Science-based Decision Support Tools to Optimize Ukiah’s Storm Water Resource Management and Habitat Protection and Restoration
SFEI-ASC Proposal April, 19, 2018

Introduction

SFEI-ASC has developed two, publically available, geospatially-based decision support tools that can help municipal separate storm sewer system (MS4) Permittees locate potential green infrastructure (GI) projects. One tool supports urban GI planning to benefit both ecological and community priorities identified by the user, while the other tool supports riparian habitat assessment and restoration planning. SFEI-ASC proposes to work with the City of Ukiah MS4 managers and other city departments to apply both tools in Ukiah to manage the storm water as a resource and to protect and restore habitats.

About the Tools

GreenPlan-IT

Green infrastructure has emerged as an integral aspect of multi-benefit, watershed approaches to address concerns about storm water quality and quantity in an urban environment. When carefully applied, GI features, such as rain gardens, tree-well planters, and permeable pavement, can be cost-effective, resilient ways to manage storm water at its source with measurable, cumulative environmental, and community benefits.

The GreenPlan-IT toolkit is a publically available, geospatial planning tool that optimizes municipal storm water management and GI planning by identifying, and ranking potential GI project locations based on their potential for achieving multiple ecological and/or community benefits (or other priorities defined by the user), and evaluating GI project effectiveness in reducing storm water runoff and pollutant loads at a watershed scale. The toolkit consists of four stand-alone tools (Figure 1) that, when combined (Figure 2), support watershed based regional GI project planning and tracking.

Figure 1. Four component tools of GreenPlan-IT.
Figure 2. GreenPlan-IT flowchart depicting how the four tools relate to each other to support regional green infrastructure planning at a landscape scale.

GreenPlan-IT tools help address the following key storm water management questions:
- Where are the suitable locations for GI implementation?
- What areas have the greatest potential to reduce storm water runoff and pollutant loads?
- How much water quality and/or hydrologic improvements can be achieved with different kinds of GI installations vs. implementation cost within the planning region?

Riparian Zone Estimation Tool (RipZET)
Loss of riparian areas has affected water quality and habitat conditions and presented a number of challenges for resource managers and planners. Current approaches to restoring and protecting riparian areas focus on functions or ecological services, including stream shading, bank stabilization, organic material input, runoff filtration, floodwater storage, and groundwater recharge. Land use planners need tools to help visualize the extent of ‘functional riparian width’ as a means for ensuring appropriate riparian functions for stream reaches targeted for restoration and maintaining relatively undisturbed stream reaches targeted for development.

The Riparian Zone Estimation Tool (RipZET) is a geospatial, decision support tool that estimates the extent of riparian buffer along streams based the average height of mature riparian vegetation and steepness of hillslopes adjacent to the channel. RipZET’s output is a GIS-shape file that represents riparian extents, which is summarized by functional riparian width-classes representing the relative proportions of ecological services provided within a watershed. Managers use RipZET to characterize riparian extents at a landscape scale, and identify areas of potentially poor ecological services that could be targeted for restoration.
Phased Approach

SFEI-ASC proposes a phased approach to support the City of Ukiah’s Storm Water Resource Management and Habitat Protection and Restoration. The first phase would be to support the development of a map of potential high priority GI project locations. The GreenPlan-IT’s Site Locator Tool will be employed to identify and rank potential urban LID/GI project locations within the City of Ukiah based on priorities set by a project workgroup comprised of MS4 managers and other City departments as warranted. In addition, SFEI-ASC will employ RipZET to support the identification of stream restoration opportunities.

Future phases would be to apply the other GreenPlan-IT tools to support watershed based storm water management and planning. This would include setting-up and calibrating the hydrologic Model, running the Optimization tool (based on the Site Locator and Model outputs), and implementing the project tracker tool. Modeling base-line hydrologic and pollutant loads in the watershed is required input for the Optimization Tool, which uses iterative calculations to estimate the effectiveness of proposed GI projects vs. cost in reducing storm water runoff and pollutant loads. Eventually, the Tracker could be used to track projects and evaluate the cumulative benefits of the implemented GI projects in reducing runoff and pollutant loads.

These future phases would be covered under a separate proposal. In the meantime, SFEI-ASC will coordinate with the City of Ukiah to identify existing hydrologic and pollutant-monitoring data and evaluate if those data could be used to calibrate the hydrologic Model for the City of Ukiah.

Phase 1 Scope of Work: Identifying Potential High Priority GI Sites ($33,000)

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Dr. Josh Collins (Principal Investigator, josh@sfei.org)

Project Period: July 15, 2018 – May 31, 2019

1. **GreenPlan-IT Site Locator Tool** ($24,500) Months 1-10

The Geographic Information System (GIS) based Site Locator Tool is a planning tool that can be used to identify and rank potential GI project locations through GIS analysis. The Tool incorporates many regional, publicly available data layers and builds in several intersecting analyses that require user input data to produce maps of possible GI locations. These analyses are flexible, allowing the end-user the flexibility to add local data layers to better identify suitable locations and rankings of GI locations, to produce outputs of different levels of refinement, and to run the analyses with varying amounts of data. The Site Locator Tool can be fine-tuned iteratively as additional local data or data with better resolution become available. In addition, there are six GI feature types in the Tool: bio-retention basins, permeable pavement, green street features (such as vegetated swales and planter boxes), storm water wetlands, wet pond, and infiltration trench. Any combination or all GI feature types can be selected when running the Tool.
1.A. Site Locator Tool Workgroup (supports the tool set-up and interim product review)
SFEI-ASC will work with City of Ukiah MS4 managers and other departments (as warranted) to identify, compile, and prioritize relevant GIS datasets needed to run the GreenPlan-IT’s Site Locator Tool and determine the GI feature types to include. Up to three workgroup meetings will be held (by web-conference and/or in-person) to support the development of the Site Locator Tool inputs, set the analysis parameters, and review the results. Additional coordination and data gathering efforts will be carried out via emails and phone calls.

Deliverables
- Workgroup meeting agendas, presentations, and meeting summaries (These will be submitted with the progress reports under item 3.)

1.B Run the GreenPlan-IT Site Locator Tool
SFEI-ASC will run the Site Locator Tool to identify and rank proposed GI project locations within the City of Ukiah based on the priorities identified by the Site Locator workgroup in Task 1 above. This includes the initial set-up and run and one additional run based on additional data or adjustments to the list of priorities and/or weights provided at the second the Site Locator Workgroup meeting. The final Tool output will be a GIS dataset of the ranked GI project locations that reflect the multi-benefit priorities developed through the workgroup process.

Deliverables
- Memorandum describing the Site Locator Tool methods, final input priorities, and results that include a heat-map of ranked GI project locations and a list of those ranked locations
- GIS shape file of the ranked GI project locations and associated meta data

2. RipZET – Estimate Riparian Buffer Widths ($5,000) Months 4-8
SFEI-ASC will coordinate with the City of Ukiah’s MS4 managers to define the study area extent for running RipZET. SFEI-ASC will compile available vegetation and topographic data and run RipZET ‘s vegetation and hillslope modules to generate GIS datasets representing riparian extents within the study area based on vegetation and hillslope processes. A summary memo will be developed to present the methods, outputs, and summary charts that characterize the relative amounts of riparian areas based on functional riparian width-classes.

Deliverables
- Memorandum describing RipZET methods and results, which include a map representing the modeled riparian extents and summary tables and charts characterizing the relative amounts of riparian areas based on functional riparian width-classes.
- GIS shape file of the ranked GI project locations and associated meta data

3. Project Management ($3,500) Months 1-10
SFEI-ASC’s project management tasks include internal project coordination and staffing, contract coordination internally and with clients, invoicing, and progress reports. Progress reports will summarize work completed during the invoicing period (and will be submitted per the schedule below) including any workgroup meetings held during the reporting period. Copies of meeting
agendas and presentation material will be attached to progress reports. The third and final project progress report will essentially be a final project report that describes work completed during the last reporting period as well as throughout the project period, including a summary of project expenditures.

Deliverables
- 3 Invoices and project progress reports

Table of Project Milestones and Estimated Schedule

<table>
<thead>
<tr>
<th>Milestones &amp; Deliverables</th>
<th>Description</th>
<th>Submission Date*</th>
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<tbody>
<tr>
<td>1</td>
<td>SFEI will coordinate with the City of Ukiah to hold the first workgroup meeting (via web-conference and/or in-person) to present the project overview, and begin to identify relevant GIS datasets, and develop a list of local priorities.</td>
<td>Meeting completed by (September 30, 2018)</td>
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<td>2</td>
<td>The first progress report and invoice, covering work performed through October, will be submitted along with the meeting materials (e.g. agenda and presentation materials)</td>
<td>(November 30, 2018)</td>
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<td>3</td>
<td>The second progress report and invoice, covering work performed through January, will be submitted along with meeting materials from the second workgroup meeting (a web-conference meeting held in January), and the RipZET memorandum and GIS-shape file output.</td>
<td>(February 20, 2019)</td>
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<td>4</td>
<td>Site Locator Tool Memorandum &amp; GIS-shape file output.</td>
<td>(April 10, 2019)</td>
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<td>5</td>
<td>The third progress report will include the final project progress report, covering work completed throughout the project period, and the final invoice.</td>
<td>(May 20, 2019)</td>
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* These submission dates are ‘not-to-exceed dates’ when SFEI will submit items to the City of Ukiah, and assumes that the Project start date is July 15, 2018.