MARYLAND DEPARTMENT OF THE ENVIRONMENT

WATER MANAGEMENT ADMINISTRATION

WASTE WATER PERMITS PROGRAM

GUIDELINES FOR

LARGE ON-SITE SEWAGE DISPOSAL SYSTEMS

WITH A MAXIMUM ACCUMULATIVE

FLOWS ≥ 5000 GALLONS PER DAY

June 5, 2015

INTRODUCTION

The primary responsibility for onsite sewage treatment and disposal rests with the State of Maryland, Department of the Environment and is governed by the Code of Maryland Regulations (COMAR) 26.04.02 -**"Sewage Disposal and Certain Water Systems for Homes and Other Establishments in the Counties of Maryland Where a Public Sewage System is Not Available".** COMAR 26.04.02 is administered by delegated authority to local health and environmental agencies from the Secretary of the Department of the Environment. In most cases local requirements are the same as COMAR 26.04.02, however, the specific delegated county may choose to be more but not less stringent. The users of this manual are cautioned to check with the local Approving Authority to determine if more stringent requirements are applicable to the specific project under review.

Where the maximum (design) daily flow for an onsite system equals or exceeds 5,000 gallons per day for the total project or property, whether utilizing one or more than one treatment unit or disposal field, plans are required to be jointly approved by the Maryland Department of the Environment (MDE) - Water Management Administration (WMA) and the local Approving Authority. This practice enables a cooperative use of local and state manpower from site evaluation through construction inspection.

Proposals should be made directly to the local Approving Authority for subsurface systems. The local Approving Authority will then contact the appropriate WMA personnel for coordination of site evaluation and design review. Application should be made directly to MDE, WMA, State Groundwater Discharge Permits Division for all Groundwater Discharge Permitted Systems. These include systems covered by this guideline and when spray irrigation, rapid infiltration, drip irrigation or other land treatment methods as described in “Guidelines for Land Treatment of Municipal Wastewaters” (MDE-WMA-001-07/03) are proposed.

These guidelines are based upon current practice, appropriate research on onsite sewage systems, and best public health, scientific, and engineering technology, and draw heavily upon the experience of MDE staff with the design, installation, and performance of large subsurface sewage disposal systems.

Revisions to these guidelines will be made periodically, as warranted by new research results, additional accumulated experience with the installation and performance of large subsurface sewage systems, and changes in legal authority.

For more information contact:

Maryland Department of the Environment
Waste Water Permits Program, On-Site Systems Division
1800 Washington Boulevard
Baltimore, MD 21230
(410) 537-3778 800-633-6101 x3778 www.mde.state.md.us

LARGE ONSITE SEWAGE DISPOSAL SYSTEMS GUIDELINES

SECTION 1 DEFINITIONS

A. "Approving Authority" means MDE or delegated county official authorized to administer and enforce environmental laws as authorized under Environment Article 1-301.

B. "Average Daily Flow" means a wastewater flow volume that is 50% of the maximum daily wastewater flow (Burks and Minnis 1994; Crites and Tchobanoglous 1998).

C. "BOD_5" means Biochemical Oxygen Demand, 5-day test. See AWWA, Standard Methods, procedure 5210 for more information.

D. "Design Flow" means the Maximum Daily Flow.

E. "Maximum Daily Flow" means the anticipated maximum volume of wastewater that may be produced on any given day.

F. "OSDS" means "On-Site Sewage Disposal System" as defined in COMAR 26.04.02.01B (26) as disposal of sewage effluent beneath the soil surface.

G. "State Groundwater Discharge Permit" means an individual State Discharge Permit issued pursuant to COMAR 26.08.02.09 and 26.08.04 permitting the discharge of wastewater to groundwater of the State.

H. "Land Application System" means any wastewater disposal system defined in "Guidelines for Land Application/ Reuse of Treated Municipal Wastewaters", MDE-WMA-001-04/10 (or latest version).

SECTION 2 PROJECT COORDINATION

The local delegated Approving Authority in most cases will handle project coordination. Site evaluation, design review and construction inspection will be a collaborative effort between the local delegated Approving Authority and WMA.

SECTION 3 PERMIT REQUIREMENTS

A. State Groundwater Discharge Permit

1. An individual State Groundwater Discharge Permit:

   (a) Is required for all OSDS with a maximum daily flow greater than or equal to 10,000 gallons per day (gpd).

(b) May be required for any system with a maximum daily flow less than 10,000 gpd if determined by the Approving Authority and WMA, based on specific project characteristics, that the OSDS warrants additional monitoring, control or other special permit conditions; and,

(c) Is required for all OSDS with a maximum daily flow between 5,000 and 10,000 gpd if the OSDS requires wastewater pretreatment for nutrient reduction and/or BOD_5 reduction prior to dispersal to the groundwater of the State.

2. Any public informational meetings and/or hearings for approval of the State Groundwater Discharge Permit will be coordinated by WMA. Application for a State Groundwater Discharge Permit should be submitted to:

Maryland Department of the Environment
WMA- Wastewater Permits Program
1800 Washington Boulevard: Suite 455
Baltimore, Maryland 21230-1720

B. Compliance with the County Water and Sewer Plan

1. All projects that require a State Groundwater Discharge Permit must be in compliance with the respective County Water and Sewerage Plan (County W/S Plan) prior to WMA's processing the State Groundwater Discharge Permit application. See COMAR 26.08.04.02A (2) (b).

2. It is recommended that the applicant include with the State Groundwater Discharge Permit application a written statement from the appropriate local agency responsible for the County W/S Plan that indicates that the proposed activity is in compliance with the County W/S Plan.

C. State Construction Permit For Pretreatment System

A State Construction Permit for Pretreatment Systems and Collection Systems may also be required. Contact the Office of Budget and Infrastructure Financing, Engineering and Capital Projects Program, Water and Wastewater Division at (410) 537-3758 for information and determination of applicability of COMAR 26.03.02-Submission of Plans for Approval and Record of Systems of Water Supply, Sewerage, and Storm Water.

D. Local Construction Permit

A permit for the construction of the OSDS is issued by the local Approving Authority, which in most cases also handles project coordination. Site soil evaluation, review of the disposal system design, and disposal system construction inspection are a collaborative effort between the local Approving Authority and WMA.

SECTION 4 TREATMENT

A. The applicant shall provide a description of the anticipated wastewater quality characteristics.

B. The applicant may be required to submit sample results from the facility or from similar facilities to evaluate anticipated raw and treated effluent quality.

C. Wastewater containing excessive grease, BOD_5, suspended solids, volatile organic compounds, marina pump out wastes, chemical toilet wastes or other contaminants, may require advanced pretreatment or may be prohibited from being discharged to groundwaters of the State.

D. Pretreatment for nitrogen reduction may be required to reduce the input of nitrogen into the groundwater system based on the following:

1. New proposed facilities shall have an effluent nitrogen concentration no greater than 8-mg/l total N discharged to the disposal system;

2. Existing facility flows shall have a nitrogen concentration no greater than 20-mg/l total N effluent quality discharged to the disposal system.

3. Existing facilities proposing expansion shall have the nitrogen effluent quality determined based on a weight ratio of the new flows (8 mg/l total N) and existing flows (20 mg/l total N), but not to exceed 20 mg/l.

4. The discharge of wastewater shall not cause nitrogen in groundwater to exceed 10 mg/l at the property line.

5. A State Groundwater Discharge Permit may limit pounds of nitrogen discharged based on flow and total nitrogen concentration.

6. Facilities whose wastewater discharge occurs in a well head protection area where the discharge could affect the quality of groundwater supplying the well shall have an effluent nitrogen concentration not to exceed 10 mg/l.

E. Every State Groundwater Discharge Permit for OSDS will contain the following statements with regards to treatment requirements:

1. If new Best Available Technology becomes available, then the nitrogen discharge limit may be based on that technology's performance [see COMAR 26.08.03.01C(2)]; and,

2. "New Nutrient Reduction Tributary Strategies are being developed for the Chesapeake Bay. The Strategies will deal with nutrient reductions for both ground and surface discharges. In view of the strong possibility that this facility will eventually have to remove nitrogen, it is recommended the treatment plant be designed so that additional Biological Nitrogen Removal facilities can be added if necessary."

SECTION 5 SEWAGE FLOW

A. Maximum daily flow is to be used as the basis for design of the soil absorption system.

B. Residential flows are to be computed based upon a maximum daily flow of 150 gallons per bedroom.

C. Maximum daily flow for other facilities is to be computed based on estimated maximum daily flows and/or using the best available water usage information. Refer to recommended flows titled "MDE Guidance on Wastewater Flows for use in Designing On-site Systems" (Appendix B) to estimate anticipated wastewater flows. When available, actual flow records from similar facilities may be considered when estimating maximum daily flow.

D. When projects encompass a primary use that generates proportionally large maximum daily flows on specific days of the week and significantly less flow on other days, flow equalization may be applied. Churches, sports arenas, and fairgrounds may be examples of this type of use. The appropriateness of incorporating flow equalization will be considered on a case-by-case basis in consultation with the WMA Onsite Systems Division. Storage requirements for flow equalization should be calculated using a graphical approach where the cumulative inflow volume is plotted verses time (Metcalf and Eddie 1991) (Crites and Tchobanoglous 1998) (US EPA 2002). Employing flow equalization will not negate the requirement for a discharge permit for facilities with a maximum daily flow of 10,000 gpd or greater.

E. Flow reductions may be considered for facilities only where justified by sufficient data from comparable facilities, shall be approved by the WMA, and shall take into account effects on wastewater strength.

SECTION 6 SITE EVALUATION

A. Overall site suitability will generally be determined in accordance with COMAR 26.04.02 and the County Groundwater Protection Plan, where applicable. A sufficient number of test pits, borings, percolation tests, and wells will be required to adequately characterize the site.

B. Field work and data collection shall conform to standard accepted industry practice.

1. Soil evaluation procedures can be found in WMA-Site Evaluation Manual (MDE, 1994 or latest version). Soil descriptions are to follow the NRCS classification procedures.

2. Slug testing procedures can be found in Butler (1997).

3. Where applicable, ASTM standards for data collection and evaluation will be utilized.

C. All fieldwork shall be performed under the observation of the local Approving Authority and/or WMA personnel.

D. The applicant is responsible for providing a qualified soil scientist to perform soil testing and descriptions.

E. Mounding Analysis:

1. Mounding analysis of groundwater beneath the disposal field shall be required for all system designs to show that the proposal will maintain the required unsaturated soil treatment zones.

2. For the mounding analysis, the use of one of several available computer models based on the work of Hantush (Hantush 1967) is recommended. Where other models are to be used, justification should be presented.

3. Field determined hydraulic conductivity values should be used for performing the mounding analysis.

4. An adequate number of field tests should be conducted and data submitted, to substantiate the suggested hydraulic conductivity. The geometric mean of all hydraulic conductivity tests is to be used as the hydraulic conductivity value for evaluation purposes.

F. Nitrogen Loading Analysis:

1. A nitrogen loading analysis is required for all system design proposals that do not include nitrogen reduction through treatment to 10mg/l or less pursuant to a groundwater discharge permit condition.

2. The nitrogen dilution capacity will be determined using a predetermined nitrogen mass balance formula developed by J. E. Stone (1976).

3. In determining the gross sewage flow limitation or the level of nitrogen removal necessary, only the acreage within the project site and drainage basin, which could be expected to dilute the groundwater, may be included in the mass balance calculation.

4. Consideration of proposed impervious surface and the potential reduction in infiltration volumes that reduce the expected dilution volume should be given by the applicant.

5. Appendix D provides an example of a Nitrogen Loading Analysis

G. Hydrologic Balance Analysis:

1. Hydrologic balance analysis shall be required for all systems.

2. Appendix C provides an example of a Hydrologic Balance Analysis.

3. In the Coastal Plain the initial screening may use existing data from well and boring records and literature values. In the Piedmont and areas west, field determined values shall be used.

H. Hydraulic conductivity of fractured rock aquifers and saprolite typical of Piedmont and areas west varies widely. The applicant shall retain an experienced consultant to conduct necessary field tests to determine the hydraulic conductivity used for the hydrologic balance in the Piedmont and areas west. Aquifer thickness only includes the thickness of the saprolite present at the site.

SECTION 7 SEWAGE DISPOSAL AREA

A. The sewage disposal area (SDA) suitability will generally be determined in accordance with COMAR 26.04.02, Section 6 of this guideline, and the County Groundwater Protection Plan, where applicable.

B. The SDA shall meet the minimum horizontal setback requirements specified in COMAR 26.04.02. Larger separation distances may be required to minimize the potential health and environmental hazards of large onsite systems.

C. Parking or other forms of compaction should not be allowed over the absorption field or recovery area. An exception to this may be possible where determined that compaction would not affect the soil absorption system nor its replacement area(s).

D. The SDA is the land area utilized for the initial and replacement portions of the onsite sewage disposal system. Sewage collection and treatment components should be located outside the SDA.

E. For projects with a maximum daily flow less than 10,000 gpd, where residential housing units are proposed, the SDA will be based on the following criteria:

1. Multiuse systems proposed with a State Groundwater Discharge Permit will provide sufficient area for initial and 2 repair subsurface disposal systems;

2. All other proposed systems, such as Shared Facility systems, will provide sufficient area for 10,000 square feet per dwelling unit; and,

3. Additional area may be required based on specific site conditions and/or wastewater characteristics.

F. The SDA size should be sufficient to accommodate three (3) systems at 100% of the maximum daily flow taking into account permeability rates and mounding calculations in the initial and recovery areas.

G. The initial system shall be designed for at least 150 % of the design flow utilizing uniform low-pressure distribution (Otis 1982). At least three (3) separate absorption cells should be provided to enable alternating service and prolonged resting of individual cells (Siegrist et al., 1986).

H. The SDA configuration of fields or cells should be located so trench bottoms can be installed level. The groundwater mound, which forms beneath the effluent field, should remain below the unsaturated soil treatment zone that is required to be maintained below the trench or bed bottom. Fields should generally be long and narrow with the long dimension parallel to the natural ground contour and/or groundwater contour where appropriate.

I. As described in an approved Ground Water Protection Report, bermed infiltration ponds and other groundwater penetration systems do not require an unsaturated soil treatment zone. However, groundwater mounding analysis must be utilized in the review of groundwater penetrating systems to help assess long term hydraulic function.

SECTION 8 SUBSURFACE APPLICATION RATE

A. The soil application rate will be established based on effluent quality and upon a detailed soil and site evaluation.

1. For typical domestic septic tank effluent, the system should be designed with a maximum loading rate of 0.8 gallons per day per square foot (gpd/ft^2). A lower loading may be required based on available site and soil information.; for example, where average percolation test results average greater than 15 minutes per inch a 0.4 gpd/ft^2 may be required.

2. A maximum loading rate of 1.2 gpd/ft^2 may be considered where a State Groundwater Discharge Permit specifies treatment of wastewater to produce effluent quality equal to or better than 30 milligrams per liter for BOD_5 and total suspended solids. This represents a 50% increase over the maximum loading rate required without pretreatment as prescribed above.

B. The nitrogen loading analysis may limit area loading rates.

C. All OSDS will be designed for uniform, low-pressure distribution with dosing and resting features.

SECTION 9 CONSTRUCTION PLANS / AS-BUILT CONSTRUCTION PLANS

A. The applicant shall submit complete sets of engineering drawings and calculations to the local Approving Authority. Copies shall also be submitted to the WMA-Waste Water Permits Program and the Engineering and Capital Projects Program (when applicable) for review and approval.

B. The applicant shall obtain all applicable permits before starting construction. At least two weeks prior to the construction of the treatment and/or disposal system, the local Approving Authority and WMA shall be informed of the construction schedule.

C. Any major changes to the approved design must be proposed by the engineer of record and receive approval by the local Approving Authority and WMA.

D. The piping system shall be tested for leakage and equal distribution, preferably, prior to backfill. Representatives from the local Approving Authority and/or WMA shall be present for the test. The design engineer should coordinate with the construction superintendent to ensure that the test proceeds in an orderly fashion. The design engineer should be present at the site during the test.

E. The permittee shall be responsible for providing a qualified inspector to insure collection, treatment and disposal systems are constructed in accordance with all applicable approved plans and permits.

F. As-built drawings shall be prepared and provided to the local Approving Authority and WMA within one month after the completion date of construction. As-built drawings shall include all changes incurred during construction. A note shall be included in the as-built drawings to indicate that the drawings substantiate the actual installation.

G. The Notes section in the design drawings shall include the contents of Section 9, B - F.

REFERENCES

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Metcalf & Eddie, Inc., Wastewater Engineering: Treatment, Disposal and Reuse, 3rd edition, 1991, McGraw-Hill publishers.

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Converse, J. C. and E. J. Tyler. The Wisconsin Mound System Siting, Design, and Construction. 15.13, January 1986.

Hantush, M. S. Growth and Decay of Groundwater Mounds in Response to Uniform Percolation. Water Resource Res., 3: 227-234, 1967.

MDE 1994, WMA-Site Evaluation Training Manual for On-Site Sewage Treatment and Disposal Systems, 1994, by Maryland Center for Environmental Training

Otis, R. J. Pressure Distribution Design for Septic Tank Systems. ASCE, Vol. 108, No. EE1, February 1982. ISSN 0090-3914/82/0001-0123

Siegrist, R. L., D. L. Anderson and J. C. Converse. Commercial Wastewater On-site Treatment and Disposal. Proceedings of the Fourth National Symposium on Individual and Small Community Sewage Systems, ASAE, December 1984.

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Siegrist, R. L., D. L. Anderson, D. L. Hargett and RSE Group. Large Soil Absorption Systems for Wastewaters from Multiple-Developments. EPA/600/2-86/023, February 1986.

U. S. Environmental Protection Agency. Design Manual Onsite Wastewater Treatment and Disposal Systems, 1980.

U.S. Environmental Protection Agency. Onsite Wastewater Treatment Systems Manual, 2002, Document #EPA/625/R-00/008.

APPENDIX LISTING

APPENDIX C

PRELIMINARY ANALYSIS OF HYDROLOGIC BALANCE TO DETERMINE SITE WASTE CAPACITY

The large onsite sewage system guidelines includes an analysis to calculate the site capacity to accept additional water equivalent to the project waste flow. (See Section 6 G) The basis for this analysis is Darcy's Law which is the foundation of groundwater hydraulics. The form for the formula expressing the law used here is:

$$Q = KiA$$

where:

Q = rate of flow,
K = permeability or hydraulic conductivity of the porous medium,
i = hydraulic gradient,
A = area normal to the direction of flow = HW;

where:

H = thickness of surficial aquifer available to transmit wastes from the site.
W = width of aquifer (total width of an imaginary boundary where the groundwater flow will pass through and reach to a discharge point, such as stream or marsh area.)

The following is an example of how to apply the hydrologic balance analysis for a site. A large onsite septic system is proposed for the disposal of 6,000 gpd, maximum daily flow, of septic tank effluent (STE). The characteristics of the site and the surficial aquifer below the proposed site sewage disposal area are:

Figure 1. Sample Project Layout for Hydrologic Balance Analysis.

Where:

i = ground water gradient based on water level readings in monitoring wells/piezometers P1 - P3 in Figure 1 = 4% or .04, nondimensional

K = 60 gpd/ft^2 Horizontal saturated hydraulic conductivity based on MW1 well log indicating surficial aquifer of predominantly fine sand texture and a selection of conductivity value from Table 2 in "The Wisconsin Mound System Siting, Design, and Construction", by James C. Converse and E. J. Tyler, Small Scale Waste Management Project and presented at the 5th Northwest Wastewater Treatment Short Course On Site Wastewater Treatment: September 10 and 11, 1985. Revisions were made January 27, 1986.

H = 10 feet, the thickness of the surficial aquifer available to transmit wastewater below the sewage system construction depth plus the required unsaturated soil treatment zone.

W = 580 feet, width of the aquifer along an imaginary boundary where the ground water flow will pass through and reach to a discharge point, such as a stream (or the property boundary intercepting the discharge point along the imaginary boundary).

Q = volume rate of flow which can be transmitted by the surficial aquifer, gpd.

AR = 40 inches, Annual rainfall for area where project is located.

DA = 1160 ft. by 580 ft., drainage area within property line or recharge boundary such as stream.

DA_R = recharge area due to rainfall.

R_x% = recharge rate to groundwater due to rainfall by percent infiltration.

S = Preliminary sewage effluent application rate in gallons per day (gpd).

Steps in Calculations of Site Capacity for Additional Water:

1. Determine the volume rate of flow (Q) which can be transmitted by the surficial aquifer:

   $Q = KiHW = 60 \text{ gpd/ft}^2 \times .04 \times 10 \text{ ft.} \times 580 \text{ ft.} = 13{,}920 \text{ gpd}$

2. Determine the recharge rates $R_{x\%}$ for assumed recharge ratios (20% or 40%), select most appropriate rate due to slope and texture of surface soils in drainage area.

   $R_{20\%}$ = AR/12 in./ft x DA_R/365 days per year x 20% x 7.48 gal/ft^3 = ( )gpd

   $R_{20\%}$ =40"/12 in./ft x (580' x 1160')/365 days per year x .20 x 7.48 gal/ft3 = 9,192 gpd

3. Determine the preliminary sewage effluent application rate (S) for the project area.

   $Q = R_{x\%} + S$

   for $R_{20\%}$ = 9,192 gpd, and Q = 13,920 gpd;

   13,920 = 9,192 + S; S = 13,920 - 9,192 = **4,728 gpd.**

The allowable preliminary sewage effluent application rate (S) is 4,728 gpd as an average design sewage flow. Since the design sewage flow is maximum daily flow and the average daily flow is 1/2 of the maximum daily flow this site capacity is 4,728 x 2 = 9,456 gpd. The 9,456 gpd is greater than the 6,000 gpd proposal, therefore, the site capacity should be sufficient to allow detailed site/soil evaluation and to attempt design for a 6,000 gpd system. After detailed site testing, sewage system layout and mounding calculations are completed the final sewage flow can be determined and will always be less than or equal to (S) unless additional information is obtained during actual field testing which allows a recalculation of (S).

APPENDIX D

NITROGEN DILUTION ANALYSIS TO DETERMINE SITE WASTE CAPACITY OR THE NEED FOR NITROGEN PRETREATMENT

The large onsite sewage system guidelines includes an analysis to calculate the site capacity to dilute nitrogen from the subsurface disposal of the project waste flow. (See Section 6 F) The basis for this analysis is the nitrogen mass balance developed by J. E. Stone, "Land Application of Wastes: Nitrogen Considerations" (1976). The mass balance formula is expressed as:

$$W = [(4.43\ C + a(P-ET) - cP] / [(y-a) - y (d + n)]$$

Where:

W = allowable wastewater loading (inch/yr)
C = removal of nitrogen by crop (lb/acre/yr), = 0
a = allowable nitrogen concentration in percolate (mg/l), = 10
P = infiltration due to precipitation (inch/yr), = 15
ET = potential evapotranspiration (inch/yr), = 0
c = concentration of nitrogen in precipitation (mg/l), = 0.5
y = concentration of N in wastewater (mg/l), = 60
d = fraction of N denitrified, = 0
n = fraction of N volatilized as ammonia, = 0

Therefore:

$$W = [(4.43 (0) + 10(15 - 0) - 0.5 (15)] / [(60 - 10) - 60 (0)]$$

$$W = 142.5 / 50 = 2.85 \text{ inch/yr.}$$

To calculate the site capacity use the following:

$$A = Q / W$$

Where:

A = area required to dilute average sewage flow (acres).

Q = average sewage flow generated from a home with three bedrooms = 225 gpd or 82,125 gal/yr.

W = allowable wastewater loading (acre/inch/yr)

Using:
One acre-inch equals 27,150 gallons

Therefore the area required to dilute 225 gpd of waste is:

A = Q / W, where Q = 82,125 gal/yr divided by 27,150 gal/acre-inch = 3.03 ac-in/yr
and where W = 2.85 inch/year.

A = 3.03 ac-in/yr divided by 2.85 inch/year = 1.06 acres needed, for the equivalent of (1) three bedroom home.

The following examples illustrate how to apply this formula to a specific acreage use (example 1) or to a larger proposed flow (example 2):

1. [(Acres in project / A) x Q] x 2 = maximum daily flow without nitrogen reduction pretreatment for the proposed gross acreage.

   Example 1: [(12 acres/ 1.06 acres needed) x 225 gpd] x 2 = 5,094 gpd maximum daily flow

2. [(Max. daily sewage flow gpd / 2) / Q] x A = acres needed without nitrogen reduction.

   Example 2: [(6,000 gpd / 2) / 225 gpd] x 1.06 acres needed per 225 gpd = 14.1 acres

The allowable maximum daily sewage flow for the site with 12 acres is 5,094 gpd without nitrogen pretreatment. The acreage needed to satisfy site capacity for a 6,000 gpd system without nitrogen pretreatment is 14.1 acres. If pretreatment to reduce nitrogen is proposed recalculate the acreage needed at a percent of the 1.06 acres for 100 % nitrogen load.