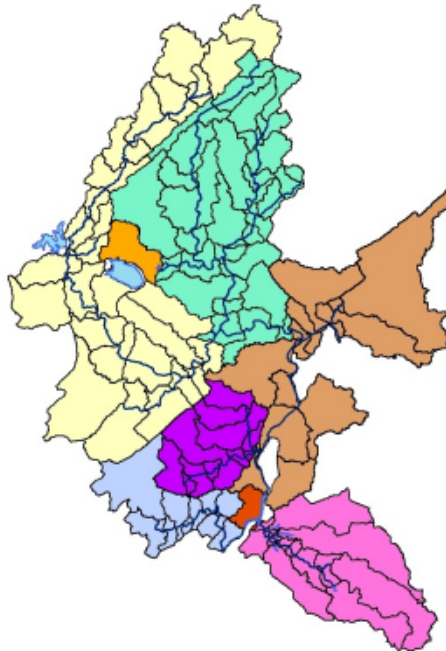




PHASE II EXECUTIVE SUMMARY

*RARITAN RIVER BASIN NUTRIENT TMDL STUDY
WATERSHED MODEL AND TMDL CALCULATIONS*



PREPARED FOR:

RUTGERS UNIVERSITY NEW JERSEY ECOCOMPLEX
AND
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER MONITORING AND STANDARDS

MAY 2013

EXECUTIVE SUMMARY

This study was undertaken to provide the scientific foundation to understand the cause-and-effect relationships between pollutant loads and observed water quality responses for a select set of related water quality impairments in the Raritan River Basin. Defining these relationships provides the Department with the defensible technical basis to address total phosphorus (TP), pH, dissolved oxygen (DO), and total suspended solids (TSS) impairments in streams and lakes within the study area. This will include regulatory actions, implemented through NJPDES permits, and non-regulatory actions involving regional and local partners, targeted funding, and stewardship building.

Phosphorus can cause designated use impairment by stimulating excessive growth of algae and aquatic plants, which can cause oxygen supersaturation during the day and oxygen depletion at night. Large diurnal variations of DO are often associated with large diurnal variations of pH, both of which can be induced by excessive growth in the system. As a result, phosphorus is related, through primary productivity, to both DO and pH. In addition to affecting attainment of DO and pH criteria, excessive productivity can result in non-attainment of the narrative nutrient criteria at N.J.A.C. 7:9B-1.14(d)4.i:

“Except as due to natural conditions, nutrients shall not be allowed in concentrations that render the waters unsuitable for the existing or designated uses due to objectionable algal densities, nuisance aquatic vegetation, diurnal fluctuations in dissolved oxygen or pH indicative of excessive photosynthetic activity, detrimental changes to the composition of aquatic ecosystems, or other indicators of use impairment caused by nutrients.”

The study defined critical locations and end points that drive the pollutant load reductions needed in order to attain Surface Water Quality Standards (SWQS) and thereby support designated uses. Based on applicable instream and in-lake water quality criteria in the SWQS [N.J.A.C. 7:9B-1.14(d)], water quality targets were defined in terms of TP, DO, and TSS. In order to address pH impairments, peak diurnal DO thresholds were defined at critical locations to relate predicted DO to the maximum pH criterion of 8.5 s.u.

The Raritan River Basin Model was developed by Kleinfelder/Omni as a diagnostic and predictive tool to inform the management responses developed by NJDEP to address water quality impairments. The Model consists of a family of five watershed area models that are

calibrated and validated for nutrients, DO, and TSS. Each watershed area model simulates flow and water quality by integrating hydrologic (runoff and baseflow), pollutant loading (point and nonpoint source), hydraulic (channel characteristics such as depth and velocity), and receiving water quality (pollutant fate and transport) models within a geographically-based modeling framework. The hydrologic and nonpoint source pollutant loading model (HydroWAMIT) was developed specifically for this project in order to simulate important features of the system and to isolate various nonpoint sources. It is coupled with a large-scale application of USEPA's dynamic surface water quality model, Water Analysis Simulation Program (WASP7.1). The Raritan River Basin Model represents a state-of-the-art simulation tool that integrates point and nonpoint sources and captures salient hydrologic properties, hydraulics, and instream kinetics. Watershed modeling analyses were performed to assess the impact of nutrient reductions from point and nonpoint sources on DO, phosphorus concentrations, pH (through relationship with diurnal DO peaks), and TSS in streams and lakes throughout the system.

A phosphorus TMDL Condition was defined as the combination of point and nonpoint source reductions that will satisfy water quality targets throughout the system. Point and nonpoint source reductions varied significantly among the various basins and even from one watershed to the next within a basin. Wastewater treatment plant (WWTP) point source allocations were assigned for both summer and winter based on satisfaction of water quality targets under varying seasonal flows. The model has demonstrated that instream levels of orthophosphorus are critical to attaining water quality objectives; therefore, in addition to TP, effluent loadings for the TMDL Condition were also established for orthophosphorus. Stormwater sources were assigned watershed-specific percent reductions of loads from urban and agricultural land areas. Attachment 1 provides the effluent concentrations and loads associated with the TMDL Condition for each WWTP point source in each major basin¹, as well as the stormwater source reductions that would be required in each watershed to achieve water quality standards.

The TSS TMDL Condition was based on the stormwater TSS improvements that would result from the implementation of the phosphorus TMDL, which was found to satisfy TSS water quality targets at all subwatershed outlets. Percent reductions of TSS in stormwater from urban

¹ Effluent levels for the Lower Millstone River (downstream of Carnegie Lake) and the mainstem Raritan River downstream of the Millstone River are not included in Attachment 1, since a TMDL analysis for TP was not performed in this watershed area. The 0.1 mg/L TP criterion does not apply to the Lower Millstone River; however, based on the results of follow-up studies in the mainstem Raritan River, it is possible that this area will be affected by a future TMDL based on impact to the mainstem Raritan River.

and agricultural areas were set to the same percent reduction assigned to each subwatershed for TP reductions. This is a conservative assumption, since stormwater management improvements generally reduce TSS in stormwater more than TP. Attachment 1 provides the stormwater and nonpoint source TSS source reductions required in each watershed.

As required under the Clean Water Act, this study was focused on achieving 100% compliance with applicable surface water quality criteria. The Clean Water Act also requires a Margin of Safety (MOS) in setting the TMDL in order to account for uncertainty in the loading estimates, physical parameters, and the model itself; a MOS of 10% for WWTP point sources and 20% for stormwater and nonpoint sources was applied in order to account for these uncertainties. The TMDL requires major reductions of nonpoint source and stormwater loads; the reason is that stormwater causes storm-induced peaks of both phosphorus and TSS concentrations in the streams. Major reductions are required in order to prevent those peaks from exceeding the water quality targets. Similarly, the TMDL Condition requires significant reductions of TP and orthophosphorus levels from WWTP sources. These reductions are necessary to satisfy the nutrient criteria under all flow conditions and to constrain instream productivity enough to reduce the diurnal pH peaks below the criterion.

The TMDL outcomes for each impairment designation in each subwatershed are provided in Attachment 2. Following the public comment process and approval by EPA, the phosphorus and TSS TMDLs will be implemented through NJPDES permit revisions for wastewater and urban stormwater sources, and programs designed to encourage the application of agricultural BMPs.

Attachment 1
Summary of TMDL Condition

Raritan River Basin TMDL Condition for WWTP Point Sources

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Effluent Concentrations (mg/L) and Loads (kg/d) Associated with TMDL Condition*					
				May - October			November - April		
				OrthoP (mg/L)	TP (mg/L)	TP (kg/d)	OrthoP (mg/L)	TP (mg/L)	TP (kg/d)
NJ0028304	Day's Inn - Roxbury - Ledgewood	0.04	0.5 mg/l TP as AML	0.08	0.50	0.08	0.11	0.50	0.08
NJ0021954	Mt Olive Twp - Clover Hill STP	0.5	1.0 mg/l TP as AML	0.08	0.62	1.18	0.11	1.00	1.89
NJ0023493	Washington Twp-Schooley's Mt	0.5	No Limit	0.08	0.68	1.29	0.11	0.71	1.35
NJ0109061	Washington Twp-Long Valley	0.244	No Limit	0.08	1.34	1.24	0.11	1.37	1.27
NJ0028487	NJDC Youth Correct - Mountainview	0.26	0.4 mg/l TP as AML	0.09	0.18	0.18	0.13	0.25	0.25
NJ0078018	Clinton West	0.25	2.0 mg/l TP as AML	0.09	0.18	0.17	0.13	0.25	0.24
NJ0035084	Exxon Research & Eng Co	0.22	0.5 mg/l TP as AML	0.09	0.18	0.15	0.13	0.25	0.21
NJ0020389	Town of Clinton WTP	2.03	2.0 mg/l TP as AML	0.14	2.00	15.37	0.20	2.00	15.37
NJ0100528	Glen Meadows/Twin Oaks	0.025	No Limit	0.43	2.23	0.21	0.61	2.41	0.23
NJ0028436	Flemington Boro	3.85	No Limit	n/a	n/a	n/a	n/a	n/a	n/a
NJ0022047	Raritan Twp MUA	3.8	No Limit	0.14	1.31	18.90	0.20	1.86	26.75

*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition.

North-South Branch

**Raritan River Basin
TMDL Condition for WWTP Point Sources**

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Effluent Concentrations (mg/L) and Loads (kg/d) Associated with TMDL Condition*					
				May - October			November - April		
				OrthoP (mg/L)	TP (mg/L)	TP (kg/d)	OrthoP (mg/L)	TP (mg/L)	TP (kg/d)
NJ0000876	Hercules Kenvil Works Facility	0.135	1.0 mg/l TP as AML	0.30	0.59	0.30	0.50	1.00	0.51
NJ0022675	Roxbury Twp-Ajax Terrace	2.0	1.0 mg/l TP as AML	0.10	0.20	1.50	0.18	0.36	2.73
NJ0026824	Chester Shopping Center	0.011	No Limit	0.41	2.21	0.09	0.54	2.34	0.10
NJ0022781	Valley Rd Sewer Co - Pottersville STP	0.048	No Limit	0.41	2.21	0.40	0.54	2.34	0.43
NJ0021865	Fiddler's Elbow CC - Reynwood Inc	0.03	No Limit	0.41	2.21	0.25	0.54	2.34	0.27
NJ0102563	Route 78 Office Area - Tewksbury	0.09653	New Discharge	0.07	0.13	0.05	0.12	0.23	0.08
NJ0023175	Clinton Twp BOE - Round Valley	0.009	No Limit	1.25	2.50	0.09	1.25	2.50	0.09
NJ0098922	Readington-Lebanon SA	1.45	No Limit	0.14	1.40	7.66	0.18	1.44	7.90
NJ0021334	Mendham Boro	0.45	1.0 mg/l TP as AML	0.27	0.54	0.92	0.36	0.72	1.23
NJ0026387	Bernardsville	0.8	1.0 mg/l TP as AML	0.20	0.41	1.23	0.27	0.54	1.64
NJ0033995	Environmental Disposal Corporation	2.1	0.5 mg/l TP as AML	0.25	0.50	3.97	0.25	0.50	3.97

*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition.

Raritan River Basin TMDL Condition for WWTP Point Sources

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Effluent Concentrations (mg/L) and Loads (kg/d) Associated with TMDL Condition*	
				TP (mg/L)	TP (kg/d)
NJ0004243	Elementis	0.036	No Limit	0.35	0.05
NJ0029475	Hightstown Boro Advanced WWTP	1.000	1.0 mg/l TP as AML	0.12	0.44
NJ0023787	East Windsor Twp MUA	4.500	1.0 mg/l TP as AML	0.12	1.99
NJ0024104	Princeton Meadows STP	1.640	1.0 mg/l TP as AML	0.12	0.73
NJ0023922	USDOE PPPL	0.637	No Limit	0.09	0.22
NJ0000272	David Sarnoff Research	0.096	1.0 mg/l TP as AML	0.35	0.13
NJ0031445	Firmenich Inc	0.036	1.0 mg/l TP as AML	0.35	0.05

*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition.

Raritan River Basin TMDL Condition for WWTP Point Sources

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Effluent Concentrations (mg/L) and Loads (kg/d) Associated with TMDL Condition*	
				TP (mg/L)	TP (kg/d)
NJ0000795	Bristol-Myers Squibb Co	0.172	No Limit	0.18	0.12
NJ0035319	Stony Brook RSA Pennington	0.445	No Limit	0.18	0.30
NJ0000809	Hopewell Business Park	0.128	1.0 mg/l TP as AML	0.18	0.09
NJ0022110	Educational Testing Service	0.080	1.0 mg/l TP as AML	0.18	0.05

*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition.

Raritan River Basin TMDL Condition for WWTP Point Sources

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Effluent Concentrations (mg/L) and Loads (kg/d) Associated with TMDL Condition*			
				May - October		November - April	
				TP (mg/L)	TP (kg/d)	TP (mg/L)	TP (kg/d)
NJ0035301	Stony Brook RSA - Hopewell	0.300	No Limit	0.22	0.25	0.54	0.61
NJ0069523	Montgomery Twp - Cherry Valley STP	0.286	0.5 mg/l TP as Max Summer	0.22	0.23	0.54	0.58
NJ0022390	Montgomery Twp - Skillman Village (formerly NPDC)	0.500	1.0 mg/l TP as AML	0.22	0.41	0.54	1.02
NJ0023663	Carrier Foundation Rehab STP	0.040	1.0 mg/l TP as AML	0.70	0.11	1.00	0.15
NJ0060038	Montgomery Twp - Pike Brook	0.670	0.3 mg/l TP as AML	0.23	0.59	0.30	0.76
NJ0026140	J & J Consumer Products	0.063	1.0 mg/l TP as AML	0.70	0.17	1.00	0.24
NJ0067733	Montgomery Twp - Oxbridge	0.088	0.2 mg/l TP as AML Summer	0.20	0.07	1.00	0.33

*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition.

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105010010	Drakes Brook (above Eyland Ave)	84% TP & TSS Reduction		100% Compliance with 0.05 mg/l TP Criterion in Solitude Lake
02030105010020	Drakes Brook (below Eyland Ave)			
02030105010030	Raritan River SB (above Rt 46)			
02030105010040	Raritan River SB (74d 44m 15s to Rt 46)			
02030105010050	Raritan R SB (LongValley br to 74d44m15s)			
02030105010060	Raritan R SB (Califon br to Long Valley)			
02030105010070	Raritan R SB (StoneMill gage to Califon)	68% TP & TSS Reduction		100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105010080	Raritan R SB (Spruce Run-StoneMill gage)			
02030105020050	Beaver Brook (Clinton)	68% TP & TSS Reduction	60% TP & TSS Reduction	
02030105020060	Cakepoulin Creek	68% TP & TSS Reduction		
02030105020070	Raritan R SB (River Rd to Spruce Run)	68% TP & TSS Reduction		
02030105020080	Raritan R SB (Prescott Bk to River Rd)			
02030105020090	Prescott Brook / Round Valley Reservoir			
02030105020100	Raritan R SB (Three Bridges-Prescott Bk)			

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105030010	First Neshanic River	72% TP & TSS Reduction	68% TP & TSS Reduction	100% Compliance with 0.1 mg/l TP Criterion in Neshanic River
02030105030020	Second Neshanic River			
02030105030030	Headquarters trib (Third Neshanic River)			
02030105030040	Third Neshanic River			
02030105030050	Back Brook			
02030105030060	Neshanic River (below FNR / SNR confl)			
02030105040010	Raritan R SB (Pleasant Run-Three Bridges)	68% TP & TSS Reduction	60% TP & TSS Reduction	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105040020	Pleasant Run			
02030105040030	Holland Brook	68% TP & TSS Reduction		100% Compliance with 0.1 mg/l TP Criterion in Holland Brook
02030105040040	Raritan R SB (NB to Pleasant Run)	68% TP & TSS Reduction	60% TP & TSS Reduction	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105050010	Lamington R (above Rt 10)			
02030105050020	Lamington R (Hillside Rd to Rt 10)			
02030105050030	Lamington R (Furnace Rd to Hillside Rd)			
02030105050040	Lamington R (Pottersville gage-FurnaceRd)			

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105050050	Pottersville trib (Lamington River)	68% TP & TSS Reduction	60% TP & TSS Reduction	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105050060	Cold Brook			
02030105050070	Lamington R (HallsBrRd-Pottersville gage)			
02030105050080	Rockaway Ck (above McCrea Mills)			
02030105050090	Rockaway Ck (RockawaySB to McCrea Mills)			
02030105050110	Lamington R (below Halls Bridge Rd)			
02030105050100	Rockaway Ck SB	72% TP & TSS Reduction		Compliance with 0.05 mg/l TP Criterion in Cushetunk Lake
02030105060010	Raritan R NB (above/incl India Bk)	76% TP & TSS Reduction		100% Compliance with 0.05 mg/l TP Criterion in Ravine Lake
02030105060020	Burnett Brook (above Old Mill Rd)			
02030105060030	Raritan R NB (incl McVickers to India Bk)			
02030105060040	Raritan R NB (Peapack Bk to McVickers Bk) - upstream Ravine Lake			
	Raritan R NB (Peapack Bk to McVickers Bk) - downstream Ravine Lake	68% TP & TSS Reduction	60% TP & TSS Reduction	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105060050	Peapack Brook (above/incl Gladstone Bk)			
02030105060060	Peapack Brook (below Gladstone Brook)			

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105060070	Raritan R NB (incl Mine Bk to Peapack Bk)	68% TP & TSS Reduction	60% TP & TSS Reduction	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105060080	Middle Brook (NB Raritan River)			
02030105060090	Raritan R NB (Lamington R to Mine Bk)			
02030105070010	Raritan R NB (Rt 28 to Lamington R)			
02030105070020	Chambers Brook			
02030105070030	Raritan R NB (below Rt 28)			
02030105080010	Peters Brook			
02030105080020	Raritan R Lwr (Rt 206 to NB / SB)			
02030105080030	Raritan R Lwr (Millstone to Rt 206)			
02030105090010	Stony Bk (above 74d 49m 15s)	84% TP & TSS Reduction		Achieves Natural Condition in Carnegie Lake (0.05 mg/l Average TP) and 100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams
02030105090020	Stony Bk (74d 48m 10s to 74d 49m 15s)			
02030105090030	Stony Bk (Baldwins Ck to 74d 48m 10s)			
02030105090040	Stony Bk (74d46m dam to/incl Baldwins Ck)			
02030105090050	Stony Bk (Province Line Rd to 74d46m dam)			
02030105090060	Stony Bk (Rt 206 to Province Line Rd)			
02030105090070	Stony Bk (Harrison St to Rt 206)			

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105100010	Millstone River (above Rt 33)	84% TP & TSS Reduction	84% TP & TSS Reduction	Achieves Natural Condition in Carnegie Lake (0.05 mg/l Average TP) and 100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams
02030105100020	Millstone R (Applegarth road to Rt 33)			
02030105100030	Millstone R (RockyBk to Applegarth road)			
02030105100040	Rocky Brook (above Monmouth Co line)			
02030105100050	Rocky Brook (below Monmouth Co line)			
02030105100060	Millstone R (Cranbury Bk to Rocky Bk)			
02030105100070	Cranbury Brook (above NJ Turnpike)			
02030105100080	Cedar Brook (Cranbury Brook)			
02030105100090	Cranbury Brook (below NJ Turnpike)			
02030105100100	Shallow Brook (Devils Brook)			
02030105100110	Devils Brook			
02030105100120	Bear Brook (above Trenton Road)			
02030105100130	Bear Brook (below Trenton Road)			
02030105100140	Millstone R (Rt 1 to Cranbury Bk)			
02030105110020	Millstone R (HeathcoteBk to Harrison St)			

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105110010	Heathcote Brook	60% TSS Reduction		100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams
02030105110030	Millstone R (Beden Bk to Heathcote Bk)			
02030105110040	Beden Brook (above Province Line Rd)	68% TP & TSS Reduction		100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
02030105110050	Beden Brook (below Province Line Rd)			
02030105110060	Rock Brook (above Camp Meeting Ave)			
02030105110070	Rock Brook (below Camp Meeting Ave)			
02030105110080	Pike Run (above Crusier Brook)			
02030105110090	Cruser Brook / Roaring Brook			
02030105110100	Pike Run (below Crusier Brook)			
02030105110110	Millstone R (BlackwellsMills to BedenBk)	60% TSS Reduction		100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams
02030105110120	Sixmile Run (above Middlebush Rd)			
02030105110130	Sixmile Run (below Middlebush Rd)			
02030105110140	Millstone R (AmwellRd to BlackwellsMills)			
02030105110150	Royce Brook (above Branch Royce Brook)			
02030105110160	Royce Brook (below/incl Branch Royce Bk)			

Raritan River Basin Stormwater and Nonpoint Source TMDL Condition

HUC-14s within Study Area	Subwatershed	Agricultural NPS Percent Reduction	Urban NPS Percent Reduction	Water Quality Targets
02030105110170	Millstone River (below Amwell Rd)	60% TSS Reduction	60% TSS Reduction	100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams
02030105120010	Green Bk (above/incl Blue Brook)			
02030105120020	Green Bk (N Plainfield gage to Blue Bk)			
02030105120030	Stony Brook (North Plainfield)			
02030105120040	Green Bk (Bound Bk to N Plainfield gage)			
02030105120050	Middle Brook EB			
02030105120060	Middle Brook WB			
02030105120070	Cuckels Brook			
02030105120080	South Fork of Bound Brook			
02030105120090	Spring Lake Fork of Bound Brook			
02030105120100	Bound Brook (below fork at 74d 25m 15s)			
02030105120110	Ambrose Brook (above/incl Lake Nelson)			
02030105120120	Ambrose Brook (below Lake Nelson)			
02030105120130	Green Brook (below Bound Brook)			
02030105120140	Raritan R LwR (I-287 Piscatway-Millstone)			

Attachment 2
Summary of TMDL Outcomes

Phosphorus Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105010080-01	Raritan R SB(Spruce Run-StoneMill gage)	SDR* by NJDEP	NSB 3-19 Solitude Lake	0.05 mg/l	TMDL demonstrates 100% compliance
NJ02030105020040-01	Spruce Run Reservoir / Willoughby Brook	2010 303(d)	out of extent	n/a	Not Addressed
NJ02030105020050-01	Beaver Brook (Clinton)	2010 303(d)	NSB 4-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105020070-01	Raritan R SB(River Rd to Spruce Run)	2010 303(d)	NSB 7-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105020100-01	Raritan R SB(Three Bridges-Prescott Bk)	2010 303(d)	NSB 7-13	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105030060-01	Neshanic River (below FNR / SNR confl)	2010 303(d)	NSB 8-2	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105030070-01	Neshanic River (below Black Brk)	2010 303(d)	NSB 8-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105040010-01	Raritan R SB(Pleasant Run-Three Bridges)	2010 303(d)	NSB 9-4	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105040030-01	Holland Brook	SDR* by NJDEP	NSB 10-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105040040-01	Raritan R SB(NB to Pleasant Run)	2010 303(d)	NSB 11-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105050020-01	Lamington R (Hillside Rd to Rt 10)	2010 303(d)	NSB 12-6	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105050090-01	Rockaway Ck (below McCrea Mills)	2010 303(d)	NSB 15-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105050100-01	Rockaway Ck SB	2010 303(d)	NSB 14-2 Cushetunk Lake	0.1 mg/l 0.05 mg/l	TMDL demonstrates 100% compliance
NJ02030105050070-01	Lamington R(Halls Bridge Rd to HerzogBrk)	2010 303(d)	NSB 16-4	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105060040-01	Raritan R NB(Peapack Bk to McVickers Bk)	SDR* by NJDEP	NSB 19-7 Ravine Lake	0.05 mg/l	TMDL demonstrates 100% compliance
NJ02030105070030-01	Raritan R NB (below Rt 28)	2010 303(d)	NSB 22-8	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105080020-01	Raritan R Lwr (Rt 206 to NB / SB)	2010 303(d)	NSB 23-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105080030-01	Raritan R Lwr (Millstone to Rt 206)	SDR* by NJDEP	Main 2-2	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090050-01	Stony Bk(Province Line Rd to 74d46m dam)	2010 303(d)	SB 1-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090060-01	Stony Bk (Rt 206 to Province Line Rd)	2010 303(d)	SB 1-21	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090070-01	Stony Bk (Harrison St to Rt 206)	2010 303(d)	SB 1-27	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090090-01	Stony Bk- Princeton drainage	2010 303(d)	Carnegie Lake	0.05 mg/l	TMDL demonstrates attainment of Natural Condition in Carnegie Lake

*SDR = Supplemental Data Review

Phosphorus Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105100010-01	Millstone River (above Rt 33)	2010 303(d)	UM 1-1 Watershed	none	TMDL Condition: - demonstrates attainment of Natural Condition in headwater lakes; - demonstrates attainment of Natural Condition in Carnegie Lake.
NJ02030105100020-01	Millstone R (Applegarth road to Rt 33)	2010 303(d)			
NJ02030105100030-01	Millstone R (RockyBk to Applegarth road)	2010 303(d)	UM 1-2	none	
NJ02030105100050-01	Rocky Brook (below Monmouth Co line)	2010 303(d) SDR* by NJDEP	UM 2-6 (streams) UM 2-1 (Peddie Lake)	none 0.05 mg/l	
NJ02030105100060-01	Millstone R (Cranbury Bk to Rocky Bk)	2010 303(d)	UM 3-15	none	
NJ02030105100090-01	Cranbury Brook (below NJ Turnpike)	SDR* by NJDEP	UM 4-1 (Plainsboro Pond)	0.05 mg/l	
NJ02030105100110-01	Devils Brook	SDR* by NJDEP	UM 8-1 (Gordon Pond)	0.05 mg/l	
NJ02030105100130-01	Bear Brook (below Trenton Road)	SDR* by NJDEP	UM 6-1 (Grovers Mill Pond)	0.05 mg/l	
NJ02030105100140-01	Millstone R (Rt 1 to Cranbury Bk)	2010 303(d)	UM 9-1	none	
NJ02030105110020-01	Millstone R (HeathcoteBk to Harrison St)	SDR* by NJDEP	Carnegie Lake	0.05 mg/l	
NJ02030105110030-01	Millstone R (Beden Bk to Heathcote Bk)	2010 303(d)	BB 4-13	none	0.1 mg/l TP criterion does not apply to Lower Millstone River; possible future TMDL based on impact to Raritan River.
NJ02030105110050-01	Beden Brook (below Province Line Rd)	2010 303(d)	BB 1-18	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105110100-01	Pike Run (below Crusier Brook)	2010 303(d)	BB 3-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105110110-01	Millstone R (BlackwellsMills to BedenBk)	2010 303(d)	BB 5-12	none	0.1 mg/l TP criterion does not apply to Lower Millstone River; possible future TMDL based on impact to Raritan River.
NJ02030105110120-01	Sixmile Run (above Middlebush Rd)	2010 303(d)	BB 5-11 Watershed	none	Not Addressed
NJ02030105110130-01	Sixmile Run (below Middlebush Rd)	2010 303(d)			
NJ02030105110140-01	Millstone R(AmwellRd to BlackwellsMills)	2010 303(d)	BB 5-15	none	0.1 mg/l TP criterion does not apply to Lower Millstone River; possible future TMDL based on impact to Raritan River.
NJ02030105110170-01	Millstone River (below Amwell Rd)	2010 303(d)	BB 5-20		

*SDR = Supplemental Data Review

Phosphorus Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105120080-01	South Fork of Bound Brook	2010 303(d)	MS 4-1 Watershed	none	Not Addressed
NJ02030105120090-01	Spring Lake Fork of Bound Brook	2010 303(d)			
NJ02030105120100-01	Bound Brook (below fork at 74d 25m 15s)	2010 303(d)			
NJ02030105120130-01	Green Brook (below Bound Brook)	2010 303(d)	MS 4-5	none	Follow-up monitoring to evaluate nutrient impacts and possible future TMDL
NJ02030105120140-01	Raritan R Lwr(I-287 Piscatway-Millstone)	2010 303(d)	MS 5-3		
NJ02030105120160-01	Raritan R Lwr (MileRun to I-287 Piscatwy)	2010 303(d)	downstream of extent		
NJ02030105120170-01	Raritan R Lwr (Lawrence Bk to Mile Run)	2010 303(d)			
NJ02030105120180-01	Middle Brook	2010 303(d)	MS 3-5 Watershed	none	Not Addressed
NJ02030105150010-01	Weamaconk Creek	2010 303(d)	out of extent	n/a	Not addressed - Impairments in the Duhernal lake watershed are being addressed in a separate TMDL study.
NJ02030105150030-01	McGellairds Brook (below Taylors Mills)	2010 303(d)			
NJ02030105150060-01	Matchaponix Brook (below Pine Brook)	2010 303(d)			
NJ02030105160030-01	Duhernal Lake / Iresick Brook	SDR* by NJDEP			

*SDR = Supplemental Data Review

TSS Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105020070-01	Raritan R SB(River Rd to Spruce Run)	2010 303(d)	NSB 7-1	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105020080-01	Raritan R SB(Prescott Bk to River Rd)	2010 303(d)	NSB 7-7	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105020100-01	Raritan R SB(Three Bridges-Prescott Bk)	2010 303(d)	NSB 7-13	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105040040-01	Raritan R SB(NB to Pleasant Run)	2010 303(d)	NSB 11-1	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105050100-01	Rockaway Ck SB	2010 303(d)	NSB 14-2	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105050070-01	Lamington R(HallsBrRd-HerzogBrk)	2010 303(d)	NSB 16-4	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105060040-01	Raritan R NB(Peapack Bk to McVickers Bk)	2010 303(d)	NSB 19-11	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105070030-01	Raritan R NB (below Rt 28)	2010 303(d)	NSB 22-8	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105080030-01	Raritan R Lwr (Millstone to Rt 206)	2010 303(d)	Main 2-2	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105100010-01	Millstone River (above Rt 33)	2010 303(d)	UM 1-1 Watershed	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105100020-01	Millstone R (Applegarth road to Rt 33)	2010 303(d)			
NJ02030105110010-01	Heathcote Brook	2010 303(d)	BB 4-2 Watershed	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120180-01	Middle Brook	2010 303(d)	MS 3-5 Watershed	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120130-01	Green Brook (below Bound Brook)	2010 303(d)	MS 4-5	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120140-01	Raritan R Lwr(I-287 Piscatway-Millstone)	2010 303(d)	MS 5-3	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120160-01	Raritan R Lwr (MileRun to I-287 Pisctwy)	2010 303(d)	downstream of extent	40 mg/l	TMDL demonstrates 100% compliance (impairment occurs within spatial extent)
NJ02030105120170-01	Raritan R Lwr (Lawrence Bk to Mile Run)	2010 303(d)			
NJ02030105150010-01	Weamaconk Creek	2010 303(d)	out of extent	40 mg/l	Not addressed. Recommend delist based on WC1 and WC3 data.

pH Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	DO Target (pH Threshold)	Outcome
NJ02030105010050-01	Raritan R SB(LongValley br to 74d44m15s)	SDR* by NJDEP	NSB 3-6	none	DO swings decrease significantly. SBR4 used to evaluate TMDL for pH.
NJ2030105010060-01	Raritan R SB(Califon br to Long Valley)	SDR* by NJDEP	NSB 3-12 SBR4	13.5	TMDL demonstrates 100% compliance
NJ02030105020040-01	Spruce Run Reservoir / Willoughby Brook	2010 303(d)	out of extent	n/a	Not Addressed
NJ02030105020050-01	Beaver Brook (Clinton)	2010 303(d)	NSB 4-5	none	DO swings decrease significantly. SBRR10 used to evaluate TMDL for pH.
NJ02030105020070-01	Raritan R SB(River Rd to Spruce Run)	2010 303(d)	NSB 7-1		
NJ02030105020080-01	Raritan R SB(Prescott Bk to River Rd)	SDR* by NJDEP	NSB 7-7		
NJ02030105020100-01	Raritan R SB(Three Bridges-Prescott Bk)	SDR* by NJDEP	NSB 7-13		
NJ02030105030060-01	Neshanic River (below FNR / SNR confl)	2010 303(d)	NSB 8-2		
NJ02030105030070-01	Neshanic River (below Black Brk)	2010 303(d)	NSB 8-5		
NJ02030105040030-01	Holland Brook	SDR* by NJDEP	NSB 10-1		
NJ02030105040040-01	Raritan R SB(NB to Pleasant Run)	2010 303(d)	NSB 9-7 SBRR10	11.9	TMDL demonstrates 100% compliance
NJ02030105050090-01	Rockaway Ck (below McCrea Mills)	2010 303(d)	NSB 15-5	none	DO swings decrease significantly. LR5 used to evaluate TMDL for pH.
NJ02030105050070-01	Lamington R(HallsBrRd-HerzogBrk)	2010 303(d)	NSB 16-4 LR5	11.4	TMDL demonstrates 100% compliance
NJ02030105060090-01	Raritan R NB (Lamington R to Mine Bk)	SDR* by NJDEP	NSB 21-8	none	DO swings decrease significantly. LR5 used to evaluate TMDL for pH.
NJ02030105070030-01	Raritan R NB (below Rt 28)	SDR* by NJDEP	NSB 22-8		
NJ02030105080030-01	Raritan R Lwr (Millstone to Rt 206)	2010 303(d)	NSB 23-8		
NJ02030105110010-01	Heathcote Brook	2010 303(d)	BB 4-2 Watershed	n/a	Not Addressed. Cause of pH impairment not assessed.
NJ02030105110030-01	Millstone R (Beden Bk to Heathcote Bk)	2010 303(d)	BB 4-13	n/a	Recommend delist based on data at M3, M4, and M7
NJ02030105110170-01	Millstone River (below Amwell Rd)	2010 303(d)	BB 5-20	n/a	
NJ02030105120020-01	Green Bk (N Plainfield gage to Blue Bk)	2010 303(d)	MS 4-5 Watershed	none	Not Addressed. Cause of pH impairment not assessed.
NJ02030105130040-01	Ireland Brook	2010 303(d)	out of extent	n/a	Not Addressed
NJ02030105130060-01	Lawrence Bk (Milltown to Church Lane)	2010 303(d)			
NJ02030105150050-01	Barclay Brook	2010 303(d)			

*SDR = Supplemental Data Review

Dissolved Oxygen Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105010060-01	Raritan R SB(Califon br to Long Valley)	2010 303(d)	NSB 3-12 SBR4	7.0	TMDL demonstrates improved DO.
NJ02030105030030-01	Headquarters trib (Third Neshanic River)	2010 303(d)	Neshanic Headwatershed	4.0	Outside spatial extent of stream model; NPS only - likely similar to NR1
NJ02030105030040-01	Third Neshanic River				
NJ02030105030060-01	Neshanic River (below FNR / SNR confl)	2010 303(d)	NSB 8-1 NR1	4.0	TMDL demonstrates improved DO. Low DO exacerbated by high SOD.
NJ02030105050020-01	Lamington R (Hillside Rd to Rt 10)	SDR* by NJDEP	NSB 12-3 LR2	4.0	TMDL demonstrates improved DO. Low DO exacerbated by high SOD.
NJ02030105060040-01	Raritan R NB (Peapack Bk to McVickers Bk)	2010 303(d)	NSB 19-7 Ravine Lake	4.0	DO addressed through TP TMDL in Ravine Lake.
NJ02030105100030-01	Millstone R (RockyBk to Applegarth road)	2010 303(d)	UM 1-1 UMR1	4.0	TMDL demonstrates 100% compliance
NJ02030105100050-01	Rocky Brook (below Monmouth Co line)	2010 303(d)	UM 2-4 RB4	4.0	TMDL demonstrates 100% compliance
NJ02030105100060-01	Millstone R (Cranbury Bk to Rocky Bk)	SDR* by NJDEP	UM 5-1 UMR3	4.0	TMDL demonstrates 100% compliance
NJ02030105100110-01	Devils Brook	2010 303(d)	UM 8-1 Gordon Pond	4.0	DO addressed through Gordon Pond TMDL for TP
NJ02030105100130-01	Bear Brook (below Trenton Road)	2010 303(d)	UM 6-1 Grovers Mill Pd	4.0	DO addressed through Grovers Mill Pond TMDL for TP
NJ02030105100140-01	Millstone R (Rt 1 to Cranbury Bk)	2010 303(d)	UM 5-1 UMR3	4.0	TMDL demonstrates 100% compliance
NJ02030105110030-01	Millstone R (Beden Bk to Heathcote Bk)	2010 303(d)	BB 4-8 M4	4.0	Low DO due to naturally high SOD. Not addressed.
NJ02030105150010-01	Weamaconk Creek	2010 303(d)	out of extent	4.0	Not addressed.
NJ02030105150060-01	Matchaponix Brook (below Pine Brook)	2010 303(d)		4.0	
NJ02030105160010-01	Deep Run (above Monmouth Co line)	2010 303(d)		4.0	
NJ02030105160020-01	Deep Run (Rt 9 to Monmouth Co line)	2010 303(d)		4.0	
NJ02030105160030-01	Duhernal Lake / Iresick Brook	2010 303(d)		4.0	
NJ02030105160040-01	Deep Run (below Rt 9)	2010 303(d)		4.0	
NJ02030105160100-01	Raritan R Lwr (below Lawrence Bk)	2010 303(d)	downstream of extent	4.0	Not addressed.

*SDR = Supplemental Data Review