

## **Response to comments associated with FP-4: Replacement and lifecycle costs of permeable pavements compared with standard impervious pavements**

1. National information not applicable for the region due to different climate condition (KC study showed)

To mitigate the risk that this data is not widely available, we plan to substantially scale back the full proposal. We plan to cut the effectiveness modeling component (objectives 2 and 3), and focus only on assembling whatever information is available on the costs of permeable pavement from Puget Sound jurisdictions as well as case studies in U.S. and abroad (objective 1). Our only deliverable will be a white paper summarizing the best available information on the number of permeable pavement installations in the Puget Sound and the actual or projected (based on experience elsewhere) costs, with ranges of uncertainty.

2. Permeable pavement construction, maintenance cost changes rapidly. Should only use recent data, which may not be enough to have any valuable conclusion.

Our initial proposal promised a database, but the revised will instead promise only the white paper, with the hope that we find enough data to make a database a worthwhile deliverable. If we in fact, turn up a reasonable amount of cost data in this project, a subsequent SAM can pursue the effectiveness modeling component.

3. Very concerned about available information for the study from locals to make any valuable comparison.

See response to comment 1

4. Maintenance equipment cost very high. Small section permeable pavement maintenance cost very high, not cost-effective. For heavily urbanized cities (not many new, re-development area)- not a cost-effective option.

If cost is being measured in terms of just dollars and cents associated with construction and maintenance of pavement, possibly. But what are the avoided ecosystem costs if permeable pavements are used in place of standard pavement?

5. How does permeable pavement WQ treatment function differ from other infiltration systems? Not much...

True – but the emphasis here is the difference between permeable and standard impervious pavements.

6. WQ treatment occurs in underlying sand layer
7. only focusing TSS and TP? Seems limited.

In Jayakaran et al., 2019, basic and phosphorous treatment show in wearing and aggregate layer, no sand layer was used.

Although we know that it is feasible to model the effectiveness (water quality) component of our project, we heard the reviewers' concerns that the cost data on permeable pavements may not be widely available for jurisdictions in the Puget Sound. We have emailed several jurisdictions a detailed set

of cost questions to gauge data availability. We have not heard back from most - perhaps this is because of circumstances rather than a lack of data

8. Spills - should they be built into the lifecycle cost? This would also depend on what the required response is, could specify a few standard responses.

We can include questions in our survey about the experience of implementing jurisdictions with spills and associated maintenance costs.

### **Overall response on budget**

We expect this revised version of the proposal to have substantially lower costs: one semester of a PhD student in Economics to survey Puget Sound jurisdictions (in conjunction with AJ and JC), review the academic and case study literature (with JC), and draft the white paper. The membership of the TAC would remain the same but would only meet (online) twice: once in the beginning to comment on the draft cost questions and help identify jurisdictions, and a second time to provide comments on the draft white paper. JC and AJ would commit to two weeks each, to supervise the student, help with outreach to jurisdictions and report writing, and manage the TAC. The revised project would run 6 months. Our original budget for Objective 1 (Task 2) was \$51k, so it is likely to be in that ballpark with a little additional for project management.