

**North & South Branch Raritan Watershed Management Area  
Stormwater Management & Hydrology Work Group  
Strategy Worksheet NSSM-S2A2**

<b>Strategy Name:</b> Tracking Ground Water Recharge Losses <b>NSSM-S2A2:</b> Utilize GIS to track losses of ground water recharge by updating results every 2 or 3 years.	Strategy Priority: H (H/M/L)
<b>Objectives Addressed by Strategy:</b> <b>NSSM-O2A:</b> By 2010, develop a system for tracking impacts on ground water and baseflow.	Strategy Schedule: (Begin/End)
<b>Narrative Description of Strategy:</b> This strategy will involve developing a method to refine and understand the impact that impervious surfaces have on ground water recharge areas and stream baseflow. The strategy also involves estimating recharge changes due to land use changes through the use of GIS. Between 1986 and 1995, the WMA lost nearly 6% of its estimated average rate of recharge (from 12.91 inches per year in 1986 to 12.15 inches per year in 1995). During the same time period, all 51 subwatersheds (HUC-14s) in the WMA experienced losses in ground water recharge, with losses ranging between 1.26% and 25.81%. The majority of the losses ranged between 0 and 10%. The headwaters of the Lamington River watershed lost approximately 26% of its estimated annual recharge (the highest loss in the WMA) due to conversion of large tracts of forested land to commercial land uses. Baseflow comprises an average of 70% of the mean annual flow at five gauging stations in the Highlands Province and 42% of the mean annual flow at six gauging stations in the Piedmont Province. Runoff is a higher percentage of total streamflow in the Piedmont due to the presence of shallow soils with low permeability. Within the WMA, extreme low flows during dry periods in the later summer have occurred with greater frequency in the 1990s. This may be an indication that water tables in the area are dropping. Development pressure and suburban sprawl are converting a great deal of forested and agricultural land to urban land uses. Along with urban land uses comes an increase in impervious cover that both increases stormwater runoff and decreases ground water recharge and baseflow, along with bridges over streams, stormwater outfall structures and other changes to the stream corridor.	
<b>Areawide WQM Plan Consistency Determination Issues:</b> NA	

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation	Responsible Parties for Oversight	Resource Needs (L,M,H,VH)	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
1. Use the NJGS GSR-32 model to establish relationships between land use changes and recharge over time, and to summarize impacts of development on recharge. Then, identify a method to refine and understand	C:  R: NJDEP, county planning boards, NJWSA (upstream of Bound Brook gauge)	C:  R: N&S Branch WMAC & Raritan Project stakeholders	M	C:  R: Water Supply Bond	Challenge: Tracking BMP use or BMP effectiveness	% TIA  % Effective IA  Completion of model  Change in estimated ground water recharge as a result of model	

C = Committed; R = Recommended

General Estimates: Low = \$5,000 - \$50,000; Moderate = \$50,000 - \$250,000; High = \$250,000 - \$1 million; Very High = over \$1 million

Acronyms: NJDEP=NJ Department of Environmental Protection; USGS=United States Geological Survey; NJGS=NJ Geological Survey; BMP=Best Management Practices; NJWSA =NJ Water Supply Authority; %TIA=Percent Total Impervious Area; %EIA=Percent Effective Impervious Area

Committee Abbreviations: N&S Branch WMAC = North & South Branch Raritan Watershed Management Area Committee; NSSM = North & South Branch Raritan Stormwater Management & Hydrology Work Group; NSHW = North & South Branch Headwaters & Stream Management Work Group; NSEO = North & South Branch Raritan Education & Outreach Work Group; RBEO = Raritan Basin Education & Outreach Committee; RBC = Raritan Basin Council; TAC = Technical Advisory Committee

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation	Responsible Parties for Oversight	Resource Needs (L,M,H,VH)	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
the reality of effective vs. total % impervious area, on-site BMPs, etc.							
2. Use satellite imagery, development plans, etc. to update land use/land cover coverages, during periods between State aerial photography. Field verify GIS data results.	C:  R: NJDEP, county planning boards, NJWSA (upstream of Bound Brook gauge)	C:  R: N&S Branch WMAC & Raritan Project stakeholders	M	C:  R: Existing Resources	Challenges: Lots of field work; data gaps; cost of satellite imagery may be prohibitive unless targeted to specific subwatersheds of concern	Updated coverages	
3. Estimate recharge changes due to land use changes using GIS. Refine estimates using method from Step 1.	C:  R: NJDEP, county planning boards, NJWSA (upstream of Bound Brook gauge)	C:  R: N&S Branch WMAC & Raritan Project stakeholders, TAC	L-M	C:  R: Existing Resources		Recharge estimates	
4. For subwatersheds with estimates of significant recharge losses, estimate impacts on aquifer recharge and stream baseflow.	C:  R: NJGS, USGS	C:  R: N&S Branch WMAC & Raritan Project stakeholders	L-M	C:  R: Water Supply Bond		Disaggregated estimates for stream flow and aquifer recharge	
5. Using results of Steps 1-4, implement methods to restore baseflow and ground water recharge as identified in NSSM-S2A1 and S2C1.	C:  R: USGS, NJGS, NJDEP, Counties, Municipalities	C:  R: NJDEP, N&S Branch WMAC	M-H	C:  R: 319 projects, graduate research projects	Challenges: Funding; time constraints  See Basin Strategy: GW Recharge Restoration	Number of restoration plans implemented	

<b>Action Plan (Steps or Tasks)</b>	<b>Responsible Parties for Planning, Design &amp; Implementation</b>	<b>Responsible Parties for Oversight</b>	<b>Resource Needs (L,M,H,VH)</b>	<b>Committed or Recommended Resources</b>	<b>Major Challenges and Opportunities</b>	<b>Evaluation Method &amp; Indicators</b>	<b>Schedule and Milestones for Implementation</b>
					Project		