

Wastewater Capacity Analysis for partial fulfillment of Wastewater Management Plans

CAPACITY ANALYSIS FOR WASTEWATER TREATMENT IN SEWER
SERVICE AREAS, UNASSIGNED SEWER SERVICE AREAS, AND
AREAS NOT SERVED BY SEWER SERVICE

NJDEP

Wastewater Capacity Analysis for Assigned Sewer Service Area

Wastewater Capacity Analysis for Areas within the Sewer Service Area (Assigned)

The wastewater capacity analysis for areas within the sewer service area (SSA) is comprised of two components:

- Determine the existing and future wastewater management needs within the SSA and
- Performing the capacity analysis.

REQUIREMENT: Existing and Future Wastewater Management Needs

N.J.A.C. 7:15-4.5

(b) The existing and future wastewater management needs of each sewer service area of a DTW, or industrial wastewater facility that receives wastewater from outside the industrial facility boundary, shall be identified and evaluated in a wastewater treatment capacity analysis prepared in conformance with the following:

- 1. For assigned sewer service area, the applicant shall identify the existing and projected future flows that will be generated.***
- 2. For unassigned sewer service area, the applicant shall identify the future flows from the entire area in accordance with N.J.A.C. 7:14-4.5(b)1ii***

REQUIREMENT: Capacity Analysis

N.J.A.C. 7:15-4.5(b)

3. For each assigned and unassigned sewer service area, the applicant shall determine if there is a potential capacity deficiency in accordance with the following: (i. and ii.)

The following steps are outlined in more detail:

1. Determine Existing Flow
2. Determine Future Flow
 - a. Urbanized Municipalities
 - b. Non Urbanized Municipalities
3. Capacity Analysis

1. **Determining Existing Flow**

Existing Flow

Existing flow is defined at N.J.A.C. 7:15-4.5 (b) 1(i).

1. *For assigned sewer service area, the applicant shall identify the existing and projected future flows that will be generated.*

i. For the purposes of this paragraph, the existing flow is the highest consecutive 12 months rolling average over the most recent five-year period preceding development of the WMP, as reported in the Discharge Monitoring Reports required pursuant to N.J.A.C. 7:14A-6.8 for the facility, or other method approved by the Department if the Department determines that the alternate method better predicts flow taking into account factors unique to the area, such as significant variability of flows due to seasonal population shifts, the effects of weather, or variable volumes of combined sewage conveyed to the wastewater treatment facility.

****The Department is currently working to provide facility flow information as it relates to the WQMP rules. Information will be posted on the Water Resources Management Website (<http://www.nj.gov/dep/wqmp/guidance.html>) and subsequently updated in an appendix chapter as the CPP is updated.

1. Determine Existing Flow **and report existing flow numbers in the WMP**. Please note that those wastewater treatment plants with an existing flow of 80% or more of the permitted flow will be required to consider options to address the potential for capacity deficit to avoid reaching 95% or more of the permitted flow and entering into the Capacity Assurance Program.

2. Determine Future Wastewater Flow

2a. Urbanized Municipalities

Future Flow- Urbanized Municipalities

N.J.A.C. 7:15- 4.5(b)1ii

(1) *For urbanized municipalities, estimate future wastewater flows by multiplying the population increase projected within a 20-year planning horizon from the date of the WMP preparation, developed using the municipal master plan or other governmental or academic source, by a value of 75 gallons per capita per day and adding any known new non-residential flows including flows from sources such as expanded or redeveloped industries, landfill leachate, or septage;*

After determining the existing flow for the SSA, add additional future flow based on the following:

1. Determine the population increase for the 20-year planning horizon.
2. Take the projected increase in population and multiply this by 75 gallons per day (gpd) to get the future wastewater flow from increased population.
3. Add any known additional non-residential flows to the future flow from increase in population to estimate the total additional future flow.
4. Add additional future flow¹ to the existing flow to get total future wastewater flow.
5. **Provide the Total Future Wastewater Flow in the WMP.**

2b. Non Urbanized Municipalities

Future Flow- Non Urbanized Municipalities

N.J.A.C. 7:15- 4.5 (b) 1ii

(2) *For municipalities, not subject to (b)1ii(1) above, estimate build-out future wastewater flows from existing development that is not currently connected and future development based on flow projections from N.J.A.C. 7:14A-23.3, 7:14A-23.2(c), or 7:9A, as applicable. Federal lands and areas with limited development potential, such as preserved open space or areas subject to statutory restrictions, may be excluded from the calculation of future flows provided the WMP agency identifies the area to be excluded and the reason for exclusion, and the basis for exclusion is approved by the Department.*

After determining the existing flow for the SSA, add additional future flow based on the following:

¹ Some counties may have information regarding the number of houses in these areas that are currently served by individual subsurface sewage disposal systems (or septic), and where this information is available, it can be added to this total.

1. Collect zoning information as it will be used to determine the number of units, houses, and square footage of future development (build-out).
2. Determine parcels within the SSA that are undeveloped or underdeveloped and calculate the area that is developable (removing preserved lands or other restricted lands).
3. Apply zoning to these parcels to determine the maximum number of residential units and square footage for non-residential development.
4. Multiply the number of units or square footage by the corresponding gallons per day of sewerage (as defined at N.J.A.C. 7:14A-23.3 or 7:14A-23.2(c), as applicable) to determine how much wastewater flow will come from new development.
 - a. For residential development, multiply the number of residential units by 300 (or you may use numbers located in *N.J.A.C. 7:14A-23.3* if zoning and build-out can be determined at this level).
 - b. For non-residential development, multiply the square footage by 0.1 gpd. (Square footage can be determined using Floor Area Ratio or other appropriate build-out measure as specified by zoning.) (WMP agencies may choose to utilize flow charts established at *N.J.A.C. 7:14A-23.3* as zoning or build-out provides this information, but this level of analysis is at the discretion of the WMP agency and is not required.)
 - c. Add all the potential flow from future development together.
5. Identify parcels developed on septic/ individual subsurface sewage disposal systems and calculate the corresponding flow associated with the development. Add the flow from these systems to the flow from future development.
6. **Provide the results for additional future flow in the WMP (in gpd or million gallons per day (mgd)).**
7. Add the additional future flow to the existing flow (existing flow is defined at N.J.A.C. 7:15-4.5 (b) 1(i)) to get the total future flow for the SSA within a municipality.

[Zoning buildout for areas not currently served X gpd] + [existing flow] =
future wastewater flows
8. **Provide the Total Future Wastewater Flow in the WMP.**
9. **Provide the calculations, assumptions and justifications used for determining potential flow from existing and future development.**

3. Capacity Analysis

Compare Total Future Wastewater Flow with the Permitted Flow at the Wastewater Treatment Plant.

Potential Capacity Deficiency-Assigned SSA

N.J.A.C. 7:15-4.5(b)3

*i. For each assigned sewer service area, compare the sum of the existing flow and the result of the calculation at (b)1ii **[future flow calculation]** above with the current permitted flow at the wastewater treatment facility. Any deficit between the need and the permitted flow constitutes a potential capacity deficiency;*

1. Compare the total future wastewater flows of the SSA with the current permitted flow of the respective wastewater treatment facility. (Keep in mind that not all capacity will be available to all municipalities, especially with regional treatment plants that serve multiple municipalities. The build-out for all municipalities will need to be added together to determine the treatment plant's ability to handle future wastewater flow projections.)

$$[\text{Permitted Flow}] - [\text{Future Projected Flow}] = (+/-) \text{ gpd or mgd}$$

If (-) gallons, then potential capacity deficiency exists.

2. **Provide the results of the capacity analysis in the WMP. Identify if there is a capacity deficiency.**
3. **If potential capacity deficiency exists, evaluate strategies and discuss in the WMP.**

Wastewater Capacity Analysis for Unassigned Sewer Service Area

Wastewater Capacity Analysis for Areas within Sewer Service Area (Un-assigned)

The wastewater capacity analysis for areas within the SSA is comprised of two components:

- Determine the existing and future wastewater management needs within the SSA, and
- Performing the capacity analysis.

REQUIREMENT: Existing and Future Wastewater Management Needs

N.J.A.C. 7:15-4.5

(b) The existing and future wastewater management needs of each sewer service area of a DTW, or industrial wastewater facility that receives wastewater from outside the industrial facility boundary, shall be identified and evaluated in a wastewater treatment capacity analysis prepared in conformance with the following:

- 1. For assigned sewer service area, the applicant shall identify the existing and projected future flows that will be generated.***
- 2. For unassigned sewer service area, the applicant shall identify the future flows from the entire area in accordance with N.J.A.C. 7:14-4.5(b)1ii***

REQUIREMENT: Capacity Analysis

N.J.A.C. 7:15-4.5(b)

3. For each assigned and unassigned sewer service area, the applicant shall determine if there is a potential capacity deficiency in accordance with the following: (i. and ii.)

The following steps are outlined in more detail:

1. Determine Future Flow
2. Capacity Analysis

1. Determine Future Wastewater Flow

Build-Out for Unassigned SSA

N.J.A.C. 7:15- 4.5 (b)

2. For unassigned sewer service area, the applicant shall identify the future flows from the entire area in accordance with N.J.A.C. 7:14-4.5(b)1ii

N.J.A.C. 7:14-4.5(b)1ii

(2) For municipalities, not subject to (b)1ii(1) above, estimate build-out future wastewater flows from existing development that is not currently connected and future development based on flow projections from N.J.A.C. 7:14A-23.3, 7:14A-23.2(c), or 7:9A, as applicable. Federal lands and areas with limited development potential, such as preserved open space or areas subject to statutory restrictions, may be excluded from the calculation of future flows provided the WMP agency identifies the area to be excluded and the reason for exclusion, and the basis for exclusion is approved by the Department.

1. Determine future flows based on zoning within the unassigned SSA.
2. Future flows will be based on zoning build-out ²regardless of what has been built on ISSDS. Developed and undeveloped parcels should be analyzed as existing flow information does not exist for these areas.
3. **Provide the total Future Flow in the WMP.**
4. **Provide the calculations, assumptions and justifications used for determining potential flow.**

2. Capacity Analysis

Potential Capacity Deficiency-Unassigned SSA

N.J.A.C. 7:15-4.5(b)3

ii. For any unassigned sewer service area, the entire wastewater demand calculated at N.J.A.C. 7:15-4.5(b)2 (above) constitutes a potential capacity deficiency.

1. **Report the flow determined above as a potential capacity deficiency within the WMP.**
2. **Since potential capacity deficiency exists, evaluate strategies and discuss in the WMP.**

² If there are areas within the unassigned SSA that are currently developed on smaller lots than are currently permitted by zoning, counties may use this information for a more accurate account of future flow.

Wastewater Capacity Analysis for Areas
Outside the Sewer Service Area using
Nitrate Dilution Analysis

Wastewater Capacity Analysis for Areas outside the Sewer Service Area based on Nitrate Dilution Analysis

The wastewater capacity analysis for areas outside the SSA is comprised of three components:

- Determine the nitrate dilution capacity of the area outside the SSA,
- Determine the septic density (zoning build-out) outside the SSA, and
- Performing the capacity analysis by comparing this density with nitrate dilution capacity for the same area.

REQUIREMENT: Nitrate Dilution Analysis

N.J.A.C. 7:15-4.5

(c) For areas not covered by (b) above (a sewer service area), the future wastewater treatment needs shall be evaluated through a nitrate dilution analysis in conformance with the following:

1. Except as provided in (c)2 and 3 below, for areas proposed to be served by individual subsurface sewage disposal systems discharging 2,000 gallons per day or less to ground water, the applicant shall determine the development density that can be accommodated in developed and underdeveloped areas that will result in attainment of two mg/L nitrate in the ground water on a HUC 11 basis, as follows:

The following steps are outlined in more detail:

1. Perform Nitrate Dilution Capacity Analysis
2. Determine Development Density
3. Capacity Analysis

1. Determine Nitrate Dilution Capacity for each HUC-11³

Nitrate Analysis

N.J.A.C. 7:15- 4.5 (c) 1

i. Determine the number of acres per equivalent dwelling unit using either:

(1) "A Recharge-Based Nitrate-Dilution Model for New Jersey V7.0 for Excel 2010" developed by the New Jersey Geological Survey, incorporated herein by reference, as amended and supplemented, available at <http://www.nj.gov/dep/wrm/>; or

(2) A simplified model using HUC 11 recharge values called "A Recharge-Based HUC 11-Scale Nitrate-Carrying-Capacity Planning Exercise for New Jersey, MS Excel Workbook, version 3.0," (2009) incorporated by reference, as amended and supplemented, available at <http://www.nj.gov/dep/wrm/>;

Start by identifying the HUC-11s within the municipality and use one of the Nitrate Dilution models identified above to determine the acres needed per equivalent dwelling unit to attain 2 mg/L nitrate in the ground water within each HUC.

ii. Determine the number of undeveloped and underdeveloped acres in each municipality or portion thereof in each HUC-11 and divide the number of acres by the number of acres per unit calculated in (c)1i above to determine the number of additional equivalent dwelling units.

Using the number of acres needed per dwelling unit, divide available acres for development by the acres per dwelling unit. This number will provide how many equivalent dwelling units can be developed and still attain 2 mg/L nitrate in ground water for that HUC. This number will be compared to allowable dwelling units based on zoning.

[# of undeveloped/underdeveloped acres] / [# of acres per unit] = # of additional dwelling units
that can be supported and maintain 2mg/L nitrate across the HUC.

1. Using the models identified in N.J.A.C. 7:15- 4.5 (c)1, determine the number of acres needed per equivalent dwelling unit within the HUC-11 for each dwelling unit.
2. Determine number of undeveloped/underdeveloped acres within the HUC-11 minus wetlands or other hydrologic features.

³ Conforming Municipalities and Preservation areas within the Highlands Region will have analysis prepared by the Highland Council in conformance with the Highlands Regional Master Plan.

3. Divide the remaining acres by the number of acres needed per dwelling unit based on the nitrate models (Step 1 above) to determine the number of dwelling units that can be supported by the HUC -11.
4. **Provide the number of dwelling units that can be supported by each HUC-11 in the WMP.**

2. Determine Development Density

Build- Out Analysis

N.J.A.C. 7:15- 4.5 (c) 1

iii. Apply existing zoning to all undeveloped and underdeveloped areas to determine the number of equivalent dwelling units for comparison to (c)1ii above. For nonresidential areas, convert the proposed development type to equivalent dwelling units by dividing the flow projected to be generated in accordance with N.J.A.C. 7:9A-7.4 by 500 gallons per day;

By applying zoning to the undeveloped and underdeveloped areas outside of the SSA within each of the HUCs, the resulting number of dwelling units can be used to compare to the nitrate analysis done using the nitrate dilution models.

Zoning Build-out Tools (These should be used as guidance to see how to determine build-out potential, not wastewater flow projections. Ultimately, commercial and other non-residential areas will need to be converted to equivalent dwelling units according to the rules above.)

1. Collect zoning data as it will be used to determine the number of units, houses, and square footage of future development (build-out).
2. Determine parcels outside the SSA that are undeveloped or underdeveloped. (Permanently preserved open space or farmland may be excluded from undeveloped or underdeveloped parcels.)
3. Apply zoning to these parcels to determine the number of dwelling units or equivalent dwelling units for non-residential development (described below).
4. If non-residential, determine the equivalent dwelling units by doing the following:
 - a. Using N.J.A.C.7:9A- 7.4 (c), determine the gallons per day associated with the zoning build-out.
 - b. Divide the total gallons per day from non-residential development by 500 gallons per day to get the number of equivalent dwelling units. If this results in a partial unit, round up to the nearest whole number.
5. Add non-residential equivalent dwelling units to the number of dwelling units from residential zoning to get the total number of dwelling unites allowed by zoning.
6. **Provide the total number of dwelling units allowed by zoning for each HUC-11 in the WMP.**
7. **Provide the calculations, assumptions, and justifications used for determining potential number of dwelling units from future development.**

3. Capacity Analysis

The future development potential for areas outside of the SSA should be compared with the nitrate carrying capacity for each HUC or portion thereof within the municipality using the methods described above. Where future development potential is greater than the nitrate carrying capacity for that HUC or portion thereof in the municipality, then strategies should be explored to meet/sustain the 2mg/L nitrate in ground water throughout the HUC or portion thereof within the municipality.

Insufficient Nitrate Capacity

N.J.A.C. 7:15- 4.5 (c) 1

- iv. Identify areas where the number of additional equivalent dwelling units calculated in (c)1iii above exceeds the allowable number of additional equivalent dwelling units in (c) 1ii above;*
- v. If the future nitrate dilution capacity is insufficient to meet the projected loading from future development, the local government unity shall work with the Department to evaluate options to address this capacity gap. The CPP, which is posted on the Department's website at <http://www.nj.gov/dep/wrm/>, identifies potential strategies to address this capacity deficiency;*

[# of additional dwelling units that can be supported by the HUC] – [Equivalent dwelling units from build-out] = (+/-) dwelling units

1. Compare the number of dwelling units identified in **Step 1: Perform Nitrate Capacity Analysis for each HUC-11** with the number of dwelling units per HUC-11 or portion thereof within the municipality to determine if there is sufficient capacity.
2. **Provide the results of the capacity analysis in the WMP. Identify if there is a capacity deficiency.**
3. **If Capacity Deficiency exists, evaluate strategies and discuss in WMP.** Note: If deficiency is within 10% margin of error, please note this in the WMP and review with NJDEP. This may result in a determination that strategies to address the capacity deficiency may not be needed at this time.