



Tennessee Department of Environment
and Conservation
Division of

Water Pollution Control

MEMORANDUM

DATE: February 15, 2011

TO: Hari Akunuri

FROM: Robert G. O'Dette, M.S., P.E.

SUBJECT: **SOP-10042, Stonebridge on Douglas Lake**
Jefferson County, Tennessee
Review of SOP Application

I have reviewed the SOP application submitted for the above-referenced project. Based upon my review, the Dandridge soil does not meet our state design criteria and can not be used for this project. Therefore, a drip dispersal area of **1.42** acres (61,816 SF) is adequate for a design flow of **16,620** GPD and **55** residential units with the following permit conditions:

- Limit influent flow to treatment plant to 16,620 GPD and residential units to 55.
- The nitrate-nitrogen concentration in the applied wastewater must not exceed 21 mg/L.
- The BOD concentration in the applied wastewater must not exceed 25 mg/L.
- The E. coli concentration in the applied wastewater must not exceed 23 colonies/100 ML.
- Monitoring for ammonia-nitrogen.
- Since the nutrient (nitrate) loading calculations are based upon a nitrogen uptake rate (U) of 303 lbs-N per acre per year (mixed hardwoods), it is not necessary to include the following sentence in the SOP: *"For cover crops other than trees, the cover crop shall be cut on a regular basis and the cuttings removed from the site."*
- A requirement for a Biological/Natural certified operator to operate the treatment system should be included in the permit.

If you have any questions, please do not hesitate to contact me.

Robert G. O'Dette, M.S., P.E.

Wastewater Application Rates Based on Nitrate Concentration

Stonebridge on Douglas Lake, Jefferson County

Nitrate Loading Rate = $L_{wn} = (C_p)(Pr - PET) + U (4.413) / [(1-f)(C_n) - C_p]$ -- Eqn. 17-2

- L_{wn}** = Calculated Allowable Nitrate Loading Rate
- Pr** = Table A-3 of Chapter 16 - 5-year return monthly precipitation (in/month)
- PET** = Table A-2 of Chapter 16 - Potential Evapotranspiration (in/month)
- N- Uptake** = Table A-5 of Chapter 16 - Monthly Nitrogen Uptake Rate by Vegetation (lbs/acre/month)
- f** = Applied Nitrogen Fraction Removed by Denitrification / Volatilization (%)
- C_p** = 10 Maximum Nitrate Concentration in Leachate (mg/L)
- C_n** = 21 Nitrogen Concentration in Applied Wastewater (mg/L)
- 4.413 Conversion Factor
- U** = 303 Annual Nitrogen Uptake Rate for Mixed Hardwoods (lbs/acre/yr)

MONTH	Pr in/mo	PET in/mo	N Uptake %/mo	N Uptake lb/ac/mo	f (Denitrif) %/mo	L _{wn} in/mo	L _{wn} in/wk	L _{wn} in/day	L _{wn} GPD/SF	L _{wh} GPD/SF
JAN	7.62	0.10	1%	3.03	25%	15.41	3.48	0.50	0.310	
FEB	6.72	0.27	2%	6.06	25%	15.88	3.97	0.57	0.353	
MAR	8.85	0.97	4%	12.12	27%	24.84	5.61	0.80	0.499	
APR	6.59	2.30	8%	24.24	29%	30.58	7.13	1.02	0.635	
MAY	6.13	3.59	12%	36.36	31%	41.48	9.37	1.34	0.834	
JUN	5.52	4.90	15%	45.45	33%	50.93	11.88	1.70	1.058	
JUL	6.85	5.44	17%	51.51	35%	66.30	14.97	2.14	1.332	
AUG	4.73	5.00	15%	45.45	35%	54.35	12.27	1.75	1.092	
SEP	5.54	3.79	12%	36.36	34%	46.21	10.78	1.54	0.960	
OCT	4.47	1.98	8%	24.24	32%	30.87	6.97	1.00	0.620	
NOV	6.11	0.82	4%	12.12	29%	21.69	5.06	0.72	0.451	
DEC	7.55	0.27	2%	6.06	26%	17.98	4.06	0.58	0.361	
TOTALS	76.68	29.43	100%	303		416.52				