

Updated Infiltration Methods in the Stormwater Manuals
LOI #5
May 31, 2023

Applicant: City of Tacoma
Project Manager: Merita Trohimovich
Contact phone: 253-341-0123
Email: mtrohimo@cityoftacoma.org

Project Summary

This grant request will include a facilitated technical review of recently developed advances in infiltration testing and design methodology. This review will focus on the methods that were recently developed by a Kindred/City of Tacoma team using grant funds provided by EPA's NEP program and managed by the Department of Ecology (Flexible Infiltration Test Methods for Evaluating Infiltration Feasibility WQNEP-2020-TacoES-00054). The review will also include other methods developed in other parts of the United States that may offer advantages over the current methods in the Stormwater Management Manual for Western Washington (SWMMWW). Based on this technical review, Ecology will be provided with the information needed to consider modification of the existing infiltration methods within the SWMMWW.

The infiltration methods developed by the Kindred/City of Tacoma team are documented in an Infiltration Guide. The Infiltration Guide was developed based on numerical modeling and field testing that is documented in a six volume Technical Report. The infiltration guide addresses the full range of infiltration design, including: feasibility assessment, infiltration testing and analysis of the results, correction factors, calculating capacity of both shallow and deep infiltration facilities, and groundwater mounding assessment. An Excel workbook was developed to guide the user through the process and automate the calculations. The new test methods incorporate a complete model of flow dynamics in the subsurface and are more accurate than either grainsize methods or the pilot infiltration test (PIT). The methods include testing in excavated test pits (similar to the PIT method) but also includes borehole methods that are easier and less expensive to conduct than PIT testing in dense urban settings. In addition, these methods can be used to predict the capacity of dug (BMP T7.50) or drilled drywells, (aka UIC wells, SWMMWW Section I-4) which is not well addressed in the SWMMWW.

The technical review panel proposed for this project will include a professional facilitator, likely users of the methods (geotechnical engineers and hydrogeologists), Ecology staff, and any municipal stormwater professionals that wish to participate in the review process. The review panel will evaluate the new methods and suggest changes and refinements. If the review panel agrees that these advances should be incorporated into the SWMMWW, they will work with Ecology staff to develop specific language that can be incorporated into the SWMMWW. This process is similar to the technical review process that Ecology used previously to develop the infiltration methods included in the current SWMMWW.

Project Purpose

Priority Topic: In order to focus the Round 4 funding requests for the Stormwater Action Monitoring (SAM) program, the Stormwater Work Group (SWG) developed a list of approved priority topics. This funding request is designed to address Maintenance/Manual Priority 5: *Research related to adaptations for the Stormwater Management Manuals; e.g., ... vetting feasibility of new BMP design screening methods (i.e., infiltration testing methods).*

Furthermore, this grant request specifically addresses the following requirement of the National Pollutant Discharge Elimination System (NPDES) Western Washington Phase I and/or Phase II Municipal Stormwater Permits:

“Stormwater management programs shall make *low impact development (LID) the preferred and commonly used approach to site development* (Section S5.C.6.c.i in the Western Washington Phase I Permit and Section S5.C.1.c in the 2019 Western Washington Phase II Permit).”

Many LID best management practices (BMP) include infiltration (e.g., infiltration ponds, bioretention facilities, pervious pavement, and drywells). Sizing these BMPs requires estimating their infiltration capacity, which can be affected by soil permeability, the geometry and size of the infiltration facility, and the potential for groundwater mounding beneath the facility.

Permittee Engagement: A number of permittees participated in the City of Tacoma infiltration study, including the following cities: Everett, Kirkland, Mukilteo, Port Angeles, Sammamish, and Seattle; and the following counties: Clallam, King, and Kitsap. In addition, the following municipalities have reviewed this proposal and have expressed support for this funding request:

City of Mukilteo - Meiring Borchers, mborchers@mukilteowa.gov, (425) 263-8083

City of Port Angeles - Jonathan Boehme, jboehme@cityofpa.us, (360) 417.4803

City of Seattle - Sean Caraway, sean.caraway@seattle.gov, (206) 423-6756

City of Kirkland - Jenny Gaus, jgaus@kirklandwa.gov, 425 587-3850

King County - Angela Gallardo, agallardo@kingcounty.gov, (512) 940-6225

Letters of support were provided by several of these permittees and are included with this proposal.

Regional/Statewide Significance: This proposal would evaluate potential upgrades to current stormwater infiltration methods in the SWMMWW. These upgrades could include more accurate analysis of pilot infiltration test (PIT) data, addition of borehole methods that are easier to implement in urban neighborhoods, technically based correction factors, and better-defined mounding analysis methods. If approved and incorporated into the SWMMWW, these upgrades could also eventually be incorporated into the Eastern Washington Stormwater Manual and stormwater manuals developed by permittees.

The current PIT test method requires a large amount of space and water to complete the test. For projects that require several PIT tests on the site, this can be very expensive and time intensive. These issues can be onerous for small projects and in redevelopment scenarios and may

discourage project proponents from investigating infiltration. Borehole methods can be completed in a much smaller footprint and require less water and time to complete than the PIT test. Adding additional options to the SWMMWW will help encourage more project proponents to investigate infiltration as a stormwater management tool.

Long-Term Benefits/Durable Deliverables: This grant proposal will significantly improve our infiltration testing and assessment and provide stormwater infiltration facilities that are properly sized and designed. This will reduce the potential for over-building or under-building our infiltration facilities and result in more efficient stormwater management design.

One of the topics that will be addressed is the proper level of infiltration assessment for different sized projects. For example, although gran-size methods for estimating infiltration rates can be inaccurate (often by a factor of 5) they may be suitable for small projects if the design infiltration rate is sufficiently conservative.

Project Description and Scope of Work

This grant request will include a facilitated technical review of recently developed advances in infiltration testing and design methodology. This review will include methods that were recently developed by a City of Tacoma team using grant funds provided by EPA's NEP program and other methods developed in other parts of the United States that may offer advantages over the current methods in the SWMMWW. The technical review panel will include a professional facilitator, likely users of the methods (geotechnical engineers and hydrogeologists), Ecology staff, and any municipal stormwater professionals that wish to participate in the review process. It is anticipated that there will be three workshops to discuss the proposed methods and determine if they offer significant advantages over current methods. The draft Infiltration Language will be updated after each workshop and the consensus opinion of the group will be documented in meeting notes.

In order to ensure that the proposed changes to the SWMMWW can be easily incorporated into the manual, there will be additional meetings with Ecology staff before and after the workshops to understand their expectations. If Ecology determines that the SWMMWW should be updated to incorporate the new infiltration methods, the project team will work with Ecology staff to refine the language as needed for inclusion into the SWMMWW.

Scope of Work and Project Tasks:

The scope of work, goals, and deliverables for this proposed project are summarized in Table 1 and described below:

1. **Project Administration and Management:** Complete project contracting with SAM and consultant team. Provide complete invoices including a description of work completed in the reporting period. Manage project schedule and ongoing work.
Goal: Document project progress.
Deliverable: Project contracting, monthly invoicing and reporting.

2. **Literature review of existing infiltration methods:** This task includes a review of infiltration methods across the United States to determine if there are practices that offer advantages over the current stormwater infiltration practices in Washington State. This review will include regulatory guidance/requirements in stormwater manuals adopted by states and municipalities and a review of the technical literature to see if there are recent advances that have not been incorporated into stormwater manuals. This task will rely on reviews conducted by others and well-accepted methods that are published in technical journals.
Goal: To identify best practices in the area of stormwater infiltration across the county.
Deliverable: Technical memorandum summarizing existing infiltration methods.
3. **Initial Guidance from Ecology:** This task includes a meeting with Ecology to discuss the project and solicit guidance for potential changes to the SWMMWW. This meeting will define which portions of the SWMMWW may be modified based on the results of this technical review, help to identify the level of technical detail and complexity that would be considered appropriate, and clarify how Ecology would like to participate in the workshops. A specific topic that will be addressed is the use of grain size methods for estimating infiltration rates for small sites. This meeting will be led by the professional facilitator included on the project team. Following this meeting, the existing infiltration guide will be converted to draft SWMMWW language and will address guidance from Ecology Staff and incorporate any new methods from other parts of the United States that were identified in Task 1: Literature Review.
Goal: Develop a work product that meets Ecology’s guidelines for the SWMMWW.
Deliverable: Draft Infiltration Language V1.
4. **Workshops and Revisions:** This task includes three workshops with the technical review panel. The workshops will be led by the professional facilitator and the technical panel will include geotechnical engineers, hydrogeologists, Ecology staff, and municipal stormwater professionals. The technical panel will review the draft Infiltration Language V1 prepared in Task 2 before the first workshop. Revised drafts of the Infiltration Language will be prepared following each workshop and provided to members of the technical panel before the next workshop.
Goal: To provide a final work product that is acceptable to stormwater professionals responsible for infiltration testing and design.
Deliverables: Revised Infiltration Language (V2, V3, and V4) and a summary of feedback provided by the technical panel following each workshop
5. **Final Guidance from Ecology:** This task includes a meeting with Ecology staff to solicit guidance for final changes to the Infiltration Language to ensure that it is suitable for incorporation into the SWMMWW. This meeting will be led by the professional facilitator. Following this meeting, the Infiltration Language will be edited to address this guidance from Ecology Staff and the final draft will be submitted.
Goal: Develop a work product that meets Ecology’s guidelines for the SWMMWW.
Deliverable: Infiltration Language V5.

6. **Communications with Permittees:** This task includes providing draft versions of the Infiltration Language to interested permittees on a regular basis to solicit feedback and obtain buy-in. In addition, team members will present proposed changes to the SWMMWW at conferences and meetings. The timing and content of these presentations will be coordinated with Ecology. One of these presentations shall be to SAM's Stormwater Work Group. This task also includes preparation of a draft SAM Fact Sheet that provides a two-page summary of the project following the SAM-provided template.
Goal: Obtain feedback and buy-in from permittees.
Deliverable: Distribute draft versions of the Infiltration Language to interested permittees at least three times. Conduct at least three presentations on the proposed SWMMWW changes at conferences and meetings attended by stormwater professionals. Prepare a draft SAM Fact Sheet.

The proposed project does not include any data collection or data analysis. Therefore, no Quality Assurance Project Plan (QAPP) is required.

Project Team and Project Management

Team Structure: Table 2 lists all the team members and their roles. Key team members include:

- **Merita Trohimovich with City of Tacoma** will manage the contract with Ecology and provide a permittee's perspective on the potential changes to the SWMMWW.
- **Scott Kindred with Kindred Hydro, Inc.** was the original author of the Infiltration Guide for the NEP grant and will be the primary author for the proposed Infiltration Language. In addition, he will manage the consultant team.
- **Gretchen Muller with Cascadia Consulting Group** will facilitate the meetings and evaluate the Infiltration Language to ensure that it addresses Ecology's requirements and the general consensus feedback from the technical review team.
- **The technical review panel includes eight consulting firms** with one to two representatives from each firm. Both hydrogeologists and geotechnical engineers are included on the panel as shown in Table 2. In addition, Tony Allen with the Washington State Department of Transportation will be included on the panel.

Engagement of Permittees: Permittees are welcome to join the technical review panel. As discussed in Task 5 above, interested permittees will be provided drafts of the Infiltration Language during the technical review process. Permittees that have expressed interest in the past include the following cities: Everett, Kirkland, Mukilteo, Port Angeles, Sammamish, and Seattle; and the following counties: Clallam, King, Kitsap, and Pierce.

Past Project Performance:

The City of Tacoma has received numerous grant awards and has a strong track record for completing these projects successfully. Examples of recent grant-funded projects managed by Ms. Trohimovich include:

- WQSWGRS-2123-TacoES-00087: Stormwater Rate Structures: Alternatives and Evaluation

- WQSWCAP-2123-TacoES-00215: Water Quality Stormwater Capacity Grant
- WQNEP-2020-TacoES-00054: Flexible Infiltration Test Methods for Evaluating Infiltration Feasibility

The City of Tacoma and Kindred Hydro, Inc. worked together on the NEP grant-funded study referenced in the Project Summary. This project included evaluation of both steady-state and falling-head methods using a combination of numerical simulations and field testing. The results of this project include a six-volume technical report detailing the project and an Infiltration Guide with practical guidance for conducting infiltration assessments. Although this project had a Technical Advisory Committee (TAC) most of the TAC members were municipal stormwater managers who did not specialize in stormwater infiltration and there was limited feedback. Based on this lesson learned, the TAC for this study will include consultants with significant experience in stormwater infiltration.

Mr. Kindred has continued his infiltration research with California State Polytechnic University, Pomona and is currently working on a drywell study funded by the Los Angeles County Clean Safe Water program (<https://safecleanwaterla.org/>). (Cal Poly Pomona Reference: Dr. Mehrad Kamalzare, mkamalzare@cpp.edu, 909-869-4908). This study includes side-by-side testing of 48-inch diameter drilled drywells and small diameter test wells drilled using different drilling techniques. The goal of this study is to determine if results of test wells provide reliable estimates of full-scale drywells.

Mr. Kindred is also working with the Snoqualmie Tribe on a grant-funded project to monitor changes in groundwater flow dynamics due to a floodplain restoration project near Fall City, Washington. This two-year project is almost complete and has provided valuable insight into groundwater flow dynamics in a floodplain. (Snoqualmie Tribe Reference: Matt Baerwalde, Mattb@snoqualmientribe.us, 425-495-4111).

Ms. Muller has 17 years of facilitation experience. Examples of these projects include:

- Puget Sound Implementation Strategies Facilitation, Washington Department of Ecology, 2017-2021
- Southern Resident Orca Task Force, Washington State Governor’s Office, 2017-2019
- Action Agenda Support, Puget Sound Partnership, 2018-2019, 2021-Present
- Statewide LID Needs Assessment and Training Plan; LID Training Program, Washington Department of Ecology, 2011-2013

Project Budget and Schedule

Budget: The project budget and deliverables for each task are provided in Table 1. There are six main tasks and a number of sub-tasks. Deliverables, goals, and budget are provided for each sub-task.

Schedule: The project schedule is provided in Table 1. It is our expectation that the project can be completed 30 weeks after notice to proceed. This schedule assumes that Ecology’s feedback on the Infiltration Language in Tasks 3 and 5 will be provided within four weeks.

Table 1: Summary of Tasks and Deliverables				
Task	Deliverables	Goal	Budget	Complete
1) Project Administration/Management	Project Contracting, Invoicing and Reporting	Document Project Progress	\$8,000	Ongoing
2) Literature Review	Review of Existing Methods	Identify best practices in the area of stormwater infiltration	\$24,260	Week 4
3) Initial Ecology Guidance	Draft Infiltration Language V1	Provide a work product that meets Ecology's guidelines for the SWMMWW	\$19,450	Week 8
4a) Workshop 1 and Revisions	1) Revised Infiltration Language V2 2) Summary of Feedback from Review Panel	Provide a work product acceptable to stormwater infiltration professionals	\$21,850	Week 13
4a) Workshop 2 and Revisions	1) Revised Infiltration Language V3 2) Summary of Feedback from Review Panel		\$21,850	Week 18
4a) Workshop 3 and Revisions	1) Revised Infiltration Language V4 2) Summary of Feedback from Review Panel		\$21,850	Week 23
5) Final Guidance from Ecology	Final Infiltration Language V5	Provide a work product that meets Ecology's guidelines for the SWMMWW	\$29,040	Week 30
6a) Communications with Permittees	1) Distribute Infiltration Language V1, V2, V4 2) Three Presentations of potential changes to SWMMWW	Obtain feedback and buy-in from permittees.	\$5,330	Week 30
6b) SAM Fact Sheet	1) SAM Fact Sheet		\$2,000	Week 30
Project Total			\$153,630	

Table 2: Project Team

Organization	Team Member	Expertise	Role
City of Tacoma	Merita Trohimovich	Stormwater Engineer	Project Manager
Kindred Hydro, Inc.	Scott Kindred	Hydrogeologist, PE, LHg	Author, Manage Consultant Team
Cascadia Consulting Group	Gretchen Muller	Facilitation	Facilitator
Richard Martin Groundwater	Richard Martin	Hydrogeologist, LHg	Technical Reviewer
Aspect Consulting	Henry Haselton	Geotechnical Engineer, PE	Technical Reviewer
	Andrew Austreng	Hydrogeologist, LHg	Technical Reviewer
Shannon & Wilson	Brian Peck	Hydrogeologist, PG, LHg	Technical Reviewer
	Paul Van Horne	Hydrogeologist, LHg	Technical Reviewer
Earth Solutions NW, LLC	Henry Wright	Geotechnical Engineer, PE	Technical Reviewer
	Keven Hoffmann	Hydrogeologist, LHG	Technical Reviewer
Terra Associates, Inc.	Ted Schepper	Geotechnical Engineer, PE	Technical Reviewer
	John Sadler	Hydrogeologist, LHG	Technical Reviewer
Landau Inc.	Eric Weber	Hydrogeologist, LHg	Technical Reviewer
	Annabel Irwin	Geotechnical Engineer, PE	Technical Reviewer
GeoEngineers, Inc.	Bridget August	Hydrogeologist, LG, LHG	Technical Reviewer
Associated Earth Sciences, Inc.	Jennifer Saltenstall	Hydrogeologist, LG, LHG	Technical Reviewer
WSDOT	Tony Allen	Geotechnical Engineer, PE	Technical Reviewer



May 26, 2023

Stormwater Action Monitoring Grant Reviewers

RE: LOI #5: Updated Infiltration Methods in the Stormwater Manuals– Letter of Support

Dear SAM Reviewer:

The City of Port Angeles endorses the grant proposal (Updated Infiltration Methods in the Stormwater Manuals) submitted by City of Tacoma's for the Stormwater Action Monitoring (SAM) grant program. We value this opportunity to partner with the City of Tacoma to implement this project.

The City is very interested in this project which will support the implementation of low impact development best management practices that rely on infiltration. We see the need to improve our infiltration testing and design process and provide less expensive and disruptive testing methods for dense urban settings. Traditional PIT Tests have been found to be very costly and a barrier to housing needs in Port Angeles. The results of this project will be very useful as we move forward with green stormwater infrastructure.

We look forward to the opportunity to partner with the City of Tacoma on this project.

If you have any questions please contact me at 360-417-4803.

Sincerely,

A handwritten signature in black ink that reads "Jonathan Boehme".

Jonathan Boehme, P.E.
City Engineer



CITY OF
MUKILTEO

Public Works Department

May 26, 2023

Matt Nienhuis
Director of Public Works
City of Mukilteo
11930 Cyrus Way
Mukilteo, WA 98275

Subject: Stormwater Action Monitoring Grant Reviewers
RE: LOI #5: Updated Infiltration Methods in the Stormwater Manuals—
Letter of Support

Dear SAM Reviewer:

The City of Mukilteo endorses the grant proposal for Updated Infiltration Methods in the Stormwater Manuals, submitted by City of Tacoma's for the Stormwater Action Monitoring (SAM) grant program. We value this opportunity to partner with the City of Tacoma to implement this project.

Our City is very interested in this project which will support the implementation of low impact development best management practices that rely on infiltration. We see the need to improve our infiltration testing and design process and provide less expensive and disruptive testing methods for dense urban settings. The results of this project will be very useful as we move forward with green stormwater infrastructure implementation.

We look forward to the opportunity to partner with the City of Tacoma on this project.

Sincerely,

Matt Nienhuis
Director of Public Works

Cc: File copy

Signature: *Matt Nienhuis*

Email: MNIENHUIS@MUKILTEOWA.GOV

Letter of Support Tacoma LOI#5 2023

Final Audit Report

2023-05-26

Created:	2023-05-26
By:	Meiring Borchers (mborchers@mukilteowa.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAA-rbmJmIZTeAGS_p-IFpLD6c-VwRZLBft

"Letter of Support Tacoma LOI#5 2023" History

-  Document created by Meiring Borchers (mborchers@mukilteowa.gov)
2023-05-26 - 8:55:24 PM GMT
-  Document emailed to Matt Nienhuis (MNIENHUIS@MUKILTEOWA.GOV) for signature
2023-05-26 - 8:55:49 PM GMT
-  Email viewed by Matt Nienhuis (MNIENHUIS@MUKILTEOWA.GOV)
2023-05-26 - 10:52:58 PM GMT
-  Document e-signed by Matt Nienhuis (MNIENHUIS@MUKILTEOWA.GOV)
Signature Date: 2023-05-26 - 10:53:28 PM GMT - Time Source: server
-  Agreement completed.
2023-05-26 - 10:53:28 PM GMT



GRANT APPROVAL FORM

Please refer to the guidelines and instructions on Pages 2 and 3 before completing this form.

PRIOR TO GRANT APPLICATION: COMPLETE THIS SECTION AND SUBMIT TO CITY MANAGER'S OFFICE AND FINANCE ACCOUNTING.

FORMAL TITLE OF GRANT: Updated Infiltration Grants in Stormwater Manual
FEDERAL CFDA (IF APPLICABLE): _____

AGENCY APPLYING TO: Ecology, Stormwater Action Monitoring Group PROGRAM BEGIN DATE: Jan 2024
APPLICATION DUE DATE: MAY 31, 2023 PROGRAM END DATE: JUNE 2026

PROJECT SUMMARY (BRIEF DESCRIPTION): This grant request will include a facilitated technical review of recently developed advances in infiltration testing and design methodology. This review will focus on the methods that were recently developed by a City of Tacoma team using grant funds provided by EPA's NEP program and will also include other methods that may offer advantages over the current methods.

RESTRICTIONS/CONDITIONS OF FUNDING: Funds will be used for the study with scope and budget agreed upon after award.

PARTNERS ON THIS GRANT (PIERCE COUNTY, STATE, FEDERAL, NON PROFIT, ETC.): Kindred Hydro and a number of Municipalities (letters of support are currently being gathered)

GRANT AMOUNT APPLYING FOR \$ 150,000-200,000 CITY MATCH \$ 0 IS THE CITY MATCH EARMARKED IN THE CURRENT BUDGET?
FEDERAL \$ _____ YES NO NA
STATE \$ _____
OTHER \$ _____
WOULD THE CITY MATCH NEED TO BE INCLUDED IN FUTURE BUDGETS?
 YES NO NA
GRANT TYPE: CAPITAL OPERATING

LEAD DEPARTMENT: Environmental Services PROGRAM MANAGER NAME: Merita Trohimovich PHONE NUMBER: 253-341-0123

FINANCE: FUND ACCOUNTANT NAME: Louis Nguyen PHONE NUMBER: 591-5836
BUDGET OFFICE: BUDGET ANALYST NAME: MAC ACABADO PHONE NUMBER: 594-7925

DocuSigned by: Michael P. Stevin III, P.E. 05/23/2023 DocuSigned by: Elizabeth Pauli 05/23/2023
DIRECTOR OR DIVISION MANAGER DATE CITY MANAGER DATE

AWARD DETERMINATION: COMPLETE AND SUBMIT THIS SECTION TO FINANCE ACCOUNTING.

GRANT STATUS: DENIED AWARDED DATE OF AWARD: _____ GRANT NUMBER: _____
AWARD AMOUNT: \$ _____ MATCH AMOUNT: \$ _____

GRANT BEGIN DATE: _____ GRANT END DATE: _____ DEADLINE FOR REIMBURSABLES : _____
IS THIS GRANT RENEWABLE? YES NO MULTI YEAR? _____

PLEASE ANSWER ALL QUESTIONS: (PLEASE REFER TO THE PAGE 3 OF THIS DOCUMENT TO DETERMINE RESOLUTION/ORDINANCE NECESSITY)
1. HAVE APPROPRIATIONS, INCLUDING MATCHES, FOR THIS GRANT BEEN INCLUDED IN THE CURRENT BIENNIAL BUDGET? YES NO
2. DOES THE RECEIVING DEPARTMENT NEED AN IMMEDIATE APPROPRIATION? YES NO
3. WILL THE CITY BE MATCHING FUNDS OR SERVICES IN EXCESS OF \$200,000? YES NO
4. DOES THE GRANT REQUIRE SEPARATE COUNCIL ACTION BY GRANTOR? YES NO
5. IF THERE ARE PROJECT FTE'S, HOW MANY ARE ANTICIPATED? _____



**Seattle
Public
Utilities**

Geotechnical Engineering

MEMORANDUM

Date: May 30, 2023

To: Stormwater Action Monitoring Grant Reviewers

From: Sean Caraway, P.E.
SPU Geotechnical Engineering

Subject: LETTER OF SUPPORT – UPDATED INFILTRATION METHODS IN
THE STORMWATER MANUALS: LOI NO. 5

Dear SAM Reviewer:

The City of Seattle endorses the grant proposal (Updated Infiltration Methods in the Stormwater Manuals) submitted by City of Tacoma for the Stormwater Action Monitoring (SAM) grant program. We value this opportunity to partner with the City of Tacoma to implement this project.

Our organization is very interested in this project which will support the implementation of low impact development best management practices that rely on infiltration. We see the need to improve our infiltration testing and design process and provide less expensive and less disruptive testing methods for dense urban settings. The results of this project will be very useful as we move forward with green stormwater infrastructure projects, in the City of Seattle.

We look forward to the opportunity to partner with the City of Tacoma on this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Sean Caraway".

Sean Caraway, P.E.
Senior Geotechnical Engineer
SPU Geotechnical Engineering

May 31, 2023



Stormwater Action Monitoring Grant Reviewers
RE: LOI #5: Updated Infiltration Methods in the Stormwater Manuals– Letter of Support

Dear SAM Reviewer:

Kirkland supports the grant proposal (Updated Infiltration Methods in the Stormwater Manuals) submitted by City of Tacoma's for the Stormwater Action Monitoring (SAM) grant program. We value this opportunity to partner with the City of Tacoma to implement this project.

Infiltration is key to controlling the flow and improving the quality of stormwater in our community. Accurate information about infiltration potential is key to the developing feasible designs for green infrastructure projects. We see the need to improve our infiltration testing and design process and to provide less expensive and less disruptive testing methods for dense urban settings. The results of this project will be very useful as we move forward with green stormwater infrastructure.

We look forward to the opportunity to partner with the City of Tacoma on this project.

Sincerely,
Public Works Department

A handwritten signature in black ink that reads "Jenny Gaus". The signature is written in a cursive style. It is placed over a large, light green background illustration of a waterfront scene, including a building, a dock, and a sailboat on the water.

Jenny Gaus, Surface Water Strategic Advisor