

Eastern Washington Stormwater Effectiveness Studies
Quality Assurance Project Plan

Private Residential BMP Owner Awareness Effectiveness Study

Study Classification:

Structural BMP Operational BMP Education & Outreach

Study Objective:

Evaluate Effectiveness Compare Effectiveness



Prepared By:
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Proposal Public Information

The proposal will be available on the regional Wenatchee Valley Stormwater Technical Advisory Committee (WVSTAC) webpage hosted by the City of Wenatchee, www.wenatcheewa.gov/wvstac.

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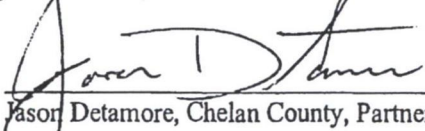
Private Residential BMP Owner Awareness Effectiveness Study


Signature Page


This section will be completed for the QAPP.

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1.0 Table of Contents

Signature Page.....	3
Distribution List.....	4
1.0 Table of Contents.....	5
List of Figures.....	6
List of Tables.....	6
2.0 Executive Summary.....	7
3.0 Background.....	8
3.1 Problem Description.....	8
3.2 Results of Prior Studies.....	9
3.3 Regulatory Requirements.....	9
4.0 Project Overview.....	9
4.1 Study Goal.....	9
4.2 Study Description and Objectives.....	10
4.3 Study Location and/or Target Population.....	10
4.4 Data Needed to Meet Objectives.....	11
4.5 Tasks Required to Conduct Study.....	11
4.6 Potential Constraints.....	12
4.7 Considered Mitigation Approach Alternatives.....	12
5.0 Organization and Schedule.....	13
5.1 Key Project Team Members: Roles and Responsibilities.....	13
5.2 Project Schedule.....	15
5.3 Budget and Funding Sources.....	15
6.0 Quality Objectives.....	16
7.0 Experimental Design.....	20
7.1 Study Design.....	20
7.2 Process for Selecting the Test-Site and Target Population.....	20
7.3 Type of Data being Collected.....	21
7.4 Other Education & Outreach Programs.....	21
8.0 Instrument Design and Development.....	21
8.1 Instrument Design.....	22
8.2 Procedures for Collecting Data.....	22
8.3 Instrument Validation.....	22
9.0 Quality Control.....	23
9.1 Study QC Procedures.....	23
9.2 Corrective Action.....	23
10.0 Data Management Plan Procedures.....	23

10.1 Data Identification	23
10.2 Data Recording & Reporting Requirements	24
10.3 Procedures for Missing Data	24
10.4 Acceptance Criteria for Existing Data	24
11.0 Audits	25
12.0 Data Verification and Usability Assessment.....	26
12.1 Data Verification	26
12.2 Data Usability Assessment	26
13.0 Data Analysis Methods	26
13.1 Hypothesis Testing	26
13.2 Quantitative & Qualitative Data Analysis Methods.....	27
13.3 Data Presentation Methods	27
14.0 Reporting.....	27
14.1 Final Reporting	27
14.2 Dissemination of Project Documents.....	28
15.0 References	29
16.0 Appendices.....	30

List of Figures

Figure1: Wenatchee Valley Municipal Stormwater Boundaries	11
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List of Tables

Table 1: Potential Constraints and Subsequent Mitigation Approach	12
Table 2: Key Project Team Members: Roles and Responsibilities	13
Table 3: Study Timeline.....	15
Table 4: Study Cost Breakdown	16
Table 5: Data Quality Indicators and Measurement Performance Criteria.....	17
Table 6: Types of Data Being Collected.....	21
Table 7: Audits.....	25
Table 8: Data Verifier Tasks.....	26
Table 9: Effectiveness Study Reporting.....	29

2.0 Executive Summary

In 2011, the Eastern Washington Phase II Municipal Stormwater Permit (Permit) began requiring permittees to develop and implement a stormwater management program element to control stormwater runoff from new and re-development projects through the usage of post-construction stormwater best management practices (BMPs). The Permit also required permittees to establish a mechanism to ensure privately owned post-construction BMPs are maintained to continue to achieve water quality and environmental benefits. The goal of the proposed study is to assess the effectiveness of the regulatory mechanism, the recorded Operations and Maintenance (O&M) agreement, at informing owners about BMPs and their responsibility to maintain BMPs. The present study involves a survey of residents in single family homes in subdivisions which were one acre or larger and have one or more post-construction stormwater BMPs serving more than one home located within the municipal permit boundaries of the Wenatchee Valley. The study will assess BMP owner awareness between a test group consisting of subdivisions which were required to implement an O&M agreement and a control group consisting of subdivisions built prior to the requirement to implement an O&M agreement. The survey will be used to evaluate the knowledge, attitude, and practices of residents in subdivisions with an O&M agreement and those without an O&M agreement to assess their overall awareness of their BMPs and responsibility to maintain BMPs. The study results are anticipated to show how effective the O&M agreement is at informing residents of their ownership and responsibility to maintain BMPs. The study results will be presented in a final report presenting trends in owner awareness for stormwater BMPs and will provide recommendations for improving education and outreach efforts for private BMP owners.

3.0 Background

Increasingly dense development within urbanized areas has required improved methods to manage stormwater runoff from impervious surfaces. The use of pipes and catch basins was adequate for a time, but rapid urbanization, persistent degradation of natural landscapes, water quality, and climate change-related increases in the amount and intensity of rainfall have all made stormwater management a high priority. To prevent or minimize water quality impacts of new and redevelopment projects, Eastern Washington Phase II Municipal Stormwater permittees were required to develop, implement, and enforce a program to address post-construction stormwater runoff from public and private projects beginning in 2011. The minimum requirement set forth by the Permit was a regulatory mechanism for projects meeting a one-acre area threshold to manage a percentage of stormwater onsite using post-construction best management practices (BMPs). Permitted jurisdictions were also required to implement a mechanism to ensure long-term maintenance of the BMPs.

The Permit states that project proponents shall ensure implementation of long-term operation and maintenance standards to protect water quality and reduce the discharge of pollutants to the maximum extent practicable. As projects are completed, developers transfer BMP maintenance responsibility to property owners and homeowners associations. In many jurisdictions, for projects built after 2011, BMP owners have a recorded Declaration of Stormwater Covenants, also referred to as an Operations and Maintenance Agreement, detailing the type, location, and maintenance requirements for the BMP requiring inspection and maintenance. For many projects built before 2011, information about stormwater BMP operations and maintenance may be incorporated into the covenants recorded on the subdivision plat or in the homeowner associations' covenants.

3.1 Problem Description

All post-construction stormwater BMPs require inspection and maintenance. Appropriate operation and maintenance activities are required to ensure BMPs continue to function properly and yield expected water quality and environmental benefits. Builders and developers are required to install BMPs with their projects and once completed, long-term maintenance is then left to private property owners and homeowners associations. Stormwater program managers generally perceive stormwater BMP awareness to be low for residential property owners (Matsler, 2017).

Many Permittees use an Operations and Maintenance agreement (O&M agreement) recorded with the County Auditor at the time the BMP is installed to inform property owners about the purpose and maintenance requirements of the BMP. As properties change ownership over time, it is assumed, owner awareness of BMP existence and the obligation for inspection and maintenance of the BMP is likely to decrease despite the O&M agreement providing guidance to all property owners. Programs for managing post-construction stormwater BMPs are not limited to Eastern Washington, therefore addressing trends in BMP owner awareness may have wide reaching impacts for the development and implementation of post-construction BMP educational programs.

3.2 Results of Prior Studies

There is significant research published regarding the effectiveness of various post-construction BMPs ability to reduce pollutants and control flow, and their effectiveness over time in various climates. In cases where traditional BMPs such as ponds and swales may not be appropriate due to size and space requirements or an inability to remove target pollutants the stormwater industry has emerged with new technologies to meet site requirements. The effectiveness of emerging technologies is also readily available because protocols are in place to assist manufacturers of emerging technologies to verify and prove their performance claims (Washington State Department Of Ecology Water Quality Program, 2019). After BMPs are installed and ownership is transitioned to property owners or a homeowners association (HOA), published information regarding owner awareness of BMPs is less prevalent.

Difficulties in ensuring maintenance of post-construction BMPs located on private property have been documented in literature. Rafter (2007), discusses the responsibilities, neglect, and budgeting requirements associated with the long-term upkeep of stormwater BMPs. There have also been studies of literature evaluating knowledge, attitudes, and behaviors related to green infrastructure for flood management (Venkataramanan, et al., 2020). While the literature review provides valuable insight and resources regarding green-infrastructure and post-construction BMPs, it does not elaborate the general awareness of privately owned BMPs. Many agencies publish educational materials for post-construction BMP maintenance through various outlets, including print materials, workshops and training, but there has been little research published regarding the effectiveness of the educational materials and their impact on improving maintenance frequency or BMP awareness.

3.3 Regulatory Requirements

The 2019 Eastern Washington Phase II Municipal Stormwater Permit S5.B.1 requires permittees to implement a public education and outreach program designed to educate target audiences about the impacts of stormwater discharges. Additionally, S5.B.5.ii.(c) requires permittees to implement a regulatory mechanism to ensure adequate ongoing long-term maintenance of post-construction BMPs approved by the Permittee.

4.0 Project Overview

4.1 Study Goal

The goal of this study is to assess the effectiveness of the recorded O&M agreement as a regulatory mechanism to educate all owners within a subdivision about the BMP serving their neighborhood and the responsibility of the HOA or other neighborhood organization to maintain and inspect the BMP by evaluating the level of BMP owner awareness throughout the entire subdivision. While not every resident in a subdivision is directly responsible for BMP maintenance, it is beneficial to understand each resident's awareness of the BMP serving their neighborhood, how they may impact the BMP, and if they know who to contact in case of issue or emergency. By evaluating owner awareness of stormwater BMPs, the study will address the assumptions made by stormwater managers that there are very few people knowledgeable about stormwater BMPs. Additionally, the study will assist in determining if owner awareness differs between surface and subsurface BMPs.

4.2 Study Description and Objectives

A survey will be developed by the lead agency and administered by a consultant to solicit information from residents in single family homes located in subdivisions which met the one-acre threshold at the time of construction and have post-construction BMPs in the Wenatchee Valley. The selected residential developments will have BMPs that serve multiple homes. Data will be collected from developments which were required to implement an O&M agreement and developments which were not required to record an O&M agreement to establish the effectiveness of the O&M agreement at providing education.

The main objectives of the study are as follows:

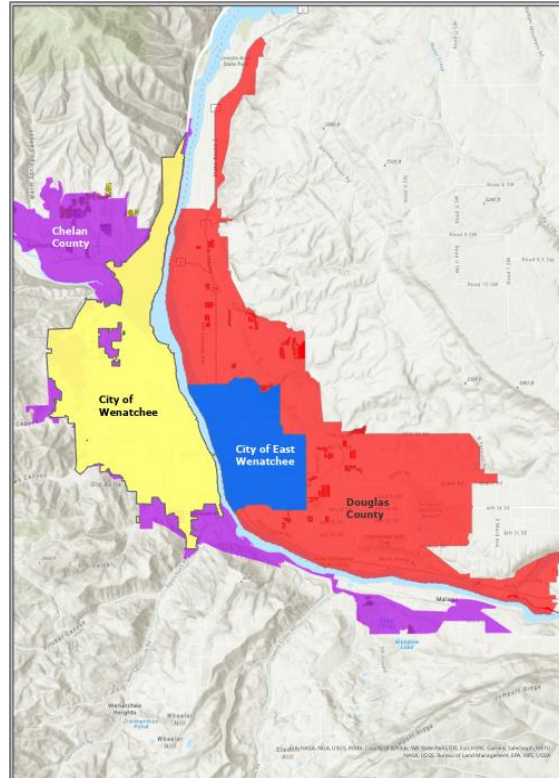
- Gauge neighborhood awareness of the BMP existence, the O&M agreement, need to maintain the BMP, maintenance requirements, and the obligation to inspect and maintain the BMP.
- Utilize survey responses to determine most effective way to distribute information on BMP operation and maintenance to homeowners and homeowners associations.

The scope of this study does not include BMP site inspections due to the varying inspection processes and schedules used by permittees and the goal of the study is focused on assessing awareness of the O&M agreement for the BMP.

4.3 Study Location and/or Target Population

The Wenatchee Valley, shown in Figure 1, including Douglas County, Chelan County, City of East Wenatchee, and the City of Wenatchee, will be the study location. The target population will include residents in subdivisions which met the one-acre threshold built with post-construction BMPs serving more than one home with a recorded O&M agreement. The control population will include residents in subdivisions which met the one-acre threshold built with post-construction BMPs serving more than one home without a recorded O&M agreement. The study will survey all residents in the test and control subdivisions. The study targets all residents within the neighborhoods because the O&M Agreement is recorded against all properties and all members of a homeowners association pay into the management of the BMP. Understanding neighborhood awareness is also valuable because properties often change ownership and HOA contacts may change. Within the study location, there are an estimated 2,000 total homes (including the test and control groups) homes meeting the criteria to be included in this study.

Figure 1: Wenatchee Valley Municipal Stormwater Boundaries



4.4 Data Needed to Meet Objectives

The following data will need to be collected:

- Subdivisions from each of the jurisdictions, meeting the one-acre threshold with post-construction BMPs serving more than one household, with a recorded O&M agreement and without a recorded O&M agreement to establish recipient list. Jurisdictions will also be asked to provide the date of the subdivision construction.
- Responses to surveys from residents in subdivisions.

4.5 Tasks Required to Conduct Study

The project is expected to include the following tasks. A detailed breakdown of the task timeline is included in Table 3.

- Technical Advisory Group formed and initial proposal submitted to Ecology 1/27/2021
- Detailed Study Design Proposal, submitted to Ecology 3/31/2021
- Ecology Review Period
- Quality Assurance Project Plan, 6-months maximum
 - Finalization of Interlocal Agreement
- Ecology Review Period
- Data Collection Preparation, 6-months, maximum
 - Select a consultant.
 - Lead agency will prepare the survey and validate the survey with assistance from

- Technical Advisory Group and the selected consultant.
- Collect information about housing developments located within the Municipal Permit Boundary to create mailing lists for survey.
- Data Collection, 1-year
 - Conduct a survey of single-family housing developments in the Wenatchee Valley constructed with an O&M agreement (test group) and without an O&M agreement (control group).
 - Data collection allotted 1-year to accommodate additional prompts to increase survey response or other unforeseen issues which could occur.
- Analysis and Reporting, 6-months, maximum

4.6 Potential Constraints

This section describes the conditions that may impact the project schedule, budget, or scope and the steps that will be taken to reduce the impact of these conditions. The potential constraints and mitigation approach are summarized in Table 1.

Table 1: Potential Constraints and Subsequent Mitigation Approach

Potential Constraint	Mitigation Approach
The homeowner or resident may not want to return the mail survey.	The survey can also be offered online to reduce required effort to return.
The mail survey is thrown away or recycled because it appears to be “junk mail”.	The local jurisdiction could send a postcard or letter in advance of the survey letting the targeted neighborhood know that a survey will be conducted within a given timeframe.
Response rate of mail surveys can be very low.	If the mail survey has low response rate, utilize a post card to initiate contact and solicit participation, and provide the option for the participant complete the survey online. The Technical Advisory Group will evaluate follow up options based on survey response rate to encourage more survey responses. Follow up options may include postcard mailing, door hangers, or e-mail survey.

4.7 Considered Mitigation Approach Alternatives

In the evaluation of mitigation approaches for potential constraints facing the study, there were many alternatives considered but not selected. The list below details mitigation approaches which were not selected by the Technical Advisory Group (TAG).

- Phone Surveys: Phone surveys were not selected as an alternative to survey distribution because previous studies have indicated phone surveys are not a reliable method of soliciting survey responses. Within the study area, the Permittees do not have a reliable database of phone numbers. Additionally, due to the high volume of scam calls received rates of ignored or silenced phone calls is expected to be high.
- Utility Bill Inserts: Utility bill inserts were not selected as an alternative to inform

residents of the upcoming survey because within the study area, the utility bill inserts are not a reliable method to distribute information. All permittees within the study area operate using different billing cycles and have a substantial number of residents utilizing paperless billing.

- Survey Completion Incentives: Incentives were not selected as mitigation approach because local government cannot provide giveaway incentives. Incentives are additionally challenging because what constitutes an incentive to complete the survey to one resident may not be considered an incentive to another.

5.0 Organization and Schedule

The purpose of this section is to describe who is responsible for completing the tasks, when the tasks will be completed, how much each task will cost, and how the study will be funded.

5.1 Key Project Team Members: Roles and Responsibilities

Table 2 provides a detailed description of each participating agency, their role in the completion of the effectiveness study and the responsibility associated with each role.

Table 2: Key Project Team Members: Roles and Responsibilities

Participating Entity	Role	Responsibility
Department of Ecology	Regulator	Accept initial study topic proposal. Review and accept Detailed Study Design Proposal and Quality Assurance Project Plan with comments. Provide technical guidance as needed.
City of Wenatchee Chelan County Douglas County City of East Wenatchee City of Pullman	Financial Support	Provide lead entity with financial contributions toward their cost of executing the study.
City of Wenatchee Chelan County Douglas County City of East Wenatchee City of Pullman	Reviewer	Review and provide comments (<i>either technical review or QA/QC for grammar, etc.</i>) on the study documents prior to the lead entity submitting the documents to Ecology. Documents include: <ul style="list-style-type: none"> • Quality Assurance Project Plan (QAPP) • Final Report • Fact Sheet

Participating Entity	Role	Responsibility
City of Wenatchee* Chelan County Douglas County City of East Wenatchee City of Pullman Consultant	Technical Advisory Group Lead*/Member	<p>The goal of a Technical Advisory Group (TAG) is to provide insight, suggestions, and professional opinions over the course of the research study. The expectations of the TAG members may include:</p> <ul style="list-style-type: none"> • Attend project status meetings (either by phone or in person) and participate in the meeting discussion • Review and provide comments on research materials (i.e. QAPP, data collected, data analyzed, study reports, etc.) • Develop and validate the survey for distribution for the subdivisions
City of Wenatchee	QAPP Author	The QAPP Author is responsible for developing the contents of the QAPP as defined in the QAPP Template through Ecology approval of the QAPP.
Consultant	Data Collector and Data Analyst	Data collectors are responsible for collecting some or all of the data during the data collection phase of the study. This includes following the standard operating procedures (SOPs) for data collection as defined in the QAPP (see section 8.0 of the QAPP Templates for additional discussion on SOPs).
City of Wenatchee Douglas County	Auditor	<p>Auditors are responsible for conducting audits to verify the study conforms to the plan and procedures defined in the Ecology approved QAPP (see section 11 of the Education and Outreach QAPP Template or section 12 of the Operational and Structural QAPP Template for additional discussion on audits). This may include:</p> <ul style="list-style-type: none"> • Verify the staff collecting the data has been trained and are following the SOPs for data collection as defined in the QAPP. <i>This will include being present when the data is collected.</i> • Verify the data management procedures are being followed as defined in the QAPP including review all the data records to ensure they are consistent, correct and complete, with no errors or omissions. <i>This will include traveling to the location where the data is stored and reviewing the data records compared to the QAPP Data Management Plan.</i>

Participating Entity	Role	Responsibility
City of East Wenatchee	Data Verifiers	Data verifiers will review the analyzed data and verify the analysis is correct. This may include: <ul style="list-style-type: none"> • Verify that the data collected in the field matches the data being analyzed • Review the data analyzed for errors • For qualitative data (i.e. open-ended questions) the data verifier (also referred to a peer debriefing) will assist with validating the codes/themes compared to the data collected to determine if they have the same results as the researcher.
City of Wenatchee	Final Report Author	The author of the final report is responsible analyzing the data and summarizing the findings of the study into a report as defined the QAPP Template sections 14.0 and 15.0 or section 13.0 and 14.0 for Education and Outreach Studies.
City of Wenatchee	Fact Sheet Author	The author of the fact sheet is responsible for summarizing study findings and recommendations. The fact sheet is to be distributed to other permittees.

5.2 Project Schedule

The project is expected to take 18 to 24 months once the QAPP has been approved and finalized. Table 3 contains the detailed study timeline.

Table 3: Study Timeline

Task Name	2021				2022				2023				2024	
	Q1: Jan- Mar	Q2: Apr- Jun	Q3: Jul- Sept	Q4: Oct- Dec	Q1: Jan- Mar	Q2: Apr- Jun	Q3: Jul- Sept	Q4: Oct- Dec	Q1: Jan- Mar	Q2: Apr- Jun	Q3: Jul- Sept	Q4: Oct- Dec	Q1: Jan- Mar	Q2: Apr- Jun
Proposal Development	█													
Ecology Proposal Review		█												
QAPP Development			█	█										
Ecology QAPP Review					█									
Data Collection Prep. & Consultant Selection					█	█								
Data Collection							█	█	█	█	█	█		
Analysis and Reporting													█	█

5.3 Budget and Funding Sources

The study will be funded jointly by the City of Wenatchee, City of East Wenatchee, Chelan

County, Douglas County, and City of Pullman through an interlocal agreement, found in Appendix A. Data collection costs were estimated based on quotes from social marketing research companies. The other tasks were estimated based on past project costs. The estimated costs below for consultant services are assumed to include the hosting of a web survey, data collection, and statistical data analysis. The administrative costs were estimated based on past project costs for the lead agency’s time conducting the study and developing documents including the Detailed Study Design, Quality Assurance Project Plan, and Final Report. The administrative costs incurred by the lead agency are included in the total estimated costs but are not billed to partner agencies through the interlocal agreement. The estimated costs below do not include the in-kind services provided by the partners and participating jurisdictions. In-kind services are expected to include time for reviewing documents, participating in consultant selection, and providing data.

Table 4: Study Cost Breakdown

Task	Estimated Total Cost
Consultant Services	\$5,000
Consultant Data Collection	\$15,000
Mailings	\$5,000
Administrative Costs	\$15,000
Total Estimated Study Cost	\$40,000

6.0 Quality Objectives

The goal of a QAPP is to ensure that the data collected during the study is scientifically and legally defensible. The QAPP documents how quality assurance (QA) and quality control (QC) will be applied to a research project to assure that the results obtained are the type and quality expected. This section emphasizes how the data quality indicators (DQIs) and respective measurement performance criteria (MPCs) will be applied to this project. DQIs are qualitative and quantitative measurements that characterize the aspects of quality data. DQIs also guide the development of the experimental design as well as the process of creating and analyzing data with the intent of establishing the trustworthiness of the results.

Seven principal DQIs were identified for the education and outreach programs and include: Validity, Reliability, Objectivity, Credibility, Transferability, Completeness, and Integrity. These DQIs provide the basis for the MPCs; the data performance or the acceptance criteria that specifies how good the data must be to meet the project objectives. The DQIs and respective MPCs specific to this study can be found in Table 5.

Table 5: Data Quality Indicators and Measurement Performance Criteria

Data Quality Indicator	Approach to Address Data Quality Indicator	Measurement Performance Criteria
<p>Validity - Closeness between the measured value and the true value. An instrument is considered valid when it measures what it is purported to measure.</p>	<ul style="list-style-type: none"> The survey for homeowners will be written in language that is accessible to the target audience. 	<ul style="list-style-type: none"> The survey for homeowners will be written at a 6th grade writing level and verified by the Flesch-Kincaid grade level test in Microsoft Word. The survey will also be available translated into Spanish. The survey will be designed using the Knowledge-Attitude-Practice (KAP) model and will be validated by the Technical Advisory Group and the selected consultant. The results of the surveys will be reviewed by the auditor and the data verifier to verify that the results are consistent with the goals of the study. More information about the auditor can be found in Section 11.
<p>Reliability - The degree to which an instrument produces stable and consistent results on repeated measurements. The level of precision or reliability, also called sampling error, is the range in which the true value of the population is estimated to be.</p>	<ul style="list-style-type: none"> Standard Operating Procedures (SOPs) will be defined and consistently followed for collecting the surveys. Survey forms will be developed to collect the survey responses. Survey will utilize a large sample size. 	<ul style="list-style-type: none"> Survey data will be collected on a paper form or on an electronic form. The electronic form will not require that the participant answer all questions. The survey sample population is large, estimated 2,000 total potential participants. Using an acceptable margin of error at 5% and a .50 estimate of variance, the minimum returned sample size is approximately 320 surveys.
<p>Objectivity - Attempt to diminish or eliminate the investigators bias. An objective investigator is neutral and open to all sides of the argument without imposing their own bias, motivation, interest, or perspectives.</p>	<ul style="list-style-type: none"> The surveys will be collected by a consultant. 	<ul style="list-style-type: none"> All of the survey data must be collected by the consultant to be considered useable data.

Data Quality Indicator	Approach to Address Data Quality Indicator	Measurement Performance Criteria
<p>Completeness - The amount of valid data needed to be obtained from the measurement system. Data is considered complete when: the sample size is representative of the target population.</p>	<ul style="list-style-type: none"> • All completed subdivisions within municipal permit boundaries of City of Wenatchee, Chelan County, Douglas County, and East Wenatchee meeting the one-acre threshold with at least one post-construction BMP that serves more than one home at the time this QAPP is approved will be included in the survey. 	<ul style="list-style-type: none"> • The auditor will verify through evaluating a map with the subdivisions selected that the subdivisions are located within the permit boundaries of the study area. • The survey will be mailed with pre-paid postage return envelopes.
<p>Credibility – Credibility is often referred to as social desirability bias. This describes a type of response bias where survey respondents answer questions in a manner they believe will be viewed favorably by others. It can take the form of over-reporting "good behavior" or under-reporting "bad" or undesirable behavior.</p>	<ul style="list-style-type: none"> • Identification codes developed by the consultant will be used for the subdivision survey data to protect the homeowners who might respond to the survey that they are not implementing maintenance for their BMP or they are unaware of their maintenance responsibility. 	<ul style="list-style-type: none"> • Identifying information will be removed from the surveys prior to the City of Wenatchee receiving the data from the consultant. Data will be coded to identify which jurisdiction the respondent is from and type of BMP associated with the respondent's neighborhood. • Postcard will be sent to target neighborhoods prior to the survey mailing to explain the survey purpose and ensure authenticity using jurisdiction logos and local information. • Survey will have a disclaimer statement to specify that no enforcement action will be taken as a result of "wrong" answers and survey responses will be reviewed anonymously to guide future education and outreach.

Data Quality Indicator	Approach to Address Data Quality Indicator	Measurement Performance Criteria
<p>Transferability – The extent to which sample data can be transferred from a sample to a population. Datasets are considered transferable if the instruments, data sources, data collection procedures, sample selection procedures, and reporting are equivalent.</p>	<ul style="list-style-type: none"> • The test areas will include subdivisions that have been required to implement an O&M agreement and control areas which include subdivisions which were not required to implement an O&M agreement. • SOPs will be consistently followed during data collection. 	<ul style="list-style-type: none"> • Compare responses from target population to control population using hypothesis testing at a predefined confidence interval and statistical power. • The auditor will verify that the homeowner survey has been implemented by according to the SOP by completing a test survey via mail and using the web platform to receive a receipt certification from the consultant administering the survey. Data will be considered acceptable if the surveyors followed the SOP.
<p>Integrity - Integrity is concerned with minimizing errors through the process of collecting, recording, and analyzing data.</p>	<ul style="list-style-type: none"> • SOPs will be consistently followed during data collection. • Data recording and reporting procedures will be consistently followed during the study including using standard forms for data collection and reviewing the data to ensure it has been properly recorded and logged into database. • The SOP for the homeowner survey will include assurances for maintaining respondent confidentiality. 	<ul style="list-style-type: none"> • The auditor will verify that the homeowner survey has been implemented following the SOP by completing a test mail survey and a test web survey and verifying receipt from the consultant. Data will be considered acceptable if the surveyors followed the SOP. • The data will be considered usable if it was coded prior to the City of Wenatchee receiving the data from the consultant and all of the survey data was collected by the consultant. • The survey forms will be standard for the mail survey and the web survey. To preserve data integrity, web surveys will not have questions that require answers to move forward.

7.0 Experimental Design

7.1 Study Design

The O&M agreement recorded for post-construction BMPs is part of the regulatory mechanism intended to provide guidance and explain the obligation for owners to maintain their BMPs. To evaluate the effectiveness of the O&M agreement, a Knowledge- Attitude- Practice (KAP) style survey will be administered by a consultant. KAP surveys are descriptive, but have shown to be highly effective at finding statistically significant determinants of knowledge, attitude, and practices. KAP surveys have been applied to a variety of environmental contexts, including measuring the effectiveness of educational materials (Maeda, et al., 2018). The survey will be designed with similar methodology to a 2014-2015 KAP study completed in the Chesapeake Bay area, which evaluated source control BMP implementation based on social factors (Maeda, et al., 2018). The KAP method seeks to assess survey participant's understanding of a topic, their feelings and preconceived ideas, and how their understanding and feelings are put into practice. The survey will be administered by a consultant via mail or through an online platform in single family housing developments, meeting the one-acre threshold, with and without an O&M agreement in the Municipal Stormwater Permit Boundary areas of Douglas County, Chelan County, East Wenatchee, and Wenatchee, WA. Demographic information, including age, gender, race, highest level of education, household ownership status, homeowner association membership status, and if children are present in the house will be included in the survey. Utilizing a variety of yes/no, multiple choice, Likert scale, and open-ended questions, the survey will assist Permittees in determining the effectiveness and readability of the O&M agreement, maintenance practices, and how practices may be influenced by other factors independent of the O&M agreement (i.e., neighborhood safety, mosquitoes). Survey questions for the KAP portion of the survey are anticipated to include questions similar to:

1. What type of stormwater feature is in your neighborhood?
2. Do you know where the BMP is located?
3. Are there any concerns about the structure?
4. Who is responsible for maintaining the structure? Are you familiar with the Operations & Maintenance agreement in place for the stormwater BMP serving your neighborhood?
5. What type of maintenance has been done on the BMP?

The consultant selected for the project will be required to conduct a survey utilizing mail and web format and perform data analysis for qualitative and quantitative data. The consultant will conduct the study following their established procedures and then provide statistical analysis of the data. To improve credibility of the results and remain exempt from the requirement of having an institutional review board, the survey responses will be collected and analyzed anonymously. This research can be considered minimal risk, indicating that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life (CFR 46.102.7.1).

7.2 Process for Selecting the Test-Site and Target Population

The test sites will be located within the municipal stormwater permit boundaries of Douglas County, Chelan County, Wenatchee, and East Wenatchee, WA. Within the test site, the target population will consist of single-family residential housing developments selected based on the following criteria:

- The development triggered the size threshold of 1 acre or larger or smaller than 1 acre but part of common development or sale.

- The development has one or more stormwater post-construction BMPs serving more than one home (i.e., pond, swale, etc.).

The Municipal Stormwater Permit required the implementation of a regulatory mechanism to ensure long term maintenance of post-construction BMPs for projects built in 2011 and after. Projects constructed prior to 2011 were not obligated by the Municipal Stormwater Permit to execute an O&M agreement, though some jurisdictions chose to execute the O&M agreement for some projects.

Subdivisions meeting the size and post-construction BMP criteria for the study will be divided into a test group and a control group established by whether or not the subdivision was required to record and implement an O&M agreement upon construction. The test group will consist of subdivision which were required to implement an O&M agreement. Subdivisions in the test group will consist primarily of those constructed after 2011; however, there will be subdivisions in the test group with an O&M agreement that were constructed prior to 2011. The control group will consist of subdivisions which were not required to implement an O&M agreement. Subdivisions in the control group will consist entirely of those that were constructed prior to 2011.

7.3 Type of Data being Collected

The type of data required to meet the study objectives is described in Table 6. All data will be collected from the target populations by mail or internet survey. Survey data will be collected from residents by the consultant. The lead agency will collect information from the jurisdictions on subdivisions meeting the criteria to compile a mailing list for the consultant.

Table 6: Types of Data Being Collected

Data Type	Purpose
Survey Responses from Target and Population	Multiple choice, Likert Scale, and open-ended survey responses will be used to assess demographics and the participant’s knowledge, attitude and practices regarding the stormwater BMP serving their neighborhood.
Subdivisions meeting the size and post-construction BMP criteria.	This information will be collected during the data collection preparation from the Permittees to place the subdivision into the test and control groups and create the mailing list for the consultant.

7.4 Other Education & Outreach Programs

Each of the Permittees within the study area— Chelan County, Douglas County, City of East Wenatchee, City of Wenatchee— have been asked to provide information regarding any education and outreach programs targeted at private property owners for maintenance of post-construction BMPs. The Wenatchee Valley permittees form the Wenatchee Valley Stormwater Technical Advisory Committee and often provide education and outreach regionally. To date, there have been no regional efforts to provide education to property owners with privately owned post-construction BMPs. Individually, the permittees have utilized the O&M agreement to provide education to property owners.

8.0 Instrument Design and Development

This section describes the instruments that will be used during the study along with the process used

to develop and validate the instrument. The instrument for this study will be a survey distributed to single family homes in subdivisions that trigger the one-acre threshold with a post-construction BMP that serves more than one home. Preliminary drafts of the survey have been developed based on the objectives of the study and can be found in Appendix B. Preliminary drafts of the survey are included in lieu of the finalized drafts because the questions listed may be revised based on the input from the expert peer review panel, which will include the Technical Advisory Group and the consultant. The consultant will help ensure that the wording and order of the questions is effective, the length is appropriate, and any questions that could be confusing or difficult will be edited before the final survey is distributed via mail by the consultant with the option to complete the survey via the internet.

8.1 Instrument Design

The preliminary survey was developed based on the study goal of assessing the owner awareness of post-construction BMPs and the regulatory mechanism that requires maintenance of the BMPs. The survey is intended to assess the effectiveness of the regulatory mechanism by comparing survey responses from home owners in subdivisions which were required to implement an O&M agreement and those that were not required to implement an O&M agreement. The survey will assess the overall knowledge of the post-construction BMP, their attitude toward the BMP in their neighborhood, and implementation of maintenance practices outlined in the O&M agreement.

Literacy experts indicated that the average American reads at a 6th to 7th grade level, but educational materials should be written at a 5th grade reading level (Roy, et al., 2015). The survey will be written at a 6th grade level as determined by the Flesch-Kincaid grade level test tool in Microsoft Word. The instrument design will also include a translation into Spanish. According to the *Limited English Proficiency Application* (Washington Military Department, 2019), the test area, consisting of Chelan and Douglas Counties, lists Spanish as the language meeting the limited English proficiency criteria based on US Census data.

8.2 Procedures for Collecting Data

This section defines the procedures for collecting the survey data. Defining these procedures and following them consistently will help minimize errors and support the integrity of the collected data. Standard operating procedures are the procedures that define specifically how to conduct an activity. SOPs should provide in sufficient detail that the activity is repeatable and can be reproduced by an individual (i.e. third party) unfamiliar with the project.

The following SOPs can be found in Appendix C:

- Subdivision Survey SOP
 - The SOP in Appendix C is considered a draft and will be clarified and expanded with the selection of a consultant.

8.3 Instrument Validation

Validation is the process to verify the instrument measures what was intended to measure and produces stable results. The surveys will be validated through an expert peer review panel which will include the Technical Advisory Group and the consultant. The consultant will help ensure that the reading level is appropriate for the study, the translation into Spanish has been completed, wording and order of the questions is effective, the length is appropriate, and any questions that could be confusing or difficult will be edited before the final survey is distributed via mail by the consultant with the option to complete the survey via the internet.

9.0 Quality Control

The purpose of this section is to describe the QC procedures that will be employed during the study to minimize errors and support the integrity of the data through the process of recording, and analyzing data.

9.1 Study QC Procedures

For all data that will be collected during this study, the following quality control procedures will be implemented.

- Develop and consistently follow SOPs during the data collection process (Refer to Appendix C).
- Develop and consistently follow data recording and reporting procedures (Refer to Section 10.0 Data Management Plan Procedures).
- Conduct Audits of data collection and data management (Refer to Section 11.0 Audits).

9.2 Corrective Action

If findings from an audit indicate that a corrective action is required, the lead agency is responsible for implementing a corrective action plan within 10 days of the audit. Corrective actions will be documented throughout the study using the Corrective Action Form (Appendix D) and all completed forms will be included in the final report.

10.0 Data Management Plan Procedures

This section defines the data management plan, specifically how all the data collected and other important project documents will be managed, stored, and archived during the study. The purpose of the data management plans is to reduce the potential for errors during the data collection and analysis phases of the project; it also ensures that if an unanticipated change in Key Team Members were to occur, the project can be more easily continued by a new team member.

10.1 Data Identification

Preliminary data collection for this study will consist of collecting information from the jurisdictions regarding subdivisions that meet the study criteria. Jurisdictions within the study area will be asked to provide subdivision names, year constructed, plat information, type of post-construction BMP, if there is a known homeowners association, and if the subdivision has an O&M agreement. The plat information will be used in conjunction with county parcel information to build a mailing list for survey distribution. Subdivision information will also be given to the consultant to assist in determining whether or not survey respondents answered questions about BMPs correctly.

Survey responses from the residents will be divided between the test and control group. The survey responses will be coded by the consultant to ensure the confidentiality of the of the survey participants is maintained. The coding will, at a minimum, include a unique identifier to indicate whether the participant came from the test group or the control group and what type of BMP is associated with the subdivision (i.e., surface or subsurface BMP). The unique coding will be essential to data analysis and the ability to determine the level of owner awareness as it relates to the O&M agreement and the type of BMP located within the neighborhood. The jurisdictions will not be provided with the coding key in order to protect the anonymity of the survey respondents.

10.2 Data Recording & Reporting Requirements

Survey data will be collected by the consultant via mail or online survey platform. The preliminary forms for the mail survey and web survey are in Appendix B. The use of a standard survey form will help reduce errors in data collecting and recording.

Microsoft Excel (or similar program used by the consultant) will be used for compiling the study data. The data will be stored on the City of Wenatchee shared work drive in a project folder labeled “BMP Owner Awareness Study.” All files saved to the drive are backed up daily by the City of Wenatchee’s Information Technology Department. The consultant will be responsible for collecting and storing the survey data collected from subdivisions until the data is electronically transferred to the City of Wenatchee. As the lead agency, the City of Wenatchee will store the data for a minimum of five years.

10.3 Procedures for Missing Data

Missing data is a common problem in survey-based studies. For a variety of reasons, survey respondents neglect to answer questions. Treating missing data correctly is critical to ensure the validity of research because improperly handled missing data can substantially impact the results of a study. Missing data are most likely to occur as a result of nonresponse, which may vary from an intentional decision to disregard the survey or skipping certain survey responses, but missing survey data could also occur as a result of technical errors on the part of the researcher or equipment (i.e., online survey program errors or computer malfunctions.)

For this survey, decisions for handling missing data will be addressed during data analysis. Improperly handled missing data can cause errors to data analysis. Research suggests that there are five methods to treat missing data: listwise deletion, pairwise deletion, single imputation/ ad hoc approaches, maximum likelihood approaches, and multiple imputation (Newman, 2014). The consultant will be responsible for analyzing data and addressing missing data in accordance with the type and amount of missing data. The consultant will be asked to provide justification for the manner of addressing missing data and present the method with the final report.

If it is not possible to address missing data in accordance with the QAPP, the chosen method will be documented in the final data report presented by the consultant and included in the final report

10.4 Acceptance Criteria for Existing Data

This section is not applicable to this study. This study will not utilize existing data.

11.0 Audits

The purpose of an audit is to verify conformance with the QAPP and ensure the usability of the data. Audits will be conducted throughout the study to ensure the any corrective actions can be implemented in a timely manner. The auditors will use the audit checklist in Appendix E to ensure that all tasks are completed as they have been described in the SOPs. The audits will be conducted at the City of Wenatchee Public Services Center, 1350 McKittrick Street, Wenatchee, WA, by the City of Wenatchee and Douglas County.

Table 7: Audits

Audit Number	Timing	Audit Tasks
1	Prior to distribution of the survey	<ul style="list-style-type: none"> • The survey is written at a 6th grade level or lower. • Survey is reviewed and accepted by panel of experts and any changes have been documented • Verify the list of subdivisions is complete and consistent with the target population criteria
2	During the survey data collection.	<ul style="list-style-type: none"> • The SOP for the surveys is being followed. • The web survey function is open and functioning • The survey data is being collected by the consultant. A test survey will be completed online and via mail and a receipt verification will be sent by the consultant.
3	During the review of the final report.	<ul style="list-style-type: none"> • The SOP for the surveys was followed • All of survey data was collected by the consultant. • Any open-ended responses were coded before receipt. • The responses from target population were compared to the control population using hypothesis testing at a predefined confidence interval and statistical power. • The process for handling missing data has been documented by the consultant.

12.0 Data Verification and Usability Assessment

The goal of this study is to evaluate the effectiveness of the regulatory mechanism that requires O&M agreements for post-construction BMP owners to determine if residents residing in subdivisions which were required to implement an O&M agreement are more aware of their post-construction BMP than those in subdivisions which were not required to implement and O&M agreement. This section explains the process that they study will employ to verify the instruments, evaluate the quality of the data, and evaluate the overall usability of the date for meeting the study objectives.

12.1 Data Verification

The data verifier for this study will be the City of East Wenatchee. The data verifier will complete the tasks described in Table 8.

Table 8: Data Verifier Tasks

Tasks	Study Phase
Verify that the audits addressed the MPCs	Draft final report
Review the data records for completeness	Draft final report
Review the data analyzed for errors	Draft final report

To document this process, the data verifier will use the Data Verifier Form in Appendix E.

12.2 Data Usability Assessment

As noted in Table 8, the data verifier will review the data to determine if the MPCs have been met. If the MPCs were met, then the data is of sufficient quality to meet study objectives and will be considered usable. If the MPCs were not met, the data will not be considered usable and will not be included in the dataset for analysis. The usability of the data will be documented in the final report.

13.0 Data Analysis Methods

To evaluate the effectiveness of the regulatory mechanism, survey responses will be analyzed to compare the BMP owner awareness of homeowners living in subdivisions with O&M agreements and those living in subdivisions without O&M agreements. Additionally, owner awareness will be compared among neighborhoods with shared BMPs. Specific data analysis methods will be selected and documented in the final report. Analysis methods cannot be selected until the data has been collected because analysis methods depend on the size of the sample and the completeness of the data. All data analysis will be completed by the consultant.

13.1 Hypothesis Testing

Hypothesis testing will be used to assess whether there is statistically significant difference between subdivisions with O&M agreements (test area) and subdivisions without O&M agreements (control area.) Hypothesis testing will be used to determine whether or not to accept the null hypotheses that there is no relationship between the O&M agreement and post-

construction BMP owner awareness and there is no relationship between the type of BMP (i.e. surface or subsurface BMP.) and owner awareness. The level of significance is typically set prior to data collection at 5% for behavioral sciences (Craparo, 2007). This analysis will be completed by the consultant.

13.2 Quantitative & Qualitative Data Analysis Methods

The consultant will select the appropriate data analysis methods based on the final survey questions. Data analysis methods will be selected at the discretion of the consultant based on the type of questions asked, analysis methods may include utilizing descriptive statistics, frequencies, comparing means, or multivariate statistics. Coding will be developed by the consultant if any narrative responses are required. Analysis methods cannot be selected until data has been collected because data the analysis method is selected based on the dataset and the size of the sample. Once data is collected and the analysis method is selected and the consultant will document the selected analysis method and the justification for the method chosen.

13.3 Data Presentation Methods

Data will be presented in the final reports in tables and bar graphs to illustrate relationships and anomalies.

14.0 Reporting

The purpose of this section is to describe the final reporting and dissemination of the study findings.

14.1 Final Reporting

Table 9 summarizes the reports required by the Eastern Washington Phase II Municipal Stormwater Permit for this study and the party responsible for preparing the reports.

Table 9: Effectiveness Study Reporting

Report	Responsible Party	Purpose
Annual Reports (S8.B2)	City of Wenatchee City of East Wenatchee Douglas County Chelan County City of Pullman	Describe and record participation in the effectiveness study meetings, proposal development, project reviews, and study implementation.
Final Report (S8.B1.b)	City of Wenatchee	Report the final results of the study and the recommendations for future actions based on the findings. The surveys, results, statistical analysis used, and rejected and un-useable data will be documented in the report.

Fact Sheet (S8.B1.c)	City of Wenatchee	Produce a fact sheet summarizing the findings and recommendations to be shared with other permittees.
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14.2 Dissemination of Project Documents

The project findings will be compiled into a final report and will be posted to the Wenatchee Valley Stormwater Technical Advisory Committee webpage hosted by the City of Wenatchee: www.wenatcheewa.gov/WVSTAC. The report will also be available upon request from the City of Wenatchee in electronic or hard copy format. Results from the final report may also be presented at conferences.

15.0 References

- Craparo, R. (2007). Significance Level. *Encyclopedia of Measurement and Statistics*, 889-891.
- Maeda, P., Chanse, V., Rockler, A., Montas, H., Shirmohammadi, A., Wilson, S., & Leisnham, P. T. (2018). Linking stormwater Best Management Practices to social factors in two suburban watersheds. *PLoS One*, 1-23.
- Matsler, A. M. (2017). Knowing Nature in the City: Comparative Analysis of Stormwater Systems Challenges along the "Eco-Technical" Spectrum of Green Infrastructure in Portland and Baltimore. *Ph.D. in Urban Studies*. Portland, Oregon: Portland State University.
- Newman, D. A. (2014). Missing Data: Five Practical Guidelines. *Organizational Research Methods*, 372-411.
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- Rafter, D. (September 2007). The Messy Business of Maintaining BMPs: Who's responsible for best management practices? *Stormwater Magazine*. Retrieved from http://gustfront.ccrfd.org/pdf_arch1/NPDES/SSWGWebDocs/The_messy_business_of_maintaining_BMPs.pdf
- Roy, S., Phetxumphou, K., Dietrich, A. M., Estabrooks, P. A., You, W., & Davy, B. M. (2015). An evaluation of the readability of drinking water quality reports: a national assessment. *Journal of Water and Health*, 645-653.
- Venkataramanan, V., Lopez, D., McCuskey, D. J., Kiefus, D., McDonald, R. I., Miller, W. M., . . . Young, S. L. (2020). Knowledge, attitudes, intentions, and behavior related to green infrastructure for flood management: A systematic literature review. *Science of the Total Environment*.
- Washington Military Department. (2019). Limited English Proficiency . *Application*. <https://waseocgis.maps.arcgis.com/apps/webappviewer/index.html?id=ffd638d41f7045fe97a27d1e2ccbe0af>.
- Washington State Department Of Ecology Water Quality Program. (2019, August). Stormwater Management Manual for Eastern Washington. Washington: Washington State Department of Ecology.

16.0 Appendices

Appendix A Interlocal Agreement

Return Document to:

Public Works Administrative Assistant
City of Wenatchee
P.O. Box 519
Wenatchee, WA 98807-0519

The information contained in this boxed section is for recording purposes only in accordance with RCW 36.18 and RCW 65.04, and is not to be relied upon for any other purposes, and shall not affect the intent of or any warranty contained in the document itself.

Document Title: Interlocal Cooperative Agreement
Reference Number of Documents Released: N/A
Reference Numbers of Related Documents: N/A
Grantor: Douglas County, Chelan County, City of Wenatchee, and City of East Wenatchee, City of Pullman
Grantee: Douglas County, Chelan County, City of Wenatchee, and City of East Wenatchee, City of Pullman
Legal Description (Abbreviated): N/A
Parcel Number(s): N/A

**INTERLOCAL AGREEMENT FOR
DEVELOPMENT AND IMPLEMENTATION OF AN EFFECTIVENESS STUDY RELATED TO REGIONAL
STORMWATER MANAGEMENT AND PERMIT COMPLIANCE**

This agreement (“Agreement”) is made and entered among Douglas County, Chelan County, the City of Wenatchee (“Wenatchee”), the City of East Wenatchee (“East Wenatchee”) and the City of Pullman (“Pullman”), collectively the “Parties”.

WHEREAS, Chapter 39.34 RCW (Interlocal Cooperation Act) provides for the formation of interlocal agreements that enable local governments to effectively cooperate with each other to the benefit of local communities;

WHEREAS, the Federal Clean Water Act, 33 U.S.C. § 1251 et seq. and the Phase II Stormwater Final Rule promulgated by the U.S. Environmental Protection Agency (“EPA”) require the operators of certain small municipal separate stormwater sewer systems to obtain National Pollutant Discharge Elimination System (“NPDES”) permit coverage;

WHEREAS, in Washington State, the EPA has delegated authority for the Federal Clean Water Act, including development and administration of the Phase II municipal stormwater management program, to the Washington State Department of Ecology (“Ecology”);

WHEREAS, Douglas County, Chelan County, Wenatchee, East Wenatchee and Pullman are covered under the Eastern Washington Phase II Municipal Stormwater Permit;

WHEREAS, on July 1, 2019, Ecology issued the current Eastern Washington Phase II Municipal Stormwater Permit (“Permit”), Effective Date: August 1, 2019; Permit Expiration Date: July 31, 2024;

WHEREAS, Section S8 of the Permit requires each city and county to participate in an Ecology-approved study to assess the effectiveness of permit-required stormwater management program activities and best management practices;

WHEREAS, the Parties collaborated on the Mobile Contractor Education and Outreach Effectiveness Study to comply with S5.B.1.b of the Permit;

WHEREAS, the Parties developed and submitted a list of project participants and associated roles to comply with Section S8.A.2.b of the Permit by March 31, 2021;

WHEREAS, a detailed study design proposal titled "Private Residential BMP Owner Awareness Effectiveness Study" (the "Study") was submitted to Ecology on March 31, 2021 to comply with Section S8.A.2c ; and

WHEREAS, the Parties wish to continue their cooperative approach for compliance with state and federal standards for stormwater management.

NOW, THEREFORE, the Parties hereby agree as follows:

1. The Recitals above are incorporated and made part of this Agreement.
2. Wenatchee shall be the lead agency for the purposes of the Study.
3. Wenatchee shall be responsible for completing the Study as required by Section S8.B.2 and implementation of the revised mobile contractor education and outreach program as required by Section S5.B1.b of the Permit.
4. The Parties will work together to accomplish the Study and implement the revised mobile contractor education and outreach.
 - a. The Parties will cooperatively select a consultant to conduct a survey of property owners and provide a report of the survey results.
 - b. The consultant will contract with Wenatchee for the accomplishment of study activities when approved by the Parties.
 - c. The Parties will review and provide comments on the study submittals and education and outreach materials.
5. The Study shall be funded in equal shares by each of the Parties. Each Party's contribution shall not exceed seven thousand dollars (\$7,000). Wenatchee will pay the consultant and bill the other Parties their equal shares. The Parties shall reimburse Wenatchee within forty-five (45) days of receipt of billing.
6. This Agreement does not create any new or separate legal or administrative entity to administer the provisions of this Agreement, and the Parties will not acquire nor dispose of real or personal property for use in this undertaking.

7. This Agreement is effective upon signature by all Parties and filing with the Chelan County Auditor. This Agreement shall remain in effect through the end of the Permit cycle unless terminated earlier pursuant to its terms.
8. Any Party may withdraw from the Agreement upon thirty (30) days' written notice to the other Parties.
9. This Agreement shall terminate upon the withdrawal of at least three (3) of the Parties, or by written agreement of all Parties.
10. The Parties' authorized representatives and contact persons for administration of this Agreement, communication, and service of all notice, except service of process are:

Chelan County: Jason Detamore
316 Washington Street, Suite 402
Wenatchee, WA 98801
(509) 667-6415

Douglas County: Jennifer Lange, P.E.
140 19th Street NW, Suite A
East Wenatchee, WA 98802
(509) 884-7173

City of East Wenatchee: Garren Melton
271 9th Street NE
East Wenatchee, WA 98802
(509) 884-1829

City of Wenatchee: Jessica Shaw
1350 McKittrick Street, Suite A
Wenatchee, WA 98801
(509) 888-3200

City of Pullman: Shilo Sprouse
190 SE Crestview St, Bldg A
Pullman, WA 99163
(509) 338-3220

11. Each Party shall maintain books, records, documents and other materials relevant to its performance under this Agreement. Each Party shall retain all such books, records, documents and other materials for the longest applicable retention period under federal and state law. The records shall be kept available for and subject to inspection, review and audit by each Party hereto or its designee, any agency funding a portion of the project, any authorized auditing or oversight entity, and the Washington State Auditor's Office.

SIGNATURE PAGE 1 of 5

Adopted: 8/3/2021

CITY OF EAST WENATCHEE

Jerrilea Crawford
Jerrilea Crawford, Mayor

8/3/2021
Date

ATTEST:

Maria E. Holman

Maria Holman, City Clerk

8/3/2021
Date

APPROVED AS TO FORM:

Devin Poulson

Devin Poulson, City Attorney

8/3/2021
Date

SIGNATURE PAGE 2 of 5

Adopted: 8/3/2021

DOUGLAS COUNTY
BOARD OF COUNTY COMMISSIONERS


Marc S. Straub, Chair


Kyle Steinburg, Vice Chair


Dan Sutton, Member

8/3/21
Date

ATTEST: 

Tiana Rowland, Clerk of the Board *for Dayna Rowland*

08/03/2021
Date

APPROVED AS TO FORM: 

Jim Mitchell, Civil Deputy Prosecuting Attorney
WSBA #31031

8/3/21
Date

SIGNATURE PAGE 3 of 5

Adopted: 9/23/2021

CITY OF WENATCHEE



Frank Kuntz, Mayor

9/24/2021

Date

ATTEST:



Tammy Stanger, City Clerk

Date

APPROVED AS TO FORM:



City Attorney

9/27/21

Date

SIGNATURE PAGE 4 of 5

Adopted: _____



ATTEST: Carlye Baity

Carlye Baity
Clerk of the Board

8-17-21
Date

APPROVED AS TO FORM:

[Signature]
Robert W. Sealby
Prosecuting Attorney

8-11-21
Date

CHELAN COUNTY
BOARD OF COUNTY COMMISSIONERS

[Signature]
Bob Bugert, Chairman

EXCUSED
[Signature]
Tiffany Gering, Commissioner

[Signature]
Kevin Overbay, Commissioner

8-17-21
Date

SIGNATURE PAGE 5 of 5

Adopted: SEPTEMBER 14, 2021

CITY OF PULLMAN



Glenn A. Johnson, Mayor

SEPTEMBER 15, 2021
Date

ATTEST:



Dee Stiles-Elliott, City Clerk

SEPTEMBER 15, 2021
Date

APPROVED AS TO FORM:



City Attorney

9-14-21
Date

Appendix B Preliminary Homeowner Survey Forms

Preliminary Homeowner Survey Questions

1. What is your age?
 - a. 18-24
 - b. 25-34
 - c. 35-44
 - d. 45-54
 - e. 55-64
 - f. 65+
 - g. Prefer not to say
2. What is your highest level of education?
 - a. Some high school
 - b. High School Graduate or GED
 - c. Some College
 - d. College Graduate
 - e. Trade School
 - f. Prefer not to say.
3. Are there children living in your home?
 - a. Yes
 - b. No
4. What is the name of the subdivision you live in?
5. How long have you lived at your current residence?
 - a. 0-5 years
 - b. 6-10 years
 - c. 11-15 years
 - d. Longer than 15 years
6. Can you identify what type of stormwater facility is in your neighborhood?
 - a. Pond
 - b. Swale
 - c. Underground Infiltration
 - d. I don't know
7. How familiar are you with the stormwater facility that collects stormwater for your neighborhood?
Very Unfamiliar 1 2 3 4 5 Very Familiar
8. Based on your understanding, whose responsibility is it to maintain the stormwater facility?
 - a. City or County
 - b. Property owner
 - c. Our Homeowner's Association
 - d. Other _____
9. How familiar are you with the Operations & Maintenance Agreement (O&M Agreement) for the stormwater facility in your neighborhood?
 - a. Our neighborhood doesn't have an O&M agreement
 - b. I'm not familiar with the O&M Agreement
 - c. I have heard of the O&M Agreement
 - d. I am very familiar with the O&M Agreement
10. Do you have any concerns about the stormwater facility?
 - a. Yes
 - b. No
11. If you have concerns about the feature, what are they?
 - a. Neighborhood safety
 - b. Mosquito Breeding
 - c. Flooding
 - d. Neighborhood Aesthetics
 - e. Other _____
12. Have you ever consulted any document related to the maintenance of the stormwater feature in your neighborhood?
 - a. Yes
 - b. No
13. What type of maintenance or recordkeeping has been done to the stormwater feature in your neighborhood? (Please describe)
14. How often are inspections and maintenance done on the stormwater facility?
(Please List)
15. What is the best way for you to receive stormwater information about your neighborhood's stormwater feature?
 - a. Mailing to individual property owner
 - b. Mailing to HOA
 - c. Other HOA Outreach (Please List)
 - d. Website
 - e. Social Media
 - f. Other (Please List)

Appendix C Standard Operating Procedures (SOP)

Residential Survey SOP

Step 1: Permittees located in study area will compile a list of all residential subdivisions meeting the one acre threshold with one of more stormwater BMPs serving multiple homes. .

Step 2: Consultant will provide survey administration training with proper usage of survey form. The auditor will sit in on the training in person or through video conferencing.

Step 3: Consultant administers survey by mailing paper surveys to residents in the target neighborhoods and hosting a web survey.

Step 4: Web and paper survey will be distributed containing the same questions and same format. Web survey will not have required questions to ensure consistency with mail survey.

Step 5: Survey respondents will be identified on survey form using identification number and population code assigned by the consultant to protect anonymity prior to receipt by the City of Wenatchee to protect the identity of respondent and prevent bias from survey.

Appendix D Corrective Action From

Corrective Action Form

Date: _____

Prepared By: _____ Agency: _____

Resident Survey: _____ Audit: _____

Data Verification: _____ Other: _____

Number	Reported Issue	Prescribed Corrective Action

Received within 2 days of issue?: Yes _____ NO _____

Date Received: _____ Time: _____

Received By: Mail _____ E-mail _____ Office _____ Other _____

Received by (Signature): _____ Date: _____

Reviewed by (Signature): _____ Date: _____

Appendix E Audit & Data Verifier Forms

Audit Number 1				
Completed prior to start of study				
Date		Auditor		
Audit Task				
	Yes	No	N/A	Comments
Survey has been validated by panel of experts, approval and changes have been documented.				
Homeowner survey is written at 6 th grade level or lower.				
List of subdivisions is complete and consistent with the target population criteria.				
The survey is available translated into Spanish.				
Pre-survey post card has been sent to target neighborhoods with local jurisdiction logos				
Auditor Signature				

Audit Number 2					
Completed during the survey data collection					
Date		Auditor			
Audit Task	Yes	No	N/A	Comments	
Survey is sent with pre-paid return postage					
Test web survey is completed and receipt verification is received from consultant					
Test mail survey and receipt verification is received from consultant					
Survey format for web and mail survey is the same (no web survey questions are required to continue; question format is the same)					
Auditor Signature					

Audit Number 3					
Completed during the review of the final report					
Date		Auditor			
Audit Task		Yes	No	N/A	Comments
All of the data was collected by the consultant					
The survey data from the homeowners was blind coded before receipt					
The responses from the target population were compared to the control population using a predefined confidence interval and statistical power					
Results of the study are consistent with the goals of the study					
Auditor Signature					

Data Verification Form					
To be completed after the final audit during the completion of the final report					
Date		Data Verifier			
Verification Task	Yes	No	N/A	Comments	
Data audits performed at the designated times					
Verify audits addressed MPCs					
DQIs have been addressed					
Data records are complete, consistent, and correct					
Data records have been analyzed for errors and omissions					
Data Verifier Signature					