KITSAP COUNTY HEALTH DISTRICT
ENVIRONMENTAL HEALTH DIVISION
WATER QUALITY PROGRAM

YUKON HARBOR WATERSHED RESTORATION PROJECT

FINAL REPORT

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December 2006

Funded By:
Washington State Department of Ecology
Section 319 Non-Point Source Fund and

KITSAP COUNTY SSWM Surface and Storm Water Management

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ACKNOWLEDGMENTS

The author would like to thank the following Kitsap County Health District staff for their assistance in completing the Yukon Harbor PIC Project: Leslie Banigan, Jodie Holdcroft, Margarite Thomas, Mindy Fohn, Richard Bazzell, Shawn Ultican, John Kiess, Stuart Whitford, Susie Magdamit, and Tracey Larson.

A special thanks to Brian Stahl of Kitsap Conservation District for his work on implementing animal waste management plans and farm management plans in the Yukon Harbor watershed.

YUKON HARBOR WATERSHED RESTORATION PROJECT FINAL REPORT

EXECUTIVE SUMMARY

This project addressed a serious fecal coliform bacteria (FC) contamination problem in the Colvos Passage / Yukon Harbor watershed in Kitsap County. The Yukon Harbor area is an older residential area where most of the parcels were platted and developed prior to existing onsite sewage system (OSS) regulations. The natural physical conditions of the area, primarily the surface and ground water conditions and the soil types and depths, are not conducive for the utilization of "standard gravity" OSS. Development of the surrounding upland parcels has increased the runoff to the shoreline parcels, further degrading the ability of the area for OSS operation.

On March 27, 2001, Washington State Department of Health (State Health) issued an initial classification of *Prohibited* for Geoduck Tracts 08300 and 08350 based on elevated FC levels in the fresh water drainages to the Yukon Harbor shoreline. State Health recommended that the Health District conduct an intensive survey of the watershed to identify and correct failing OSS and inadequate animal waste management practices.

In response, the Health District performed a dry weather shoreline survey of all fresh water drainages to the Yukon Harbor shoreline from Point Southworth to Manchester dock in March and April 2001. The survey mapped impaired drainages and located twelve drainages that had FC samples results in excess of testing limits, indicating the presence of raw sewage.

To address the water quality problems specified above, the Health District initiated source corrections in the summer of 2001. The Yukon Harbor Watershed Restoration Project became a cooperative effort of the Health District, Kitsap Conservation District, and the local community to conduct an intensive Pollution Identification and Correction (PIC) survey of the Yukon Harbor marine shoreline and selected parcels along Curley Creek and Long Lake. Funding was provided with a WSDOE Section 319 Non-Point Source Fund Grant, with matching funds from SSWM.

The PIC OSS survey was conducted from May 2003 to August 2006. The project area consisted of 413 parcels, 35 are undeveloped leaving 378 parcels to survey. The results of this survey were,

- A project total of 51 OSS failures (15%) were found.
- A project total of 15 suspect OSS (5%) were found.
- A project total of 16 non-conforming OSS (5%) were found.
- A project total of 102 "no records" OSS (31%) were found.
- A project total of 151 "no apparent problems" OSS (45%) were found.

Six project shoreline surveys were conducted; November 2002, February 2004, July 2005, March 2006, May 2006, and August 2006. The shoreline sampling became the most powerful tool in source location along the Yukon Harbor shoreline, locating 27 of the 50 failures.

With a project size of 378 parcels to survey, a total of 51 septic systems (15%) were found to be failing within the Yukon PIC boundaries. That places the Yukon Project at the high end of the 3% to 15% failure rate from the PIC projects completed in Kitsap County since 1995. These failures were located from different activities designed to maximize the potential for FC source location. Shoreline surveys located 28 failures, parcel survey / inspection located 6 failures, impact monitoring found 3, and 14 were located by responding to complaints called in by local residents. Factors that have affected the failures found during this project are typical of other surveys. The age of the system, poor soil types, proximity to surface waters, high water table, and tidal effects, have all contributed to the high number of failures found during this survey. Repairs of the failures have been as simple as replacing a broken pipe to complex designs involving alternative systems designed around existing lot limitations. O&M contracts were required on 31 of the 51 failures.

KCD conducted an inventory of the Yukon Harbor watershed rating agricultural sites on the "potential to pollute". The "potential to pollute" used a rating of 1-5; with 1 being the highest priority. The Health District conducted parcel monitoring on project area parcels having a rating of 1 and 2. In 2003 there were 10 sites rated with a priority 1, and 12 with a priority 2. By October 2006 KCD had succeeded in lowering the "potential to pollute" to, 3 parcels with a priority 1, and 3 parcels with a priority 2.

Surveys were conducted at nine well systems located within the Yukon Harbor / Colvos Passage watershed. These well systems had nitrate levels at or above the 2.5 mg / L "trigger" point. Septic systems were not found to contribute to the high nitrate levels in these problem wells, however several of these wells had signs of high fertilizer use near the wellhead.

Based upon the findings of the Yukon Harbor Watershed Restoration Project, the Health District's Water Quality Program offers the following recommendations.

- The Health District encourages the residents to approve LID #9, the purposed sewer extension on Colchester Drive and Yukon Harbor Road. This extension will direct 81 OSS on shoreline parcels to the sewer for all future repairs.
- The Health District will continue to work with the remaining property owners with failing OSS. Parcels that connect to LID #8, and the remaining properties installing a replacement OSS.
- The Health District will continue to be involved in the Yukon Harbor Shoreline. Involvement will be through complaint response, trend monitoring, and follow up of operation and maintenance (O&M) reports submitted to the District. In addition, properties with ongoing concerns will be flagged in Health District files to assist future inspections.

- Local residents are encouraged to continue to be proactive in OSS maintenance; those with alternative OSS will receive a yearly report on the condition of their system. Those with standard gravity OSS should have their septic tanks and drainfields inspected every three years (at minimum).
- The Health District recommends conducting future shoreline surveys to continue to maintain the improvements gained by the Yukon PIC. The older gravity OSS still operating along the shoreline will continue to fail. Upgrading these older systems to alternative OSS with O&M contracts will correct the existing failure and add another level of protection in the form of the yearly inspections.

Kitsap County Health District
Water Quality Program

YUKON HARBOR WATERSHED RESTORATION FINAL REPORT

1.0 BACKGROUND AND PROBLEM STATEMENT

Summary

This project addressed a serious fecal coliform bacteria (FC) contamination problem in the Colvos Passage / Yukon Harbor watershed in Kitsap County

Violations of the state fresh water FC standard along the Yukon Harbor shoreline had forced the Washington State Department of Health (DOH) to initially classify two commercial shellfish beds as *Prohibited*. In addition, both Curley Creek and Long Lake had confirmed violations of the fresh water FC standard. Curley Creek was listed on the 1998 Clean Water Act Section 303(d) list (303d list) for FC contamination.

Review of all data collected since 1995 indicates that the Yukon Harbor marine station located at the mouth of Curley Creek had outliers more than twenty times the marine water FC standard.
In addition to FC contamination, nine (9) drinking water systems in close proximity to Curley Creek and Long Lake had reported levels of nitrates in excess of Kitsap County's action level of 2.5 ppm.

FC Contamination of the Yukon Harbor Shoreline and Near Shore Marine Waters

On March 27, 2001, DOH issued an initial classification of *Prohibited* for Geoduck Tracts 08300 and 08350 based on elevated FC levels in the fresh water drainages to the Yukon Harbor shoreline. DOH recommended that the Health District conduct an intensive survey of the watershed to identify and correct failing on-site sewage disposal systems (OSS) and inadequate animal waste management practices.

In response, the Health District performed a dry weather shoreline survey of all fresh water drainages to the Yukon Harbor shoreline from Point Southworth to Manchester dock in March and April 2001. The survey mapped impaired drainages and located the most obvious FC sources. There were 140 freshwater drainages sampled, 24 had FC concentrations greater than 100 fc / 100ml. Twelve of the FC samples had results in excess of testing limits, indicating the presence of raw sewage.

The "Water Quality Standards for Surface Waters of the State of Washington" Chapter 173-201A WAC fresh water fecal coliform (FC standard) for Yukon Harbor (Class AA) is:

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

Fecal coliform organism levels shall both not exceed a geometric mean value of 14 colonies/100ml, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 43 colonies/100m

Health District monitoring data for the Yukon Harbor near-shore marine station indicates that the station met standard for water year 2000-2001. However, review of all data collected since 1995 indicates that the Yukon Harbor marine station located at the mouth of Curley Creek had outliers more than twenty times the marine water FC standard. This indicates that nonpoint FC pollution sources (e.g., failing OSS and animal waste) were impacting the near shore marine environment.

Salmonberry Creek

Salmonberry Creek flows into Long Lake, the outlet of Long Lake is Curley Creek, which discharges into the Yukon Harbor shoreline. Water quality was a concern in Salmonberry Creek, as the creek had met the FC standard only 5 times in 10 years of monitoring.

FC Contamination of Long Lake

According to a study conducted by Washington State Department of Ecology (WSDOE) in 1998, Long Lake was eutrophic and FC concentrations "were unusually high for lakes". The Health District had closed the swimming beach at Long Lake County Park twice during the preceding seven years due to elevated bacterial contamination, once due to an illness outbreak, and many times due to potentially toxic blue-green algae blooms. Long Lake also had a documented history of failing OSS: The Health District identified and corrected eighteen (18) failing OSS and documented fourteen (14) suspected failing OSS during a PIC survey conducted in 1998.

FC Contamination of Curley Creek

The largest fresh water drainage into the Yukon Harbor near shore area is Curley Creek. The Curley Creek watershed includes Long Lake and Salmonberry Creek. Health District monitoring data for water year 2000-2001 showed that Curley Creek failed to meet Part 2 of the fresh water FC standard. Curley Creek met Part 2 during one water year since monitoring commenced in 1995-1996. That year was 1999-2000; a year during which Washington state experienced drought conditions.

Nitrate Contamination of Nine (9) Drinking Water Systems

There are nine (9) drinking water systems in close proximity to Long Lake and Curley Creek that currently violate Kitsap County's nitrate action level of 2.5 ppm. Sample

results provided to the Health District's Drinking Water Program showed concentrations ranging from 2.54 to 4.70 ppm. DOH's drinking water standard for nitrate is 10 ppm, and the action level is 5 ppm.

FC Correction

The Health District initiated FC source corrections in the summer of 2001, to address the water quality problems specified above. However, given the severity of the problem along the marine shoreline, and the other water quality problems described above, a larger and more intensive pollution identification and correction project in the watershed was necessary.

The Yukon Harbor Watershed Restoration Project became a cooperative effort of the Health District, Kitsap Conservation District (KCD), and the local community to conduct an intensive PIC survey of the Yukon Harbor marine shoreline and selected parcels along Curley Creek and Long Lake (see **Figure #1**). Funding was provided by a WSDOE Section 319 Non-Point Source Fund Grant, with matching funds from Kitsap County's Surface and Stormwater Management (SSWM) Program. This survey has been conducted in accordance with the Health District's comprehensive and proven "Manual of Protocol: Fecal Coliform Bacteria Pollution Identification and Correction Projects" (PIC Protocol). In addition, the Health District performed an assessment of FC impacts in the Salmonberry Creek watershed.

2.0 PROJECT DESCRIPTION

2.1 Project area description

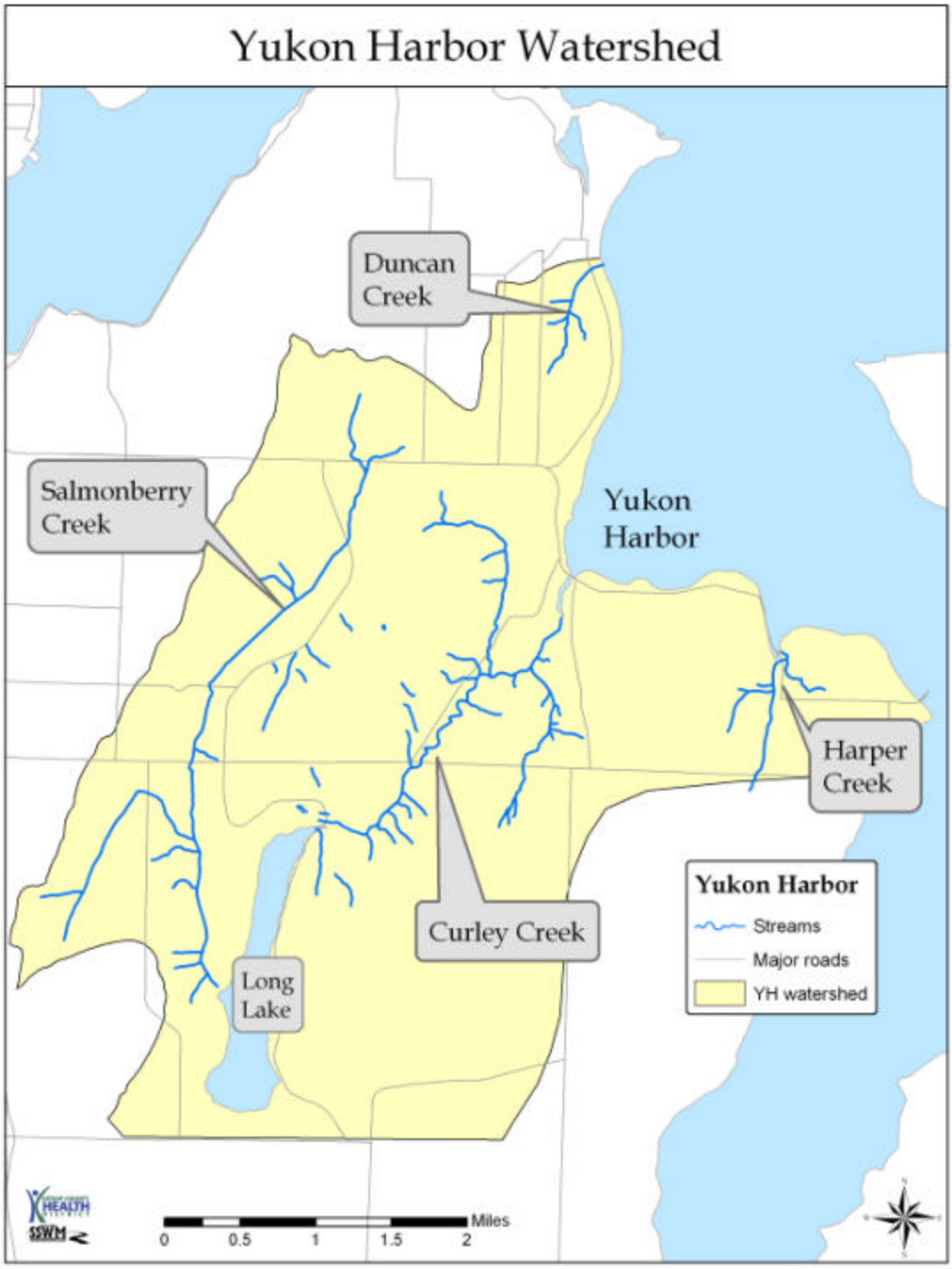
The Yukon Harbor shoreline is part of the Colvos Passage/Yukon Harbor watershed, (see **Figure #2**) located in Kitsap County. Surface waters of the Colvos Passage/Yukon Harbor Watershed are designated as Class AA waters by the State of Washington (Chapter 173-201A WAC). Class AA waters are considered "extraordinary primary contact waters" and earn this designation by markedly and uniformly exceeding established criteria related to watershed use and water quality. Yukon Harbor shoreline has a lot of public access and signs of recreational shellfish harvest.

Shoreline parcels were considered the highest priority for FC source correction. Upland parcels were investigated depending on water quality data and KCD prioritized agricultural inventory. The boundary of the Yukon Harbor project follows the shoreline from the south end of the Manchester sewer district to Southworth point. Parcels on both sides of Yukon Harbor drive were included to allow for a closer look at a portion of the project with a higher level of failures. The parcels that border the stream corridor along the main segment of Curley Creek were included to help account for possible impact to the shoreline from Curley Creek. Additional parcels were investigated along the west fork of Curley Creek in response to intermittent high FC counts. During the project upland parcels were added to trace high FC samples to their source. The final number of parcels surveyed was 378.

Figure 1


Yukon Harbor Survey Area
Duncan Creek
Salmonberry Creek
Yukon Harbor
Harper Creek
Curley Creek
Long Lake
Yukon Harbor
Streams
Major roads
YH watershed
Survey Area
0
0.5
1
1.5
2
Miles

Figure 2


Yukon Harbor Watershed
Duncan Creek
Salmonberry Creek
Yukon Harbor
Harper Creek
Curley Creek
Long Lake
Yukon Harbor
Streams
Major roads
YH watershed
Miles
0
0.5
1
1.5
2

There are four named streams that impact the Yukon Harbor shoreline, Salmonberry Creek, Curley Creek, Duncan Creek, and Harper Creek. Salmonberry Creek has its headwaters located northwest of Yukon Harbor and flows south discharging into the west shore of Long Lake. The headwaters of Curley Creek are the north end of Long Lake. Salmonberry creek flows into Long Lake and Curley creek flows out of the lake. From Long Lake, Curley Creek flows for approximately five miles before discharging into Yukon Harbor due west of Blake Island. The mouth of Curley Creek is located near the middle of the project area. Duncan Creek originates southwest of the town of Manchester near Alaska St. It flows northeast approximately 0.7 miles to its discharge point into Puget Sound. The mouth of Duncan Creek is the approximate northern boundary of the project area Harper Creek flows north from Sedgwick Rd. to the estuary near Harper Park on Southworth Dr. The mouth of Harper Creek is located near the southeast edge of the project area.

The natural freshwater drainages within the project area have been severely modified by development. The upland areas above the shoreline have developed over the years into a maze of seasonal drainages, curtain drains, storm water runoff, natural springs, and ponds.

Development on and above the Yukon shoreline is dense, with increasing demands on the storm water conveyances to the shoreline. The effect of this has been an increase of surface water flowing to the shoreline properties, saturating portions of the shoreline parcels. This increase in groundwater together with a traditional high water table creates additional demands on the existing septic systems and possibly contributing to the higher level of failures contaminating the popular beach. Many of the failures have occurred in groups, bunched together due to a combination of the high ground water, poor soils and other challenging conditions. It is also noteworthy to mention the existence of many natural springs and artisan wells scattered along the hillside above the shoreline.

2.2 Goals and Objectives

Goals

The goals of the Yukon Harbor Watershed Restoration Project have been to:

- Reduce FC levels from Long Lake, Curley Creek and other fresh water drainages to the Yukon Harbor Shoreline.
- Locate and correct potential sources of nitrate contamination of nine (9) wells located near Long Lake and Curley Creek.
- Prevent future water quality problems through an intensive public education campaign targeted at OSS operation and maintenance and adequate animal waste management practices.
- If source corrections and water quality improvements are adequate, DOH can upgrade the classification for Geoduck Tracts 08300 and 08350 from *Prohibited* to

Approved, and WSDOE can reclassify Curley Creek from category 5,"303(d) List" to category 1, "Meets Tested Standards".

Objectives

The objectives of the Yukon Harbor Watershed Restoration Project have been to:

- Identify and correct sources of FC pollution in the Yukon Harbor Watershed
- Solicit and foster community support and stewardship of water quality through informing, educating, and involving the public in the project area.

The Yukon Harbor Watershed Quality Assurance Project Plan has assisted the Health District in meeting these goals and objectives by:

- Serving as a project guide to Health District staff;
- Documenting improvements or declines in water quality, and;
- Providing fresh water quality data sufficient in quality (consistent with WSDOE's WQP Policy 1-11 "Assessment of Water Quality for the Section 303(d) List) to serve as a basis for WSDOE classifying Curley Creek as category 1, "Meets Tested Standards".
- Providing fresh and marine water quality data sufficient in quality to serve as a basis for supporting a DOH classification upgrade of Geoduck Tracts 08300 and 08350.

To facilitate the goal to identify and correct FC contamination impacting the Yukon Harbor shoreline the Health District conducted the following tasks.

- Conducted six shoreline surveys to locate contaminated drainages to the Yukon Harbor shoreline.
- Conducted door-to-door sanitary surveys of 378 properties within the Yukon Harbor watershed to locate failing OSS and inadequate animal waste management.
- Conducted 12 surveys of upland properties as a direct result of identifying contaminated drainages to the marine waters.
- Conducted "Impact" monitoring of drainages entering the Yukon Harbor shoreline to assist in locating FC sources.
- Conducted ongoing "Trend" monitoring for FC in the Yukon Harbor marine waters, upland watershed streams, and freshwater drainages to the Yukon Harbor shoreline.
- Conducted educational activities including public meetings and a workshop on OSS operation and maintenance and nutrient management.

This plan has been reviewed and amended in response to changes in monitoring goals. These amendments have resulted in increasing the number of shoreline surveys from two to six. Due to the project location and terrain the shoreline surveys have proven to be a valuable tool in locating contaminated drainages to the Yukon shoreline.

3.0 PROJECT DESIGN AND METHODS

All work was performed according to the methods contained in the "Manual of Protocol: Fecal Coliform Bacteria Pollution Identification and Correction Projects" (Health District, 2003) (PIC Protocols*).*

The project design consisted of the following components:

3.1 Yukon Harbor Shoreline Surveys

Six shoreline surveys were completed along the Yukon Harbor shoreline project area. These surveys became the single most valuable tool in locating FC contamination on the shore. As this was recognized, several more surveys were added to the project to accomplish our goal of FC source corrections. The conditions varied greatly from survey to survey. Three surveys were conducted in the wet season, and three during the dry season. Due to the wide variance in weather conditions, the number of samples taken for each event varied from a low of 67 samples to a high of 126. The number of samples with an FC count equal to or higher than the 200 FC 100 / ml threshold found during each survey ranged from a high of 30 samples to a low of 7. All of these "hotspots" were confirmed by resample.

Sampling stations were labeled in numerical sequence from the southern project border to the northern border. As new locations were added they were given a unique number to prevent any confusion from survey to survey. Location descriptions were recorded at each sample station and the flow was photographed.

The conditions for each survey varied by time of year and weather conditions. Three of the surveys were conducted with a north to south direction and three surveys were south to north. Different days of the week as well as weekends were involved to increase the opportunity to locate a contaminated flow that might be time or condition sensitive.

Sample stations testing at or above 200 FC / 100ml were re-sampled. If the conformation sample also resulted in 200 FC / 100ml or higher, then Health District staff investigated to locate FC sources. An OSS is considered "failed" when a dye test proves a hydraulic connection to a high FC sample location. Once an OSS was declared, "failed", Health District staff worked with the homeowner to assist with the repair process. This assistance often required several visits with the homeowner and designer / installers.

Repeated shoreline surveys also helped to verify corrections made on repaired failures. Several of the repairs were completed by using a permitted "phased" repair plan that allowed the homeowner to do the repair in stages and retest the system after each "phase". If the repair was successful, there was no need to move to the next phase. If the repair was unsuccessful, the homeowner took the necessary steps to correct the failure until the OSS met county regulations in performance and design. Each new survey gave KCHD staff an opportunity to re-check those phased repairs as well as continue to search for new sources.

Another benefit from the high number of shoreline surveys was having a wide variety of conditions to increase the opportunity of locating a FC source that occurs in limited conditions or time frames. For example, a weekend sampling might located an FC source that occurs only from weekend laundry. Sampling in early morning or late afternoon allows more opportunities to locate problem systems that only fail during maximum water use or to locate failing systems that do not follow the usual water use patterns.

3.2 Pollution Identification and Correction Survey

The property survey consisted of an OSS record search, homeowner/resident interview, field survey, and if necessary, water samples and dye test. The purpose of the survey was to identify all potential sources of FC contamination, including failing OSS and inadequate animal waste management. Owner/residents were given OSS records and site-specific tips regarding how to get the most life possible from their OSS.

Based upon the results of each survey, OSS were categorized as Failing; Suspect; Non-Conforming; No Records or No Apparent Problems (see **Appendix A** for rating category criteria). Properties found to be vacant or rated Suspect were re-contacted and surveyed when changes were noted. Failing OSS were corrected pursuant to OSS Regulations.

High priority non-OSS FC sources in the watershed were also assessed. The Health District contracted with KCD on April 1, 2003 to provide services for this project including: develop and maintain a prioritized inventory of agricultural sites in the watershed, develop farm plans for landowners, create Best Management Practice (BMP) designs for landowners, assist landowners with BMP implementation, and provide community outreach and education.

KCD conducted an inventory of the Yukon Harbor watershed prioritizing agricultural sites on the "potential to pollute". Conditions were noted relative to number of livestock, type of livestock, livestock confinement, pasture conditions, barns and outbuildings, and proximity of agricultural land use activity to surface waters. The "potential to pollute" used a rating of 1-5; with 1 and 2 being "high" priority.

High priority watershed parcels were surveyed for FC sources. Owners and operators were referred to KCD for technical assistance and cost-share opportunities. FC monitoring was conducted on parcels not voluntarily cooperating with KCD as discussed in Best Management Practice Effectiveness (BMPE) monitoring below.

3.3 Water Quality Monitoring

Water quality monitoring was conducted pursuant to the "Yukon Harbor Watershed Restoration Project Quality Assurance Project Plan", May 2002

Trend Monitoring

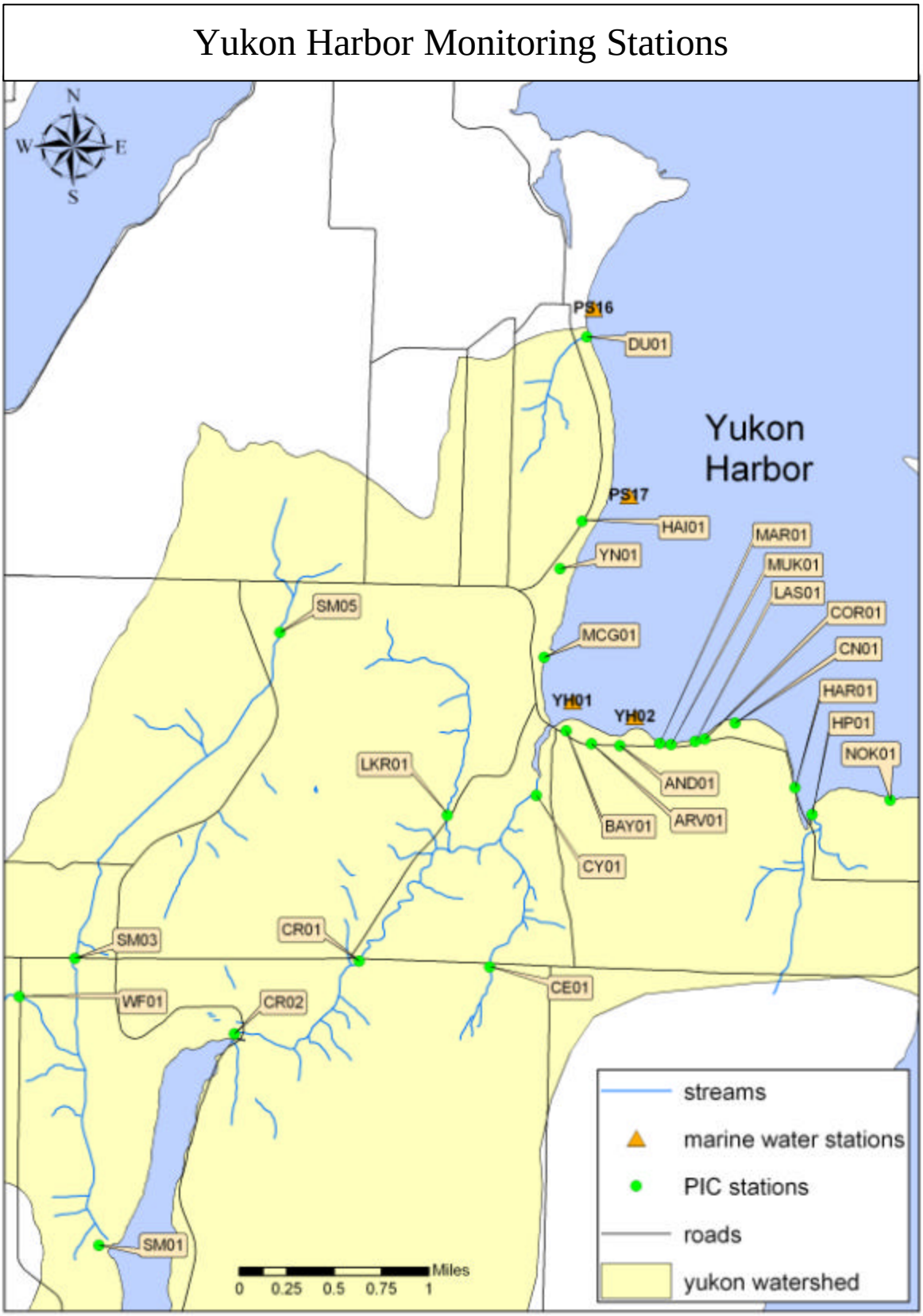
The Health District has conducted trend monitoring of Kitsap County streams and marine waters since January 1996 with SSWM funding. Trend monitoring of the Yukon Harbor Watershed began in October 1997. Monitoring is conducted pursuant to the Health District's Trend Monitoring Plan.

The Health District conducted monthly monitoring of fourteen (14) stations in the Yukon Harbor Watershed during the project period. Please see **Appendix B**. for a list of monitoring stations, and **Figure 3** for their locations. Four trend stations were removed (HP01, MR01, CN01, and YN01) to better utilize resources based on water quality results. These stations were retained for Impact monitoring.

Impact Monitoring

The purpose of Impact monitoring was to characterize FC water quality of watershed segments. Impact monitoring began with semi-monthly sampling of fourteen trend and seven impact monitoring stations in the project area. Additional impact stations were added during the project to facilitate source identification. Sample frequency was adjusted to monthly in 2004 to better utilize resources. Many investigative samples were added to Impact events to assist in FC source locations after water quality data located high FC counts in previous samples. These temporary additional samples were used to further segment streams to help with the FC source investigation and were not recorded in the water quality database. Impact monitoring has been conducted using the same field procedures as set forth for trend monitoring in the Trend Plan.

Figure 3 Yukon Harbor Monitoring Station Map



Best Management Practice Effectiveness (BMPE) Monitoring

Health District staff encouraged voluntary cooperation with KCD and conducted "parcel" monitoring on non-cooperating project area properties having with potential FC sources. Parcel monitoring has been routinely performed during or shortly after rain events. Wet weather increases the likelihood of detecting properties with FC/EC pollution (e.g., inadequate animal waste management practices and failing OSS).

Five sample events are needed to compare drainage to FC standards to determine whether a water quality violation exists. Violations were handled through the Interlocal Agreement Between Kitsap County Health District and Kitsap Conservation District. For a copy of this agreement please see **Appendix D** for KCD's Final Report "Yukon Harbor Watershed Restoration Project" December 2006. Owners choose a Voluntary Compliance Agreement or a Notice and Order to Correct Violation. The Health District enforced violations through the Kitsap County Board of Health "Solid Waste Regulations".

3.4 Educational Activities

The Health District's homeowner/resident OSS survey included a strong educational component to educate property owners about how to properly operate and maintain their OSS, to identify any non-conforming conditions that could cause premature OSS failure, reduce nutrient contamination, and to adequately manage animal waste. Educational brochures and water conserving fixtures were made available to all participants.

KCD provided site-specific water quality recommendations to operators in the farm planning process. They maintained a public relations program to inform landowners about the status of water quality in the watershed and steps taken to improve it. They held several events, including a Heavy Use Area Protection and Waste Storage Facility demonstration at Kitsap Saddle Club. Please refer to **Appendix D** for KCD's final report**.**

Three public meetings were held. The "kick-off" public meeting with Health District and KCD was held October 15, 2003 with more than 100 attending. The Health District presented water quality data showing a FC pollution problem in the Yukon Harbor watershed and explaining the pollution identification and correction process. KCD explained the farm planning process, BMP implementation and cost share opportunities.

A second project "up-date" meeting was held February 22, 2005 with 25 attendees. Both of these meetings contained educational material on septic maintenance. Brochures were made available and questions about septic systems were answered during and after the meetings.

One Health District sponsored educational workshop was conducted on October 29, 2005. This workshop was designed to inform residents about OSS operation and maintenance and nutrient management.

3.5 Well Surveys

Nine drinking water systems in close proximity to Long Lake and Curley Creek were surveyed to attempt to correct high nitrate levels. Each well was inspected for any possible sources of nitrate. This involved inspecting 28 drainfields within the 200' well arc of the nine systems.

4.0 RESULTS AND DISCUSSION

4.1 Yukon Harbor Shoreline Surveys

Six project shoreline surveys were conducted; November 2002, February 2004, July 2005, March 2006, May 2006, and August 2006. The shoreline sampling became the most powerful tool in FC source location along the Yukon Harbor shoreline. Also shoreline surveys were used to determine OSS repair effectiveness.

Sample results from the shoreline surveys located 28 of the 51 project failures. These 28 failures would not have been located without shoreline work. The many and varied flows sampled along the shoreline became a verification of the success of the project. A failing OSS rarely flows at a constant rate, looking for those 'tell-tail" signs and following to a sample location may produce a location that can be sampled at a later date. KCHD staff put a high importance on locating all of the flows possible, even a weak flow because the next time you attempt to sample it could be flowing. Other "tell tail" signs can be matting around a bulkhead pipe, crack or stairs. Culvert location markings on a road might help locate a buried culvert on the beach. An unnatural pile of rocks on the beach can hide an outlet pipe.

Staff experience was also a key ingredient in locating smaller flows. Personal knowledge gained during a shoreline event proved useful when conditions changed and flows moved, or other signs alerted the staff member to a possible source.

An interesting side effect of the extensive shoreline work was the increased familiarity of the Health District staff with the residents who live along the Yukon shoreline. Seeing the Health District actively sampling, photographing, and recording data in field books caused many residents to question the water quality staff and report issues that concerned them. Several of the failures were located by information shared by residents who felt this project was for the good of the community. Shoreline survey work helped residents to understand how upland activities affect the shoreline. Creating and maintaining "good will" with residents of a PIC area is crucial to the overall success of a PIC project. The cooperation of the residents is a valuable source of information.

See **Appendix C** for the complete list of shoreline survey stations and sample results.

4.2 Pollution Identification and Correction – OSS Survey

The pollution identification and correction OSS survey was conducted from May 2003 to August 2006. The project area consisted of 413 parcels, 35 of which were undeveloped leaving 378 parcels to survey. The OSS survey consisted of two parts, an interview with the homeowner that involved a discussion of the existing septic system and its care and operation. The second part was a physical inspection of the system, this involved walking the disposal field, and examining the exposed portions of the system including observation ports, tank covers, transport lines, curtain drains. Then suggesting how the homeowner could improve performance. Often these inspections revealed potential problems such as improper placement of downspouts, damage to a drainfield by parking vehicles over the laterals, or unwanted growth of blackberry and tree roots that could plug the disposal lines.

Many of the surveys required additional inspection due to conditions that were suspect of a failing OSS. These "suspect" systems might require laboratory samples of surface water and dye testing the OSS. A system with suspect conditions such as a saturated drainfield or a failed dye test with high FC counts, received a rating of "suspect" and the homeowner was encouraged to take the necessary steps to improve the operation of the OSS. When an OSS received a rating of "non-conforming", such as non-permitted repairs or alterations, or additional bedrooms added to the home, the homeowner was informed of the issues and how they would effect the OSS operation. The homeowner was informed of the necessary steps to resolve the issues.

Suspect and non-conforming systems found during this project were recorded without corrective enforcement. Health District records were flagged to keep a record of the issue.

OSS Survey Results

- A project total of 51 OSS failures (15%) were found.
- A project total of 15 suspect OSS (5%) were found.
- A project total of 16 non-conforming OSS (5%) were found.
- A project total of 102 "no records" OSS (31%) were found.
- A project total of 151 "no apparent problems" OSS (45%) were found.

Agricultural BMP Results

- The number of high priority sites dropped from 22 to 4 during the course of this project due to improved livestock and pasture management or BMP implementation. Seventeen of the original 22 sites were visited by KCD and eight signed KCD Cooperator Agreements. Twelve lower priority landowners signed Cooperator Agreements.

- KCD implemented BMPs on ten of the 22 high priority sites. Seven of these received cost share funding and were reimbursed a total of $68,917.21 in incentive program

funds including USDA EQIP, Washington Conservation Commission Livestock Grant and KCD Implementation grants.

- KCD secured total cost share funding totaling $95,729.22 that was distributed to nineteen landowners in the watershed. $61,375.00 of this amount was the result of KCD's innovative "Super Sign-up Friday" where selected landowners were invited to an application workshop for new grant money that became available for Animal Feeding Operation / Confined Animal Feeding Operation (AFO / CAFO) sites.

- KCD staff made 117 site visits to 30 watershed landowners.

- KCD developed 10 Farm Plans and provided landowners with 38 United States Department of Agriculture (USDA) – Natural Resource Conservation Service (NRCS) BMP design packets. Ten of these were alternative BMPs - four of which installed Low Impact Development Eco-Grid Heavy Use Area protection.

Co-operation between KCD free technical assistance and cost share and Health District enforcement has, once again proven to be an effective approach to correcting FC violations within a watershed.

4.3 BMP Monitoring

Three failures were located on parcels adjacent to impact monitoring stations. Sample results for these locations offered an opportunity to view a large sample set "before and after" the repair. **Table 1** summarizes these three stations.

Table 1 Summary of Pre and Post Correction at MR01, MCG01, and NOK01

Station I.D.	Before Correction GMV FC / 100ml (# of samples)	After Correction GMV FC / 100ml (# of samples)	Type of correction
MR01	396 (10)	33 (34)	OSS replacement, ATU to Gravity
MCG01	1139 (9)	162 (35)	OSS replacement, Glendons
NOK01	344 (22)	192 (22)	OSS replacement, ATU to Gravity

The Health District conducted parcel monitoring on project area parcels ranked as high priority by KCD. Parcel monitoring was not conducted on parcels where the property owners volunteered to implement BMPs in conjunction with KCD. KCD staff worked with owners to lower the priority rating of these properties. In 2003 there were 10 sites rated with a priority 1, and 12 with a priority 2. By October 2006 KCD had succeeded in lowering the high priority parcels with "potential to pollute" to 3 parcels with a priority 1, and 1 with a priority 2.

Parcel monitoring was challenging in this watershed due to weather conditions during the project, which were predominantly very dry or very wet. This left limited opportunities to collect representative surface water flows. Extreme wet conditions and topography made it difficult to collect samples pursuant to the Trend Plan monitoring protocols.

Of the four high priority parcels remaining, one was investigated and is not a FC source. Neighboring property owners of two of the others were reluctant to grant access to sample water flowing onto their property. The remaining parcel is upgradient of a tangled wooded wetland that is difficult to access in the best of conditions.

4.4 Water Quality Monitoring

Trend Monitoring

Trend monitoring has been conducted in the Yukon watershed since October 1997. Several new trend stations were added in June 2003 in preparation for the Yukon PIC. Both the historic locations and the new additions helped to understand the upland watershed streams and their condition as they flow to the shore. Near shore marine water samples are included in the monitoring data. A summary of the fresh and marine water results are in **Table 2** and **Table 3** listed below.

Table 2 Freshwater Trend Monitoring (FC) results 6/01/2002 to 8/22/2006

Station	Number of samples	Range (FC/100ml)	GMV (FC/100ml)	# Samples > 100 FC/100ml	% Samples >100 FC/100ml	Meets FC Standard?
CR01	48	2 - 900	31	8	17%	NO
SM01	47	<2 - ≥1600	29	5	11%	NO
SM05	47	<2 - ≥1600	27	12	26%	NO
DU01	44	<2 - ≥1600	28	8	18%	NO
CY01	41	4 – 1600	39	7	17%	NO
MR01*	8	11 – 500	105	4	50%	NO
CN01*	8	30 - ≥1600	272	6	75%	NO
HP01*	10	8 – 1600	96	4	40%	NO
YN01*	8	4 - 1600	66	3	38%	NO
CR02	44	<2 - ≥1600	17	4	9%	YES

* Trend stations added during the Yukon PIC

Table 3 Marine Water Trend Monitoring (FC) results
6/01/2002 to 8/22/2006 last 30 samples

Station	Number of samples	Range (FC/100ml)	GMV (FC/100ml)	# Samples > 43 FC/100ml	% Samples > 43 FC/100ml	Meets FC Standard?
PS16	30	<2 – 500	3	1	3%	YES
PS17	30	<2 – 30	2	0	0%	YES
YH01	30	<2 – 130	3	2	7%	YES
YH02	30	<2 - 50	3	1	3%	YES

Trend Analysis

Statistical analysis of FC data was performed on the three fresh water streams flowing to the Yukon Harbor shoreline. The 2005 Trend report listed Curley Creek, Duncan Creek, and Salmonberry with improving trends. These streams met state water quality standards for water year 2005.

For a trend to be significant the p-value for the Seasonal Kendall Test statistic must be less than 0.05 and the 12 monthly Kendall Tests must be homogeneous with a common trend. If the Seasonal Kendall Test statistic is significant, the magnitude of the trend is given by the Kendall Slope. A negative slope corresponds to an improving condition; a positive slope corresponds to a worsening condition. The Kendall Slope is only provided if there is a significant trend. Kendall Seasonal z-value is provided only if the monthly tests show a homogeneous and common trend.

Table 4 Fresh Water Trend Analysis (FC) results

Colvos Passage/Yukon Harbor Watershed **Fresh Water Seasonal Kendall Trend Results through Water Year 2005-2006** **Un-shaded rows: Long Term Trend** **Shaded Row: 3-Year Trend**															P-Value		Z-Value (P-Value)	Trend?	Kendall Slope
Station	Earliest Date	n	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	c^2_{Homo}	c^2_{Trend}	Kendall Seasonal		FC / Month
CY01	12/10/02	43	2	-1	-3	-4	3	-1	-2	0	3	-1	3	-4	0.289	0.957		No	
DU01	3/13/02	49	2	0	-6	-6	-1	-3	3	-3	1	0	5	-1	0.343	0.597		No	
SM01	3/13/96	108	-2	0	7	-13	-7	-3	-1	-7	-12	2	-3	-13	0.954	0.097		No	
SM01	10/16/03	34	3	1	-2	1	-1	0	0	-1	0	-3	1	-3	0.439	0.483		No	

c^2_{Homo} Bold Print indicates homogeneous trends across seasons ($p>0.05$)

c^2_{Trend} Bold Print indicates a common trend ($p<0.05$) and is only valid if seasonal trends are homogeneous

Kendall Seasonal Bold Print indicates a significant trend and is only valid if seasonal trends are homogeneous and common
Kendall Slope only has meaning if the seasonal trends are homogeneous and significant.

Figure 4

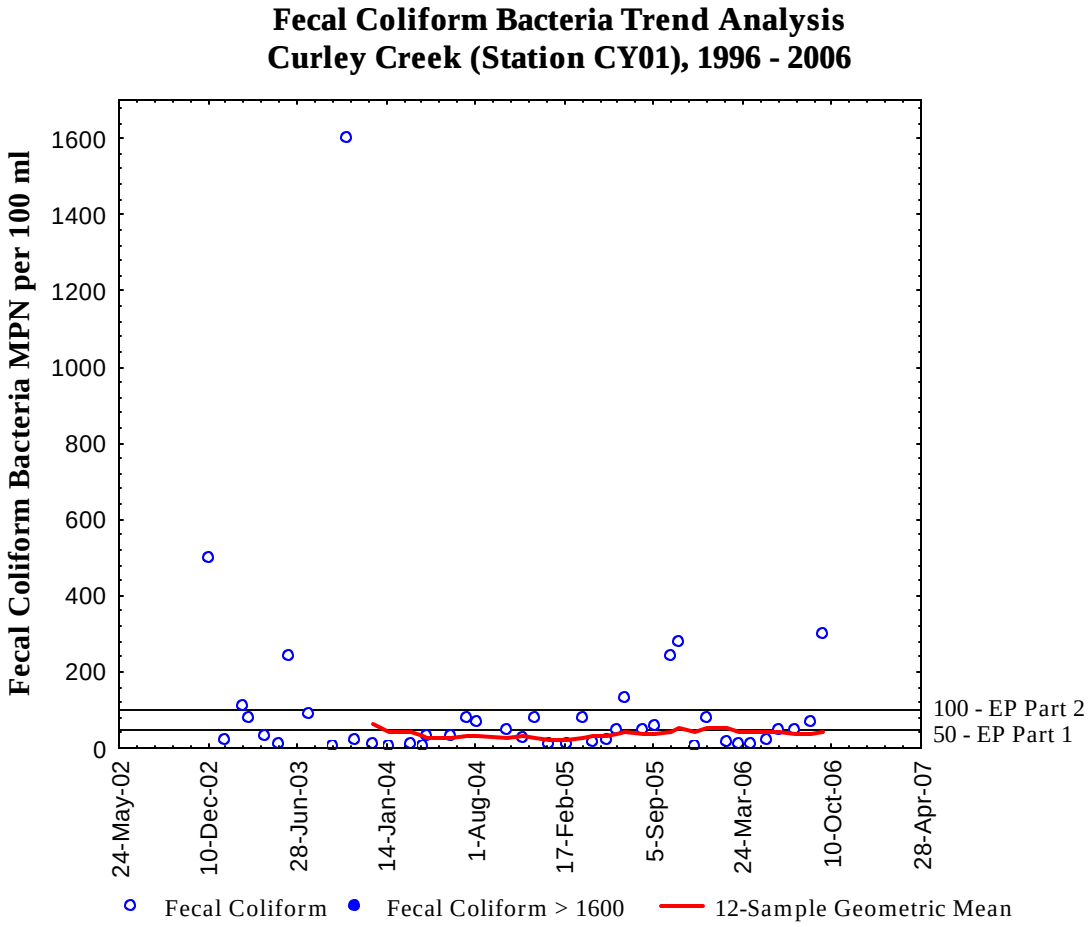

Fecal Coliform Bacteria Trend Analysis
Curley Creek (Station CY01), 1996 - 2006
Fecal Coliform Bacteria MPN per 100 ml
1600
1400
1200
1000
800
600
400
200
0
24-May-02
10-Dec-02
28-Jun-03
14-Jan-04
1-Aug-04
17-Feb-05
5-Sep-05
24-Mar-06
10-Oct-06
28-Apr-07
100 - EP Part 2
50 - EP Part 1
Fecal Coliform
Fecal Coliform > 1600
12-Sample Geometric Mean

Figure 5

Fecal Coliform Bacteria Trend Analysis
Duncan Creek (Station DU01), 1996 - 2006

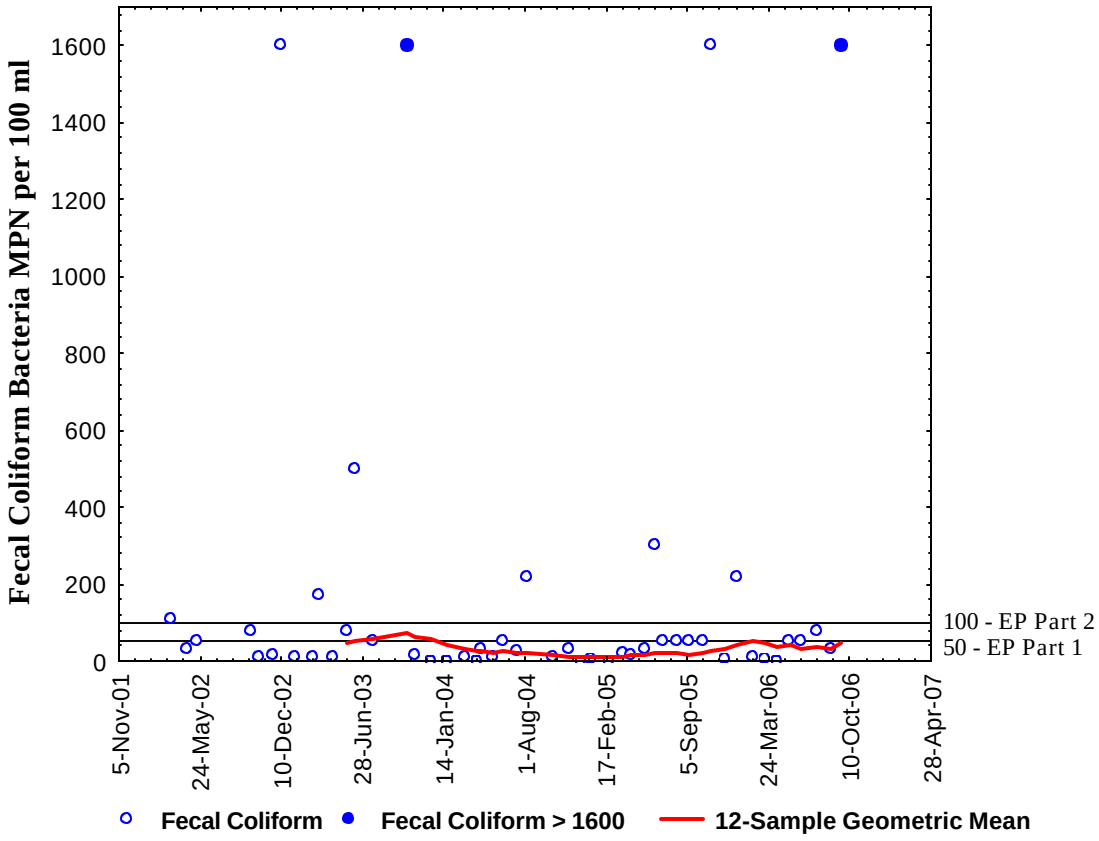
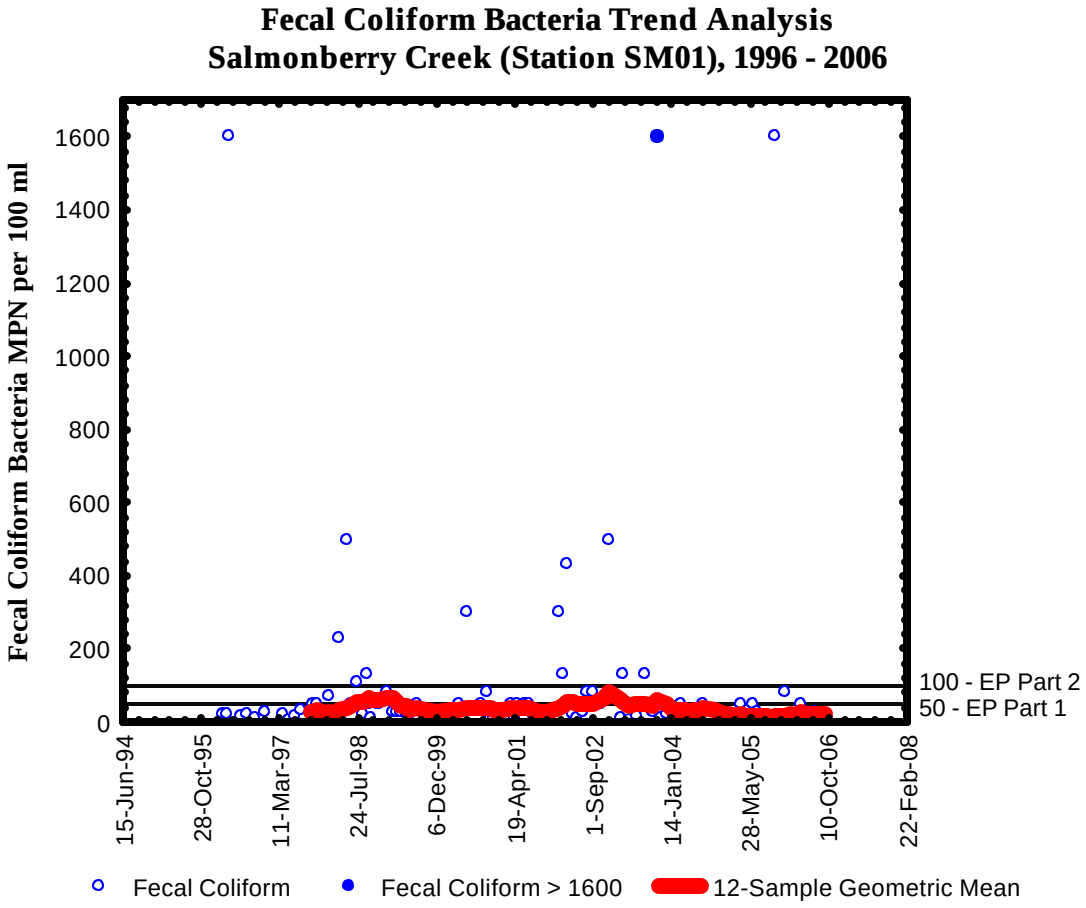


Figure 6



Trend FC and rainfall correlations

Trend monitoring data was analyzed for correlation of FC and previous 24, 48 and 72-hour rainfall depths. Data collected during the project period of January 2003 through August 2006 were selected. FC and rainfall for all previous rainfall depth periods at CR01, CR02, SM01, SM05, DU01, and CY01 showed weak insignificant correlations for 72 hour rainfall depths, ranging from –0.007 to 0.082. However there was significant improvement when using the 24 hours rainfall depths where the mean correlation was 0.738. See table **5** below for the results.

Table 5 Correlations of FC trend data and rainfall

Station	72 hour rainfall	48 hour rainfall	24 hour rainfall
CR01	**-0.0120**	**0.730**	**0.735**
CR02	**-0.0073**	**-0.035**	**0.210**
CY01	**-0.0370**	**0.019**	**0.814**
DU01	**-0.0730**	**0.506**	**0.880**
SM01	**-0.0450**	**0.541**	**0.911**
SM05	**0.0820**	**0.542**	**0.876**

Impact Monitoring

Freshwater Impact monitoring of the Yukon Harbor watershed began in June 2003, it evolved from 20 sample locations to 24. Fifteen of the stations were located along the shoreline. During the project 45 impact monitoring events were conducted. The geometric mean of each station is shown in **Table 6**

Table 6
Impact Monitoring (FC) results
6/5/2003 to 8/22/2006

Station	Number of Samples	Range (FC/100ml)	GMV[1] (FC/100ml)	# Samples >100 FC/100ml	% Samples >100 FC/100ml	Meets WQ Standard[2]
CR01	45	2-1600	50	14	31%	NO
SM01	45	2-1600	44	12	27%	NO
SM05	44	2-1600	57	16	36%	NO
WF01	45	2-1600	67	20	44%	NO
DU01	45	2-1600	53	17	38%	NO
CY01	42	4-1600	52	12	29%	NO
MR01	44	2-1600	58	17	39%	NO
CN01	45	<2->1600	357	35	78%	NO
HP01	39	11- 1600	99	17	44%	NO
YN01	45	2- 1600	82	21	47%	NO
CR02	45	2- 1600	28	3	7%	YES
SM03	41	4- 1600	55	12	29%	NO
BAY01	36	2- 1600	19	7	19%	NO
ARV01	44	<2- 1600	50	13	30%	NO
MCG01	44	4- 1600	242	31	70%	NO
LAS01	44	<2-1600	19	7	16%	NO
HAR01	44	2-1600	74	18	41%	NO
NOK01	44	13->1600	257	35	80%	NO
LKR01	45	6-1600	126	24	53%	NO
CE01	45	2-1600	37	14	31%	NO
AND01	44	<2-1600	27	14	32%	NO
COR01	35	2-900	14	6	17%	NO
HAI01	32	2->1600	59	18	56%	NO
MUK01	29	8-1600	86	12	41%	NO

4.5 Educational Activities

Educating homeowners on proper septic system operation and maintenance was a primary focus of the Yukon Harbor Project. Health District staff provided homeowners with educational brochures and a copy of the sewage disposal permit/as-built on file at the Health District for their home. Health District staff emphasized to homeowners that proper operation and maintenance is crucial to prevent premature septic system failures and protect water and shellfish quality along the Yukon Harbor shoreline.

During the OSS inspection, the Health District staff shared site-specific ideas on how to get the most life out of the system. Any practice that might degrade the performance was pointed out, with possible solutions.

On October 29, 2005 the Health District held a homeowner septic workshop where the homeowner had an opportunity to seek help on specific issues that they felt hindered the performance of their OSS.

Community outreach played a key role in KCD's efforts to encourage landowner participation in Yukon Harbor. A public relations program was maintained to inform landowners about the status of water quality in the watershed and the steps taken to improve it. Agricultural and natural resource education programs were also developed as a tool to help landowners minimize the negative impacts of agricultural practices on the environment. Nine workshops were offered to Yukon Harbor landowners at various locations throughout south Kitsap County (see **Appendix D)**. Several events, including the Heavy Use Area Protection and Waste Storage Facility demonstration, were held at the Kitsap Saddle Club. KCD introduced and installed Eco-Grid, gravel, and hog fuel to demonstrate alternative mud management surface treatments for use in horse paddocks. Eco-Grid is a low impact development plastic grid system that is marketed as a permanent solution to muddy paddocks, allowing better animal waste management.

4.6 Well Survey

Surveys were conducted at nine well systems located within the Yukon Harbor / Colvos Passage watershed. These well systems had nitrate levels at or above Kitsap's 2.5 mg / L "trigger" point. Septic systems were not found to contribute to the high nitrate levels in these problem wells, however several of these wells had signs of high fertilizer use near the wellhead. One water system (King's Glen) has denied Health District access to the well yet they have submitted two water samples. The three most recent nitrate samples for each well can be found in **Table 7** below. See **Appendix E** for the survey results for each well system.

Table 7 Nitrate Results for the Yukon Harbor Well Samples

System Name	Date / Nitrate-N	Date / Nitrate-N	Date / Nitrate-N
Bliss Water system	Jun 1994 / 4.00	Aug 2006 / 1.03	
John Cameron Water	Mar 2005 / 5.99	Sept 2005 / 3.29	Mar 2006 / 6.63
Feddock Water	Jul 2001 / 2.80	Mar 2004 / 2.00	Aug 2006 / 2.77
Greenshore Home	Feb 1999 / 0.60	May 2003 / 0.62	Aug 2006 / 1.08
Homer Wiley Water	Sept 1997 / 2.70	Feb 2000 / 2.54	Aug 2006 / <0.50
King's Glen	Aug 1998 / 3.51	Feb 2005 / 1.17	
King Road Water	Jul 2005 / 4.08	Aug 2005 / 4.77	Jan 2001 / 3.78
Long Lake Manor	May 1999 / 2.80	Jun 1999 / 2.68	Apr 2005 / 3.33
Overra Road Water	Jun 2005 / 2.50	Oct 2005 / <0.20	Aug 2006 / 1.60

4.7 Analysis of Failures

A total of 51 failing septic systems were located during the Yukon PIC. These failures were located from different activities designed to maximize the potential for FC source location. Shoreline surveys located 28 failures, parcel survey / inspection located 6 failures, impact monitoring found 3, and 14 were located by responding to complaints called in by local residents.

Of the 51 systems that were proven to be failing 36 are repaired. Six are involved in a "phased" repair process and currently not failing. Another 6 are currently vacant pending repairs, and 3 are still failing. One of the three failing systems will be connected to LID #8 by February 1, 2007, another is pending the install of the new system but not discharging sewage to the surface, and the 3rd is on a pump-out order until the failing system has been repaired.

The locations of failures are shown in **Table 8** below.

Table 8 "Yukon PIC Failure locations"

Long Lake area	5
Yukon Harbor Shoreline	36
Upland with a direct discharge to Yukon shoreline	5
Upland	3
Curley Creek	1
Salmonberry Creek	1

Factors that have affected the failures found during this project are typical of other surveys. The age of the system, poor soil types, proximity to surface waters, high water table, stormwater, and tidal effects, have all contributed to the high number of failures found during this survey.

Failures along the Yukon shoreline tended to be "grouped" which seems to indicate multiple site-specific conditions such as ground water levels, soils or terrain have created areas that are challenging for proper septic operation. On Cornell Road, five parcels failed within a six-parcel block. The surface of Cornell is just above the extreme high water mark and forms a division between the water and the homes found along its length. On Cornell, the failure-to-area connection is a combination of older (pre 1970's) drainfields placed in fill on the shoreline side of the homes. These drainfields were located where the high tide mark is 1-3 degrees below the yard. Taking into account that most of these systems had septic tanks buried 1-2 feet deep and all operating on gravity, it is easy to understand the negative effect tidal actions would have on these systems. The Cornell failures were also affected by high ground water due to their location below a hillside known for many natural springs along the hill.

On the northern section of the project, along Colchester, a group of four failures were clustered together. They share common connections with the Cornell area. Three of the four had their drainfields installed into fill and were located 20-30' from a bulkhead

causing adverse tidal effects. All four were installed prior to 1960 and an over abundance of storm water runoff from the road above. The soil is poor and these parcels do not have the depth of soil required to allow for proper operation of a gravity system.

Yukon Harbor Drive also had a cluster of four properties. Two failed and the others were non-conforming due to having been altered without permits in the past. These systems share the same adverse conditions as the other two clusters. The drainfields were located in fill behind bulkheads, installed pre-1960's, and each parcel struggled with heavy storm water runoff entering the lot.

Many of the additional failures found throughout the Yukon Harbor PIC area have proven to share the same combination of stress factors as the OSS failures mentioned above. While the degree and number of stress factors on the OSS will affect its longevity, hydraulic overload due to ground water has been a factor in most of the failures. Indications of this were found during inspections and interviews involving the failures. Homeowners complained about the rush of water down their driveway during storm events, of the need to install sump pumps under their homes, and sharing comments of the wet mushy conditions of their lawns throughout the year. Development of the Yukon shoreline began when gravity systems were the standard, now many of these gravity systems are at or exceeding their life expectancy. Results from this PIC survey supports alternative OSS as a needed replacement from the gravity OSS. As the remaining gravity systems are replaced with alternative OSS the water quality along the shoreline will continue to improve.

The methods used to repair the failures helps to create some understanding of conditions along the Yukon Harbor shoreline. Current regulations are designed with a better understanding of OSS than what existed when the Yukon began to develop. The low number of gravity repairs installed is a strong indication that the area has adverse conditions for septic system operation. Alternative systems, such as pressure systems, with or without pre-treatment are more suited to the conditions along the Yukon shoreline. **Table 9** below lists the methods used in septic repairs.

Table 9 "Method of Repairs"

Alternative OSS	29
Standard Gravity or pump to Gravity	3
Homeowner minor repair permit	12
LID #8	3
Vacate the residence with a database flag	4

Note that nearly one quarter of the repairs were accomplished with the Health District minor repair permit which streamlines the process for certain repairs. These 12 OSS were likely progressing toward premature catastrophic OSS failure, which was prevented through proactive education.

PIC projects raise the awareness and understand of septic systems throughout a project area. With the information given in meetings and during surveys, homeowners often view their OSS for the first time as an asset that must be maintained, or a liability if it is

not used or maintained properly. One common effect of this increase in knowledge is a desire to form a sewer district in their area. During this project a group of 36 homeowners on Miracle Mile formed LID #8, an extension to the existing sewer located on the north end of the project boundary. Three of the failures located during this project will connect to LID #8 as their repair option. LID #8 will be completed by December 2006.

There also is an attempt to form LID #9, which plans to further extend the Manchester sewer to the northern edge of Cole Loop. This extension would include the shoreline side of Colchester drive and Yukon Harbor road to Cole Loop and cover 81 parcels. All of the designated area included in LID #9 is within the Yukon PIC boundary. Within the purposed boundary of LID #9 the PIC survey located 19 failures. The success of this LID is uncertain. A map of LID #8 and #9 in included in **Appendix F**

5.0 CONCLUSIONS

The findings of the Yukon Harbor watershed restoration Project were:

- The Yukon Harbor area is an older residential area where most of the parcels were platted and developed prior to existing OSS regulations. The natural physical conditions of the area, primarily the surface and ground water conditions and the soil types and depths, are not conducive for the utilization of "standard gravity" OSS. Development of the surrounding upland parcels has increased the runoff to the shoreline parcels, further degrading the ability of the area for OSS operation.

- The final OSS failure rate was 15% (51 failures) within the Yukon watershed. Forty-one of these were located on shoreline parcels.

- Shoreline homes with failing OSS discharge quickly onto the shore, repairs on these systems resulted in immediate shoreline improvement, as seen in **Table 4**.

- The majority of the repairs conducted were on older systems installed when the existing regulations allowed drainfield placement in conditions now known to be problematic. The Yukon PIC surveyed 30 gravity OSS that were 30 years or older, and placed in challenging conditions yet passed the survey inspection and or dye tests. As these older gravity OSS are replaced by alternative OSS the failure rate should decline.

- KCD's efforts to improve livestock and pasture management and implement BMPs resulted in reducing the number of high priority agricultural sites in the watershed from 22 to 4. Nearly half of the parcels implemented BMPs and one third received cost share funding. Patience, educational mailings, public meetings, financial incentives, coordination with the Health District and follow-up were key ingredients to success in the watershed.

- KCD assisted landowners with the application process, BMP design and installation for federal, state, and local incentive programs, providing Yukon Harbor cooperators with nearly $100,000 needed to implement BMPs.

6.0 RECOMMENDATIONS

Based upon the conclusions of the Yukon Harbor Watershed Restoration Project, the Health District's Water Quality Program offers the following recommendations.

- The Health District encourages the residents to approve LID #9, the purposed sewer extension on Colchester Drive and Yukon Harbor Road. This extension will remove 81 OSS from shoreline parcels.

- The Health District will continue to work on correcting all failing OSS identified during this project. This will involve re-inspecting the 12 parcels repaired with a phased plan, and the 4 parcels vacated in lieu of a repair. The remaining 3 failures will involve one connection to LID #8 by February 2007, a possible enforcement that may involve legal action to force a repair, and currently one of the failures is on a pump-out order until legal property ownership issues can be resolved.

- The Health District will continue to be involved in the Yukon Harbor Shoreline. Involvement will be through complaint response, Trend monitoring, and follow up of O&M reports submitted to the District.
- Local residents are encouraged to continue to be proactive in OSS maintenance; those with alternative OSS will receive a yearly report on the condition of their system.

- The Health District recommends conducting future shoreline surveys to continue to maintain the improvements gained by the Yukon PIC. The older gravity OSS still operating along the shoreline will continue to fail. Upgrading these older systems to alternative OSS with O&M contracts will correct the existing failure and add another level of protection in the form of the yearly inspections.

- All of the fifteen shoreline impact drainages continue to fail Water Quality FC standard; most fail both part one and part two. Accounting for the upland impact on these small drainages will require additional PIC work beyond the scope of this project.

7.0 REFERENCES

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Bremerton-Kitsap County Health District, Ordinance 2000-6, "Solid Waste Regulations" August 2000

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Bremerton-Kitsap County Health District, Trend Water Quality Monitoring Plan 2003

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Kitsap County Health District. Manual of Protocol: Fecal Coliform Bacteria Pollution Identification and Correction Projects, 2003.

Kitsap County Health District. Yukon Harbor Watershed Restoration Quality Assurance Project Plan, May 2003.

Washington State Department of Ecology. Chapter 173-201A of the Washington Administrative Code Water Quality Standards for Surface Waters of the State of Washington, 1992.

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Washington State Department of Natural Resources, Soil Survey of Kitsap County Area, Washington, 1980.

APPENDIX A

CRITERIA FOR RATING ON-SITE SEWAGE SYSTEM SANITARY SURVEY RESULTS

APPENDIX A

CRITERIA FOR RATING OSS INSPECTION RESULTS

Rating Classification	Criteria for Meeting Classification[1]
No Apparent Problems[1]	• **Completed/signed** Sewage Disposal Permit on file at Health District, or available from owner. • No illegal repairs or alterations have been performed on OSS. • All applicable setbacks and conditions in effect at the time of permitting are in place.
No Records[1]	• No **completed/signed** Sewage Disposal Permit on file at the Health District, or in possession of the owner / occupant . • No Non-Conforming, Suspect or Failure criteria were observed .
Non-Conforming[2]	• Repairs or alterations have been performed on OSS without a permit • Additional bedrooms have been added to the home (or business) without a permit. • Non-conforming conditions exist (such as insufficient setbacks from surface waters or wells, no reserve area, vehicular traffic on drainfield).
Suspect[2]	• Drainfield area is saturated. • Collected water sample results from bulkhead drains, curtain drains, or other pipes or seeps, at or above 500 FC / 100 ml. **and** negative dye-test. • Collected water sample results from bulkhead drains, curtain drains, or other pipes or seeps, less than 500 FC / 100 ml. **and** positive dye-test.
Failure [2, 3]	• Sewage backing up into, or not draining out of a structure caused by slow soil absorption of septic tank effluent. • Sewage leaking from a septic tank, pump tank, holding tank, or collection system. • Surfacing sewage in a documented drainfield area. • Collected water sample result from bulkhead drains, curtain drains, or other pipes or seeps, at or above 500 FC / 100 ml. **and** positive dye-test results. • Straight discharge (gray or blackwater) from any indoor plumbing is observed and documented.

[1] All of the criteria in each rating classification must be met.

[2]One of the criteria must be met.

[3] As defined in the Kitsap County Board of Health Rules and Regulations Governing On-Site Sewage, 1996-8.

APPENDIX B

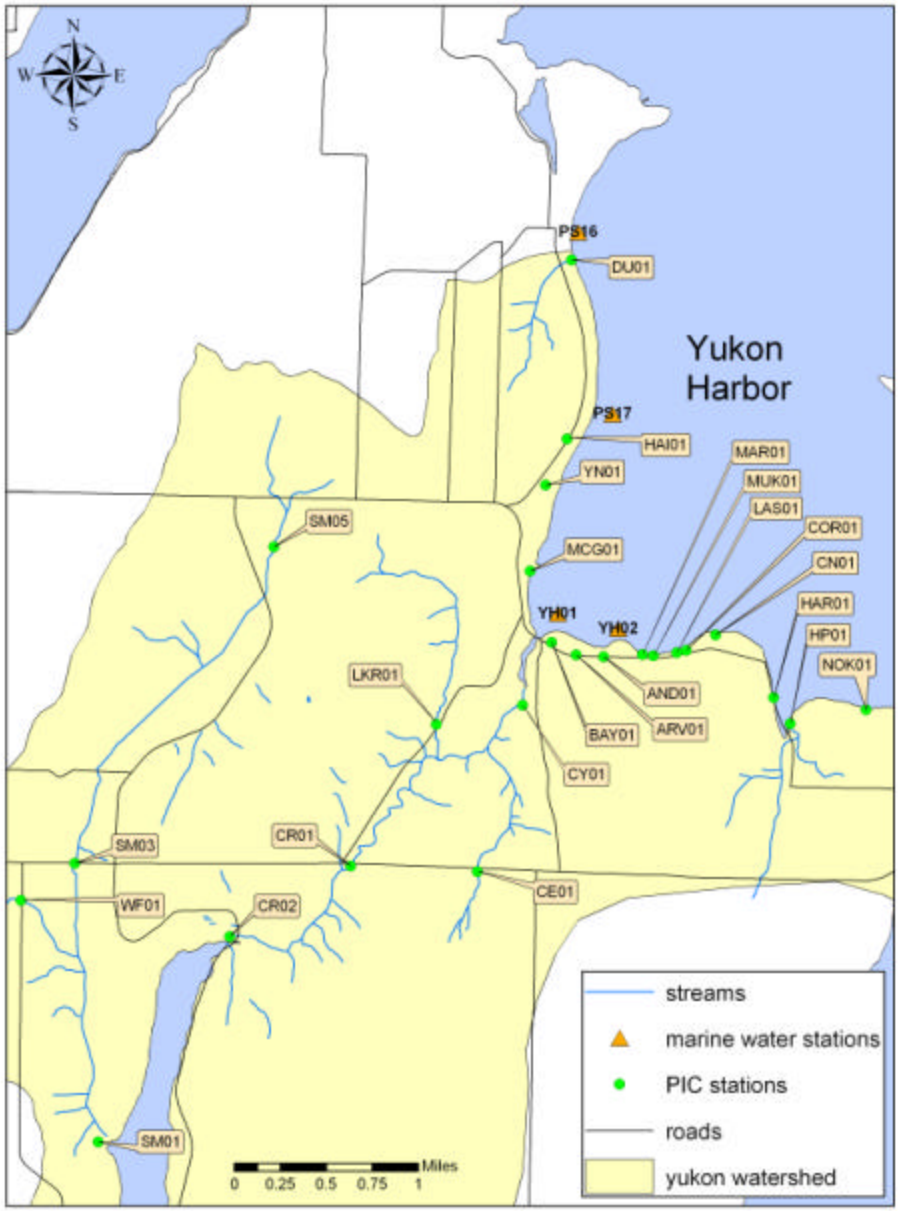
MONITORING STATION LISTS AND MAPS

Yukon Harbor Watershed Monitoring Station Location Descriptions

Freshwater Sampling in Colvos Passage / Yukon Harbor Watershed

	Station ID	Water body	Type	Location Description	GPS Coordinates
1	WF01	Salmonberry Creek	Impact	Phillips Road crossing south of Sedgwick, Upstream side	47.50215; 12260582
2	SM03	Salmonberry Creek	Impact	Salmonberry Road crossing btwn Melton and Creek View Rds (west of Long Lake Rd), Downstream side	
3	SM01	Salmonberry Creek	Trend/Impact	Clover Valley Road culvert near 7721 (s of PFA), Upstream side	47.48435; 122.59513
4	CR02	Curley Creek	Trend/Impact	Long Lake Rd. Bridge at lake outflow at 5521, Upstream side	47.49915; 122.58053
5	CR01	Curley Creek	Trend/Impact	Sedgwick Rd Bridge east of Locker Rd near 6412, Upstream side	47.50516; 122.5677
6	CE01	Curley Creek	Impact	Road crossing at Sedgwick west of Anderbar near 4914	47.50520; 122.55229
7	NOK01	Nokomis/Olympiad Stream	Impact	Olympiad Rd culvert near Nokomis (cable crossing) On beach	47.51811; 122.50771
8	HP01	Harper Creek Estuary	*Trend/Impact	Southworth Dr/Olympiad, Upstream of tidal influence	47.51575; 122.51645
9	HAR01	Harper Hill Stream	Impact	Southworth Dr at Harper Hill stop sign, Upstream culvert	47.51937; 122.59101
10	CN01	Cornell Stream	*Trend/Impact	9452 Cornell Dr Stream at beach	47.52398; 122.5255
11	COR01	Cornell Stream	Impact	Corner of Cornell and Southworth Dr.	47.52265; 122.52880
12	LAS01	Lasada Lane Stream	Impact	West of Lasada, Flow on beach past hydrant, Across from 9140 Southworth (west of Cornell)	47.52237; 122.52977
13	MUK01	Southworth Stream	Impact	Midway between Marjorie & Lasada from gully to beach	47.52207; 122.53229
14	MR01	Marjorie Lane Stream	*Trend/Impact	Marjorie Lane Pipe on beach	47.5221; 122.53403
15	AND01	Anderson Rd Stream	Impact	8587 Southworth west of Anderson Rd Upstream in yard	47.52232; 122.53834
16	ARV01	Arvick Road Stream	Impact	West of Arvick Rd 8364/8371 Southworth, Upstream in yard by woodpile	47.52207; 122.54133
17	BAY01	Bay Street Stream	Impact	Bay Street/Southworth culvert by stop sign (Also below Glendons)	47.52307; 122.54464
18	CY01	Curley Creek	Trend/Impact	Access Rd at 3535 Banner Rd Site address 7650 Martin Ln Walk thru pasture and down logging rd to stream	47.51667; 122.54001
19	LKR01	Curley Creek	Impact	Road crossing at Locker just past 3489 Locker, Upstream	47.51600; 122.55770
20	MCG01	McGregor St Stream	Impact	Yukon Harbor Dr culvert north of McGregor Rd	47.52883; 122.54709
21	YN01	Yukon Harbor Stream	*Trend/Impact	Yukon Harbor Dr/Cole Loop, Upstream culvert 1475 Yukon Harbor	47.53563; 122.54562
22	HAI01	Colchester Stream	Impact	Se. Haida Dr. drainage under Colchester to beach	47.54060; 122.54203
23	DU01	Duncan Creek	Trend/Impact	Access just before 8174 Hemlock St, Downstream of culvert	47.55298; 122.5442
24	SM05	Salmonberry Creek	Trend/Impact	Howe Farm culvert Long Lake Rd, Walk in to upstream culvert	47.53025; 122.57763

*These stations were dropped from Trend monitoring in February 2003, they were retained as Impact Monitoring.


N
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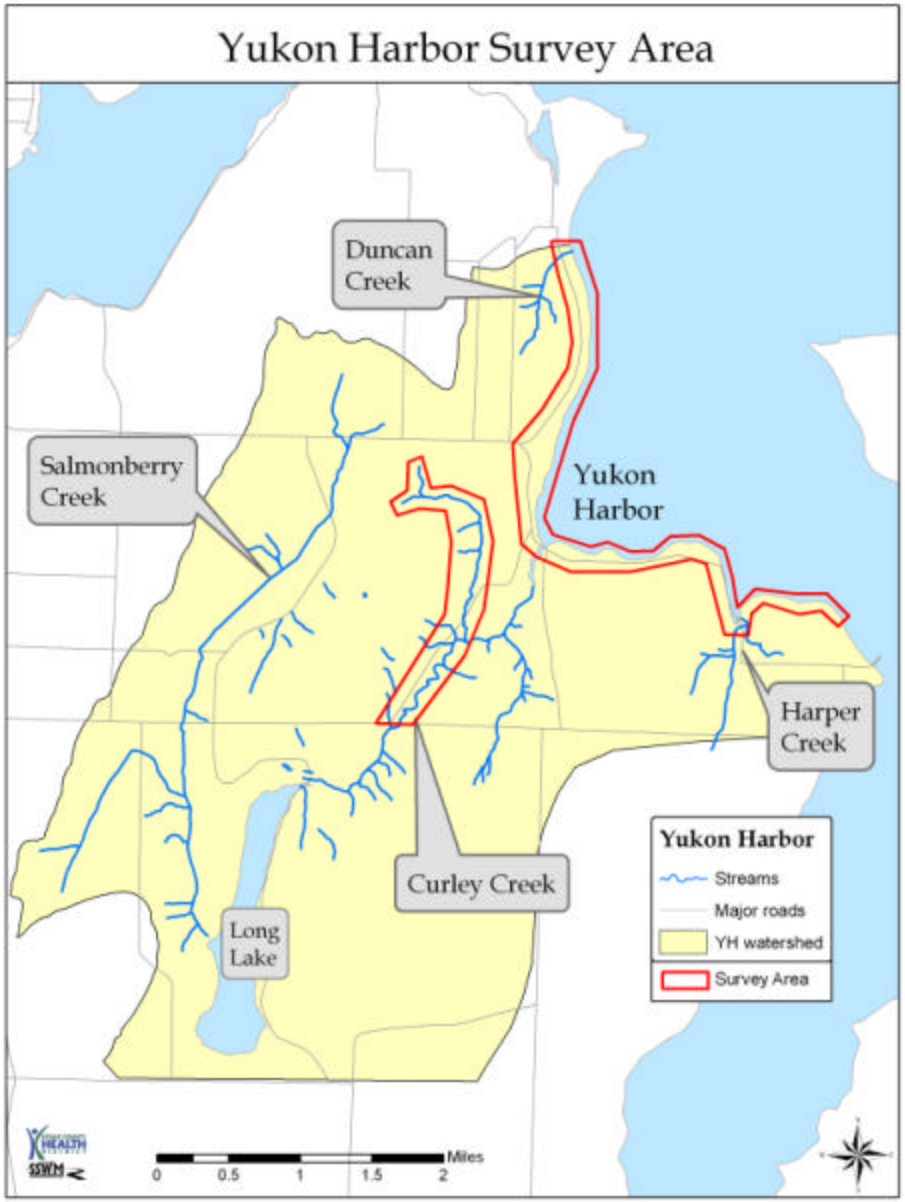
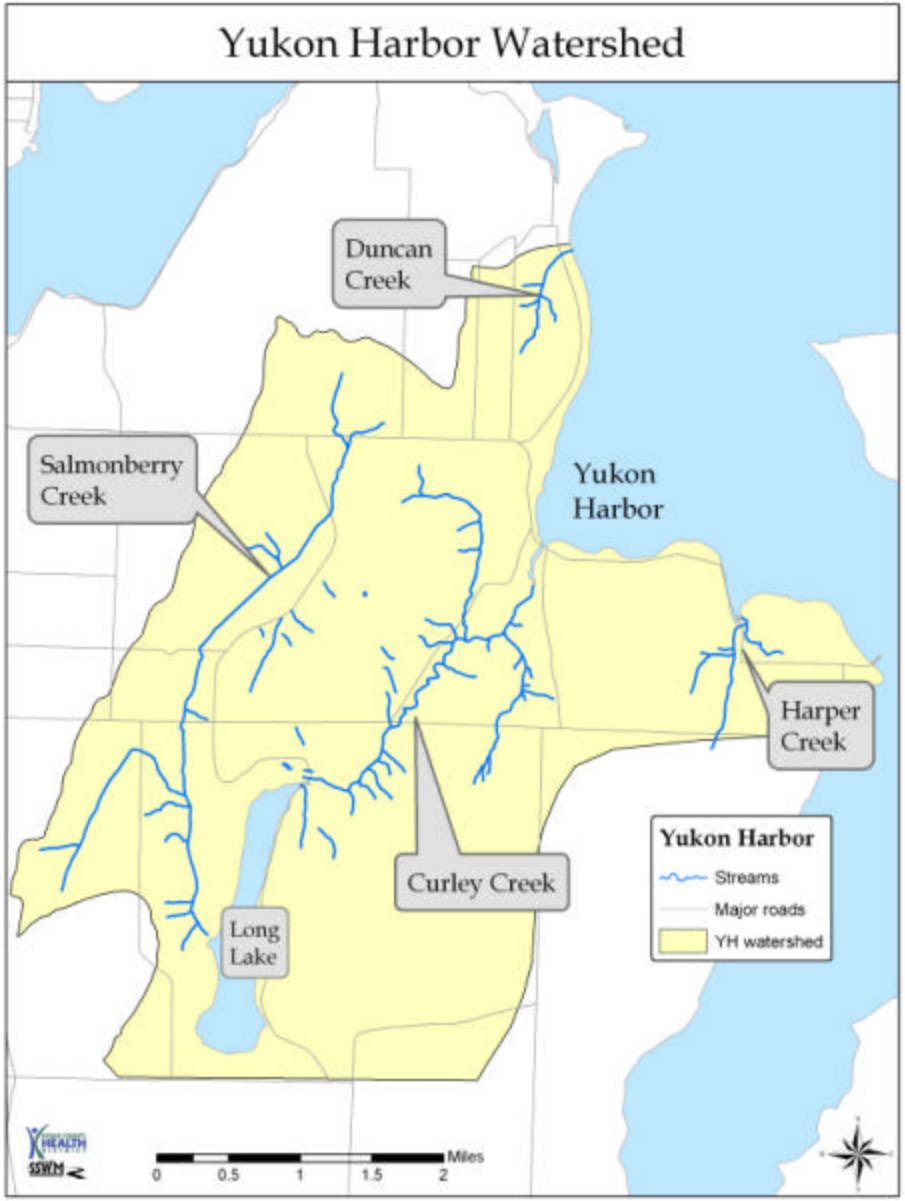
PS17
HAI01
YN01
MAR01
MUK01
LAS01
COR01
CN01
HAR01
HIP01
NOK01
SM05
MCG01
YH01
YH02
LKR01
AND01
BAY01
ARV01
CY01
CR01
SM03
CE01
WF01
CR02
SM01
0 0.25 0.5 0.75 1
Miles
streams
marine water stations
PIC stations
roads
yukon watershed


Yukon Harbor Survey Area
Duncan Creek
Salmonberry Creek
Yukon Harbor
Harper Creek
Curley Creek
Long Lake
Yukon Harbor
Streams
Major roads
YH watershed
Survey Area
0
0.5
1
1.5
2
Miles


Yukon Harbor Watershed
Duncan Creek
Salmonberry Creek
Yukon Harbor
Harper Creek
Curley Creek
Long Lake
Yukon Harbor
Streams
Major roads
YH watershed
Miles
0
0.5
1
1.5
2

APPENDIX C

SHORELINE SURVEY DATA

Yukon Harbor Shoreline Surveys

Six project shoreline surveys were conducted; November 2002, February 2004, July 2005, March 2006, May 2006, and August 2006. The conditions varied greatly from survey to survey. Three surveys were conducted in the wet season, and three during the dry season. Due to the wide variance in weather conditions, the number of samples taken for each event varied from a low of 67 samples to a high of 126. The number of samples with an FC count equal to or higher than the 200 FC 100/ml threshold found during each survey ranged from a high of 30 samples to a low of 7. All of these "hotspots" were confirmed by resample. Corrections were enforced if a dye test proved a connection between the OSS and the sample location.

Sampling stations were labeled in numerical sequence from the southern project border to the northern border. As new locations were added they were given a unique number to prevent any confusion from survey to survey. Location descriptions were recorded at each sample station and the flow was photographed.

The conditions for each survey varied by time of year and weather conditions. Three of the surveys were conducted with a north to south direction and three surveys were south to north. Different days of the week as well as weekends were involved to increase the opportunity to locate a contaminated flow that might be time or condition sensitive.

The survey data is organized to show each survey in relation to the sample stations. The stations with repairs are highlighted to show the changing conditions from survey to survey.

Yukon Harbor Shoreline Surveys

	Survey One			Survey Two			Survey Three			Survey Four			Survey Five			Survey Six			
Sample I.D.	Date	FC/100ml	Conformation	Date	FC/100ml	Conformation	Date	FC/100ml	Conformation	Date	FC/100m	Conformation	Date	FC/100m	Conformation	Date	FC/100mm	Conformations	notes:
1	11/2/03	<2		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
2	11/2/03	4		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
2B	11/2/03	dry		02/12/04	2		07/18/05	dry		3/19/06	1600	13	5/14/2006	dry		8/10/2006	dry		
3	11/2/03	500	1600	02/12/04	50		07/18/05	1601	90	3/19/06	30		5/14/2006	80		8/10/2006	500	300	NOK01, Failed, Repaired
3A	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	4		8/10/2006	dry		Pool discharge (+ for Cl)
3B	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	13		8/10/2006	dry		pool discharge?
4	11/2/03	900	130	02/12/04	4		07/18/05	900	70	3/19/06	500	1601	5/14/2006	80		8/10/2006	500	80	Pond Discharge
4B	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	17		5/14/2006	dry		8/10/2006	dry		
5	11/2/03	80		02/12/04	2		07/18/05	dry		3/19/06	8		5/14/2006	dry		8/10/2006	dry		
5B	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	1601	160,001	5/14/2006	dry		8/10/2006	dry		Failed, Repaired
6	11/2/03	900	dry	02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	dry		
7	11/2/03	300	dry	02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	dry		
7B	11/2/03	dry		02/12/04	<2		07/18/05	dry		3/19/06	dry		5/14/2006	2		8/10/2006	dry		
8	11/2/03	1601	dry	02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		Failed, Repaired
9	11/2/03	40		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
10	11/2/03	1600	dry	02/12/04	8		07/18/05	dry		3/19/06	11		5/14/2006	dry		8/10/2006	dry		
11	11/2/03	50		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
11B	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	dry		
11C	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	dry		
11D	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	1601		5/14/2006	dry		8/10/2006	dry		Vacation cabin, under dock
12	11/2/03	<2		02/12/04	dry		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
13	11/2/03	70		02/12/04	dry		07/18/05	dry		3/19/06	4		5/14/2006	dry		8/10/2006	dry		
13C	11/2/03	dry		02/12/04	4		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
13D	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	dry		
13E	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	17		Olympiad wetland drainage
13F	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	2		5/14/2006	dry		8/10/2006	dry		Olympiad wetland drainage
14	11/2/03	500		02/12/04	30		07/18/05	23		3/19/06	30		5/14/2006	1601	500	8/10/2006	130	50	Impact/HP01
14B	11/2/03	dry		02/12/04	4		07/18/05	140		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
15	11/2/03	2		02/12/04	13		07/18/05	2		3/19/06	2		5/14/2006	30		8/10/2006	17		
15B	11/2/03	dry		02/12/04	<2		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
16	11/2/03	80		02/12/04	8		07/18/05	130		3/19/06	8		5/14/2006	70		8/10/2006	1601	900	Southworth Dr. S. of HAR01
17	11/2/03	300		02/12/04	<2	240	07/18/05	17		3/19/06	60		5/14/2006	13		8/10/2006	2	13	Impact/HAR01
18	11/2/03	80		02/12/04	dry		07/18/05	dry		3/19/06	8		5/14/2006	dry		8/10/2006	dry		
18C	11/2/03	dry		02/12/04	2		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
18B	11/2/03	dry		02/12/04	8		07/18/05	dry		3/19/06	dry		5/14/2006	dry		8/10/2006	dry		
19	11/2/03	30		02/12/04	30		07/18/05	dry		3/19/06	1601	50	5/14/2006	dry	1601	8/10/2006	dry		Storm/Cambridge
20	11/2/03	300		02/12/04	<2		07/18/05	17		3/19/06	8		5/14/2006	dry		8/10/2006	dry		Storm water outfall
21	11/2/03	1601		02/12/04	4		07/18/05	26		3/19/06	110		5/14/2006	50		8/10/2006	300		Phased repair, 2nd fail
21B	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	1601	1600	5/14/2006	dry	1601	8/10/2006	dry		Phased, west end
21C	11/2/03	dry		02/12/04	dry		07/18/05	dry		3/19/06	4		5/14/2006	dry		8/10/2006	dry		
22	11/2/03	300		02/12/04	4		07/18/05	dry		3/19/06	8		5/14/2006	dry		8/10/2006	dry		
23	11/2/03	500		02/12/04	<2		07/18/05	dry		3/19/06	8		5/14/2006	dry		8/10/2006	dry		
24	11/2/03	900	30	02/11/04	110		07/18/05	300	80	3/19/06	220	1601	5/14/2006	23	30	8/10/2006	500	130	Cornell "black Iron Fence"
25	11/2/03	30		02/11/04	4		07/18/05	8		3/19/06	23		5/14/2006	dry		8/10/2006	dry		
26	11/2/03	240	11	02/11/04	170		07/18/05	dry		3/19/06	80		5/14/2006	dry		8/10/2006	dry		
27	11/2/03	500	30	02/11/04	<2		07/18/05	2		3/19/06	14		5/14/2006	1600	1600	8/10/2006	dry		failed, NOCV
28	11/2/03	1601		02/11/04	140		07/18/05	1600	1600	3/19/06	23		5/14/2006	500		8/10/2006	500	30	CN01,failed, NOCV
29	11/3/2003	1600		02/11/04	dry		07/18/05	dry		3/19/06	1601	1601	5/14/2006	dry		8/10/2006	dry		Failed, Repaired
30	11/3/2003	1600	1600	02/11/04	1601	<2	07/18/05	1600	1600	3/19/06	50		5/14/2006	1601	1600	8/10/2006	dry		2 homes, failed both repaired

31	11/3/2003	2		02/11/04	<2		07/18/05	280	dry	3/19/06	8		5/14/2006	dry		8/10/2006	dry		Failed, Repaired
32	11/3/2003	50		02/11/04	13		07/18/05	900	dry	3/19/06	11		5/14/2006	dry		8/10/2006	170		Cornell, 10" creat pipe
33	11/3/2003	22		02/11/04	<2		07/18/05	50		3/19/06	34		5/14/2006	1		8/8/2006	300	40	Impact/COR01
34	11/3/2003	2		02/11/04	23		07/18/05	26		3/19/06	23		5/15/2006	13		8/8/2006	23		
34B	11/3/2003	dry		02/11/04	2		07/18/05	dry		3/19/06	8		5/15/2006	4		8/8/2006	dry		
35	11/3/2003	70		02/11/04	8		07/18/05	300	80	3/19/06	4		5/15/2006	30		8/8/2006	500	500	MUK01, failed, Repaired
36	11/3/2003	<2		02/11/04	<2		07/18/05	170		3/19/06	4		5/15/2006	30		8/8/2006	30		
37	11/3/2003	14		02/11/04	2		07/18/05	300	bad	3/19/06	2		5/15/2006	23		8/8/2006	300	900	MR01, failed REPAIRED
37B	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/19/06	2		5/15/2006	dry		8/8/2006	dry		
38	11/3/2003	900		02/11/04	14		07/18/05	dry		3/19/06	2		5/15/2006	dry		8/8/2006	dry		
38B	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/19/06	dry		5/15/2006	16001	16000	8/8/2006	dry		Stevenson, Failed, Repaired
39	11/3/2003	500	1600	02/11/04	<2		07/18/05	22		3/19/06	4		5/15/2006	4		8/8/2006	dry	14	Impact/AND01
39B	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/19/06	2		5/15/2006	dry		8/8/2006	dry		
40	11/3/2003	30		02/11/04	2		07/18/05	240	1600	3/19/06	7		5/15/2006	80		8/8/2006	1600	300	Impact/ARV01
40B	11/3/2003	dry		02/11/04	dry		07/18/05	2		3/19/06	2		5/15/2006	dry		8/8/2006	dry		
40B2	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/19/06	dry		5/15/2006	23		8/8/2006	dry		
41	11/3/2003	23		02/11/04	2		07/18/05	50		3/19/06	30		5/15/2006	50		8/8/2006	dry		Impact/BAY01
41B	11/3/2003	dry		02/11/04	<2		07/18/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
42	11/3/2003	2		02/11/04	<2		07/18/05	50		3/20/06	2		5/15/2006	23		8/8/2006	dry		
42B	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/20/06	2		5/15/2006	30		8/8/2006	2		
42C	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/20/06	2		5/15/2006	dry		8/8/2006	dry		
43	11/3/2003	11		02/11/04	dry		07/18/05	11		3/20/06	4		5/15/2006	30		8/8/2006	90		
44	11/3/2003	6		02/11/04	2		07/18/05	8		3/20/06	13		5/15/2006	23		8/8/2006	13		Locker Road flow
45	11/3/2003	30		02/11/04	4		07/18/05	50		3/20/06	2		5/15/2006	dry		8/8/2006	dry		
45B	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/20/06	1601	1601	5/15/2006	dry		8/8/2006	dry		phased repair
46	11/3/2003	<2		02/11/04	<2		07/18/05	80		3/20/06	13		5/15/2006	8		8/8/2006	dry		
46B	11/3/2003	dry		02/11/04	<2		07/18/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
46C	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/20/06	8		5/15/2006	dry		8/8/2006	50		
46D	11/3/2003	dry		02/11/04	dry		07/18/05	dry		3/20/06	dry		5/15/2006	130		8/8/2006	dry		
47	11/3/2003	2		02/11/04	2		07/18/05	dry		3/20/06	1601	1601	5/15/2006	8		8/8/2006	170		Repaired
48	11/3/2003	50		02/11/04	<2		07/18/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
49	11/3/2003	13		02/11/04	dry		07/18/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
50	11/3/2003	30		02/11/04	11		07/18/05	240	300	3/20/06	23		5/15/2006	23		8/8/2006	80		MCG01, Repaired
51	11/3/2003	2		02/11/04	4		07/18/05	30		3/20/06	4		5/15/2006	dry		8/8/2006	<2		
52	11/3/2003	2		02/11/04	<2		07/17/05	4		3/20/06	23		5/15/2006	23		8/8/2006	dry		
53	11/3/2003	22		02/11/04	<2		07/17/05	2		3/20/06	23		5/15/2006	23		8/8/2006	dry		
53B	11/4/2003	dry		02/11/04	dry		07/17/05	dry		3/20/06	13		5/15/2006	dry		8/8/2006	dry		
54	11/4/2003	2		02/11/04	dry		07/17/05	8		3/20/06	2		5/15/2006	8		8/8/2006	4		
55	11/4/2003	7		02/11/04	<2		07/17/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
55B	11/4/2003	dry		02/11/04	2		07/17/05	dry		3/20/06	13		5/15/2006	dry		8/8/2006	dry		Under dock house
56	11/4/2003	<2		02/11/04	2		07/17/05	9		3/20/06	13		5/15/2006	23		8/8/2006	dry		
56B	11/4/2003	dry		02/11/04	90		07/17/05	dry		3/20/06	no flow	1601	5/15/2006	dry		8/8/2006	dry		matting, black, smells
56C	11/4/2003	dry		02/11/04	dry		07/17/05	dry		3/20/06	2		5/15/2006	dry		8/8/2006	dry		
56D	11/4/2003	dry		02/11/04	dry		07/17/05	dry		3/20/06	2		5/15/2006	dry		8/8/2006	dry		
57	11/4/2003	<2		02/11/04	<2		07/17/05	2		3/20/06	2		5/15/2006	13		8/8/2006	2		vacation cabin
57B	11/4/2003	dry		02/11/04	2		07/17/05	dry		3/20/06	dry	Vacant	5/15/2006	dry		8/8/2006	dry		failed, vacant, no drainfield
58	11/4/2003	7		02/10/04	<2		07/17/05	13		3/20/06	2		5/15/2006	dry		8/8/2006	dry		
59	11/4/2003	4		02/10/04	dry		07/17/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
60	11/4/2003	1600	dry	02/10/04	dry		07/17/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		Failed, Repaired
61	11/4/2003	900	dry	02/10/04	dry		07/17/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		Failed, Repaired
62	11/4/2003	<2		02/10/04	<2		07/17/05	dry		3/20/06	2		5/15/2006	dry		8/8/2006	dry		Failed, Repaired
62A	11/4/2003	dry		02/10/04	dry		07/17/05	dry		3/20/06	dry		5/15/2006	13		8/8/2006	<2		
62B	11/4/2003	dry		02/10/04	<2		07/17/05	dry		3/20/06	dry		5/15/2006	dry		8/8/2006	dry		
62C	11/4/2003	dry		02/10/04	dry		07/17/05	dry		3/20/06	2		5/15/2006	dry		8/8/2006	dry		

63		11/4/2003	50			02/10/04	30			07/17/05	9			3/20/06	13			5/15/2006	8			8/8/2006	dry			
64		11/4/2003	13			02/10/04	<2			07/17/05	<20			3/20/06	dry			5/15/2006	dry			8/8/2006	<2			
65		11/4/2003	22			02/10/04	dry			07/17/05	20			3/20/06	dry			5/15/2006	13			8/8/2006	dry			
66		11/4/2003	<2			02/10/04	<2			07/17/05	<2			3/20/06	2			5/15/2006	23			8/8/2006	<2			
67		11/4/2003	4			02/10/04	30			07/17/05	13			3/20/06	4			5/15/2006	dry			8/8/2006	dry			
67B		11/4/2003	dry			02/10/04	<2			07/17/05	8			3/20/06	8			5/15/2006	dry			8/8/2006	7			
68		11/4/2003	80			02/10/04	80			07/17/05	500	500		3/20/06	22			5/15/2006	80			8/8/2006	280	1600		Impact/YN01
69		11/4/2003	17			02/10/04	<2			07/17/05	<2			3/20/06	4			5/15/2006	23			8/8/2006	2			Failed, Repaired
70		11/4/2003	2			02/10/04	<2			07/17/05	dry			3/20/06	dry			5/15/2006	23			8/8/2006	dry			Failed, Repaired
70B		11/4/2003	dry			02/10/04	23			07/17/05	300	70		3/20/06	1601	NOCV sent		5/15/2006	dry			8/8/2006	dry			Failed, Repaired
71		11/4/2003	500	1600		02/10/04	70			07/17/05	1601	300		3/20/06	dry			5/15/2006	dry			8/8/2006	dry			Failed, Repaired
72		11/4/2003	8			02/10/04	dry			07/17/05	dry			3/20/06	dry			5/15/2006	dry			8/8/2006	dry			
73		11/4/2003	80			02/10/04	<2			07/17/05	2			3/20/06	50			5/15/2006	23			8/8/2006	4			
73B		11/4/2003	dry			02/10/04	<2			07/17/05	dry			3/20/06	2			5/15/2006	dry			8/8/2006	dry			
74		11/4/2003	110			02/10/04	<2			07/17/05	dry			3/20/06	dry			5/15/2006	23			8/8/2006	dry			
74B		11/4/2003	dry			02/10/04	2			07/17/05	dry			3/20/06	dry			5/15/2006	dry			8/8/2006	8			
75		11/4/2003	300			02/10/04	500			07/17/05	50			3/20/06	4			5/15/2006	dry			8/8/2006	dry			1389
76		11/4/2003	50			02/10/04	<2			07/17/05	<2			3/20/06	13			5/15/2006	8			8/8/2006	240			
77		11/4/2003	300			02/10/04	<2			07/17/05	bad			3/20/06	4			5/15/2006	1601	1600		8/8/2006	8			New landscaping and pipe
77B		11/4/2003	dry			02/10/04	2			07/17/05	dry			3/21/06	dry			5/15/2006	dry			8/8/2006	dry			
78		11/4/2003	2			02/10/04	<2			07/17/05	<2			3/21/06	2			5/15/2006	2			8/8/2006	8			Failed, Repaired
79		11/4/2003	<2			02/10/04	<2			07/17/05	2			3/21/06	2			5/15/2006	8			8/8/2006	<2			
79B		11/4/2003	dry			02/10/04	<2			07/17/05	dry			3/21/06	dry			5/15/2006	dry			8/8/2006	dry			
80		11/4/2003	4			02/10/04	<2			07/17/05	8			3/21/06	2			5/15/2006	8			8/8/2006	dry			
80B		11/4/2003	dry			02/10/04	dry			07/17/05	dry			3/21/06	4			5/15/2006	dry			8/8/2006	dry			
81		11/4/2003	<2			02/10/04	<2			07/17/05	dry			3/21/06	2			5/15/2006	8			8/8/2006	dry			
81C		11/4/2003	dry			02/10/04	2			07/17/05	280	300		3/21/06	1601	NOCV sent		5/15/2006	80			8/8/2006	dry			Failed, repaired
81B		11/4/2003	dry			02/10/04	<2			07/17/05	dry			3/21/06	40			5/15/2006	dry			8/8/2006	dry			
81BB		11/4/2003	dry			02/10/04	240			07/17/05	dry			3/21/06	8			5/15/2006	dry			8/8/2006	dry			
81D		11/4/2003	dry			02/10/04	dry			07/17/05	1601	80		3/21/06	2	NOCV sent		5/15/2006	dry			8/8/2006	dry			Failed, installing
81D2		11/4/2003	dry			02/10/04	dry			07/17/05	dry			3/21/06	dry			5/15/2006	13			8/8/2006	dry			
81E		11/4/2003	dry			02/10/04	dry			07/17/05	300	dry		3/21/06	dry			5/15/2006	dry			8/8/2006	1600			yard seep, passed dyetest
81F		11/4/2003	dry			02/10/04	dry			07/17/05	dry			3/21/06	dry			5/15/2006	dry			8/8/2006	dry			
82		11/4/2003	23			02/10/04	13			07/17/05	130			3/21/06	7			5/15/2006	dry			8/8/2006	dry			Impact/HAI01
83		11/4/2003	30			02/09/04	23			07/17/05	<20			3/21/06	2			5/15/2006	23			8/8/2006	dry			
83B		11/4/2003	dry			02/09/04	<2			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
84		11/4/2003	<2			02/09/04	dry			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
85		11/4/2003	<2			02/09/04	dry			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
86		11/4/2003	1600			02/09/04	1600	1600		07/17/05	<20			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			Failed, Repaired
87		11/4/2003	4			02/09/04	dry			07/17/05	dry			3/21/06	dry			5/16/2006	2			8/8/2006	dry			
87B		11/4/2003	dry			02/09/04	dry			07/17/05	dry			3/21/06	70			5/16/2006	19			8/8/2006	dry			
88		11/4/2003	1600			02/09/04	300	1600		07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			Failed, Repaired
88B		11/4/2003	dry			02/09/04	11			07/17/05	dry			3/21/06	2			5/16/2006	40			8/8/2006	dry			
89		11/5/2003	8			02/09/04	8			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
90		11/5/2003	50			02/09/04	dry			07/17/05	dry			3/21/06	dry			5/16/2006	50			8/8/2006	dry			
91		11/5/2003	13			02/09/04	<2			07/17/05	dry			3/21/06	40			5/16/2006	dry			8/8/2006	dry			
92		11/5/2003	2			02/09/04	17			07/17/05	dry			3/21/06	2			5/16/2006	dry			8/8/2006	dry			
93		11/5/2003	30			02/09/04	2			07/17/05	dry			3/21/06	17			5/16/2006	dry			8/8/2006	dry			
94		11/5/2003	<2			02/09/04	220			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
95		11/5/2003	4			02/09/04	dry			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
95B		11/5/2003	dry			02/09/04	4			07/17/05	<20			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
95C		11/5/2003	dry			02/09/04	dry			07/17/05	dry			3/21/06	2			5/16/2006	dry			8/8/2006	dry			
96		11/5/2003	2			02/09/04	<2			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			
97		11/5/2003	2			02/09/04	dry			07/17/05	dry			3/21/06	dry			5/16/2006	dry			8/8/2006	dry			

	Survey number one			Survey number two			Survey number three			Survey number four			Survey number five			Survey number six			
98	11/5/2003	<20		02/09/04	dry		07/17/05	dry		3/21/06	2		5/16/2006	dry		8/8/2006	dry		
98C	11/5/2003	dry		02/09/04	50		07/17/05	220	1600	3/21/06	4		5/16/2006	17		8/8/2006	13		Failed, Repaired
98B	11/5/2003	dry		02/09/04	<2		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
99	11/5/2003	50		02/09/04	50		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
100	11/5/2003	900		02/09/04	2		07/17/05	4		3/21/06	2		5/16/2006	1601	80	8/8/2006	dry		
101	11/5/2003	<2		02/09/04	dry		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
102	11/5/2003	1600		02/09/04	1600	1600	07/17/05	1601		3/21/06	1601	LID #8 by 7/06	5/16/2006	1601	*	8/8/2006	dry		Failed, in repair
102C	11/5/2003	dry		02/09/04	2		07/17/05	dry		3/21/06	dry		5/16/2006	40		8/8/2006	dry		
102B	11/5/2003	dry		02/09/04	<2		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
103	11/5/2003	1600	dry	02/09/04	dry		07/17/05	dry		3/21/06	dry		5/16/2006	20		8/8/2006	dry		Failed, Repaired
104	11/5/2003	2		02/09/04	<2		07/17/05	2		3/21/06	30		5/16/2006	2		8/8/2006	13		
105	11/5/2003	<2		02/09/04	dry		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
105E	11/5/2003	dry		02/09/04	dry		07/17/05	dry		3/21/06	8		5/16/2006	dry		8/8/2006	dry		
105D	11/5/2003	dry		02/09/04	50		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
105C	11/5/2003	dry		02/09/04	30		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
105B	11/5/2003	dry		02/09/04	<2		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
105A	11/5/2003	dry		02/09/04	dry		07/17/05	<2		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
106	11/5/2003	40		02/09/04	<2		07/17/05	dry		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
106B	11/5/2003	dry		02/09/04	<2		07/17/05	40		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
106C	11/5/2003	dry		02/09/04	2		07/17/05	170		3/21/06	dry		5/16/2006	dry		8/8/2006	dry		
106D	11/5/2003	dry		02/09/04	21		07/17/05	dry		3/21/06	11		5/16/2006	dry		8/8/2006	dry		
106E	11/5/2003	dry		02/09/04	dry		07/17/05	<20		3/21/06	dry		5/16/2006	dry		8/8/2006	1600	20	
107	11/5/2003	50		02/09/04	7		07/17/05	1601	1600	3/21/06	13		5/16/2006	50		8/8/2006	dry		Impact/Duncan Creek

Note: Sample Stations are numbered south to north, #1 is located at the southern end of the project area. #107 is located at the northern end of the project.

repair locations

APPENDIX D

KITSAP CONSERVATION DISTRICT FINAL REPORT

Final Report

Yukon Harbor Watershed Restoration Project

Washington State Department of Ecology
Clean Water Act Section 319 Nonpoint Source Fund
Grant # G0300178
Kitsap Conservation District
December 2006

Submitted By

Brian Stahl
Project Coordinator
Kitsap Conservation District
December 2006

Table of Contents

Introduction

The Yukon Harbor Watershed Restoration project addresses a serious fecal coliform (FC) contamination problem in the Yukon Harbor Watershed. Violations of the State FC Water Quality Standard for fresh waters draining to the Yukon Harbor shoreline forced the Washington State Department of Health (WSDOH) to initially classify Yukon Harbor shellfish beds as *Prohibited*.

The Kitsap County Health District (KCHD) has partnered with the local community to conduct an intensive sanitary survey of the Yukon Harbor marine shoreline and selected parcels along Curley Creek and Long Lake.

The Kitsap Conservation District (KCD) was contracted by the KCHD on April 1, 2003 to provide services associated with Task 1 of the Clean Water Act Section 319, *Yukon Harbor Watershed Restoration Project Grant #G0300178*. These services included the following:

- Conducting public meetings.
- Developing and maintaining a prioritized inventory of agricultural sites.
- Developing Farm Plans for landowners.
- Creating Best Management Practice (BMP) designs for landowners.
- Assisting landowners with BMP implementation.

Conservation work was performed from April 2003 through November 2006. This report describes the activities performed by KCD.

Background

The Yukon Harbor watershed is located southeast of Port Orchard and is bisected by State Hwy 160. It covers 11,660 acres and contains 7,499 parcels, with an average parcel size of 1.55 acres.

The project area includes 36 miles of streams: Curley (16 miles), Salmonberry (10.1 miles), Wilson (2.5 miles), Duncan (1.4 miles), and several that are un-named (6.5 miles). Curley Creek and Salmonberry Creek are currently on the Department of Ecology's 303(d) list for fecal coliform. It also includes 421 acres of wetlands, with an average wetland size of 3.7 acres, and Long Lake, a two mile long, 339 acre body of water that is a well known bass fishing destination.

Degradation of natural resources in the Yukon Harbor watershed has had a negative impact on the water quality of Long Lake, watershed creeks, and the Yukon Harbor shoreline. Both salmon and shellfish habitats have been compromised by non-point sources of pollution, such as septic system failures and poor agricultural management practices.

Methodology

First, an agricultural inventory of the Yukon Harbor watershed was performed to assess the number of farms present and the potential of each farm to pollute surface waters. Next, introductory letters were sent to agricultural property owners, detailing the condition of Yukon Harbor and asking for landowner participation and cooperation with ongoing cleanup efforts. An offer of technical assistance was extended to landowners willing to work with the district on farm management improvements. Also, cost-share opportunities were offered to qualified agricultural landowners as an added incentive to install Best Management Practices (BMP's).

Site specific farm management plans were developed for those willing to work cooperatively with the district. Alternative BMP's were suggested as methods to address resource concerns on the farm. Both corrective and preventative measures for waste and pasture management were included.

When a landowner decided to start a project, KCD staff provided detailed designs and assistance to get the practices implemented. BMP's were installed to NRCS standards and specifications. Operation and maintenance agreements were established and the district provided follow up assistance to address concerns and maintenance issues.

In certain cases, cost share funds were available to help finance up to 75% of the cost of implementation. Cooperators were reimbursed a total of $68,917.21 in incentive program funds for BMP installation. In addition, the District assisted one landowner with the Current Use Property Tax Exemption Program (aka Open Space Tax Program) offered through the Kitsap County Assessor's Office. This incentive program provides property tax relief for special use properties (Open Space General, Open Space Agriculture and Open Space Timber). The program was discussed with all landowners during the planning process.

The District responded in a timely manner to referrals such as water quality and solid waste complaints, land use referrals, fish barrier problems, and open space tax program applicants. To ensure that they received attention, referral sites were given high priority status.

The Kitsap Conservation District was proud to be involved with efforts to improve water quality in Yukon Harbor. Our focus has not only been to resolve existing sources of bacterial contamination, but also to prevent future water quality problems from occurring.

Task 1 Accomplishments

PUBLIC MEETINGS & EDUCATION

Description of Work Performed

Community outreach played an essential role in our efforts to encourage landowner participation in Yukon Harbor cleanup process. A public relations program was maintained to inform landowners about the status of water quality in the watershed and the steps taken to improve it. Agricultural and natural resource education programs were also developed as a tool to help landowners minimize the negative impacts of agricultural practices on the environment.

On October 22, 2003, KCD and KCHD presented the restoration project to Yukon Harbor Watershed members at the Long Lake Community Center. The event drew approximately 100 participants. KCHD explained the Pollution, Identification, and Correction (PIC) process. KCD explained the farm planning process, BMP implementation, and cost share opportunities available to agriculture sites.

KCD and KCHD held a project update meeting on February 22nd, 2005 at Sedgwick Junior High School. Twenty five landowners attended the meeting, which covered KCHD progress and KCD programs and BMP's installed in the Watershed. Invitations were sent to ninety landowners. Special invitations, encouraging participation, were sent to fourteen high priority agriculture landowners.

Workshops were offered to Yukon Harbor Watershed landowners at various locations throughout south Kitsap County. Several events, including a Heavy Use Area Protection and Waste Storage Facility demonstration, were held at the Kitsap Saddle Club. As part of the demonstration, KCD introduced and installed Eco-Grid, Gravel, and Hog fuel to demonstrate alternative mud management surface treatments for use in horse paddocks. Eco-Grid is a low impact development plastic grid system that is marketed as a permanent solution to muddy paddocks. Workshops are described in Appendixes G-J.

Summary of Public Meetings & Education

Table 1: Public Meetings & Education

Summary of Public Meetings and Educations Activities – See Appendixes F-J for descriptions of activities.	
Public meetings	3
Priority Landowner Mailings	4
KCD Newsletter issues published and distributed to KCD mail list. Currently there are over 6500 landowners on the mail list.	8
Public event activities sponsored or participated in	9
Workshops and / or educational programs conducted	9

PRIORITIZED INVENTORY OF AGRICULTURAL SITE

Description of Work Performed

Objective: Develop a prioritized inventory of animal management sites in the project area.

In May 2003, the District performed an initial windshield survey to inventory agricultural properties in the Yukon Harbor watershed. This initial survey was very limited due to staffing constraints.

In 2004, an update to the agricultural inventory using designated staff, windshield surveys and 2003 aerial photographs was performed. Conditions were noted relative to number and type of livestock, estimated acreage, pasture condition, waste management, livestock confinement, barns and outbuildings, and topography and proximity of agricultural land use activity to surface waters. A significant increase in agricultural properties was noted, particularly in upland portions and less traveled roads of the watershed.

Table 2: Number of Agricultural Properties

Agricultural Inventory	Agricultural Properties
2003	9
2004	95
2006	98

A Geological Information System (GIS) database of agricultural properties was created in 2004. Updates to the inventoried and prioritized properties were made as needed in GIS , as well as in the Yukon Harbor Watershed inventory map.

Each property's "potential to pollute" was rated on a scale of 1 to 5, with 1 being the highest.

Table 3: Priority Rating Criteria

1 – High	Pasture in poor condition. Livestock have access to surface water and/or there is a higher probability of runoff due to topography sloping toward water body. Visual evidence of contamination problem.
2 – Medium-High	Pasture in poor condition. Some reason to believe degraded conditions are seasonal or could get worse seasonally. Some areas on property reflect higher levels of management.
3 – Medium	Pasture is in fair condition. Open water in vicinity of the property but with limited access or little evidence of use. A moderate probability of runoff.
4 – Medium-Low	Pasture in good condition. No open water in vicinity and/or a low probability of contaminated runoff reaching surface water.
5 – Low	Visual inspection from roadside indicates historic or recent past farming activity. Pastures not utilized by livestock. No livestock currently on site. Old barns and/or farm equipment evident.

A table was developed for agricultural priority sites considered to be high (1) or medium-high (2). These sites were cross-referenced periodically with KCHD's on-site sewage system priorities. From 2004 on, the priority list was re-evaluated and reprioritized quarterly.

Table 4: Priority Ratings From Start of Project to End of Project

Priority	2004 Agricultural Landowners	Final - 2006 Agricultural Landowners
1 – High Priority	10	2
2 – Medium high	12	2
3 – Medium Priority	34	42
4 – Medium low	19	25
5 – Low Priority	21	27

At the conclusion of this grant in December 2006, 98 agricultural properties were inventoried. Livestock – 77% horses, 20% cattle, and 3% ratitae and other livestock – was present on 72 of the properties.

Summary of Inventory Element

As a result of improved livestock and pasture management, implementation of BMP's, and/or livestock removal, the amount of higher priority (1 & 2) sites dropped from 22 to 4. (See attached GIS Maps.)

The four remaining higher priority sites will be referred back to the Health District to determine if water quality violations exist. In the meantime, the District will remain available to all Yukon Harbor watershed Ag landowners under alternate funding.

TECHNICAL ASSISTANCE – FARM PLANNING

Description of Work Performed

Farm plans are management tools tailored to each individual's unique property. They are set up in two parts. The first part details current conditions on the farm and inventories soil, water, air, plant and animal resources, as well as human concerns (i.e. cost considerations and desires for the future). The second part contains recommendations for alternative farm management practices and lists the different Best Management Practices (BMP's) that could be implemented to solve particular resource challenges and protect the quality of soil, water, animals, plants, and air. Preservation and enhancement of fish and wildlife habitat is encouraged as well.

BMP's include such things as heavy use area protection (sacrifice paddocks), waste storage structures, roof runoff management, filter strip installation, planting of pastures and critical areas, and nutrient/waste management.

Landowners participating in the planning and implementation process were required to sign a Cooperator Agreement. This established a working relationship between the landowner and

the District. The farm planning services offered were consistent with NRCS standards that inventory existing conditions and evaluate resource needs.

Farm Plans were written in response to KCHD PIC referrals, Kitsap County Code Enforcement referrals, Kitsap County tax reduction programs, USDA – NRCS Programs, and landowner requests for BMP implementation cost share. Two plans were written for USDA – NRCS Cost Share Programs and five plans were written as a result of landowner requests for BMP implementation cost share. In addition, one plan each was written in response to a KCHD PIC referral, a Kitsap County Code Enforcement request, and a building permit requirement.

Summary of Technical Assistance – Farm Planning

- KCD staff made 117 site visits to 30 landowners in the Yukon Harbor Watershed.
- Seventeen of the original 22 high priority sites were visited by KCD Staff.
- Eight of the 22 high priority sites signed KCD Cooperator Agreements. In addition, twelve lower priority landowners signed Cooperator Agreements.
- A total of 10 Farm Plans were written.

TECHNICAL ASSISTANCE – BMP DESIGN

Description of Work Performed

KCD staff provided landowners with 38 USDA - NRCS "standard" design packets for BMP's. KCD contracted with USDA – NRCS engineers and the KCD Cluster engineer to design the BMP's required to complete projects during the grant period.

KCD staff and the engineer designed alternative BMP's for Heavy Use Area Protection on ten project sites. Four of these sites installed a Low Impact Development (LID) product, "Eco-Grid", as a surfacing in horse confinement areas to resolve extreme mud conditions (see slide #3 on the Yukon Harbor Watershed Restoration Project Photo CD).

A hog farm provided an unexpected opportunity to experiment with utilizing wood chips as a carbon source to reduce odors, nitrates, and other contaminants in livestock runoff. Due do the recent implementation of the project, data has not been collected to determine effectiveness of the treatment. See slide #4 on the Yukon Harbor Watershed Restoration Project Photo CD.

In addition to the unique or alternative BMP designs described above, many standard BMP designs were provided to landowners. See Table 5 for a list of all BMP designs.

Summary of BMP Design Element

The following types and amounts of standard BMP's were designed.

Table 5: BMP Amounts by Type

Best Management Practice	Code	Amount	Properties
Heavy Use Area Protection	561	6	Saddle Club, Armstrong, Keehn (4)
Alternative **LID** Heavy Use Area Protection	561	4	Saddle Club, Armstrong, Gorgey, Wible
Diversion	362	2	Wible, Armstrong
Critical Area Planting	342	1	Armstrong
Underground Outlets	620	2	Armstrong, Keehn
Access Road	560	3	Keehn, Ashby (2)
Waste Storage Structure	313	6	Saddle Club, Keehn (4), Seely
Roof Runoff Management	558	2	Keehn, Aguayo
Fencing	382	4	Jones. Salant, Armstrong, Wible
Pipeline	516	1	Keehn
Trough	614	1	Keehn
Tree & Shrub Establishment	612	1	Armstrong
Pasture Planting	512	2	Ashby (2)
Cover Crop	340	2	Ashby (2)
Spring Development	614	1	Keehn

TECHNICAL ASSISTANCE – BMP IMPLEMENTATION

Description of Work Performed

Once the landowner decided to implement a recommended BMP, had a design in place and, if applicable, a cost share approved, KCD staff managed the installation of the BMP. We provided the landowner with a material list and project sequence, and assisted the landowner with project completion (or coordinated volunteers or contracted work crews).

Summary of BMP Installation Element

Ten of the 22 high priority sites implemented BMP's, with seven receiving cost share funding. Cooperators were reimbursed a total of $68,917.21 in incentive program funds for BMP installation. Funding sources included USDA EQIP, Washington Conservation Commission Livestock Grant, and KCD Implementation Grants. Table 6 below lists the funding sources and amounts.

Total Incentive Program Funding secured through KCD was $95,729.22. It was distributed throughout the watershed and among all priorities.

Table 6: Funding Sources

Funding Sources	
KCD Implementation Grant	$ 7,542.21
KCD AFO/CAFO Grant	$ 61,375.00
KCD (State Commission Eng)	$ 6,067.01
KCD (Washington Conservation Corp crew) – BMP installation	$ 4,400.00
USDA-EQIP	$ 16,345.00
Total	**$95,729.22**

KCD staff observed 58 BMP's implemented on nineteen of the 99 properties on the Yukon Harbor Watershed inventory.

Table 7: Summary of BMP's.

Best Management Practice	Code	Amount	Unit	Properties
Heavy Use Area Protection	561	16,282	square feet	Saddle Club, Gorgey, Armstrong, Keehn (2), Wible
Diversion	362	1,772	feet	Wible, Armstrong, Keehn
Critical Area Planting	342	4	acres	Armstrong
Underground Outlets	620	585	feet	Armstrong, Keehn, Aguayo
Stream Crossing	578	3	each	Bauer
Waste Storage Facility	313	7	structures	Saddle Club, Keehn (4), Seely
Roof Runoff Management	558	3	systems	Keehn, Aguayo, Armstrong
Fencing	382	6,289	feet	Jones, Salant, Armstrong, Wibel, Keehn, Cederlund, Merwood, Childers
Tree & Shrub Planting	612	1	acres	Armstrong
Fish Stream Improvement	395	2,553	feet	Bauer, Childers, Jones
Pasture Planting	512	9.7	acres	Ashby
Cover Crop	340	2.0	acres	Ashby, Keehn
Watering Facility	614	1	each	Ashby
Prescribed Grazing	528A	21.6	acres	Ashby, Salant, Evens, Ashby
Nutrient Management	590	29.6	acres	Ashby
Access Road	560	467	feet	Keehn
Use Exclusion	472	5.5	acres	Ashby, Keehn, Armstrong, Bauer, Jones, Salant, Wible, Cederlund, Merwood, Childers, Bloomquist, Gagnon, Romo

- Ten of the nineteen properties which implemented BMP's were identified as high priority sites.
- KCD staff coordinated with several volunteer groups to complete project implementation. Volunteer groups included Trout Unlimited, West Sound Technical Skills Center, Ameri-corp crews, and Kitsap County Alternative to Detention Program. The groups assisted with tree plantings and livestock exclusion fencing along Salmonberry Creek.

Project Summary

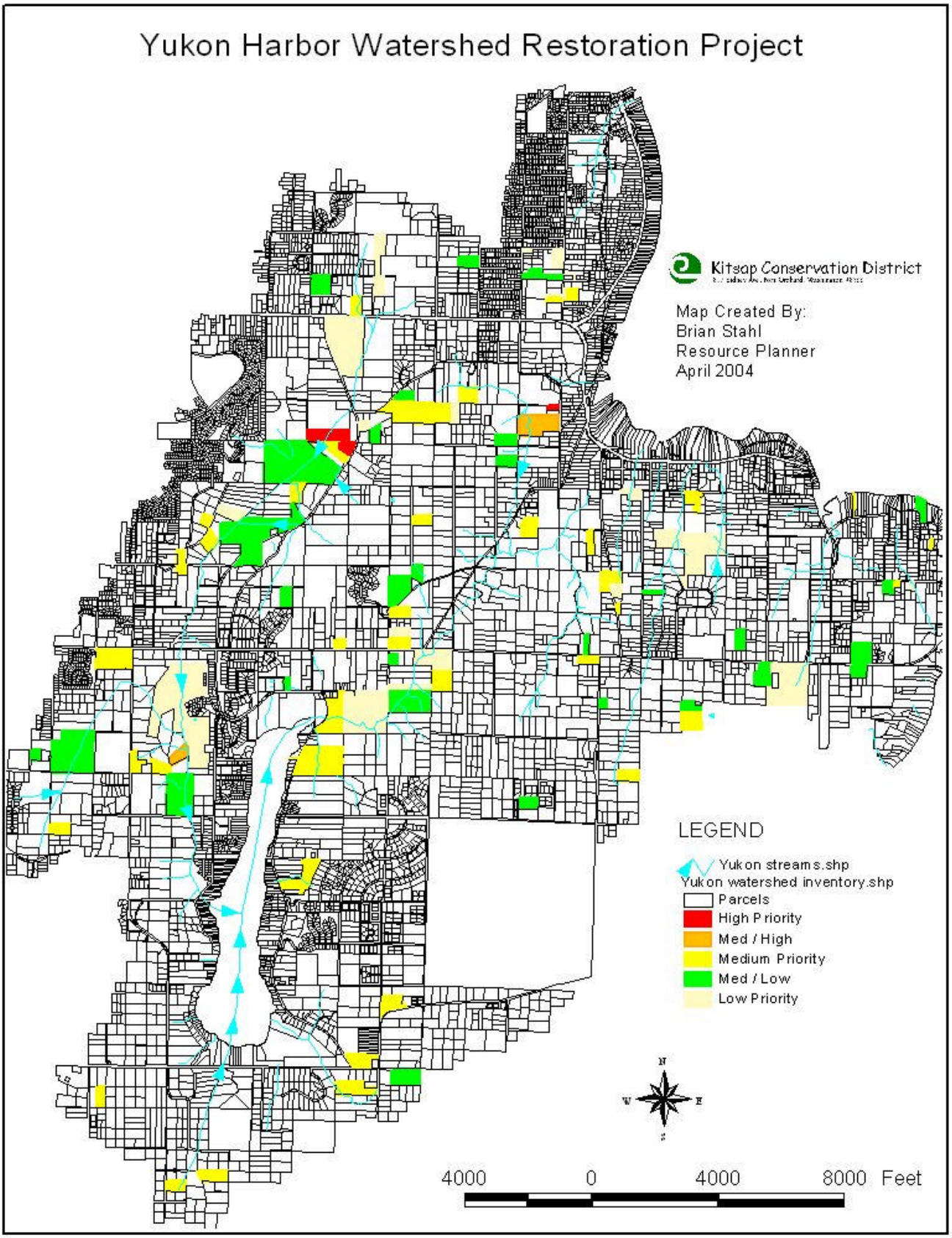
Patience, educational material mailings, public meetings, financial incentives, coordination with KCHD and follow-up were key ingredients to success in the Yukon Harbor project sites.

KCD staff sent information packets to Yukon Harbor livestock owners annually throughout the duration of the project. Packets included Best Management Practices and cost share information. KCD staff observed implementation of BMP's, indicating that landowners were utilizing the information in the packets.

KCD facilitated the use of federal, state, and local incentive programs, which provided cooperators in Yukon Harbor with the funding needed to implement BMP's. We assisted landowners with the application process for eligible incentive and cost-share programs, including the USDA Environmental Quality Incentives Program (EQIP), Washington Conservation Commission Livestock Grant and the Conservation Commission State Water Quality Implementation Cost Share Fund.

We found that given time, information, and some incentive, most landowners became willing to improve their farm management practices, thus increasing the quality of the Yukon watershed. Continuing to send BMP information packets and keeping Yukon Harbor landowners informed of the success of the project will provide "feel good incentive" to continue the good work that has been accomplished.

Yukon Harbor Watershed Aerial Photo


Yukon Harbor Watershed Restoration Project
Kitsap Conservation District
Map Created By:
Brian Stahl
Resource Planner
April 2004
LEGEND
Yukon streams.shp
Yukon watershed inventory.shp
Parcels
High Priority
Med / High
Medium Priority
Med / Low
Low Priority
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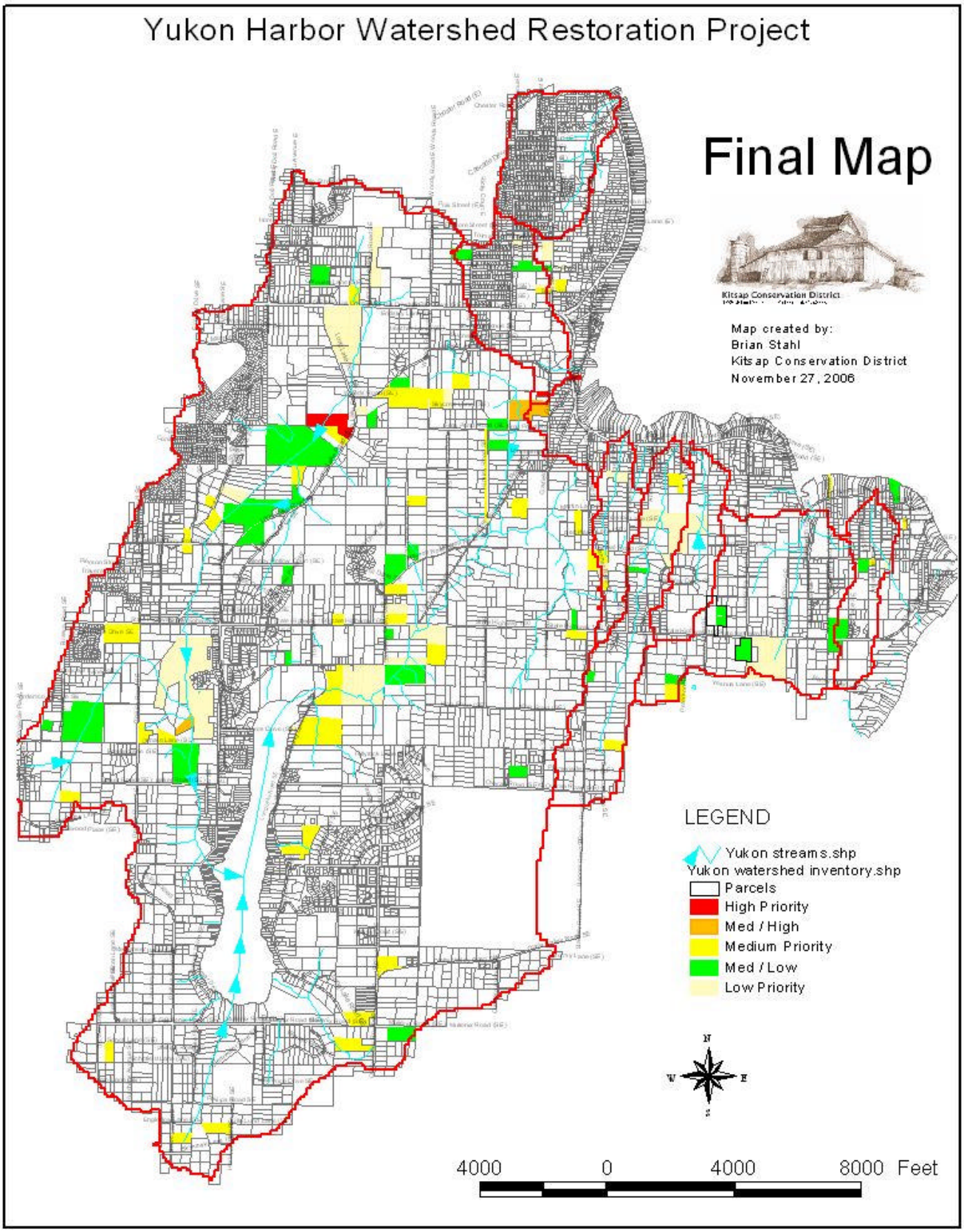
Yukon Harbor Watershed Restoration Project
Final Map
Kitsap Conservation District
Map created by:
Brian Stahl
Kitsap Conservation District
November 27, 2006
LEGEND
Yukon streams.shp
Yukon watershed inventory.shp
Parcels
High Priority
Med / High
Medium Priority
Med / Low
Low Priority
N
W
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8000 Feet

Appendix D

Insert Final Agriculture Inventory

INTERLOCAL AGREEMENT

BETWEEN KITSAP COUNTY HEALTH DISTRICT AND KITSAP CONSERVATION DISTRICT

CONCERNING INVESTIGATION AND CORRECTION PROCEDURES FOR LIVESTOCK WASTE HANDLING VIOLATIONS

1.0 Purpose and Applicability. This Interlocal Agreement (hereinafter referred to as the "Agreement") is between the Kitsap Conservation District (hereinafter referred to as the "Conservation District") and the Kitsap County Health District (hereinafter referred to as the "Health District"). Recognizing the need to carry out the responsibilities for which each is charged under State law and under the Kitsap County Surface and Storm Water Management Program, the Conservation District and the Health District consent to enter into this Agreement. This Agreement serves as the foundation for an enduring, cooperative working relationship for the purpose of protecting public health, improving water quality, and promoting agriculture stewardship through the investigation, identification and correction of inadequate livestock waste handling practices that are found to be causing a nuisance or menace to health. For the purposes of this agreement, livestock waste sources are typically manures generated by animals that are stabled, pastured, or otherwise managed, whether for private or business reasons. In addition, a "nuisance or menace to health" includes but is not limited to the pollution of water, harboring of rodents and breeding of flies. Pollution of water is defined as violations or exceedances of Washington State Surface Water Quality Standards (Chapter 173-201A WAC, as amended) or Ground Water Quality Standards (Chapter 173-200 WAC, as amended).

This Agreement specifically addresses the Health District's investigative response procedures and technical assistance referrals to the Conservation District related to livestock waste handling practices. Through this Agreement, inadequate livestock waste handling practices will be investigated by the Health District in response to public complaints or as part of a Pollution Identification and Correction project (hereinafter referred to as "PIC project") undertaken by the Health District.

2.0 Background. The Conservation District is a non-regulatory agency that works cooperatively with landowners under guidelines established by Washington State Conservation District Law (Chapter 89.08 RCW) and standards established by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The Conservation District compiles farm status inventory information from targeted areas, and prioritizes agricultural operations based on standardized rating criteria. The Conservation District provides technical assistance to small farm owners and develops Farm Plan elements specifically designed and implemented to provide best management practices (BMP) for land supporting livestock or under cultivation. These BMPs address the potential loss of protective vegetation adjacent to streams, severe soil erosion, and pollution of ground and surface water by manure and agricultural chemicals.

The Health District is responsible for regulating animal waste handling under the authority provided in Bremerton-Kitsap County Board of Health Ordinance 2000-6, "Solid Waste Regulations", (Solid Waste Regulations) as amended. These regulations provide minimum

standards for the safe handling of animal wastes, including, but not limited to, manure, dead animals, and agricultural wastes. The Health District coordinates with the Conservation District when conducting PIC projects or responding to complaints involving livestock wastes.

3.0 <u>Livestock Waste Handling Complaint Response Procedures</u>. The Health District and the Conservation District agree to undertake the following steps to respond to complaints of inadequate livestock waste handling practices filed with the Health District.

3.1 The Water Quality Program (WQ) will respond to livestock waste handling complaints. The only exceptions are complaints where livestock waste handling is one of multiple alleged violations. The Solid & Hazardous Waste Program will respond to these complaints utilizing their own procedures, which do not require notification to KCD that a violation has occurred.

3.2 An assigned WQ staff person will make an initial phone call to the complainant to verify information related to the complaint and, if needed, to collect additional information needed to respond to the complaint. Next, the Health District will conduct a site visit to confirm the livestock waste handling violation. In order to document a violation, the Health District must collect evidence (surface and/or drinking water samples, photographs, etc.) that livestock handling practices are creating a "nuisance or menace to health" through the pollution of water (surface or ground water), harboring of rodents, or breeding of flies, etc. If a violation is confirmed, the Health District will present the collected findings to the landowner, and refer them to the Conservation District for the development and implementation of a Waste Management Plan (WMP). If the violation represents an imminent threat to public or environmental health, the Health District proceeds to Section 3.4. If the violation does not present such risk, the Health District proceeds to Section 3.3. If the Health District is unable to confirm a violation, it may proceed to Section 3.8 or 3.9, or abate the complaint.

3.3 If the disposition of the livestock waste <u>does not</u> represent an <u>imminent</u> threat to public or environmental health (e.g., contamination of drinking water, the potential for direct public contact with contaminated runoff, contamination of shellfish resources, potential impacts to endangered species), the Health District will ensure correction of the violation in one of two ways:

Compliance Agreement

The landowner signs a "Compliance Agreement" with the Health District. The Compliance Agreement carries the full force and effect of an NOCV and establishes a timeline for the correction of the violation and development and implementation of the WMP. The landowner is responsible for contacting the Conservation District within ten (10) days, and the violation must be corrected within thirty (30) days. If one or both of these tasks is not completed within the specified time frames, the Health District will proceed to Section 3.6. If both of these items are complied with, the Health District will proceed to Section 3.5.

Verbal Agreement

If the landowner has demonstrated a strong level of commitment and ability to correct the violation, the Health District may reach a verbal agreement with the landowner regarding correction of the violation and development of a WMP with the Conservation District. This verbal agreement will be formalized with a letter from the Health District specifying the agreement and associated timelines – the Conservation District will receive a copy of this letter. The landowner is responsible for contacting the Conservation District within ten (10) days, and the violation must be corrected within thirty (30) days. If one or both of these tasks is not completed within these time frames, a Notice and Order to Correct Violation (NOCV) letter will be sent (as specified in Section 3.4). If both of these items are complied with, the Health District will proceed to Section 3.5.

3.4 If the disposition of the livestock waste represents an <u>imminent</u> threat to public or environmental health, or if the landowner fails to adhere to the verbal agreement discussed above, the Health District will send the landowner a Notice and Order to Correct Violation (NOCV) letter. The letter will be sent by certified mail requesting that they contact the Conservation District within ten (10) working days of receipt of the NOCV, and that corrective actions be made within thirty (30) working days of receipt of the NOCV. (KCHD may require a shorter compliance period for completion of corrective actions if required to protect public health.). In addition to including all items required in the Solid Waste Regulations, the NOCV will explain the nature of the complaint and document the public health nuisance associated with current livestock waste handling practices.

3.5 If the landowner completes the corrective actions within the specified time frame and agrees to work with the Conservation District on the development and implementation of a WMP, the complaint will be suspended pending completion of the Draft WMP. The Health District will have an opportunity to review the Draft WMP to confirm that it will prevent the livestock waste handling problem from occurring in the future. Once the WMP is finalized, the complaint and the Health District <u>enforcement</u> response will be suspended pending implementation of the WMP.

3.6 If the requirements of a Compliance Agreement or NOCV are not adhered to, the Health District may issue a civil infraction notice as specified in the Solid Waste Regulations.

3.7 The Health District will terminate all complaints for cooperative landowners after verifying that the violations have been corrected. Verification will require a written notice from the Conservation District that the Waste Management Plan has been implemented, a Health District field inspection, and water quality monitoring (if feasible).

3.8 The Health District may refer owners of properties with **potential** livestock waste handling violations to the Conservation District by sending a copy of a letter to the landowner detailing the potential sources and **recommending** that they contact the Conservation District within ten (10) working days. The purpose of such a referral is to formally notify the landowner that a **potential** violation exists, giving them an opportunity to proactively correct the problem(s) before a Health District investigation proves a violation. Therefore, the letter will be written so that the landowner both understands the problem and the potential impacts, and how he/she can fix the problem voluntarily by

cooperating with the Conservation District. Either the Water Quality Program Manager or the Pollution Identification and Correction Program Coordinator must review such letters before they are mailed. A "blind" copy of the letter will be sent to the Conservation District for their reference. The Conservation District will notify the Health District when the landowner has made contact with them. If the landowner contacts the Conservation District within ten (10) days, the Health District will postpone its investigation pending development and implementation of a WMP and elimination of the potential source(s). However, if the landowner is uncooperative in taking corrective actions and does not contact the Conservation District within this time frame, the Health District will initiate an investigation.

3.9 The Health District may refer owners of properties that have no proven or suspected livestock waste handling violations to the Conservation District. These will not be considered formal referrals to the Conservation District and they are not required to notify the Health District if contact is made.

4.0 Livestock Waste Handling PIC Procedures. The Health District and Conservation District use procedures specified in both Section 3.0 of this document and the Health District's "Manual of Protocol: Fecal Coliform Bacteria Pollution Identification and Correction" (Version Nine, November 2003 or subsequent revisions) to correct livestock waste handling violations in PIC areas. However, due to the fact that the express purpose of a PIC project is to address bacterial contamination of surface waters (which can subsequently lead to contamination of ground waters), the Health District and the Conservation District will place highest priority on sites where animal waste management practices are causing surface and/or ground water pollution. The Conservation District will contact all "high priority" agricultural sites identified in PIC areas either by telephone or by conducting a visit to the property. Sites not classified as "high priority" need only be contacted by mailing.

5.0 Indemnity. The Health District agrees to hold the Conservation District, its agents, officers and employees, harmless for all losses, claims and damages caused by the sole negligence of the Health District, its agents, officers and employees which arise directly or indirectly out of or in consequence of the Health District's or its agents' or officers' or employees' performance under this Agreement. The Conservation District agrees to hold the Health District, its agents, officers and employees, harmless for all losses, claims and damages caused by the sole negligence of the Conservation District, its agents, officers and employees which arise directly or indirectly out of or in consequence of the Conservation District's or its agents' or officers' or employees' performance under this Agreement.

6.0 Dispute Resolution. The parties to this agreement shall first attempt to resolve disputes informally at the staff level. In the event that the dispute cannot be resolved informally at the staff level, a dispute resolution procedure shall be followed. Each party to this agreement shall appoint one member to the Dispute Board. The members so appointed shall jointly appoint an additional member to the Dispute Board. The Dispute Board shall review the facts, terms, and applicable statutes and rules and make a determination of the dispute. The determination of the Dispute Board shall be binding on parties hereto. Each party to this agreement shall be responsible for paying for its own costs resulting from a dispute. Any additional costs resulting from resolution of a dispute shall be shared equally by both parties.

7.0 **Modifications of this Agreement.** Modifications to this Agreement shall only be made in writing and with the written consent of both parties.

8.0 **Review of the Agreement.** The parties agree to review the Agreement, its provisions and procedures at least once each year. The review will consist of a meeting of the parties, or their designated representatives, whether by telephone or otherwise to review and evaluate the continued necessity of the Agreement and to recommend any modifications thereto.

9.0 **Termination.** This Agreement will continue in full force and effect until such time as it is terminated by one of the parties. Either party can terminate this Agreement by notifying the other party in writing at least thirty (30) days in advance of such termination.

10.0 **Signatures.** The undersigned representatives accept the provisions of this Agreement. This Agreement shall be in effect when signed by both parties.

KITSAP CONSERVATION DISTRICT	KITSAP COUNTY BOARD OF HEALTH
_____	_____
Sharon Call District Board of Supervisors	Chris Endresen, Chair
_____	_____
Date	Date

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February 19, 2004

Dear Yukon Harbor Watershed Resident,

As a resident of the Yukon Harbor Watershed, you may be aware that the Bremerton-Kitsap County Health District is currently conducting a Pollution Identification and Correction (PIC) inventory in your watershed. The purpose of the Health District investigation is to identify and correct sources of surface and ground water contamination. Currently Yukon Harbor and the streams flowing into it are on the state's list of contaminated waters due to bacterial pollution. As a landowner within this watershed, it's important to consider that activities conducted on your land may impact the water quality on your neighbor's property downstream. Pollution levels may accumulate downstream, impacting water quality for fish and other wildlife as well as humans, livestock, and commercial fish and shellfish, among others.

The Kitsap Conservation District (KCD) works with the Health District in correcting sources of agricultural pollution. As a non-regulatory organization, the Conservation District works cooperatively with landowners that have pollution concerns relating to the management of their farm.

Our goal is to provide the technical assistance needed to manage land in a way that will allow owners to both use and protect their natural resources. Following are some examples of the types of assistance available from KCD:

- Conservation Farm Planning
- Recommendation of Best Management Practices (BMPs)
- Technical assistance with design and implementation of BMPs
- Finding cost share opportunities for recommended BMPs
- Recommendations for general farm improvement
- Woodland and wildlife habitat enhancement
- Stream restoration and enhancement

We have a successful history helping landowners solve problems on their farms. We can offer designs for many different types of fencing, heavy use area protection, livestock waste management, and other BMPs. In addition to helping with livestock problems, we also provide assistance for landowners with streams, whether it is establishing stream buffers, tree planting, or correcting problems with fish passage. The enclosed pamphlet is an excellent tool that explains the Best Management Practices we promote.

If you are interested in having the Conservation District visit your farm to help you with farm planning or to simply offer recommendations, please do not hesitate to contact me at 360-337-7171 extension 23, or by email at brian-stahl@wa.nacdnet.org. I hope to hear from you soon!

Sincerely,

Brian Stahl
Resource Planner

February 2, 2005

Dear Yukon Harbor agriculture property owner,

MARK YOUR CALENDER!!!

Yukon Harbor Watershed grant progress & update meeting
February 22, 2005
Sedgwick Junior High - 6:00-7:30

Horse Expo
April 16, 2005 – Waste Management and Mud Management Workshop
Kitsap Saddle Club - 10:00 – ???

As a resident of the Yukon Harbor Watershed, you may be aware that the Kitsap County Health District is currently conducting a Pollution Identification and Correction (PIC) inventory in your watershed. The purpose of the Health District investigation is to identify and correct sources of surface and ground water contamination caused by failing septic systems, agricultural activities and stormwater.

The Kitsap Conservation District (KCD) works with the Health District in correcting sources of agricultural pollution. As a non-regulatory organization, the Conservation District works cooperatively with landowners that have pollution concerns relating to the management of their farm.

If you have received this letter, you have a Potential to Pollute Priority Rating of 1 or 2. See below for rating criteria. It is KCD's responsibility to contact High Priority sites by phone or site visit. Please call me at (360) 337-7171 ext 23 or meet me at one of the above events to discuss your priority ranking.

Agricultural inventories are performed using windshield surveys and ground observations. Conditions are noted relative to number of livestock, type of livestock, estimated acreage, pasture condition, waste management, livestock confinement, barns and outbuildings, and topography and proximity of agricultural land use activity to surface waters. A rating system based on the "potential to pollute" is assigned on a scale of 1-5; with 1 being the highest priority. See Priority Rating Criteria.

Priority Rating Criteria

1 High:	Pasture in poor condition. Livestock have access to surface water and/or there is a higher probability of runoff due to topography sloping toward water body. Visual evidence of contamination problem.
2 Medium-High:	Pasture in poor condition. Some reason to believe degraded conditions are seasonal or could get worse seasonally. Some areas on property reflect higher levels of management.
3 Medium:	Pasture is in fair condition. Open water in vicinity of the property but with limited access or little evidence of use. A moderate probability of runoff.
4 Medium-Low:	Pasture in good condition. No open water in vicinity and/or a low probability of contaminated runoff reaching surface water.
5 Low:	Visual inspection from roadside indicates historic or recent past farming activity. Pastures not utilized by livestock. No livestock currently on site. Old barns and/or farm equipment evident.

Our goal is to provide the technical assistance needed to manage land in a way that will allow owners to both use and protect their natural resources. Following are some examples of the types of assistance available from KCD:

- Conservation Farm Planning
- Recommendations for Best Management Practices (BMPs)

- Technical assistance with design and implementation of BMPs including permitting assistance
- Finding cost share opportunities to help pay the cost of selected BMPs
- Recommendations for general farm improvement
- Woodland and wildlife habitat enhancement
- Stream restoration and enhancement

We have a successful history helping landowners solve problems on their farms. We can offer designs for fencing, heavy use areas, livestock waste facilities, gutters, underground outlets, and other BMPs. In addition to helping with livestock problems, we also provide assistance for landowners with streams, whether it is establishing stream buffers, tree planting, or correcting problems with fish passage.

Call me at your earliest convenience to arrange a site visit. We can look at your farm and discuss solutions to lower the priority level of your farm. I am normally in the office between 6:00am to 2:00pm. Once again, you may reach me at 360-337-7171 extension 23, or by email at brian-stahl@wa.nacdnet.org. I hope to hear from you soon!

Sincerely,

Brian Stahl

Resource Planner

Kitsap Conservation District

1386 SE Lund Avenue, Suite 1, Port Orchard, WA 98366
360-337-7171 FAX 360-337-7172

Greetings from the District!

We are a non-regulatory, grass-roots organization that works with private landowners through voluntary cooperation (www.kitsapcd.org). Our job is to educate and assist Kitsap landowners in issues of livestock management, water quality, and natural resource protection. In order to keep local livestock owners ahead of the curve, we've put together information on some recently revised EPA regulations.

This information will help you better understand a recent change in the *Confined Animal Feeding Operation (CAFO) rule*, if and where your farm or stable fits in, and how the District can help you fix problems that may arise.

We have developed the **CAFO Information - PowerPoint** to help walk you through the basics of *CAFO Regulations* and have included official **Risk Assessment Tools**, which can help determine where you stand. In addition, the **EPA's "Producer's Guide to CAFO Rules"** provides specific and in-depth information to help clarify the rule.

Please do not hesitate to contact us about any questions or concerns you may have. We are here to provide assistance, helping you make the most of your land with the least impact. Reach us by phone at (360) 337-7171, e-mail kcdlivestockassist@yahoo.com, or stop in for a visit.

Kitsap Conservation District

1386 SE Lund Avenue Suite 1 Port Orchard WA 98367
360-337-7171 FAX 360-337-7172

July 25, 2006

Dear *high priority landowner*,

It is the Kitsap Conservation District's responsibility to provide an "agriculture inventory" prioritizing properties on their potential to pollute. The inventory was developed for the Pollution Identification and Correction (PIC) grant project administered by the Kitsap County Health District. The grant is scheduled to be completed at the end of this year. All properties with priority ratings of 1 or 2 are highlighted and the health district will continue to monitor the streams near these properties for fecal coliform contamination. Currently, your property falls in this category and it is our goal to remove you from this list. If you have livestock access to open water such as seasonal streams, ponds, or wetland, a temporary fence installed around the area during the winter months would solve this problem. If you have a muddy paddock or manure pile where runoff is entering streams, drainages, or road ditches, planting grass in between the areas and the surface water would solve the problem. Every farm is unique and there are several options to reduce potential pollution concerns.

Call me at your earliest convenience to discuss solutions to lower the priority level of your farm. I am normally in the office between 6:00am to 2:00pm. Once again, you may reach me at 360-337-7171 extension 23, or by email at brian-stahl@wa.nacdnet.org. I hope to hear from you soon!

Sincerely,

Brian Stahl
Resource Planner

The Kitsap Conservation District (KCD) works with the Health District in correcting sources of agricultural pollution. As a non-regulatory organization, the Conservation District works cooperatively with landowners that have pollution concerns relating to the management of their farm.

Public Meetings and Educational Activities

- The first presentation was made jointly with the Kitsap County Health District at a Yukon Harbor Watershed community meeting for the grant opening on October 22, 2003 at North Kitsap High School. The event drew 100 people. Health District staff presented the project to the community. KCD provide aerial photos of the watershed and a GIS map with prioritized agricultural sites.
- KCD was invited to participate in the 2004 Kitsap County Salmon Tour. Kitsap County Surface & Storm Water Management Outreach and Education staff teams joined with Natural Resource agencies from throughout the County for the annual Salmon Tours. Held in the fall, this event provides an opportunity for participants to travel by bus to three or four different sites around the county, one being a farm, to view salmon. At each site, biologists meet with the group to discuss salmon, habitat, human impact, and how that particular site is important to salmon. KCD staff demonstrated farming Best Management Practices on the Bauer Farm. The Bauer's own 15 acres with Curley Creek bisecting the property.
- The second Yukon Harbor Watershed Restoration Project Update Meeting was held February 22nd, 2005 at Sedgwick Junior High School. Twenty five landowners attended the meeting, which included an overview of KCD programs and Best Management Practices installed in the watershed over the past year. Invitations were sent to ninety landowners. Special invitations, encouraging participation, were sent to fourteen high priority landowners. See attached sample letter.
- KCD staff and Saddle Club members constructed a Waste Storage Facility and completed a Heavy Use Area Protection Demonstration at the Kitsap Saddle Club "Working Horse Expo" on Saturday April 16th, 2005. EcoGrid was installed in a holding pen along with two other applications (Hog Fuel and Gravel). Interpretive signs were created and mounted to the pens. Fifty people attended the Expo and 65 riders participated in a horse show the following weekend. A KCD display board explaining District programs and providing participants with educational material was set up for each event.
- KCD staff conducted two educational workshops in the Port Orchard area. Yukon Harbor agriculture landowners were invited to attend. The first "Small Farm Management Workshop" was held in Purdy on January 14th, 2006 and the second "Livestock Fencing Workshop" was held in Port Orchard on March 11th, 2006. See attached for more information.
- In 2005, KCD was awarded a Washington Conservation Commission grant to educate Kitsap County livestock owners about the Animal Feeding Operation and Confined Animal Feeding Operation rules and regulations. Tasks completed included developing a livestock owner survey, developing education presentations, distributing self assessments to livestock owners, and organizing information workshops. One of the workshops was held at the Kitsap Saddle Club and was attended by 25 livestock owners.
- KCD staff sent livestock owners information packets containing Cost Share Programs and Best Management Practice information annually.

- The District sent Annual Summer and Winter Tree Sale edition newsletters to 5900 people on our mailing list.
- KCD sponsors a annual “Doo For You” event. The event is a free give-away of aged livestock manure generated from the Kitsap County Fair
- Mid Sound completed work on Salmonberry Creek to create a wetland pond complex that will provide off-channel salmon habitat. Landowners at the site contacted Mid Sound because salmon were becoming stranded in their fields during high water events. The project involved excavating 5 acres of off-channel ponds and controlling 20 acres of invasive weeds by planting native trees and shrubs. The first phase of construction was completed in September of 2003, and volunteers have planted more than 1,700 trees and shrubs at the site. The second phase of construction was completed in September of 2004. Mid Sound is also securing 40 acres of conservation easements from the five involved landowners, some of which will be donated. This project is funded by a $288,600 grant from the Salmon Recovery Funding Board and $60,000 in matching contributions. KCD and Mid Sound work cooperatively in project areas to maximize resources and expertise. In this project, KCD staff coordinated the livestock exclusion fencing component of one of the conservation easements.

PRESS RELEASE

For Immediate Release
October 4, 2004
CONTACT: Deborah Thomas
(360) 626-7723
dthomas@kpud.org

Salmon Tours - November 20, 2004

Residents in Kitsap County have an opportunity to view salmon and learn about salmon habitat by participating in the fifth annual **Salmon Tours** event on **November 20, 2004.** Participants will meet at **the Waterman's Club, 5785 E. Hillcrest, Port Orchard, WA.** Meeting time is **8:30 AM**. Kitsap Transit buses will transport participants to stream and estuary sites in South Kitsap. Local biologists will meet the groups to discuss the salmon life cycle as well as the components of healthy salmon habitat. After the tour, participants will return to the Waterman's Club at approximately 1:00 PM for a catered lunch. Immediately after lunch, Elaine Grinnell from the Jamestown S'Klallam Tribe will tell traditional stories about salmon. The cost is $12.00 per adult, $6.00 per child under 16. – Lunch is included. To register call Deborah Thomas, Kitsap Public Utility District, 360 626-7723, or e-mail her at dthomas@kpud.org.

Salmon Tours will visit the Curley Creek estuary, recently purchased as open space by the Great Peninsula Conservancy, to learn about the importance of estuarine habitat for migrating salmon. Two other sites on Curley Creek will be visited and will include talks on genetic studies of salmon, as well as a Kitsap Conservation District stream restoration project at a farm along the creek. Beaver Creek, the fourth location, will demonstrate a cooperative restoration project between the U. S. Navy and the Suquamish Tribe.

Participants should dress for the weather and wear comfortable shoes. Some walking will be required. Salmon Tours 2004 will be a day of celebration of the continued return of our Northwest Salmon, sponsored by UW Sea Grant Program, WSU Cooperative Extension, Kitsap Co. Surface and Storm Water Management, Kitsap County DCD, and Kitsap PUD.

Salmon Tours

Saturday, November 20, 2004 8:30—2:00

Meet at Waterman's Club Lodge, 5785 E. Hillcrest Port Orchard, WA

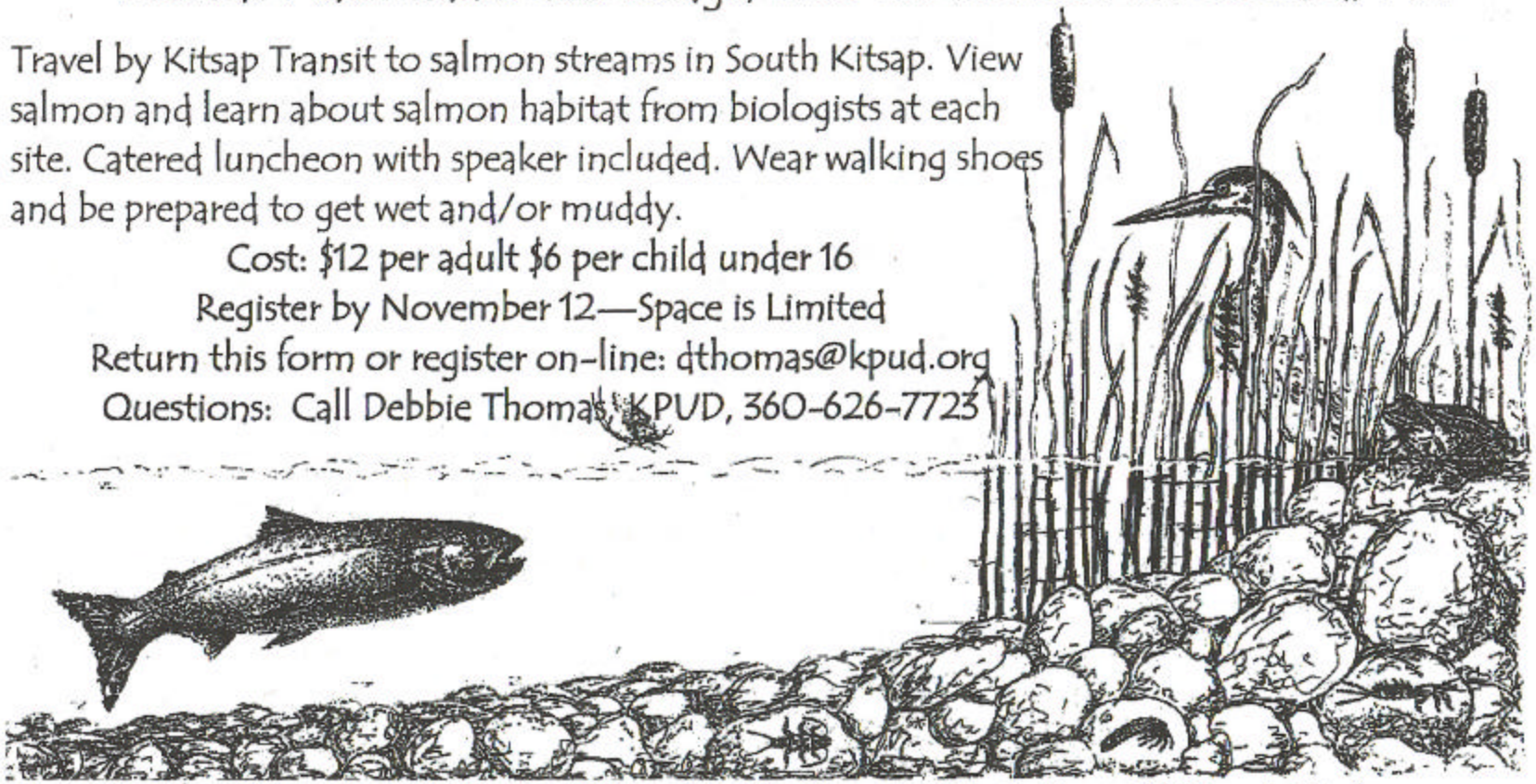
Travel by Kitsap Transit to salmon streams in South Kitsap. View salmon and learn about salmon habitat from biologists at each site. Catered luncheon with speaker included. Wear walking shoes and be prepared to get wet and/or muddy.

Cost: $12 per adult $6 per child under 16

Register by November 12—Space is Limited

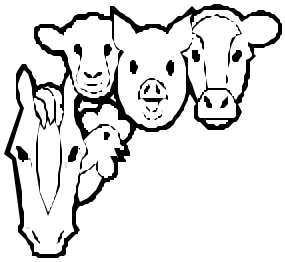
Return this form or register on-line: dthomas@kpud.org

Questions: Call Debbie Thomas, KPUD, 360-626-7723



Sponsored by: Kitsap PUD, Kitsap County DCD, Kitsap County Surface and Storm Water Management, UW Sea Grant Program, WSU Cooperative Extension

ATTENTION GARDENERS AND LANDSCAPERS
FREE aged livestock manure available for pick-up!
The Kitsap Conservation District and Kitsap County Facilities, Parks & Recreation offers
"DOO FOR YOU"
1 DAY ONLY
Kitsap County Fairgrounds – Saturday, March 5th – 10am to 3pm
No appointment necessary
Access event at Nels Nelson Road, NE entrance to Fairgrounds.
Call 360-337-7171 ext 10 for more information



"DOO FOR YOU" HANDLING INSTRUCTIONS

The material you have accessed is considered aged manure and is NOT fully composted and is NOT certified Clopylarid-Free. Clopyralid is an herbicide used to control weeds on hay fields in eastern Washington. This herbicide can survive the composting process and damage sensitive garden and vegetable plants. For more information on Clopyralid see the WSU Cooperative Extension's web site: http://www.puyallup.wsu.edu/soilmgmt/Clopyralid.htm or the Seattle Utilities site: www.seattle.gov/util/Services/Yard/For_Landscape_Professionals/CLOPYRALID_200311261705445.esp.

The composition of the material is mixed (including horse, cow, sheep, goat, poultry, rabbits, llamas and swine) livestock manure (± 20%), and alder wood shavings (± 80%). The mix has been generated from livestock during the Kitsap County Fair and has been stockpiled since September.

Some decomposition has taken place over time and the following recommendations are suggested to make this aged manure a fully composted and stable material.

- **Keep children away from playing in the pile since livestock manure carries potential harmful pathogens that can cause illness and disease. Women who are pregnant should not handle the material without gloves.**
- **Place the pile on high, dry ground away from drainage areas, low lands and surface water in order to protect water from potential contamination.**
- **During the rainy season, cover the pile with a tarp in order to prevent leaching of valuable nutrients.**
- **To activate and speed composting, add grass clippings to the pile as a nitrogen source or add additional manure if you have livestock on your property.**
- **When the pile is generating heat inside, turn the pile to add oxygen to continue microbial activity.**
- **Pathogens are killed at temperatures of 131° F and weed seed is killed at 145° F.**
- **Refer to the attached brochure, "Livestock Waste Management" for a quick reference guide to manure composting.**
- **With conscientious management, the material should be fully composted within 45 days and ready to be used as a soil amendment or top dressing.**

Those interested in long term or permanent composting facilities can visit the display area in the fairgrounds. A manure composting bin exhibit is located above the horse show arena near the rabbit barn. These wooden or concrete 8'x8' bins can be designed to meet your farm needs and are eligible for 50% cost-share funding from the Kitsap Conservation District.

Kitsap County Parks and Recreation, Kitsap County Public Works, and the Kitsap Conservation District sponsor this event. Contact the Conservation District at 337-7171 for additional information or assistance.

Kitsap Saddle Club's
Second Annual

WORKING HORSE EXPO

1470 Saddle Club Road
Port Orchard

"Horse Sense for You and Your Animal"

Saturday, April 16th

10:00 a.m. to 4:00 p.m.

Featuring Live Lectures and Demos with:

- **Kitsap Conservation District: On-site BMP Demos**
  - **Heavy Use Area Protection using Gravel and Hog Fuel (10:00 AM)**
  - **Installing HIT-GRID secure paddock surfacing (10:30 AM)**
  - **Waste Storage Bin Demonstration and Construction Information (1:00 PM)**
- Back Country Horseman: Packing and LNT Camping
- Equine Assisted Therapy/Learning
- Horse Rescue
- Miniature Horses
- Natural Horsemanship
- Peninsula Mounted Search and Rescue
- Reining/Ranch Horse
- Therapeutic Riding

Free raffle tickets to 4-H kids and
Pony Clubbers
Plan on coming early and staying late!
The Cantina will be open
Cost: Donation

For more information, go to www.kitsapsaddleclub.org

FREE LIVESTOCK FENCING WORKSHOP

Port Orchard - Saturday, March 11
9:30 am – Noon

Ready to install or replace fencing on your property?

Here's an opportunity to learn about different fencing styles and installation techniques so YOU can build a quality fence for your livestock. The workshop will take place outdoors on a farm, where a local fencing contractor will demonstrate aspects of fence building, such post installation, bracing and wire tensioning. A variety of fencing styles will be covered, including woven wire mesh, New Zealand-style power fence and post & rail. Detailed drawings and handouts will be available to take home. District staff will also talk about the role that fencing can play in pasture management and resource protection. Learn about cost-share funding programs that are available to help pay for fencing on your farm!

To register for the workshop, call Brian Stahl at the Kitsap Conservation District. 360-337-7171 x. 23.
A map will be sent to you after you register.

Small Farm Management Workshop Agenda

January 14, 2006 - 9:00 a.m. to noon
Peninsula Light Building, Purdy

9:00 Introductions by Pierce and Kitsap Conservation Districts - Discussion of watersheds and District programs

9:10 Runoff and Erosion – Erin Ewald, Pierce Conservation District

9:30 Regulations in Pierce County – Brynn Brady, Senior Planner, PALS
- Density
- Buffers
- Land Use
- Open Space

10:00 Mud Management – Martha Blair, Kitsap Conservation District
- Surface and Roof Runoff Management
- Heavy Use Area Protection

10:20 BREAK

10:30 Animal Health – Dr. Bo Weeks, DVM, Rocky Bay Equine
- Hoof Diseases
- West Nile Virus
- Keeping animals healthy in the Pacific Northwest

11:00 Kitsap County Health District Programs & Regulations – Leslie Banigan, RS, Pollution Identification & Correction Program Coordinator

11:20 Manure Management – Martha Blair, Kitsap Conservation District
- Waste Storage
- Composting
- Reapplication schedule

11:40 Pasture Management – Erin Ewald, Pierce Conservation District
- Site plan & pasture inventory
- Soils
- Weed management
- Pasture establishment & maintenance

Livestock Operation Needs Assessment Survey

The Kitsap Conservation District (KCD) has developed this Needs Assessment Survey to gauge how local landowners could be affected by revised EPA regulations for livestock operations and water quality practices. The KCD is a non-regulatory, grass-roots organization that works with private landowners through voluntary cooperation, to reduce soil erosion and impacts to water quality (www.kitsapcd.org).

We are interested in identifying improvements that local landowners may need to make in order to comply with revised regulations. This survey will allow us to provide educational and technical services that may help protect landowners from permits or fines, help with necessary improvements, and inform about farming practices that may affect water quality.

This survey is anonymous and all responses are confidential. The information you provide cannot be used to identify your farm as a candidate for regulation. Your participation is essential in our efforts to understand the needs of the local agricultural community before regulations are further applied.

PLEASE RETURN COMPLETED SURVEYS NO LATER THAN FRIDAY AUGUST 26TH.

Revised EPA Regulations on Confined Animal Feeding Operations (CAFOs)

In 2003, the EPA revised regulations for *Confined Animal Feeding Operation (CAFO)* sites.
In order for rules to apply, a farm or stable must first qualify as an *Animal Feeding Operation (AFO)*. To be considered an AFO, two conditions must exist: 1) animals are housed or fed in a confined area for more than 45 non-consecutive days a year, and 2) the confinement area does not sustain any crops, forage growth, and other vegetation (this does not include weeds or other incidental vegetation).

If a farm or stable meets these conditions and also produces significant pollution, either from discharge into surface waters

(i.e. ditches, streams, wetlands, lakes, salt waters, etc.) *or* from animals in direct contact with surface waters, it can be designated a CAFO. Farms or stables identified as CAFOs could be required to implement pollution management practices by April 2006.

This survey will help you determine if your operation could be an AFO or CAFO and if so, what improvements you would need to make to comply. If after completing Section 1 of the survey, your operation does not qualify as an AFO, we would still appreciate your return of the survey so we can estimate needs within our county. Thanks for your participation!

Section 1 – Is your farm or stable an Animal Feeding Operation (AFO)?

Answer the following question to determine if your operation could be considered an AFO.

Please mark the appropriate box.	**YES**	**NO**
Does your farm or stable house or feed animals in a confined area for more than 45 non-consecutive days a year?		
Does this confinement area lack crops, vegetation, forage growth, or post-harvest residues in the normal growing season (besides occasional weeds, shrubs, etc.)?		

If you answered NO to one of these questions, your farm does not meet the requirements of an AFO. The rest of this survey is not applicable to your operation; however, for data collection purposes, we would appreciate you to send this survey back. Please feel free to list any other needs you may have or request additional information in the "Comments" section.

If you answered YES to both questions, please continue on…. Consider the following conditions below to see if your farm could further meet the requirements of a Confined Animal Feeding Operation (CAFO).

Please mark the appropriate box.	**YES**	**NO**
Are animals in contact with water running through the confinement area?		
Does a man-made ditch, pipe, or culvert carry manure or wastewater from the animal housing or feeding area to nearby surface waters (i.e. ditches, streams, wetlands, lakes, salt waters, etc)?		

If you answered YES to *one or both* questions, your operation could be considered a CAFO. Please continue on to determine possible needs that you would have to meet to help reduce pollution discharge and comply with regulations.

Section 2 – Help us identify Kitsap County's needs: An assessment tool.

Consider the placement of your confinement area in relation to water sources. Please mark the appropriate box.

- Is the confinement area located in a flood plain? ? Yes, it's within the floodplain ? No, it's above the floodplain ? I don't know

Please circle the appropriate response .
RESPONSES

What is the distance from the area of animal confinement to your **water well**?	Less than 100 feet away	More than 100 feet away	N/A
Where are the animals fed in relation to **surface water** (i.e. when grass is not available for grazing)?	Less than 100 feet away	More than 100 feet away	N/A
How close is your animal confinement area to **open surface water** (i.e. ditches, streams, wetlands, lakes, salt waters, etc)?	Less than 100 feet away	More than 100 feet away	N/A

Section 2 – Help us identify Kitsap County's needs: An assessment tool.

Please mark the appropriate box. **YES** **NO** **N/A**

Are your animals confined in an area for a portion of the day?			
Do animals have direct access to surface waters (i.e. ditches, streams, wetlands, lakes, salt waters, etc)?			
Does all your livestock get drinking water from a water bowl, water tank or automatic waterer and not an open stream or other surface water?			
Are *in-stream watering sites* used to water your livestock?			
Is there a connection, ditch or drain between a pond and streams or other surface waters?			
Does the lot slope towards surface water and encourage the overland movement of water?			
Are there established pathways for the movement of surface water as runoff from confinement area (i.e. a ditch or channel)?			
Is *run-on surface* water (water that comes from outside your confinement area) diverted away from the confinement area?			

Do manure and sediment move offsite when it rains?			
Is manure managed or removed regularly?			
Do you stack or store manure under cover?			
Do you spread manure on fields based on the pasture's nutrient needs?			
Do you divert roof runoff water away from buildings and manure storage areas?			
Are pastures in productive condition?			
Do you remove all animals in the fall to allow regrowth of pasture for winter?			
Is there a vegetated buffer/filter strip between facilities and surface water?			
Do you have a livestock mortality management plan?			
Do you ever soil test?			
Do you have a nutrient or waste management plan?			
Would you be financially able to fix basic Best Management Practices that may be required (any of those listed above)?			

Place Stamp Here

Kitsap Conservation District
Livestock Assistance Program
1386 SE Lund Ave, Suite 1
Port Orchard, WA 98366

Please fold, tape closed, and attach postage. Thank you.

If you wish to address any farming or land practices that this survey has brought to your attention and possibly avoid future troubles, the Kitsap Conservation District can provide technical assistance for developing and making improvements. Please contact Sarah at (360) 337-7171 x27 or email kcdlivestockassist@yahoo.com for more information.

Thanks again for your participation!

COMMENTS:

_____

_____

_____

_____

_____

APPENDIX E

WELL SURVEYS

Bliss Water System

System Manager, Joann Bliss
7238 Long Lake Rd. SE Port Orchard WA

The Bliss water system has not been approved for any connections but currently has four homes connected. The well is located on the upper southeast corner of the Bliss property. There are no drainfields located within the 100' arc. Four drainfields are within the 200' arc; these are all down gradient of the well with no problems discovered during the inspections. The Long Lake Manor well head is located 120" from the Bliss wellhead.

Nitrate sampling has been limited due to non-compliance of the system manager.

Nitrate Sample History	
6/22/1994	4.0
8/24/2006	1.03

Possible source:

No septic systems within the 100' arc, two drainfields inside the 200'arc. All of the drainfields passed inspection. No risk factors have been located close enough to the well to affect the nitrate levels. It is believed that the high nitrate count in 1994 was due to lawn fertilizers.

Final recommendations:

The system manager was informed of the dangers of excessive use of fertilizers and asked to not use any fertilizer near the wellhead. The drinking water program is aware of the non-conforming issues and has a hold on all county permit approvals until this system is in compliance.

Feddock Water

System Manager, John Feddock
3725 Clover Valley Rd. Port Orchard, WA

Located in the middle of a large undeveloped parcel, and serving the homes located down gradient on long narrow lakeside parcels. The Feddock well has no drainfields within the 100' or the 200' arc. Approved for all of the existing seven connections.

The last 3 nitrate samples.

Nitrate Sample History	
7/11/2001	2.8
3/11/2004	2.0
8/24/2006	2.77

Possible sources:

No known source for the Feddock well. There is no landscaping near the well. The nitrate levels are just at our action point.

Final recommendations:

Education of the possible sources typically found for wells with high nitrate levels has been the action taken here. Mr. Feddock was given information to share with the homeowners sharing this well. We also asked them to continue with sampling and to watch for "risky" conditions near the wellhead.

Greenshore homeowners

System Manager, Kevin Masters
4556 Greenshores Dr. Port Orchard, WA

Greenshore has connected to all of their allotted 10 connections. The wellhead is surrounded by the parcels it serves. The 100' arc is free from drainfields but the 200' arc has 9 drainfields located on all sides of the well. Several of the homes had minor issues with their drainfields yet none were failing. Both standard gravity and alternative systems are located within the 200' arc. One non-permitted drainfield, now abandoned, was located within 50' of the well and could have been a factor in the past. Recent nitrate samples are well below the action level.

The last three samples.

Nitrate Sample History	
2/11/1999	0.6
5/1/2003	0.62
8/24/2006	1.80

Possible source:

With so many drainfields located so close, the potential for contamination is higher, yet no failing drainfields were found, and no Heavy fertilizer use. However the abandoned drainfield was close enough to contribute to the issue.

Final recommendations:

Education and better septic system maintance will be the action plan. Homeowners were encouraged to attend the septic system workshop and given homeowner manuals for septic systems.

Homer Wiley Water System

System Manager, Lana and Steve Prinz
6989 Phillips Rd. Port Orchard

There are no drainfields within the 100' well arc. Five drainfields are located within the 200' well arc and all five passed inspection. This water system has struggled with improper management for some time. The new system managers are taking much better care than in the past.

The last three samples.

Nitrate Sample History	
9/11/1997	2.7
2/09/200	2.54
8/24/2006	<(0.5)

Possible sources:

The Parcel where the well is located had fallen into disrepair due to a lack of care from the homeowner. The last sample was taken after years of no one living in the home. The septic system located on the well parcel has not been used during this time and no yard work has been conducted.

Final recommendations:

The new owners of the well parcel have been informed of the past history, given instructions on the nitrate issues and asked to keep a close watch on the septic as they start to use it. The new system managers have been educated on nitrate issues and given brochures to share.

John Cameron Water

System Manger, John Cameron
9241 Lawrence Dr SE Port Orchard WA

The John Cameron well is located in the northwest corner of the Cameron property, overlooking a deep ravine to the west. Approved for four connections it currently has only three. The 100' well arc has no drainfields and the 200' arc has only one down gradient drainfield located at the south end of the Cameron property. This system has consistently high nitrate counts.

The last three sample results.

Nitrate Sample History	
3/21/2005	5.99
9/20/2005	3.29
3/27/2006	6.63

Possible source:

Heavy use of fertilizers in landscaping and storing and watering potted plants around the well house.

Final recommendations:

Mr. Cameron has been informed of the dangers of fertilizing his plants around the well and his heavy use of fertilizers on his lawn. His refusal to discontinue this practice may result in stronger corrective measures including a possible citation. This corrective action will continue beyond the close of the Yukon Project.

King Road Water System

System Manager, Rick Metzger
6622 King Road Port Orchard WA

This system has four approved connections. There are no wells within a 150' well arc, with 4 drainfields within the 200' arc. All of the drainfields passed inspection, two of the drainfields are up gradient of the well and two are below it.

The last three samples:

Nitrate Sample History	
7/05/2005	4.08
9/27/2005	4.77
3/01/2006	3.78

Possible sources:

Source is uncertain but there are two suspects, a small greenhouse up gradient (about 180') and a large area that was cleared of all trees also up gradient.

Final recommendations:

Education is the primary tool used here. There is no proof that the small greenhouse is contributing, and the cleared area, if part of the problem, will re-grow and promote nitrate uptake. The system manager was informed of the problem and advised to continue with frequent nitrate samples and to watch for signs of septic failures and over-greening in the neighboring lawns.

King's Glen

System Manager, Leann Quinn
6910 SE King Rd. Port Orchard WA

This water system manager has denied access to the well by all county personnel. Several attempts to contact members of this system have failed. The system is not approved, with possibly seven to eight connections. The nitrate samples on file were submitted by the system manager and run by a state certified lab.

The only two samples on file.

Nitrate Sample History	
8/21/1998	3.51
2/28/2005	1.17

Possible Sources:

A large area has been cleared of all trees up gradient of this well. Without any surveys of the parcels it can't be known if the elevated nitrate is from natural events or not.

Final recommendations:

The drinking water program has put a hold on all county permit approvals for the parcels on this system. Before any parcel on this system can receive an approval for a permit the well system must first be in full compliance. Two of the homeowners have left the shared well system and received permission to drill private wells, these wells tested at <0.5 nitrate. The health District will continue to watch this system and consider stronger action including the possibility of a civil infraction.

Long Lake Manor Water

System Manager, Jonathan Spool
7242 Long Lake RD. SE Port Orchard WA

Approved for six connections this system is using only four of them. None of the drainfields are located within the 100' well arc. The 200' arc has only one down gradient drainfield within its boundaries, and it passed inspection. The Bliss Water system well is located 120' from the well.

The last three samples.

Nitrate Sample History	
5/12/1999	2.8
6/7/1999	2.68
4/01/2005	3.33

Possible sources:

Over fertilizing the lawn near the wellhead.

Final recommendations:

The system manager was informed of the problem, given brochures to share and asked to watch over the area around the wellhead.

Overra Road No. 1

System Manager, Washington Water Service
7327 SE Overra Rd Port Orchard WA

The Overra system is using all seven of the approved connections. There are no drainfields within the 100' arc. The 200' arc has four drainfields and all four drainfields passed inspection.

The last three samples.

Nitrate Sample History	
6/29/2005	2.5
10/26/2005	< (0.2)
8/01/2006	1.6

Possible sources:

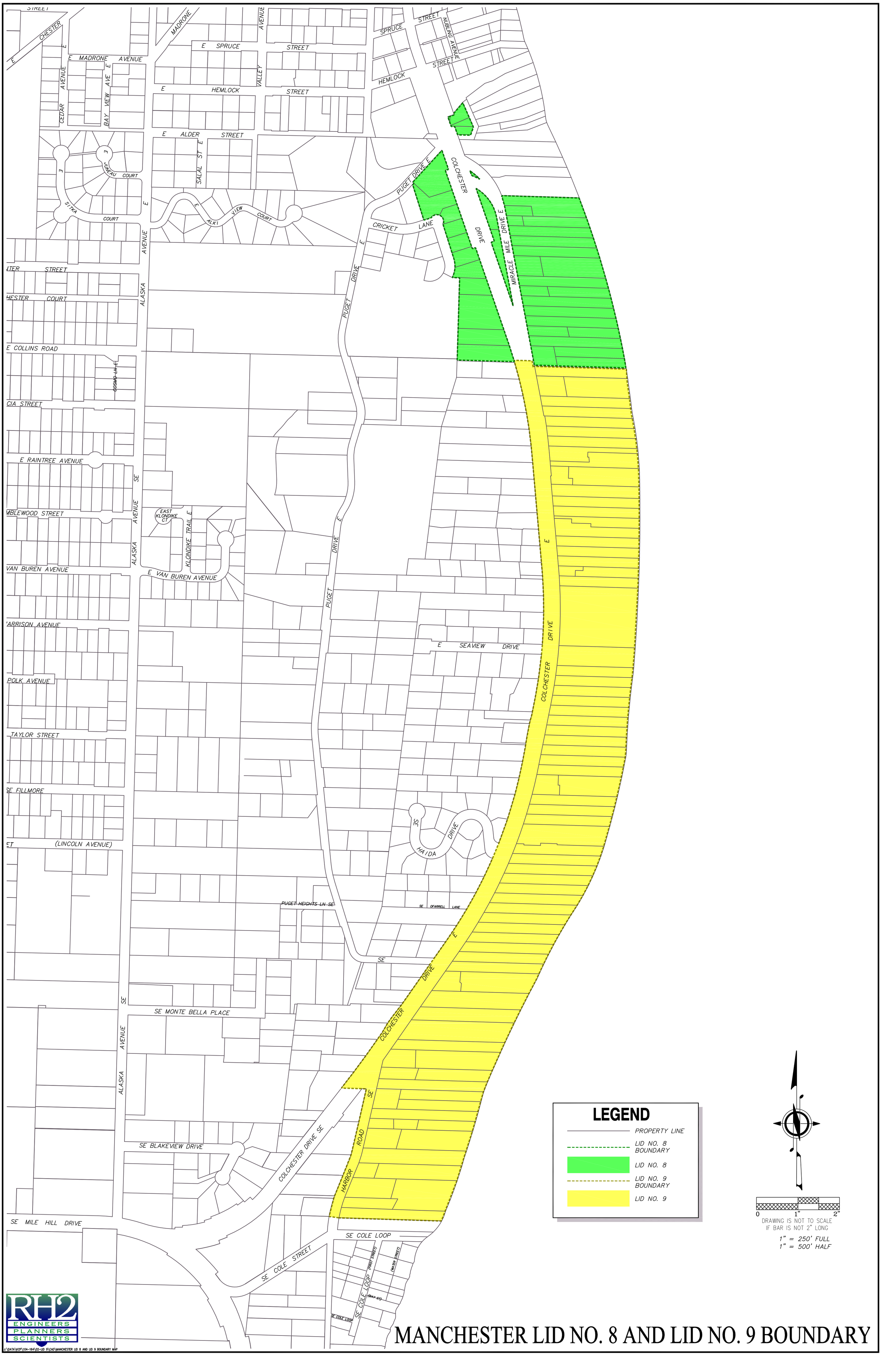
A large cattle operation had been located as close as 200' up gradient from the well and has now been moved to over 300' at the closest point. The well is located in a wooded area with no landscaping near it.

Final recommendations:

The homeowners have a professional water management service care for their well. The water service has informed and educated the homeowners about nitrate levels. They receive a yearly report on their water system.

APPENDIX F

FAILURE / REPAIR DATA
LID #8 AND LID #9



RH2 ENGINEERS PLANNERS SCIENTISTS

J:\DATA\KCP\104-164\02-LID 9\CAD\MANCHESTER LID 8 AND LID 9 BOUNDARY MAP

MANCHESTER LID NO. 8 AND LID NO. 9 BOUNDARY

Yukon Harbor Project Failures					
	ADDRESS	NUMBER	TYPE FAILURE	TYPE REPAIR	Statis as of 06
1	Clover Valley	7411	surfacing	ATU TS1 to bed	repaired
2	Clover Valley	7467	surfacing	ATU TS2 to gravity	repaired
3	Colchester Dr E	2139	direct discharge	possible LID #8 repair	vacant
4	SE Cornell Rd	9340	surfacing	Glendons	repaired
5	SE Cornell Rd	9396	direct discharge	Self repair D-box	repaired
6	SE Cornell Rd	9452	surfacing	Glendons	repaired
7	SE Cornell Rd	9952	direct discharge	Pre-treat/BSF	vacant
8	Marjorie Ln SE	3030	direct discharge	ATU to gravity	repaired
9	Olympiad Dr	10407	Xconnect w/ cd	ATU to gravity	repaired
10	Olympiad Dr	10796	direct discharge	ATU to gravity	repaired
11	Yukon Harbor Rd SE	1339	direct discharge	Glendons	repaired
12	Yukon Harbor Rd SE	1475	direct discharge	Glendons/ CD installed, phased	repaired
13	Colchester Dr E	989	surfacing	pressure beds	repaired
14	Salmonberry	3751	surfacing	Glendons	repaired
15	Yukon Harbor Rd SE	2232	surfacing	Glendons	repaired
16	Hemlock Sewer	E. end	surfacing	replace broken lines	repaired
17	Colchester Dr E	835	surfacing	WW to pressure beds	repaired
18	Colchester Dr E	837	Xconnect w/ cd	ATU to pressure Beds	repaired
19	Colchester Dr E	945	Xconnect w/ cd	ATU to Pressure Beds	repaired
20	Colchester Dr E	1525	direct discharge	Replaced broken transport line	repaired
28	Yukon Harbor Rd SE	1542	surfacing	Gravity	repaired
22	Harper Hill	9701	surfacing	ATU to gravity w/ disinfection	repaired
23	Colchester Dr E	899	surfacing	Glendons	phased/good
24	John Street	8751	surfacing	gravity	phased/good
25	Southworth	9002	surfacing	Glendons	phased/good
26	Colchester Dr E	1269	surfacing	pump to gravity or LID #8	vacant
27	Colchester Dr E	1017	surfacing	Drip	repaired
21	Cole Loop SE	?	direct discharge	Drip	vacant
29	Colchester Dr E	1011B	surfacing	connect graywater to OSS	vacant
30	Colchester Dr E	1261	direct discharge	LID #8	failing/LID #8
31	Cole Loop SE	1655	direct discharge	Atu to sand filter	repaired
32	Colchester Dr E	999	surfacing	repair water line	phased
33	Southworth	8475	surfacing	Glendons	repaired
34	Sedgwick	6206	surfacing	Glendons	repaired
35	Long Lake	6241	disconnected	ISF	pending permit
36	Colchester Dr E	1143	surfacing	Grey water/laundry	repaired
37	Colchester Dr E	1035	disconnected	vacant	vacant
38	Banner	3281	surfacing	Pressure	repaired
39	Inwood	4558	Backing up	replace D-box/transport lines	phased/good
40	Southworth Dr.	9620	Surfacing	Phased/Replace CD	phased/good
41	Cornell	9422	Surfacing	Glendons	repaired
42	Yukon Harbor Dr.	1433	Surfacing	Glendons	repaired
43	Colchester Dr E	1177	Surfacing	Glendons	repaired
44	Southworth	7620	Surfacing	White water	repaired
45	McGregor	2441	Surfacing	Phased	phased/good
46	Cornell	9525	Surfacing	glendons	failing/pumping
47	Yukon Harbor Dr.	2445	Surfacing	Correct CD xconnect	phased/good
48	Olympiad Dr	10487	Surfacing	replaced D-box & transport lines	repaired
49	Southworth Dr.	8587	direct discharge	Glendons	repaired
50	Inwood	4515	surfacing	Standard Gravity	repaired
51	Yukon Harbor Dr.		surfacing	Phased	phased/failing