



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

## **AMENDMENT NO. 2**

TO

CONTRACT NO. 1500077

BETWEEN THE

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

AND

KING COUNTY

**PURPOSE:** To amend the Agreement between the state of Washington, Department of Ecology, hereinafter referred to as “ECOLOGY” and KING COUNTY, hereinafter referred to as “KING COUNTY” or “CONTRACTOR”.

**WHEREAS:** This Agreement is undergoing a substantial extension and increase in scope in adding Attachment C to agreement to implement data analysis on the monitoring data collected under Attachments A and B of original agreement.

**IT IS MUTUALLY AGREED** the agreement is amended as follows:

- 1) The project end date is changed from April 15, 2016 to April 15, 2018.
- 2) The total amount for this contract is increased by \$150,520; from \$416,947 to \$567,467.
- 3) Attachment C- King County RSMP Streams Data Analysis Scope of Work is added to this agreement. Tasks C1-C4 describe new work to analyze and report on the study findings.



## Attachment C King County RSMP Streams Data Analysis Scope of Work

### **Project Summary: Puget Lowland Small Streams Monitoring for the RSMP**

The Regional Stormwater Monitoring Program (RSMP) small streams component will use technical analytical teams from King County, Ecology, U.S. Geological Survey (USGS) and the Puget Sound Partnership to accomplish data analysis and reporting. The small streams focus for monitoring is water quality and "watershed health" (physical habitat, sediment chemistry, and biological communities) of wadeable streams. King County is one of these entities (referred to as RSMP Contractors) who will conduct analysis and reporting for the RSMP small streams 2015 sampling program. King County will work closely with Ecology, USGS and the PSP to analyze and report on the results of this sampling program, through the following tasks and deliverables.

### **Project Activities and Tasks**

Task C1: **RSMP Stream Data Status Assessment**

Task C2: **Comparison of probabilistic to targeted programs**

Task C3: **Recommendations for future RSMP small steam monitoring**

Task C4: **Project Status Updates**

### **Project Schedule**

Calendar Year	2016				2017	
	1	2	3	4	1	2
1. Status Assessment						
2. Comparison of RSMP to targeted sites						
3. Informing future RSMP monitoring						
4. Project Status Updates						

### **Detailed Descriptions of Tasks and Deliverables**

King County staff will work closely with Ecology, USGS and the PSP to analyze and report on the results of this sampling program, through the following tasks and deliverables.

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#### **Task C1: RSMP Stream Data Status Assessment.**

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(Total Estimated Cost \$=47,400)

Water, sediment and benthic macroinvertebrate data will be used to answer the first question on status of the streams meeting numeric freshwater and sediment Washington state criteria (WAC 173-201A; WAC 173-204-563). In addition the Water Quality Index score will be calculated, where possible. All of the data will be "rolled-up" as a categorical group for the assessment strata (within and outside UGAs). Where various designated beneficial uses have multiple water quality standards (e.g. temperature), the analysis will not be done at the reach level, but rather summarized to tell the broader story.

The analysis will investigate what natural and human activity "predictor variables" help explain the scores found at the RSMP small stream sites. Additional data will be gather and correlated to the small streams data response variables gathered (water and biological quality). Advanced statistical approaches to evaluate correlations between predictor and response variables will be employed (e.g., relative and attributable risk, or boosted regression trees) for the identified key variables. Data analysis tools will include the use of R

stats, Access, Excel, or other programs to produce summary statistics, graphics (boxplots, charts), and tables.

<b>Deliverable</b>	<b>Description</b>	<b>Relates to subtasks<sup>1</sup></b>	<b>Estimated Cost</b>	<b>Deliverable Target Date</b>
<b>C1.1</b>	Compile appropriate numeric screening thresholds for water, habitat, sediment and biota data (e.g., numeric thresholds for fair, good, poor or supporting and not supporting). Products will include an electronic list (Word or Excel) format.	1.3	\$1,200	June 30, 2016
<b>C1.2</b>	Choose independent variables to include in analysis and calculate them (e.g., buffer or contributing watershed). Products will include an electronic list (Word or Excel) format.	1.8	\$4,800	June 30, 2016
<b>C1.3</b>	Conduct GIS analysis to calculate factor metric values (drainage area, percent impervious, etc.) for each site. Products will be in ArcGIS and Excel tabular format and include multipurpose maps.	1.9	\$9,600	June 30, 2016
<b>C1.4</b>	Assist team by providing standard curves for sites located in KC to assist with calculation of WQI. Provide electronic file with flow and WQI parameter data to be used for development of standard curve for a typical small stream in King County lowlands.	1.11	\$600	June 30, 2016
<b>C1.5</b>	Develop CDFs for each water, sediment, habitat metrics for data collected within and outside UGAs and PS lowland ecoregion.	1.12	\$4,800	June 30, 2016
<b>C1.6</b>	Conduct categorical analysis for metrics with screening thresholds for data collected within and outside UGAs and compare	1.13	\$9,600	July 30, 2016
<b>C1.7</b>	Conduct relative risk analysis using stressor metrics with defined thresholds if possible. Identify which are the response variables of interest (e.g., B-IBI and periphyton) and which are the independent variables to test (e.g., land cover, water and sediment quality and habitat measures). Assume the thresholds are easy to define either from existing data or from simple percentiles.  Assist team with preparation of handouts for workshop; brief report summarizing themes from comments. Co-host workshop to present results to SWG/FWG and permittees, collect comments for additional analyses.	1.17  1.19	\$4,800	September 30, 2016
<b>C1.8</b>	Present results in draft and final report and summary handouts. Include CDFs and box plots, categorical assessments in terms of % of sites in good, fair, and poor condition inside and outside UGAs, PS lowland whole. Identify variables that correlate with stream quality.  Discuss results from comparisons to standards, relative risk/attribution effort, signal to noise analyses, and discern valuable parameters for the future RSMP small streams trend program.	1.20	\$12,000	December 31, 2016 for draft; March 31, 2017 for final

Deliverable	Description	Relates to subtasks <sup>1</sup>	Estimated Cost	Deliverable Target Date
	Recommendations for parameters and also frequency of the various RSMP small stream monitoring components (flow, bug, water quality, sediment quality) will be made to both the Stormwater Work Group and Freshwater Work Group.			

<sup>1</sup> = subtask numbering relates to the QAPP addendum spreadsheet of tasks for all team members. Only King County lead sub-tasks are outlined here.

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**Task C2: Comparison of probabilistic to targeted programs**

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(Total Estimated Cost \$ = \$22,920)

RSMP small streams sites were chosen from the Washington State Master Sample which was created using EPA’s generalized random-tessellation stratified (GRTS) design. In the Pacific Northwest, there are several other stream monitoring programs that also use the same randomized study design. RSMP small streams monitoring randomized design was chosen such that results represent the entire Puget Lowlands ecoregion and the Puget Sound Salmon Recovery Region. Targeted (non-randomized) stream monitoring programs also exist in this same region, and the comparability of these programs to the RSMP is unknown. Some local jurisdictions collect extensive stream datasets, and in terms of methods and protocols may be very similar to the RSMP.

An evaluation of the comparability or usability of larger scale targeted stream monitoring programs will be conducted within a reasonable effort and given the resources available. Water quality, benthos, or sediment data from a select set of targeted stream monitoring programs (listed below) will be solicited and if provided in compatible formats, compared to the RSMP stream data if time and resources allow.

- Sources will be Puget Sound counties and cities.

The approach to the analysis is to create 4 groups within UGA, outside UGA, and a random vs targeted data set. Key response metrics (e.g., B-IBI and selected water quality and sediment quality variables) for each of the four groups will be evaluated.

Deliverable	Description	Relates to subtasks <sup>1</sup>	Estimated Cost	Deliverable Target Date
<b>C2.1</b>	Inventory data collection efforts by other existing stream monitoring programs: King Co Status and Trends	2.1.c	\$120	May 31, 2016
<b>C2.2</b>	Develop screening criteria for selection of data for use in this study including available documentation on QA/QC procedures	2.2	\$600	May 31, 2016
<b>C2.3</b>	Compile water, sediment, habitat, and biota data from selected monitoring programs. (If partner wants us to use their data, then it needs to be in a ready form for us to use.)	2.3	\$4,800	July 31, 2016
<b>C2.4</b>	Develop and compare CDFs for each water, sediment, habitat, and biological metric for each program	2.4/2.5	\$9,000	July 31, 2016

<b>Deliverable</b>	<b>Description</b>	<b>Relates to subtasks<sup>1</sup></b>	<b>Estimated Cost</b>	<b>Deliverable Target Date</b>
<b>C2.5</b>	Present results in draft and final report sections; and summary handouts. Discuss results comparing probabilistic and target programs. Include CDFs and box plots, categorical assessments in terms of % of sites in good, fair, and poor condition inside and outside UGAs, PS lowland whole.	2.6	\$7,200	September 30, 2016 for draft report section; November 30, 2017 for final
<b>C2.6</b>	Assist team in preparation of a short handout for SWG	2.7	\$600	September 30, 2016
<b>C2.7</b>	Summarize analysis options from team members for RSMP Coordinator for optional additional analyses related to targeted programs. Tee up choices about which analyses to pursue, descriptions of issue and options for decisions; short summary of people contacted, themes, for analysis and decisions made.	2.8	\$600	September 30, 2016

<sup>1</sup> = subtask numbering relates to the QAPP addendum spreadsheet of tasks for all team members. Only King County lead sub-tasks are outlined here.

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**Task C3: Recommendations for future RSMP small stream monitoring**

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(Total Estimated Cost \$ = \$46,200)

The 2015 RSMP small streams data collection effort captures a wide range of parameters. Based on the data analysis for status assessments and comparisons to other monitoring efforts, the SWG seeks feedback on what are the recommended changes to the streams monitoring effort to become more relevant, efficient and purposeful in answering stormwater management impact questions.

<b>Deliverable</b>	<b>Description</b>	<b>Relates to subtasks<sup>1</sup></b>	<b>Estimated Cost</b>	<b>Deliverable Target Date</b>
<b>C3.1</b>	Estimate components of variance for metrics with repeat-sample data from other programs, estimate precision, identify metrics with sufficient precision for detecting differences in stream quality (e.g., temporal variance < spatial variance)	3.1	\$9,600	June 30, 2016
<b>C3.2</b>	Calculate variance of monthly water quality values, evaluate seasonal patterns, estimate the increase in precision from monthly sampling	3.2	\$4,800	June 30, 2016
	Assist team with communicating results and options for RSMP coordinator and SWG	3.2.a	\$600	June 30, 2016
<b>C3.3</b>	Evaluate statistical power to detect trends based on estimated precision of selected metrics, determine the number of samples to detect a specified (e.g., 25%) change in stream quality	3.3	\$9,600	June 30, 2016
	Interpret results and options. Assist team with communicating results and options for RSMP coordinator and SWG.	3.3.a	\$600	June 30, 2016

<b>Deliverable</b>	<b>Description</b>	<b>Relates to subtasks<sup>1</sup></b>	<b>Estimated Cost</b>	<b>Deliverable Target Date</b>
<b>C3.4 (optional)</b>	The RSMP Coordinator will give permission to conduct this optional work. This deliverable with approval will examine spatial correlation of stream quality for nested sites, identify criteria for “spatially-independent sites”	3.4	\$2,400	September 30, 2016
<b>C3.5 (optional)</b>	The RSMP Coordinator will give permission to conduct this optional work. This deliverable with approval will describe based on a couple parameters (Cu, TSS, maybe another) likely sources, transport, and potential effects of stormwater management (structural/non-structural, source control, etc.); identify key gaps in understanding how stormwater management affects key parameter/pollutant	3.5	\$2,400	September 30, 2016
<b>C3.6</b>	Interpret results and options for answering SWG questions about WQ; meet with scientists, provide written comments to scientists	3.5.a	\$600	September 30, 2016
<b>C3.7</b>	Assist team with preparation of short written description of data to be collected for the next round of adaptive management.	3.6	\$1,200	September 30, 2016
<b>C3.8</b>	Write draft report sections related to this task. Incorporate comments for final report.	3.7	\$14,400	December 31, 2016 for draft; March 31, 2017 for final

<sup>1</sup> = subtask numbering relates to the QAPP addendum spreadsheet of tasks for all team members. Only King County lead sub-tasks are outlined here.

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**Task C4: Project Management and Project Status Updates**

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Total Estimated Cost \$ = \$ 34,000 (estimated \$5,667 per quarter for six quarters)

A series of communication products (presentations, short summaries, and factsheets) will be developed to communicate among team members, between agencies and for the PSEMP workgroups (particularly SWG and FWG). These products will present findings as they relate to the five priority questions introduced at the beginning of this addendum.

All project team members will work cooperatively with other team members. King County as the lead scientist will coordinate work among team members and coordinate preparation of quarterly calls with the scientists and prepare quarterly updates to the RSMP Coordinator to be used for PRO-C and SWG meetings. These updates will be via email and refer to the progress, accomplishments and concerns relating to the project’s tasks.

<b>Deliverable</b>	<b>Description</b>	<b>Relates to subtasks<sup>1</sup></b>	<b>Estimated Cost</b>	<b>Deliverable Target Date</b>
<b>C4.1</b>	Project management and quarterly project status updates	3.1	\$34,000	End of Quarter Dates: March, June, September, and December in 2016, and March and June in 2017

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**King County – Budget Detail by Task**

	Task C1. Stream data status assessment	Task C2. Comparison of probabilistic to targeted programs	Task C3. Recommendations for future RSMP small stream monitoring	Task C4. Project management and project status updates	Total
Total Estimated Costs	\$47,400	\$22,920	\$46,200	\$34,000	\$150,520