6
LARGE SYSTEMS

The focus of Chapters 3 and 4 relates to onsite wastewater disposal systems designed to serve single family homes. This chapter addresses the requirements for the design of Pre-Treatment onsite wastewater treatment and disposal systems for proposed systems with hydraulic loading rates of 900 gallons per acre per day up to 2000 gallons per acre per day, and septic tank/ absorption field treatment and disposal systems having a treatment and disposal capacity of 1000 gallons per day of more.

6.1 DEFINITION OF LARGE SYSTEMS

A large system is any onsite wastewater disposal system which will be used to treat wastewater which varies in strength or quantity from domestic wastewater produced from a single family home.

A. Community Systems

A community system which will serve more than one lot, more than one condominium unit, or more than one unit of a planned unit development is considered a large system.

B. Apartments, Duplexes and Mobile Home Parks

Multifamily housing developments will require large systems for wastewater disposal. Separate onsite wastewater disposal systems may be provided for each individual multifamily housing development. Separate onsite wastewater disposal systems for individual multifamily housing developments shall be considered large systems.

C. Commercial Establishments

Commercial establishments include restaurants, laundromats, hospitals, shopping centers, etc. All onsite systems for commercial establishments will be considered large systems because of the need to accurately quantify and classify the nature of the wastewater from these facilities.

D. Industrial Wastewater Discharges

Industrial wastewater is water that has been used as part of a manufacturing or processing enterprise. Industrial wastewater often has a very high strength and/or does not have a nutrient balance similar to domestic wastewater. Industrial wastewater systems will be considered large systems. The design of onsite wastewater disposal systems for industrial discharges is beyond the scope of this manual.

6.2 GENERAL REQUIREMENTS FOR LARGE SYSTEMS

Unless otherwise authorized by the Town Council, large systems shall comply substantially with the following requirements:

1. The system shall be designed by a registered Civil Engineer experienced in the design of Wastewater Treatment Systems. Upon request, the Engineer shall provide the Onsite Sanitary Official with a Qualification and Experience record.

2. The characteristics of the wastewater to be treated shall be documented to the satisfaction of the Onsite Sanitary Official. At a minimum the following constituent concentrations in the wastewater shall be identified in the Site Evaluation Report.
   a. 5-day B.O.D.
   b. Total Suspended Solids.
   c. Total Nitrogen reported individually as Kjeldahl Nitrogen and Nitrate Nitrogen.
   d. Any other constituent that the Onsite Sanitary Official deems necessary to identify the character of the wastewater.

3. The quantity of the wastewater shall be established and documented in the Site Evaluation Report. Wastewater quantities shall be identified through the combined or individual methods outlined in Chapter 6.2.B., Chapter 6.2.C. and Table 6.1 in this Manual. The Onsite Sanitary Official shall make the final determination of the correct wastewater flow assignment for the proposed facility based on the above Chapters methods.

4. The gross wastewater hydraulic loading rate for a large system on an existing lot with new construction shall not exceed 2000 gallons per acre per day. Gross area calculations for an existing lot with new construction shall include the area to the centerline of any abutting public road right of way.

5. The hydraulic capacity of a site to accept the daily wastewater flow shall be determined using a method(s) acceptable to the Town for all systems designed to treat and dispose over 900 gallons per acre per day.

6. A nitrogen loading prediction calculation on groundwater must be calculated for each Large System Treating and disposing effluent in quantities of 900 gallons per acre per day or more. The method utilized for calculation shall be the "Hantzche-Finnemore Equation" that is approved by the Central Region of the Regional Water Quality Control Board. The approved maximum level of concentration of Nitrate Nitrogen predicted in the ground water through the use of this equation is 7.0 mg/l. Specific values utilized in the equation authorized by the Regional Water Quality Control Board are as follows:

   a. % of Nitrate-Nitrogen loss due to Soil Denitrification is "0". (d-Value)
   b. Average rainfall recharge rate is 75% of 60 inches of rainfall on level ground. (R-value)
   c. Background Nitrate-Nitrogen Concentration in Rainfall Recharge is 2.0 mg/l. (Nb-value)

7. The replacement disposal area shall be divided into relatively equal units and have the same disposal capacity as the original field. The replacement disposal area unit shall be located as near to the original disposal area unit as is practical. Large systems having a treatment and disposal capacity of 1000 gallons per day, and systems that exceed 900 gallons per day per acre shall install both the original and replacement disposal fields at the time of initial construction. A diverter valve shall be installed between the two systems.

8. Effluent distribution shall alternate between the absorption area units.

9. Absorption fields for systems designed to treat over 900 gallons per acre per day shall not be allowed on slopes greater than thirty (30) percent.

10. Duplex pumping systems or other acceptable means of alternating effluent distribution between absorption area units shall be provided.

11. The applicant shall provide a written assessment of the impact of the proposed system upon the quality of public waters and public health.

12. Ground water monitoring wells shall be installed at the disposal site for all treatment and disposal systems that exceed a gross hydraulic loading rate of 900 gallons per day per acre. There shall be a minimum of one well installed up gradient and two wells down gradient of the disposal system. Additional wells may be required by the Onsite Sanitary Official depending on the location of the system.

13. A ground water monitoring program will be required for each disposal area. Constituent analyses and frequency of analyses shall be as determined by the Onsite Sanitary Official. All costs for the monitoring program shall be borne by the discharger.

14. Operation and Maintenance of the systems shall be as outlined in Chapter 1.4.A., Alternative and Innovative Pre-Treatment Systems, of this Manual.

Construction of a large system shall be in substantial conformance with the approved plans and specifications and with any terms of the construction installation permit issued by the Onsite Sanitary Official. After completion, the professional who prepared the plans shall certify that the system was installed in substantial conformance with such plans.

A. Septic tank size

- For projected daily wastewater flows up to 1,500 gallons, the septic tank shall have a liquid capacity equal to at least one and one-half times the daily wastewater flow, or 1,500 gallons, whichever is greater.

- For projected daily wastewater flows greater than 1,500 gallons, the septic tank shall have a liquid capacity equal to 1,500 gallons plus seventy-five percent of the projected daily wastewater flow.

- Additional volume may be required by the Onsite Sanitary Official for industrial or other special wastes such as RV parks, restaurants, laundromats, etc.

- The quantity of daily wastewater flow shall be estimated using the guidelines in this manual.

B. Design flow

Design flow means the maximum flow that may be reasonably expected to be discharged from a residential, commercial or institutional facility on any day of operation, and is expressed in gallons per day. The design flow will not be considered as an average daily flow, but incorporates a factor of safety over the average flows to accommodate peak wastewater flows or facilities that discharge greater than the average flows of wastewater either occasionally or on a regular basis.
The design flows are based on empirical data collected over many years by numerous researchers. The design flows reflect disposal system designs proven to function adequately over long periods of time. As such, the design flows anticipate variations in flows among different establishments of the same class as well as flow variations over time in the same establishment. The design flows also assume wastewater with strengths typical of the class of establishment. The calculation of design flows based on water saving devices will not be allowed.

Each component of the disposal system shall be designed and constructed to adequately treat and dispose of the design flow discharged from the premises to be served.

The flows listed in Table 6.1 are minimum guideline standards for average facilities of the categories listed.

C. Methods for determining design flows

Flows from existing comparable facilities can be used in determining design flows. The design flow may be calculated by actual potable water meter readings, or facility wastewater influent or effluent meter readings if in fact the;

- Water records are from billing records of the service provider, or from water meters certified to be within two percent by the water purveyor, or, in the case of wastewater metering, the meter read values are certified "correct" by a Registered Engineer and approved by the Onsite Sanitary Official

Adjustments for peak days: The average daily flows shall be adjusted for flow days as follows:

- Daily monitoring: If the water meter records are recorded on a daily basis, the highest ten-day flows can be averaged and used for the design flow.

- Weekly monitoring: If the water meter records are recorded on a weekly basis, the design flow shall be calculated by dividing the number of days the facility was in use into the highest weekly flow, and multiplying by 1.2.

- Monthly monitoring: If the water meter records are recorded on a monthly basis, the design flow shall be calculated by dividing the number of days the facility was in use into the highest monthly flow, and multiplying by 1.5.

- Quarterly monitoring: If the water meter records are recorded on a quarterly basis, the design flow shall be calculated by dividing the number of days the facility was in use into the highest quarterly flow and multiplying by 2.0.

D. Disposal field hydraulic loading rates

Absorption field trenches for systems discharging pretreated effluent (less than thirty milligrams per liter BOD_5 and TSS) shall be sized using the absorption trench bottom and sidewall area. The trench hydraulic loading rate shall not exceed 1.20 gallons per square foot□day, based on the design flow rate.

- For large systems a mounding analyses similar to the methodology described in the "Assessment of Cumulative Impacts of Individual Waste Treatment & Disposal Systems" prepared by Ramlet Associates for the North Coast Regional Board, February 1982, will be required.

E. Loading rates for sand and gravel filter systems

Sand and gravel filter systems proposed to serve a large system shall be sized on the basis of projected peak daily sewage flow and the strength of the wastewater, using the following criteria.

- The hydraulic loading rate to an intermittent dosing sand filter shall not exceed 1.5 gallons per square foot□day.

- The hydraulic loading rate to a recirculating gravel filter shall not exceed five gallons per square foot□day (forward flow).

- The organic loading rate to either type of filter system shall not exceed 5×10^{-3} pound BOD_5 per square foot□day.

TABLE 6.1

DESIGN FLOWS FOR COMMERCIAL ESTABLISHMENTS

Type of Facility	Unit of Measure	Design Value (gal/d)
Airports	passenger	5
	+	
	employee	15
Barber Shop	chair	100

Type of Facility	Unit of Measure	Design Value (gal/d)
Bathhouses and swimming pools	person	10
Beauty salon	chair	100
Bed and breakfast	establishment + Rental room	225 75
Boarding houses (meals)	house + boarder	225 50
Bus service areas	passenger + employee	5 5
Cafeteria, open general public	seat + employee	45 15
Cafeteria, private	meal/seat + employee	10 15
Camps: Campground with central comfort stations With flush toilets, no showers Construction camps (no meals served) Resort camps with limited plumbing (night and day)	 person person person person	 35 25 15 50
Luxury camp	person	100
Children's camps, (day use only)	camper + staff person	15 15
Children's camps, day and night	camper + staff person	20 15
Churches	seat	5
Country clubs	resident non-resident	100 25
Dance hall	attendee	5

Type of Facility	Unit of Measure	Design Value (gal/d)
	+ staff person	15
Day care facilities, serving meals	child	20
	+ adult	15
Day care facilities, not serving meals	child	15
	+ adult	15
Delicatessen, food prepared and no seats	establishment	50
	+ employee	15
Eating place, fast food and no full meals and no china service	inside seat	20
	+ outside seat	10
	+ employee	15
Fairgrounds	attendee, based on daily average	2
Factories (with showers, exclusive of industrial wastes)	person per shift	35
Factories (without showers, exclusive of industrial wastes)	person per shift	15
Gyms, not associated with schools	participant	10
	+ spectator	3
	+ employee	15
Hospitals	bed	250
Hotels and motels with shared baths	bedroom	80
	+ employee	15
Hotels with private baths	bedroom	100
	+ employee	15

Type of Facility	Unit of Measure	Design Value (gal/d)
Institutions other than hospitals	bed space	125
Laundry, self service	machine + employee	500 15
Medical offices, clinics and dental offices	medical staff + patient + office employee	80 5 15
Mobile home parks	unit	125
Motels (with bath, toilet and kitchen)	bedroom	150
Motels with private baths (without kitchen)	bedroom	100
Parks and picnic areas, public restrooms, no showers	attendee + employee	5 15
Parks and picnic areas, public restrooms with showers	attendee + employee	10 15
Picnic parks (toilet wastes only)	picnicker	5
Picnic parks (with bathhouses, showers and flush toilets)	picnicker	10
Rooming houses, no meals	house + roomer	180 30
Rental cabins and cottages	bed + employee	50 15
Restaurants	seat	40
Restaurants (single service)	customer	2
Restaurants (with bars and/or lounges)	seat	50
Schools, elementary	student +	7

Type of Facility	Unit of Measure	Design Value (gal/d)
	teacher + administrative employee	15 15
Schools, junior high	student + teacher + administrative employee	9 15 15
Schools, senior high	student + teacher + administrative employee	12 15 15
Schools, boarding	student + teacher + administrative employee	75 15 15
Service Stations	1st set of fuel pumps + each additional set + employee	500 300 15
Swimming pools and bathhouses	person	10
Shopping centers or stores, public restrooms and showers (Design for any eating places or butcher shop shall be determined and added to total design flow.)	water closet + shower + employee + parking space	400 20 15 1
Tennis and racquetball courts	court	300

Type of Facility	Unit of Measure	Design Value (gal/d)
(Design flows for any eating place to be determined and added to the total design flow.)	+ employee	15
Theaters:		
Walk-in	per seat	5
Drive-in	car space	20
Travel trailer parks (without individual water and sewer hookups)	space	50
Travel trailer parks (with individual water and sewer hookups)	space	100
Visitors center	visitor	6
	+ employee	15
Worker:		
Construction (as semi-permanent camps)	person	50
Day, at school and offices	shift	15

Note:When full-time equivalent employees will be present at an establishment, estimate the maximum number of employees who may be present during a single day of operation and add additional fifteen gallons per employee per eight hour shift, except where otherwise indicated. The design flow for employees is based on the maximum number of employees present in a twenty-four hour period.

F. Aesthetics of Advanced Treatment Systems

All advanced treatment system components shall be screened with aesthetically pleasing vegetative or manmade materials so as to reduce visibility from any public street. Components include but are not limited to above ground filter units, sand filter beds, tanks and air intake units. Above ground filter beds whose retaining walls are over two feet above finished grade and are visible from a public street shall be designed with landscaping, rock work or vegetative covering that screens the view of the filter. The aesthetic quality of the screening, landscaping, rock work or vegetative covering used and its effectiveness in fulfilling this requirement shall be reviewed administratively via the Town's design review process in conjunction with the wastewater permit approval process. Appeals of administrative design review decisions may be made to the Planning Commission.

All visual barriers or aesthetic components used to satisfy this requirement shall be maintained in good condition for as long as the large system remains in place. For purposes of this requirement, above ground piezometers and control panels shall not be required to be screened from public view.