to field topography.
- b. LHD field reviews system location and layout with an engineer's level or laser level and informs applicant in writing of any problems found. Assistance may be sought from the OSWS Regional Soil Specialist staff upon request.

**9. OSWS Review and Approval:**

- a. Applicant submits complete site information package to OSWS Central office through the LHD (**two** copies for LHD, or as locally requested, and **four** copies for OSWS\_Central office), including:
- Application for Improvement Permit (item 2a above)

**9. OSWS Review and Approval, cont'd:**

- Soil/site evaluation reports by applicant's soil scientist and LHD (items 5b and 5c above)
- Topographic Map (item 6, above)
- Site loading capacity and assessment of groundwater impacts (Item 7 above)
- Revised site plan and system layout (item 8, above)

Applicant also submits to OSWS Central office through LHD (two copies for LHD, or as locally requested, and two copies for OSWS\_Central office), the following:

- Draft legal documents for systems to be under joint or multiple ownership or control, including easements, association documents, and draft tri-party agreement, as appropriate
  - Existing component inspection/assessment reporting, if applicable, identifying any needed repairs/modifications (item 4, above)
- b. OSWS Central office forwards copies to Regional Staff, Division of Water Quality (DWQ) Groundwater Section, and other agencies as necessary.
- DWQ Groundwater Section evaluates projected impact on groundwater and advises OSWS on approval conditions and groundwater monitoring requirements
  - OSWS Central office compiles review comments from other divisions/agencies and distributes as appropriate.
  - OSWS Central office engineering staff forward to OSWS Regional Soil Specialist comments pertaining to proposed drainfield/repair field layout and on any other siting/location issues related to existing and proposed system components.
- c. OSWS Regional Soil Specialist evaluates adequacy of all submittals required above.
- Site evaluation reports prepared by applicant's soil scientist and LHD (field work should be scheduled to be done concurrent with applicant's soil scientist's and LHD's field work whenever possible) shall be reviewed. Any further field work or analyses needed by the applicant's soil scientist or LHD shall be identified in writing.
  - Acceptability of proposed drainfields and repair fields layout and proposed continued use, repair or modification of any existing system components shall be reviewed with LHD and OSWS Central Office staff input.
  - OSWS Regional Soil Specialist recommends approval or denial, or identifies any modifications or additional information needed prior to approval of revised site plan and layout. Interim site/layout issues and revisions shall be directed by the Applicant's consultants to the OSWS Regional Soil Specialist. Three copies of the finally revised site plan and system layout shall be provided to the OSWS Central office, which shall provide copies stamped "Approved by the OSWS" to the local health department and to the Applicant's engineer, and notify the Applicant of OSWS Approval.

[OSWS Central office shall acknowledge receipt of site information package and identify incomplete items found during a cursory review within 10 working days of receipt. Response shall be given by the OSWS Regional Soil Specialist within 35 working days of receipt of complete information after determined to be complete. Revisions, modifications, and additional information shall be responded to within 15 working days. Submittal packages shall be returned to the applicant after 60 days, if package remains incomplete or if comments have not yet been responded to.]\*

**10. Improvement Permit Issuance:**

- a. LHD issues improvement permit, after confirming OSWS approval of revised site plan and layout, and legal documents have been properly drafted, and when necessary, executed and recorded.
- b. The Improvement Permit shall include as conditions:
  - required modifications to be made to the site, and statement that the permit remains valid only if the proposed facility served and the site otherwise remain unchanged
  - statement that the Authorization to Construct shall not be issued until required site modifications have been completed and engineering plans and specifications have been approved by OSWS
  - other conditions determined to be necessary by the LHD

**SYSTEM ENGINEERING DESIGN APPROVAL AND ISSUANCE OF  
AUTHORIZATION TO CONSTRUCT**

11. **Applicant and/or Engineer is encouraged to request a pre-design conference with the OSWS Central office engineering staff** to discuss design options, receive updated rules and guidance documents, review procedures and projected time frames. LHD and OSWS Regional Staff may attend upon request by any party.
12. **Applicant's Engineer submits engineering design** plans, specifications and supporting calculations (submit **two** copies to LHD, or as locally requested, and **three** copies to OSWS Central office)
  - a. The North Carolina Registered Professional Engineer's seal shall appear on all plan sheets and the first page of specifications and calculations.
  - b. The design must be in accordance with applicable rules, guidelines, and recognized principles and practices of engineering and public health.
  - c. The design must incorporate and be consistent with the approved site plan, system layout and the improvement permit. Facility description and details (e.g.: floor plans) shall be submitted (**one** copy to LHD and **one** copy to OSWS) as needed to confirm compatibility with previously submitted information.

**13. Specifications must include:**

- Description of all materials and equipment to be used, manufacturer's cut sheets, pump curves, etc.
- Project-specific construction methods, installation, testing and start-up procedures
- Means for assuring the quality and integrity of the finished product
- Specific operations and maintenance procedures, including requirements for system operator; inspection, process and performance monitoring schedules; provisions for maintaining mechanical components and drainfield vegetative cover; and reporting requirements
- Provisions for residuals management
- Abandonment procedures for existing system components that are no longer required.

**14. Plans and specifications for specific system components shall include:**

a. Collection systems and force mains:

- Plan drawings, including locations of manholes and cleanouts
- Profile drawings shall be provided when the collection system is a 6-inch or larger gravity sewer serving two or more buildings or contains two or more manholes, or when it is a pressure sewer system. Otherwise show pipe invert and ground surface elevations on plan drawings for all cleanouts/manholes
- Force mains shall be shown in profile when their length exceeds 500 feet, or when their grade is not continuous. Otherwise, show inverts at beginning and end, and depth of cover
- Indicate proximity to utilities and pertinent features such as wells, water lines, storm drains, surface waters, structures, roads, and other trafficked areas.
- Detail drawings of service connections, manholes, cleanouts, valves, other appurtenances, aerial crossings, and crossings of roads, water lines, storm drains, streams or ditches
- Alignment, deflection and infiltration/exfiltration testing procedures and pass/fail criteria

b. Tanks:

- Location of tanks accessible to pumpers and maintenance vehicles, showing setbacks
- Tank dimensions and relevant elevations (bottom, floor, inlet, and outlet inverts, top and ground)
- Other pertinent elevations in pump tanks (i.e., float activation levels) or siphon tanks (i.e., siphon-trip and alarm elevations)
- Access riser, manhole, chamber interconnection and sanitary tee details
- Complete construction details for built-in-place tanks, including dimensions, reinforcement details and calculations, and construction methods
- State-approved precast tanks shall be specified as to manufacturer, nominal capacity, whether or not the tank is rated for traffic loading and State approval number (i.e., the PT-number for pump tanks, and the STB-number for septic tanks)
- For grease traps, design and construction specifications in accordance with Rule .1955(k)

b. Tanks cont'd

- Installation (e.g.: bedding, method of sealing tank and riser, pipe connections, surface water diversion) and water tightness testing procedures with pass/fail criteria
- Anti-floatation (buoyancy) calculations and provisions, if necessary

c. Pump stations:

- Pumps, discharge piping, and all related appurtenances (on the plans)
- System total dynamic head calculations, pump specifications, pump curves and expected operating conditions (in the specifications).
- Accessible pump removal system (on the plans)
- Accessible float support system, float switches and float settings (on the plans)
- Control panel and high-water alarm location and electrical connection details (on the plans)
- Control panel/high-water alarm components (on the plans or in the specifications)
- Description of float sequencing, control panel functions under normal and abnormal conditions, and appropriate settings (on the plans or in the specifications).
- See also applicable requirements in item 14b above
- Emergency storage capacity calculations and provisions for stand-by power (when applicable)
- Lighting, wash-down water supply with back siphonage protection, and protective fencing, as needed

d. Ground absorption fields:

- Final layout, existing and finished ground elevations (on the plans). All fields and lines should be re-staked in the field if necessary prior to plan approval. Staking shall be sufficient to confirm all lines can be installed along the natural ground contour, maintaining minimum required separations, and to verify relative line elevations.
- Trench and lateral distribution system plan and cross sectional details and invert elevations for each lateral (on plans)
- Manifolds, supply lines, cleanouts and interconnection details and invert elevations (on the plans)
- Flow distribution device design, construction detail, location, and invert elevations (on the plans)
- Drainage system locations, discharge points and design details (on the plans)
- Site preparation procedures (in the specifications)
- Construction phasing and phased system testing (in the specifications)
- Final landscaping provisions including compliance with erosion control requirements (in the specifications)

e. For advanced pretreatment systems (e.g.: sand filters, tertiary wastewater treatment plants), pressure sewer systems (e.g.: STEP or Grinder pump systems), and industrial process wastewater systems, contact OSWS Central office for supplemental lists of information to include with project plans and specifications

- f. Other requirements or guidelines not listed above shall be demonstrated to be followed, including:
- The Commission for Health Services Wastewater Rules [e.g.: .1938(f), .1946(4), and .1950(d)]
  - Document entitled “Planning and Permitting Procedures and Design Guidelines for Subsurface Sewage Systems Where the Design Flow Exceeds 3,000 Gallons Per Day”
  - Accepted principles and practices of soil science, geology, engineering and public health

**15. Design Review and Approval:**

- a. OSWS reviews design for completeness, compliance with applicable laws, rules, guidelines, and good engineering and public health practice.
- b. LHD reviews facility and wastewater system plans for compatibility with improvement permit, and field reconfirms field acceptability of re-staked drainfields and repair field layouts.
- c. OSWS approves plans and specifications when complete and all technical requirements have been adequately met.

[OSWS Central office shall acknowledge receipt of engineering plans and specifications, a review engineer shall be assigned, and the design engineer shall be notified of items found to be incomplete during a cursory review within 10 working days of receipt. Response shall be given within 25 working days of receipt of complete information after determined to be complete. Revisions and modifications shall be responded to within 10 working days. Incomplete projects shall be returned to the engineer after 60 days if plans and specifications remain incomplete or if comments have not yet been responded to.]\*

**16. LHD may issue Authorization to Construct after confirming:**

- All site modifications required in the Improvement Permit have been completed
- OSWS has approved the engineering plans and specifications

**SYSTEM CONSTRUCTION AND OPERATION PERMIT ISSUANCE**

- 17. Applicant, Certifying Engineer, Installer, and LHD shall hold a preconstruction meeting** on-site to review plan details, site preparation steps, installation methods, construction schedule, and inspection procedures. OSWS Staff may attend upon request by any party. Provisions must be established for there to be engineer supervision and LHD inspection of all aspects of the system installation prior to operating permit issuance. The Applicant’s soil scientist may also be required to be on-site during site preparation, selection and incorporation of fill material when determined to be critical to the proper installation of the system.

**18. Installation shall be completed** in a professional, workman-like fashion in strict accordance with approved plans and specifications (or approved modifications), and all requirements of the Improvement Permit, Authorization to Construct and applicable Laws and Rules.

- The owner shall maintain a contract with a registered professional engineer at all times during the construction of the system who shall be responsible for certifying compliance of the installation with approved plans and specifications. A contract with a soil scientist for installation supervision may also be required.
- The certifying engineer shall provide record plans and specifications (**one** copy to LHD and **one** copy to OSWS Central office) along with the certification which shall bear his/her professional engineer's seal.
- The engineer shall complete an operation and maintenance manual including O and M materials provided by the appropriate equipment suppliers and submit to the owner and proposed Operator in Responsible Charge (ORC).

**19. The Operation Permit may be issued by the LHD when:**

- The installation has been properly certified by the certifying professional engineer, and record plans and specifications have been furnished.
- The installation is determined to be complete by the LHD based upon field inspection, including final landscaping, seeding and mulching, provisions for proper system maintenance and monitoring (e.g. any groundwater monitoring wells) are in place, a system "start-up" inspection has been completed and the system is found to be complete and operational, and the system operation and maintenance manual has been furnished. The OSWS will assist with the LHD's final inspection for all systems containing advanced pretreatment components (e.g. tertiary treatment plants) or complex distribution or control components and may assist with other systems upon request.
- All necessary legal documents have been properly executed and recorded, including the tri-party agreement (when applicable) and any required easements, and documentation is provided that the owner has executed a contract with an ORC who is duly certified by the Water Pollution Control System Operators Certification Commission to operate and maintain this system.
- All other conditions of the improvement permit and Authorization to Construct it have been met.

\* **Time lines established for OSWS review activities are subject to variation depending on staff shortages and project-specific circumstances.**