



City of Puyallup

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LID Current Practice:

The City of Puyallup adopted the 2005 Washington State Department of Ecology Stormwater Management Manual for Western Washington (2005 Manual) for all sites disturbing more than one acre. With that adoption, the ordinance and subsequent Puyallup Municipal Code (PMC) section 21.10.210 Low Impact Development (LID) encourages the employment of LID practices under the guidelines in Appendix C of Volume III of the 2005 Manual. Based on this adoption, all LID Best Management Practices (BMP) included in Appendix C can be utilized on new development and redevelopment projects within the City. The measures included are:

- Permeable Pavements
- Dispersion
- Vegetated Roofs
- Rainwater Harvesting
- Reverse Slope Sidewalks
- Minimal Excavation Foundations
- Bioretention (Rain Gardens)

One measure, which I consider LID, but is not specifically listed in Appendix C is soil amendment (soil quality). This required measure reduces surface water runoff as compared to a “classic” subdivision where soil would be stripped, the remaining inorganic soil compacted and overlain with a thin layer of soil and sod. Soil amendment, as described in BMP T5.13 Post Construction Soil Quality and Depth, is probably one of the most overlooked, least-enforced requirements of the 2005 Manual. This is unfortunate, because as the BMP T5.13’s flow control credits section alludes, there is significant surface water runoff reduction achieved by proper implementation of this BMP.

Since BMP T5.13 is required under Minimum Requirement #5, and most any site triggering the thresholds of the 2005 Manual will also trigger Minimum Requirement #5, this should be a widely used BMP, yet I have seen very little evidence of it in the field, in the City of Puyallup or other jurisdictions. For the City, we have utilized the 1-acre exemption allowed under the Phase II permit, which, when coupled with vesting of some proposed projects, has resulted in no projects actually falling under the requirements of 2005 Manual for this reporting period.

BMP T5.13’s requirements are not onerous; it only requires an 8” depth of organic compost amended soils, with an additional 4” of scarified mixing zone. This improved soil condition will not only provide significant stormwater benefits but will produce healthier plant growth which require less water, fertilizer, and pesticide. The developer

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incentive, for those who want to avoid the cost of implementing this BMP, is an LID measure: not disturbing the vegetation and soil in the first place.

Practices Available for this permit term:

The City of Puyallup has an ongoing rain garden installation program, utilizing Ecology grant funds, to educate citizens about the advantages of rain garden installation. We are planning to continue this program for the short term in its current state, but hope to move to a more cost-shared, incentive-type program for rain garden installations. The ideal state would be to have citizens installing rain gardens on their own, knowing that each one they install does a little bit to help improve surface water quality.

The City of Puyallup has also incorporated porous pavers into our most recent neighborhood rain garden installation on 18th St SW. The City has been encouraging private development applicants to utilize LID where possible. The Benaroya Business Park project has installed pervious concrete parking lots, and Sound Transit has utilized rain gardens at their Red Lot project for water quality treatment (but not flow control).

Puyallup's City Hall incorporates demonstration green roofs, with educational water level LEDs showing the relative depths of standard roof, 2" depth green roof and 4" depth green roof. Additionally, the roof runoff is directed to a cistern and reused for irrigation. The site also incorporates rain gardens along Meridian.

While I can think of no examples of dispersion, reverse slope sidewalks and minimal excavation foundations, I believe there is no reason those measures couldn't have been utilized in Puyallup somewhere.

Planned Actions:

The City of Puyallup has a number of projects planned for the 5th year of the permit. While this report requires actions that prevent stormwater impacts, I believe it is important to note actions that are intended to mitigate stormwater impacts or improve water quality through restoration efforts as well. A quick summary of planned projects is given below:

Neighborhood Rain Garden Program:

The City is planning to complete three additional neighborhood rain garden installations, which will include 18-24 rain gardens. We are focusing on the Clarks Creek basin because of the water quality concerns within this basin. The first installation will occur in the 6th St SW Neighborhood on May 21. In addition to the 6-8 rain gardens, we hope to install at least one porous pavement driveway. As we have continued to develop and improve this program, these events have become mini-environmental fairs. We have had the Puyallup River Watershed Council, WSU Puyallup, and the Pierce County-City of Tacoma Health Department participate with booths providing more information on water quality issues and other environmentally friendly practices. We started incorporating fish-friendly car wash demonstrations, utilizing our car wash kits at our 5th St SE event and have since continued this effort with subsequent events. At the last

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event, we included a free home energy audit, under a grant program that was being implemented at the time. If we can work out the details, we would like to include a rain water harvesting element for this year's event as well.

For this year's events, we are answering a perceived need to have more designers and contractors become familiar and comfortable with rain gardens, so that we can build the base. We are selecting a landscape architecture firm to work with the residents in designing their rain gardens, and also to oversee the contractor. With contractors having the larger need of the two, we are hoping to obtain one or two contractors who are willing to learn on the job about rain gardens. Our second and third events are scheduled in July and September. Our September event will likely have Ciscoe Morris broadcasting live from the site. There is a chance that EPA Region 10 may choose to have a media event at the May 21 installation event as well.

Clarks Creek Riparian Habitat and Porous Maintenance Road:

The project proposes relocating an existing maintenance road/pedestrian path which is immediately adjacent to Clarks Creek – within City-owned Clarks Creek Park – and relocating it 50-75 feet away from the stream and converting it to porous gravel. The project has approved funding through Ecology Capacity grant funds and is seeking additional grant funding through 4 other grant sources. The project will demonstrate LID measures of porous pavement and amended soils. The existing road will be completely removed and all the area that is currently planted with grass will have its soils amended, and a riparian planting placed in its stead. The project will also serve as a leadership example of how we would like to see other homeowners along Clarks Creek treat their riparian shorelines. This project supports both of the TMDLs currently on Clarks Creek, while showing a different approach to shoreline development.

Porous Alley Initiative:

Kick starting this program is Ecology Capacity grant funding. The City of Puyallup spends approximately \$75,000/year maintaining the 7 miles of gravel alleys within the City, which are primarily in the valley area. Besides being a recurring maintenance cost, these alleys are commonly a cause of localized stormwater ponding, which results in a high number of complaints from citizens. With the current available funding, the City hopes to install porous asphalt pavement on approximately 1,600 linear feet of alleys. We hope to include the two alleys adjacent to the 8th Ave NW LID Retrofit project as part of that total to make that neighborhood a more complete LID Retrofit neighborhood example. We anticipate that City crews will be able to conduct the excavation, geotextile placement and permeable base placement for this project. A paving contractor will be hired to install the choker course and porous asphalt. We are confident that in addition to minimizing the maintenance issues associated with gravel driveways, we will significantly improve surface water conditions through this program. We anticipate this will be an ongoing project until all alleys are converted.

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Stewardship Partners/Russell Family Foundation:

Stewardship Partners obtained a grant from the Russell Family Foundation to install rain gardens at the remaining residences and apartment complex within the 8th Ave NW LID Retrofit project. Stewardship Partners is anticipating a May date for installation of these rain gardens. In addition to the rain gardens, Stewardship Partners will be conducting a rain garden class at the WSU Puyallup campus on May 12. Finally, Stewardship Partners is proceeding with plans to install rain gardens at Karshner Elementary, near the 8th Ave NW LID Retrofit site.

8th Ave NW LID Retrofit:

This project was conceived during the first rain garden project on 8th Ave NW. The project is located between 11th and 9th Streets NW on 8th Ave NW. Grant funding was officially received in February 2011, allowing final design and permit documents to be developed for a construction package. That process is now underway. The project will take a street with minimal storm drainage and a history of localized flooding due to a virtually 100% impervious right-of-way and convert it to a 100% porous right-of-way. The soils at the site, as demonstrated by the well functioning rain gardens, are well draining. The entire ROW will be redeveloped with porous asphalt road, rain gardens in the ROW, and porous sidewalks. The road will be narrower than normal City of Puyallup standards, both as a traffic calming measure but also as a principle of LID. The street will be curvilinear, also to provide some traffic calming. The stormwater system will be a belt and suspenders + second set of suspenders system. The pavement section is designed to contain the 100-year storm event. However, should it fail surface water will be directed to the adjacent rain gardens, which are also designed to contain the 100-year storm. If by chance both of those systems fail, a storm line constructed as part of the project will allow overflows from the interconnected rain gardens to enter the traditional stormwater collection system.

Porous Shoulder Rehabilitation:

As a pilot repair methodology, a known drainage issue at the intersection of 9th Ave NW and 11th St SW will be repaired by replacing the existing gravel shoulder with a porous gravel section similar to the pavement section below porous pavement roads. This will allow the several-hundred square foot area to readily drain into the well draining soils of the area instead of building up and crossing over the intersection. If successful, this process could be utilized in many of the valley areas of the City where similar problems occur.

Silver and Meeker Creek Restoration:

The Silver and Meeker Creek Riparian Restoration project is primarily a planting and maintenance project. Hundreds of trees have been planted along several thousand feet of stream bank for this project. Trees are a good non-structural stormwater feature – some jurisdictions are providing stormwater credits for planting trees, recognizing their value in that regard. The trees will also provide shade for both streams, helping cool the water and prevent undesirable weed growth. For Meeker Creek in particular, the trees

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will make the stream less desirable for water fowl, which are major contributors to the fecal coliform issues in the stream. The project, as an ancillary benefit, is constructing soft surface trails along the riparian corridor, providing a new recreational facility for Puyallup.

Meeker Creek Channel Restoration:

This project is dependant upon successful acquisition of property near the confluence of Meeker Creek with Clarks Creek. Project vision includes removing Meeker Creek from its trapezoidal channel, lowering the entire site to near the normal high-water mark, and restoring a nature meander to the stream for this reach. In addition to providing flood storage, the project would provide substantial riparian habitat benefits, including significant tree plantings. As mentioned above, trees are good non-structural stormwater feature in and of themselves. We anticipate that all soils on the site would be amended per T5.13 BMP as well.

12th Ave SE Regional Stormwater Facility:

This project is dependant upon successful acquisition of property near Shaw Road, and containing Deer Creek. While the primary function of the project will be as a stormwater detention facility, conceptual plan is to restore Deer Creek and associated riparian habitat within the facility. In addition to significant riparian plantings along the creek alignment, all disturbed soils will be amended per T5.13 BMP. This would include the soccer fields that are potential for design within the detention facility area, although the sand content will be slightly higher for that use.

Goals and Metrics

Rain Garden Program

The City of Puyallup has a well-recognized program for rain garden implementation, and is a contributor to Stewardship Partners' 12,000 Rain Garden project through installation of our neighborhood rain gardens and collaboration on Stewardship Partners' Russell Family Foundation grant efforts. Some of the goals of the program include:

- Educate the public on stormwater and how rain gardens can help improve stormwater conditions.
- Leverage rain garden events to cover many related stormwater and sustainability practices such as storm drain markings, car wash demonstrations, riparian plantings, porous driveways, natural yard care, etc.
- Involve local schools in the projects, specifically targeting 5-6 grade levels.
- Leverage resources through solicitation of volunteers, donations and contributions in kind.
- Utilize as many forms of media as willing to spread the message to a broader audience.
- Involve multiple design professionals in the program to broaden the experience base of designers knowledgeable of rain gardens and of our program.

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- Involve multiple contractors in the construction of the rain gardens to broaden the experience base of contractors knowledgeable of rain gardens and of our program. This need is more critical than design professionals, as many designers are familiar with rain gardens, but the contracting sector is lagging.
- Demystify rain garden maintenance and take fear of the unknown out of the equation. Obtain signed and recorded maintenance agreements for all rain gardens.
- Promote acceptance in public right-of-ways of rain garden installations, particularly on local access roads.
- Long term, transition rain garden program from 100% subsidy program, to a cost-share basis, to eventually a stormwater credit or rebate program.
- Increase the number of rain gardens installed by 20-30% annually.
- Track rain garden installations on the City's GIS database.

Porous Alley Initiative

The City is just beginning to undertake this project. We are planning on a modest 1,600 linear feet of alleys for the first year's program. As more funding becomes available and the program gains wider acceptance, we will hopefully ramp this program up. Goals include:

- Conversion of 1,600 linear feet of currently gravel alley to porous asphalt in 2011.
- Establish conversion as part of regular maintenance plan, eventually converting all 7 miles of gravel alleys to porous asphalt.
- Utilize City crews for all excavation, subgrade preparation, geotextile and permeable base placement.
- In normal budget years, utilize paving contract to have paver install choker course and porous asphalt.
- In 2011, special contract for paver will have to be established.
- Track all installations on City's GIS database.
- Add all completed projects to the City's street sweeping schedule.

Program Metrics

The City is utilizing a simple, easy to understand metric and publishing the details on the stormwater section of the website. The method is not rigorously correct, but does provide an estimation of rainwater diverted from the stormwater system. A model, such as WWHMv3, could be used to track actual water diverted from the stormwater system, but doing so would add multiple layers of complexity without adding significant value to the program's intent.

The City's program assumes that all rain fall entering the LID BMP is diverted from the stormwater system, whether that is to groundwater or the sanitary sewer system, as is the case with a lot of rain water harvesting. Based on that assumption, the collective LID BMPs surface area is multiplied by the annual rainfall for Puyallup in feet to obtain total cubic feet of water. This number is then converted over to gallons and is the number posted on the website. We are calling our program "Get Disconnected" and details can

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be found on the City's website at <http://www.cityofpuyallup.org/services/development-services/puyallups-stormwater-management-program/citizens-guide-to-protecting-waters/disconnected/>.

We arbitrarily established a goal of 9 million gallons of water diverted as our 2011 goal. With the current projects we have been able to verify, we are currently at 2.6 million gallons a year. See Figure 1 below for projects included in the current tally. If the City is able to complete all the projects planned for this coming year, we should be very close to meeting our goals, even without including any potential private development projects which may use LID measures. Development Services has been coordinating closely with Stormwater to account for LID measures being proposed in private development projects.

Location	Method of disconnection				
	Impervious surface disconnected (ft ²)	Porous Pavements	Rain Gardens	Rainwater Harvesting	Green Roofs
South Hill Business and Technology Center West, 1111 - 39th Ave. SE Puyallup, WA	11,590	Yes!			
18th Street SW Installation			Yes!		
703 18th St SW	1,740		Yes!		
707 18th St SW	876		Yes!		
715 18th St SW	456		Yes!		
715 18th St SW	1,294		Yes!		
810 18th St SW	1,622		Yes!		
810 18th St SW	1,600	Yes!			
919 18th St SW	889		Yes!		
Spinning Elementary/5th Ave SE Installation					
319 14th St SE	590		Yes!		
501 14th St SE	441		Yes!		
507 14th St SE	662		Yes!		
1414 5th Ave SE (West)	445		Yes!		
1414 5th Ave SE (East)	419		Yes!		
502 15th St SE	948		Yes!		
424 15th St SE	310		Yes!		
8th Ave NW Installation					
913 8th Ave NW	1,985		Yes!		
913 8th Ave NW	50			Yes!	
912 8th Ave NW	640		Yes!		
916 8th Ave NW	581		Yes!		
917 8th Ave NW	545		Yes!		
920 8th Ave NW	1,012		Yes!		
925 8th Ave NW	866		Yes!		
1001 8th Ave NW	435		Yes!		
Puyallup Activity Center, 210 West Pioneer	4,375	Yes!			
Puyallup City Hall, 333 S Meridian					
Rain Gardens, swales	24,600		Yes!		
Green Roof	1,250				Yes!
Porous pavements	4,500	Yes!			
Rainwater harvesting (impervious pavements' runoff, traditional roof space)	46,348			Yes!	
Total Area Disconnected in Puyallup (ft²):	111,069				
Total Gals Disconnected in Puyallup:	2,644,194				

Figure 1-Current City of Puyallup "Get Disconnected" Projects

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LID Implementation Plan

The City of Puyallup is watching the Ecology NPDES Phase II Permit reissuance process closely. It is our understanding that draft language will be forthcoming soon for the two major areas of change in the next permit: LID Implementation and water quality monitoring. The City of Puyallup has been trying to achieve as much LID implementation on a voluntary basis as it can. We have been moderately successful with this effort. It is likely that the next permit will require LID to be mandatory. However, what form this mandate will take is anyone's guess at this point. The City is prepared to begin making proactive changes after the draft permit language has been published and a reaction to it has been made by all stakeholders. To my knowledge, the City has no plans to unilaterally adopt LID measures as mandatory at this time or prior to the permit mandating LID use. The lone exception to that may come with implementation of the Dissolved Oxygen TMDL for Clarks Creek, which has toyed with the concept of LID implementation within the Clarks Creek basin as one of its measures.

Barriers to LID Implementation:

Introduction

The barriers to effective, widespread LID implementation are legion. This is to be expected with any new program, but some facets of LID face higher hurdles than others. I'm including a fairly lengthy list of potential barriers, but I'm sure it is by no means exhaustive. Unfortunately, in the real world of bureaucratic decision making, it only takes one "NO" from one of the regulatory, design, owner, or contractor sides to potentially kill the use of an LID BMP. I know of a case where a large rain garden was designed for a homeowner. The rain garden was a cost-effective solution because of the size of the impervious area being served and the water quality treatment that would be required by conventional means. After a less than easy approval process for the rain garden design, the owner decided that a rain garden was not for him. His excuse was that he was allergic to mosquitoes, and he couldn't have a rain garden on his home site. This was despite the fact that the standard stormwater measures would have ponded much more water for a much longer time, and that the rain garden would be drained in less than 24 hours - too short of a timeframe for mosquito gestation. Thus, after a series of battles to gain acceptance of the rain garden from a reluctant architect, a regulatory agency that put numerous hurdles up to approval, and winning over an extremely reluctant contractor, the owner was able to veto based on misinformation. In many ways, this is a succinct description of the barriers to LID implementation.

In no particular order, here are some of my observed barriers to LID implementation. Any one of these facets could apply to anyone in the major groups listed above: regulatory; designer; owner; contractor. Thus there are many ways to get to NO, but only one path to get to yes.

Community Acceptance and Understanding:

I don't like it:

It really isn't over simplifying it to say that some people just don't like LID, they don't think it works, and they just aren't going to do it. I've been trying to gain acceptance of porous asphalt for well over a decade now, and I'm no longer surprised to hear people make statements like "We'll never have porous asphalt on my streets". Unfortunately, this kind of thought process has been coming from the very people in charge, with the ability to make decisions about changes. The obvious thing to do is to get the information out to these people so they can start seeing that these are all viable solutions to our stormwater problems. In fact, we can't keep operating the way we have for decades because that is what got us to this position in the first place. You won't be able to convert everybody; in fact you probably won't even be able to convert a majority in the beginning. But the word has to be spread; status quo is no longer acceptable. Continuing education and outreach to staff, the design community, contractors and particularly politicians will help start turning this obstacle around.

I don't know it:

These people aren't aware of LID practices, are not comfortable with this new way of addressing stormwater, and generally are afraid of the unknown. On this front I think we are beginning to make headway. With the help of the Puget Sound Partnership and WSU, regular LID training sessions are being held for design and construction professionals at the WSU Puyallup campus. UW also has an LID course. The demand for training is great however, and I have heard that this year's WSU LID Technical Workshops have sold out already – months in advance of the actual classes. The demand is definitely there, and there is indication that we are not keeping up with the supply end.

LID practice is a shifting target. Curtis Hinman is working on revising the Rain Garden Handbook based on some of the lessons he is learning at the WSU Puyallup facility. We have been constantly revising and updating the porous asphalt specifications and process. New certification programs for pervious concrete installers have been initiated. A critical mass is developing with the design community. What is currently lagging is regulatory-agency and construction-contractor knowledge about LID implementation. Those areas will need attention. Regulatory agencies need to know the critical aspects of LID implementation so that they don't over-regulate the practices out of fear or ignorance. A firm grasp of the BMP will allow sound judgment on what really matters in design and in the field. Contractors need to have experience installing LID. Contractors can't make money installing things they don't know how to do, and thus can't do efficiently. This is part of the basis of Puyallup's rain garden program change. We want to give more contractors the chance to learn how to do this work in a low-risk environment and begin deepening the talent pool. Based on my experience, the talent pool is pretty shallow as of now.

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I don't understand it:

These people are aware of LID techniques but have not yet been fully exposed to its practice. In the regulatory arena, this results in overly cumbersome and difficult regulations required to implement LID BMPs. Unfortunately, when this bumps up against the designer who doesn't know it or the owner who doesn't like it, the hurdle becomes a decision point in favor of the status quo. It is easier to do what is familiar and "normal" than venture out into a new area; thus, conventional ideas win. In the case of an owner, *I don't understand it* is no better than *I don't like it* if the owner is not willing to be educated. This situation occurred in a large parking lot project in Puyallup that held a prime opportunity for porous pavement, but the owners didn't understand the BMP. For designers, if they don't understand it, they won't design it. Most designers have developed experience with standard BMP practices which has come at a cost. They are not willing to proceed with additional expense when there is a standard BMP practice available as an option. I have been reaching out to private development when sites which would benefit from LID practices are in the development stages to try to educate designers and owners on the benefits of LID, and try to have them incorporate LID into their designs. I have not had significant success in this arena as of now.

Ecology, Puget Sound Partnership and others can help with the *I don't understand it*, as well as the many other efforts underway. Some of the ways the current programs can be improved is by providing more specific guidelines on BMP requirements and assistance on how to design, maintain, and inspect these facilities. Specific sources are helpful, such as: where I can obtain compost that would be suitable for bioretention facilities; how do I inspect and test for porous pavements; and what reasonable requirements, that can be enforced locally without special testing or equipment, can be utilized to verify proper design and construction of BMPs?

I can't afford it:

There is a common misconception in the community at large that LID measures are more expensive. This is basically a subset of the groups above. Generally speaking, most LID measures, when properly designed and constructed and compared accurately to the alternative design are, at least, cost neutral. In many cases, particularly if using the current 2005 Manual detention standard, LID will come out far more cost effective. For example, if porous pavements and rain gardens were used to completely infiltrate a site's stormwater, the additional cost of porous pavement section to standard pavement section will be 50-75% more. The porous option, however, does not require catch basin, conveyance pipes, control structures, water quality treatment system, land for a detention basin (which might be several lots for WWHMv3 forested vs developed), fencing, maintenance roads, etc. Ultimately, maintenance costs for some of these systems will also be less than their alternatives. Porous asphalt, for example, does not need to be chip sealed every 7 years to lengthen its life span and its maintenance is nothing more than vacuum sweeping – which every jurisdiction should be including in their stormwater program. As with many of the above issues, some education is underway, and is whittling away at the ignorance of life cycle costs of LID. No matter

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how much training, education and examples are put out there; some will be late adopters no matter what we do.

Regulatory Barriers:

Credits for LID

Appendix C of the current 2005 Manual does not allow credits commensurate with actual performance of LID BMPs. For example, porous pavements, if utilized on a private project, will only receive a 50% credit for flow reduction. Apparently the philosophy behind this reduced requirement is that private owners will not effectively maintain their pavement and it will become less effective at reducing volume. When the odds are so stacked against voluntary implementation of LID practices, this disincentive makes it highly unlikely that private developers will proceed with this option. Flow modeling credits that more accurately reflect that actual performance of LID measures need to be included in the Manual. Doug Beyerlein recently provided the table of modeling results below relating to LID measures.

WWHM4 LID Modeling

Modeler:

Seattle LID Results

LID	Precip (in)	PET (in)	Ratio: Drainage to LID Area	LID Runoff (in)	LID AET (in)	LID Infiltration (in)	Annual Vol Reduction
Lateral Flow Dispersion	38.11	23.27	4 to 1	26.14	8.65	3.32	7%
Rain Garden	38.11	23.27	10 to 1	12.90	7.29	17.92	59%
Grass Bioswale	38.11	23.27	4 to 1	18.35	8.50	11.26	28%
Bioretention	38.11	23.27	10 to 1	16.23	9.11	12.77	45%
Permeable Pavement 100%	38.11	23.27	1 to 1	0.56	3.52	34.03	98%
Permeable Pavement 50%	38.11	23.27	2 to 1	4.08	5.49	28.54	87%
Green Roof	38.11	23.27	1 to 1	24.26	13.85	0.00	22%

Fire Code Requirements

One of the tenants of LID site planning is to make as little impervious surface as possible. One of the ways to do this is simply not to create as much paved area. Current fire codes, as implemented in Puyallup and many other jurisdictions, require very wide pavement sections for roads. Typical street widths in Puyallup are around 38 feet, in part, due to fire code requirements. Intuitively, with very wide streets, the right-of-way needs to be even wider to accommodate curb, gutter, sidewalk and any planting strip envisioned. Eventually you come up with the standard 60 foot or more standard right-of-way. This standard creates a lot of public land with almost all of it being impervious. Also, it makes cities less dense by utilizing large sections of land for the transportation grid which could have been used for housing or buildings. Dense development is

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sustainable development: it prevents urban sprawl and loss of rural farmland by maximizing the utilization of already urbanized areas. It is also efficient use of resources. Keeping development compact can allow much less infrastructure to support the same number of people in a less dense development.

Hopefully, once development reaches a critical mass, mass transit becomes viable, personal automobiles become less of a necessity, and walking can become a reasonable form of transportation for many daily activities. Narrower streets can become a part of this vision of a more sustainable future. Arterials, collectors and other higher volume streets should maintain the configuration they currently enjoy, but local streets and cul-de-sacs should be examined for opportunities to make them narrower than current fire codes will allow. In the classic grid road system, multiple points of access for each structure via streets and alleys, should allow for acceptable safety conditions and narrower streets.

Vesting Laws

LID for new construction and redevelopment will not fix practices of the past 150 years, but it has even less of a chance of making a significant difference with the current vesting laws. Developers need assurance that the target won't move during the process of permitting and constructing their project. However, in practice, developers rush to get vested in a project, even if they were not planning on building immediately. They then sit on the permits for as absolutely long as they can or until economic conditions are good for the project. With state laws allowing 5 years to complete a plat, with up to 3 one-year extensions, projects can actually be constructed up to 10 years later under rules predating that.

An example of this from the land use perspective, is the outskirts of Orting, which is zoned rural in Pierce County zoning, but is almost entirely moderate density single-family housing due to vested developments which beat the deadline for the 1995 Comprehensive Plan update. Similarly, we can now expect many projects to develop over the next 10 years that will not comply with the 2005 Manual because they were vested before January 16, 2009 or were under 1 acre for those jurisdictions utilizing the exemption.

It would make sense for the time line to be shorter AND to require that consistent progress be made towards finalizing construction of the project. For most projects, 3 years would be a reasonable amount of time. To anticipate one of the objections, that we would be discouraging development, I would say quite the contrary. For projects that are viable and ready to go, you are encouraging them strongly to get it done now lest you have to stop, redesign and resubmit under new regulations.

Environmental

Currently, many LID BMPs are prohibited from use in areas with high ground water tables or poor soils. Rain gardens, for instance, have a 3 foot separation requirement from high ground water for larger systems. This requirement appears to neglect the water quality treatment provided through the soil/root media of the rain gardens

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themselves. Guidance for permeable pavements has been similar, although I believe the LID committee finally recommended that ground water could be within a foot of bottom of the pavement section. Again, recognition of the treatment capabilities of the pavement section itself appears to be neglected. The efforts of the LID Program at WSU Puyallup will hopefully be addressing these issues with their experiments and studies. In the meantime, these potentially excessive restrictions on LID use will likely restrict application of LID BMPs in areas where they would ultimately be beneficial. When studies from other areas indicate effective water quality treatment through these systems AND we know the status quo is the path to more pollution, we should error in favor of the systems which are most likely to help us. While I've listed this as an environmental concern, ultimately it is a regulatory one. Most jurisdictions have adopted the 2005 Manual, including the LID Appendix. With the LID practice being so fluid, Ecology must find a way to keep Appendix C updated on a frequent basis until the state of the art stabilizes somewhat. The current version of Appendix C, I believe, has been amended at least once since its publication, but is still behind the recommendations of the LID committee.

Conclusions

Two years ago, when I was still a member of the City of Puyallup's Planning Commission, I would not have thought I would come to this conclusion. I was pretty firm in my belief that we were not ready to make LID mandatory. There are still many questions to answer, and the practice of LID is in flux. Nonetheless, we have more than reasonable assurance through studies and experience in other parts of the world that LID practices are beneficial to stormwater and should be adopted.

After taking a look at the obstacles to implementing LID, I don't think LID will ever be able to make any in roads on storm water quality and quantity unless it is mandated. Realizing that new construction and redevelopment alone will not correct our current deficiencies, retrofitting needs to be a key goal as well. Until LID becomes the norm rather than the exception, we will be fighting an uphill battle. LID needs to be adopted by public works departments, looking at failing roads as an opportunity to retrofit to porous pavements instead of chip seals and overlays. Narrower roads can allow for rain garden installations within existing right-of-ways. A large portion of our impervious surface within the Puget Sound basin is public roads (the City of Puyallup alone has 150 miles of streets or around 620 acres of impervious surface). LID retrofits of public roads needs to become the rule.

Finally, a large amount of time was spent last year on determining what "where feasible" meant in LID implementation. I understand that my opinion will be regarded as naïve and disregarding political reality, but quite practically, if new construction or development occurs, unequivocally some form of LID can be implemented regardless of soil, slope or type of project. Green roofs can be installed on any building, soils can be amended with organics in any disturbed area, and rain water harvesting can occur anywhere stormwater is generated. I believe that LID should be mandated to the maximum extent possible, up to 100% retention of stormwater on site. Specific BMPs

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may not be suitable to a every site, but other BMPs should be implemented in their place, with the universal three above utilized if no other BMPs can be effectively implemented on the site. The goal should be 100% retention of stormwater on site, with no further LID BMPs required once 100% is achieved. Otherwise, all available BMPs would be utilized to the maximum extent until all available BMPs are exhausted.

Respectfully Submitted,

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