Stormwater Web Portal

Feasibility Study and Final Recommendations Report

Green Futures Lab
University of Washington

[contents]

[executive summary]

This report was generated to assess the feasibility of a potential web-based resource which would provide information on green stormwater management. Several research methods were employed in this study including a review of existing resources, a public survey, and a series of personal interviews. Each of these inquiries uncovered insufficiencies in the online stormwater resources currently available, often due to difficulties accessing and navigating these resources. Thus, this report concludes that there is indeed a strong need for the proposed Stormwater Web Portal.

There are many possible forms that the Stormwater Web Portal could take, and if it is to be developed it will be important to carefully define its scope, intended users, and unique niche online. However, this report suggests that in order to avoid duplication with existing resources and to make the web portal accessible and appealing to a large audience, it is important that it have a strong graphic orientation.

We anticipate that it will take approximately one year to develop the Stormwater Web Portal. During this time, the Green Futures Lab would establish the web portal content through collaboration with stormwater professionals and research institutions, while employing the services of graphic designers and web developers to design and build the site. Once built, it is important that the web portal be regularly maintained and updated to remain relevant.

[feasibility study]

Study Objectives

This feasibility study served the purpose of generating research that will strategically guide the approach and future development of the Stormwater Web Portal (hereinafter called the web portal). The feasibility study portion of this project was determined to be a necessary step in developing this new online resource as a means of ensuring that efforts are not being duplicated and that there is actually a need for the type of web portal that has been envisioned. The feasibility study also provided the opportunity to reach out to stakeholders and gather information on how best to direct the development of the web portal. The primary research objectives within this feasibility study were as follows: inventory and analysis of existing web resources; a public survey and personal interviews; analysis of the results of that data collection; and identification of preliminary design parameters for the web portal.

Study Components

Research on existing web resources was conducted to assess the the status of stormwater management information currently available online and to avoid duplicating a resource that may already be functioning similarly to the envisioned web portal. This inventory and analysis process also helped determine format and content needs for the web portal and allowed us to identify websites and their respective organizations that could potentially become collaborators on this project. While completing this inventory, and throughout the feasibility study, a focus was placed on the Pacific Northwest region though global resources were also considered.

In order to secure widespread feedback on the development of the web portal, a public survey was developed and distributed online. The goal of the survey was to reach many different types of professionals and citizens interested and/or invested in stormwater management issues. Survey participants were asked for various feedback, including the kinds of stormwater management information they need and look for, where they go for this information, and whether they have encountered obstacles in searching for this information online. The survey was seen as an important way of reaching out to the public to gain further information on the current status of online stormwater management resources, what information is needed and what problems exist, and how best to move forward with the web portal.

Personal interviews were another important research component of the feasibility study. The personal interviews were seen as a way to elaborate on the questions asked in the public survey and to get

more detailed feedback from professionals that work closely with stormwater management issues. The interview process offered a conversational atmosphere and provided the opportunity to go deeper into the topic of stormwater management outreach -- helping us determine the best web resources currently available, the opportunities and constraints found in online stormwater management information, and the most effective way to develop the web portal.

This report represents a synthesis of all the information gathered from these unique research objectives. The following sections of this report include the results and detailed findings from the inventory and analysis of existing web resources, distribution of the public survey, and administration of personal interviews. The report concludes with recommendations on how to move forward and develop a robust, comprehensive, and graphically-driven online stormwater management resource that will become the web portal.

[existing web resources]

Creating the Inventory

The collection, inventory, and analysis of existing web resources was an ongoing process through the duration of this feasibility study. There were multiple benefits to completing this portion of the research and compiling an inventory of online stormwater management resources. Through compiling and examining these websites, information was gathered about individual website content and design and knowledge was obtained about how online stormwater management information is organized and made available at a larger scale. The web resource inventory was initially populated through independent web research and use of a standard search engine. New resources were then added after receiving feedback from the public survey responses and personal interviews. The compilation of web resources was not an attempt to gather every website with stormwater management information. This would be unrealistic as there are countless sources on this subject matter. Rather, the inventory that has been created represents a sample of the most prominent, comprehensive, popular, and highly recommended websites dealing with stormwater management - many of which are focused on the Puget Sound region. The raw inventory of existing web resources is included in Appendix A of this report.

For the purposes of this feasibility study, the existing web resources were organized as either "web portal examples" or more broadly as "general web resources." Websites listed in the "web portal examples" category were thought to function as more comprehensive stormwater management resources that provide a wider range of information. In some cases, websites were included that had a strong web portal format but not a specific focus on stormwater management. These "web portal example" websites serve as precedents in considering how the web portal will be put together, helping to inform both web design and content. The "general web resources" category includes a variety of websites with more specific stormwater management topic foci. These websites are helpful in showing the broad spectrum of stormwater management information available online.

Analysis of Existing Resources

In observing how many different websites serve as valuable stormwater management resources, it is worth acknowledging the vast quantities of information that is available. While the information is there, it can be relatively difficult to access and/or find information of particular interest. With so many different sources of information, so many different types of information, and so many different approaches to providing the information, a standard web search is often quite cumbersome.

Stormwater management information is scattered throughout the web. Should information be sourced from federal, county, state, or local jurisdictions? Is this the same information that is being distributed by nonprofits and university based organizations? Which organization is supplying the most current information and which source is most appropriate for a particular audience? These kinds of questions come up because it is not always an easy process to navigate through the swaths of stormwater information found online.

There were several important findings that resulted from analysis of individual websites. One common issue with the "web portal example" resources is that they tend to be relatively text heavy, and at times, poorly organized and difficult to navigate. Long blocks of text can quickly detract from a visitor's experience on the website by forcing the user to read through information she or he is not concerned with in order to locate the appropriate resource. While text is clearly necessary to explain complex concepts at times, overuse of it can become a nuisance and fail as a method of capturing the attention of and engaging the website user. Many of the "web portal example" resources are government based and several of them are poorly designed and their content is organized in an unclear manner. When there is already so much different stormwater management information floating around online, a poorly designed and difficult to navigate website makes finding specific information that much harder. When a website holds valuable information but it is all presented in text format and is inadequately organized, the opportunity to effectively communicate the information is missed.

After reviewing a large variety of different websites, including the sites that exhibit a web portal type function for stormwater information, it was determined that all of the goals envisioned by the web portal are not being expressed by any single web resource and that the the development of the web portal would not result in the duplication of any existing efforts. While many of the "web portal example" resources deliver a relatively comprehensive base of stormwater information, none of them do so in a way that goes beyond text-based communication, that offers a user friendly and well-organized interface, and that focuses on the power of photos, diagrams, and other graphics to communicate stormwater management information and engage the website visitor. For instance, the EPA's Green Infrastructure website (http://water.epa.gov/infrastructure/greeninfrastructure/) has a comprehensive set of resources, is very well organized, and easy to navigate but it lacks the strategic use of graphics to explain and promote the use of green infrastructure. The Philadelphia Water Department's website (http://www.phillywatersheds.

org/) contains a wide range of information, has decent content organization, and includes some graphic appeal but doesn't offer many technical resources and fails to utilize graphic communication to its full potential.

The Potential Role of the Stormwater Web Portal

The Pacific Northwest is a regional leader in implementing sustainable stormwater management strategies and there were no regionally based websites found that effectively serve as a central public and technical resource for exhibiting, explaining, promoting, and implementing green stormwater infrastructure. There is great potential for the web portal to take on this role. The Washington Stormwater Center (http://www.wastormwatercenter.org/) was identified as a regionally based central resource for technical stormwater management information and an organization that could become a possible collaborator in the development of the web portal, though their target audience is primarily municipal engineers and managers. The inventory and analysis of existing web resources made it clear that there is a wealth of valuable stormwater management information available online and that there are many websites that would be helpful to use as linked resources from a central, graphically inviting web portal.

[public survey results]

Through the distribution of an online survey, we were able to reach out to a wide audience of professionals concerned with stormwater management in various capacities. While the survey provided less detailed feedback than the personal interviews, it allowed us to benefit from a much larger pool of opinions.

Distribution

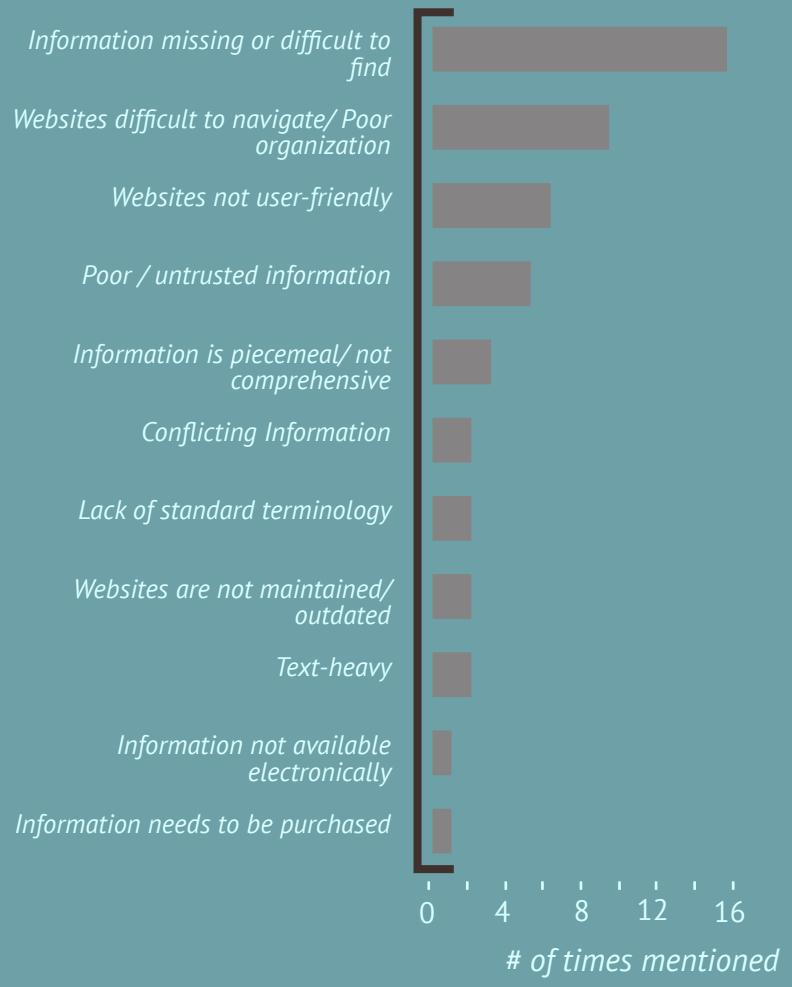
We elected to distribute the survey primarily to individuals and organizations in the Seattle area. The distribution process began by reaching out to professionals at one of Seattle's monthly Green Infrastructure Partnership meetings. During the meeting, we introduced the web portal feasibility study and collected suggestions on individuals and organizations that would be good targets for either the online survey or personal interviews. We supplemented those suggestions with our own research into relevant organizations. In total, we distributed the survey to 41 local organizations, including nonprofits, consulting firms, government offices, and design and engineering firms. The survey was also sent to 10 national organizations, but those inquiries did not generate any responses.

Respondent Demographics

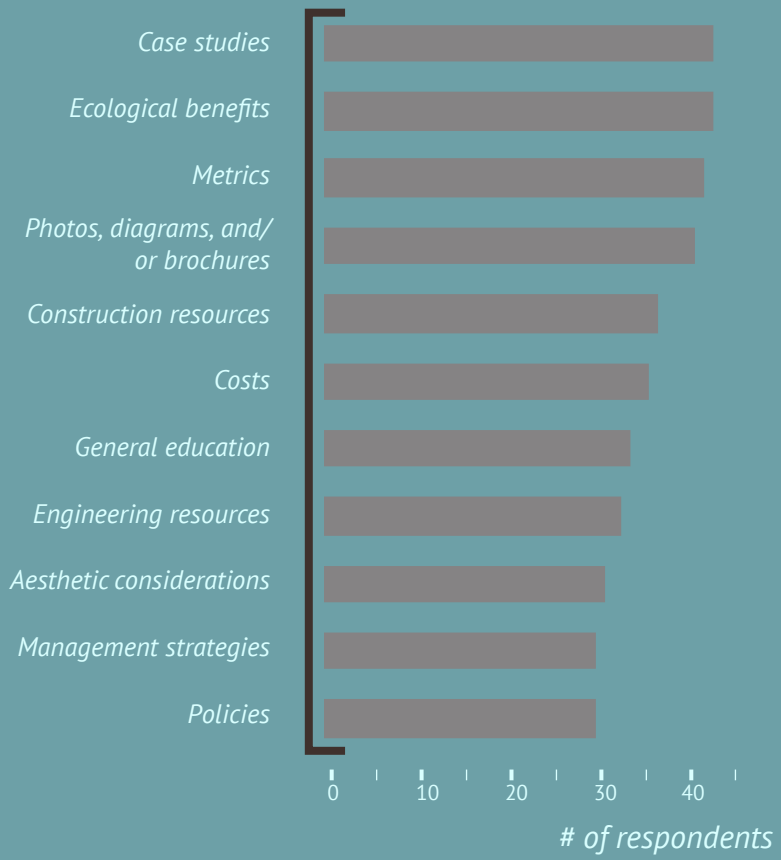
The survey received a total of 58 responses, with all but 4 respondents residing in Washington

Obstacles encountered searching for stormwater management information online

(summarized from open responces)



What kinds of information or resources regarding stormwater management do you want or need?



state. The respondents were a mix of professionals, students, and educators from a fairly even spread of stormwater related fields. Every respondent expressed professional interest in stormwater management. (See Appendix B, Charts I and II)

Results

The survey responses suggest a strong interest in the development of better web resources on stormwater management. Around 90% of the respondents selected the internet as their preferred source of information. However, over half (57%) of all respondents reported encountering obstacles when searching for stormwater management information online. Nearly every respondent (97%) selected that they would be interested in using the web portal if it were developed. (See Appendix B, Charts III, IV, V and VI)

The most common obstacle reported in searching existing stormwater web resources was being unable to locate needed information (either because it does not exist or it is difficult to find). Most other obstacles reported were related to the quality of existing resources, such as websites that are poorly organized, not user-friendly, or text-heavy. (See chart on pg. 9). These findings suggest that while there is some need for new content, there would also be a lot of benefit to organizing and consolidating

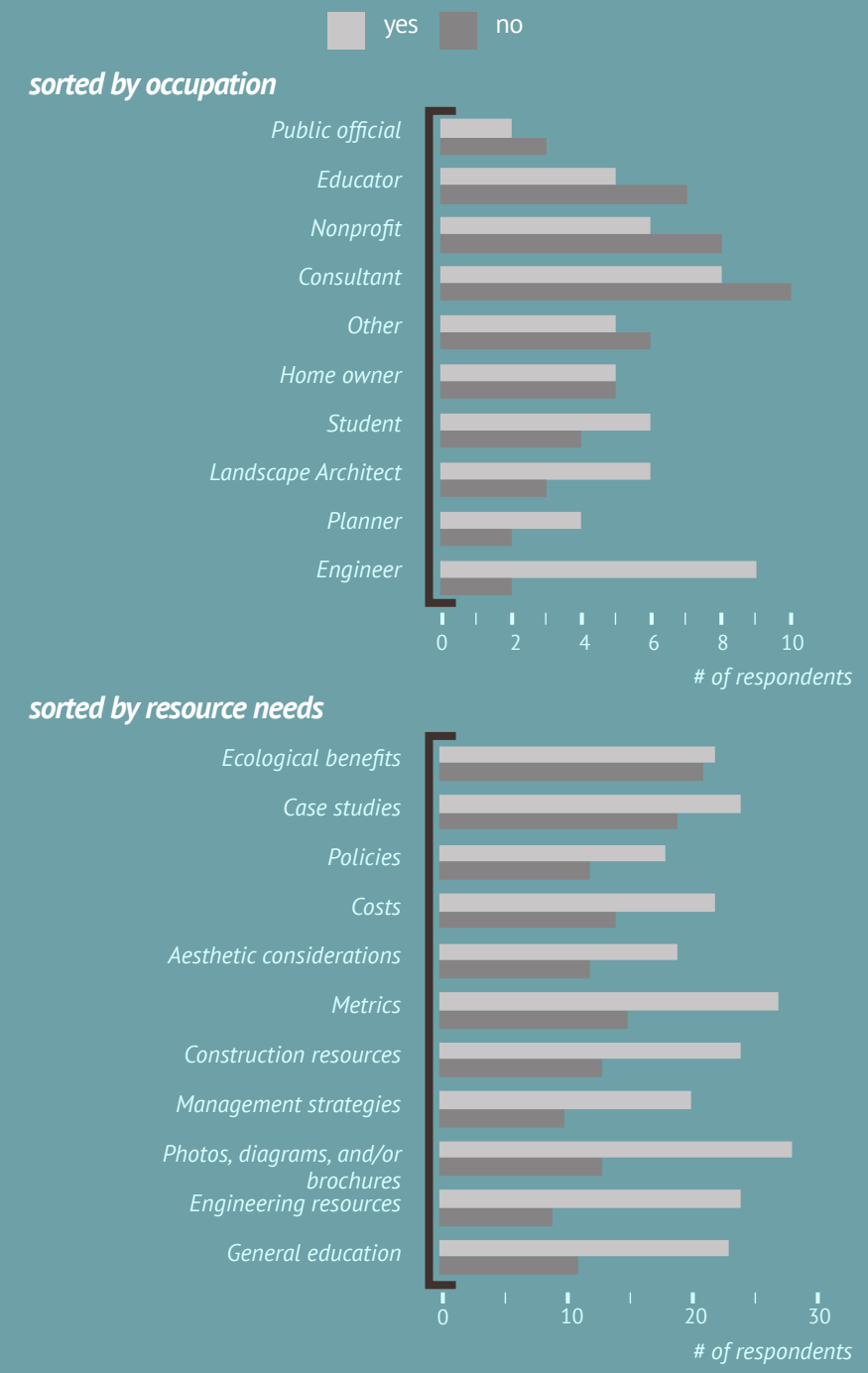
existing information and making it more accessible through graphics and visual devices.

One survey question asked respondents to select the types of information and resources that they would benefit from. Every category was selected by over half of the respondents, suggesting a demand for a wide variety of stormwater resources. (See chart on pg. 10).

In order to analyze which of the above categories are most lacking among existing web resources, these results were sorted by those respondents who reported encountering obstacles searching for information and those who did not. (See chart opposite). This analysis indicated unmet needs for information and resources regarding both the implementation and promotion of green stormwater infrastructure. No single category appears to be well covered by existing resources.

The same sorting process was also applied to the question regarding the respondent's occupation. (See chart opposite). This analysis found the most pronounced lack of resources among planners and designers.

Have you encountered any obstacles obtaining stormwater management information or resources online?



[personal interview results]

Personal interviews were a critical part of this feasibility study, resulting in a wide range of focused feedback on the development of the web portal. We made an effort to interview a diverse set of professionals who work on stormwater issues day-to-day and consistently search for stormwater management information. We ended up conducting personal interviews with a total of ten professionals working in Seattle, WA. The interviewees represented a variety of organizations associated with the implementation stormwater management solutions, including city and county jurisdictions, nonprofit advocacy groups, consultants, and engineering, design and planning firms. The individuals interviewed also held a variety of professional roles, including program/project managers, permit coordinators, outreach coordinators, planners, designers, engineers, consultants, and researchers.

We felt that our selection of professionals for these interviews served as a diverse representation of people and organizations that would be interested in using the the type of web portal we are proposing. Many of our interviewees provided similar feedback on the status of existing online resources and ideas for the development of the web portal but unique information and advice was given as well. All of the individuals interviewed were supportive of the web portal concept and thought that this new resource would be a necessary addition to the stormwater management information currently available online. The raw interview data sheets, including more detailed information about the individuals and their respective organizations, are included in Appendix C following this report.

The following pages provide a summary of the information obtained from the interviews that we feel informs the strategic development of the web portal.

Gaps in stormwater information currently available online

- *Technical information (i.e. pollutant removal, bioretention, infiltration rates, soil mixes, etc.)*
- *Visual resources*
- *Stormwater calculators*
- *New research and knowledge, evolving information*
- *Information on site suitability for GSI implementation*
- *List of stormwater management consultants, designers, and contractors*
- *Cost information for facility development*
- *Cost comparisons between green and grey infrastructure*
- *Cost benefit analysis*
- *Simple explanations of stormwater concepts and green infrastructure*
- *Maintenance requirements*
- *Quality info on rain gardens*
- *Bulletin board with list of events and tours, opportunities for collaboration, shared information between different professionals working on stormwater management*
- *Basic information on LID in easily accessible format*
- *Concept of separated sewer systems*
- *More technical info needed - site specific info, infiltration rates for different facility types*
- *Monitoring info - how facilities perform, water quality data/metrics*
- *New innovations beyond basic strategies*
- *Case studies*
- *Quantifying additional benefits of GSI beyond stormwater*
- *Strategies for navigating regulatory barriers, policy considerations for GSI implementation*
- *Local research studies and information on how to make GSI projects more efficient*
- *Info on effects of stormwater management on soil contamination*

Other difficulties in searching for stormwater information online

- *Lots of information but hard to find what you're looking for*
- *Many resources have a strong bias*
- *Design standards not clearly communicated*
- *Online resources are not well-organized*
- *Different jurisdiction requirements for stormwater management makes things difficult*
- *Web content often not designed to fit users*
- *Language used has too much jargon*
- *Long blocks of text*
- *Hard to filter down to necessary technical info*
- *Municipal websites are notoriously hard to navigate - unsure where information is located, trial and error search, organization is unclear*

Characteristics that make websites with stormwater information more useful

- *Summaries of articles helps with web search*
- *Making scientific research accessible*
- *Good technical resources*
- *Outreach videos*
- *Provision of information from around the world*
- *Relevant technical info, well organized, clear answer to particular question*
- *Good search functions, good web page design*
- *Peer reviewed information, start of industry standard/standard operating procedures*
- *Municipal websites are relevant to permit requirements*

Stormwater management information that would be most critical to include on this web portal

- *Published scientific research, monitoring information*
- *Cost-benefit analysis*
- *Information on how to implement GSI*
- *Interactive area for sharing technical info - web portal can become a forum/networking mechanism*
- *Summary of qualified contractors*
- *Comprehensive facility sizing factor information*
- *Diverse sustainable stormwater management strategies*
- *Water quality monitoring data from different forms of stormwater management*
- *Cost estimates for GSI implementation*
- *Unbiased perspective on stormwater management for general public*
- *Explain that grey/standard infrastructure may be appropriate in some situations*
- *Maintenance issues need to be considered and discussed, cost comparisons for maintenance*
- *Introductory stormwater process info for the public, separate vs. combined sewer systems*
- *Technical info, innovative design solutions, new technology*
- *Information on performance/case study metrics and monitoring data*
- *Opportunity to create resource for municipalities - code development for separating stormwater from sewer system, implementation of GSI, comparing municipal codes*
- *Multidisciplinary resource is more interesting, more engaging, more informative*
- *Boil down to most important info (i.e. simple plant list showing what will work on a shoreline restoration)*
- *New regulations/policy development*
- *Case studies, regional advances and beyond*
- *web portal info must be maintained, must be kept updated and current*
- *Basic explanation about how stormwater facilities work*
- *Show early success stories and convince public that facilities are replicable*
- *How to retrofit in a positive way*
- *Show multifunctional benefits of facilities to community*
- *How to make projects perform more efficiently*
- *Facts and figures on the effectiveness of GSI projects (i.e. how much stormwater a certain sized rain garden could capture)*
- *Information on how GSI projects will evolve over time*
- *Information on what plants and other design strategies have been most effective in a certain area*
- *Simplified definitions*

Why this type of web portal would be valuable to people searching for stormwater management information online

- *Potential to broaden possible design strategies*
- *The information could be used for providing recommendations to others, putting together grant applications, educational purposes, and to convince skeptics that sustainable stormwater management is a good thing*
- *Could be helpful to the public, good to show how these facilities work in the community - a lot of the work to be done is political rather than scientific*
- *There currently aren't any online resources that are adequate, have to spend too much time searching for information*

Why photos and other graphics would add value to this web portal

- *Use of graphics makes information easier to understand and more engaging*
- *Photos and graphics can communicate idea more quickly*
- *Graphics have aesthetic value and can explain complex info simply*
- *Visual orientation and images of facilities would be helpful*
- *Potential to broaden knowledge obtained, show what facilities look like, and exhibit different facility types and possibilities*
- *Having diverse visual resources/information in one place would be good*
- *Important to keep viewers attention with graphics that engage, static and text heavy information is boring and viewer will leave page*
- *Can help make the info less bureaucratic, graphics can generate excitement and motivation to implement GSI*
- *They will help the public understand GSI and trust the strategy as an amenity*
- *Interactive graphics can help professionals and public understand stormwater processes and provide context*
- *Graphics can help show the feeling of the street, the landscape experience*
- *Graphic orientation will be important – most don't want to read scientific papers*
- *Would be helpful for sharing information*

Types of visual resources that would be most valuable for this web portal

- *Animated graphics for people new to stormwater, data tables and scientific figures for technical users*
- *Photos of facilities and diagrams showing stormwater flow and different system possibilities*
- *Photos of LID projects that look good and other local success stories*
- *Map of green infrastructure sites*
- *Video allows control of tone and all of the senses*
- *Make web portal as graphic as possible, focus on technical info without too much writing*
- *Drawings/designs*
- *Potential to graphically move people through the GSI implementation process (step by step)*
- *Visual comparison of 'grey to green'*
- *Quantifiable studies with relevant graphics.*
- *Plenty of 'black and white' websites with photos but nothing that shows all of the context (i.e. the whole street, not just the facility)*
- *People respond to graphics and diagrams more than photos – good to show how system works*
- *Diagrams showing how water moves through the system*
- *Photos, diagrams, and possibly videos would be very useful in marketing residential GSI programs - need materials for outreach*

Strategies for organizing the web portal information

- *Be strategic if including information for people new to stormwater and experienced professionals*
- *Too many tabs and columns is a hindrance*
- *Good search engine function could be helpful*
- *Organize web portal by subject/type of information*
- *Should be organized by audience/user type (i.e. layperson vs. technical professional)*
- *"Who are you page" could be helpful to direct people to the right place*
- *External links should be carefully organized*
- *Only include the best links and provide summaries*
- *Use a consistent graphic theme*
- *Organize content into pieces people are looking for*
- *Audience based organization could be problematic if the user wants info from multiple groups*
- *Hybrid of audience types and informational categories might work*
- *Need to organize complex information simply*
- *Information nested in multiple levels*
- *Potential to search by either type of project/info or audience*

[general recommendations]

The inventory and analysis of existing stormwater management web resources and feedback obtained from the public survey and personal interviews has clearly established the need for the development of the web portal. Although the development of this new web resource will require substantial planning and design work, we see this report as an opportunity to begin exploring what this web portal will look like, the content it will contain, and how this information will be organized.

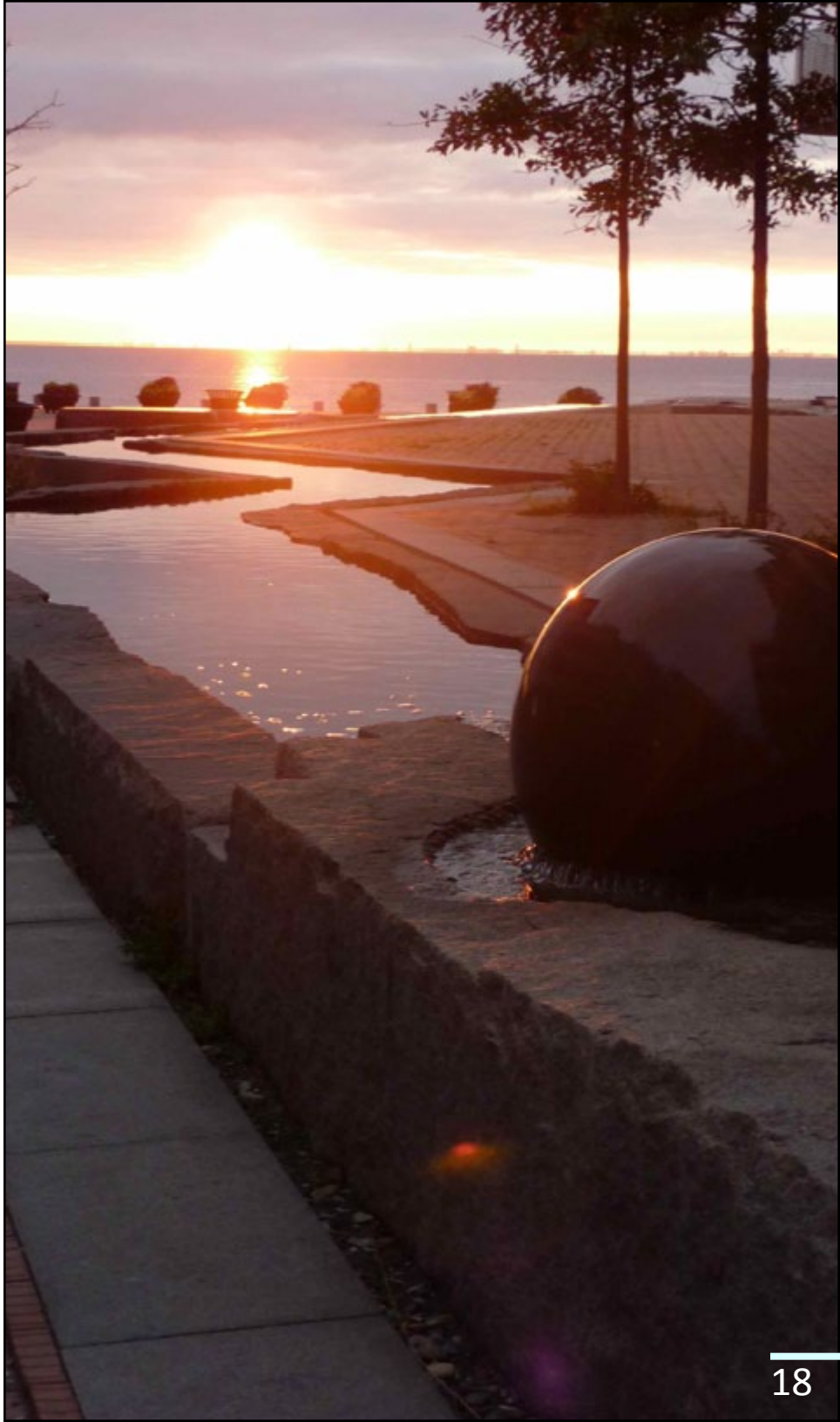
Stormwater management is a hot topic. Federal regulations (e.g. NPDES permit requirements) and community concern for the environmental impacts of urbanization have resulted in widespread communication about this subject. Many different cities and communities are working to generate effective stormwater management solutions and provide outreach to meet these goals through a variety of different strategies. As we have seen, information on the subject is distributed in a multitude of ways and formats, much of which is found online. There is a wide range of subject matter on stormwater management and different websites approach their content focus and outreach goals in unique ways.

The critical questions to ask as we move forward in developing this web portal are:

- How do we create a new web resource that is not simply just another stormwater management website?
- How will the web portal be organized and designed to hold a unique niche online?
- What is the distinct mission of the web portal and who are our intended audiences?
- What will be the extent and type of information presented on the website?

The overarching goal for the web portal is to support the advocacy and implementation of green stormwater infrastructure (GSI) with a focus on the Pacific Northwest region. The web portal will provide outreach through a variety of resources to generate community and government investment in GSI and to catalyze the application of these strategies as far reaching as possible. The intended audiences for the web portal will be wide ranging, including those interested in making GSI a reality in their communities. Implementation will be promoted in different ways, for both professionals and homeowners. The informational content of the web portal will primarily revolve around the planning and design of GSI and resources will be made available for people new to stormwater management as well as seasoned professionals. We see the web portal taking on a unique niche by serving the outreach needs of a diverse community of GSI advocates through a highly graphic approach. Photos,

graphics, diagrams, and other visual resources will be adopted as a paramount strategy in efficiently and effectively communicating GSI information. Graphic orientation will help attract and engage web portal visitors, allow visualization of successful projects and GSI system dynamics, and provide a robust suite of visual resources for promoting and implementing GSI strategies.



[content recommendations]

Resources for Promoting Green Stormwater Infrastructure (GSI)

Through every phase of the feasibility study, we uncovered a need for resources that would assist those who aim to promote GSI to the general public, clients, colleagues, and decision-makers. A graphically-oriented web portal would be particularly appropriate for serving this need by making stormwater information more accessible to those who are unfamiliar with it. Many survey respondents and interviewees also expressed a desire for research data on the efficacy of GSI facilities and the benefits of GSI compared with conventional stormwater infrastructure. While some of this information already exists, our research indicated that there is a strong need for it to be consolidated and summarized in both web content and downloadable promotional materials. Furthermore, many respondents and interviewees expressed that this type of information would be better trusted if it were provided by the University of Washington rather than a government agency, nonprofit, or private firm.

Resources for Implementing GSI

Our findings suggest that the existing information related to stormwater permits and jurisdictional policies is fairly comprehensive. However, this information is often very cumbersome to locate and sort through. Therefore, it could be very useful to organize a set of links to this information.

There is also fairly comprehensive information available on how to build standard GSI facilities, though it can be difficult to locate. Several respondents reported that they would like to be better aware of different options for stormwater management. There was also an expressed need for this information to be better supported by graphics and diagrams as well as consolidated and organized. In addition, there is a lack of information that would assist in deciding which type of GSI facility might be most appropriate in a particular context. Several survey respondents and interviewees requested research and monitoring data that measured the effectiveness of different facility types under various soil, climate, and maintenance conditions. There is also a need for cost information on GSI facilities compared with conventional stormwater infrastructure.

Those involved in the design of stormwater facilities are also interested in information on technical innovations and the latest developments in GSI. However, this information is often proprietary. The interviewees we questioned on this felt that people might be willing to share this information if they received recognition in return. A possibility is to share this information through a blog or series of peer-reviewed articles that provided such recognition.

Case Studies

A final need is for case study information which could help with both the promotion of GSI (by providing a database of successful projects), and its implementation (by introducing designers to a variety of GSI models). The EPA's Green Infrastructure (GI) website has an existing case study database at http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm. This resource is well organized, allowing users to choose a geographical region from a map which directs them to a list of GI case studies in that region. Creating a case study database through the web portal, however, would not necessarily be repetitive for three reasons. First, the case studies listed on the EPA website are far from comprehensive. (There are seven total for the entire western United States). Second, the EPA's case studies are not necessarily related to stormwater. Finally, the EPA's list does not provide the same type of graphic content that is being considered for the web portal.

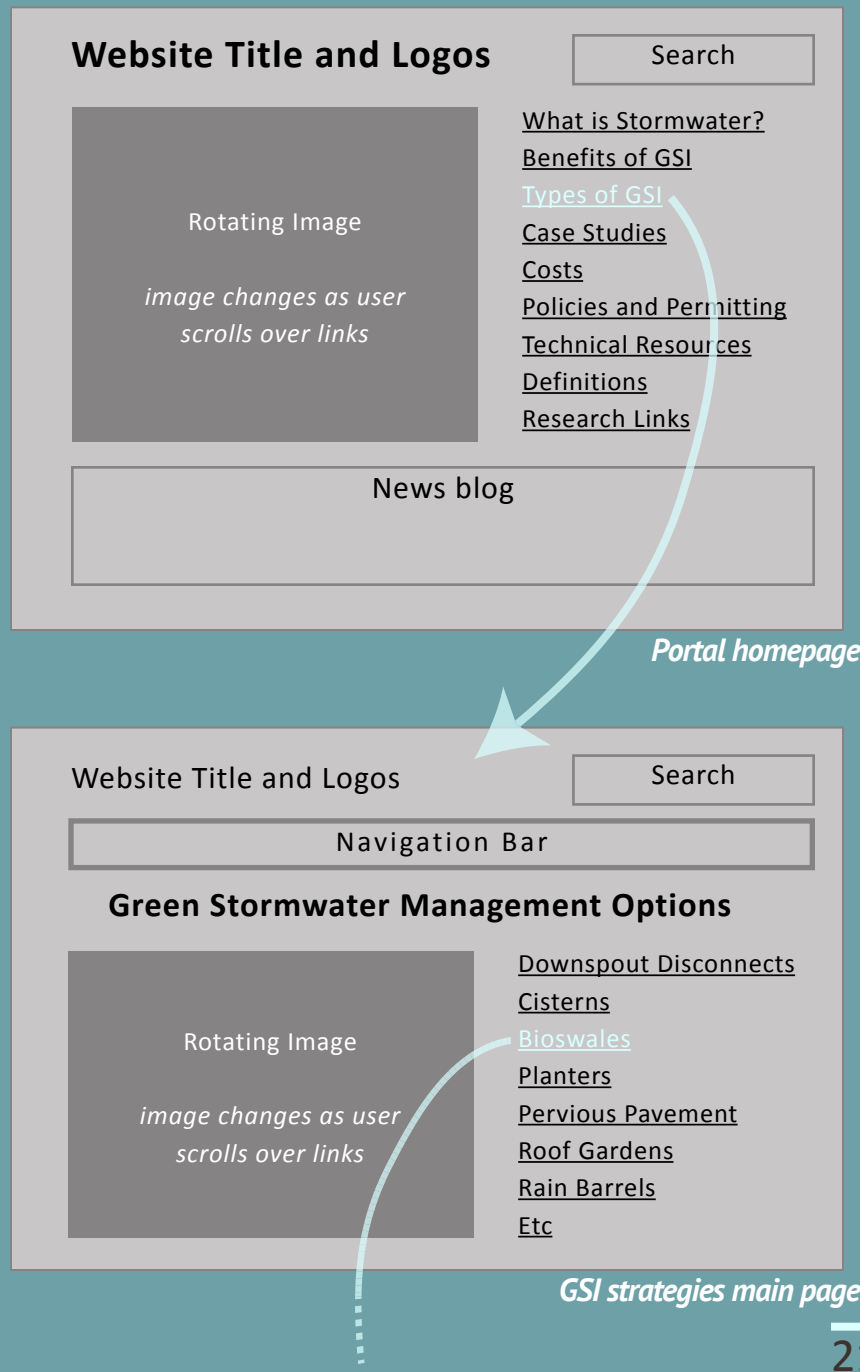
[design recommendations]

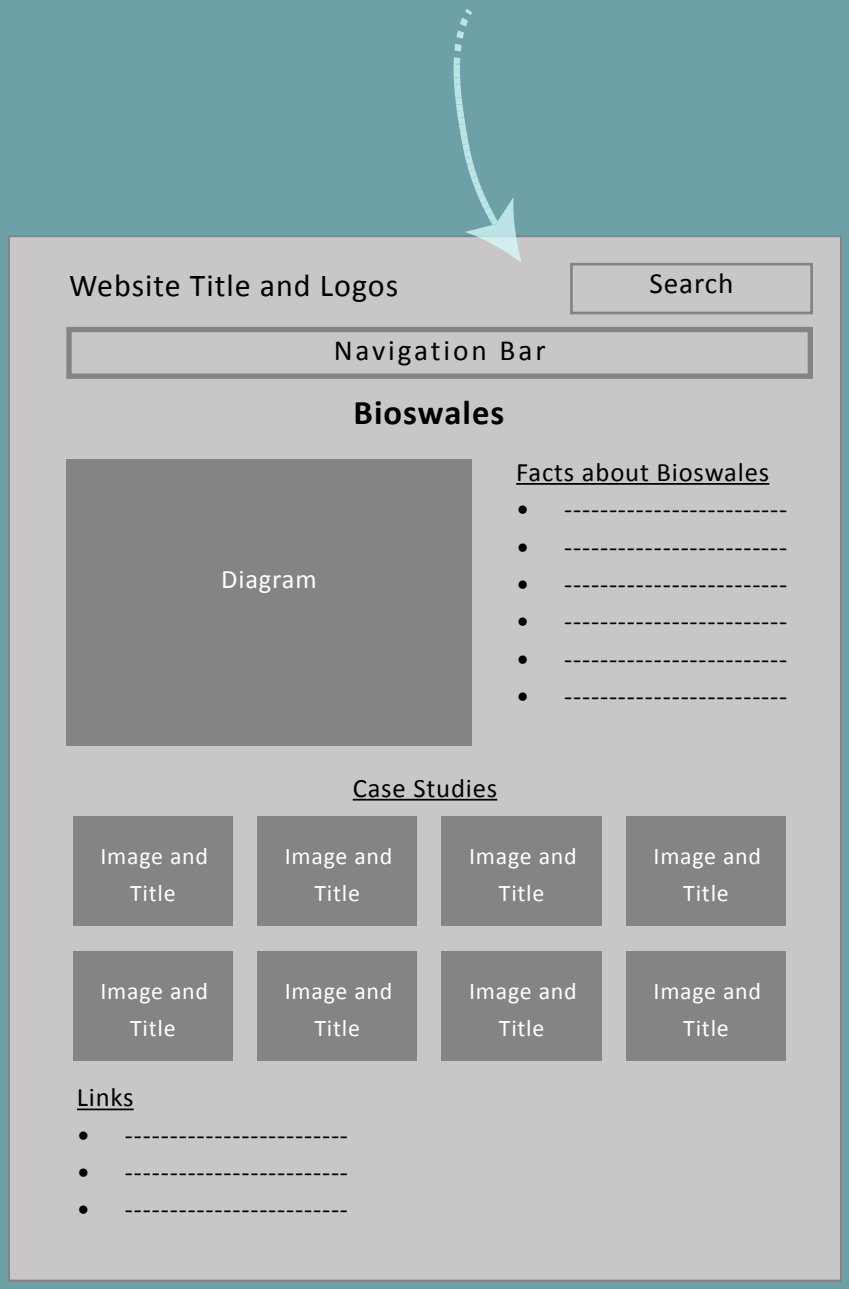
Organization

There are many different ways that the web portal could be designed and its information could be organized. One decision regarding organization of the various stormwater management resources that would be included on the web portal is whether they would be categorized by audience type (i.e. homeowner vs. engineer) or information type (i.e. GSI strategies vs. technical research). One advantage of organizing resources based on audience type is that the web portal visitor will instantly be directed on where to navigate on the website. The problem with this type of navigation is that we would be forced to make assumptions on what type of visitors would be coming to the site and also what type of information each different visitor would want. In order to avoid making any of these assumptions, we felt that organizing the web portal resources based on information type would be the most user-friendly way to move forward.

A clear hierarchy of information will be essential to ensuring that the web portal is well organized and easy to navigate. We foresee the home page consisting of several primary categories of information represented by an appropriate photo or other graphic along with minimal text. Each of these informational categories will take the visitor to a page with a finer grain of detail, further explanation, and more

Possible Web Portal Structure and Navigation





Bioswale page

visual resources and links. In some cases there may be additional categories that would take the visitor to more detailed information and graphics on a particular subject matter and in other cases external links may be provided to direct the visitor to appropriate resources. Conceptual mock-up graphics have been created to help visualize what the web portal could look like and how visitors might navigate through the various resources. (See graphics on pg. 21 and opposite).

Navigation

Navigation through the web portal could potentially be enhanced by embedding a search engine function into the website. This would be a way for visitors to bypass any self-directed movement through the various pages of the web portal and instead be given the opportunity to enter a search request and be presented with associated resources found on the website. Each page on the web portal would be tagged to allow the search function to operate efficiently.

Links

Links to external stormwater management resources will be a valuable function of the web portal. It will be necessary to strategically select the links to be included, ensure a clear organization of the links based on information type, and to provide brief summaries of the links in order to

direct visitors to the appropriate place.

Appearance on Search Engines

Websites move up in standard search engines the more they are visited. Once the web portal is published, it should be announced to potential user groups to bring in initial visitors. The networking with stormwater professionals that took place as part of this feasibility study will be useful in this regard.

Creating and Maintaining the Web Portal

Once the content and graphic design for the web portal are settled, the web development team would build the site as a series of templates using html. A content management system such as Drupal would allow the Green Futures Lab to add to, update, and edit the site using the templates that have been created.

[budget projections]

Project Timeline

After an initial consultation with the web development team at Creative Communications, we estimate that it will take around one year to complete the website. During this year the Green Futures Lab would hire a research assistant for approximately 20 hours per week to manage the project. In addition to the web development team, the Green Futures Lab would collaborate with a professional writer and possibly a photographer to develop the web portal content.

Cost Projections

We estimate that it will cost a total of $65,000-$72,000 to develop the web portal. Approximately 70% of this total would fund the research assistant and faculty advisor at the Green Futures Lab and 30% would go toward the web development team and consultants. Once published, it will cost approximately $5,000-$10,000 per year to keep the web portal updated and maintained. This cost will most likely move from the higher range of that scale toward the lower as the kinks get worked through.

Breakdown of Cost Estimate

Web developers and writer	$19,000
3 terms Research Assistant	$33,000
Faculty Oversight	$7,500
Student hourly (summer)	$5,000
Materials, printing, etc.	$1,000
Subtotal	$65,500
Contingency @10%	$6,550
Projected Total	**$72,050**

Appendix A:

Inventory of Existing Web Resources

WEB PORTAL EXAMPLES

Source	Organization - Topic Focus	Website URL	Notes	Embedded Links and Publications
Government	*EPA - Green Infrastructure*	http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm#tabs-1	Comprehensive GSI info. Text heavy. Well organized. Basic stormwater info, case studies, technical info, funding, policy, modeling tools, research, etc.	
Government	*EPA - NPDES*	http://cfpub.epa.gov/npdes/home.cfm?program_id=6	Basic, Industrial, Construction, and Municipal categories. Lots of links and information. Poor design and interface. Mostly technical.	
Government	*EPA - Polluted Runoff (Non Point Source Pollution) Page*	http://www.epa.gov/owow_keep/NPS/index.html	Links to information on LID, water quality protection resources, etc. Basic, conceptual, and technical information. Decent navigation.	
Government	*EPA - Stormwater*	http://www.epa.gov/oaintrnt/stormwater/index.htm	Stormwater and GSI resources. General and text heavy.	
Government	*City of Portland, Bereau of Environmental Services - Sustainable Stormwater Management*	http://www.portlandonline.com/bes/index.cfm?c=34598	Many resources. Facility types, case studies, monitoring, reports and publications, etc. Poor organization/hierarchy of info. Text heavy.	http://www.portlandonline.com/bes/index.cfm?c=31870 --Sustainable Stormwater Management Solutions (PDFs of facility types) http://www.portlandonline.com/bes/index.cfm?c=45470 --Landscapes for Rain, The Art of Stormwater (Aesthetics) http://www.portlandonline.com/bes/index.cfm?c=34980 --Stormwater Facility Handbooks (Homeowners & Large Scale)
Nonprofit	*Water Environment Research Foundation (WERF) - Sustainable Stormwater BMPs*	http://www.werf.org/liveablecommunities/index.htm	Who are you? guide, Toolbox, Case Studies. Solid approach to broad audience. No technical info. Some use of photos.	

Nonprofit	*Washington Stormwater Center*	http://www.wastormwater-center.org	NPDES consulting for municipalities and businesses, LID projects (limited). Text heavy with some photos, limited stormwater info for broad audience.	http://www.puyallup.wsu.edu/stormwater -- WSU Puyallup Research & Extension Center, LID Stormwater Research Program http://raingarden.wsu.edu -- Puget Sound rain gardens
Government	*Phillidelphia Water Department*	http://www.phillywater-sheds.org	Good website with broad content. User friendly, well designed. Good use of photos/ graphics. Basic watershed information, GSI strategies, research, local case studies, information for schools, residents, businesses, etc. Brochures and PDFs. Lacking GSI technical info.	
Government/ Private (?)	*Gray to Green - Green Infrastructure Handbook for Municipalities (Kentucky)*	http://www.gray2greenky.com	Basic stormwater info, GSI strategies, funding, and case studies. Poor web design, some use of photos.	
Government	*King County - Stormwater Services*	http://www.kingcounty.gov/environment/waterandland/stormwater.aspx	Broad stormwater management information. General info, technical design manuals, LID resources, educational videos, etc. Text heavy, limited use of photos.	
University	*University of Arkansas Community Design Center*	http://uacdc.uark.edu	Diagramatic approach to presenting information on variety of urban sustainability projects. Nice use of graphics.	

GENERAL WEB RESOURCES

Source	Organization - Topic Focus	Website URL	Notes	Embedded Links and Publications
Nonprofit/ Professional	*Association of Watershed and Stormwater Professionals*	http://www.awsps.org	Paid membership site for professionals. Webcasts, publications, etc. Easy navigation.	
Nonprofit	*Low Impact Development Center*	http://www.lowimpactdevelopment.org	Variety of LID resources, project database, etc.	
Government	*New York State Stormwater Management Design Manual*	http://www.dec.ny.gov/docs/water_pdf/swdm2010entire.pdf	Technical resource. Online PDF.	
Nonprofit	*Puget Sound Partnership - Stormwater and LID*	http://www.psp.wa.gov/stormwater.php	Basic stormwater and LID info. Access to some publications. Useful technical manual. (See embedded publications)	http://www.psp.wa.gov/downloads/LID/LID_manual2005.pdf --LID technical guidance manual
Nonprofit	*UW Botanic Gardens - Stormwater Design Seminars*	http://depts.washington.edu/uwbg/education/stormwater.shtml	Comprehensive LID resources. Downloadable PDFs of presentations.	
Government/ Private (?)	*California Stormwater Quality Association - Stormwater BMP Handbooks*	http://www.cabmphandbooks.com	BMP technical handbooks for New Development and Redevelopment, Industrial and Commercial, and Municipal projects.	
Government	*State of Oregon DEQ - Biofilters for Stormwater Discharge Pollution Removal*	www.deq.state.or.us/wq/stormwater/docs/nwr/biofilters.pdf	PDF publication. Basic info, ecological implications, mostly technical design info. Images and diagrams. Bioswales, Vegetative Buffers, & Constructed Wetlands.	
Government	*Seattle Public Utilities - Residential RainWise program*	http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/ResidentialRainwiseProgram/index.htm	Homeowner resources for residential stormwater management. Use of graphics, links to video.	
Government	*Seattle Public Utilities - Green Stormwater Infrastructure*	http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/index.htm	Code compliance, case studies, residential resources, incentives, LID info.	

Government	*Seattle Public Utilities - Restore Our Waters*	http://www.ci.seattle.wa.us/util/Services/Drainage_&_Sewer/Keep_Water_Safe_&_Clean/RestoreOurWaters/index.htm	General water quality education for public. Text heavy. Mostly links.	
Nonprofit	*Center for Neighborhood Technology (CNT) - Green Values Stormwater Toolbox*	http://greenvalues.cnt.org	Technical resource, costs and benefits. GSI info and stormwater management calculators. Green Solutions Manual PDF. Website needs updates (broken links).	
Government	*EPA - LID*	http://www.epa.gov/owow_keep/NPS/lid/index.html	Links with descriptions. Variety of LID resources. Fact sheets and reports, design and guidance manuals, information resources, videos and multi-media.	
Nonprofit	*The Partnership for Water Sustainability in BC*	http://www.waterbucket.ca	Resources for water quality preservation and green infrastructure in B.C.	
Nonprofit	*Artful Rainwater Design*	http://www.artfulrainwaterdesign.net	Case studies/photo gallery exhibiting aesthetics in stormwater management.	
Government	*City of Portland, Bureau of Environmental Services - Landscapes for Rain: The Art of Stormwater*	http://www.portlandonline.com/bes/index.cfm?c=45470	Traveling photo exhibit displaying aesthetic function of sustainable stormwater management.	
University	*Virginia Tech Center for Watershed Studies*	http://www.cws.bse.vt.edu	Research on stormwater management and LID, case studies.	
Nonprofit	*Stewardship Partners - 12,000 Rain Gardens program*	http://www.stewardshippartners.org/raingarden_central.html	Rain garden resources for homeowners/ landowners.	https://www.bae.ncsu.edu/topic/bioretention/index.html -- bioretention https://www.bae.ncsu.edu/topic/bioretention/research-Lit_Review.html -- bioretention lit review
Government	*King County - GSI and CSO control*	http://www.kingcounty.gov/environment/wastewater/CSO/Controlling/Reducing/GSI.aspx	General regional info on GSI and impacts on CSO reduction.	
Nonprofit	*People for Puget Sound - Polluted runoff*	http://pugetsound.org/education/polluted-runoff	Regional problems and solutions for polluted stormwater.	

Appendix B:
Public Survey Results

How would you describe yourself? *(select all that apply)*

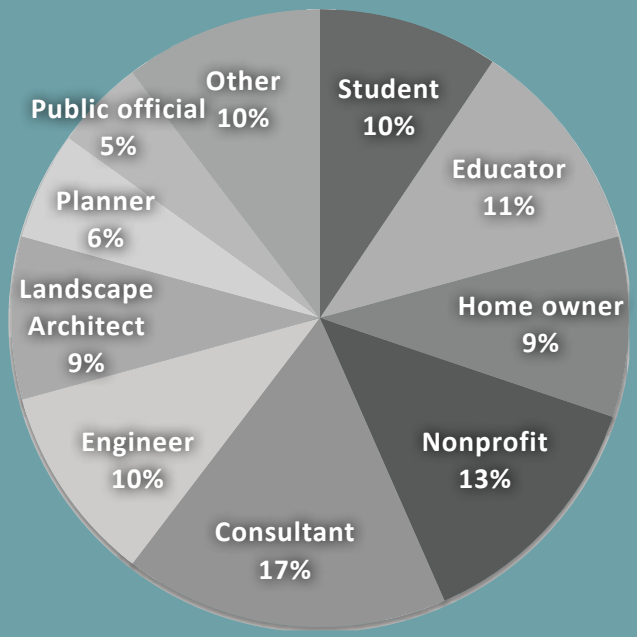


Chart I

Where do you currently reside?

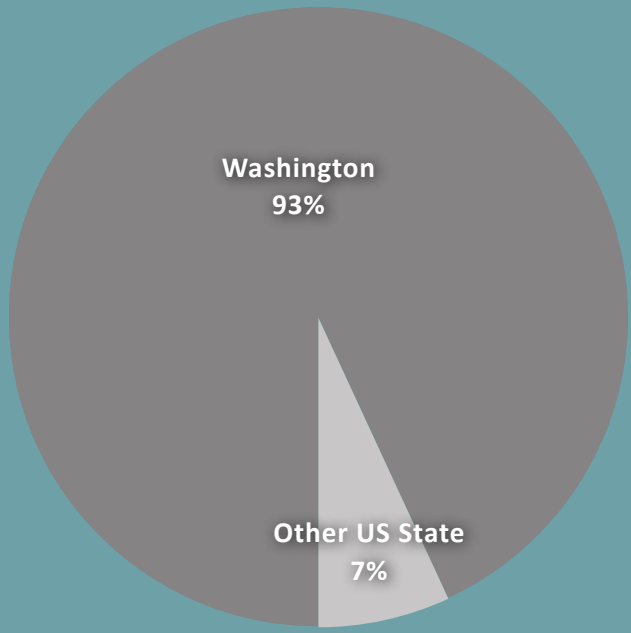


Chart II

What are your preferred sources of information on stormwater management? *(Rating average)*

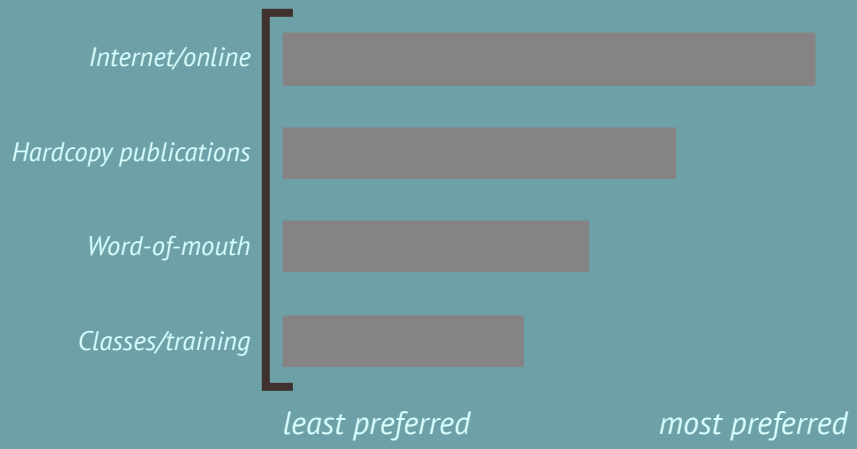


Chart III

What are your preferred sources of information on stormwater management? *(All responces)*

	Most Preferred	Neutral	Least Preferred
Internet/ online	*89.7% (52)*	8.6% (5)	1.7% (1)
Hardcopy publications	*34.0% (18)*	39.6% (21)	26.4% (14)
Word-of-mouth	*22.2% (12)*	40.7% (22)	37.0% (20)
Classes/ training	*46.3% (25)*	46.3% (25)	7.4% (4)

Chart IV

If there were a comprehensive online stormwater management resource, would you use it?

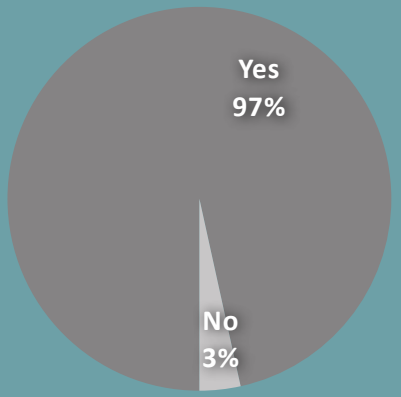


Chart V

Have you encountered any obstacles obtaining stormwater management information or resources online?

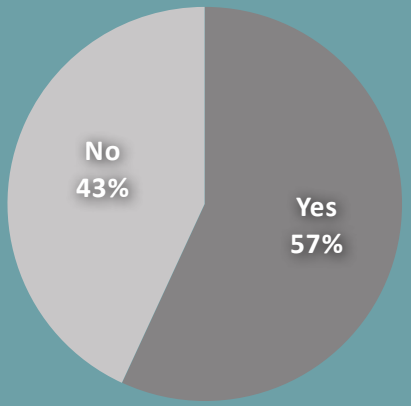


Chart V

How would you use this information? *(Summarized from open responses)*

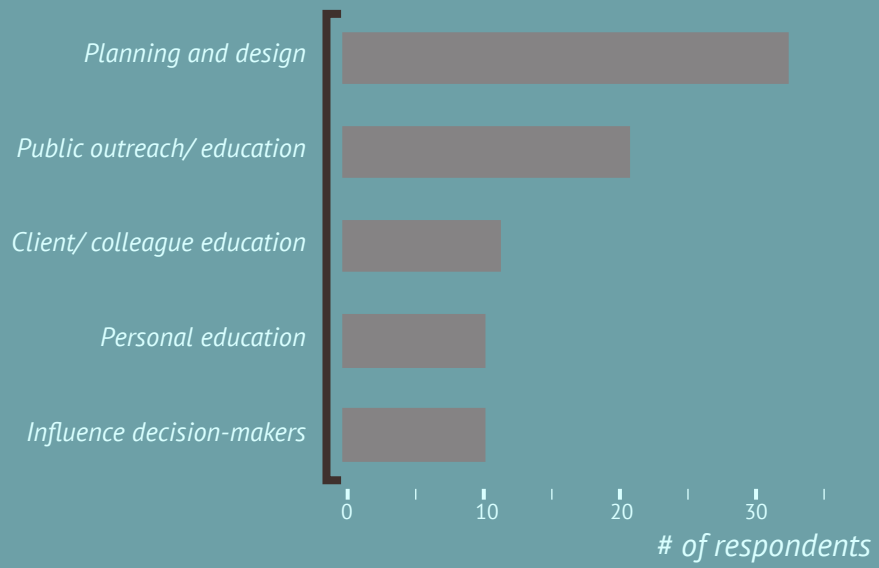


Chart VII

How would you use this information? *(All responses)**

Client/ colleague education

- *"brochures client education"*
- *"I would use this information to design natural drainage stormwater facilities and to help inform clients as to the benefits of these designs."*
- *"To confirm the maintenance/management requirements of facilities, to confirm the facility type appropriate for a site, and to provide clients information which may help them select an environmentally friendly option."*
- *"Having a trusted resource that is easy to access and utilize outside of my own organization's websites would be useful for referring to and sharing with interested parties such as the private land owners that we primarily focus on."*
- *"Improve designs, educate clients (maintenance, benefits, aesthetics), provide context sensitive solutions, compare costs."*
- *"Developing concepts, education, putting new policies in place, as a way to show clients the benefits of such practices"*
- *"To convince clients to invest in more rigorous stormwater management."*
- *"Provide to public and private clients to persuade them that the long-tem benefits of ecological stormwater management far outweigh any possible higher cost during construction and establishment. Also, better information available at the start of a project results in a better design at the end."*
- *"Building internal capacity but also providing clients with all of the latest and greatest for stronger stormwater mitigation strategies"*
- *"As new ideas, planning resources, additional resources for my clients, etc"*
- *"Selling the idea to use GSi on projects. Making it easier for designers and construction folks to build better projects. Too many of the same mistakes get repeated too often"*

** Responses are quoted directly from the survey and may be placed in multiple applicable categories*

How would you use this information? *(con't from above)*

Planning and design

- *"research for site planning and design"*
- *"to help provide state of the art designs for my client, especially stormwater treatment"*
- *"I would use this information to design natural drainage stormwater facilities and to help inform clients as to the benefits of these designs."*
- *"better manage stormwater"*
- *"Research for stormwater options"*
- *"To confirm the maintenance/management requirements of facilities, to confirm the facility type appropriate for a site, and to provide clients information which may help them select an environmentally friendly option."*
- *"in design"*
- *"incorporate it into our designs"*
- *"Engineering design."*
- *"In stormwater engineering design and research."*
- *"Improve designs, educate clients (maintenance, benefits, aesthetics), provide context sensitive solutions, compare costs."*
- *"I would use it professionally by designing workshops and sharing other tools. I would also use it to make informed decisions as a home-owner."*
- *"To design and build green infrastructure projects, disseminate the information to landowners and others"*
- *"Developing concepts, education, putting new policies in place, as a way to show clients the benefits of such practices"*
- *"some information i will use soley for my own knowledge becase i find it interesting, other for the purpose of civil engineering"*
- *"Preparation of cost opinions, working with construction contractors to execute designs."*
- *"I would use it for my job. I work at an Engineering firm that focuses on waste water, arsenic removal of ground water, and storm water. I would also use it for my studies at school."*
- *"To design/construct my own residential system."*
- *"Development of designs for stormwater management."*
- *"site planning"*
- *"Provide to public and private clients to persuade them that the long-tem benefits of ecological stormwater management far outweigh any possible higher cost during construction and establishment. Also, better information available at the start of a project results in a better design at the end."*
- *"I would use this info as design resources"*
- *"Increase the quality and range of services we can offer"*
- *"To construct my own raingarden."*
- *"Building internal capacity but also providing clients with all of the latest and greatest for stronger stormwater mitigation strategies"*
- *"To design programs for jurisdictions and others."*
- *"Personal knowledge and understanding with the idea of implementing GSI into any project I may be working on if possible."*
- *"currently use some information in classes/workshops, and would like to use information in future designs"*
- *"As new ideas, planning resources, additional resources for my clients, etc"*
- *"For project planning and triple bottom line (TBL) analysis"*
- *"Selling the idea to use GSi on projects. Making it easier for designers and construction folks to build better projects. Too many of the same mistakes get repeated too often"*

How would you use this information? *(con't from above)*

Public outreach/ education

- *"Having a trusted resource that is easy to access and utilize outside of my own organization's websites would be useful for referring to and sharing with interested parties such as the private land owners that we primarily focus on."*
- *"education, information dissemination"*
- *"I would encourage my colleagues to use it in our outreach materials and inform our target audience about the benefits of watershed stewardship."*
- *"To improve educational mat'ls for general public (both in terms of images and convincing, inspiring, motiving information)."*
- *"We do volunteer restoration events and always include an education element; stormwater BMPs always factor in..."*
- *"I would use it professionally by designing workshops and sharing other tools. I would also use it to make informed decisions as a home-owner."*
- *"To design and build green infrastructure projects, disseminate the information to landowners and others"*
- *"Developing concepts, education, putting new policies in place, as a way to show clients the benefits of such practices"*
- *"general edification & I might use it in discussions of environmental issues & options for improving hydrologic management in human-dominated landscapes in my classes"*
- *"To help communties and Government Agenceis understand the importance of this"*
- *"Would work this into my class and into the Greenroads credits concerning stormwater and LID practices"*
- *"General education information is needed for the public from an unbiased source providing information related to the basics of onsite/home stormwater management and pollution prevention. Source control techniques, as well as very simple to understand yet comprehensive information on LId/GSI like rain gardens would be very very helpful."*
- *"To inform environmental (and related) professionals, decisions-makers and the general public on alternative management strategies and the associated benefits/challenges"*
- *"outreach to residents"*
- *"To help King Conservation District develop a landowner incentive practice for installing rain gardens and other storm water infrastructure."*
- *"Improve my skills and to pass along to others to educate them."*
- *"currently use some information in classes/workshops, and would like to use information in future designs"*
- *"for outreach materials to help permittees understand and fix problems"*
- *"Posted on a website, Integrated into communications materials for public meetings, Background for elected officials and department executives"*
- *"I would use multiple avenues to educate the public so that they would become more interested in things like rain gardens, cisterns, green walls, etc."*

How would you use this information? *(con't from above)*

Personal education

- *"General increase in knowledge base."*
- *"do right."*
- *"For continuing education."*
- *"general edification & I might use it in discussions of environmental issues & options for improving hydrologic management in human-dominated landscapes in my classes"*
- *"some information i will use soley for my own knowledge becase i find it interesting, other for the purpose of civil engineering"*
- *"I would use it for my job. I work at an Engineering firm that focuses on waste water, arsenic removal of ground water, and storm water. I would also use it for my studies at school."*
- *"To construct my own raingarden."*
- *"Improve my skills and to pass along to others to educate them."*
- *"Personal knowledge and understanding with the idea of implementing GSI into any project I may be working on if possible."*
- *"As new ideas, planning resources, additional resources for my clients, etc"*

Influence decision-makers

- *"To better describe to regulated entities/other audiences what is possible, practicable, feasible, viable, necessary and/or effective."*
- *"To inform and influence federal policy makers."*
- *"I would use it steer the discussion about stormwater management."*
- *"Developing concepts, education, putting new policies in place, as a way to show clients the benefits of such practices"*
- *"To help communties and Government Agenceis understand the importance of this"*
- *"Would work this into my class and into the Greenroads credits concerning stormwater and LID practices"*
- *"To inform environmental (and related) professionals, decisions-makers and the general public on alternative management strategies and the associated benefits/challenges"*
- *"To highlight an additional benefit of/need for natural area restoration. Hopefully to help direct funding to restoration on behalf of stormwater management"*
- *"To design programs for jurisdictions and others."*
- *"Posted on a website, Integrated into communications materials for public meetings, Background for elected officials and department executives"*

Appendix C:
Personal Interviews

Aaron Clark

Stewardship Partners
Rain Garden Program Manager
ac@stewardshippartners.org

July 11th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Took a few classes with Kern Ewing while obtaining PhD in biology at the UW. Started getting into restoration toward end of program. Worked a little bit in landscape design afterward and did personal research and pro bono work on rain gardens.

What is your job title?

Rain Garden Program Manager

What is your role in this job?

Working on the 12,000 Rain Gardens program (with a grant from Russell Family Foundation). Project involves training master gardeners, signage/interpretation, demonstration gardens, clusters of residential gardens.

In what ways is your work associated with stormwater management?

Working with private landowners to implement rain gardens and green stormwater infrastructure. Outreach for 12,000 Rain Gardens program.
Connecting homeowners with contractors.
Providing technical information on rain gardens.
Creating database of contractors.

How do you access stormwater management information?

-a few in-house documents that Stewardship Partners have developed
-google searches
-lit searches
-peer reviewed journal articles

What sources of stormwater management information have you found most valuable?

12,000 Rain Gardens
WA Stormwater Center for monitoring and data results

What websites do you frequently visit for stormwater information?

WSU Stormwater Center Snohomish extension website
Wikipedia for general info
North Carolina State-- lit review, little synopses

Are there certain characteristics that make these websites more useful?

If yes, please explain.

Summaries of articles on NC State website
Making scientific research info accessible

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

Technical information (ie how many gallons of water would collect on a certain sized roof)
Visuals
Calculators

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

Missing graphics and visuals. Difficult to find, hard to sift through, a lot of information but hard to access. Need for a more neutral resource. Nonprofits, etc hard to trust because might have bias. UW and WSU are most trusted institutions in the state. Would like to see a collaboration between GFL and WSU Stormwater Center.

Do you think that this type of web portal is necessary?

Please explain.

Yes - making it graphic increases understanding and makes more enticing

What information do you think is most critical to include in a stormwater web portal?

-scientific information
-monitoring information
-cost-benefit analysis
-quantification of benefits

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)

Should two different audiences come through the same portal (newbies vs. converts)? Complex issue. Too many tabs and columns is a hindrance. Good search function could be helpful.
Broken down by types of information--personal benefits, environmental benefits, resources, costs

Do you think that photos and other graphics would add value to this type of resource?

Please explain.

Graphics have aesthetic value and can explain complex info simply. Graphics convey aesthetics and sell the product! Images are powerful. Promotional capacity runs risk of implying a bias or deterring those looking for more technical information

What type of visual resources do you think would be most useful?

Animated graphic demonstration of concept for people new to stormwater management. For technical users- data tables, scientific figures, accessible to decision makers unfamiliar with field.

Amy Waterman

Sustainable Seattle
Program Manager - Water Resources
amy@sustainableseattle.org

July 13th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Masters in natural resource management with focus on water resource policy. 17 years of non-profit and local government work – watershed management, wetlands, stormwater issues. New York – stormwater district program development.

What is your job title?

Previously, Program Manager – Water Resources. Now working as an independent consultant.

In what ways is your work associated with stormwater management?

Grant writing, community outreach for raingarden development, coordinating raingarden construction, field work (i.e. perc tests, etc.)

How do you access stormwater management information?

Online research and articles.

What sources of stormwater management information have you found most valuable?

SPU website, SPU GSI publication, Rain Wise website, Stewardship Partners website, EPA GSI website

What websites do you frequently visit for stormwater information?

SPU/Rain Wise and Stewardship Partners are good starting points. WA Stormwater Center at times.

Are there certain characteristics that make these websites more useful?

If yes, please explain.

Prior knowledge about websites made them easy targets for outreach purposes. Stewardship Partners is quite presentable. SPU has good technical resources.

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

Known information vs. evolving information – there needs to be a place where new research and knowledge can be distributed. Questions such as "do I have a site that is suitable for a raingarden?" are hard to find out - becomes necessary to hire a contractor/consultant. More information could help people do it themselves.

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

Web primarily used as a starting point. Lots of different info about basic things (i.e. sizing factors for raingardens) is confusing. Need to clearly communicate design standards.

Do you think that this type of web portal is necessary?

Please explain.

Yes. Visual orientation and images of facilities would be helpful. Potential to broaden possible design strategies.

What information do you think is most critical to include in a stormwater web portal?
Accessible information on determining whether a raingarden is feasible at a site and how to do it. Interactive area for sharing technical info – graphic information could enhance this. Challenge working with contractors with different knowledge bases (sustainability minded vs. raingarden contractor). Hard to know who is doing the best work. Summary of qualified contractors could be helpful. Facility sizing factors in different situations/for different types of sites. What to do if a raingarden is not possible? Other management strategies (i.e. cisterns, green roof, etc).

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)
Information organized by subject would be good. Starting point for different users (i.e. how to build a raingarden, policy, funding/incentives, etc.) Not based on "who you are" but rather "what do you need"…

Do you think that photos and other graphics would add value to this type of resource?
Please explain.
Yes. Visuals are helpful. Potential to broaden knowledge obtained, show what facilities look like, and exhibit different facility types and possibilities. Having diverse visual resources/information in one place would be good.

What type of visual resources do you think would be most useful?
Photos of facilities and diagrams showing stormwater flow and different system possibilities.

Elissa Ostergaard

King County
WRIA 9 Planner
Stewardship Coordinator
elissa.ostergaard@kingcounty.gov

July 9th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?
If yes, please explain.
Previously worked for City of Bellevue as a stormwater manager. Worked on the LID chapter for the city's stormwater manual.

What is your job title?
Planning and Stewardship Coordinator
WRIA 9

What is your role in this job?
Planner, outreach coordinator

In what ways is your work associated with stormwater management?
Work on the Salmon Recovery Team and Green Duwamish initiative. Work on salmon habitat improvement projects, tree planting along the Duwamish River, habitat and fish monitoring plan for watershed, invasive removal/planting natives, and plan around limiting factors (i.e. stormwater issues). Work on LID part of King County plans (LID has been identified as a strategy for improvement).

How do you access stormwater management information?

New information obtained from internet, tours, and site visits with developers.

What sources of stormwater management information have you found most valuable?

WSU Extension LID training was helpful. Resources from training included an online raingarden handbook and LID technical guidance manual. Herrera and HDR are great consultants. Watershed Management Group is a good resource.

What websites do you frequently visit for stormwater information?

WA Stormwater Center, People for Puget Sound, online WSU Extension LID resources. WA Stormwater Center is good for technical information. It is hard to find but helpful. Rain Wise "How To's" are good.

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

List of stormwater management consultants, designers, and contractors. Cost information for facility development (i.e. where to go when required to determine project cost for a grant proposal?). Cost comparisons between green and grey infrastructure. Simple explanations of stormwater concepts and green infrastructure are missing. Maintenance requirements are missing. Quality info on rain gardens. Bulletin board with list of events and tours, opportunities for collaboration, shared information between different professionals working on stormwater management.

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

Have yet to find a stormwater management website that is well-organized. Different jurisdiction requirements for stormwater management makes things difficult (harder to implement projects).

Do you think that this type of web portal is necessary?

Please explain.

Yes. The information could be used for providing recommendations to others, putting together grant applications, educational purposes (i.e. homeowners wanting to go green), and to convince skeptics that sustainable stormwater management is a good thing (i.e. by showing cost comparisons and benefits).

What information do you think is most critical to include in a stormwater web portal?

Integration and proper organization of stormwater management information is needed. Need more data from monitoring water quality associated with different forms of stormwater management. Cost estimates for green infrastructure needed for grant applications.

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)

Web portal should be organized by user type (i.e. layperson vs. technical professional). External links should be carefully organized.

Do you think that photos and other graphics would add value to this type of resource?

Please explain.

Yes.

What type of visual resources do you think would be most useful?

Consistent graphic theme. Photos of LID projects that look good and other local success stories. Map of green infrastructure sites.

Giles Pettifor

King County
Stormwater Permit Asst. Coordinator
giles.pettifor@kingcounty.gov

July 11, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Masters in Environmental Science and Management - coastal water quality focus. Stormwater related masters thesis.

What is your role in this job?

Coordinate NPDES permit compliance for the county. Permit covers everything King County does in terms of water quality management. Disseminate information about permit to rest of the county and make sure people understand permit. Collect information on procedures for meeting permit requirements and and relay this info to WA Department of Ecology.

How do you access stormwater management information?

Most information is generated in-house. County created design manual for developers, etc. Design manual dictates the way stormwater infrastructure is built. King County codes mandate that you can't put anything but rainwater in drain (NPDES permit). King County Surface Water Design Manual... SPBM? SOP standard operating procedure?

What sources of stormwater management information have you found most valuable?
Online resources and jurisdiction/municipal publications.

What websites do you frequently visit for stormwater information?
King County website: http://www.kingcounty.gov/environment/waterandland/stormwater.aspx
Puget Sound Starts Here
City of San Diego's website
WA DOE permit resources page
EPA nonpoint source toolbox

Are there certain characteristics that make these websites more useful?
If yes, please explain.
City of San diego - outreach videos, provision of information from around the world
WA DOE - possibility of creating a library of stormwater resources

Have you encountered any gaps in the stormwater information available online?
If yes, please explain.
Basic information on LID in easily accessible format, concept of separated sewer systems

Have you encountered any other difficulties searching for stormwater information online?
If yes, please explain.
Web content often not designed to fit users. Language used has too much jargon and is not accessible enough.

Do you think that this type of web portal is necessary?
Yes.

What information do you think is most critical to include in a stormwater web portal?
There is enough technical information for professionals. Unbiased perspective on stormwater management for general public. Think about the problems people have with LID in West Seattle… How do you quickly show that the website is neutral? This will help change public values. Consider social marketing in order to get message across. Explain that grey/standard infrastructure may be appropriate in some situations. Maintenance issues need to be considered and discussed. Cost comparisons for maintenance. Introductory portal for the public. Separate vs. combined sewer systems and basic stormwater process information for public.

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)
"Who are you page" can be helpful. How do you efficiently direct people to the right place?

Do you think that photos and other graphics would add value to this type of resource?
Please explain.
Yes, it is important to keep the viewers attention with graphics that engage. Static and text heavy information is boring and viewer will leave page.

What type of visual resources do you think would be most useful?
Video allows control of tone and all of the senses. Puget Sound Starts Here did this.

Greg Murphy
J.A. Brennan Associates
Senior Associate - Landscape Architect
greg@jabrennan.com

July 9th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Most education has happened on the job. Some academic experience with natural drainage.

What is your role in this job?

Designer and project manager

In what ways is your work associated with stormwater management?

Recreation and ecological restoration projects (stream banks, waterfront, Elliot Bay Seawall). Civil engineers do most of the technical stormwater - stamping drawings.

General design, site flow, main features... work with engineer to ensure technical feasibility. "We design, they engineer" System configuration, layout, general design - ongoing dialogue with civil engineer.

How do you access stormwater management information?

Work with civil engineers, internet search. What is allowed in this jurisdiction? Site specific research, codes, standards... Flow rates, infiltration rates, etc. Some web search for technical info. Usually searching for technical data leads to municipal information.

What sources of stormwater management information have you found most valuable?

ASLA case studies - firms get recognition and technical knowledge is provided. Kitsap County LID Manual - great design tool, comprehensive design resource, technical info, etc. www.kitsapLID.org

Seattle DOT CAD details for street facilities, WADOT standard details and 'ecology embankments'

Are there certain characteristics that make these websites more useful?

If yes, please explain.

Relevant technical info, well organized, clear answer to particular question. Good search functions. Good web page design.

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

More technical info needed - site specific info, infiltration rates for different facility types. Management info, monitoring info. How well did these facilities perform? Other innovative responses beyond basic palette? Water quality monitoring data - metrics on cleaning water = valuable data.

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

Long blocks of text, filtering down to necessary technical info. How do you make technical info readily available online? Hard to decipher all the information and find the information needed (i.e. subsurface wetlands)

Do you think that this type of web portal is necessary?

Yes.

What information do you think is most critical to include in a stormwater web portal?

Technical info, innovative solutions, new technology. Home base for information on performance / case study metrics and monitoring data. Opportunity to create resource for municipalities - code development for separating stormwater from sewer system, implementation of GSI, comparing municipal codes... Sharing information to generate firm recognition. Web portal can become a networking mechanism...

Multidisciplinary resource is more interesting, more engaging, more informative. Boil down to most important info. Eg. simple plant list showing what will work on a shoreline restoration.

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)

Include summary for links! Nothing wrong with bias and thinning out the links with what's best. What are users likely to be searching for? Technical specs vs. raingarden design vs. details vs. monitoring/test results vs. municipal codes vs. costs. Put yourself in the mind of potential users. Organize content into pieces people are looking for.

Do you think that photos and other graphics would add value to this type of resource?

Please explain.

Yes, photos and graphics can communicate idea more quickly.

What type of visual resources do you think would be most useful?

Diagrams, photos. Making it as graphic as possible. Focus on technical info without too much writing.

Gwen Vernon and Gretchen Muller

Cascadia Consulting Group
Senior Associates
gwen@cascadiaconsulting.com

July 11th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Gretchen - came from SPU working on NPDES permit compliance and green infrastructure topics, Rain Wise program, capital improvement projects in public right of way

What is your job title?

Gwen Vernon - Senior Associate, Stormwater, Green Infrastructure, Waste & Recycling

Gretchen Muller - Senior Associate, Stormwater, Green Infrastructure

What is your role in this job?

Project manager, team management

In what ways is your work associated with stormwater management?

Resource conservation and green infrastructure, stormwater management, outreach (residents, schools, and businesses). Connected to stormwater through more general sustainability work (i.e. working with local jurisdictions). Education and research leads to policy changes.

How do you access stormwater management information?
Listservs/online

What sources of stormwater management information have you found most valuable?
NPS Info (Non Point Source Info - EPA), Puget Sound Partnership regional info, Stormwater Magazine monthly newsletter

What websites do you frequently visit for stormwater information?
Not particular websites, but pieces of information embedded in multiple websites (i.e. google search a specific topic). WA Stormwater Center.

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

Cost benefit analysis, case studies, quantifying additional benefits of GSI beyond stormwater, strategies for navigating regulatory barriers, policy considerations for GSI implementation.

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

Municipal websites are notoriously hard to navigate (i.e. SPU website is very poorly organized, hard to get to the info needed). Problematic when this region is looked upon for GSI information nationwide.

Do you think that this type of web portal is necessary?

Please explain.

Web portal concept sounds good. Necessary to strategically implement a useful structure.

What information do you think is most critical to include in a stormwater web portal?
New regulations/policy development, technical innovations, case studies, regional advances and beyond. The web portal will only be as good as the maintenance that goes into it – must be kept updated and current.

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)
Audience based or project type based could be good. Audience based could be problematic if the user wants info from multiple groups. Hybrid of audience types and informational categories possible? Need to organize complex information simply. Use of search boxes could lead portal user to specific information.

Do you think that photos and other graphics would add value to this type of resource?

Please explain.

Yes, can help make the info less bureaucratic. Graphics can generate excitement and motivation to implement GSI.

What type of visual resources do you think would be most useful?
Photos of successful projects, drawings/designs. Potential to graphically move people through the GSI implementation process (step by step). Comparison of 'grey to green'. Quantifiable studies with relevant graphics.

John Phillips

King County Department of Natural Resources and Parks
Water Quality Planner/Project Manager
CSO & Sediment Management Programs Wastewater Treatment
Divisionjohn.phillips@kingcounty.gov

July 11th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Ongoing attendance at conferences pertaining to stormwater management topics. Water resource and watershed training – stormwater was a part of the conversation. Academic background in planning and policy.

What is your job title?

Water Quality Planner – project manager

What is your role in this job?

Green stormwater infrastructure planning for the CSO program. Also work on climate issues related to wastewater treatment and sediment management in water bodies.

In what ways is your work associated with stormwater management?

Identifying feasible areas for GSI implementation. Modeling and field work. Navigating policy scenarios – County to City.

How do you access stormwater management information?

Mostly online, sent directly. Newsletters. Google searches. Water and Environmental Research Foundation. Water and Environment Federation. National Association for Clean Water Agencies – policy. WSU and UW.

What sources of stormwater management information have you found most valuable?

Individuals: Neil Weinstein with LID Center, Curtis Hinman with WSU/WA Stormwater Center

What websites do you frequently visit for stormwater information?

Living Communities - through WERF. LID Center.

Are there certain characteristics that make these websites more useful?

If yes, please explain.

Peer reviewed information, start of industry standard, standard operating procedures vs. random white paper off web. True research for water resources and wastewater.

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

West Seattle CSO soil issues/soil contamination – missing info on soil contamination online, need to contact specific researchers. Do contaminants from stormwater accumulate in soil and create risk for public? Need more local research studies and information on how to make GSI projects more efficient.

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

No, because information has already been compiled for the County.

Do you think that this type of web portal is necessary?

Please explain.

Yes, good and helpful for public. The research is there function wise but it will be good to show how these facilities work in the community. Will be good to have a resource that is accessible to the public. A lot of the work to be done is political rather than scientific.

What information do you think is most critical to include in a storm-water web portal?

Published research – with information about the researchers and their research in an accessible and clear format.

-UW and WSU would be a good, trusted source of information

Basic explanation of how these facilities work. Help show early success stories and convince public that facilities are replicable. How do we retrofit in a positive way? Show multi-functional benefits of facilities to community. Information on local projects. How to make projects perform more efficiently.

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)

See Living Communities website – scientists and research oriented approach, not much graphic orientation.

Do you think that photos and other graphics would add value to this type of resource?

Please explain.

Yes, it will help the public understand GSI and trust the strategy as an amenity. Interactive graphics can help professionals and public under-stand stormwater processes and provide context. Plenty of 'black and white' websites with photos but nothing that shows all of the context (i.e. the whole street, not just the facility). Graphics can help show the feeling of the street, the landscape experience. Graphic orientation will be important – most don't want to read scientific papers.

What type of visual resources do you think would be most useful?

People respond to graphics more than photos – good to show how system works. Diagrams showing how water moves through the system.

Liz Fikejs
Seattle Public Utilities
Conservation Program Manager
liz.fikejs@seattle.gov

July 16th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?
If yes, please explain.
Limited formal training, LID program with Curtis Hinnman. Mostly on the job training.

What is your role in this job?
Outreach and education manager for SPU's conservation programs. Focus on water conservation in residential landscape. Current work is focused on rainwise program.

In what ways is your work associated with stormwater management?
Piloting residential rain garden programs. Needs to find out how to best market GSI to different neighborhoods and demographics.

How do you access stormwater management information?
Local articles written on GSI projects.

What websites do you frequently visit for stormwater information?
None in particular. Hasn't found anything good.

Have you encountered any gaps in the stormwater information available online?
Visuals. Photographs.

Do you think that this type of web portal is necessary?
Please explain.
Definitely. There aren't any resources currently that are adequate. Has to spend way too much time searching for information.

What information do you think is most critical to include in a stormwater web portal?
Facts and figures on the effectiveness of GSI projects. (ie. How much water a certain sized rain garden could capture). Information on how GSI projects will evolve over time and maintenance. Information on what plants, etc have been most effective in a certain area. Case studies and information on different GSI projects around the country.
Definitions- put in layman's terms with visuals.

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)
Information nested in multiple levels. Can possibly search by either type of project or audience.

Do you think that photos and other graphics would add value to this type of resource?
Please explain.
Yes.

What type of visual resources do you think would be most useful?
Photos and diagrams and possibly videos would be very useful in marketing residential GSI programs. Needs materials for outreach.

Nathaniel Riedy
SvR Design
Civil Designer (Engineer)
nathanielr@svrdesign.com
206-992-8380

July 9th, 2012

INTERVIEW TRANSCRIPT

Do you have an educational background and/or training in stormwater management issues?

If yes, please explain.

Civil Engineering degree, UW, 2008
Green stormwater infrastructure not really taught
Learned green infrastructure in office

What is your job title?

Civil Designer (Engineer)
The office focus on green infrastructure, particularly green stormwater infrastructure

What is your role in this job?

-hydrology
-modeling stormwater
-designs of stormwater planters and raingarden details
-curb cuts and overflows

Works with other designers and consults the principles on designs. Aesthetics are important to the firm.

How do you access stormwater management information?

Seattle stormwater manual, Washington Department of Ecology stormwater manual -- a lot of information in there about constraints, maintenance, etc. Tries to follow standards when possible, but runs into situations where standards don't apply.

Attends workshops at the WSU campus in Puyallup.
Green Infrastructure brownbags at the office, often with suppliers of products such as green roof systems.
Learns bits over time at the workplace through working directly with coworkers.

What websites do you frequently visit for stormwater information?

City of Seattle green stormwater infrastructure website.
-- possible model website
Website about asphalt, Prof Stephen T. Muench

Are there certain characteristics that make these websites more useful?

If yes, please explain.

Website is relevant to permit process. High effort to work with city. Maintenance issues.

Have you encountered any gaps in the stormwater information available online?

If yes, please explain.

Mostly looking for technical information, not looking for aesthetic or maintenance.
Would like more information on:
-pollutant removal
-bioretention
-infiltration rates
-soil mixes

Have you encountered any other difficulties searching for stormwater information online?

If yes, please explain.

Seattle GSI website not user friendly. Difficult to navigate the tabs/ unsure where information is located. Trial and error search. Organization is unclear.

What information do you think is most critical to include in a stormwater web portal?

A place where people posted their ideas about specific functions (a forum).
Information on component design - picture/ diagram, description, information
Innovative new solutions to stormwater management/facility design

How do you think this information should be organized? (Audience-based, scale, project type, type of information--general education, technical, etc)

Audience-based

Do you think that photos and other graphics would add value to this type of resource?

Please explain.

Yes, would be really helpful for sharing information.

What type of visual resources do you think would be most useful?

Photos and diagrams. Diagram can be more helpful than photos.