Current Stormwater Practices and Future Implementation at Portland State University with the Uncertainty of Climate Change

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Introduction:

- Stormwater is water that is unable to naturally soak into the ground due to high amounts of impervious surfaces.
- When precipitation occurs, stormwater collects soils, pet waste, litter, oil, and grease, which find its way into local bodies of water, which has serious impacts on environmental and human health.
- Portland State University (PSU) has implemented stormwater green infrastructure (SGI) including bioswales, planters, and rainwater reuse systems to reduce its runoff, but the effectiveness of these systems have not been analyzed.
- As climate change persists, precipitation events are expected to increase in severity, emphasizing the importance of implementing new and upgrading aging SGIs.

Research Question:

How effective is PSUs green infrastructure in reducing stormwater runoff? How might runoff change as anthropogenic climate change persists?

Goal #1: Create a comprehensive inventory of the SGI on campus, including the amount of pervious versus impervious area and the total SGI (facilities, sq. ft., etc.).

Goal #2: Determine their effectiveness in reducing stormwater using current and future predicted precipitation data and the Environmental Protection Agency's Stormwater Management Model (EPA SWMM).

Goal #3: Propose SGI implementation recommendations to the university for the next 15-20 years based on these findings.

Future Work:

- **Goal #1:** We have completed our SGI inventory successfully. Additionally, we will create an ArcGIS map of the SGI at PSU that will serve as a model for the university and future graduate students interested in stormwater research.
- **Goal #2:** We have begun conducting preliminary work on EPA SWMM, including mapping the university, and identifying the stormwater pipe system. However, we have yet to run different precipitation scenarios as anthropogenic climate change is expected to persist.
- **Goal #3:** We have identified some areas at PSU that would be suitable for the implementation of SGI, but once we complete our runoff analysis, we will be able to make better informed decisions concerning future recommendations.

Goal #1: Comprehensive Inventory of SGI at PSU:

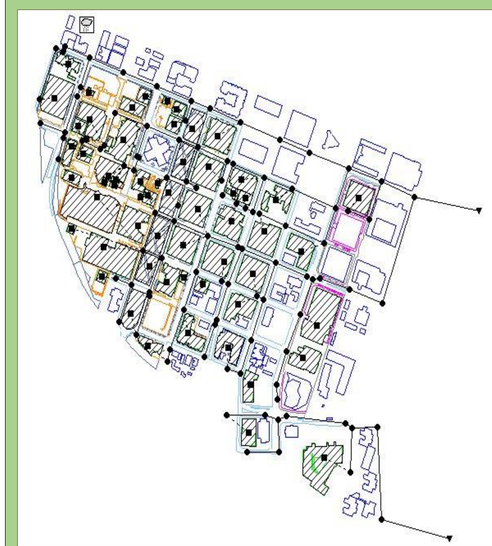
- *PSU has a total of 86 SGIs (~51,414 sq. ft.):* 61 flow-through planters, 18 eco-roofs, 2 pervious pavers, 5 storm filter catch basins, 1 bioswale, and 3 water reuse systems.
- *79% of the campus study area is impervious, including:* PSU buildings (28%), paved roads (19%), sidewalks (14%), non PSU buildings (5%) and other impervious surfaces (13%).
- *21% of the campus study area is pervious, including:* PSU permeable area (9%), non PSU permeable area (10%), and green infrastructure (2%).

Ecoroof at Native American Student Center

Flow-through Planter at Karl Miller Center

Rainwater Reuse System at Epler Hall (via Google Earth)

Goal #2: Effectiveness of SGI using EPA SWMM:

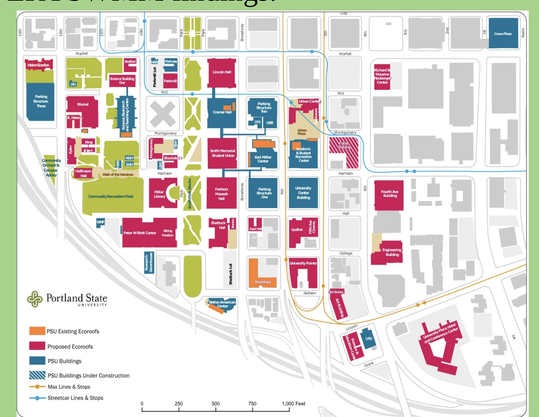


EPA SWMM model of PSU

- Use climate data from the City of Portland as our current precipitation scenario.
- Undergo sensitivity analysis to predict future precipitation scenarios.
- Run different scenarios with current and increased temperature and storm intensities.
- Identify possible SGI implementation.

Goal #3: Recommendations Based on Findings:

- Evaluation of effectiveness of current SGI and possible areas of future implementation.
- Climate change predictions analysis and recommendations based on EPA SWMM findings.



Current SGI and possible future implementation

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