

In April 2009, JRA worked with a graduate student from Virginia Commonwealth University's Urban and Regional Planning Program to develop a watershed protection plan for the Crater Planning District Commission. We chose this area to focus on because it is heavily influenced by the Fort Lee military base, from direct employment and housing for base personnel to indirect support services. Due largely in part to the Base Realignment and Closure (BRAC) recommendation, the supported base population is anticipated to increase 47% from 2007 to 2011, resulting in thousands of new homes and hundreds of thousands of square feet of retail and commercial space.

Most of the localities in the Crater District (Charles City, Chesterfield, Dinwiddie, Greensville, Prince George, Surry and Sussex counties and the cities of Colonial Heights, Emporia, Hopewell, and Petersburg) are rural in nature, with small populations and low population densities. Large-scale development pressure of this kind has historically not been an issue. It was determined through a review of codes and ordinances that there is not a lot of flexibility to allow low impact development * (LID) design strategies and innovative stormwater quality designs. It is our hope that this will change over time with outreach and education.

The overall report conducted by the graduate student involved the analysis of codes and ordinances, an evaluation of watershed integrity maps based on the Virginia Conservation Lands Needs Assessment data, and a survey of local site designers and developers in the region. The survey was conducted to determine the level of experience with and opinions of LID design strategies and traditional water quality best management practices (BMPs).

The web-based survey consisted of ten questions and was distributed to sixty-five developers, engineers, contractors and architects in the greater Richmond and Petersburg areas. The goals of the survey include:

1. Determine what LID measures and BMPs are being utilized in the study area;
2. Identify impediments to design, approval, and construction;
3. Delineate future workshop topics to assist local government staff, designers and developers;
4. Identify network of designers and developers with LID experience, to share details and designs, lessons learned, and case study information.

The pages that follow come directly from the student's thesis. We thank the twenty-two respondents who shared their insight with us on the issue of LID design and implementation.

*LID is a stormwater management approach intended to match post-development hydrology as closely as possible to pre-development hydrology. LID strategies include treating and releasing stormwater close to the source, rather than piping it in a storm sewer system to a single discharge point. Infiltration of stormwater is also encouraged where soil types are amenable. LID encourages reducing the volume of post-development runoff in addition to the release rate (Pennock, 2009).



APPENDIX D

SUMMARY OF SURVEY RESULTS

Question 1

Engineer/Developer Community LID Survey		
What types of BMPs do you incorporate most frequently into your designs (check all that apply)?		
Answer Options	Response Frequency	Response Count
Pervious pavement	42.9%	9
Bioretention basins	85.7%	18
Engineered wetlands/shallow marsh	42.9%	9
Open-space/buffer preservation	71.4%	15
Inlet/filter systems	42.9%	9
Extended detention dry or wet basins	33.3%	7
Below-ground detention/infiltration	61.9%	13
Other (please specify)		6
<i>answered question</i>		21
<i>skipped question</i>		1
Number	Other (please specify)	
1	Extended Detenetion & Wet Ponds	
2		
3	Rain Gardens/Bio-Retention	
4	Soil amendment	
5	rain gardens, swales	
6	amended soils	

Question 2

Engineer/Developer Community LID Survey		
What are the biggest determining factors in choice of BMP (check all that apply)?		
Answer Options	Response Frequency	Response Count
Cost	75.0%	15
Size	65.0%	13
Removal efficiency	65.0%	13
Ease of installation/maintenance	60.0%	12
Other (please specify)		9
<i>answered question</i>		20
<i>skipped question</i>		2
Number	Other (please specify)	
1	Appearance	
2		
3	approval process by government agencies, aesthetics, what the the client expectations are	
4	function and aesthetics	
5	Aesthetics and Educational Value	
6	As a GC, the factors that we find influence owners are cost, land use (again tying back to cost) and installation maintenance (again related to cost). Removal efficiency is considered, but general after the other three. A 100% efficient method that is outside of the owner's budget will not be implemented. Aesthetics are also generally considered.	
7	Aesthetics	
8	Contractor familiarity	
9	Which type best suits the development	

Question 3

Engineer/Developer Community LID Survey	
What do you see as impediments to Low Impact Development (LID) approval? For example, locality requirements for curb and gutter may conflict with LID strategy to drain into grass-	
Answer Options	Response Count
	19
<i>answered question</i>	19
<i>skipped question</i>	3

Number	Response Text
1	
2	Curb and gutter requirements; low credit for removal with locality
3	Different criteria for each locality
4	Zoning ordinances definitely impact LID practices. I currently have a project in a locality that requires curb and gutter along with pave parking lots. The owner wants to use LID measures but due to the ordinance can not.
5	curb and gutter; clayey soils
6	
7	Developers wanting lowest first costs in engineering fees
8	design guidelines and calculaton methodology does not promote multiple BMP or series approaches, difficulty moving beyond 'hard' engineering concepts
9	long term maintence responsibilities of structures, cost, and lack of support from local governement agencies
10	Current practices endorsed by engineers, developers unwilling to think beyond the norm
11	government government and more government
12	many localities don't except the methods and the math submitted and require non-lid techniques, curb and gutter requirements are a big conflict as are oversized road widths
13	costs compared to conventional stormwater management
14	Lack of engineering imagination & willingness to innovate; local restrictions
15	Poor knowledge of LID principle by local officials
16	agency approval /acceptance/ understanding is the biggest
17	Government approvals. One example is the comment is received from the City of Richmond was that they had never seen combined bioretention & storage before so they would not approve it and would not entertain any discussion of the merits.
18	removal efficiencies
19	local requirements

Question 4

Engineer/Developer Community LID Survey		Response Count
What could localities do to facilitate LID strategy design and approval? (For example, &quot;provide a library of approved strategies with details, photographs, or		
Answer Options		Response Count
		22
<i>answered question</i>		22
<i>skipped question</i>		0
Number	Response Text	
1	Design it themselves	
2	Design manual with examples	
3	Have DCR review and approve all SMP plans	
4	Approved strategies would be localities need to be open to other ideas that are outside the norm (Rainwater harvesting for irrigation, etc.)	
5	expand their standard BMP list	
6		
7	more community education to alternate solutions	
8	Seminars for design professionals & developers	
9	semi-annual workshops to clarify approvals process and share precedents for successful implementation	
10	practice more flexibility to encourage 'creative', integrated approaches. Allow calculation methodology to work with 'series' system approaches. Example - green roof capturing first flush runoff, then overflow going into rainwater harvesting cistern to be used for irrigation.	
11	accept LID as a primary means of treating non-point source pollutants, encourage developers to implement LID practices through proffers or financial incentives, stronger enforcement of BMP maintenance programs	
12	Write strategies into the ordinance, Bonus densities for natural infiltration of all stormwater on site, expedited review process for projects incorporating natural drainage techniques	
13	allow experts in their professional fields do their jobs	
14	understand them and start approving them, install LID's on their own properties to set examples	
15	provide reasonable efficiencies and storage for each LID technology	
16	costs/benefits are associated with each. Provide a library of approved strategies and "typical" construction details/methods for each. Incentive programs for designs utilizing LID.	
17	Mandate/recommend LID features be incorporated into designs (early in design). May need to provide assistance to engineers & suggest specific practices that may be applicable to sites.	
18	look at what other localities are doing	
19	approve the concepts when implemented w/o requested a ridiculous amount of information	
20	Some people in plan review need to be educated or fired. My hope is that the new DCR stormwater regulations will force the issue with the local governments	
21	example stated above would be a start	
22	same standards and interpretation of same in all localities	

Question 5

Engineer/Developer Community LID Survey		
Which of the following would you consider most useful for protecting water quality (check all that apply)?		
Answer Options	Response Frequency	Response Count
Mixed-use zoning	36.8%	7
Density bonuses	52.6%	10
Street-width reductions	47.4%	9
Transfer/Purchase of development rights	36.8%	7
Offset mitigation fee for unmet pollutant load	36.8%	7
Other (please specify)		9
<i>answered question</i>		19
<i>skipped question</i>		3
Number	Other (please specify)	
1		
2	scenic stream, by-way, rural & historic viewshed protection/designation; overlay district protection of river, Comp Plan w/stated Vision of rural preservation	
3	multiple, small-scale, decentralized measures	
4	planting requirements, tree preservation, good site design	
5	Proposed DCR regs. give significant credit for sheet flow discharge to conservation areas.	
6	restrict development along lake and stream buffers	
7	rehabilitation of areas that are not working properly in streams and offsite	
8	any of these could be effective, it's all in the implementation	
9	All of the above, again should be determined by type of development. Not one standard for all	

Question 6

Engineer/Developer Community LID Survey	
What other incentives could localities provide to encourage use of LID or enhanced water quality measures in land-development projects?	
Answer Options	Response Count
	17
<i>answered question</i>	17
<i>skipped question</i>	5

Number	Response Text
1	Require them
2	
3	utility credits for decreased treatment load
4	tax reductions, abaitments, & credits
5	tax credits given for quantifiable preserved or restored ecosystem services
6	financial contribute to the BMP maintenance programs
7	See above
8	its not the developer who needs incentives, its the local governments
9	they should be requiring them, not offering incentives
10	reduced permit and stormwater utility fees
11	expedited permitting process
12	Provide substantial design assistance/case studies/etc. to convey the possibilities to designers and developers.
13	incentives for LID in urban infill redevelopment
14	zoning leniency, understand shared parking and reduce parking requirements
15	education programs for developers and contractors, I see contractors overbidding LID items because they are not familiar with them
16	density bonuses
17	more partnerships with developers

Question 7

Engineer/Developer Community LID Survey		
Would you be interested in demonstration or hands-on training in LID design and construction methods?		
Answer Options	Response Frequency	Response Count
Yes	81.8%	18
No	18.2%	4
<i>answered question</i>		22
<i>skipped question</i>		0

Question 8

Engineer/Developer Community LID Survey		
Have you encountered any problems with BMP/LID design and construction? Check any that apply or list others.		
Answer Options	Response Frequency	Response Count
Timing/phasing of installation	56.3%	9
Outlet channel/level spreader construction	12.5%	2
Buffer/wetlands preservation	25.0%	4
Construction/Installation issues	50.0%	8
Lack of acceptance by owners	37.5%	6
Cost	50.0%	8
Coordination between developer, builder, contractor	43.8%	7
Other (please specify)		8
<i>answered question</i>		16
<i>skipped question</i>		6

Number	Other (please specify)
1	it can be specialty work that gets done by general contractors
2	lack of knowledge (my own)
3	N/A
4	lack of owner commitment beyond meeting the minimum requirement
5	maintenance after installation
6	contractor inexperience
7	I see a lot of poorly executed bioretention areas
8	None

Question 9

Engineer/Developer Community LID Survey		
Have you encountered any problems with LID/BMP maintenance? Check any that apply or list others.		
Answer Options	Response Frequency	Response Count
Replacement of proprietary filters or soil media	18.8%	3
Education of maintenance staff	68.8%	11
Monitoring/maintenance requirements	37.5%	6
Documentation	25.0%	4
Other (please specify)		5
<i>answered question</i>		16
<i>skipped question</i>		6

Number	Other (please specify)
1	It's not a priority of the Owner/Operator
2	
3	N/A
4	once installed, no regular maintenance program. owner not accountable
5	Maintenance will not get done unless the locality enforces it.