

Chapter 2 Preliminary Data Requirements

2-1. General

The goal of Federal and state water pollution control authorities in conducting pollution abatement activities is to protect and enhance the capacity of water resources to serve the widest possible range of human needs. Material presented in this chapter is intended to identify the data requirements considered necessary to the design of small-scale wastewater treatment facilities.

2-2. Recreational Facilities

a. Definitions. The term “recreational area” is used throughout this manual to include land or water areas dedicated to the enjoyment of the public. For the purpose of this manual, recreational treatment facilities are defined as any wastewater treatment facilities for recreational areas including primitive campsites; modern campsites complete with trailer dump stations, flush toilets, and showers; and parks, picnic areas, overlooks, comfort stations, fish cleaning stations, etc.

b. Type. The type of recreation area determines the complexity of the recreational facility treatment system. For example, a modern campsite requires a more complex design of the wastewater treatment facility than a primitive campsite, while recreational treatment facilities in parks, picnic areas, overlooks, comfort stations, and fish cleaning stations have special design considerations of their own.

c. Frequency. The frequency of public visitation is an important consideration in the design of any recreational treatment facility. Most recreational treatment facilities are seasonal operations and experience wide fluctuations in wastewater flow that can range from no flow to maximum flow conditions over a short period of time. For example, facilities that experience large number of visitors on weekends may require a treatment process that can effectively operate over a wide fluctuation of both hydraulic and organic loading.

d. Estimation of design parameters. The estimation of wastewater design parameters has been historically based on different methods, such as traffic count, percent occupancy, and head count. Each method, however, has inherent limitations and may or may not be applicable to a specific site. A detailed discussion of each estimation method is presented in Chapter 3.

2-3. Determination of Effluent Limitations

a. Regulations. The primary design goal for any wastewater treatment plant is to meet Federal, state and local effluent limitations and receiving-body-of-water quality standards. Therefore, the design engineer must become familiar with national and local regulatory requirements governing a specific area for discharging wastewater and/or land application.

b. Monitoring requirements. Federal and state regulatory requirements for discharges from treatment facilities into recreational waters are usually more stringent than those for discharges from treatment facilities to other receiving waters. Monitoring requirements usually consist of flow, residual chlorine, pH, 5-day biochemical oxygen demand (BOD₅), total suspended solids (TSS), and fecal coliform. Total Kjeldahl nitrogen (TKN) and total phosphorous determinations may also be required. Table B-3 summarizes state requirements pertinent to recreational treatment facilities design.

2-4. Site Selection Factors

a. General considerations. The planning design engineer, when selecting sites for recreational treatment facilities, must ensure that the planned facility will not cause interference or detractions from the natural, scenic, aesthetic, scientific, or historical value of the area. In addition, topographic, geological, hydrogeologic, and atmospheric factors and conditions must be considered when designing the treatment facility for a recreational area. For specific considerations regarding site selection, space, and access requirements, see TM 5-814-3, Chapter 2.

b. Aesthetic considerations. The designer must ensure that distinguishing features that make the area of recreational value are not degraded. Vertical building construction should complement or enhance adjacent architectural and environmental features. Aesthetic aspects are important enough to the value of any recreational area that additional construction, operation, and maintenance costs to preserve the beauty of the site may be justified.

c. Topographic considerations. Topography must be considered if maximum utilization of gravity flow through the entire system is to be achieved. Many recreational areas are well drained and gently sloping. Flat terrain usually requires a decision concerning pumping of wastewater to some point within the plant before adequate gravity flow can be obtained. Additional pumping costs may be necessary for a treatment facility on a site remote from visitor concentrations.

d. Geologic and hydrogeologic considerations.

(1) The capacity or incapacity of geological formations underlying the recreational facilities to support loads must be considered when selecting a site. Rock formations directly affect the excavation costs. The absorptive capacity of underlying soils is an important site selection parameter for various treatment systems. For example, land disposal systems require soils with high permeability for effective treatment. However, lagoons or other wastewater treatment processes that use earthen dikes should not be constructed over highly permeable soils, and they must be lined to avoid excessive rates of seepage from the basins. To avoid groundwater contamination, seepage rate should generally not exceed 0.3 mm/d ($\frac{1}{8}$ in/d).

(2) Adequate soil exploration is essential in site selection to guard against excessive seepage and against structural failure. Selected references are available to determine soil characteristics and expected properties (Taylor 1963, Teraghi 1960).

e. Atmospheric condition considerations. The atmospheric conditions of a candidate site must be evaluated during the planning phase; these include temperature, pressure, air movements, humidity, cloudiness, and precipitation. Average, as well as extreme, atmospheric conditions and variability of elements are also important considerations during site selection. Generally, it is best to locate recreational treatment facilities downwind from visitation centers to minimize odor and aerosol problems. If the construction of a recreational treatment facility at a remote site is not feasible, the design engineer must consider other alternatives, such as installing a landscape and/or decorative screen around the treatment plant and limiting the odor from the plant under normal operating conditions. Location is especially important where treated wastewater effluents are disposed by land application. For specific atmospheric condition considerations and requirements, see TM 5-814-3, Appendices D and E.