

**Lower Raritan Watershed Management Area  
Land Use, Wastewater & Water Supply Subcommittee  
Strategy Worksheet LRLU-S3A6  
Strategy Worksheet LRSW-S4C1  
Strategy Worksheet LRSW-S4C2**

<p><b>Strategy Name:</b> Improved Knowledge Regarding Stormwater Management and Environmentally Sensitive Development <b>LRLU-S3A6.</b> Train municipal and consultant professional planners and engineers and other pertinent land development entities in environmentally-sensitive zoning and site design techniques, such as low impact development and smart growth methods, including the economic benefits of such methods.</p> <p><b>LRSW-S4C1.</b> Develop and implement programs that will improve the knowledge base of appropriate parties regarding actions intended to manage quantity and quality of stormwater from existing and proposed development. Educate municipal officials and other pertinent stakeholders about the relationship of stormwater management programs to</p> <ul style="list-style-type: none"> <li>• healthy watersheds</li> <li>• sustainable, cost effective development</li> <li>• flood damage prevention.</li> </ul> <p><b>LRSW-S4C2.</b> Encourage the use of innovative approaches to stormwater management and site design in the land development process.</p>	<p>Strategy Priority: (H/M/L) LRLU-S3A6 = M LRSW-S4C1 = L LRSW-S4C2 = H</p>
<p><b>Objectives Addressed by Strategy:</b> <b>LRLU-O3A.</b> By 2004, municipalities shall help protect environmental resources and mitigate environmental impacts by requiring a thorough examination of environmental impacts from applicants for development or redevelopment projects. <b>LRSW-O4C.</b> By 2006, municipalities and other stakeholders will be provided with policy guidelines, methods (BMPs), implementation guidelines and maintenance protocols to achieve the goals and objectives stated in the Lower Raritan watershed management plan. <b>LRLM-O2F.</b> By 2006, municipalities and other stakeholders will be provided with policy guidelines, methods (BMPs), implementation guidelines and maintenance protocols to achieve the goals and objectives stated in the Lower Raritan WMA watershed management plan. <b>LREO-O1A.</b> Develop an approach that will ensure cooperation and acceptance of the goals, objectives and strategies of the Lower Raritan watershed management plan. The approach shall motivate stakeholders to take action and implement the strategies of the watershed management plan. <b>RBEO-O2A.</b> Stakeholder participants involved in Plan implementation thoroughly understand Raritan Basin issues and watershed management techniques. <b>RBEO-O2B.</b> Stakeholder participants involved in Plan implementation have a core competence in the application of watershed management techniques to Raritan Basin issues. <b>RBEO-O4A.</b> Municipal and county officials receive background training/education to support municipal and county planning and management actions that support the implementation of the watershed management plan. In addition, officials are knowledgeable regarding available tools and ordinances to implement the plan recommendations in their communities.</p>	<p>Strategy Schedule: (Begin/End)</p>
<p><b>Narrative Description of Strategy:</b> Development pressure and suburban sprawl are converting a great deal of forested and agricultural land to urban land uses within the WMA. Along with urban land uses comes an increase in impervious cover that increases stormwater runoff, decreases ground water recharge and baseflow, and degrades water quality of surface and ground water resources. New urban land also increases the number of bridges over streams, increases the number of stormwater outfall structures that discharge to streams, and physically alters the stream corridor. The surface waters of the WMA have documented pollutant loadings from non-point sources. The construction of housing and roads, known sources of sediment loading, along with runoff from the suburban landscape and storm drains, known sources of nutrient, fecal coliform bacteria and sediment loading, all contribute to the suburban non-point source pollution. Primary concerns within the WMA include fecal coliform and phosphorus.</p>	

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The Lower Raritan watershed management strategies identify various types of site design practices that should be promoted and encouraged. In particular, LRLU-S3A2, LRLU-S3A3 & LRLU-S3A4 identified recommended site design practices and policies for the Lower Raritan. The intent of this strategy is to compile design techniques identified as appropriate for use in the Lower Raritan WMA, complementing the information in the policy planning toolbox developed in LRLU-S3A2 and other Lower Raritan strategies. The designs chosen for promotion shall support the intent of the goals, objectives and strategies developed by the Lower Raritan subcommittees, such as naturally filtering and infiltrating runoff before it leaves the development site. A 'how to' manual of the techniques will be developed and linked to the other Lower Raritan strategies with action steps designed to identify appropriate BMPs for the Lower Raritan WMA. Designs and techniques will be evaluated for their appropriateness for different areas of the WMA.

A significant opportunity for use of these practices is present at the municipal level, through zoning and site development ordinances. Municipal officials, consultants, developers and other pertinent target groups will then be educated about alternative site design techniques and practices and stormwater management practices that have, to date, been considered 'innovative'. Various methods of information delivery and levels of specificity are included in the education program, depending on the target audience. The potential methods include training programs, videos, web-based training, and presentations to various audiences. The goal of the training programs would be, in addition to education of the target groups, marketing the techniques to them. Incentives would be developed to encourage attendance at training programs.

**Areawide WQM Plan Consistency Determination Issues:** None

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation <sup>1</sup>	Responsible Parties for Oversight	Resource Needs <sup>2</sup>	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
1. Identify locally and regionally accepted project designs, including those in the NJDEP 2002 BMP Manual and other concepts such as low impact development design. Identify additional designs and techniques that are considered innovative. <sup>3</sup>  See: LRLU-S3A2: Policy & Planning Toolbox LRLU-S3A3 & LRLU-S3A4: Site Plan Provisions to Protect Water Resources	C: R: NJDEP, LRLU (if active), LRSW <sup>4</sup>	C: R: LRMC-WRA LRWVG LRWVAC <sup>5</sup>	L	C: LRLU-S3A2 LRLU-S3A3, LRLU-S3A4  R: 319 grant	Challenge: Local acceptance may not indicate a valid technique	Completed list	NJDEP BMP Manual - 2003
2. Determine which designs and techniques work best in different areas of the WMA. Consider	C: R: NJDEP, Rutgers University, SCD,	C: R: LRMC-WRA LRWVG LRWVAC	L-M	C: LRLU-S1B3, LRLM-S2C2, LRLU-S3A1, LRLU-S3A2,	Challenge: Achieving a balance between locally usable	Identification of appropriate designs for different areas	

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<p>hydrologic and geologic conditions in each sub-watershed. The chosen designs should match the ordinance provisions detailed in:</p> <p>LRLI-S1B3: Development of a Manual Detailing Legal Basis, Incentives &amp; Rationales for Plan Implementation</p> <p>LRLM-S2C2: Sediment Reduction Plan</p> <p>LRLU-S3A1: Evaluation of Environmental Impacts of Proposed Development</p> <p>LRLU-S3A2: Policy &amp; Planning Toolbox</p> <p>LRLU-S3A3 &amp; LRLU-S3A4: Site Plan Provisions to Protect Water Resources</p> <p>LRLU-S3A5 &amp; LRSW-S4A3: Incentives for Incorporation of BMPs</p> <p>LRLU-S4A3: Reduce Water Quality Impacts from Septic Systems</p> <p>LRLU-S4C1: Incorporation of Water Resources Protection into Transportation Projects</p> <p>LRSW-S1B2: Regulation of Stormwater from New Development to Protect Water Quality</p> <p>LRSW-S2A3 &amp; LRSW-S2B3: Program of Activities to Remove NPS Pollution from Stormwater</p> <p>LRSW-S2B1: C&amp;A of</p>	<p>LRLU, LRSW</p>			<p>LRLU-S3A3 &amp; LRLU-S3A4, LRLU-S3A5 &amp; LRSW-S4A3, LRLU-S4A3, LRLU-S4C1, LRSW-S2A3 &amp; LRSW-S2B3, LRSW-S1B2, LRSW-S2B1, LRSW-S4A1</p> <p>R: 319 grant, CBT grant</p>	<p>design techniques and excessive complexity in the guidance</p>	<p>of the WMA</p> <p>Adoption of municipal ordinances and county resolutions which support concepts in alternative designs</p>	

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Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation <sup>1</sup>	Responsible Parties for Oversight	Resource Needs <sup>2</sup>	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
<p>Stormwater Impacts to Water Quality from New Development LRSW-S4A1: Assess &amp; Improve Organizational and Regulatory Capacity for Stormwater and Flood Damage Management</p> <p>Conversely, the concepts of the chosen designs shall be incorporated into those ordinance provisions. The chosen concepts shall also be incorporated into the policy and planning toolbox of LRLU-S3A2.</p>							

**LRLU-S3A6, LRSW-S4C1 & LRSW-S4C2:** Improved Knowledge Regarding Stormwater Management and Environmentally Sensitive Development

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation <sup>1</sup>	Responsible Parties for Oversight	Resource Needs <sup>2</sup>	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
<p>3. Develop and distribute a “how to” manual to achieve post development volume, flow, velocity, etc. not to exceed pre-development flow, etc., environmentally sensitive site designs, etc. with the concepts from Action Steps 1 and 2, LRLU-S3A2, LRLU-S3A3 and LRLU-S3A4 to accompany the training program.</p> <p>See:                      LRLM-S2A2: Identification of Methods to Control Pollutant Contributions                      LRLU-S3A2: Policy and Planning Toolbox                      LRSW-S1A2: Improve Effectiveness of Existing Stormwater Management Systems                      LRSW-S1B2: Regulation of Stormwater from New Development to Protect Water Quality                      LRSW-S2A3 &amp; LRSW-S2B3: Program of Activities to Remove NPS Pollution from Stormwater                      LRSW-S2A4 &amp; LRSW-S2B4: BMPs to Manage Hot Spots</p>	<p>C: R: NJDEP, LRSW</p>	<p>C: R: LRMC-WRA LRWVG LRWVAC</p>	<p>L-M</p>	<p>C: NJDEP Best Management Practices Manual LRLM-S2A2, LRLU-S3A2, LRSW-S1A2, LRSW-S1B2, LRSW-S2A3 &amp; LRSW-S2B3, LRSW-S2A4 &amp; LRSW-S2B4</p> <p>R: Existing resources</p>	<p>Opportunity: Compilation of information to achieve goals of Raritan Plan</p>	<p>Completion of manual or decision to use existing NJDEP materials</p>	

**LRLU-S3A6, LRSW-S4C1 & LRSW-S4C2:** Improved Knowledge Regarding Stormwater Management and Environmentally Sensitive Development

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation <sup>1</sup>	Responsible Parties for Oversight	Resource Needs <sup>2</sup>	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
4. Develop a training program or series of programs (i.e., seminar series or videos) to educate municipalities, engineers, developers, consultants and regulators regarding alternative site design practices for managing stormwater runoff. The program shall be implemented through existing programs where possible.	C: R: RCE, NJDEP, Cook College Office of Continuing Education, LRSW, LRLU	C: LRMC-WRA LRWMG LRWMAC	L-M	C: Practices from 2002 NJDEP BMP manual R: Information developed as part of Action Step 1 and 2	Challenge: Funding  Challenge: Encouraging attendance  Challenge: Identifying appropriate medium for each target audience	Development of training program	
5. Provide incentives (i.e., CEUs) to encourage attendance at training programs.	C: R: Cook College Office of Continuing Education, interest group associations with continuing education programs and/or requirements	C: R: LRMC-WRA LRWMG LRWMAC	L	C: R: Existing continuing education programs	Opportunity: Use of program as part of continuing education programs, particularly for those to maintain certifications, may be an appropriate way to reach certain target audiences	Number of professionals utilizing incentives	
6. Use a web-based system to distribute information to municipalities, developers, consultants and regulators regarding alternative design practices for managing stormwater runoff (e.g., Rutgers Cooperative Extension training).	C: R: LREO, LRSW, Raritan Basin web site, interest group associations with continuing education programs	C: R: LRMC-WRA LRWMG LRWMAC	L	C: RCE Pesticide Training program as a model  R: Existing educational programs, existing programs requiring continuing education	Challenge: Getting people to access the web site  Opportunity: Model for web-based education	Tracking number of people who sign up for on-line training	

**LRLU-S3A6, LRSW-S4C1 & LRSW-S4C2:** Improved Knowledge Regarding Stormwater Management and Environmentally Sensitive Development

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation <sup>1</sup>	Responsible Parties for Oversight	Resource Needs <sup>2</sup>	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
7. Give presentations to planning board members and consultants regarding alternative design practices for managing stormwater runoff.	C: R: LREO, LRSW	C: R: LRMC-WRA LRWMG LRWMAC	L	C: R: Existing resources	Challenge: Attendance at meetings; getting the information to the "right" people	Number of planning boards receiving presentation	
8. Educate municipalities, developers and consultants regarding available BMPs through use of one or more demonstration sites.	C: R: LREO, LRSW, RCE, SCDs, landowners	C: R: LRMC-WRA LRWMG LRWMAC	L-H, depending on site and BMPs constructed	C: R: 319 grants, interest group associations, existing resources	Opportunity:: Documentation of success and/or effectiveness of BMPs	Number of visitors to demonstration sites(s)	
9. Educate property owners and homeowners associations regarding implementation and maintenance of BMPS.	C: R: LREO, LRSW, RCE	C: R: LRMC-WRA LRWMG LRWMAC	L	C: R: Existing programs	Challenges: Finding and reaching appropriate audiences Funding for maintenance		
10. Educate those responsible for construction of BMPS, e.g. contractors, landscape companies, etc.	C: R: LREO, LRSW, RCE , professional organizations	C: R: LRMC-WRA LRWMG LRWMAC	L	C: R: Existing programs	Opportunity: Increase in number of BMPs constructed as designed	Increase in number of BMPs constructed as designed	

**LRLU-S3A6, LRSW-S4C1 & LRSW-S4C2:** Improved Knowledge Regarding Stormwater Management and Environmentally Sensitive Development

Action Plan (Steps or Tasks)	Responsible Parties for Planning, Design & Implementation <sup>1</sup>	Responsible Parties for Oversight	Resource Needs <sup>2</sup>	Committed or Recommended Resources	Major Challenges and Opportunities	Evaluation Method & Indicators	Schedule and Milestones for Implementation
11. Identify and implement incentives to encourage buy-in by developers and municipal officials and to promote implementation of various BMPs and use of the site designs identified in this strategy. See: LRSW-S4A3 & LRLU-S3A5: Incentives for Incorporation of BMPs	C: R: Interest group associations, Rutgers University, NJDEP, counties, municipalities, developers	C: R:LRMC-WRA LRWVG, LRWVAC NJDEP	Variable by NPS reduction incentive	C: LRSW-S4A3, LRLU-S3A5  R: 319 grants, 604(b) grants, existing resources, Developer application fees	Challenges: Encouraging developers to try alternative designs and municipalities to require such designs  Identifying the level of incentive that will achieve results most efficiently  Funding to implement BMPs	Implement-ation of incentives leading to BMP implement-ation  Designs are used in site designs  Implementation of BMPs	
See: RBEO- S2A1/S2B1: Training for Stakeholder Participants RBEO-S4A1: Educate Influential Persons for Management Plan Implementation Support RBEO-S4A3: Municipal Training & Information for Effective Implementation RB-S5: Watershed Planning and Policy Toolbox							

<sup>1</sup> C = Committed, R = Recommended

<sup>2</sup> General Estimates: Low = \$5,000 - \$50,000; Moderate = \$50,000 - \$250,000; High = \$250,000 - \$1 million; Very High = over \$1 million

<sup>3</sup> Suggested references:

Center for Watershed Protection. Better Site Design: A Handbook for Changing Development Rules in Your Community

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Center for Watershed Protection. Recommended Model Development Principles for Frederick County, MD. <http://www.cwp.org/Frederick.pdf>

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## **LRLU-S3A6, LRSW-S4C1 & LRSW-S4C2: Improved Knowledge Regarding Stormwater Management and Environmentally Sensitive Development**

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- Delaware Department of Natural Resources and Environmental Control and The Environmental Management Center of the Brandywine Conservancy. 1997. Conservation Design for Stormwater Management: A Design Approach to Reduce Stormwater Impacts from Land Development and Achieve Multiple Objectives Related to Land Use. [http://www.wa.gov/puget\\_sound/Programs/lid\\_cd/pdf\\_docs/DEL\\_MAN.PDF](http://www.wa.gov/puget_sound/Programs/lid_cd/pdf_docs/DEL_MAN.PDF)
- Delaware Department of Natural Resources and Environmental Control. Conservation Design for Stormwater Management. [http://www.dnrec.state.de.us/water2000/Sections/Watershed/ws/fact\\_appo\\_cons\\_design\\_sw.pdf](http://www.dnrec.state.de.us/water2000/Sections/Watershed/ws/fact_appo_cons_design_sw.pdf)
- Idaho Department of Environmental Quality. Environmental Planning Tools and Techniques Report. [http://www.deq.state.id.us/water/gw/env\\_planning\\_tools\\_report.htm](http://www.deq.state.id.us/water/gw/env_planning_tools_report.htm)
- Low Impact Development Center, Inc.. Low Impact Development – Urban Design Tools. <http://www.lid-stormwater.net/> and <http://www.lowimpactdevelopment.org/>
- Metropolitan North Georgia Water Planning District. Subdivision/Open Space Ordinance. <http://www.northgeorgiawater.org/pdfs/modordfin-task10/tab4.pdf>
- National Association of Counties. Local Tools for Smart Growth – Practical Strategies and Techniques to Improve Our Communities. <http://www.naco.org/programs/environ/sources/localtools.pdf>
- National Association of Home Builders. Smart Growth, Smart Choices. [http://www.nahb.org/publication\\_details.aspx?publicationID=15&sectionID=155](http://www.nahb.org/publication_details.aspx?publicationID=15&sectionID=155)
- National Association of Home Builders. Builder Greener, Building Better. [http://www.nahb.org/publication\\_details.aspx?sectionID=155&publicationID=17](http://www.nahb.org/publication_details.aspx?sectionID=155&publicationID=17)
- National Center for Smart Growth. <http://www.smartgrowth.umd.edu/>
- National Wildlife Federation. 2000. Innovative Site Design. <http://www.nwf.org/northeastern/resources/innovative.pdf>
- Natural Lands Trust. Growing Greener – Putting Conservation Into Local Codes. <http://www.natlands.org/planning/growgreen.html>
- New Jersey Future. Smart Growth. <http://www.njfuture.org/articles/smartgrowth.html>
- Pennsylvania Center for Local Government Services. 2000. Land Use in Pennsylvania – Practices and Tools. [http://www.landuseinpa.org/docs/Land\\_Use\\_in\\_PA-Inventory/Land\\_Use\\_in\\_PA-Inventory-Table.pdf](http://www.landuseinpa.org/docs/Land_Use_in_PA-Inventory/Land_Use_in_PA-Inventory-Table.pdf)
- Purdue Department of Agricultural and Biological Engineering. Impacts of Land Use Change on Water Resources: An analysis tool, Long-Term Hydrologic Impact Assessment (LTHIA) <http://www.ecn.purdue.edu/runoff/>
- Prince George's County Department of Environmental Resources. Low Impact Development Design Strategies: An Integrated Approach. <http://www.epa.gov/owow/nps/lidnatl.pdf>
- Smart Communities Network. Land Use Planning Strategies. <http://www.sustainable.doe.gov/landuse/lustrat.shtml>
- Smart Growth Network. Smart Growth Online. <http://www.smartgrowth.org/default.asp>
- USEPA. 2000. Bioretention Application. [http://www.wa.gov/puget\\_sound/Programs/lid\\_cd/pdf\\_docs/LID\\_BIO.PDF](http://www.wa.gov/puget_sound/Programs/lid_cd/pdf_docs/LID_BIO.PDF)
- USEPA. Encouraging Smart Growth. <http://www.epa.gov/smartgrowth/index.htm>
- USEPA. 2000. Vegetated Roof Cover. [http://www.wa.gov/puget\\_sound/Programs/lid\\_cd/pdf\\_docs/LID\\_ROOF.PDF](http://www.wa.gov/puget_sound/Programs/lid_cd/pdf_docs/LID_ROOF.PDF)

<sup>4</sup> All qualifiers in #1 (e.g. if active) for subcommittees apply throughout the action plan.

LRLU = Lower Raritan Land Use, Wastewater & Water Supply Subcommittee

LRLI = Lower Raritan Legal, Institutional & Implementation Subcommittee

LRWQ = Lower Raritan Water Quality Monitoring & Modeling Subcommittee

SCD = Soil Conservation District

NJDEP = New Jersey Department of Environmental Protection

<sup>5</sup> LRMC-WRA = Lower Raritan-Middlesex County Water Resources Association

LRWMA = Lower Raritan Watershed Management Area Committee or equivalent

LRSW = Lower Raritan Stormwater/Flooding Subcommittee

LREO = Lower Raritan Education & Outreach Subcommittee

RBEO = Raritan Basin E&O Subcommittee

BMP = Best Management Practice

RCE = Rutgers Cooperative Extension

LRWMG = Lower Raritan Watershed Management Group