August 24, 2022

Jeff Hamlin – Public Works Department
City of Snoqualmie
P.O. Box 987
Snoqualmie, Washington 98065

Re: Amendment No. 4 to Consultant Services Contract for Water Rights Permitting Services
Proposed Scope of Work and Cost Estimate
City of Snoqualmie Water Right Permitting Support and Geotechnical Monitoring
Contract Exhibit A
Project No. 150386

Dear Jeff-

Aspect Consulting LLC (Aspect) has prepared this Scope of Work (SOW) and Cost Estimate to continue supporting the City of Snoqualmie (City) with advancing several elements of its water supply and water rights planning efforts. The overall project elements addressed in this SOW include the following:

- ***Preparing Required Submittals and Supporting Processing of the City's pending groundwater and surface water right applications.*** (Application Nos. G1-27589 and S1-28833 filed in 1995 and 2016, respectively). In response to these applications, the Department of Ecology (Ecology) issued Preliminary Water Right Permits to the City, which include prescribed reports to be submitted by certain due dates. The reports are intended to inform Ecology's opinion as to whether or not the water right applications can be approved and must be submitted as described or the permit applications will be cancelled.
- ***Completing a Feasibility and Pilot Study of an Aquifer Storage and Recovery (ASR) Program being Considered by the City.*** With past support from Aspect, the City recently secured a Streamflow Restoration Grant from Ecology to evaluate the feasibility of an ASR Program. The ASR program involves diverting excess Canyon Springs water during high flows, conveying it within the distribution system, then recharging the aquifer through the existing South Wellfield; a portion of this stored water would later be recovered by the City through normal wellfield operation. The goal of the ASR program is to improve the legal and physical availability of water supply to both the City and the Snoqualmie River. The Grant Agreement with Ecology provides $477,400 in funding to cover portions of this work and includes detailed scope of work and submittal requirements.
- ***On-Call Water Rights Support.*** Technical and regulatory permitting support is anticipated to advance the ASR program being considered by the City (described below), and support the City's broader water rights portfolio. This includes a Reservoir Permit application for ASR testing and implementation, regulatory processing support for source water rights for ASR (e.g., drafting a Report of Examination for the pending surface water right application S1-28833 for Canyon Springs), and addressing other near-term water rights requirements as they arise.

- ***Providing ongoing geotechnical evaluation of the Canyon Springs Pipeline.*** Aspect has previously assisted the City with monitoring and stabilization of the embankments supporting the water supply line from Canyon Springs. Ongoing monitoring indicates some continued movement of natural embankment areas, prompting the need for continued monitoring and reporting of embankment conditions to support this critical City infrastructure.

Aspect will provide hydrogeologic, geotechnical and water rights consulting services to the City, including agency and stakeholder coordination as directed. Our proposed Scope of Work under this contract is organized as follows (note that the order of tasks has been set to align with the task numbers in the City's Streamflow Restoration Grant Agreement):

Task 1 – On-call Water Rights Support
Task 2 through 8 – Complete ASR Feasibility Study and Pilot Testing Scope of Work as detailed in the Grant Agreement with Ecology
Task 9 – Prepare and Support Processing of a Preliminary Reservoir Permit for ASR
Task 10 – Preliminary Permit Submittal for Surface Water Application No. S1-28833
Task 11 – Preliminary Permit Submittals for Groundwater Application No. G1-27589
Task 12– AKART Analysis
Task 13 – On-call Agency, Stakeholder, and City Presentations/Coordination
Task 14 – Canyon Springs Pipeline Monitoring
Task 15 – Project Management and Communication

Task 1: On-call Water Rights Support

Under Task 1, Aspect will provide on-call water rights support to the City. Work will be completed at the City's direction and within the constraints of the approved budget and may include:

- Evaluating the City's water rights portfolio in relation to City projects and/or future planning efforts.
- Preparing water rights applications and/or coordinating with Ecology on existing pending applications (e.g., amending the existing application to related to Canyon Springs to address seasonal use for ASR).
- Supporting the City in addressing water rights compliance issues.
- Other data synthesis and/or analysis needed to support water supply planning, as directed by the City.

Deliverables and Schedule: As requested by the City.

Tasks 2 through 8: Execute ASR Streamflow Restoration Grant Scope of Work

Under Tasks 2 through 8, Aspect would complete the scope of work for the City's ASR Feasibility Study and Pilot Testing, as detailed in the Grant Agreement with Ecology. The detailed scope of work for Tasks 2 through 8 is provided as Attachment A. A summary of each of the tasks is provided below, followed by a summary of all required deliverables and current due dates required under the Grant Agreement. Note that given the delay in Ecology's issuance of the Grant Agreement with the City, we assume that the deliverable schedule will be delayed by approximately 2 months, and that due dates will be extended by Ecology.

Task 2: Characterization of the Hydrogeologic System. Includes review and analysis of existing data and reports to develop a hydrogeologic conceptual model.
Task 3: Water Quality Assessment. Includes preparation of a Quality Assurance Project Plan (required by Ecology), analysis of water quality data, and completion of a geochemical model to assess water quality implications.

Task 4: Regulatory Assessment. Includes an evaluation of compliance with Groundwater Quality Standards, anticipated provisions of an ASR reservoir permit, compliance with Chapter 173-157 WAC, and water right impairment considerations.

Task 5: Streamflow Benefit Quantification & Program Design. Includes developing and running a numerical groundwater model to evaluate ASR's effect on streamflow and water rights considerations.

Task 6: Capital and O&M Cost Assessment. Includes an assessment of planning level costs for implementation and maintenance of the ASR program.

Task 7: *Feasibility Study Report.* Includes cumulative analysis of preceding tasks and developing a report presenting the results and findings of the ASR feasibility study.

Task 8: ASR Pilot Testing. Includes completing an ASR pilot test with a focus on evaluating the ASR performance metrics identified in the final Feasibility Study Report. Groundwater recharge is expected to occur over a 6-week period during the wet season.

Deliverables and Schedule:

Task	Required Deliverable	Deliverable Due Date[1]
2	2.1 - Summary Materials (cross-sections, etc.)	1/15/2023
	2.2 - Permission Forms (if needed)	--
3	3.1 - QAPP	1/15/2023
	3.2 - Emails confirming data upload	12/31/2024
	3.3 - Final QAPP	12/31/2023
4	4.1 - Regulatory Framework Memo	7/15/2023
5	5.1 - Presentation Materials	7/15/2023
6	6.1 - O&M Summary Tables	7/15/2023
7	7.1 - Draft FS Report	11/1/2023
	7.2 - Final FS Report	12/31/2023
	7.3 - Presentation Materials	--
	7.4 - Tribal Comment Upload	12/31/2024

1, Based on Ecology's final draft of the Grant Agreement, dated June 28, 2022.

Assumptions: (1) Response to tribal and/or stakeholder coordination beyond what is described in Attachment A will be addressed under a separate task. (2) Ecology review times for draft deliverables will be approximately 30 days, unless otherwise indicated in the Grant Agreement

language provided as Attachment A. (3) Due date extensions will be coordinated by the City and Aspect with Ecology to align with the actual effective date of the signed Grant Agreement.

Task 9: Prepare and Support a Reservoir Permit Application

A reservoir permit is required to authorize the recharge, storage and recovery of water in a groundwater reservoir through ASR. A Preliminary Permit will need to be issued to the City prior to conducting the Task 7 Pilot Test, but reservoir permitting support is excluded in the Streamflow Restoration Grant Agreement.

Under Task 9, Aspect would hold a pre-application meeting with Ecology, prepare a reservoir permit application package and cover letter requesting a Preliminary Permit, and coordinate with Ecology on considerations for permit processing. Aspect will also coordinate with the Ecology's Water Quality Program to discuss compliance provisions regarding Groundwater Quality Standards (Chapter 173-200 WAC)

Deliverables: Draft and Final Preliminary Reservoir Permit Application package for ASR.

Schedule: The draft application will be provided to the City for review and comment by October 1, 2023, followed by submittal to Ecology to authorize recharge activities by the 1st quarter of 2024.

Assumptions: Substantive stakeholder and/or tribal coordination will not be completed under this task (such support would be provided under Task 13 at the City's request).

Task 10: Preliminary Permit Submittal for Surface Water Application No. S1-28833

Under Task 10, Aspect will revise the Phase 1 Regulatory Assessment based on Ecology's March 31, 2022 email, and prepare the "Phase 2 Compliance Plan" required for submittal to Ecology under the Amended Preliminary Permit No. S1-28833 issued to the City. Aspect has already completed the majority of work to edit the Phase 1 Regulatory Assessment. The Phase 2 Compliance Plan will address the following information requirements:

- The point(s) of compliance where the instream flow measurement will be evaluated.
- Description of how/when flows at the compliance point(s) will be checked to ensure compliance at the diversion is maintained.
- Descriptions of measurement methodology, threshold values, and evaluation techniques.
- Explanation of how interruptions will be managed.
- Where meters or other measurement devices will be installed, where required by Chapter 173-173 WAC.
- Ecology and DOH concerns as described in Appendix H of our Joint Review Procedures for Planning and Engineering Documents by describing how the City plans to exercise a portfolio of interruptible and non-interruptible rights.

Note that Ecology has not yet completed final approval of the "Phase 1 Regulatory Assessment", previously submitted in compliance with the subject Preliminary Permit. That document suggests that coordination with Puget Sound Energy (PSE) will be completed, as necessary, under one of the on-call tasks in this SOW, to address potential impairment concerns regarding PSE's water right

claim at Snoqualmie Falls. The report prepared under this task will document that coordination effort by the City.

Deliverables: Draft and Final Phase 2 Compliance Plan.

Schedule: The completed draft of the Phase 2 Compliance Plan is currently due to Ecology by October 31, 2022. At least 30 days ahead of the due date, Aspect will provide a draft report for City review, then incorporate comments ahead of the due date.

Assumptions: (1) Draft report will incorporate one round of City comments, and the final report will address one round of Ecology comments. (2) The City will initiate and facilitate any coordination with water right holders, including PSE. (3) Substantive stakeholder and/or tribal coordination will not be completed under this task, but could be provided under Task 13 at the City's request.

Task 11: Preliminary Permit Submittals for Groundwater Application No. G1-27589

Under Task 11, Aspect will prepare the "Phase 2 Testing and Analysis Plan" and the "Phase 3 Final Mitigation and Compliance Plan" required for submittal to Ecology under Preliminary Permit No. G1-27589 issued to the City. The "Phase 2 Testing and Analysis Plan" will address the following information requirements:

- A description of the measures and analysis planned to address the data gaps for the application previously identified by Ecology.
- General details of a quantitative groundwater model proposed to analyze the timing and distribution of impacts to the Snoqualmie River.

Typically, the details of the analysis proposed in the Testing and Analysis Plan would be developed in close coordination with Ecology. However, because the City has already established that a numerical groundwater model will be developed to evaluate the ASR program (funded by Ecology under Task 5), the general approach to modeling to be discussed in the Testing and Analysis Plan is considered already established.

The "Phase 3 Final Mitigation and Compliance Plan" will address the following information requirements:

- A summary of all work performed under previous tasks of the Preliminary Permit.
- A detailed description of how the proposed mitigation would offset the impacts of the proposed withdrawal or diversion and use of water.
- A description of the changes in environmental conditions from the proposed mitigation, specifically if impoundment/storage is a component of the mitigation plan.
- A calculation of anticipated consumptive use.
- A description of how and when non-consumptive water will return to groundwater or surface water and a description of how this volume was estimated.
- A description of the actions that will be taken to ensure mitigation will be maintained for the duration of the water right authorization (often in perpetuity).
- Descriptions of measurement methodology, threshold values, and evaluation techniques.

- Where meters or other measurement devices will be installed, where required by Chapter 173-173 WAC.

Deliverables: Draft and Final Phase 2 Testing and Analysis Plan and Draft and Final Phase 3 Mitigation and Compliance Plan.

Schedule: The completed draft of the Phase 2 Testing and Analysis Plan is currently due to Ecology by July 31, 2022, and the Phase 3 Final Mitigation and Compliance Plan is due on July 31, 2023. At least 30 days ahead of that due date, Aspect will provide a draft report for City review, then incorporate comments ahead of the October 31 deadline.

Assumptions: (1) Draft report will incorporate one round of City comments, final report will address one round of Ecology comments. (2) The City will initiate and facilitate any coordination with water right holders, including PSE. (3) Substantive stakeholder and/or tribal coordination will not be completed under this task (such support would be provided under Task 13 at the City's request).

Task 12: AKART Analysis

Under Task 12, Aspect will provide an analysis of all known, available and reasonable methods of prevention, control and treatment (AKART). This analysis is required under Chapter 173-200 WAC for Ecology to substantiate a regulatory decision authorizing the recharge of Canyon Springs source water, which contains disinfectant residuals and disinfection byproducts that are not naturally present in groundwater. In some instances, Ecology has authorized ASR testing as proposed in Tasks 2 through 8 without first requiring an AKART analysis, but Aspect's recent coordination with Ecology indicated that an AKART analysis would be required prior to issuance of the temporary permit for testing. The AKART analysis would consist of the following elements:

- Describe the water quality characteristics for background and source water.
- Evaluate water quality compatibility (based on the analysis completed under Task 3) and compliance with drinking water and groundwater standards (Chapters 246-290 and 173-300 WAC, respectively).
- Identify and evaluate treatment methods/technologies to remove constituents that exceed background groundwater quality prior to recharge; viability and effectiveness will be considered, among other aspects of the technology and operational alternatives.
- Prepare Planning Level cost estimates included capital, operations, and maintenance costs.
- Identify potential receptors to recharged water.
- Identify and evaluate alternative strategies to treatment methods/technologies (e.g., enhancements and operational improvements to the existing system and public interest).
- Develop a compliance recommendation that identifies the preferred alternative.

Schedule: The final AKART analysis report will be required by Ecology prior to issuing a Preliminary Reservoir Permit to authorize the ASR pilot test described under Task 8, with recharge tentatively planned to begin on February 1, 2024. A draft AKART analysis will be provided to the City for review and comment by November 1, 2023 or at an earlier mutually agreed date as necessary.

Assumptions: (1) Draft report will incorporate one round of City comments, final report will address one round of Ecology comments. (2) The City will initiate and facilitate any coordination with water right holders, including PSE. (3) Substantive stakeholder and/or tribal coordination will not be completed under this task (such support would be provided under Task 13 at the City's request).

Task 13: On-call Agency, Stakeholder, and City Presentations/Coordination

Under Task 12, Aspect will provide on-call agency and stakeholder coordination support to the City. Work will be completed at the City's direction and within the constraints of the approved budget and may include:

- Preparing for, facilitating, and/or participating in meetings with interested tribes regarding water rights considerations and/or the ASR program being considered.
- Preparing presentation materials (e.g., slide deck, white paper, etc.).
- Addressing substantive stakeholder comments on City water rights applications (e.g., the reservoir permit application for ASR prepared under Task 9 or other pending applications).
- Providing presentations to City Council and/or City staff.

Deliverables and Schedule: As requested by the City.

Assumptions: Work completed under this task is outside the scope of work established in the Grant Agreement (Attachment A).

Task 14: Canyon Springs Geotechnical Monitoring and Reporting

Twice per year over two years, Aspect will complete visual inspection of the steep slopes and condition of the natural and constructed embankments that support the water line from Canyon Springs to the Chlorination Station. Existing field stations for specific areas of concern previously identified will continue to be monitored. Photos will be taken and archived for comparison with future site visits. Aspect will observe the performance of the recently stabilized slope and other slopes and areas of elevated risk along the alignment and comment on performance and recommendations for maintenance where necessary.

Results of Aspect's reconnaissance findings will be summarized in field reports with observations, recommendations, and photos or maps of significant features.

Deliverables: Four (4) field reports describing the results and interpretation of four field investigations of the pipeline.

Schedule: Fieldwork will be scheduled in coordination with the City, to occur in the fall and spring of each year between the fall of 2022 and Spring 2024.

Assumptions: (1) City staff will accompany Aspect on field inspections or otherwise provide detailed field instruction as needed.

Task 15: Contract Support, Progress Reporting, and Meetings

This task includes project management, including progress reports, internal staff coordination, and invoicing over the duration of Tasks 1 through 13. Aspect will also assist the City in preparing

quarterly progress reports and payment requests ("PRPRs") to Ecology regarding Tasks 2 through 8, along with the project closeout report for the Grant Agreement. Aspect will also conduct internal reviews of the project performance and risks at 0%, 30%, 60%, and 90% completion and share those findings with the City.

Deliverables: Monthly invoicing and project reports and text for quarterly PRPRs.

Schedule: Monthly project updates will be provided with invoices the 15th of each month.

Assumptions: The project duration will extend from July 15, 2022 through December 31, 2024.

Budget

The proposed budget for this work is presented in the following table. Work will be billed on a time-and-materials basis, not to exceed the overall authorization without prior approval from the City. Estimated hours by task and staff class are included as Attachment B.

Task Title	Labor	Direct Costs	Total
Task 1: On-call Water Rights Support	$20,000		$20,000
Task 2: Characterization of the Hydrogeologic System	$25,800		$25,800
Task 3: Water Quality Assessment	$59,000	$10,000	$69,000
Task 4: Regulatory Assessment	$14,900		$14,900
Task 5: Streamflow Benefit Quantification & Program Design	$122,500		$122,500
Task 6: Capital and O&M Cost Assessment	$7,300		$7,300
Task 7: Feasibility Study Report	$61,900		$61,900
Task 8: ASR Pilot Testing	$136,000	$40,000	$176,000
Task 9: Prepare and Support a Reservoir Permit Application	$12,000		$12,000
Task 10: Preliminary Permit Submittal for Surface Water Application No. S1-28833	$26,000		$26,000
Task 11: Preliminary Permit Submittals for Groundwater Application No. G1-27589	$40,000		$40,000
Task 12: AKART Analysis	$10,000	$25,000	$35,000
Task 13: On-call Agency, Stakeholder, and City Presentations/Coordination	$18,000		$18,000
Task 14: Canyon Springs Geotechnical Monitoring and Reporting	$15,000	$1,000	$16,000
Task 15: Contract Support, Progress Reporting, & Meetings	$30,000		$30,000
Total Budget	$598,400	$76,000	$674,400

We appreciate the opportunity to work with the City of Snoqualmie on this project and will be pleased to discuss this proposed scope of work with you.

Sincerely,

Aspect consulting, LLC

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Attachments: Attachment A – Streamflow Restoration Grant Draft Scope of Work dated June 28, 2022
Attachment B – Estimated Labor Hours by Task

ATTACHMENT A

DEPARTMENT OF ECOLOGY
State of Washington

Agreement Number

Draft Scope of Work for Negotiation: WRSRP-2020-Snoqua-00096

GENERAL INFORMATION
Project Title: City of Snoqualmie ASR Program Development and Feasibility and Pilot Testing

Total Project Cost:	$477,400
Total Project Eligible Cost:	$477,400

The Effective Date of this Agreement is: July 15, 2022
The Expiration Date of this Agreement is no later than: *12/31/2024*
Project Type:

Project Short Description:
The RECIPIENT will complete a feasibility study and pilot testing for an Aquifer Storage and Recovery program using existing infrastructure. The RECIPIENT will divert water from its existing Canyon Springs source during high flows when water is seasonally available, convey it within its distribution system, and recharge a deep aquifer through existing wells. Some of the recharged water is expected to enhance streamflow in the Snoqualmie River, including during low flow periods.

Project Long Description:
The RECIPIENT will complete a feasibility study and pilot testing for an Aquifer Storage and Recovery (ASR) program using its existing Canyon Springs water source to store seasonally available water in a deep groundwater reservoir tapped by the City's two existing wellfields. The planned groundwater storage reservoir is hydraulically connected to the Snoqualmie River through leakance to a shallower aquifer system. A portion of the stored water is expected to discharge to the river as increased baseflow throughout the storage period, leading to increased streamflow and temperature benefits to the mainstem Snoqualmie River.

As proposed, the ASR program would improve water availability for public water supply in the summer months, when minimum instream flows are often not met in the Snoqualmie River, and help offset permit-exempt wells within WRIA 7. The RECIPIENT is pursuing the ASR program because urban development within and surrounding the City has increased dramatically in the last 20 years, while summer water availability is limited and is predicted to decline as a result of climate change and increased drought occurrence.

Between 2000 and 2019, Snoqualmie River instream flows below Snoqualmie Falls were not met an average of 61% of days in July and August. In contrast, instream flows were met an average of 80% of days from November through May.

The seasonal streamflow surpluses and deficits indicate the potential for large flow benefits by re-timing with winter storage and summer release, but conventional storage infrastructure would be cost prohibitive, given the required storage volume. Given the City's existing infrastructure and favorable hydrogeologic setting, ASR presents a unique opportunity in WRIA 7 to store significant quantities of available winter flows for streamflow enhancement and City water supply at relatively low cost.

Using its existing Canyon Springs source and gravity conveyance, the RECIPIENT will recharge groundwater at the City's South Wellfield, which is completed within ancient Snoqualmie River alluvium (referred to as the "Olympia" sediments)_ at a depth of about 500 feet. The RECIPIENT will use its existing water rights for the source water for the ASR pilot testing. The RECIPIENT will apply for a Preliminary Reservoir Permit to authorize recovery of water.

Past efforts have characterized the deep aquifer tapped by the City (the proposed groundwater storage reservoir) as semi-confined over many square miles and shown that pumping (or recharge) would directly affect the Snoqualmie River. Numerical groundwater flow modeling will provide more detailed analysis on the timing and quantities of potential streamflow benefits. Development of this calibrated groundwater model, along with evaluating water level changes in the aquifer, will also determine the recoverable quantity of water from storage for City supply and streamflow enhancement.

Following Ecology guidance for Managed Aquifer Recharge projects and the ASR information requirements of Chapter 173-157 WAC, the Feasibility Study will: (1) further characterize the groundwater system; (2) address water quality of ASR source water, groundwater, and their comingling; (3) evaluate costs and regulatory requirements; (4) complete program design; (5) identify potential impacts to stakeholders and the environment; and (6) conduct groundwater modeling and analysis to refine quantification of streamflow benefits and to guide permitting.

Based on conclusions of the Feasibility Study, the RECIPIENT will refine the ASR program design, including performance monitoring. Once final program design is complete, the RECIPIENT will make minor infrastructure improvements as necessary (e.g., bypass piping for wellhead check valves), address regulatory requirements (RECIPIENT funded), and conduct a pilot test to verify the findings of the FS.

The workflow and funding source for this project is outlined as follows. The tasks with asterisks are provided here for context. The findings of RECIPIENT-funded tasks will be included in the FS Report and/or the Pilot test report.

Task 1: Project Administration (RECIPIENT-funded)
Task 2: Hydrogeologic Characterization to define modeling approach (grant funded)
Task 3: Water Quality Assessment (grant funded)
Task 4: Regulatory Assessment to identify permit constraints and information needs (grant funded)
Task 5: Streamflow Benefits Quantification (numerical groundwater modeling) and programmatic design (grant funded)
Task 6: Capital O&M Cost Assessment to determine overall implementation costs (grant funded)
*Additional Task to be Completed Outside of this Agreement: Engineering Assessment to Determine ASR Infrastructure Needs (RECIPIENT Funded)
Task 7: Feasibility Study Report (grant funded)
*Additional Task to be Completed Outside of this Agreement: Reservoir Permit Application Package Preparation and Submittal (RECIPIENT-funded)
Task 8: Pilot Testing (grant funded)

Outreach to stakeholders and tribal governments
The RECIPIENT will communicate the project schedule and comment due dates well in advance to ECOLOGY and federally recognized Tribal governments with interests in the region to ensure that the project remains on schedule and on task and that tribes have reasonable opportunity to comment and meaningfully provide feedback. The RECIPIENT will document comments received within the comment period, and incorporate the comments/suggestions into their

analyses and reporting to the extent they are within the scope of work for the agreement. The RECIPIENT will share all comments received with ECOLOGY, including comments received outside of comment periods, but prior to the expiration of the grant. Funding provided under this Agreement does not guarantee approval of permits required for the project. Permitting decisions will be made in accordance with applicable laws, regulations, and policies. Any interested party has a right to appeal a permitting decision to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of the permit. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC.

Overall Goal:

The overall goal of this project is to complete an ASR feasibility assessment, which includes hydrogeologic testing and analysis, ASR program design, quantification of streamflow benefits, assessment of regulatory and water quality considerations, and pilot testing of an ASR program.

Contacts

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Billing Contact	Gerald Knutsen Financial Services Manager PO Box 987 Snoqualmie, Washington 98065 Email: Jknutsen@snoqualmiewa.gov Phone: 425-888-1555 or 425-831-6041
Authorized Signatory	Katherine Ross Mayor 38624 SE River St Snoqualmie, Washington 98065 Email: kross@snoqualmiewa.gov Phone: 425-888-5307

SCOPE OF WORK

Task Number: 1 **Task Cost:** $0

Task Title: Project Administration/Management

Task Description

A. The RECIPIENT will administer the project. Responsibilities will include, but not be limited to: maintenance of project records; submittal of requests for reimbursement and corresponding backup documentation, progress reports and Recipient Closeout Report; submittal of required performance items; and compliance with applicable procurement and contracting requirements.

B. The RECIPIENT will, along with each request for reimbursement, prepare and submit a progress report to ECOLOGY's project manager through Ecology's Administration of Grants and Loans (EAGL) on line grant management system. The reports shall include, at a minimum, the following information:

   A comparison of actual accomplishments to the objectives established for the reporting period.
   1. The reasons for any delays if the project does not meet established objectives.
   2. Plan and schedule of activities for the upcoming two months.
   3. Analysis and explanations of any cost overruns.
   4. Any additional pertinent information.

C. The RECIPIENT shall submit a Recipient Closeout Report encompassing the entire project with their last payment request. The RECIPIENT shall submit the final payment request and Recipient Closeout Report within 30 days of the end of this agreement.

D. The RECIPIENT must manage and carry out this project in accordance with any completion dates outlined in this agreement.

Task Goal Statement

Properly managed project that meets agreement and Ecology administrative requirements.

Task Expected Outcomes

* Timely and complete submittal of requests for reimbursement, quarterly progress reports and Recipient Closeout Report.

*Properly maintained project documentation

Recipient Task Coordinator: Jeff Hamlin

Project Administration/Management
Deliverables

Number	Description	Due Date
1.1	Progress Reports	
1.2	Recipient Closeout Report	12/31/2024

SCOPE OF WORK

Task Number: 2 **Task Cost:** $25,800

Task Title: Characterization of the Hydrogeologic System

Task Description:

The RECIPIENT will refine understanding of hydrogeologic system related to the Olympia aquifer (the 'Target Aquifer'), the reservoir for ASR storage. The RECIPIENT will evaluate hydraulic parameters, available storage volumes, aquifer boundary conditions, and hydraulic continuity with the Snoqualmie River.

The RECIPIENT will incorporate aquifer and well testing previously conducted by the City at its wellfields, combined with previously performed relevant groundwater modeling and other hydrogeologic studies and will complete the following tasks:

A. The RECIPIENT will complete further analysis of well logs, testing data, and geologic reports to better define the lateral and vertical extent of the Target Aquifer and develop updated cross-sections.

B. RECIPIENT will refine the hydrogeologic conceptual model for confining conditions, determining hydraulic gradients, hydraulic conductivities, and areas of continuity with the Snoqualmie River.

C. RECIPIENT will refine estimates of available storage volumes and durations in the Target Aquifer, based on hydraulic parameters and assessments of long-term and seasonal water level data.

D. RECIPIENT will assess any projected impacts from the ASR program on other groundwater uses in the vicinity (Landowner Acknowledgement Forms will be completed if other user's wells are identified for performance monitoring).

E. The RECIPIENT will prepare figures, including hydrogeologic cross-sections, maps showing the extent of the Target Aquifer, water level hydrographs, and/or summary tables of aquifer parameters and calculations related to the Target Aquifer.

F. The RECIPIENT will prepare and provide summary materials describing the findings of this task to ECOLOGY and interested federally recognized Tribal governments. The RECIPIENT will include and discuss the comments/suggestions received within 60 days after delivery of these materials into their analyses and reporting (under task 7), to the extent they are within the scope of work for the agreement. The RECIPIENT will share all comments received with ECOLOGY, including comments received outside of comment periods, but prior to the expiration of the grant.

Task Goal Statement:
Characterize the storage capacity of the Target Aquifer and determine groundwater flow characteristics (e.g., gradient, velocity, and leakance) relative to Snoqualmie River baseflows.

Task Expected Outcome:
This task will result in refinement of the hydrogeologic conceptual model and aquifer parameters, delineation of the Target Aquifer, and estimation of potential storage volumes and duration.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
2.1	Cross-sections/maps, and summary table(s) of hydrogeologic properties of key aquifers and aquitards submitted to ECOLOGY. Upload to EAGL and notify Ecology Project Manager when upload is complete. (Note that incorporation of comments on materials addressed in task 7)	1/15/2023
2.2	Landowner Acknowledgement Forms (if needed for task 2D). Upload to EAGL either the Landowner Acknowledgement forms or confirmation that Landowner Acknowledgement forms were not needed for monitoring. Notify Ecology Project Manager when upload is complete.	

SCOPE OF WORK

Task Number: 3 **Task Cost:** $69,000

Task Title: Water Quality Assessment

Task Description:

The RECIPIENT will characterize water quality for receiving groundwater in the Target Aquifer (native groundwater quality) and Canyon Springs source water, and identify any concerns regarding potential water quality impacts and compliance with the antidegradation policy in Chapter 173-200 WAC associated with introduction of the source water into the Target Aquifer.

A. The RECIPIENT will develop and submit a Quality Assurance Project Plan (QAPP) based on templates provided by ECOLOGY to guide the environmental monitoring activities during the Water Quality Assessment. The QAPP will document all methods, procedures, parameters, monitoring stations, and quality control measures to be implemented during the Water Quality Assessment.

   The RECIPENT will prepare the QAPP to address all water quality and water resources data collection using Ecology's current Environmental Assessment Program (EAP) General QAPP Template. The QAPP will go through a review process and must be approved and signed by both ECOLOGY and the RECIPIENT. Any monitoring activity conducted before the QAPP receives final approval may not be eligible for reimbursement and any data collected may not be eligible to be submitted under an approved QAPP. ECOLOGY will only consider such exceptions under very limited circumstances and decisions are at the discretion of ECOLOGY.

   The RECIPIENT will revise the QAPP or prepare a separate QAPP, if needed, to guide the environmental and performance monitoring activities conducted during the pilot test in task 8.

B. The RECIPIENT will submit all environmental monitoring data into Ecology's Environmental Information Management (EIM) database.

C. RECIPIENT will compile and evaluate the City's historical water quality data submitted to the Department of Health.

D. RECIPIENT will complete PHREEQC geochemical modeling to identify dissolution and precipitation reactions, and water chemistry in the aquifer and ASR well(s) before, during, and after ASR cycling. Attention will be given to characterizing water quality reactions that could occur at the City's South Wellfield during comingling of stored and native groundwater.

Task Goal Statement:

Conduct water quality characterization and modeling to represent operational phases of the ASR program. The characterization will inform regulatory and modeling considerations, and the predictive modeling will inform O&M, performance, and impairment assessments.

Task Expected Outcome:
Development of water quality datasets for the source and receiving waters, and the expected chemistry resulting from comingling of source and receiving waters in storage.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
3.1	Upload final approved and signed QAPP into EAGL prior to conducting any monitoring activities (due date assumes 30-day ECOLOGY review)	1/15/2023
3.3	Upload final approved QAPP covering monitoring activities conducted during pilot testing under task 8.	12/31/2023
3.2	Collect and manage all data following an approved QAPP and submit all monitoring data into ECOLOGY's EIM database. Upload to EAGL the emails from the EIM coordinator confirming the data has been accepted and entered into EIM.	12/31/2024

SCOPE OF WORK

Task Number: 4 **Task Cost:** 14,900

Task Title: Regulatory Assessment

Task Description:

The RECIPIENT will identify and summarize the regulatory requirements for implementing the proposed ASR program. This will include an assessment of compliance with Groundwater Quality Standards (Chapter 173-200 WAC) based on the water quality assessment conducted in Task 3, anticipated provisions of an ASR reservoir permit, compliance with Chapter 173-157 WAC, and water right impairment considerations. The RECIPIENT will evaluate specific permit considerations under the Task 5 modeling efforts.

Task Goal Statement:

This task goal is to identify the regulatory requirements and permitting approach for the ASR program with consideration to the results of the Hydrogeologic Characterization (Task 2) and Water Quality Assessment (Task 3).

Task Expected Outcome:

Development of a permitting approach for the project that meets regulatory requirements and allows approval of the project.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
4.1	Final technical memorandum summarizing specific regulatory requirements for the project. Upload to EAGL and notify Ecology Project Manager when upload is complete.	7/15/2023

Task Number: 5 **Task Cost:** 122,500

Task Title: Streamflow Benefit Quantification & Program Design

Task Description:

A. RECIPIENT will evaluate and determine the expected streamflow benefits provided by the ASR program and develop an operational design that maximizes water supply and streamflow benefits.

B. RECIPIENT will incorporate data compiled and synthesized under the Task 2 Hydrogeologic Characterization and past efforts into development of a numerical groundwater flow model representing the Target Aquifer for ASR and hydrogeologic boundaries, including the Snoqualmie River.

C. RECIPIENT will calibrate the model using recent pumping test results, water level and streamflow data collected by public agencies, and other available studies.

D. Following completion of a suitable model calibration and appropriate model sensitivity analyses, the RECIPIENT will use the groundwater model to simulate a range of reasonable recharge, storage, and recovery scenarios (e.g., source water availability, recharge and recovery locations and durations, and storage times). The period and duration of streamflow benefits will be assessed based on the modeling results.

E. The RECIPIENT will refine the design of the ASR program to provide the maximum anticipated benefits to streamflow and water supply under practical operations. Program design will include an assessment of existing diversion, conveyance, and well infrastructure to identify necessary infrastructure changes, if needed.

F. RECIPIENT will prepare a presentation summarizing the findings of this task and provide this presentation to ECOLOGY and interested federally recognized Tribal governments during a combined meeting. The RECIPIENT will include and discuss the comments/suggestions received within 60 days after delivery of the presentation into their analyses and reporting (under task 7), to the extent they are within the scope of work for the agreement. The RECIPIENT will share all comments received with ECOLOGY, including comments received outside of comment periods, but prior to the expiration of the grant.

Task Goal Statement:

The goal of this task is to develop a numerical groundwater model to assess future water supply and streamflow benefits of the ASR program. Based on model predictions, the ASR program design will be refined to produce the maximum expected benefits to enhance instream flows in the Snoqualmie River and provide public water supply benefits, through optimization of recharge volumes, storage scenarios, and wellfield operations.

Task Expected Outcome:

Analysis with a numerical groundwater model that provides an appropriate tool to design and assess the performance of the ASR program for optimal benefits to streamflow enhancement and the City's public water supply.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
5.1	Presentation materials, including relevant figures, tables, and maps. Upload to EAGL and notify Ecology Project Manager when upload is complete. (Note that addressing comments from ECOLOGY and interested federally recognized Tribal governments is part of Task 7)	7/15/2023

SCOPE OF WORK

Task Number: 6 **Task Cost:** $7,300

Task Title: Capital and O&M Cost Assessment

Task Description:

A. The RECIPIENT will identify the capital and O&M cost requirements for implementing and operating the proposed ASR program.

Task Goal Statement:

The goal of this task is to provide accurate quantification of the planning-level costs for implementation and maintenance of the ASR program to be considered and incorporated into the recommendations of the FS Report (Task 8).

Task Expected Outcome:

Understanding of planning-level costs associated with implementation and long- term operation of the ASR.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
6.1	Summary Tables of O&M assessment (description of the capital and O&M assessment and associated conclusions, incorporated into the FS report and submitted to ECOLOGY).	7/15/2023

SCOPE OF WORK

Task Number: 7 **Task Cost:** 61,900

Task Title: Feasibility Study Report

Task Description:

A. The RECIPIENT will assemble the technical analyses completed under Tasks 2 through 6 to prepare the ASR Feasibility Study (FS) report. The FS report will assess the appraisal-level costs, and technical and regulatory viability of the project with respect to streamflow restoration and public water supply benefits, along with the other required elements of a Feasibility Study identified in the 2020 Streamflow Restoration Grant Guidance documents. The report will be structured to provide information required to support a viable application package to ECOLOGY for an ASR reservoir permit, as specified in Chapter 173-157 WAC. The results of the hydrogeological, numerical groundwater modeling, and geochemical modeling will be presented in the context of streamflow benefits and regulatory considerations, including the recommended quantities of groundwater withdrawal for public water supply use. FS findings will include an uncertainty analysis in the calculated streamflow benefits. The FS will also provide specific recommendations for pilot testing of the ASR program.

B. The RECIPIENT will prepare a presentation summarizing the findings of the draft FS and provide this presentation to ECOLOGY and interested federally recognized Tribal governments during a combined meeting. The RECIPIENT will include and discuss the comments/suggestions received within 60 days after delivery of the presentation into the Final Feasibility Study report, to the extent they are within the scope of work for the agreement. The RECIPIENT will share all comments received with ECOLOGY, including comments received outside of comment periods, but prior to the expiration of the grant.

If appropriate, the FS report will then include recommendations for addressing data gaps, including pilot test program approaches and durations, and recommended provisions for a Quality Assurance Project Plan (QAPP) to be revised, as necessary, under Task 3.

Task Goal Statement:

The goal of this task is to assemble the technical analyses completed under Tasks 2 through 6 into a comprehensive FS Report intended to allow ASR project review by ECOLOGY, City of Snoqualmie administrators and technical staff, and other stakeholders.

Task Expected Outcome:

Completion and distribution of the draft FS Report, followed by a final report addressing ECOLOGY and tribal government comments.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
7.1	Draft FS Report compiling technical materials and associated conclusions developed under Tasks 2 through 6. Draft report will meet Ecology's document accessibility standards. Upload to EAGL and notify Ecology Project Manager when upload is complete.	11/1/2023
7.2	Final FS Reports compiling technical materials and associated conclusions developed under Tasks 2 through 6 and addressing comments from ECOLOGY and federally recognized Tribal governments. Final report will meet Ecology's document accessibility standards. Upload to EAGL and notify Ecology Project Manager when upload is complete. Due date assumes 30-day Ecology review.	12/31/2023
7.3	Presentation materials, including relevant figures, tables, and maps. Upload to EAGL and notify Ecology Project Manager when upload is complete.	
7.4	Comments received from federally recognized Tribal governments. Upload to EAGL and notify Ecology Project Manager when upload is complete.	12/31/2024

Task Number: 8 **Task Cost:** 176,000

Task Title: ASR Pilot Testing

Task Description:

The RECIPIENT will conduct an initial pilot test of the ASR program under a new temporary ASR Reservoir Permit (to be obtained separately and in advance by the City), followed by performance analyses and comparison of results to the Task 5 model predictions (aquifer water levels and hydraulic parameters). An overview of the subtasks to be completed under this task is provided below.

A. The RECIPIENT will complete a pilot test with a focus on evaluating the ASR performance metrics identified in the final Feasibility Study Report that has incorporated stakeholder and ECOLOGY comments (e.g., aquifer/well levels, well yield, and water quality changes).
B. The RECIPIENT will instrument City wells with dataloggers for water level, flow, and field water quality (up to four additional private wells may also be identified and monitored).
    1. The RECIPIENT will conduct a system shakedown to evaluate the recharge, storage, and recovery system by conducting a brief period of ASR cycling (e.g., less than 1 day) to make sure all equipment and infrastructure is operable and to identify any necessary adjustments to be made.
    2. Following this initial system shakedown, the RECIPIENT will conduct the pilot test. The pilot test involves recharge, storage, and recovery within the Target Aquifer at a single City well. Recharge will occur over a single recharge season (e.g., over a continuous 6-week period to be scheduled sometime between October and May) at the highest rate that is reasonably sustainable (the actual recharge rate and duration will depend on well hydraulics and infrastructure performance). After the recharge phase is complete, stored water will be left in the aquifer for an extended period (e.g., several months, to be informed by the results of the preceding tasks) to assess water quality and water level response in the aquifer. At the conclusion of the storage phase, the RECIPIENT will recover water remaining in storage through pumping the same well used for recharge.
    3. During each phase of the ASR pilot test, the RECIPIENT will monitor water quality and the hydraulic performance of the well, Target Aquifer, and the City's drinking water distribution system. The RECIPIENT will analyze test data to inform future implementation of the ASR program. Any monitoring activities conducted as part of this task will be covered by an approved QAPP, prepared under task 3.

C. Prepare Pilot Test Report. The RECIPIENT will prepare a report documenting the water quality and hydraulic performance of the ASR program components observed during the pilot test as detailed in the approved QAPP. This report will recommend O&M procedures for preliminary implementation of the ASR program and/or identify any issues that may affect implementation.

Task Goal Statement:

Complete initial pilot testing to demonstrate feasibility and associated streamflow benefits of the ASR program.

Task Expected Outcome:

Demonstration of ASR program feasibility and associated streamflow benefits.

Recipient Task Coordinator: Jeff Hamlin

Deliverables

Number	Description	Due Date
8.1	A report presenting the data and analysis collected during the pilot test. Report will meet Ecology's document accessibility standards. Upload to EAGL and notify Ecology Project Manager when upload is complete.	12/31/2024

Attachment B: Labor Hours and Budget By Task

Work Element	Labor Budget Basis in Hours											Total Labor Budget	Other Direct Charges	Total
	Principal 2	Associate	Sr. Associate	Senior 2	Project 3	Project 1	Project 1	Staff 3	Sr. CAD	Sr. Editor	Coordinator 2			
Task 1: Water Rights on-Call														
on-call support	26	32				24				6		$ 19,932		$ 19,932
Task 2 - Hydrogeologic Characterization														
Data synthesis and Analysis		2		16	16			30				$ 10,570		$ 10,570
Cross-sections & Evaluate/Summarize Well Logs		2		8				8	16			$ 5,310		$ 5,310
Estimate Hydraulic Parameters		2		4				8				$ 2,342		$ 2,342
Identify/characterize Other Groundwater Users		2		8				40				$ 7,566		$ 7,566
Task 3 - Water Quality Assessment														
Prepare Draft & Final QAPP		12		32				44	10			$ 16,466		$ 16,466
Synthesize Existing data		4		16				48				$ 10,716		$ 10,716
WQ Sampling, synthesis, and analysis		4		8				16				$ 4,684	$ 10,000	$ 14,684
PHREEQC Modeling	4	20		40	60			24				$ 27,124		$ 27,124
Task 4- Regulatory Assessment														
Evaluation	8	16		24								$ 10,392		$ 10,392
Memorandum	2	8		10					2			$ 4,536		$ 4,536
Task 5 - Numerical Modeling														
Setup & Calibration		16		4	240			120	16			$ 64,488		$ 64,488
Sensitivity Analysis		4		4	60			60				$ 20,328		$ 20,328
Model Scenarios	4	8		8	60			60				$ 23,048		$ 23,048
Coordination on Results (presentation and meet	8	24		24	8			8				$ 14,600		$ 14,600
Task 6 Cost Assessment														
Identify System Changes	1	4		8								$ 2,739		$ 2,739
Obtain cost estimates for engineering		4		4				12				$ 3,324		$ 3,324
Estimate Costs for Regulatory Compliance		2		4								$ 1,238		$ 1,238
Task 7 - FS Report														
Prepare Draft Report Text	8	20		60	8			32				$ 24,324		$ 24,324
Figures & Tables				4	8			32	24			$ 9,848		$ 9,848
Present & Coordinate on Results	4	24		32	8			8	8			$ 16,244		$ 16,244
Prepare Final Report	4	16		24				8	8			$ 11,524		$ 11,524
Task 8 - Pilot Testing & Reporting														
Initiate Pilot Test (Mon. Network Setup. determi	8	32		80				180				$ 49,984	$ 25,000	$ 74,984
Pilot Testing and Analysis (storage and recovery)	8	32		60				160				$ 43,184	$ 15,000	$ 58,184
Reporting	8	24		40				40	8			$ 21,944		$ 21,944
Meetings, Coordination, EIM Uploads, and PM	16	32		32				24				$ 20,864		$ 20,864
Task 9: Reservoir Permit														
PreApp Meetings	4	6				2						$ 2,920		$ 2,920
Application Package	3	6				10				4		$ 4,486		$ 4,486
Ecy Coordination	6	8				4						$ 4,308		$ 4,308
Task 10: S1-28833 Prelim Permit														
Phase 1 revisions (complete)	2	12	4						2	4		$ 5,276		$ 5,276
Develop Phase 2 Compliance Program	2	6	8									$ 4,040		$ 4,040
Draft Phase 2 Compliance Plan Report	2	8	8			24			6	8		$ 10,444		$ 10,444
Final Phase 2 Compliance Plan Report	4	4	8			6			2	4		$ 5,964		$ 5,964
Task 11: G1-27589 Prelim Permit														
Draft Phase 2 CMP	2	8	2			32			8	6		$ 10,280		$ 10,280
Final Phase 2 CMP	2	8	2			12			2	2		$ 5,544		$ 5,544
Draft Phase 3 Mitigation Plan	4	24	4			20			4	4		$ 12,328		$ 12,328
Final Phase 3 Mitigation Plan	4	24	4			20			4	4		$ 12,328		$ 12,328
Task 12: AKART Analysis														
Technical Analysis (incl. sub coordination)	4	8				12						$ 5,056	$ 15,000	$ 20,056
Draft and final Report	4	8				12						$ 5,056	$ 10,000	$ 15,056
Task 13: On-call Agency/Stakeholder Support														
on-call support	24	24	8			4			16			$ 17,736		$ 17,736
Task 14: Canyon Springs Geotech														
4 site walks							60					$ 9,960	$ 1,000	$ 10,960
4 field reports		8					16			4		$ 5,088		$ 5,088
Task 15: Contract Support, Progress Reporting, & Meetings														
Comms	20	40										$ 15,320		$ 15,320
QA/QC	4	4	4			4						$ 3,792		$ 3,792
Invoicing	8	30									16	$ 11,252		$ 11,252
Total	208	586	52	570	468	186	76	986	144	46	16	$ 598,497	$ 76,000	$ 674,497