

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
AMENDMENT OF JOINT FUNDING AGREEMENT
FOR
WATER RESOURCES INVESTIGATIONS

This amendment is for the agreement dated April 1, 2019

Paragraphs 2a and 2b of the agreement are hereby modified to read as follows:

- (a) \$10,000 by the party of the first part during the period April 1, 2019 to December 31, 2019.
- (b) \$149,600 by the party of the second part during the period April 1, 2019 to December 31, 2019.

The Joint Funding Agreement (JFA) between the USGS and Washington State Department of Ecology for a fixed priced agreement "to provide scope of work for watershed basin delineations and technical assistance to plan for round two of status and trends sampling Stormwater Action Monitoring" is hereby amended to add reimbursable funds in the amount of \$117,600 and USGS funds in the amount of \$10,000 and to extend the end date to December 31, 2019.

Total funding from Washington State Department of Ecology for this work is changed to total funding at \$149,600 and will be billed quarterly. Total funding for this project work is \$159,600.

All remaining terms and conditions as included in the original JFA agreement are unchanged.

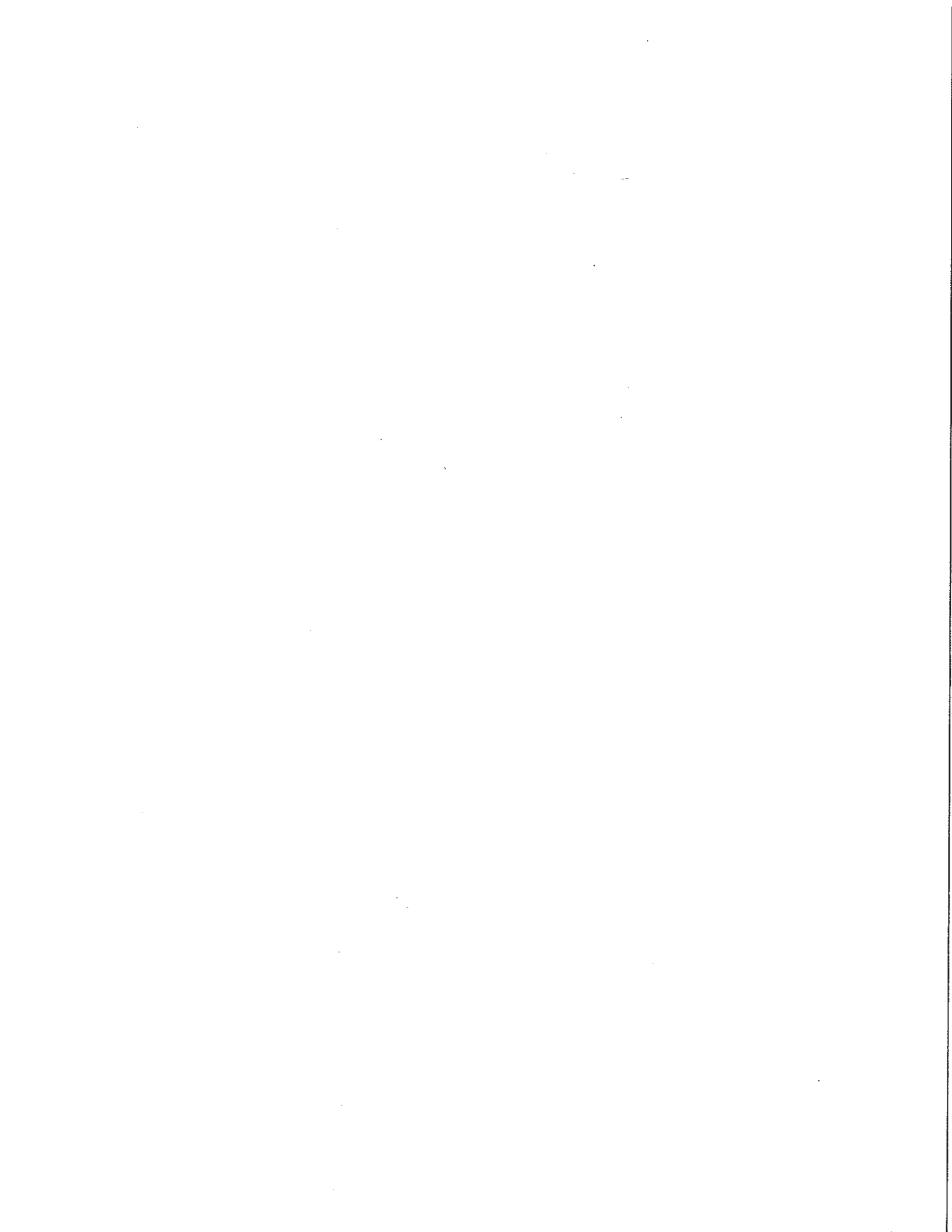
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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Amendment __ Attachment B

Scope of Work for site selection and set up of year one sites for the small stream status and trends sampling for the Stormwater Action Monitoring (SAM) program

Prepared by US Geological Survey, Washington Water Science Center

Final Draft - July 16, 2019

Background

The Stormwater Action Monitoring (SAM) program is a cumulative regional monitoring effort collectively funded by the Phase I and II Municipal Stormwater Permittees in the Puget Sound region of Washington State. Under the SAM program, there is a regional effort to document and track the status and trends of small streams and the marine nearshore in the Puget Lowlands with respect to water chemistry, sediment chemistry, habitat and biota (mussels, algae and macroinvertebrates).

The first round of the SAM small streams and nearshore work took place in 2015 and analysis of that data was released in 2018 (DeGasperi and others, 2018) and 2017 (Lanksbury and others, 2017), respectively. In the small streams report, several changes to how stream sites are selected for future rounds of SAM small streams work were proposed. These changes along with an updated, higher-resolution, national hydrography dataset (NHD) have made it necessary to redraw the master sample list for candidate stream sites for round two of this program slated to begin in 2020. The master sample list generates a spatially balanced and random sample site list that can be used in probabilistic studies within the Puget Lowland ecoregion. The probabilistic approach allows one to collect data at a subset of randomly chosen sites and extrapolate the findings to unsampled sites within the study area.

The reselection of the round two small stream sites is being conducted by the U.S. Geological Survey and is ongoing. It is expected that the new list of sample sites will be available by August 2019 and at this time site reconnaissance for the first round of sites will need to be completed. This amended scope of work outlines additional tasks the USGS will complete after the GIS analysis and the new list of candidate SAM sites is finalized.

The USGS was asked to provide technical assistance with these next steps because of their experience conducting site selection for the original SAM sites in 2015 as well as experience installing and maintaining pressure transducers (i.e. level loggers) for stream depth, which are now included as part of the base program for small streams monitoring in the SAM program.

Objectives

This Scope of Work includes two additional tasks in support of the SAM small streams program:

Task 1. Conduct site reconnaissance and selection of 35-40 small streams sites for the first round of SAM streams sampling in 2020 based on the new master sample list.

Task 2. Purchase and deploy level loggers for each site that will be sampled in summer of 2020.

Task 3. Purchase and deploy continuous conductivity meters for some sampling sites in Task 2.

Approach

Task 1 – The final list of candidate small streams sites will be provided to USGS for this task by Ecology. Once the list is provided, the USGS will select 35-40 suitable small streams sites in the order they appear in the master list to be sampled in summer 2020. Site selection will begin using desktop reconnaissance to examine the site for access, potential landowner information, and suitability for the SAM program. For each site that looks acceptable, a field visit will take place to verify the site will work for the SAM program. This verification will include (1) access to the site is possible either through right of way or private landowner permission, (2) the site is safe to sample, (3) there is a long enough reach to conduct the summer watershed health measure (WHM) sampling, which includes sampling for invertebrates, algae and habitat along a 150 meter (or greater) reach, and (4) there is flow at the site.

The goal is to conduct the site selection process during summer (August to September) to confirm there is still flow during the time when the WHM will take place in 2020. During the 2015 SAM small streams sampling, several sites had to be dropped because there was no flow present during the summer sampling. A recommendation for round 2 of SAM small streams sampling was to conduct site selection at the same time the summer sample will take place so the number of sites that might be dropped is reduced.

Detailed records of the site selection process, including reasons for sites being dropped will be kept and archived.

Deliverable 1: Final SAM sampling list of selected, dropped sites with brief site description and reasons for sites being dropped.

Task 2- Once the set of 35-40 final SAM sites are selected and confirmed, the USGS will purchase and deploy pressure transducers to measure stage at each location. A recommendation for round 2 of the SAM small streams program was to include continuous stage, an indicator of flow condition, at each site. Flow is an important factor to stream health and it was not included in the 2015 SAM small stream program. The stage data will be used to calculate several flow metrics known to correlate to biological condition and vary with watershed urbanization (DeGasperi and others 2009, Booth and Konrad, 2017). Ideally, a full year of stage data will be needed to calculate these metrics, so the goal is to have the level loggers installed at each site by October 1, 2019. In addition to the water level data, the loggers

also record temperature; therefore, a continuous record of stream temperature will also be available for each location.

Pressure transducer data for each stream will be used to calculate a continuous record of average stream depth in the reach which can be used to estimate various flow metrics such as the flashiness index (Booth and Konrad, 2017). To calculate depth at each site, the pressure transducer must be corrected to the local barometric pressure to determine the pressure of the water column only. Therefore, two (2) pressure transducers are needed per site, one for the water pressure, and one for the local barometric (air) pressure. For 35 stream sites, at least 70 pressure transducers will be needed. Since it is possible some may be lost or damaged, a total of 75 is recommended to have on hand to start up the SAM small stream monitoring. This equipment will be continuously used in subsequent monitoring years. Unused pressure transducers will be stored at the USGS office in Tacoma and available to other SAM projects if they are not being used.

Prior to deployment, each level logger will be checked for depth and temperature in the laboratory. Level loggers will be placed in a calibrated tank to check the pressure at 2 different water levels. For temperature, a 5-point check will take place in a constant temperature water bath. The 5-point temperature check will follow standard USGS protocols and occur prior to and at the end of deployment to document instrument drift.

Deployment of the level loggers in the field will follow USGS guidelines and recommendations for measuring stage (Sauer and Turnipseed, 2010) and procedures used during a recent (2015) USGS study in Puget Sound (Sheibley and others, 2017). The USGS Puget Sound study focused on the same types of streams for the SAM study so those procedures are directly applicable for the SAM study. Each site will provide unique conditions for the installation of the instream level loggers and installation will vary on a site by site basis. Briefly, each level logger will be enclosed in a protective PVC housing and attached to an anchor to the stream bed consisting of a fence post, rebar, or angle iron. The PVC housing will have multiple holes drilled into it to allow connection to the stream yet provide protection of sensors from debris during high flow. Each level logger will be installed off the bottom of the streambed to ensure they are not buried during their deployment and stage will be related to stream depths measured during the WHM in summer 2020.

Note, this task does not include the continued operation, maintenance, and downloading of the transducer data; this task only includes the deployment and setup of the loggers. Funding to download, conduct field checks, and maintain the loggers will be included in future contracts by the agency (or agencies) responsible for conducting the core SAM small stream monitoring program.

Deliverable 2: Confirmation email of level logger deployment completion and photo of each site with deployed level logger.

Task 3-The USGS will be contributing federal matching funds \$10,000 in order to collect additional continuous conductivity data at sampling sites. USGS will share the data and the task outcomes with SAM. As the funding for this task is provided by USGS, no deliverables are required.

Schedule

The timeline for this project will begin once the Joint Funding Agreement is signed and take approximately 3 months to complete. Field reconnaissance visits for candidate small streams sites are expected to take place in August and September 2019 during low flow to help ensure that channels will not be dry during the planned summer sampling in 2020. As much as possible, deployment of the two pressure transducers will take place at the same time as field site reconnaissance and site selection to minimize expenses from field visits. However, there will be cases that more than one site visit will be needed. All work for these two tasks will be completed by October 31, 2019, with an emphasis of having as many sites as possible done by October 1, 2019, the start of the water year.

Task or Element	FY 2019	FY 2020
	July-Sept	October
Task 1 – Site Selection	X	
Task 2 – Deploy pressure transducers	X	X
Task-3-Deploy conductivity meters	X	X

Costs

The total cost for this work is \$117,600. This estimate includes salary for two people for approximately 6 weeks for site selection and deployment of pressure transducers. It also includes the purchase cost of 75 pressure transducers (unit cost for transducer is \$299), and field supplies needed to deploy them. A detailed budget is provided below.

Budget Item	Task 1	Task 2	Task 3
Salary	\$14,900	\$24,850	
Travel	\$1,000	\$2,000	
Equipment		\$22,425	\$10,000
Supplies for deployment		\$7,575	
Vehicles	\$600	\$600	
Total direct cost	\$16,500	\$57,450	\$10,000
Total indirect cost	\$10,000	\$33,650	
Total by task	\$26,500	\$91,100	\$10,000

References cited

Booth, D. B. and C. P. Konrad (2017). Hydrologic metrics for status-and-trends monitoring in urban and urbanizing watersheds. *Hydrological Processes* 31(25): 4507-4519.

DeGasperi, C. L., H. B. Berge, K. R. Whiting, J. J. Burkey, J. L. Cassin and R. R. Fuerstenberg (2009). Linking hydrologic alteration to biological impairment in urbanizing streams of the Puget Lowland, Washington, USA. *Journal of the American Water Resources Association* 45(2): 512-533.

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Lanksbury, J., B. Lubliner, M. Langness, and J. West, 2017, Stormwater Action Monitoring 2015/16 mussel inventory survey, Final report August 9, 2017, Washington State Department of Fish and Wildlife, Olympia, WA, 124 p.

Sauer, V.B., and Turnipseed, D.P., 2010, Stage measurement at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A7, 45 p. <https://pubs.usgs.gov/tm/tm3-a7/>

Sheibley, R.W., Morace, J.L., Journey, C.A., Van Metre, P.C., Bell, A.H., Nakagaki, Naomi, Button, D.T., and Qi, S.L., 2017, Design and methods of the Pacific Northwest Stream Quality Assessment (PNSQA), 2015: U.S. Geological Survey Open-File Report 2017-1103, 46 p., <https://doi.org/10.3133/ofr20171103>.