

**Bainbridge Island
Shoreline Survey Project**

**Final Report
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**In cooperation with
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INTRODUCTION

The City of Bainbridge Island (City) contracted with the Kitsap County Health District (Health District) to complete a survey of approximately 1.4 miles of marine shoreline in Eagle Harbor, 1.3 miles between Lynwood Center and Point White, 4.0 miles along Crystal Springs, and 1.3 miles along Fletcher Bay. The majority of this area is currently closed to shellfish harvest due to pollution. **Figure 1** provides a detailed map showing the project area and current shellfish harvest restrictions.

During the survey, all flowing discharges to the marine shoreline were sampled for fecal coliform bacteria (FC) or E. coli bacteria (EC), both of which are indicators of the presence of viruses and bacteria associated with human and animal waste. Any direct sewage impacts to the marine shoreline were corrected by the District. Other flowing discharges with elevated FC and EC counts were reported to the Washington State Department of Health (WSDOH) and investigated separately as soon as possible.

This report presents the results of the shoreline survey, corrective actions taken to eliminate confirmed sources of bacteriological contamination, and suggested future actions to identify and remove remaining sources.

PUBLIC EDUCATION & OUTREACH

In lieu of a “door to door” notification process, it was decided that a press release and a public meeting would be a more efficient use of time. This is because most people in the project area would not be asked for an inspection of their on-site sewage system, and would therefore not be impacted by the project. The meeting was held on February 5, 2008 in the Bainbridge Island City Council Chambers.

In addition to the public meeting, many people were given information on the project during the shoreline surveys. This information primarily focused on proper operation of septic systems to prevent failure and minimizing other sources of fecal coliform contamination including pet waste.

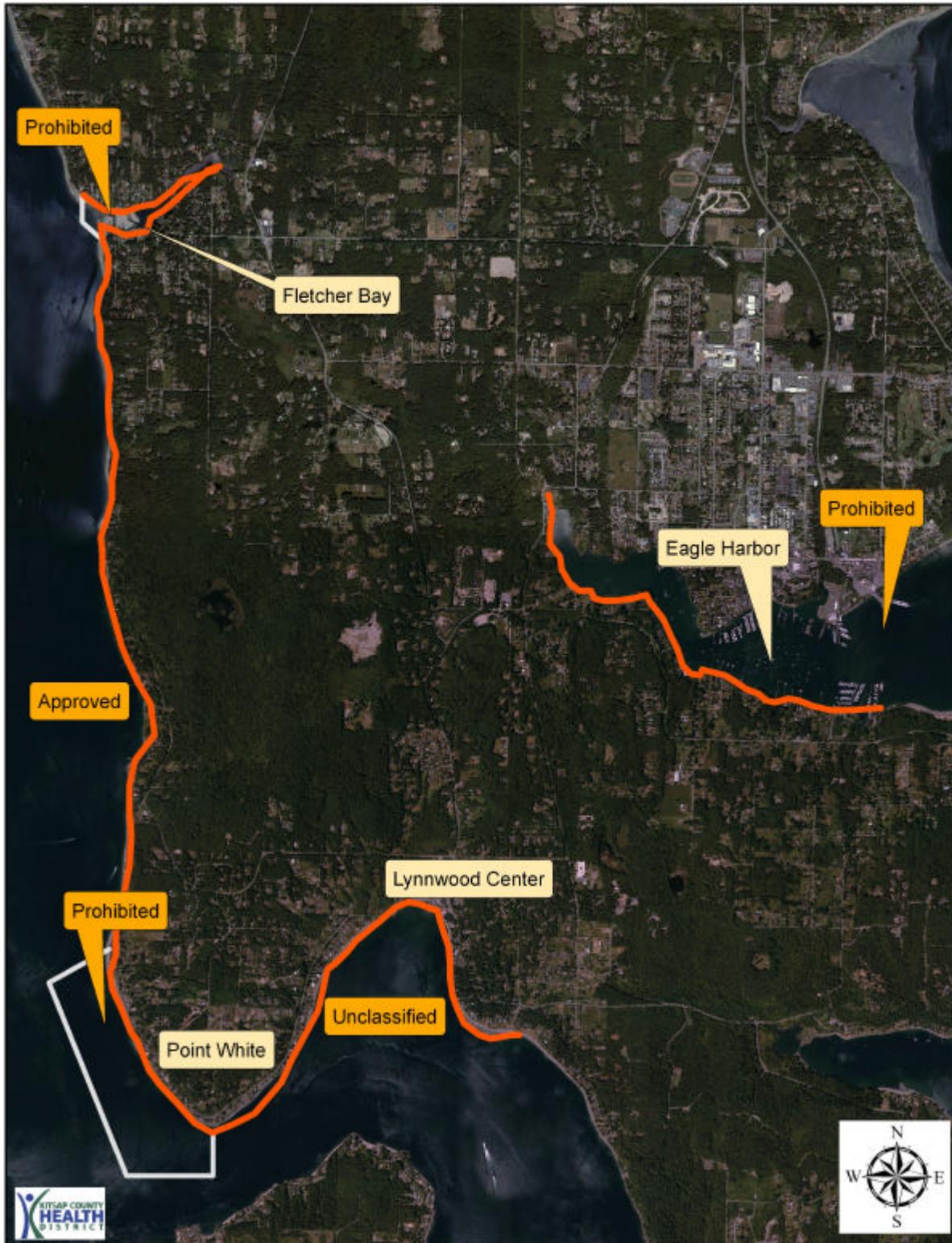
POLLUTION IDENTIFICATION AND CORRECTION

Methods

The Health District and the City conducted four full shoreline surveys spanning approximately 8 miles of Bainbridge Island shoreline along Eagle Harbor, Pt. White, Crystal Springs and Fletcher Bay. Four separate and complete surveys were conducted to minimize the probability of missing any flowing discharges due to varying weather and/or tidal conditions and to confirm results. This technique has worked quite well over the years for the Health District.

All fieldwork was conducted in compliance with the Health District’s “Manual of Protocol for Conducting Fecal Coliform Pollution Identification and Correction Projects” (Health District, December 2003).

Figure 1
Project Area Map



The following data was recorded for each discharge in the project area:

- A unique FC and EC sampling location id
- Latitude and longitude
- Physical description
- Time of sample collection

Each water sample was collected in a 120-milliliter polystyrene bottle and placed inside a soft-sided cooler on ice. At the end of the shoreline survey, samples were removed from soft-sided coolers and placed in an ice/water bath inside a standard cooler. Samples were delivered to Twiss Analytical Laboratories and were analyzed for fecal coliform bacteria or E.coli bacteria within 24 hours of collection. Fecal coliform bacteria and E. coli bacteria are indicator organisms used to assess whether viruses and pathogens associated with human or animal sewage are present in surface waters. The higher the levels of these bacteria in a water sample, the more likely it is that viruses and pathogens that can make people sick are present.

Sampling locations that had two (2) or more samples with FC counts greater than or equal to 200FC/100ml, and/or EC counts greater than or equal to 160 EC/100ml were marked for further investigation. Only failing septic systems that directly impacted the shoreline were investigated and corrective action taken. Corrections to failing septic systems are made pursuant to state and local on-site sewage system regulations. The remaining contaminated discharges were reported to WSDOH and will be investigated as soon as a funding source is located.

Results

Appendix A contains an Excel spreadsheet detailing the results of all shoreline surveys conducted for this project. The spreadsheet is organized by the unique sample id and the date of the shoreline survey. Note that a total of 16 sampling events were required to meet our objective of four full shoreline surveys in the project area. These events occurred between February 12, 2008 and June 19, 2008.

A total of 584 samples were collected during this project. The number of samples collected resulting in either FC levels ≥ 200 or EC levels ≥ 160 , was 73 of 584 or 12.5%. Thirty or 41% of these samples were collected between the intersection of Baker Hill Road and Crystal Springs Road and the southern tip of Fletcher Bay.

Ten of the 23 “hot spots” identified during the project are located along this stretch. (“Hot spots” are drainages where at least two of the samples collected from that drainage exceeded the thresholds specified above). However, only one failing on-site sewage system has been confirmed to date in this area. That system is currently in the repair process.

Figure 2 describes the locations of FC or EC “hot spots” and failing on-site sewage systems identified during the survey. **Table 1** provides additional detail on the location of the “hot spots” and the failing on-site sewage systems. **Table 2** describes the location of these systems and the cause of the failure.

Figure 2
FC and EC “Hot Spots” and Failing OSS

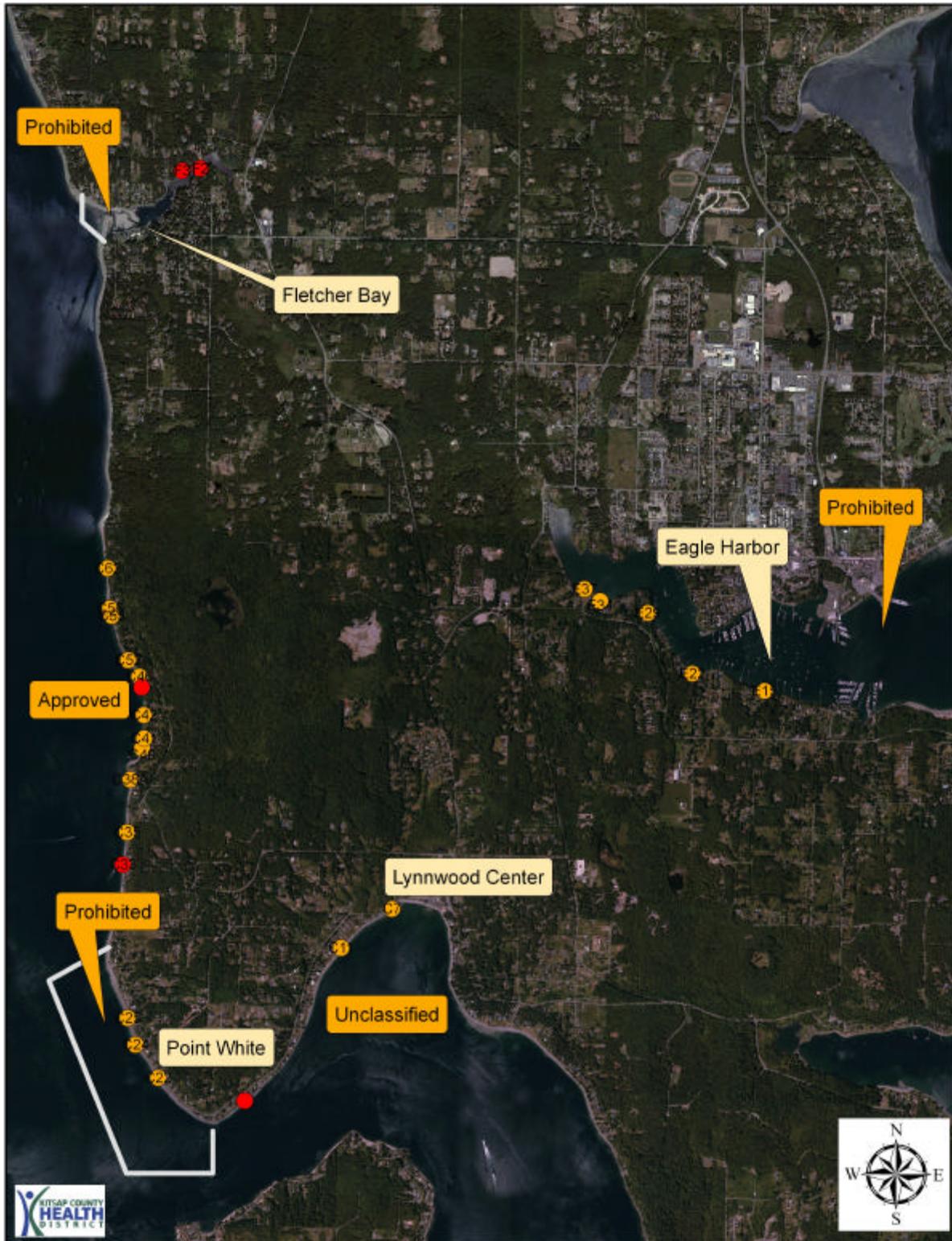


Table 1
FC and EC Hot Spots and Failing On Site Septic Systems

Station ID	Latitude	Longitude	Physical Description
C7	47.60362	-122.55216	Seep west of lumber building
C11	47.60124	-122.55651	Stream running between two homes, wooden furniture nearby
C22	47.59333	-122.57220	24 inch concrete pipe, look for two huge rocks nearby at low tide
C24	47.59526	-122.57423	24 inch concrete pipe, due north of small dock with green canoe
C25	47.59682	-122.57497	12 inch concrete pipe, opposite 3692 Crystal Springs Road
C33	47.60586	-122.57569	FAILING OSS , 4674 Crystal Springs Road, AAN 5240210082001, 4 inch abs pipe out of bulkhead with parking area behind.
C35	47.60777	-122.57540	24 inch concrete due north of station 34. Station 34 is located just south of Baker Hill and Crystal Springs intersection
C38A	47.61090	-122.57522	8 inch green pvc due south of station 39. Station 39 is a 4" black flex pipe next to light brown house with concrete block chimney
C40	47.61275	-122.57424	12 inch corrugated metal pipe out of rock bulkhead
C41	47.61333	-122.57409	12 inch corrugated plastic pipe near large root ball
C42	47.61472	-122.57415	6 inch white HDPE pipe out of rock bulkhead with heavy ivy growth on top
C46	47.61672	-122.57456	Flow off of concrete bulkhead that is covered in ivy. 50 feet north of station 45, which is located at 5869 Crystal Springs Road
C52	47.61793	-122.57562	Flow onto concrete bulkhead located under wood dock
C55	47.62052	-122.57714	6 inch bulkhead drain and two flows out of rock bulkhead, brown house with yellow ochre trim
C56	47.62095	-122.57731	Stream due north of station 55. Tan house with white trim
C62	47.62332	-122.57760	12 inch concrete pipe over top of concrete bulkhead. Willow tree overhangs.
E15	47.61695	-122.52010	Waterfall off of cliff about 200 feet west of barn on beach.
E22	47.61788	-122.52643	Stream near cable crossing sign
E29	47.62140	-122.53045	Small stream near old shack located next to maple tree
E34	47.62203	-122.53462	Stream west of condos
E37	47.62272	-122.53600	Stream due west of station 36, two 4 inch poles in ground nearby. Station 36 is 4 inch abs pipe in front of cedar house with gazebo and canoes.
F2	47.64698	-122.57142	FAILING OSS , 8677 Battlepoint, AAN 20250210292006, 4" black flex pipe over top of pressure treated bulkhead, weathered cedar house.

**Table 2
Description of Failing On-Site Sewage Systems**

Address	Tax Account Number	Cause of Failure
8677 Battlepoint	20250210292006	Sewage pump wiring defect caused overflow from tank into roof drainage system, which flowed into Fletcher Bay. <i>System Repaired.</i>
8681 Battlepoint	20250210482003	Broken or cracked sewage transport pipe allowed sewage to flow into the roof drainage system then out to Fletcher Bay. <i>System Repaired.</i>
4674 Crystal Springs	05240210082001	Drainfield leaks into curtain drain that flows to beach. <i>System Repaired.</i>
5869 Crystal Springs	41420000050303	Drainfield leaks through bulkhead onto beach. <i>Repair in progress.</i>
3204 Point White Drive	09240220412004	Drainfield leaks through bulkhead onto beach. <i>Connected to City of BI sewer.</i>

A total of five failing on-site sewage systems were identified during the project (see Table 2). No failing on-site sewage systems have been identified (to date) along the South shore of Eagle Harbor or in the Lynwood Center portion of the project.

Please find below a repair status report for each property:

8677 Battlepoint has been repaired and documentation submitted. A plan for a replacement system has been approved. The new system will have aerobic treatment and drip irrigation for disposal.

8681 Battlepoint has been repaired, but no documentation has been received by the Health District. Follow-up dye testing revealed no problems. The Health District will conduct an additional dye test this fall to verify the repair.

4674 Crystal Springs has been repaired. A new system has been installed utilizing aerobic treatment and drip irrigation for disposal.

5869 Crystal Springs is currently being repaired. A replacement system is being installed utilizing intermittent sand filtration for treatment and bottomless sand filter for disposal. The leak from the bulkhead has been plugged and the owners are conserving water. This has minimized the public health impact from the failing system until repairs are complete.

3204 Point White Drive has been connected to sewer

The remaining contaminated discharges were reported to the Washington State Department of Health and will be investigated jointly by the City and the Health District through NPDES project work or grant funding.

CONCLUSIONS

- ✓ No failing on-site sewage systems have been identified to date along the south shore of Eagle Harbor. In addition, only five (5) of the 64 (8%) drainages sampled in this area need further investigation. This is good news, especially when these results are compared with the shoreline survey data collected by the Health District in 1996. During that project, 56 drainages were sampled and 15 (27%) required investigation. This shows that the on-site sewage system repairs that were completed after the 1996 shoreline survey have resulted in water quality improvements.
- ✓ The Crystal Springs marine shoreline is impacted by failing on-site sewage systems and possibly other sources including pet waste, waterfowl, etc. The main problem area appears to be between the intersection of Baker Hill Road and Crystal Springs Road, and the mouth of Fletcher Bay. These findings are consistent with generally poor soils, high water table, and older homes in this area which could contribute to poor septic system performance.
- ✓ Only two (2) of 24 (8%) drainages sampled in Fletcher Bay required investigation, and both of those were linked to failing on-site sewage systems which have since been repaired. In addition, only two (2) of 35 (6%) drainages sampled, and one (1) failing on-site sewage system was found between Pleasant Beach and Point White. Bacterial contamination in water at these locations is very low.

RECOMMENDATIONS

As you can see in Table 2, there is still significant follow-up work to be completed in this project area as 20 contaminated drainages still need to be investigated. Six (6) of these drainages are streams, seven (7) are stormwater outfalls, and seven (7) are other types of drainages including beach seeps, curtain drains, etc. The streams and storm drainages need to be segmented and intensively sampled to determine sources of bacterial contamination. Additional sampling and possibly dye testing needs to be conducted to determine sources in the other drainages. All information pertaining to failing on-site sewage systems and/or “hot spots” has been forwarded to WSDOH so they can evaluate potential impacts to Approved commercial shellfish growing areas. If WSDOH believes there is an impact to a shellfish growing area, they will typically establish closure zones and notify growers in the area.

- ✓ The Health District and the City should identify funding sources for Phase 2 of this project which will entail the investigation of the 20 “hot spots” described above. This project should start no later than January 2009.
- ✓ The Health District should work with the City of Bainbridge Island on the development of a priority list for fecal coliform bacteria pollution identification and correction projects.
- ✓ The Washington State Department of Health should determine whether the current “prohibited” classification for Fletcher Bay can be changed to “unclassified” based upon the results of this shoreline survey.

Appendix A
Shoreline Survey Results

Please contact the Health District's Pollution Identification and Correction Program at (360) 337-5235 if you would like more information on shoreline survey results