



# Proposal for Scaled-up Monitoring Program

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## Introduction and Background

The purpose of this document is to broadly outline a proposal for the scaled-up implementation of the Rain Garden and Bioretention Assessment Protocol (RGBAP) across the Western Washington region. This proposal is not a formal request for funding, but rather a presentation of options and recommendations from our project team for taking the protocol that we developed and putting it to its highest and best use in terms of stormwater management and municipal stormwater program efficiency and overall effectiveness.

As of the writing of this proposal, the RGBAP has been recently finalized and includes an array of field-based metrics. This protocol has been developed through multiple versions of development, beginning with a review of existing scientific literature, national stormwater professional network input (EPA's NPSinfo Listserv), and two rounds of volunteer training, implementation, review and revision. Included in the final deliverables are a formatted (for print) data collection sheet, a digital data collection spreadsheet, and detailed instructions and training materials designed for volunteers and non-technical staff members.

## Scaled-up Monitoring and Assessment Program for Puget Sound

### Assessment Protocol

The RGBAP is a protocol to assess rain garden and bioretention facilities for function and any maintenance needs. Putting the RGBAP to use in municipalities across Western Washington could be relatively simple. Our RGBAP team recommends that municipalities choose which version of the protocol to use as well as who to have implement it. By utilizing the RGBAP, municipalities will collect standardized data that can be easily compared to and combined with data from other municipalities across the region. Standardized data is a requisite basis for regionally coordinated analysis of the ongoing and long-term effectiveness of rain gardens and bioretention facilities. By supporting municipalities' implementation of the protocol in the way that fits their existing programs, capacities and goals, we hope to encourage more widespread utilization of these functional metrics. The ultimate

goal is creation of a regionally useful database for continued improvement in the effectiveness of stormwater programs region-wide.

Beyond functional and aesthetic maintenance needs data compiled could provide detailed information on regional effectiveness of rain gardens and bioretention facilities by identifying correlations between hydrology, vegetation, soil, mulch and aesthetics. Using the full RGBAP is recommended for municipalities that want an assessment protocol for rain gardens and bioretention facilities that collects a broad set of metrics and can contribute maximally to regional datasets and analysis of rain garden and bioretention effectiveness research.

#### A la Carte elements of the protocol

For municipalities that already have rain garden and bioretention assessment programs developed, with specific metrics and data categories prioritized, we recommend reviewing the metrics and scoring methodology used in the RGBAP for integration into their existing assessment program. By using the same metrics that other municipalities are using, integration of assessment data at the regional scale will be considerably more feasible. The more municipalities that utilize the standardized metrics in the RGBAP, the more data we will have from across the region and the faster we will be able to identify and improve issues and problems in design, engineering and installation guidance for rain gardens and bioretention. Implementation of a reduced set of assessment metrics may also be desirable for municipalities that are new to rain gardens and bioretention facilities and are concerned about capacity and budget needed to assess and maintain them. For example, starting with hydrologic assessments because they are the most directly linked metrics to municipal NPDES permit compliance may be an approach that some municipalities want to take. In those cases, the hydrology assessment data collected using the RGBAP can still contribute meaningfully to the regional database and the municipality can avoid the costs of developing their own metric(s), protocol, and related training materials. Adding other assessment metrics later would also be relatively simple if that municipality becomes interested in additional aspects (e.g. vegetation) of the rain garden and bioretention facilities in their jurisdiction.

#### Municipal Staff-Assessments

Options for municipalities to implement the RGBAP include using municipal staff who may already be assessing other infrastructure assets, stormwater related or otherwise. The RGBAP was designed to require minimal training and to be implementable without specific technical expertise. Training existing staff to utilize the RGBAP and integrate it into ongoing operations may provide a higher level of standardization compared to volunteer-based assessments and could minimize transportation/mobilization costs if rain garden and bioretention assessments were conducted opportunistically when staff are already scheduled to be near rain garden and bioretention sites that have not been recently assessed.

#### Volunteer Program Assessments

For municipalities that do not want to use limited municipal staff time to assess rain gardens and bioretention, the option of collaborating with a local NGO or WSU Extension program that recruits and organizes volunteers for environmental work can provide a similar level of assessment and asset management value at reduced expense. Throughout the development and test implementation stages of the RGBAP project, volunteers organized by WSU Extension program staff conducted the assessments and the quality as well as the replicability of the data they collected was high. The additional benefit of

community engagement and environmental education around a challenging environmental issue like stormwater is also of potential value for municipalities as they work to comply with stormwater permits and invest in rain gardens, bioretention and other forms of Green Stormwater Infrastructure at broad geographic scales and sometimes on private land.

### Integrated assessment and maintenance

Our project team recommends integrating rain garden and bioretention maintenance activities with the assessments. Integration of assessment and maintenance activities into the same site visit could provide efficiencies and pre-empt communication barriers or time-consuming clarifications between assessment and maintenance staff members.

Assessment data immediately preceding maintenance would inform which maintenance actions to take. Additionally, an assessment followed by maintenance followed by another assessment would provide valuable adaptive management insights for relative effectiveness of maintenance actions. Integrated assessment and maintenance site visits would create efficiencies in terms of staff or volunteer time and create a degree of accountability and transparency in maintenance schedules and related budget impacts. Rain garden and bioretention assessment and maintenance activities could be conducted by the same staff, volunteers, or contracted entity. However, if accountability is a particular concern, separation of assessment and maintenance responsibilities could reduce potential conflicts of interest.

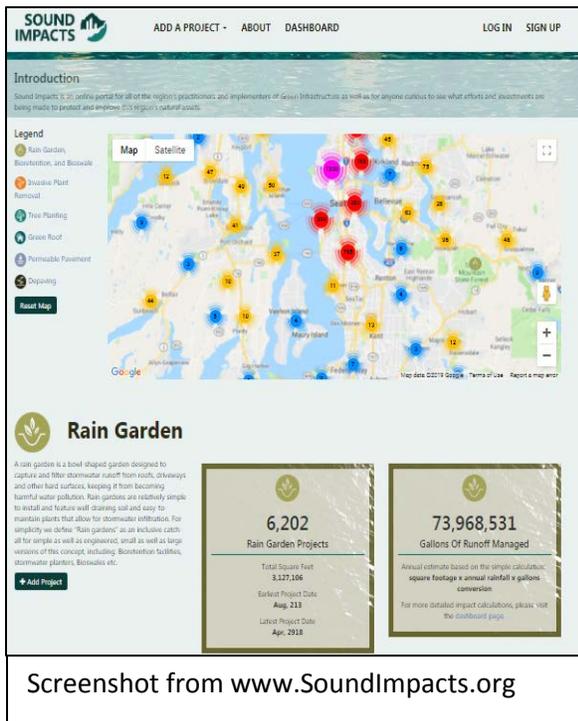
It is worthwhile to note that both assessment and maintenance activities can be provided by staff or contracted partner organizations including WSU Extension programs, Conservation Districts and job training programs and organizations like the Duwamish Infrastructure Restoration Training (DIRT) Corps.

### Regularity of Assessments

Based on many years of combined experience assessing and rehabilitating rain gardens and bioretention facilities in western Washington, our project team recommends implementing an assessment program that revisits sites with regularity in order to identify and remedy emerging issues before they become more expensive and time consuming to address. Assessment of sites is recommended to occur on an annual basis. For new rain garden and bioretention facilities (less than 2 years old) annual or biannual (twice per year) assessments are recommended due to the sensitivity of new plants during their establishment period and the lack of baseline data for those facilities. Certain metrics can raise maintenance requirements that are urgent vs. other metrics that indicate issues less likely to escalate quickly. For example: presence of “target problem plants” (i.e. invasive or noxious weeds), presence of extensive erosion and/or channelization, blocked inflow or overflow, are all issues that could escalate quickly if not addressed. Presence of non-target weeds, or poor-to-moderate plant vigor are issues that are less likely to escalate quickly. Established facilities that frequently experience failures may need more frequent assessments (or they may need to be re-designed and re-installed). Established rain gardens and bioretention facilities that are assessed to consistently be free of major maintenance and functional concerns may be justifiably assessed less frequently (perhaps biennially—i.e. every two years).

## Data entry system

The data entry system that was developed as part of the current project was significantly improved over the course of this project. In its current form, a macro-enabled Microsoft Excel spreadsheet includes several data entry failsafe features to prevent data entry errors. However, our team recommends that for the greatest ease of use and efficiency, the data form (currently a paper form) and the data entry system should be combined. A combined data form- data entry system could be developed as an app for mobile devices (e.g. tablets) or as a webform that could be loaded on mobile devices or laptop computers. Utilizing the current digital data entry MS Excel spreadsheets on a laptop or tablet in the field could achieve this goal as well. Such an integrated data entry system would eliminate the step of transcribing hand-written data into digital form, thereby streamlining the assessment process significantly, and reducing opportunities for error.



The screenshot shows the Sound Impacts website interface. At the top, there are navigation links: "ADD A PROJECT", "ABOUT", "DASHBOARD", "LOG IN", and "SIGN UP". Below the navigation is an "Introduction" section with a brief description of the organization's mission. A "Legend" section lists various project types: Rain Garden, Bio-retention, and Bioretention; Infiltration Plant; Tree Planting; Green Roof; and Permeable Pavement. A map of the San Francisco Bay Area is displayed, showing numerous colored markers representing different project types. Below the map, there is a "Rain Garden" section with a description and two statistics: "6,202 Rain Garden Projects" and "73,968,531 Gallons Of Runoff Managed".

**6,202**  
Rain Garden Projects

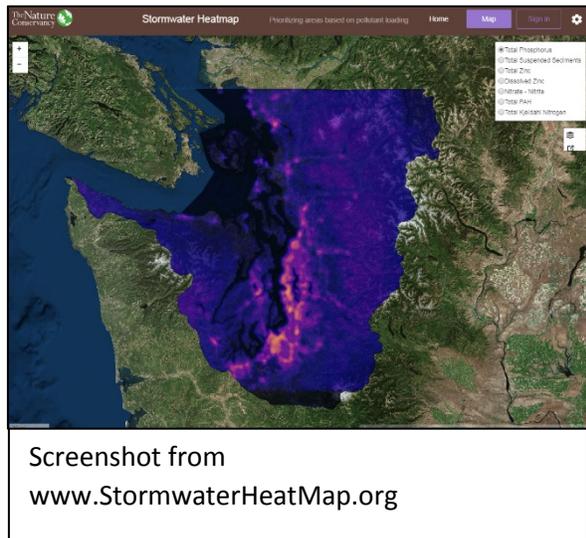
**73,968,531**  
Gallons Of Runoff Managed

Screenshot from [www.SoundImpacts.org](http://www.SoundImpacts.org)



The promotional image shows a hand holding a smartphone that displays a photograph of a rain garden. The phone is positioned over a map of the same area, which has a yellow arrow pointing to the location of the rain garden. The map is overlaid on a satellite-style background. The logo for "2ND NATURE WATER LLC" is visible in the top right corner of the image.

Promotional image from 2<sup>nd</sup> Nature Water LLC depicting some of the functionality of their software



The screenshot shows the Stormwater Heatmap website interface. The title is "Stormwater Heatmap" and the subtitle is "Prioritizing areas based on pollutant loading". The main content is a map of a watershed area with a heatmap overlay, showing areas of high pollutant loading in red and orange. The map is overlaid on a satellite-style background. The logo for "The Nature Conservancy" is visible in the top left corner of the image.

Screenshot from [www.StormwaterHeatMap.org](http://www.StormwaterHeatMap.org)

The data entry system should also be integrated with a data management system and database that is georeferenced. An example of an integrated assessment, data entry, data management, asset management and analysis system has been developed by 2<sup>nd</sup> Nature Water LLC out of Santa Cruz California. A possible strategy for moving forward quickly with developing a data entry, database system for the RGBAP would be using existing software, like that developed by 2<sup>nd</sup> Nature Water LLC, and customizing the site/facility assessment form based on the RGBAP metrics.

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## Regional coordination

### Data management and Analysis

Identifying an entity with a regional purview to oversee, manage, and own the assessment data from all of western Washington is critical. Washington State Department of Ecology is potentially a good fit for this role. Oversight of the assessment database could be minimal, but with more effort, more value could be derived from the data, such that with adequate quality assurance, data analysis at the regional scale could be used to ask and answer questions about effectiveness of design, installation and maintenance, and inform best practice recommendations and permit requirements.

### Reporting and Communications

As a public database, the research using assessment data could be outsourced to contractors or conducted by local, state and federal agencies. At a minimum, a regional report that details assessment results of rain gardens and bioretention facilities should be shared with all participating jurisdictional governments and interested parties. An online portal that shows where bioretention and rain garden installations are and how well they are functioning would be of outreach and education value. Synchronizing that portal to existing green infrastructure portals and stormwater maps (e.g. Sound Impacts, the “Puget Sound Info” portal that Puget Sound Partnership is currently researching, state agency data on water quality and wildlife metrics related to stormwater, and the Nature Conservancy’s Stormwater Heatmap, among others) would be of high value as well.

## Potential funding sources

Because of the regional value that a scaled-up assessment program would offer, a funding source that operates at the regional or larger scale would be the best fit for the next phase of this project. Example funders include: SAM, State Clean water funds (GRSS grants, revolving fund), and EPA NEP funding / PSP near term actions. Another strategy would be to seek support from a national funder that might see this project as a useful pilot that could be scaled up to national scale implementation. Of these funding sources, SAM has several advantages over the others. In particular, scaled up implementation of the RGBAP requires municipalities buying in to the idea and supporting this standardized implementation of rain garden and bioretention assessments collectively. SAM is the only funding source that is already predicated on region-wide municipal involvement and support. In other words, this project will only work if municipalities want it to work, and SAM funding will only be granted if municipalities want it to be funded.

## Proposed Outcomes

Through scaling up the RGBAP across western Washington, developing an integrated data collection system and database, and launching regionally standardized assessment programs in jurisdictions across the region, this project will improve the effectiveness of rain gardens and bioretention facilities in multiple ways. Effectiveness will improve through the widespread collecting of standardized assessment data that will support improved guidance and more well-informed, data-driven permit requirements. Effectiveness will also improve due to assessment-based maintenance of rain gardens and bioretention facilities. Effectiveness of stormwater programs overall will improve because region-wide assessment data will be able to inform cost-benefit analyses of different stormwater management strategies, informing municipal decisions on which strategies to invest in based on permit

requirements, budgets, near and long-term municipal goals etc. Scaled-up implementation of the RGBAP will also increase public involvement, awareness and knowledge around stormwater and green infrastructure in general.

## Budget Considerations

Most of the cost of scaled up implementation of the RGBAP is likely to be imbedded in the existing assessment and monitoring budgets of western Washington jurisdictions, since each jurisdiction will decide if, how, and how much to invest in assessment activities within their own jurisdictions. For the regional components of this project the budget would need to cover the development of the data collection system and database creation and management. Ideally it would also cover regional data analysis of effectiveness of rain gardens and bioretention and a municipality engagement process that would guide that analysis to address the questions of greatest collective interest. No member of the RGBAP team has the expertise to determine these costs, as outside contractors with expertise in database and data management software would be needed. But if municipalities and other invested stakeholders (Ecology, PSP) agree that it is worth pursuing, a detailed budget could be developed.