NUTRIENT LOADING SUMMARY

Basic Watershed Statistics

Chepachet WHPAs

Current Land Use

LAND USE

Total Watershed Area	**1,055.4**	**acres**	
Forested	511.5		48.5% of the Study Area
Wetlands	78.8		7.5%
Sewered	0.0		0.0%
Surface Water Area	19.4		1.8%
Riparian Area within the Watershed	**124.9**	acres	11.8%
Forested	62.9		50.3% of the Riparian Area
Wetlands	21.5		17.2%
Sewered	0.0		0.0%

SOILS

Over Entire Study Area		**Complete Watershed Analysis ONLY** Unsewered Watershed Area		Unsewered Riparian Area
Hydrologic Soil Group				
A	24.4%	A and B	39.0%	27.3%
B	14.6%	C (Non-restrict)	9.8%	40.1%
C	59.3%	D (Non-restrict)	1.7%	2.3%
D	1.7%	Restrictive	49.6%	30.3%

SEPTIC SYSTEMS

		Riparian Area Within	Outside	
Estimated Number in the Watershed	**560**	52	507	
		9.4%	90.6%	of total #
Estimated Number situated in "***Restrictive***" Soils	**306**	32	275	
	54.8%	60.5%	54.2%	of # in/out of Rip. Area
		10.3%	89.7%	of # in Restrictive
Estimated Number of **Malfunctioning** Systems	**0**	0	0	
	0.0%	0.0%	0.0%	of # in/out of Rip. Area
		#DIV/0!	#DIV/0!	of total # Malfunct.

HYDROLOGIC BUDGET

	Before BMP's Mgal/yr	Inches/yr	After BMP's Mgal/yr	Inches/yr
Average Annual Precipitation	1,290	45.0	1,290	45.0
Average Annual Evapotranspiration	516	18.0	516	18.0
Average Annual Surface Runoff	256	8.9	256	8.9
Average Annual Groundwater Recharge				
From Precipitation	518	18.1	518	18.1
From Septic Systems	25	0.9	25	0.9
Average Annual Surface Runoff if the watershed were entirely forested			81.6	2.8
This suggests an increase in runoff from development of			214%	

Complete Watershed Analysis:

Chepachet WHPAs

Current Land Use

Phosphorus Load (lb P/yr)		Before BMP's		After BMP's	
SOURCES:		lb P/yr	% of total	lb P/yr	% of total
Diverse sources such as fertilizers and pet waste		865.1	99.3%	865.1	99.3%
Direct atmospheric deposition on surface waters (not including coastal embayment area)		5.8	0.7%	5.8	0.7%
Malfunctioning septic systems located:					
	within riparian areas	0.0	0.0%	0.0	0.0%
	outside riparian areas	0.0	0.0%	0.0	0.0%
OR	on "Restrictive" soils	0.0	0.0%	0.0	0.0%
	on "Non-Restrictive" soils	0.0	0.0%	0.0	0.0%
		0.8		**0.8**	
TOTAL AVERAGE ANNUAL PHOSPHORUS LOAD TO SURFACE WATER		**870.9**	**lb P/yr**	**870.9**	**lb P/yr**
		Before BMP's		**After BMP's**	
If the watershed were entirely forested.....				117.4	lb P/yr
This suggests an increase in loading from development of				642%	

Nitrogen Load (lb N/yr)		Before BMP's		After BMP's	
SOURCES:		lb N/yr	% of total	lb N/yr	% of total
Diverse sources such as fertilizers and pet waste		4,585.9	96.7%	4,585.9	96.7%
Direct atmospheric deposition on surface waters (not including coastal embayment area)		155.3	3.3%	155.3	3.3%
Malfunctioning septic systems located:					
	within riparian areas	0.0	0.0%	0.0	0.0%
	outside riparian areas	0.0	0.0%	0.0	0.0%
OR	on "Restrictive" soils	0.0	0.0%	0.0	0.0%
	on "Non-Restrictive" soils	0.0	0.0%	0.0	0.0%
		4.5		**4.5**	
TOTAL AVERAGE ANNUAL NITROGEN LOAD TO SURFACE WATER		**4,741.2**	**lb N/yr**	**4,741.2**	**lb N/yr**
		Before BMP's		**After BMP's**	
If the watershed were entirely forested.....				1,866.8	lb N/yr
This suggests an increase in loading from development of				154%	

The phosphorus and nitrogen loading coefficients are assumed to include loads from diverse sources such as fertilizers, applied to both lawns and crops. Fertilizers also contribute nutrients to groundwater, which is calculated explicitly in the GROUNDWATER section. Even though the contribution from fertilizers to the surface water load is not explicitly calculated, it is included in the loading coefficients and may have an impact.

Groundwater Analysis:

Chepachet WHPAs
Current Land Use

Total Area Contributing to Groundwater **1,055.4 acres**

	Before implementation of BMP's			**After** implementation of BMP's		
SOURCES:	Portion of Total Area	lb N/yr	Portion of Total Load	Portion of Total Area	lb N/yr	Portion of Total Load
Unsewered Areas	100.0%			100.0%		
Total # of septic systems in area	560	8,462.2	63.8%	560	8,462.2	63.8%
Fertilized Lawns	13.5%	1,120.2	8.4%	13.5%	1,120.2	8.4%
Fertilized Agricultural Areas	3.7%	2,517.3	19.0%	3.7%	2,517.3	19.0%
Pets in Residential Areas		463.8	3.5%		463.8	3.5%
Unfertilized Pervious Areas	55.3%	700.7	5.3%	55.3%	700.7	5.3%
		N lbs/yr/ac 12.6			**N lbs/yr/ac 12.6**	
AVERAGE ANNUAL NITROGEN LOAD TO GROUNDWATER		**13,264.1 lb N/yr Before BMP's**			**13,264.1 lb N/yr After BMP's**	
If the watershed were entirely forested.....					1,148.6 lb N/yr	
This suggests an increase in loading from development of					1055%	
AVERAGE CONCENTRATION OF NITRATE-N IN RECHARGE		**2.9 mg/l of NO_3-N Before BMP's**			**2.9 mg/l After BMP's**	
If the watershed were entirely forested.....					0.2 mg/l	
This suggests an increase in loading from development of					1374%	

(assuming that nitrogen behaves conservatively once it reaches the groundwater, and that the nitrogen is in the form of nitrate)

Land Use/Soils Tables

SUMMARY TABLE 1:
Land Use/Hydrologic Soil Group Distribution
Chepachet WHPAs
Current Land Use

LAND USE	*Total Area (acres)*	*Hydrologic Soil Group* A	B	C	D	% of Total
[1] HD Res.(>8 /ac)	6.1	6.1	0.0	0.0	0.0	0.6%
[2] MHD Res.(4-7.9/ac)	68.5	19.5	0.8	48.2	0.0	6.5%
[3] MD Res.(1-3.9/ac)	173.4	53.4	27.0	93.0	0.0	16.4%
[4] MLD Res.(0.5-0.9/ac)	4.2	1.6	0.6	2.0	0.0	0.4%
[5] LD Res.(<0.5/ac)	1.6	1.6	0.0	0.0	0.0	0.2%
[6] Commercial	55.8	23.3	2.4	29.9	0.3	5.3%
[7] Industrial	0.0	0.0	0.0	0.0	0.0	0.0%
[8] Roads	0.0	0.0	0.0	0.0	0.0	0.0%
[9] Airports	0.0	0.0	0.0	0.0	0.0	0.0%
[10] Railroads	0.0	0.0	0.0	0.0	0.0	0.0%
[11] Junkyards	8.3	0.0	0.0	4.8	3.5	0.8%
[12] Recreation	30.0	30.0	0.0	0.0	0.0	2.8%
[13] Institution	17.5	0.0	0.0	17.5	0.0	1.7%
[14] Pasture	26.7	0.2	14.8	11.6	0.0	2.5%
[15] Cropland	26.6	2.7	3.3	20.6	0.0	2.5%
[16] Orchards	12.4	2.6	7.1	2.8	0.0	1.2%
[17] Brush	10.1	0.5	1.7	8.0	0.0	1.0%
[18] Forest	511.5	106.5	91.8	302.8	10.5	48.5%
[19] Barren	4.3	3.7	0.7	0.0	0.0	0.4%
[20] Wetland	78.8	4.4	3.9	68.9	1.6	7.5%
[21] Water	19.4	1.6	0.2	15.8	1.8	1.8%
Total (acres)	**1,055.4**	257.7	154.3	626.0	17.5	100%
		24.4%	14.6%	59.3%	1.7%	

SUMMARY TABLE 2:

Land Use Distribution in Sewered and Unsewered Portions of Watershed
Chepachet WHPAs
Current Land Use

LAND USE	Total Area (acres)	Sewered Area (acres)	*Unsewered Area (acres)* Non-Restrictive*(by soil hydrologic group) A and B	C	D	Restrictive*	Total Unsewered (acres)
[1] HD Res.(>8 /ac)	6.1	0.0	6.1	0.0	0.0	0.0	6.1
[2] MHD Res.(4-7.9/ac)	68.5	0.0	20.3	0.7	0.0	47.5	68.5
[3] MD Res.(1-3.9/ac)	173.4	0.0	80.4	2.6	0.0	90.4	173.4
[4] MLD Res.(0.5-0.9/ac)	4.2	0.0	2.2	0.0	0.0	2.0	4.2
[5] LD Res.(<0.5/ac)	1.6	0.0	1.6	0.0	0.0	0.0	1.6
[6] Commercial	55.8	0.0	25.7	3.3	0.3	26.6	55.8
[7] Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[8] Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[9] Airports	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[10] Railroads	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[11] Junkyards	8.3	0.0	0.0	0.0	3.5	4.8	8.3
[12] Recreation	30.0	0.0	30.0	0.0	0.0	0.0	30.0
[13] Institution	17.5	0.0	0.0	0.0	0.0	17.5	17.5
[14] Pasture	26.7	0.0	15.1	0.2	0.0	11.4	26.7
[15] Cropland	26.6	0.0	6.0	2.6	0.0	18.0	26.6
[16] Orchards	12.4	0.0	9.6	1.2	0.0	1.6	12.4
[17] Brush	10.1	0.0	2.2	0.9	0.0	7.0	10.1
[18] Forest	511.5	0.0	198.3	59.9	10.5	242.9	511.5
[19] Barren	4.3	0.0	4.3	0.0	0.0	0.0	4.3
[20] Wetland	78.8	0.0	8.4	25.7	1.6	43.2	78.8
[21] Water	19.4	0.0	1.8	5.8	1.8	10.1	19.4
Total (acres)	**1,055.4**	**0.0**	411.9	102.9	17.5	523.1	**1,055.4**
		0.0%	39.0%	9.8%	1.7%	49.6%	100.0%

SUMMARY TABLE 3:

Land Use Distribution in the Riparian Areas of the Surface Watershed
Chepachet WHPAs
Current Land Use

Riparian Area/Total Watershed Area = 11.8%

LAND USE	Total Area (acres)	Sewered Area (acres)	*Unsewered Area (acres)* Non-Restrictive*(by hydrologic soil group) A and B	C	D	Restrictive*	Total Unsewered Area (acres)
[1] HD Res.(>8 /ac)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[2] MHD Res.(4-7.9/ac)	8.4	0.0	3.2	0.0	0.0	5.2	8.4
[3] MD Res.(1-3.9/ac)	15.5	0.0	7.2	0.6	0.0	7.6	15.5
[4] MLD Res.(0.5-0.9/ac)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[5] LD Res.(<0.5/ac)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[6] Commercial	5.6	0.0	0.2	0.8	0.1	4.5	5.6
[7] Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[8] Roads	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[9] Airports	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[10] Railroads	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[11] Junkyards	0.9	0.0	0.0	0.0	0.9	0.0	0.9
[12] Recreation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[13] Institution	1.0	0.0	0.0	0.0	0.0	1.0	1.0
[14] Pasture	2.5	0.0	0.9	0.0	0.0	1.6	2.5
[15] Cropland	1.1	0.0	0.5	0.6	0.0	0.0	1.1
[16] Orchards	3.2	0.0	1.9	1.2	0.0	0.1	3.2
[17] Brush	2.2	0.0	0.6	0.5	0.0	1.1	2.2
[18] Forest	62.9	0.0	17.1	31.2	1.3	13.2	62.9
[19] Barren	0.1	0.0	0.1	0.0	0.0	0.0	0.1
[20] Wetland	21.5	0.0	2.4	15.0	0.5	3.5	21.5
Total (acres)	**124.9**	**0.0**	34.1	50.0	2.9	37.9	**124.9**
		0.0%	27.3%	40.1%	2.3%	30.3%	100.0%

SUMMARY TABLE 4:

Average Annual Volume of Runoff to Surface Water (% of Total Runoff)
Chepachet WHPAs
Current Land Use

LAND USE	*Hydrologic Soil Group* A	B	C	D	% of Total Runoff by land use
[1] HD Res.(>8 /ac)	1.87%	0.00%	0.00%	0.00%	1.87%
[2] MHD Res.(4-7.9/ac)	3.63%	0.17%	12.80%	0.00%	16.61%
[3] MD Res.(1-3.9/ac)	5.86%	3.65%	14.94%	0.00%	24.45%
[4] MLD Res.(0.5-0.9/ac)	0.12%	0.05%	0.20%	0.00%	0.37%
[5] LD Res.(<0.5/ac)	0.08%	0.00%	0.00%	0.00%	0.08%
[6] Commercial	5.56%	0.71%	10.45%	0.10%	16.82%
[7] Industrial	0.00%	0.00%	0.00%	0.00%	0.00%
[8] Roads	0.00%	0.00%	0.00%	0.00%	0.00%
[9] Airports	0.00%	0.00%	0.00%	0.00%	0.00%
[10] Railroads	0.00%	0.00%	0.00%	0.00%	0.00%
[11] Junkyards	0.00%	0.00%	1.79%	1.35%	3.14%
[12] Recreation	1.43%	0.00%	0.00%	0.00%	1.43%
[13] Institution	0.00%	0.00%	4.66%	0.00%	4.66%
[14] Pasture	0.01%	0.83%	1.02%	0.00%	1.85%
[15] Cropland	0.19%	0.42%	3.77%	0.00%	4.38%
[16] Orchards	0.06%	0.39%	0.25%	0.00%	0.70%
[17] Brush	0.00%	0.03%	0.25%	0.00%	0.28%
[18] Forest	0.00%	1.46%	9.63%	0.50%	11.59%
[19] Barren	0.09%	0.09%	0.00%	0.00%	0.18%
[20] Wetland	0.00%	0.06%	2.19%	0.07%	2.33%
[21] Water	0.77%	0.09%	7.56%	0.84%	9.26%
% of Total Runoff by Hydrologic Soil Group	19.7%	8.0%	69.5%	2.9%	**100.0%** of Total runoff volume before BMP's

SUMMARY TABLE 5:

Average Annual Phosphorus Export to Surface Water
Chepachet WHPAs
Current Land Use

LAND USE	*Hydrologic Soil Group* A	B	C	D	% of Total P by land use
[1] HD Res.(>8 /ac)	2.56%	0.00%	0.00%	0.00%	2.56%
[2] MHD Res.(4-7.9/ac)	4.98%	0.23%	17.54%	0.00%	22.75%
[3] MD Res.(1-3.9/ac)	8.02%	5.00%	20.46%	0.00%	33.48%
[4] MLD Res.(0.5-0.9/ac)	0.17%	0.07%	0.27%	0.00%	0.51%
[5] LD Res.(<0.5/ac)	0.10%	0.00%	0.00%	0.00%	0.10%
[6] Commercial	2.67%	0.42%	6.86%	0.07%	10.02%
[7] Industrial	0.00%	0.00%	0.00%	0.00%	0.00%
[8] Roads	0.00%	0.00%	0.00%	0.00%	0.00%
[9] Airports	0.00%	0.00%	0.00%	0.00%	0.00%
[10] Railroads	0.00%	0.00%	0.00%	0.00%	0.00%
[11] Junkyards	0.00%	0.00%	1.47%	1.39%	2.86%
[12] Recreation	1.72%	0.00%	0.00%	0.00%	1.72%
[13] Institution	0.00%	0.00%	6.38%	0.00%	6.38%
[14] Pasture	0.01%	0.91%	1.02%	0.00%	1.94%
[15] Cropland	0.15%	0.70%	7.49%	0.00%	8.34%
[16] Orchards	0.12%	0.76%	0.48%	0.00%	1.35%
[17] Brush	0.00%	0.02%	0.14%	0.00%	0.16%
[18] Forest	0.61%	1.05%	5.21%	0.24%	7.12%
[19] Barren	0.02%	0.01%	0.00%	0.00%	0.03%
[20] Wetland	0.00%	0.00%	0.00%	0.00%	0.00%
[21] Water	0.06%	0.01%	0.55%	0.06%	0.67%
% of Total P by Hydrologic Soil Group	21.2%	9.2%	67.9%	1.8%	**100.0%** of Total P exported to surface water before BMP's