CENTENNIAL CLEAN WATER FUND GRANT

State of Washington Department of Ecology
&
Port of Illahee

Illahee Surface Water Management Plan (SWMP)

Grant G0700283

FINAL REPORT

June 2011

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1. INTRODUCTION

Illahee is a community with many amenities including a small fish bearing stream, a nearly self contained watershed, critical areas, aquifer recharge areas, riparian areas, and flood plains, such that nearly half of Illahee is still in its natural state. It is also a community with major water related issues affecting local aquifers, Illahee Creek, and Puget Sound waters and shorelines.

The Illahee Creek watershed is relatively small when compared to other watersheds in the Puget Sound region, but it is a major contributor of sediment pollution in Port Orchard Bay. Although much of the watershed is protected by the natural features of the Illahee Preserve, it has been impacted by increasing urban development in the upland margins of the watershed. These developments were believed to be influencing peak storm flows and exacerbating low flow problems in Illahee Creek. Additionally, Illahee Creek is on Ecology's 303(d) list (impaired water bodies list) for excess fecal coliform bacteria and low dissolved oxygen.

Those issues are the reason the Port of Illahee was awarded a Centennial Clean Water grant by the Washington State Department of Ecology.

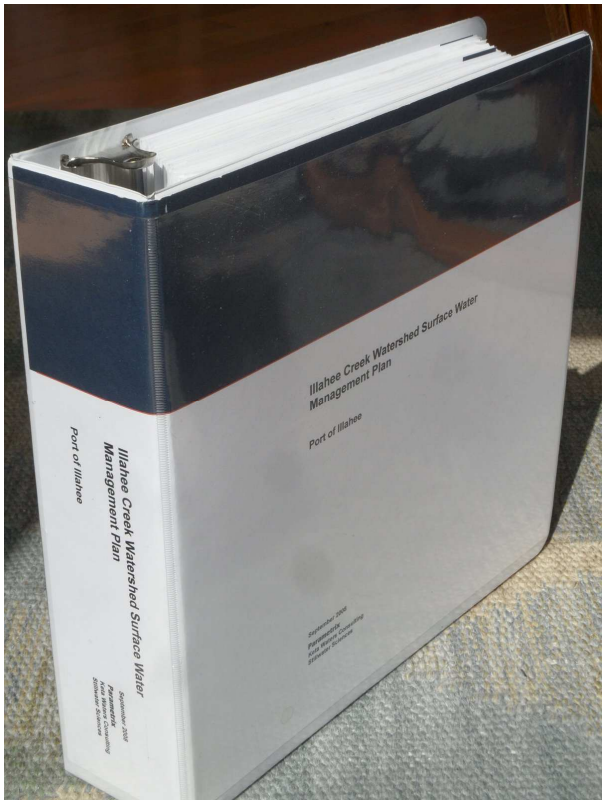
2. CENTENNIAL CLEAN WATER GRANT

The Centennial Clean Water grant seeks to improve the waters of Illahee Creek and Port Orchard Bay by supporting four specific tasks: Basin Assessment and Surface Water Management Planning, Water Quality Monitoring, Riparian Planting, and Public Information and Education.

Total Cost of Project:	$268,000.00
Grant Amount:	$181,000.00
Project Start Date:	4/17/2007
Project End Date:	6/30/2011

3. BASIN ASSESSMENT AND SURFACE WATER MANAGEMENT PLAN

3.1 Project Overview. The engineering firm Parametrix was contracted to complete an Illahee Basin Assessment and Surface Water Management Plan. The assessment was conducted by project manager and water resources specialist Erin Nelson, PE, LG; watershed assessment lead and recognized watershed expert Derek Booth, PhD, PE, PG; aquifer protection lead and recognized hydrologist Joel Massmann, PhD, PE; and fisheries/habitat lead and fisheries biologist Pete Lawson. The Illahee Creek Watershed Surface Water Management Plan (SWMP) was issued in September 2008. Portions of the executive summary are as follows:



Illahee Creek Watershed Surface Water Management Plan Report

An aerial view of the Illahee Watershed shows a substantial forested area surrounding the mainstem of Illahee creek and its tributaries. To view it from this perspective, one might conclude that the creek is sufficiently protected from urban growth or stormwater impacts. This is not the case. Despite the excellent riparian conditions afforded by the Illahee Preserve, Illahee Creek and its tributaries are being impacted by stormwater runoff, and reduced aquifer recharge from development outside the forested area. Without implementation of stormwater controls on existing development and greater regulatory or institutional controls on future development, including insurance of adequate aquifer protection, the aquatic habitat conditions in Illahee Creek will continue to degrade. We do believe recovery is possible; however, it will take a combination of strategies and partnerships between public and private stakeholders for funding and implementation.

3.2 Primary Watershed Issues. The report summarizes the primary issues impacting the watershed as:

Surface Water Runoff
Surface water runoff from impervious surfaces and conversion of watershed forested properties has altered the natural hydrology of Illahee Creek resulting in channel erosion and sedimentation that has degraded aquatic habitat conditions in the creek.

Landslides
Inappropriate stormwater discharge locations on steep erosive slopes have caused landslides that deliver high volumes of sediment to the creek and subsequently the Illahee Creek delta.

Reduced Aquifer Recharge
Groundwater seeps are the primary source of water to Illahee Creek. With groundwater resources in the Illahee Creek watershed being over-allocated, the withdrawal of groundwater for domestic purposes and the conversion of more land to impervious surfaces will reduce the baseflows available to Illahee Creek, impacting salmonids that need fresh, cold water for survival.

Water Quality
Illahee Creek is on Ecology's 303(d) Category 5 list for impairment due to elevated fecal coliform bacteria and low dissolved oxygen.

Functionality of Illahee Creek Culvert
The Illahee Creek culvert is being impacted by high sediment loads originating higher up in the watershed. The culvert could be jeopardized by continued sediment deposition and high peak flows, as well as an ongoing maintenance problem for Kitsap County staff.

Degraded Salmonid Habitat
All of the above issues result in degraded habitat for aquatic species, including salmonids that have historically used Illahee Creek for spawning and rearing.

3.3 Recommended Strategies. Strategies recommended in the assessment are as follows:

The Illahee Community in partnership with Kitsap County and others have largely accomplished one of the most important aspects of surface water management: protection of high quality resources and land in the watershed. Acquisition of the 460-acres that is now the Illahee Preserve make it possible to address other issues in the watershed and perhaps, reverse the trend of aquatic habitat degradation in Illahee Creek.

The recommended strategies for addressing the issues affecting Illahee Creek include planning, educational and capital strategies that will involve multiple stakeholders, regulations, and agencies with different interests. The strategies include projects that (1) preserve ecological function, (2) retrofit existing development, and (3) plan for and strive to reduce impacts from future development. Additionally, monitoring programs are recommended to track progress as these strategies are implemented. The lists for the recommended strategies discussed in this plan as well as priority and timeframe for implementation are noted in the report in Table ES-1 of the Executive Summary, in the report body, and in Appendix C.

3.4 Funding and Partnerships Required. The report goes on to recommend that implementation of the recommendations will require significant funding and partnerships.

Implementation of the strategies identified in this plan will require significant funding and partnerships. Many communities struggle to get basic funding needs met, let alone funding for beneficial projects that are not required for basic health-and-safety needs. This will be the primary challenge for the Port of Illahee and the Illahee Community in implementing this plan. Possible funding sources for projects identified in the plan include (1) Kitsap County for projects directly related to County needs or requirements, (2) granting agencies, (3) taxes or fees collected by a special drainage district or the Port district, (4) individual private donors, and (5) volunteer labor. For many projects, the best approach will be to develop strategic partnerships and cost-sharing arrangements between stakeholders.

The total estimated cost to bring existing development into compliance with current stormwater standards that are considered protective of the environment is approximately $20 million. The best strategy to protect Illahee Creek from future degradation is to ensure that development is done in a responsible way that uses the best tools available, including the most current stormwater management strategies, and considers all of the potential future consequences including reduced aquifer recharge.

3.5 Implementation of SWMP Findings. One of the advantages of completing the Illahee Creek Watershed Surface Water Management Plan (SWMP) early in the grant process was it provided opportunities for the Port of Illahee and the Illahee community to begin implementing the SWMP findings. This was especially helpful with respect to successfully completing the Public Information and Education task as well as providing opportunities to go beyond what was originally planned.

3.6 Demonstration Rain Garden. One of the SWMP findings recommended that Low Impact Development (LID) applications be used in those areas of the watershed where the storm water surges begin. In addition to the need for new and larger storm water retention facilities, rain gardens for individual property owners were recommended. In order to help residents better understand the mechanics and esthetics of rain gardens, a series of demonstration rain gardens was established at the entrance to the Illahee Preserve. This topic is discussed further in Section 6.

3.7 Gifting of Rolling Hills Golf Course. On August 17, 2010 a press release was received stating that Don Rasmussen and Kerma Peterson were gifting the Rolling Hills Golf Course to Kitsap County. The purchase of the golf course was one of the recommendations in the grant report. The news made the front page of the Kitsap Sun on August 19th with another story on August 21st entitled "Rolling Hills Much More Than Golf Course to Illahee Residents." The latter article does an exemplary job of explaining the community's storm water concerns and documents the Department of Ecology/Port of Illahee's involvement. Additionally, the Kitsap Sun's Sunday follow-on editorial highlighted the storm water mitigation opportunities now available with the golf course gift. This kind of coverage by the local press was outstanding in highlighting one of the central issues in the SWMP, that the golf course was the likely area where storm water retention facilities could be installed. The actual conveyances of the legal papers transferring the golf course to the county were signed on March 15, 2011.

4. WATER QUALITY MONITORING

4.1 Summary Findings. Illahee Creek is polluted with fecal coliform bacteria. Since 1996, the Kitsap County Health District has monitored fecal coliform (FC) levels at the mouth of the creek, and in the 14 years of monitoring, water quality standards have not been completely met. In 2006, a three year intensive monitoring effort was begun to identify sources and locations of fecal coliform pollution in Illahee Creek. Using a team of volunteers working first as part of a National Fish & Wildlife Foundation Grant, and later with a Department of Ecology Centennial Clean Water grant, water samples were collected at thirteen locations in the Illahee Creek Watershed as well as three

locations in Port Orchard Bay. Much higher concentrations of fecal coliform bacteria were found in the upstream monitoring locations, an area that was previously unstudied. This indicates that Illahee Creek may have a greater fecal coliform pollution problem than previously understood.

4.2 Background. Illahee Creek is one of only a few salmon streams in Kitsap County whose entire watershed is in an Urban Growth Area. In spite of this fact, as of 2011, the watershed still retains many rural characteristics, with just 15 percent of the surface area impervious and more than 65 percent forested. The 820 acre watershed includes much of the 444 acre Illahee Preserve, the 107 acre Rolling Hills Golf Course, and plans for a further 90 acres of acquisitions and conservation easements. The 2003 Kitsap Peninsula Refugia report notes that:

> "Although salmonid abundance and diversity are lower than historic levels, multiple species of salmon and trout continue to utilize Illahee Creek, making a potentially significant salmon refuge in the eastern part of the peninsula."

Long time residents remember when Illahee Creek was a much more productive salmon stream. Despite the current level of preservation, Illahee Creek has a number of problems resulting from development, including the related issues of low base flows, storm water surges, channel scouring and erosion, pool filling, sedimentation, and fecal coliform (FC) pollution. As the outlying areas in the watershed were developed these problems became more pronounced. The number of fish spawning in the creek also decreased despite efforts by the Port of Illahee, the Suquamish Tribe and others to introduce more salmon to the stream.

There have, however, been strong positive changes in the last decade that signal renewed hope for Illahee Creek. The creation of the Illahee Preserve, the granting of conservation easements along the stream corridor, the gifting of the golf course to Kitsap County, and strong community involvement in protecting the stream are among the positive signs for the future.

Being a largely protected watershed within an urban environment makes Illahee Creek a significant natural resource and a refuge to the many people who live in Illahee and the surrounding area. The high percentage of this watershed that has already been preserved, and the involvement of the community in restoration and preservation efforts, signals a strong potential for positive change. By preserving and improving the health of this ecosystem, the community hopes that Illahee Creek will remain an important link to our natural heritage for generations to come.

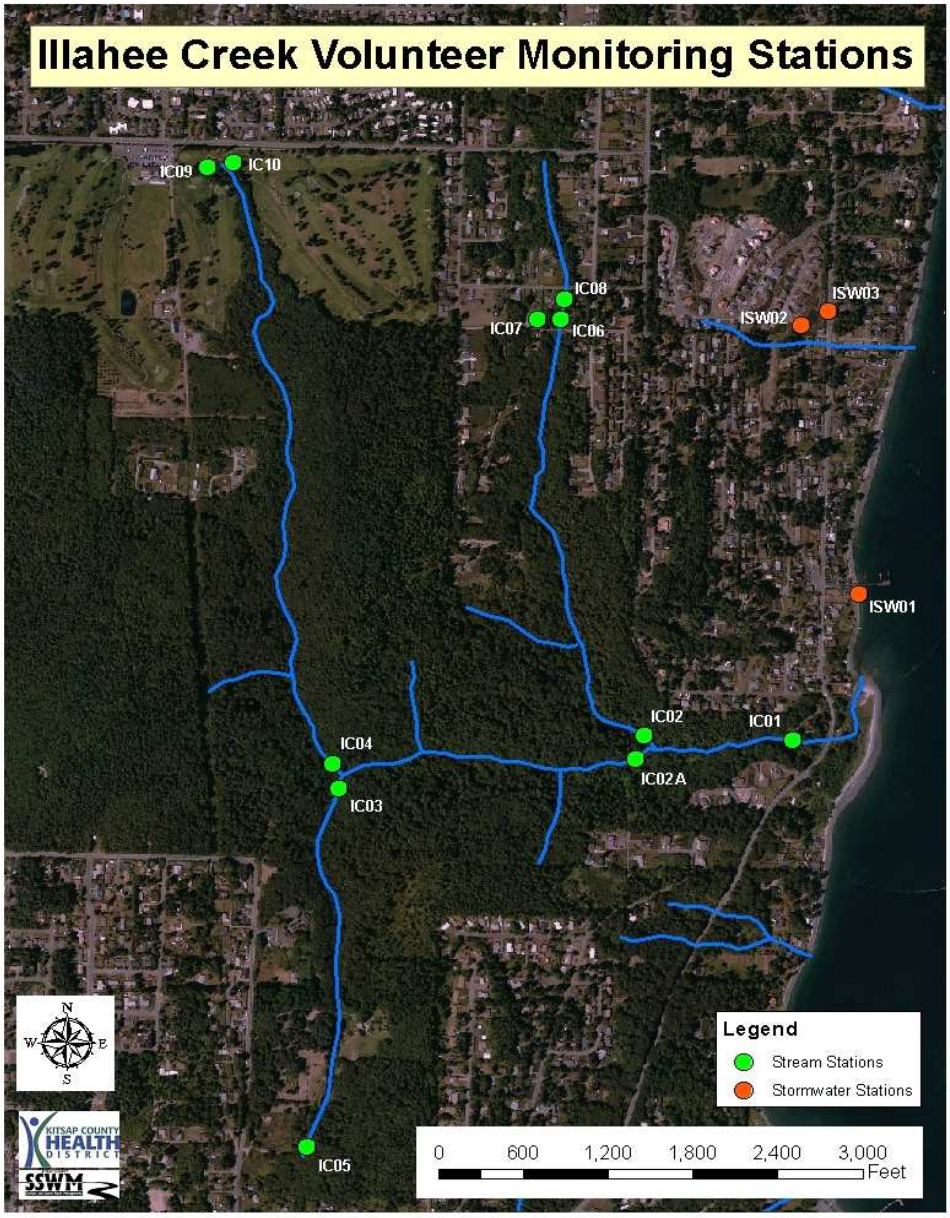
4.3 Objective. The objective of the water quality monitoring task is to further the understanding of fecal coliform pollution in Illahee Creek, so that corrective measures can be taken in order to meet federal and state water quality standards. The task compiles data from more than 350 observations over 40 months at fourteen monitoring locations.

4.4 Previous and Ongoing Efforts. The Kitsap County Health District has monitored water quality in the Port Orchard / Burke Bay watershed, including Illahee Creek, since 1996, and continues to monitor fecal coliform levels monthly near the mouth of the creek. The Kitsap Heath District 2010 Water Quality Monitoring Report notes that "Current water quality is moderate, and statistical analysis for the creek shows a stationary trend" and “Dense residential development may be a

principal cause of poor water quality in some areas of the watershed".

4.5 Monitoring Stations. Monitoring stations are described in the next table and in the map following. During the project, some sites were dropped after a year of monitoring because no problems were encountered, while additional investigative monitoring stations were selected to assist in determining other potential areas of fecal coliform pollution.

Station ID	*Location Description*
IC01	Illahee Creek Culvert Entrance
IC02	Illahee Creek North Tributary Prior to Confluence with Main Stream Flow
IC02A	Illahee Creek Upstream of North Tributary Confluence
IC03	Illahee Creek North Fork Prior to Confluence with South Fork
IC04	Illahee Creek South Fork Prior to Confluence with North Fork
IC05	Illahee Creek South Fork Prior to Flow into the South Fork Pond
IC06	Illahee Creek North Tributary at Wise Street
IC07	Illahee Creek North Tributary at Wise Street, west flow
IC08	Illahee Creek North Tributary at Wise Street, north flow
IC09	Illahee Creek North Fork at McWilliams Rd (Rolling Hills) West Outlet
IC10	Illahee Creek North Fork at McWilliams Rd (Rolling Hills) East Outlet
ISW01	Illahee Storm Water Illahee Dock Outfall
ISW02	Illahee Storm Water Illahee North Outfall
ISW03	Illahee Storm Water Illahee North Detention Pond Outfall



4.6 Criteria for Analyzing the Results. The "Water Quality Standards for Surface Waters of the State of Washington" are codified in Chapter 173-201A of the Washington Administrative Code. The Extraordinary Primary Contact fresh water standard for fecal coliform bacteria (freshwater FC standard) is:

"Fecal coliform organism levels shall both not exceed a geometric mean value of 50 colonies/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 mL".

4.7 Monitoring Results. The Table below shows fecal coliform counts per 100ml in each sample collected by volunteers. The sampling period covers 40 months of testing beginning on March 2006 and ending on June 2009. Not all stations were utilized during the 40 months with changes being made during the sampling period to help isolate areas of higher concentrations.

Location	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07
IC01	30	13	23	80	23	30	50	17	17	30	2	14	2	4	30	50	70	30	1600		23
IC02	4	2	2	130	23	2	2	8	50	50	4	50	2	22	30		17	17	900		8
IC02A																	30	30	1600		4
IC03		80	30	30	30	13	13	17	2	23	2	2									
IC04		4	50	300	23	13	30	13	22	23	7	7	2								
IC05		17	17	110	220	30	110	50	11	17	13	30		11	60	240	500	80	1600		300
IC06	13	500	1600						80	110	23	50							1600		30
IC07						300						62									
IC08													22						1600		
IC09													30	11	80	1600		500			30
IC10																		23	1600		17

Location	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-09	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Geometric Mean
IC01	11	80	8	8	4	8	130	50	80	13	80	13	13	4	21	8	30	11	130	22
IC02	14	80	2	23	2	13	13	22	17	50	30	23	4	7	8	17		4	30	13
IC02A	4	50	2	23	8	2	30	11	50	23	50	22	17	2	4	8	30	4	50	15
IC03																				12
IC04																				16
IC05	8	30	13	30	50	80	240	30	8	50	80	4	4	7	6	30	130	30		39
IC06	30	23	23	13								4	30							55
IC07	13	80		30									4		2	8	30			22
IC08	50	50	50	23	80								23	300	1600	13	50			79
IC09	8	23	11	240	900	300	30	80	300	80	500	11	30	23	13	30	50	80	30	63
IC10	17	23	4	11	8	2	8	11	14	2	2	2	8	2	13	2	80	13	4	9
ISW01		23	80	170	30			50	130	23	11	8		2	30	17	30	4	13	23
ISW02		2	130	13	4			1600	7	30	2	2	2	2	2	2	23	4	23	8
ISW03		13			1								17				17			8

Table showing Fecal Coliform concentrations in Illahee Creek Monitoring Stations March 2006 to June 2009. Counts are per 100ml.

4.8 Analysis Conclusions. The data indicates that problems are worst in the upstream locations. The average of the geometric mean FC counts for upstream locations IC05, IC06, IC07, IC08, IC09, and IC09a is 46 / 100ml, whereas for down and midstream locations IC01, IC02, IC02a, IC03, and IC04 is 16 /100ml. This is significant since previous efforts to monitor the stream had only tested near the mouth of the creek, where it showed the lowest levels of fecal coliform pollution. Because of this, the true health of the creek may not have been previously recognized.

4.9 Recommendations. Fecal coliform (FC) monitoring of Illahee Creek should continue near the mouth of the creek and at selected upstream locations to determine any trend changes. The Parametrix report recommends Low Impact Development (LID) applications be implemented throughout the watershed, and directed primarily at locations contributing to storm surges in Illahee Creek. It is important that FC monitoring stations located at strategic points in the watershed be used to track any FC changes or trends with the greater watershed. It is critically important that FC monitoring stations be used downstream of the LID facilities to determine if these installations are successful in reducing FC pollution in the stream.

The recommended monitoring stations have been reduced from 14 to 7 and are:

Station ID	*Location Description*
IC01	Illahee Creek Culvert Entrance
IC02	Illahee Creek North Tributary Prior to Confluence with Main Stream Flow
IC02A	Illahee Creek Upstream of North Tributary Confluence

IC05	Illahee Creek South Fork Prior to Flow into the South Fork Pond
IC06	Illahee Creek North Tributary at Wise Street
IC09	Illahee Creek North Fork at McWilliams Rd (Rolling Hills) West Outlet
IC10	Illahee Creek North Fork at McWilliams Rd (Rolling Hills) East Outlet

5. RIPARIAN PLANTING

5.1 Delayed Installation Due to Flooding. The riparian planting task was delayed several years following the devastating flooding of the December 3, 2007 flooding that occurred along Illahee Creek. The flooding nearly took out the Illahee Creek culvert under Illahee Road and according to one report raised the flood plain of the lower riparian area by 18 inches. That event also took out many saplings that had been planted years earlier and it was decided to wait to see what might be done with the flood plain and the seriously compromised culvert.

5.2 Culvert Dredging Results. The riparian planting task was also on hold because the culvert was authorized to go through routine dredging in hopes that it would lower the stream bed significantly. While the stream bed has not significantly lowered in spite of several dredgings, there have also been no more devastating floods, and the clear opening has remained around 2 feet (significantly greater than the design height of 5' 6"). With the area now relatively stabilized it was agreed to complete the riparian planting task.

5.3 Landowner Agreement. Landowner agreement discussions found some hesitation with a required 10 year maintenance agreement by the most affected landowner. The riparian planting area was visited on July 15, 2010 with Department of Ecology representatives, Dave Garland and Joan Nolan, who were supportive of modifications to a landowner agreement document that decreased the effective length to something less than 10 years. Also discussed was the fact that although the riparian area was well forested, it was primarily red alder, which has a rather short life span, and that trees such as western red cedar, are a better choice. Negotiations resulted in a landowner agreement with a 5 year maintenance plan, and with the Illahee Forest Preserve group being responsible for the maintenance phase of the plantings, or until December 31, 2015.

5.4 Riparian Planting. The Riparian Planting project eventually resulted in the planting of 1500 western red cedars along the lower riparian corridor of Illahee Creek. The contract for the riparian planting was negotiated with Treez, Inc, of Bremerton, WA who transported and planted the area with the 1,500 western red cedar 2 foot saplings (or roughly 80 trees per acre on 25' centers). The planting began in early February 2011 and completed on February 18, 2011.

6. PUBLIC INFORMATION AND EDUCATION

6.1 Reaching Residents. Outreach to residents with important information about their community is necessary but is also extremely difficult. Residents are often busy with their own lives, raising a family, working, hobbies, organizations, etc, and have little time to keep track of community events, much less get involved with them. Additionally, newspapers are cutting back, which affects coverage of community issues, and subscription numbers continue to decrease resulting in fewer residents in the community subscribing, which is the situation we found in Illahee.

6.2 New Methods. And so new methods are required if the residents of Illahee are to be reached. The concern of members of the grant steering committee was that the completed watershed studies not end up as just another scientific study on a shelf in someone's office. This concern resulted in some methods not previously considered being used to ensure that information is relayed to as many residents as possible.

ELECTRONIC COMMUNICATION (WEBSITE/EMAIL/BLOGS/FACEBOOK)

6.3 Website. The Illahee Community registered its domain name in June 2006 and began using the illaheecommunity.com website later in the year. Eventually illaheecommunity.com became the umbrella website for other Illahee websites and community related groups such as the Illahee Forest Preserve and the Illahee Community organization. The goal was to develop a single website for Illahee, a sort of one stop for anything that had to do with Illahee. And so it also became the established website required by the grant to communicate events, disperse data, maps and analysis, and provide opportunities for involvement with the volunteer events and monitoring program.

6.4 Website Advertised. In order to get the website address out to residents and the greater Illahee community, the Port of Illahee had a sign made for their information board at the Illahee community dock and new and revised brochures for the Illahee Preserve also referenced the new website. Additionally, all following community and grant items were hosted on the illaheecommunity.com website.

6.5 Frequency of Website Use. At the outset of the grant it was determined electronic communication would be used to the maximum extent to reach residents and property owners in Illahee. While a website in itself can be an outreach and educational tool, it needs to be one that is used regularly by the community. In other words, if residents do not routinely frequent a website, then the ability to communicate events such as meeting notifications or new information is haphazard at best. Something more dynamic besides possible infrequent use of a website was needed if the majority of Illahee residents were to be reached.

6.6 Direct Electronic Communication. What was desired was to foster a means of direct electronic communication with as many residents as possible. During other events in Illahee, including the Illahee community coming together to prepare a subarea plan for consideration by the county, a number of email addresses had been acquired by those interested in being kept informed of these

various events. It was decided to use that already established form of direct electronic communication, email, to disseminate grant and educational information to those already on the email list, and to add many more to the list.

6.7 Email Numbers. Over the last few years the number of email recipients has continued to increase to the point where the numbers fluxuate between 400 and 500. The numbers vary as people move and new names are added. Also, some residents forward the emails electronically to their neighbors, while others print them and give them to neighbors who do not have internet access.

6.8 Email Newsletter Approach. Over the years it was found that residents appreciate a more newsletter type of approach, with most commenting that they appreciated wildlife information and photos in the updates. Residents often respond to the updates with some submitting information to be passed on. Rarely do residents ask for their names to be removed from the list, though several have stated they would rather go to the website for their updates.

6.9 Updates Posted on Blog. In 2010 the community updates were also posted on a blog site so residents could respond directly to the updates. This service has not received the attention that was hoped for, with very few bloggers apparently in Illahee.

6.10 Updates on Facebook. Also in 2010, the community updates were posted on Facebook, with over 100 friends added quickly. This is a new concept for many in Illahee, similar to that of blogging, and is also slow to catch on.

6.11 Website Transition. In June 2011 it was suggested that the website be transitioned to a Content Management System (CMS) to make it easier for those involved with posting the updates. The website host is being changed and the website modified to make it more dynamic with the updates showing up on the opening page of the website. It was explained that website software and management issues have changed over the past 5 years, which is when the Illahee website was established, and that a CMS website is a better system for the future. The transition is in process and the goal for the future is to have the email newsletters directly posted to the website and Facebook, in addition to being sent out to Illahee residents, which is now possible with CMS.

6.12 Port of Illahee Website. In 2010 the Port of Illahee established their own website portofillahee.com which will be a duplicate hosting site for grant reports. The Port separated from the illaheecommunity.com website in order to avoid a possible conflict of interest by having their local government information hosted on the community website.

6.13 Website Collaboration. The illaheecommunity.com website was established for the greater Illahee community and is managed by the Illahee Community non-profit group and hosts the umbrella website for Illahee, and has been the primary website for information for the duration of the grant. Additional collaborations are: the grant's Illahee Creek Watershed Surface Water Management Plan (the Parametrix report) is being hosted by Kitsap County's Department of Community Development, and the related Illahee Preserve Stewardship Plan is being hosted by Kitsap County's Parks and Recreation Department. All of these organizations are working collaboratively together, sharing hosting costs, and providing links to each other's websites.

6.14 Archival History. It was also decided by those involved with the website transition that the emailed community updates should continue to be collected and stored on the website, as an archival repository of Illahee history, available to anyone who may be interested. This was one of the special features created in the original website that now functions as a history bank for the community.

6.15 Labor Intensive. It needs to be noted that keeping up a website, sending out email updates, putting them on a blog site and Facebook, and keeping updated grant information available, is a labor intensive undertaking.

6.16 Websites Volunteer Supported. The community websites have been nearly entirely run with volunteers, including those paying for domain names and hosting services out of their own pockets. The Illahee community is to be commended for their volunteer labors and their financial support. It is community support such as this that has allowed additional educational grant projects to be pursued and funded.

EDUCATIONAL SIGNS (RAIN GARDEN/PRESERVE/SWMP)

6.17 Educational Sign Concept. One effective way to tell the story of a grant, a concept, or a community is through educational or interpretive signs. Standard interpretive signs seem to be roughly 2' x 3' and are used throughout the United States by various government and private agencies. Locally, these types of signs are used by the Clear Creek Trail group and one of their key sign designers lives in Illahee. He is a graphic artist and has volunteered to develop a standard Illahee sign and combine it with the pertinent grant and community information into educational signs.

6.18 Sign Locations. A major issue with educational signs is finding appropriate locations where signs can be placed so they can be viewed by the greatest number of people. In Illahee there are only a few public places that are possibilities, with the Illahee Preserve being the biggest attraction in the area. And thus it was decided to use the Illahee Preserve as the location for the educational signs. The Port of Illahee may in the future acquire appropriate properties that could be used for educational signs, which would help better distribute the signs in the community.

6.19 Rain Garden Opportunity. When Kitsap County constructed a new parking lot for the Illahee Preserve it was designed using Low Impact Design criteria which called for a bioswale or rain garden to handle stormwater flows from the parking areas. It was suggested that this might be a prime opportunity for Kitsap County Parks, the Port of Illahee, and the Illahee Community to work collaboratively to establish a native plant demonstration rain garden at the new parking lot location. The purpose of the rain garden would be to encourage not only Illahee residents, but the greater surrounding area, to install individual rain gardens on their property.

6.20 Rain Garden Agreements & Plots. Multiple agencies and groups were contacted to verify government and community support. These include Kitsap County Parks and Recreation, Kitsap County Surface and Stormwater Management (SSWM), Washington State Department of Ecology,

Kitsap Conservation District, Kitsap WSU Extension, Sea Grant Kitsap, Port of Illahee, Illahee Preserve Stewardship Committee, Rotary Club of East Bremerton, Illahee Forest Preserve, and the Illahee Community. This resulted in 5 rain gardens being installed by community volunteers in two bioswale areas totaling roughly 4000 square feet. The four demonstration rain garden plots average about 800 square feet and have three walkways in-between them near where the rain garden educational signs will be placed.

6.21 Rain Garden Educational Signs. A total of six educational signs and one entry sign were used to tell the rain garden story, and are being placed strategically along three paths separating four native plant demonstration rain garden beds.

6.22 Preserve/SWMP Educational Signs. In order to tell the story of the Illahee Preserve and the Illahee Creek Watershed Surface Water Management Plan (SWMP) a welcome sign shadowed by three secondary signs are being placed at the entrance to the Illahee Preserve. The three secondary signs tell the stories and future plans for preservation, restoration, and education.

ILLAHEE FILM PROJECT

6.23 Strategy. It was during a discussion with one of the Puget Sound Partnership experts on the science panel that we were challenged to use tools that would reach the younger generation with the grant findings and the work that was being accomplished in Illahee. There were concerns that all the good work of the grant would soon be unknown and the watershed report itself could end up on book shelves in offices, never to see the light of day again, since it is a relatively small watershed. It was suggested that films be used to tell the Illahee story and that the films be posted on sites such as YouTube.

6.24 Illahee Film. The grant team sent out an RFP for the film project and eventually contracted with Shelly Solomon of Leaping Frog Films (LFF) to produce the Illahee video. Included in the film would be a history of the community along with the grant project and interviews of local experts. A long version of the film was proposed (approximately 30 minutes) or one of sufficient duration to tell the story, and a shorter version (approximately 10 minutes) that would be more compatible with sites like YouTube. By the time the film was nearing completion it was one film of approximately 40 minutes duration. The filmmaker filmed numerous residents, experts, and officials in order to weave a compelling story of a community's efforts to preserve and restore their natural features and save Puget Sound in the process. The film's title will be "Illahee – Saving Puget Sound, One Watershed at a Time". The video was not completed during the project period but is anticipated to be completed in 2012.

TRADITIONAL MEETINGS

6.25 Four Public Meetings Held. There were a total of four public meetings held to present the findings of the Illahee Creek Watershed Surface Water Management Plan. Each of the presentations was held at the Norm Dicks Government Center's council chambers.

6.26 Parametrix Mid Project Briefing 3/11/08. A mid project briefing was held on March 11, 2008 at the Norm Dicks Government Center. The press release for the briefing stated:

> A mid-project briefing by renowned scientists working in Illahee will be held at the Norm Dicks Government Center on the evening of March 11, 2008 from 6-8 pm.
>
> Speakers include: Fisheries biologist Pete Lawson of Paramentrix; Geologist Derek Booth, PhD of Stillwater Sciences; Hydrologist Joel Massmann, PhD of Keta Waters; and Stormwater Engineer, Erin Nelson of Paramentrix.
>
> Dr. Booth will discuss the general geology of the Illahee area and in particular the relationship with groundwater and surface water hydrology, along with his thoughts regarding whether Illahee lies within a seismic fault zone. Dr. Joel Massmann will discuss the underlying aquifers in Illahee and their relationship to Illahee Creek and low base flows. Pete Lawson will present his biological assessment of Illahee Creek and fish habitat recommendations. Erin Nelson will discuss their progress in identifying solutions to the storm water surges plaguing Illahee Creek. There will also be brief overview of the results of the National Fish and Wildlife Foundation grant. A question and answer session will follow the presentation.
>
> These projects are funded by grants from the National Fish and Wildlife Foundation and the Washington State Department of Ecology, and by the Port of Illahee, the Illahee Forest Preserve, and the Illahee Community. Water quality testing programs and stormwater planning are supported by Kitsap County Department of Health and Kitsap County Public Works.

6.27 Combined Meeting & Parametrix Briefing 1/29/09. There was a combined watershed and community plan briefing held on January 29, 2009 at the Norm Dicks Government Center. The press release for this briefing was as follows:

> The Illahee Creek Watershed Surface Water Management Plan final report briefing by Parametrix, and a briefing of the adopted Illahee Community Plan by Kitsap County, will be held at the Norm Dicks Government Center on the evening of January 29, 2009 from 6:30 – 8:30 pm.
>
> Speakers will be: Erin Nelson, the Parametrix Project Manager for the Port of Illahee / Department of Ecology Centennial Clean Water grant; and Katrina Knutson, Senior Planner with the Kitsap County Department of Community Development.
>
> The Parametrix report is funded by a grant obtained by the Port of Illahee from the Washington State Department of Ecology and includes basin assessments, an aquifer protection plan, and specific recommendations to correct identified problem areas. The briefing will provide an overview of the assessment findings and then concentrate on the identified recommendations and projects needed to fix the problems. The Parametrix report is related to ongoing water quality testing and stormwater planning supported by Kitsap County Health District and Kitsap County Public Works.

The Illahee Community Plan was recently adopted by the Kitsap County Board of County Commissioners and represents a collaborative effort between Kitsap County and the Illahee Community to develop a plan that meets the needs of both Kitsap County and the Illahee Community. The briefing will cover the revised community boundaries, the new Green Belt Zone, the View Protection Overlay, and a brief discussion of whether the Citizens Advisory Group should continue.

6.28 Keta Waters Presentation 6/30/09. Dr. Joel Massmann of Keta Waters briefed the community on "Groundwater, Aquifers & Infiltration Requirements" with a subtitle of "A Briefing of the Manette Peninsula Aquifer and Illahee Watershed Aquifer Protection Plan." The press release for the briefing reads as follows:

A briefing discussing our underlying aquifers, the source of water in these aquifers, and their importance to our drinking water and streams will be held at the Norm Dicks Government Center on the evening of June 30, 2009 from 6:30-8 pm.

Dr. Joel Massmann will discuss the underlying aquifers and groundwater recharge on the Manette Peninsula and within the Illahee Creek watershed. The presentation will address questions regarding how much fresh water is in these aquifers, where does this fresh water come from, and where does it go. These questions will be described in the context of relationships between groundwater for municipal supply and groundwater to support stream flow and wetlands.

Dr. Massmann has over twenty-five years of experience as a groundwater consultant. He is the founder of Keta Waters and was previously a faculty member in the Department of Civil and Environmental Engineering at the University of Washington.
Dr. Massmann's study of the local aquifers was funded in part by grants from the National Fish and Wildlife Foundation and the Washington State Department of Ecology, and by the Port of Illahee, the Illahee Forest Preserve, and the Illahee Community.

6.29 Second Keta Waters Presentation 3/29/11. A second "Groundwater, Aquifers & Infiltration Requirements" briefing by Dr. Joel Massmann of Keta Waters was presented on March 29, 2011. The purpose of this briefing was to extrapolate USGS study findings to the Illahee watershed. The press release for the briefing was:

A briefing discussing the underlying aquifers in Illahee and the surrounding area will be held at the Norm Dicks Government Center on the evening of March 29, 2011 from 6:30-8 pm.

Dr. Joel Massmann will discuss the underlying aquifers and groundwater recharge on the Manette Peninsula and within the Illahee Creek watershed. The presentation will address questions regarding how much fresh water is in these aquifers, where does this fresh water come from, and where does it go. These questions will be described in the context of relationships between groundwater for municipal supply and groundwater to support stream flow and wetlands.

In June 2009, Dr. Massmann noted that the Manette Aquifer may essentially be at water balance and the water rights for the aquifer may have been over-allocated. (Also in June 2009 the Kitsap County Commissioners adopted a "Water as a Resource Policy" for Kitsap County.) Since that time the Kitsap PUD and local water purveyors have funded USGS to conduct a detailed study of the Kitsap Peninsula that will take several years to complete. In the meantime the implications of local aquifers possibly at water balance needs to be addressed. Dr. Massmann has been invited back to discuss the aquifer issues again and any possible extrapolations for Illahee from the USGS Groundwater Study of Bainbridge Island that was issued on March 1, 2011. He will also provide specific recommendations for protecting aquifers, which are the sole source of our drinking water on the Manette Peninsula.

Dr. Massmann has over twenty-five years of experience as a groundwater consultant. He is the founder of Keta Waters and was previously a faculty member in the Department of Civil and Environmental Engineering at the University of Washington.

Dr. Massmann's study of the local aquifers was funded in part over the last few years by grants from the National Fish and Wildlife Foundation and the Washington State Department of Ecology; and by the Port of Illahee, the Illahee Forest Preserve, and the Illahee Community.

7. ECOLOGY SITE VISIT.

Joan Nolan and Dave Garland visited the Port of Illahee's Surface Water Management Plan project near Illahee Washington on July 15, 2010. We were shown around by the Port's Project Manager Jim Aho. We observed the upper watershed wetlands, new rain garden and stormwater ponds in Illahee Preserve, and walked up the mouth of Illahee Creek about ¼ mile to see remnants of an historical concrete diversion dam. Plantings at the rain gardens have not yet naturalized but are expected to do so over the next 2 years.

Jim Aho shows Joan Nolan wetlands in upper headwaters of Illahee Creek on July 15, 2010. An Illahee Community Website is updating community residents on the project and email updates are sent to over 400 residents. Recipients are also networking with Puget Sound Partnership's ECONET public education and outreach group to promote rain gardens and aquifer recharge to a larger audience.

Jim Aho & Joan Nolan in upper Illahee Creek July 15, 2010.

The Illahee Preserve Native Plant Demonstration Rain garden is nearly complete and plant materials are naturalizing. Signage is planned along the three pathways separating the four rain garden plots in order to identify them as rain gardens and to educate and emphasize the need for rain gardens. Runoff from Preserve parking lot drains directly into the rain garden which infiltrates about 30% more water than comparable lawn area. Planting, weeding and mulching of the rain garden plots was accomplished by a number of volunteer work parties.

Rain garden at Illahee Preserve

Stormwater ponds at Illahee Preserve

Illahee Preserve rain garden overflow drains to primary and secondary stormwater ponds shown here to provide further infiltration and treatment. The stormwater ponds are separated by a rock berm filter. Some limitations on other candidate rain garden sites in the watershed were imposed by steep slopes and septic drainfield setbacks. Areas with sewers turned out to be the best candidates for rain garden sites.

Riparian plantings along Illahee Creek were re-evaluated since the accumulation of 18" of sediment in the lower floodplain in December 2007. The Illahee Creek culvert was replaced in 1999 but flooding and sedimentation almost caused culvert failure in 2007. Further proliferation of rain gardens in the Illahee watershed will help mitigate damage to stream morphology and habitat due to large storms.

Joan Nolan by lower Illahee Creek on July 15, 2010

8. CONCLUSIONS

8.1 Just the Beginning. With the completion of the grant, the groundwork is now in place for future action. A roadmap has been established that will require the dedicated efforts of government, private agencies, and the Illahee community as they seek to preserve and restore a stream, a watershed, and ultimately Puget Sound

8.2 Storm Water Surges Continue. In the meantime, sediment continues to be deposited at the mouth of the Illahee creek and brown silt laden water continues to flow into Port Orchard Bay during rainfalls of approximately one inch or more.

These surge events have been going on for now more than 40 years. But with the Illahee Watershed Surface Water Management Plan there is finally a plan detailing the necessary remedies. Those remedies need to be implemented before the momentum that has been established by the grant begins to fade.

Storm surges and the associated sedimentation problem are the primary contributors to the rising flood plain at the mouth of Illahee Creek and the filling of the culvert under Illahee Road. It is imperative that upstream modifications be implemented as soon as possible to prevent a possible washout of Illahee Road if the culvert fails.

8. 3 Aquifer Problems Continue. The aquifers in Illahee are reported to be at water balance, meaning that the amount of precipitation infiltrating into the underlying Manette aquifer is the same as the amount of ground water being withdrawn by wells and discharging as stream base flows. Additionally, Illahee Creek competes with well withdrawals for base flow, as has been shown using the Bainbridge Island USGS modeling data. These two facts indicate that this area has likely reached the maximum development density that the underlying aquifers can continuously supply, and that no further growth should be permitted without commensurate assurance that the aquifers will be replenished. This is a problem without an agreed upon plan and needs further attention.

8.4 Golf Course Acquisition - A Giant Step Forward. The gifting of the 107 acre Rolling Hills Golf Course to Kitsap County is one of the strong positive outcomes of this grant. It is a partnership that has already begun to preserve and restore the watershed, where the owner of the golf course, the community, and Kitsap County worked together to find a way for the acquisition to move forward. The acquisition of the golf course is a giant step forward for the watershed and is critical to controlling the storm water surges that plague Illahee Creek. Other recommendations identified by the grant will require additional follow-on grants, presumably from the Department of Ecology, to make the necessary changes happen.

8.5 Public Information & Education Efforts. Considerable efforts have been made to inform residents and the surrounding community of the issues with the Illahee Creek watershed, Illahee Creek, and the receiving waters of Puget Sound. Public meeting, informational brochures, booths at fairs and festivals, demonstration rain gardens, signs, and a major film, done primarily with volunteer efforts, are all designed to tell the story of a Port

District and a Community working together to save a watershed, a salmon stream, and Puget Sound.

8.6 Illahee Film – A Grant Project Summary Report. While engineering reports and recommendations are important, they don't reach most community members. The Illahee film is designed to inform and inspire, and summarizes many of the accomplishments of the grant, in a way that will appeal to community members and further the public's understanding of our community and watersheds.

Prepared and submitted by:

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For the Port of Illahee