DEPARTMENT OF
ECOLOGY
State of Washington

AMENDMENT NO. 4

To

IAA No. C1500059

INTERAGENCY AGREEMENT (IAA) BETWEEN

THE STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY AND

CITY OF REDMOND

PURPOSE: To amend the Agreement between the state of Washington, Department of Ecology, hereinafter referred to as "ECOLOGY" and CITY OF REDMOND, hereinafter referred to as "CITY," or "CONTRACTOR".

WHEREAS: This Agreement is undergoing an increase in scope and extension of the timeline to allow for completion of the work described in the new Appendix D.

IT IS MUTUALLY AGREED the agreement is amended as follows:

1) The project end date is changed from June 1st, 2020 to December 31st, 2022.
2) Compensation is increased for additional work added by this amendment. The total is changed from $1,775,755 to $2,646,849.85, an increase of $871,094.85.
3) Appendix D is new to the Statement of Work adding 2 years of monitoring. Appendix D has three tasks (D1.0, D2.0, and D3.0) to continue monitoring of the flow, water, sediment, physical habitat, and biological quality at the study sites for January 1, 2020 to December 31, 2021; and two tasks (D4.0 and D5.0) for a trend analysis report for Water Years 2016 – 2019 and Water Years 2016 – 2021.
4) The project representative from Redmond is changed to Jessica Atlakson.

All other terms and conditions of the original Agreement including any Amendments remain in full force and effect, except as expressly provided by this Amendment.

This Amendment is signed by persons who represent that they have the authority to execute this Amendment and bind their respective organizations to this Amendment.

This Amendment is effective when executed by ECOLOGY.

IN WITNESS WHEREOF: the parties have executed this Amendment

State of Washington Department of Ecology	**City of Redmond**
By:	By:
Signature Date	Signature Date
Print Name: Polly Zehm	Print Name:
Title: Deputy Director	Title: Mayor
Approved as to form only: Office of Attorney General	Approved as to form: _____ City Attorney

APPENDIX D

STATEMENT OF WORK FOR JANUARY 1, 2020 THROUGH December 31, 2021

Background

The City of Redmond (REDMOND) has a Citywide Watershed Management Plan (WMP) to implement structural and nonstructural stormwater controls pursuant to the Phase II municipal stormwater permit. This Redmond Paired Watershed Study (RPWS) will study and quantify improvements in receiving water conditions based on implementing the WMP controls. This RPWS will measure various hydrologic, chemical, physical, and biological indicators of stream health. The RPWS was initiated in the fall of 2015 and will be implemented over an anticipated ten-year timeframe. Funding comes from the Stormwater Action Monitoring (SAM) program, a coordinated monitoring program founded by Phase I and II municipal stormwater permittees and administered by Ecology.

This scope of work in Appendix D continues field measurement collection, data management, quality assurance review, data analysis, and reporting for this study over the last three quarters of water year 2020 (a water year is defined as the 12-month period that extends from October 1 in any given year through September 30 of the following year), all of water year 2021 and the first quarter of water year 2022. Two additional tasks in Appendix D includes a trend analysis report for water years 2016 – 2019 and water years 2016 – 2021. Additional monitoring and trend analysis for the study in subsequent years would occur under a new contract or addendum to this contract. The monitoring will follow the already approved quality assurance project plan (QAPP) for this Paired Watershed study.

This scope of work includes a discussion of the activities, assumptions, deliverables, and a schedule associated with the following tasks:

- Task D1.0 – Last three quarters of Water Year 2020 Study Implementation
- Task D2.0 - Water Year 2021 Study Implementation
- Task D3.0 – First quarter of Water Year 2022 Study Implementation
- Task D4.0 - Trend Analysis Report: Water Years 2016 - 2019
- Task D5.0 - Trend Analysis Report: Water Years 2016 – 2021

Work on these tasks will be performed by REDMOND with assistance from Herrera Environmental Consultants (Herrera), and King County. REDMOND, Herrera, and King County are collectively referred to as the “Project Team” in this scope of work. Where applicable, specific roles for each member of the Project Team are called out under individual tasks. The cost by deliverable, and schedule are included in the table at the end of this Scope of Work.

Task D1.0 – Last three quarters of Water Year 2020 Study Implementation

Under this task, the Project Team will implement required monitoring activities identified in the QAPP for the RPWS over the final three quarters water year 2020 (January 1, 2020 through September 30, 2020). This would include field measurement collection, data management and quality assurance review, and reporting. These activities are described in more detail under the following subtasks:

Subtask D1.1 - Hydrologic Monitoring

REDMOND has subcontracted with King County to continue the hydrologic monitoring component of the RPWS through Water Year 2020. This involves continuous flow monitoring at 14 stations in seven watersheds. Data from the continuous flow monitoring will be processed to calculate a suite of indicators for evaluating hydrologic impacts from urban development. King County will continue hydrologic monitoring which involves maintenance of the continuous flow monitoring equipment and replacement as needed, telemetry where cell phone coverage is available, maintenance of the automatic processing, and posting of data on King County's Hydrological Information Center (HIC) database on their public website. King County will perform a quality assurance review on these data that will clearly identify any limitations to their use by January each calendar year for the prior water year's data. Herrera will generate summary statistics (e.g., antecedent dry period, flow at time of sample collection) from the flow record for storm and base flow events that were sampled for water quality under Subtask D1.2. These statistics will be stored in the data management system developed for this project and presented in the data report described under Subtask D1.6. These statistics will be used in analyses to detect trends in water quality that will be performed in Task D4.0 and D5.0. REDMOND will coordinate the project team members (Herrera and King County) to summarize the continuous flow monitoring data for each station for presentation in the data report described in Subtask D1.6.

Assumptions

- Telemetry and database all continue to work without problems.
- Equipment will be replaced as it reaches maximum manufacturer's life expectancy.

Deliverables

- Posting of telemetered data on HIC (continual).
- Posting of non-telemetered data on HIC will occur every 5 weeks.
- Table with flow summary statistics for sampled storm and base flow events from 14 stations.

Subtask D1.2 – Water Quality Monitoring

REDMOND subcontracted with Herrera for the water quality monitoring component of the RPWS. This involves the collection of up to twelve grab samples over the water year during storm events (three each quarter) at 14 stations. In addition, up to four grab samples will be collected over the water year during base flow (one each quarter) at these stations. Each sample will be analyzed for the following indicators for evaluating water quality impacts from urban development:

- Total suspended solids

- Turbidity
- Conductivity
- Hardness
- Dissolved organic carbon
- Fecal coliform bacteria
- Total phosphorus
- Total nitrogen
- Copper, total and dissolved
- Zinc, total and dissolved

In addition, probes will be used for continuous in-situ monitoring of temperature at all 14 stations and conductivity at a subset of 9 stations.

Collection of grab samples during both storm and base flow events will include the following activities performed in accordance with the QAPP for the study:

- Weather tracking and go/no go decision coordination
- Mobilization of field crews for sampling during the event
- Delivery of samples to the laboratory after the event
- Auditing of laboratory analytical results within seven days of their receipt
- Entry of the analytical results into the study's data management system
- Preparation of a data validation memorandum that will establish the usability of all the data
- Preparation of graphical and tabular summaries for the data report described in Subtask D1.6

REDMOND will ensure coordination between the project team members. King County will oversee the continuous in-situ monitoring at each station using the probes. Herrera will coordinate with King County to provide review of continuous data and summarize them for presentation in the data report described in Subtask D1.6.

Assumptions

- Storm event sampling will be performed by two teams of two Herrera staff. Sampling for each event will be performed over an 8- hour period including travel but not including storm tracking and go/no go decision coordination. A 15 percent contingency is included to account for sampling event false starts and allow for make-up sampling.
- Nominally, all 14 stations will be sampled during each storm event. If specific stations are not sampled because a sampling event was terminated, they will be prioritized for sampling in subsequent events to ensure the annual sampling goals established for the study are met for every station.
- Base flow event sampling will be performed by one team of two Herrera staff. Sampling for each event will be performed over a 10- hour period including travel.

- King County will provide continuous water quality monitoring data in an electronic format for review by Herrera. King County will perform a quality assurance review on these data that will clearly identify any limitations to their use and interpretation.
- Obtaining storm event samples may not be possible during particularly dry quarters. If this should occur, efforts will be made to conduct makeup sampling in subsequent quarters to obtain twelve grab samples from each station over the water year.

Deliverables

- Laboratory analytical results and documentation of Herrera audits for 14 stations from 16 sampling events (12 storm events + 4 base flow events) uploaded to the Environmental Information Management (EIM) database.
- Data validation memorandum.

Subtask D1.3 – Sediment Quality Monitoring

The sediment quality monitoring component of the RPWS involves the collection of sediment samples once during the water year at 19 monitoring stations. Each sample is analyzed for the following indicators for evaluating sediment quality impacts from urban development:

- Total organic carbon
- Copper
- Zinc
- Polycyclic aromatic hydrocarbons
- Phthalates

This task is to collect stream sediment samples. This includes the following activities that will be performed in accordance with the QAPP for the study:

- Mobilization of field crews for sampling
- Delivery of samples to the laboratory after the event
- Auditing of laboratory analytical results within seven days of their receipt
- Entry of the analytical results into the study's data management system
- Preparation of a data validation memorandum that will establish the usability of all the data

Assumptions

- Sediment samples and the benthic macro invertebrate samples described in Subtask D1.5 will be collected during the same field visit to each station. This sample collection will be performed by one team having two Herrera staff. Collection of these samples from 3 stations will require approximately 8-hours of field time including travel.

Deliverables

- Laboratory analytical results and documentation of Herrera audits for 19 stations.

- Data validation memorandum.

Subtask D1.4 - Physical Habitat Monitoring

Under this subtask, REDMOND will ensure Herrera is trained and conducts physical habitat monitoring for the RPWS once during the water year at 19 monitoring stations. Herrera will coordinate directly with Ecology's Environmental Assessment Program (EAP) for training, data management, and quality control of habitat data. At each station, the characteristic bed-form type will be recorded as a whole, and physical habitat quality indicators will be measured at 11 cross sections and one longitudinal (thalweg) profile. Pursuant to the QAPP for the study, the following indicators will be measured at each cross-section:

- Bank-full width, wetted width, and cumulative bar width
- Bank-full depth, wetted depth, substrate class and embeddedness
- Fish cover
- Riparian shading
- Riparian vegetation structure

The following indicators will be measured along the thalweg profile:

- Thalweg depth and the presence of bars and/or edge pools
- Main channel slope and bearing
- Large woody debris tally, including notation of diameter, length, category, zone, and key-pieces

Upon completion of field work, physical habitat monitoring data will be uploaded to the EIM. Based on post processing of these data within this system, Ecology will provide a suite of indicators for assessing physical habitat quality that are consistent with those being used for the broader SAM program. A summary of these indicators will be presented in the data report described in Subtask D1.6.

Assumptions

- Two Herrera staff will participate in an Ecology sponsored 2-day training session on the physical habitat monitoring protocols developed for the SAM program. These staff will coordinate an additional 1-day training session for two additional Herrera staff that will be involved in the monitoring.
- Physical habitat monitoring will be performed by two teams having two Herrera staff. Physical habitat monitoring at each station will require approximately 8-hours of field time including travel.
- Data from the physical habitat monitoring will be recorded on custom forms while in the field. The custom forms will be reviewed in the field upon completion of the monitoring at each station to ensure all required data have been collected. In an office setting, data from the custom forms will then be transferred to the electronic field data collection software that has been developed by Ecology to ensure completeness in field data collection, and facilitate upload of these data to Ecology's Watershed Health database in the EIM. Ecology's Environmental

Assessment Program will perform quality assurance review of the compiled physical habitat monitoring data and calculate metrics for assessing physical habitat conditions using scripts that have been developed to work with the Watershed Health database in the EIM. Costs for EAP's support for these activities are not included in the cost proposal for this scope of work.

- A delay of approximately 4 months can be expected for obtaining processed metrics for assessing physical habitat conditions from EAP via the Watershed Health database in the EIM system.

Deliverables

- Results from physical habitat monitoring at 19 stations that are uploaded to Watershed Health database in the EIM.

Subtask D1.5 - Biological Monitoring

Under this subtask, REDMOND will ensure Herrera conducts biological monitoring for the RPWS once during the water year at 19 stations. Pursuant to the QAPP for the study, this entails the collection of a composite sample of benthic macro invertebrates from specific locations along the cross-sections for physical habitat monitoring that are described in Subtask D1.4. These samples will be submitted to an analytical laboratory where they will be processed to compute the following indicators for use in evaluating stream health:

- Benthic Index of Biotic Integrity
- Taxa Richness
- Ephemeroptera Richness
- Plecoptera Richness
- Trichoptera Richness Clinger Percent
- Long-Lived Richness
- Intolerant Richness
- Percent Dominant
- Predator Percent
- Tolerant Percent

Assumptions

- Benthic macro invertebrate samples and the sediment samples described in Subtask D1.3 will be collected during the same field visit to each station. This sample collection will be performed by one team having two Herrera staff. Collection of these samples from 3 stations will require approximately 8-hours of field time including travel.
- A delay of approximately 3 months can be expected for obtaining biological metrics from the contract lab.

Deliverables

- Laboratory results from macroinvertebrate sample analysis for 19 stations entered into the Puget Sound Stream Benthos database.

Subtask D1.6- Water Year Data Summary Report

A data summary report will contain tabular and/or graphical summaries of all data that were collected over the water year in connection with the following monitoring components of the RPWS: hydrologic, water quality, sediment quality, physical habitat, and biological. This report will provide a detailed description of any quality assurance issues associated with these data based on results from audits and data validation memoranda. Any corrective actions that were undertaken to address quality assurance issues will also be described. Finally, this report will document all rehabilitation efforts that have occurred in the Application watersheds over the previous year. Included will be detailed information on the design and operational status of structural stormwater controls and the frequency and geographic extent of nonstructural stormwater control implementation.

REDMOND will collaborate with Herrera and King County to prepare a preliminary draft of the data summary report. The draft will be sent to Ecology (SAM Coordinator) and the technical advisory committee that has been established for the study (see Subtask D1.7). Herrera will then finalize the water year report based on comments received. REDMOND will review and send to Ecology.

Deliverables

- Preliminary draft data summary report.
- Revised raft data summary report.
- Final Water Year 2019 data summary report.

Subtask D1.7 – Technical Advisory Committee Coordination

The technical advisory committee for this study includes representation from the following agencies: Ecology, King County, Kitsap County, City of Seattle, and the U.S. Geological Survey (USGS). This task is to coordinate and for the project team to participate in up to two meetings to obtain input from the committee on technical issues related to the study over water year 2020. It is anticipated that one of these meetings will occur after the release of the data report from Subtask D1.6 to review and discuss the monitoring results from the water year. Contingency budget is also provided for a second, optional meeting to address unforeseen issues that may arise during implementation of the RPWS over the water year.

Assumptions

- Technical advisory committee meetings will last 2-hours and be attended by up to 3 Herrera staff.
- King County presentation on hydrologic data and attended by up to 4 staff.

Deliverables

- King County presentation on hydrologic data.
- Meeting notes documenting discussion items and consensus decisions from the technical advisory committee.

Subtask D1.8 – Project Management

REDMOND and Herrera will share responsibilities for ongoing contract administration of this project, including preparing invoices and progress reports, as well as coordination of all work efforts with Ecology (SAM Coordinator) and the Project Team.

Deliverables

- Monthly invoices and progress reports.

Task D2.0 – Water Year 2021 Study Implementation

Under this task, REDMOND will ensure Herrera and King County implement required hydrologic and water quality monitoring activities identified in the QAPP for the RPWS over water year 2021 (October 1, 2020 through September 30, 2021). The activities, assumptions, and deliverables for Task D2.0 are identical to those for Task D1.0.

Task D3.0 – First Quarter of Water Year 2022 Study Implementation

Under this task, REDMOND will ensure Herrera and King County implement required monitoring activities identified in the QAPP for the RPWS over the first quarter of water year 2022 (October 1, 2021 through December 31, 2021). The activities, assumptions, and deliverables for Task D3.0 are identical to those for Subtasks D1.1, D1.2, and D1.8.

Task D4.0 –Trend Analysis Report: Water Years 2016 - 2019

Following completion of required monitoring for water year 2019 and preparation of the associated data summary report, REMOND will ensure Herrera prepares a trend analysis report covering data collected over the first 4 years of study implementation (water years 2016 – 2019). This report will summarize results from statistical analyses performed to detect improving or degrading trends in receiving water conditions in the seven watersheds that are the focus of monitoring efforts for the RPWS. A detailed discussion of these trends will be provided with a specific emphasis on relationships between trends and rehabilitation efforts in the Application watersheds relative to trends in the Reference and Control watersheds. A summary of major conclusions from these analyses will also be provided.

Statistical analyses will follow procedures that are described in the QAPP and documented in minutes from the technical advisory committee meeting that occurred on July 29, 2019. The following specific procedures will be performed in connection with these analyses:

- Correlation analyses to detect trends over time in water and sediment pollutant concentration data and computed indicators from hydrologic and biological monitoring.

- Computation of annual mass load estimates from data for a subset of parameters from water quality monitoring; correlation analyses would then be performed on these estimates to detect trends over time.
- Comparison of data from physical habitat monitoring to reference conditions from Puget Sound lowland ecoregion streams.
- Spatial statistical analysis to identified watershed characteristics that may be driving trends in computed indicators from biological monitoring.

REDMOND will collaborate with Herrera and King County to prepare a preliminary draft of the trend analysis report. The draft will be sent to Ecology (SAM Coordinator) and the technical advisory committee that has been established for the study (see Subtask D1.7). Herrera will then finalize the trend analysis report based on comments received. REDMOND will review and send to Ecology.

Communication of the trend findings report will include two (2) presentations of the design results, and interim-study conclusions to permittees and stakeholders. One of these presentations will be made to the Stormwater Work Group. The other can be made at a conference with a stormwater and regional focus (e.g. MuniCon), upon agreement with Ecology (SAM Coordinator). A draft SAM fact sheet for distribution on the SAM website will be drafted.

Assumptions

- Comments on the draft and revised draft trend analysis reports will be provided using a standardized template to be provided by Herrera.
- Herrera will spend up to 40 hours compiling or digitizing spatial datasets (such as the spatial extent of management actions in the larger watersheds draining to the study monitoring locations) to support the spatial statistical analysis.

Deliverables

- Preliminary draft trend analysis report.
- Draft trend analysis report.
- Final trend analysis report.
- Two presentations on study design and findings to date.
- Draft SAM factsheet on project findings to date.

Task D5.0 –Trend Analysis Report: Water Years 2016 – 2021

Following completion of required monitoring for water year 2021 and preparation of the associated data summary report, REDMOND will ensure Herrera prepares a trend analysis report covering data collected over the first 6 years of study implementation (water years 2016 – 2021). The activities, assumptions, and deliverables for Task D5.0 are identical to those for Task D4.0.

Task/Deliverable	Quantity	Total by Deliverable	Target Dates
Task D1.0 – Last three quarters of Water Year 2020 Study Implementation			
Subtask D1.1 Hydrologic Monitoring			
Posting of telemetered data on HIC (continual). Posting of non-telemetered data on HIC will occur every 5 weeks.	1	$70,465.20	
Table with flow summary statistics for sampled storm and base flow events from 14 stations.	1	$7,790	
Subtask Total		$78,255.20	1/31/2021
Subtask D1.2 Water Quality Monitoring			
Laboratory analytical results and documentation of Herrera audits for 14 stations X 16 sampling events	12	$98,160	
Data validation memorandum	1	$14,500	
Subtask Total		$112,660	1/31/2021
Subtask D1.3 Sediment Quality Monitoring			
Laboratory analytical results and documentation of Herrera audits for 19 stations	1	$17,100	
Data validation memorandum		$4,280	
Subtask Total		$21,380	1/31/2021
Subtask D1.4 Physical Habitat Monitoring			
Results from physical habitat monitoring at 19 stations that are uploaded to Ecology's data management system	1	$64,500	
Subtask Total		$64,500	1/31/2021
Subtask D1.5 Biological Monitoring			
Laboratory results from macroinvertebrate sample analysis for 19 stations entered into the Puget Sound Stream Benthos database or EIM	1	$15,400	
Subtask Total		$15,400	1/31/2021
Subtask D1.6 Water Year Data Summary Report			
Draft data summary report	1	$19,400	2/28/2021
Final data summary report	1	$4,860	4/30/2021
Subtask Total		$24,260	

Task/Deliverable	Quantity	Total by Deliverable	Target Dates
Subtask D1.7 Technical Advisory Committee Coordination			
King County presentation on hydrologic data	1	$3,958.96	
Meeting notes documenting discussion items and consensus decisions from the technical advisory committee.	2	$3,100	
Subtask Total		$7,058.96	3/31/2021
Subtask D1.8 Project Management			
Compiled progress reports from project team members (12 months)	9	$15,555.04	
Subtask Total		$15,555.04	9/30/2021
Task Total		**$339,069.20**	
Task D2.0 – Water Year 2021 Study Implementation			
Subtask D2.1 Hydrologic Monitoring			
Posting of telemetered data on HIC (continual). Posting of non-telemetered data on HIC will occur every 5 weeks.	1	$58,626.35	
Table with flow summary statistics for sampled storm and base flow events from 14 stations.	1	$8,020	
Subtask Total		$66,646.35	1/31/2022
Subtask D2.2 Water Quality Monitoring			
Laboratory analytical results and documentation of Herrera audits for 14 stations X 16 sampling events	16	$133,120	
Data validation memorandum	1	$14,800	
Subtask Total		$147,920	1/31/2022
Subtask D2.3 Sediment Quality Monitoring			
Laboratory analytical results and documentation of Herrera audits for 19 stations	1	$17,400	
Data validation memorandum		$4,360	
Subtask Total		$21,760	1/31/2022
Subtask D2.4 Physical Habitat Monitoring			
Results from physical habitat monitoring at 19 stations that are uploaded to Ecology's data management system	1	$66,300	
Subtask Total		$66,300	1/31/2022

Task/Deliverable	Quantity	Total by Deliverable	Target Dates
Subtask D2.5 Biological Monitoring			
Laboratory results from macroinvertebrate sample analysis for 19 stations entered into the Puget Sound Stream Benthos database	1	$15,700	
Subtask Total		$15,700	1/31/2022
Subtask D2.6 Water Year Data Summary Report			
Draft data summary report	1	$20,000	2/28/2022
Final data summary report	1	$5,000	4/30/2022
Subtask Total		$25,000	
Subtask D2.7 Technical Advisory Committee Coordination			
King County presentation on hydrologic data	1	$1,811.19	
Meeting notes documenting discussion items and consensus decisions from the technical advisory committee.	2	$3,200	
Subtask Total		$5,011.19	3/31/2022
Subtask D2.8 Project Management			
Compiled progress reports from project team members (12 months)	12	$20,843.69	
Subtask Total		$20,843.69	9/30/2021
Task Total		**$369,181.23**	
Task D3.0 – First Quarter of Water Year 2022 Study Implementation			
Subtask D3.1 Hydrologic Monitoring			
Posting of telemetered data on HIC (continual). Posting of non-telemetered data on HIC will occur every 5 weeks.	1	$16,506.52	
Subtask Total		$16,506.52	12/31/2022
Subtask D3.2 Water Quality Monitoring			
Laboratory analytical results and documentation of Herrera audits for 14 stations X 16 sampling events	4	$33,840	
Subtask Total		$33,840	12/31/2021

Task/Deliverable	Quantity	Total by Deliverable	Target Dates
Subtask D3.3 Project Management			
Compiled progress reports from project team members (12 months)	3	$5417.90	
Subtask Total		$5417.90	12/31/2021
Task Total		**$55,764.42**	
Task D4.0 – Trend Analysis Report: Water Years 2016 – 2019			
Draft data analysis report	1	$38,800	6/30/2020
Final data analysis report	1	$9,700	8/31/2020
Stormwater Work Group and Conference Presentations	2	$3,200	12/31/2020
SAM Factsheet	1	$1,100	9/30/2020
Task Total		**$52,800**	
Task D5.0 – Trend Analysis Report: Water Years 2016 – 2021			
Draft data analysis report	1	$39,900	6/30/2022
Final data analysis report	1	$9,980	8/31/2022
Stormwater Work Group and Conference Presentations	2	$3,300	12/31/2022
SAM Factsheet	1	$1,100	9/30/2022
Task Total		**$54,280**	
Project Total		**$871,094.85**	