SAFE CLEAN WATER PROGRAM SCIENTIFIC STUDY PROPOSAL QUESTIONNAIRE

1. Proposal identification information and summary of the project goals.

Title: **Groundwater Quality Monitoring: Studying Pollution Removal in Stormwater Drywells and Monitoring the Spatial and Temporal Effects of Stormwater Drywells on Local Groundwater Quality**

Proposing Organization: **California State Polytechnic University, Pomona**

Your summary of the Project Goals and Objectives:

All three proposal reviewers agreed that the overarching goal of this project is to better understand how drywells remove pollutants in runoff and direct the water into groundwater, and to identify risks associated with operating drywells that can lead to groundwater becoming inadvertently contaminated with pollution. The project's ultimate goal is to produce managerially relevant insights that will help ensure that: (1) drywell functionality will be maintained for longer periods, (2) test site drywells are selected appropriately, and (3) appropriate steps are taken to protect groundwater at risk of contamination from drywells.

2. Are the objectives clearly stated? What portion of the objectives need more clarification?

   All three reviewers agreed that the project's objectives are clearly stated. One reviewer offered no caveats, while the other two reviewers caveated their assessment. The first of these two reviewers expressed concerns about whether the study can achieve its objective of understanding the mechanism by which drywells remove pollution from soil. The second reviewer concluded that the project's objectives are too narrowly defined and incomplete to convey how the project will support its stated goal of enhancing water supply, and how the project will support SCWP goals.

3. How do the project goals directly support a nexus to increasing stormwater or urban runoff capture and/or reducing stormwater or urban runoff pollution?

   The reviewers did not agree on how effectively the project supports the SCWP's goals of increasing stormwater or urban runoff capture and/or reducing stormwater or urban runoff pollution. Two of the reviewers were wholly complimentary of the project, noting that the insights provided by the study have the potential to increase management confidence in using drywells as a stormwater management solution, including by shedding light on how to pre-treat runoff entering drywells to prevent groundwater from becoming polluted. The third reviewer expressed reservations about the project's nexus with SCWP goals, noting that the project's description of how drywells are used appears to be "dated," in that the proposal seemingly does not recognize the fact that drywells are an unsuitable solution for "many areas." where infiltration is limited or not possible and where PFAS is an issue

4. What is (are) the overarching technical approach element(s) of the proposed project as you understand them (not necessarily the same as the elements described in the proposal)?

   The proposal reviewers agreed that the overarching technical approach is to use standardized methods to monitor multiple drywell systems over a multi-year period. The project will evaluate

runoff water quality in the drywell's pretreatment chamber, in its sedimentation chamber and in surrounding groundwater.

5. Has the proposal provided sufficient information to describe the technical approach for each element? If not, what information is missing?

   The reviewers disagreed about whether sufficient information is provided describing the proposal's technical approach. One reviewer expressed complete satisfaction with the technical approach described in the proposal. The other two reviewers identified multiple types of missing information. One reviewer noted that the project has not yet identified any of the sites to be monitored, did not identify a list of the specific pollutants to be monitored, and did not describe a backup plan in the event that – when the project's monitoring period ends – there is no statistically significant increase in the pollution levels measured in groundwater. The second reviewer noted that the project does not describe any specific pretreatment options for runoff entering the drywell, nor specifics about the drywell maintenance approaches to be used with respect to issues such as clogging.

6. Is the technical approach sound? If not, what do you recommend should be done to improve the technical approach of the proposed project?

   One reviewer expressed complete satisfaction with the technical soundness of the proposal, while the other two reviewers expressed concerns. One of the latter two reviewers said the project should have listed the specific pollutants that will be measured, plus done "back-of-envelope" calculations to estimate travel time of pollutants from the drywell system into groundwater. The second reviewer characterized the technical approach as "relatively superficial" and suggested that the proposal could have asked more ambitious study questions, such as assessing how to minimize the need for drywell pretreatment because of the high cost of pretreatment.

7. How achievable are the study's stated technical objectives, especially within the proposed timeframe and budget?

   The reviewers disagreed on how achievable the study would be within the planned timeframe and budget. Two reviewers expressed optimism with no caveats; one of these reviewers called the budget "very large" and the timeline "quite long," and the other reviewer characterized the objectives as "very achievable" and complemented the study team for already completing the "necessary groundwork" for the study. The third reviewer was more pessimistic, noting that while the budget "seems adequate," the installation of monitoring wells can represent a "substantial cost" that the proposal should have broken costs down to demonstrate the adequacy of the budget. The third reviewer also noted that the project does not present a "Plan B" in the event that the project does not generate statistically significant data sets within the allocated timeframe for monitoring.

8. What are the greatest technical risks that you foresee the proposing agency facing when implementing the project?

   All three reviewers agreed that the project faces technical risks. Two reviewers focused on the fact that the project has not yet identified study sites, with one reviewer commenting that the project's achievability will be shaped by the characteristics of the individual study site (e.g., area

of contributing impervious surface, depth of the drywell and groundwater, geology). The latter of these two reviewers focused on the fact that the pollutants the project is seeking to monitor may not be present at the drywell sites selected – a consequence of drywell permitting requirements being intentionally designed to prevent pollution from entering groundwater. The second reviewer also noted that the project's reliance on students for staffing will be a challenge due to turnover. The third reviewer was more optimistic about potential technical risks, saying that they don't foresee "any major technical risks," although they caveated this assessment by noting that the project's monitoring scope may not be adequate to provide conclusive results.

9. Please describe the linkages between the project's technical objectives and the types of decisions that stormwater managers will make based on the project's outcome(s)? Will the technical achievements provide stormwater managers useful linkages that extend beyond this study?

   All three reviewers agreed that the project has the potential to produce results useful to stormwater managers, but varied in the degree of confidence they put behind this assessment. One reviewer said the management utility of the results will be influenced by the quality of the modeling work, as modeling is key to producing mechanistic insights about drywells that can be readily transferred to other sites. A second reviewer characterized the study's management utility as "limited" due to the fact that drywells are not a viable stormwater management option at many sites, although this reviewer simultaneously complimented the fact that the multi-year timeline for this study is "rare" and thus has the potential to provide managerially relevant insights on pretreatment and maintenance issues. The third reviewer expressed concerns that the two sites that will be monitored during the study may not provide conclusive data for unmonitored sites, which would limit the study's ability to produce managerially relevant drywell pretreatment guidelines.

10. Please provide any additional technical perspectives you would like to share.

    All three reviewers shared additional technical perspectives. One reviewer expressed concern that the proposal does not mention whether the project will consider the width of the infiltration cone surrounding the well when deciding where to install monitoring wells – an important consideration. A second reviewer expressed concerns that the proposal appears to have been written in a "rushed" manner that could have contributed to why key information is missing, including about the study team's qualifications. The third reviewer expressed optimism about the study, commenting that it is "exactly" the type of pilot project needed to better understand drywells.

11. Please answer each of the following questions by selecting one of the following five answer choices: *Excellent, Very good, Adequate, Inadequate or Not applicable because of insufficient information*. Please add an explanation to accompany your answer choice (or refer to the question number above for appropriate context and rationale):

    a. How well do the proposal objectives address the County's goals of increasing stormwater or urban runoff capture and/or reducing stormwater or urban runoff pollution?

The reviewers did not agree about the adequacy of the proposal's objectives for addressing SCWP goals. One reviewer rated the proposal as "inadequate," and critiqued the proposal's use of "broad generalizations" when describing connections to SCWP goals, and suggested that the project will play a "limited" role in advancing SCWP goals. The other two reviewers were more optimistic. One reviewer gave an "adequate" rating and did not elaborate further. The second reviewer gave an "excellent" rating and noted that the project has the potential to produce insights that could help groundwater from becoming inadvertently polluted by drywells. This reviewer wished to know how the proposal will add to the knowledge already recommended in the State Board's 2020 California Dry Well Guidance document.

b. How well do you think the technical approaches will achieve the study objectives and stated outcomes?

The reviewers did not agree about the achievability of the study's objectives and desired outcomes. One reviewer gave an "inadequate" rating and did not elaborate further. A second reviewer gave an "adequate" rating and said that while the technical approaches were "sound," the study's objectives should have been more ambitious. The third reviewer gave a "very good" rating and caveated this assessment by expressing concern that the project will be unable to generate statistically significant monitoring data, which would affect conclusiveness of study results.

c. Technical experience and qualifications of the study team?

The reviewers did not agree in their assessment of the study team's experience and qualifications. One reviewer gave a rating of "not applicable because of insufficient information" and cited a lack of information on key faculty investigators, including whether they've done equivalent comparable work, plus noted the study's reliance on students to help staff the project, which could lead to "challenges." A second reviewer gave an "adequate" rating and did not elaborate further. The third reviewer gave a "very good" rating and expressed confidence in the study team's expertise.