



CITY OF
BAINBRIDGE ISLAND

**CITY OF BAINBRIDGE ISLAND
PLANNING COMMISSION SPECIAL MEETING
THURSDAY, APRIL 7, 2016
6:00 PM - 8:30 PM
CITY COUNCIL CHAMBER
280 MADISON AVE N
BAINBRIDGE ISLAND, WASHINGTON**

- 6:00 PM CALL TO ORDER**
Call to Order, Agenda Review, Conflict Disclosure
- 6:05 PM REVIEW AND APPROVAL OF MINUTES**
January 21, 2016
- 6:10 PM PUBLIC COMMENT**
Accept public comment on off agenda items
- 6:15 PM GENERAL SHORELINE MASTER PROGRAM LTD. AMENDMENT**
Study Session
- 7:00 PM PUBLIC COMMENT - Shoreline Master Program Ltd. Amendment**
- 7:10 PM 2016 COMPREHENSIVE PLAN UPDATE**
Study Session on Water Resources Element
- 8:15 PM PUBLIC COMMENT ON COMPREHENSIVE PLAN UPDATE**
- 8:25 PM NEW/OLD BUSINESS**
- 8:30 PM ADJOURN**

**** *TIMES ARE ESTIMATES****

Public comment time at meeting may be limited to allow time for Commissioners to deliberate. To provide additional comment to the City outside of this meeting, e-mail us at pcd@bainbridgewa.gov or write us at Planning and Community Development, 280 Madison Avenue, Bainbridge Island, WA 98110



**CITY OF BAINBRIDGE ISLAND
SPECIAL PLANNING COMMISSION MEETING
AND PUBLIC HEARING
THURSDAY, JANUARY 21, 2016
6:00 p.m.-9:30 p.m.
CITY COUNCIL CHAMBER
280 MADISON AVE N
BAINBRIDGE ISLAND, WASHINGTON**

CALL TO ORDER - Call to Order, Agenda Review, Conflict Disclosure
PUBLIC COMMENT - Accept public comment on off agenda items
ORDINANCE 2016-01 TREE AND LANDSCAPING – Public Hearing
LIMITED SHORELINE MASTER PROGRAM AMENDMENT – Introduction & Presentation
PUBLIC COMMENT ON COMPREHENSIVE PLAN UPDATE
2016 COMPREHENSIVE PLAN UPDATE

- *Revised Update Schedule*
- *New Climate Change Guiding Principle Proposal*
- *Transportation Element*

PUBLIC COMMENT ON COMPREHENSIVE PLAN UPDATE
NEW/OLD BUSINESS
ADJOURN

CALL TO ORDER - Call to Order, Agenda Review, Conflict Disclosure

Chair Pearl called the special meeting to order at 6:02 PM. Commissioners in attendance were Maradel Gale, Jon Quitslund, William Chester, Michael Killion and Lisa Macchio. Michael Lewars was absent. City Staff in attendance were Interim Planning Director Joe Tovar, Senior Planners Jennifer Sutton and Christy Carr and Administrative Specialist Jane Rasely who monitored recording and prepared minutes. The agenda was reviewed. There were not any conflicts reported.

PUBLIC COMMENT - Accept public comment on off agenda items

None.

ORDINANCE 2016-01 TREE AND LANDSCAPING – Public Hearing

The public hearing began at 6:03 PM with a very brief introduction by Planner Sutton. Commissioner Gale asked if the proposed changes would eliminate situations like the “horror” that had occurred just west of Grow Avenue on Wyatt Way. Ms. Sutton stated the particular subdivision ordinance that would prevent that had not yet been reviewed by the Tree Ad Hoc Committee. Questions about previous City ordinances (or the lack thereof) regarding trees were discussed. Ms. Sutton stated the City has always had a tree ordinance, but that changes were made after a King County court case requiring developers to save trees. Interim Director Tovar reported

that City Council was tasking the Tree Ad Hoc Committee with looking at this subject specifically and wanted them to report back within the next couple of months.

Public Comment

Charles Schmid, Citizen – Stated he was at the Council meeting Tuesday night and the new Council Members spoke eloquently about trees and the necessity for them. He thanked the Ad Hoc Tree Committee and acknowledged all the work they had done on the Ordinance which was complex and important to preserving or attempting to preserve the Island's special, natural appearance. He felt the Ordinance was especially important as there were major subdivisions currently going through the permitting process. He mentioned screening as a function that is always spoken about but he realized today another function that ought to be talked about more was runoff because the trees help hold up water. He said they were trying to setup a zoning ordinance that reflected the Comp Plan but it is never stated that's why they were doing this. Mr. Schmid complimented the Committee for coming up with a new way to calculate trees and shrubs by area instead of staying with the lineal number as previously used. He reminded the Commission about the importance of trees along the sidewalks were and that sometimes they were overlooked. Mr. Schmid spoke about the frustration of writing these ordinances and then seeing them disregarded. He asked the Tree Ad Hoc Committee to set aside some time to look at the violations and why they were done to try and solve the issues. (See attached document from Mr. Schmid for his submitted comments).

Olaf Ribeiro, Citizen – Wanted to congratulate the Committee for what they had done because he knew it had been a tough Fall with the discussions that had occurred and there had been times when he did not expect the Ordinance to get this far. Mr. Ribeiro would have liked a better definition of "significant trees." He named other jurisdictions like Lake Stevens, Olympia, etc., whom he felt defined "significant trees" better stating they take into account whether the tree was in a critical buffer area, the quality of the tree and a whole list of other criteria. He felt this would give applicants a guideline besides just saying a tree is significant and they would get further along with more specific criteria. He asked about the penalties for cutting down a tree citing three different places in the Ordinances where the fines appeared to be different. Mr. Ribeiro wanted to know which fine would be imposed. He stated he would like to see three times the value of the tree used. Commissioner Gale stated it would be the greater of the fines. He asked about the calculations for the number of trees required in a buffer using the example of 5,000 square feet. He felt requiring 250 square feet per tree was too much space. Commissioner Pearl noted that. Mr. Ribeiro stated he was a proponent of roadside buffers in residential zones and did not want to see chain link fences along rural collector roads instead of a vegetative buffer. He asked why the tree unit table topped out at 30" plus diameter trees. He felt they should go up to at least 48" diameter trees. He also did not know the scientific basis for using tree units and felt the Tree Ad Hoc Committee might want to look into that.

Kathy Wolf, Citizen – Wanted to offer up some ideas with the news that there would be ongoing discussion and review of these considerations. What struck her when quickly skimming the document was a lot of attention to buffers and screening. She felt that was a landscape architect outlook on the subject as opposed to her more ecological outlook. What the Ordinance implies is that the trees are an amenity that keep the public from avoiding seeing the wrong things and trees were much more than that ecologically. She mentioned the conversation that would happen involving the role of trees and climate response and she wanted to point out quite extensive literature was available on the role of trees in storm water management, air quality, energy use

reduction (with strategic growth and placement of trees in relationship to buildings) and that the outlook could be expanded to be more of an eco-system services perspective than simply the mechanics of land uses with a buffer strip between them. Canopy cover was a goal in response in many communities including Seattle, Olympia and Bellevue. She stated many communities in the State now had canopy cover goals. She stated that if there were strips around the edges of properties, canopy cover goals would not be achieved. The continuity of canopy would generate the benefits such as storm water management which was very relevant today. She asked that they proceed looking at other models in the State that do address a more ecological performance perspective as well as the kind of design and visual amenity perspective. Ms. Wolf also asked the Commissioners to consider forest structure giving the example of many cities having canopy goals because of storm water management because of the research that suggested that all the leaf area a tree has, particularly conifers in this climate, aid in absorption through the soil but as interception of water acting as a remarkable sponge where the water was not absorbed, but readmitted into the atmosphere. In a general sense, she felt it would be affective and that the structure below that canopy also performed that function citing the smaller trees and shrubs for example. Ms. Wolf related that she recently saw three parcels that had been developed where they very carefully protected the trees, but stripped out everything below them including the soil. In stripping out the soil and vegetation and planting grass, a ground surface with a runoff coefficient almost equal to pavement was introduced. She stated water swished across a lawn almost as quickly as pavement. She wanted the Commission to think of trees as eco-system service providers with an economic benefit to the community so they would look at vegetation as a whole instead of a scattering of trees they were cataloging by size and numbers. Ms. Wolf hoped there would be opportunity to bring these sorts of services into the code and mentioned there were jurisdictions all around the Puget Sound Basin that are addressing how to encourage people to plant trees, conserve trees and retain trees on private property. She did not want to see that let go over time for a more ecological perspective instead of a landscape architecture and site design perspective.

Don Willott, Citizen and Non-motorized Advisory Committee – Had not seen anything addressing the habitat value of snags but when people thought of trees he felt they were thinking also of wildlife. He stated that Paul Bannick, a well-known wildlife photographer who knew his habitats very well, pointed out that the large woodpeckers excavate holes and smaller woodpeckers trim them up a little bit and use them and all kinds of other birds use those holes, but without the snags, the holes would not be there. Mr. Bannick recommended that as many snags should be retained as tall as you can in balance with height safety so he encouraged attention to the habitat value of snags. Mr. Willott mentioned the Sound to Olympics Trail and that its concept was not a ribbon of asphalt but a greenbelt. He stated that State Route 305 (SR 305) was designated a scenic highway by the Washington State Department of Transportation (WSDOT) and he believed that most Islander's felt strongly about maintaining the character of the Island including the view shed as well as the habitat and all the values that Ms. Wolf and the others had spoken about. His particular request was that the Planning Commission and the Ad Hoc Tree Committee pay special attention to SR 305 and work at creating or maintaining vegetative buffer outside of the right of way because they have an attractive trail and to maintain the view shed that so many value will require they have that. He felt that would make the use of the trail more attractive. Mr. Willott also hoped they would pay special attention to saving the buffer outside of the right of way which, while wider than most state highway corridors, was still like trying to put ten pounds of something into a five pound bag if a regional trail and transit were to be housed there. Those uses required thoughtful planning of the space.

Commissioner Macchio expressed concern that the things Ms. Wolf brought up were not reflected in the current proposal. She also questioned the tree unit methodology saying she did not understand it. She also wanted to know the scientific basis behind it stating if there was not a rationale, they should not be using it. Commissioners Pearl and Quitslund agreed using tree units was a compromise with Commissioner Quitslund continuing on to say there were bigger issues that needed to be tackled and they did not want to get hung up on smaller issues instead. Chair Pearl reiterated that it was better than what the City previously had.

The Planning Commission determined the Public Hearing should be kept open into their meeting on February 11, 2016. Director Tovar informed the public present that this would be their notice that the public hearing would continue and if they wanted to make further comment, there would be an opportunity at the February 11, 2016 meeting.

LIMITED SHORELINE MASTER PROGRAM AMENDMENT – Introduction & Presentation

Senior City Planner Christy Carr gave what she called the 30,000 foot view of the proposed amendments to the Shoreline Master Program (SMP). The limited amendment will correct some grammatical and cross-reference errors as well as consolidate similar sections such as vegetation management and shoreline buffers.

PUBLIC COMMENT ON COMPREHENSIVE PLAN UPDATE

None.

2016 COMPREHENSIVE PLAN UPDATE

Director Tovar gave an update on the schedule. He spoke about pushing the date for recommendation to City Council out to the end of 2016 from June 2016. He then went into detail about the timeline stating they may be asked to go to three meetings a month in order to cover all the material needing review.

Director Tovar presented the edits received by EcoAdapt for Guiding Principle 8 saying a lot of the language/concepts used were adopted by the State as ideology without regulations stating how local jurisdictions should achieve them. Chair Pearl asked for consensus from the other Commissioners regarding adding the 8th principle. All the Commissioners agreed it should be added, but that it should be added as Guiding Principle 7 and the current 7th Guiding Principle should become Guiding Principle 8. Commissioner Gale asked for input on what they liked, didn't like, what should be included, etc., so the Drafting Committee would have a place to start.

Public Comment

Stacey Justus-Nordgren, EcoAdapt – Presented EcoAdapt's suggested revisions for Guiding Principle 8 stating they felt the language should be a clear statement of principle of what the City was going to consider in their policy that they would then make in each Element. (See attached revisions.)

Discussion continued on the Transportation Element with each Commissioner weighing in on changes they felt were needed. Exploration of stronger statements using words like leadership and champion happened as opposed to relying on support and encourage.

PUBLIC COMMENT ON COMPREHENSIVE PLAN UPDATE

Ron Peltier, City Council Member – Wanted to speak about the Overriding Principles stating four of them were about stewardship, sustainability and preserving the special character of the Island. He mentioned revised Principle 3: “Foster diversity, meet human needs of the residents, our most precious resource,” stating it created somewhat of a mandate about creating a variety of housing choices to meet the needs of present and future generations in all economic segments and promote the plans, projects and proposals to create a significant amount of affordable housing. He felt there was a conflict between wanting to create tree canopy, protecting water resources maintaining and enhancing ecological function and creating a range of housing when they had limited resources to do that. Mr. Peltier hoped the Planning Commission could think about this and reconcile these conflicts by tweaking the wording to the Overriding Principle.

Ross Hathaway, Citizen – Stated Squeaky Wheels advocated for efficient, safe and pleasant bicycling and walking for citizens of all ages and abilities on Bainbridge. Mr. Hathaway went on to say the citizens of Bainbridge consistently and strongly demanded improvements for walking and bicycling was widely recognized that there are significant deficiencies along the roadways for these modes. He felt they needed to make more progress in that area and it was very important that the Comprehensive Plan’s sub-elements contained strong goals and tools that would support the successful pragmatic implementation measures that would make those improvements reality. He wanted the Commission to think about stating the words “efficient, safe and pleasant” were important and deserved equal weight of somebody driving a car. He encouraged them to adopt a bicycle and pedestrian level of service standard stating they were nationally recognized standards that could potentially be modified to fit Bainbridge Island specifically if needed.

Don Willott, Non-Motorized Transportation Committee – Picked up on what Mr. Hathaway said about levels of service for both bicyclists and pedestrians hoping to include level of service measures for transit. He also encouraged the Commission to think in terms of separated grade crossings stating highway conversations tended to focus on right and left turn lanes and queue jump lanes for buses to get ahead of the traffic but adding the lanes makes it more hostile for pedestrians, especially slower pedestrians and since Bainbridge was a very gray community that was important. There were places along the highway corridor where they could go over the top because it was built on cut and fill. That would break up the mile long “super” block between Winslow Way and High School Road. He felt there were other places along the highway that could take advantage of that as well and since there was real budget money coming in from WSDOT, there were real decisions to make and the City needed to show leadership in what they advocate.

NEW/OLD BUSINESS

ADJOURN

Meeting was adjourned at 8:56 PM.

Accepted by:

DRAFT



CITY OF
BAINBRIDGE ISLAND

PLANNING & COMMUNITY DEVELOPMENT

MEMORANDUM

TO: Planning Commission

FROM: Christy Carr, AICP
Senior Planner

DATE: April 4, 2016

RE: Study Session on General Shoreline Master Program Limited Amendment

I. INTRODUCTION

The following topic areas are being presented tonight:

- **Consolidate and simplify regulations related to shoreline buffer:** The 1996 SMP referred to a “native vegetation zone.” This term was replaced in the 2014 SMP with a two-zone (Zone 1 and Zone 2) shoreline buffer. The lion’s share of SMP regulations address structures and vegetation within the shoreline buffer. Two sections – Section 4.1.2.5 (Regulations – Revegetation Standards) and Section 4.1.3 – Vegetation Management – contain similar and sometimes conflicting regulations about vegetation in the shoreline buffer. These two sections need to be consolidated and simplified to improve consistency and ease of use and eliminate unintended consequences of conflicting code.
- **Vegetation Alteration and Maintenance:** Revisions are needed to clarify when revegetation standards apply, what is allowed without City review (e.g.; landscape maintenance), the differences between vegetation within and outside the shoreline buffer, and what (if any) regulations apply to pruning/thinning/limbing of existing vegetation for general and/or view maintenance. Regulations related to significant tree and hazard tree removal need to be clarified.

II. OVERVIEW OF PROPOSED REVISIONS

Revisions are proposed to two sections – Section 4.1.2, Environmental Impacts and Section 4.1.3 – Vegetation Management. The primary purpose of the revisions is to simplify and clarify these two sections, which requires significant reorganization of the sections. To facilitate review and dialogue, the revisions are not presented in strikethrough/underline format; rather, two versions of each section are provided: one is the existing section, the other is the proposed, revised section (attached). The proposed revisions are keyed by type of change:

- Moved; no change

- Moved; revised language
- New language
- Revised language in place

Plain text indicates no change in location or language.

As titled and presented, the two sections lack clarity as to their purpose and intent. Section 4.1.2 is presently titled, “Environmental Impacts.” “Environmental Impact Mitigation” is a basic concept or principal provided in Ecology’s shoreline master program guidelines (guidelines) (WAC 173-26-201(2)(e)). The basic principal is that all proposed shoreline development, uses and activities require an analysis of environmental impacts, the analysis of environmental impacts shall be conducted consistent with the preferred mitigation sequence listed in WAC 173-26-201(2)(e) and the proposal must result in no net loss of shoreline ecological functions and processes. **This section was revised to better reflect the intent of the basic concept provided in Ecology’s shoreline master program guidelines, remove any language that does not apply and improve clarity of implementation of the regulations.**

Section 4.1.3 is titled, “Vegetation Management.” The corresponding general master program provision in the guidelines is titled, “Shoreline Vegetation Conservation” (WAC 173-26-221(5)). Its purpose is to conserve and protect shoreline vegetation through a variety of measures such as clearing and grading regulations, setback and buffer standards and mitigation requirements. This section establishes the shoreline buffer standards. The majority of the section deals with vegetation alteration in the shoreline buffer. **This section was revised to improve clarity regarding exceptions and existing landscaping, consolidate all shoreline buffer reduction provisions and mitigation requirements, and clarify that vegetation management regulations apply only to new development, uses and activities.**

Revisions to Table 4-3 are also proposed (attached) only to improve clarity.

Planning Commission Action: The Commission should ask questions of staff about the information presented. The Commission should provide input to staff on the proposed revisions.

III. NEXT STEPS

Staff is developing additional text amendments and a summary and narrative of proposed changes and will complete other submittal requirements for the limited amendment as the process proceeds.

Commission members should read the current SMP regulations in anticipation of reviewing proposed changes. Particular sections of focus include:

- Section 4.1.5.8 and Appendix B-9
- Section 4.2.1
- Shoreline Single Family Residence Mitigation Manual

The Planning Commission will continue to review proposed revisions at subsequent meetings.

Existing SMP

4.1.2 Environmental Impacts

4.1.2.1 Applicability

All shoreline development and activity shall be located, designed, constructed, and managed in a manner that avoids, minimizes and/or mitigates adverse impacts to the shoreline environment. The preferred mitigation sequence (avoid, minimize, rectify, reduce, or compensate for the environmental impact) shall follow that listed in WAC 173-26-201(2)(e). See definition of “Mitigation” listed in this Master Program, in Section 8.0, Definitions.

In approving shoreline development, the City shall ensure that shoreline development, use, and/or activities will result in no net loss of ecological functions and ecosystem-wide processes necessary to sustain shoreline resources, including loss that may result from the cumulative impacts of similar developments over time consistent with constitutional and statutory limitations on the regulation of private property. To this end, the City may require modifications to the site plan and/or adjustments to proposed project dimensions, intensity of use, and screening, as deemed appropriate. If impacts cannot be avoided through design modifications, the City shall require compensatory mitigation commensurate with the project’s adverse impacts.

4.1.2.2 Goal

Minimize impacts of shoreline development, uses and activities on the environment during all phases of development (e.g. design, construction, and management).

4.1.2.3 Policies

1. Ensure all shoreline uses, activities and developments are designed and located in a manner that prevents or mitigates adverse impacts to shoreline ecological functions and ecosystem-wide processes, including the use of the mitigation sequence (avoid, minimize, rectify, reduce, compensate); and make available flexible alternatives to accommodate preferred shoreline uses.
2. Ensure, through appropriate monitoring and enforcement measures that all required conditions are met, and improvements are installed and properly maintained.
3. Promote shoreline uses and activities within critical areas which do not cause significant adverse impacts to ecological functions and ecosystem-wide processes, such as public access on publicly owned lands.
4. In assessing the potential for new uses, activities and developments to cause adverse impacts, take into account all of the following:
 - a. Effects on ecological functions and ecosystem-wide processes, including temporal loss of functions; and
 - b. Effects that occur on-site and effects that may occur off-site; and
 - c. Direct and indirect effects and long-term effects of the project; and

- d. Effects of the project and the incremental or cumulative effects resulting from the project added to other past, present, and reasonably foreseeable future actions; and
 - e. Compensatory mitigation actions that offset adverse impacts of the development action and/or use.
5. To provide for comprehensive management strategies for shoreline areas, integrate planning and regulatory measures, such as those within the comprehensive plan, regional watershed plans, or state and federal regulations.

4.1.2.4 Regulations-Impact Analysis and No Net Loss Standard

1. All shoreline development, use and activities, including preferred uses, and uses that are exempt from a shoreline substantial permit, shall be located, designed, constructed, and maintained in a manner that protects ecological functions and ecosystem-wide processes. All proposed shoreline development, uses and activities shall:
- a. Utilize the required mitigation sequence of Section 4.1.2.6, Regulations – Mitigation; and
 - b. Utilize effective erosion and scour control methods during project construction and operation; and
 - c. Minimize adverse impacts to critical salt water habitat, fish and wildlife conservation areas, and/or other ecological functions and ecosystem-wide processes, such as those provided by shoreline vegetation; and
 - d. Minimize interference with beneficial natural shoreline processes, such as water circulation, sand and gravel transport movement, erosion, and accretion; and
 - e. Avoid hazards to public health and safety; and
 - f. Minimize the need for shoreline stabilization measures and flood protection in the future; and may require a geotechnical analysis to ensure that the proposed activity meets this regulation (See Section 6.2, Shoreline Stabilization); and
 - g. Result in no net loss of ecological functions and processes necessary to sustain shoreline resources, including loss that may result from the cumulative impacts of similar developments over time.
2. In reviewing and approving shoreline development, use or activity, regardless of whether a permit is required the following shall apply:
- a. The Administrator shall condition the shoreline development, use, and/or activities such that it will:
 - i. Meet provisions in subsection 1 above; and
 - ii. Employ measures to mitigate adverse impacts on shoreline functions and processes, if necessary; and
 - iii. Modify the site plan and/or adjust the project dimensions, intensity of use, or screening as deemed appropriate to address impacts. If impacts cannot be avoided through design modification, the Administrator shall require compensatory mitigation, pursuant to regulations in Sections 4.1.2.5,

Regulations – Revegetation Standards, and 4.1.2.6, Regulations – Mitigation; and

- b. If a proposed shoreline development, use or activity is determined by the Administrator to result in significant short-term, long-term, or cumulative adverse environmental impacts lacking appropriate compensatory mitigation, it shall be sufficient reason for the Administrator to deny a permit.
3. To assure that development activities contribute to meeting the no net loss provisions pursuant to subsection 1 and 2 above, an applicant is required to submit a site-specific analysis of potential impacts and a mitigation plan that includes compensatory mitigation measures when determined necessary as a result of the analysis. The site-specific analysis shall be prepared in accordance with Section 4.1.2.9, Submittal Requirements – Site-Specific Impact Analysis and Mitigation Plan.
4. To mitigate anticipated impacts and meet the no net loss standards in subsection 1 and 2 above, an applicant for a single family residential development or accessory structures may choose to use the Standard Residential Mitigation Manual in Appendix D in lieu of a site-specific impact analysis and mitigation plan. If an applicant uses the Single Family Residential Mitigation Manual, compensatory mitigation requirements provided in the manual shall be included in the project submittal.

4.1.2.5 Regulations – Revegetation Standards

1. Vegetation replanting is required for all development, uses or activities within the 200-foot shoreline jurisdiction that either alters existing native vegetation or any vegetation in the required Shoreline Buffer or Vegetation Management Areas, whether a permit is required or not. This includes invasive species removal. Minimum requirements for planting plans can be found in the City’s Administrative Vegetation Management Manual. The following information shall be submitted for approval prior to vegetation disturbance as part of a project proposal or clearing permit pursuant to BIMC 15.18, Land Clearing:
 - a. Residential, Industrial and Commercial Development.
 - i. Vegetation disturbance of 200 square feet or less requires submittal of an annotated list of proposed plants and their spacing specifications and location.
 - ii. Vegetation disturbance-greater than 200 square feet requires that the planting plan shall be completed by a qualified professional or the applicant may use the single-family residential mitigation manual.
 - b. Public Park and City Maintained Areas.
 - i. Vegetation disturbance of 2,500 square feet or less requires submittal of an annotated list of proposed plants and their spacing specifications and location.
 - ii. Vegetation disturbance greater than 2,500 square feet requires that the planting plan shall be completed by a qualified professional.
2. For vegetation mitigation in the Shoreline Buffer or Site-specific Vegetation Management Areas, all new plantings shall meet the provisions in Section 4.1.3.5(5), except for the Point Monroe District which shall meet special provisions in subsection 6,

3. If the Shoreline Buffer is altered or reduced pursuant to provisions of Section 4.1.3, Vegetation Management or Section 4.2.1, Nonconforming Uses, Non-Conforming Lots, and Existing Development, the following shall occur in Zone 1:
 - a. Retain existing native vegetation; and
 - b. Plant the entire area of Zone 1. Obtain 65% vegetation canopy coverage within 10 years.
4. When vegetation mitigation is required for new upland development, uses, or activities the mitigation plan shall include new plantings that are protective of views from the primary structure of the subject property and in proportion to the identified impact. Mitigation shall be located in the following sequence, except for the Point Monroe District which shall meet special provisions in subsection 6,
 - a. Within Zone 1, plant vegetation-to obtain a minimum of 65% native vegetation canopy coverage;
 - b. In Zone 2, plant to increase canopy coverage, in a manner that promotes contiguous native vegetation or in areas nearest the shoreline;
 - c. In the Shoreline Buffer, plant in a manner that promotes a contiguous native vegetated corridor that connects to the shoreline;
 - d. Outside of the Shoreline Buffer, plant in a manner that promotes a contiguous native vegetated corridor to the shoreline;
 - e. Outside of the Shoreline Buffer; or
 - f. At an off-site location approved by the Administrator, within Zone 1, plant to meet the standard of subsection a.
5. When mitigation is required for shoreline stabilization projects due to site disturbance, the required planting plan shall also include the following, unless an alternative planting plan is approved by the Administrator:
 - a. Replant 75% of the shoreline area located along the upland edge of the shoreline stabilization structure to a minimum depth of ten (10) feet, unless demonstrated to be infeasible to the Administrator;
 - i. The depth may be reduced to five (5) feet to allow for landscape design variation, provided that the total square footage of the area planted equals the required 75% of the shoreline;
 - b. Planting plans shall meet provisions in Section 4.1.3.5(5), and shade bearing plants shall be provided at suitable-fish spawning sites; and
 - c. Include plantings equivalent to one tree per ever 20 linear feet of shoreline and one shrub per ever five linear feet, which may be planted with due consideration of views from the primary structure of the subject property.
6. Special Mitigation Provisions for Point Monroe District. When vegetation mitigation is required for new development, uses, or activities in the Point Monroe District, the mitigation plan shall include new vegetation communities appropriate for dune, sand spit, barrier beach, barrier estuary, or barrier lagoon,

including salt marsh that shall be installed within the spit-specific vegetation management area (SVMA) as defined in Section 4.1.3.5(9), thirty (30) foot setback between the OHWM and the primary structure, or where area is available on the site.

4.1.2.6 Regulations – Mitigation

1. Mitigation Sequence: Mitigation shall include the following actions in order of priority (a-e), and (f) is required for all mitigation activities:
 - a. Avoiding the impact altogether by not taking a certain action or parts of an action;
 - b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;
 - c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
 - d. Reducing or eliminating the impact over time by preservation and maintenance operations;
 - e. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and
 - f. Monitoring the impact and the compensation projects and taking appropriate corrective measures.
2. When compensatory mitigation is necessary to offset impacts, mitigation measures in the immediate vicinity of the impact shall be the preferred mitigation option. Property owners may be required to perform the balance of compensatory mitigation off-site if the property cannot support required mitigation or when off-site mitigation can be demonstrated to the satisfaction of the Administrator to be more beneficial to shoreline ecological functions and processes. For example, off-site mitigation may be the better choice if large, cohesive areas are available off-site while only small fragmented areas are available on-site for mitigation.
3. Mitigation actions shall not have a significant adverse impact on other preferred shoreline uses promoted by the policies of the Shoreline Management Act.
4. When compensatory mitigation measures are required, all of the following shall apply:
 - a. The quality and quantity of the replaced, enhanced, or substituted resources shall be the same or better than the affected resources; and
 - b. The mitigation site and associated vegetative planting shall be nurtured and maintained such that healthy native plant communities can grow and mature over time; and
 - c. Unless the Single-family Residential Mitigation Manual is being used for single-family residential development and accessory structures pursuant to Section 4.1.2.4(4), the mitigation shall be informed by pertinent scientific and technical studies, including but not limited to the Shoreline Inventory and

Characterization Report, the Shoreline Restoration Plan and other background studies prepared in support of this Program; and

- d. The mitigation activity shall be monitored and maintained to ensure that it achieves its intended functions and values, pursuant to Section 4.1.2.7, Surety Regulations.
5. To encourage shoreline property owners to remove bulkheads and perform other beneficial shoreline restoration actions in advance of shoreline development or redevelopment, the City may give mitigation credit to any beneficial restoration action that occurred within 10 years of the proposed development/redevelopment activity provided that:
 - a. The applicant/property owner declares the intent of the restoration or enhancement project as mitigation credit at the time of the restoration permit application; and
 - b. The City can confirm via site inspection, photographs, or other evidence that the restoration actions have improved shoreline conditions.
6. Where feasible, replacement compensatory mitigation should be required prior to impact and, if applicable, prior to final inspection and approval of building occupancy; and to ensure no net loss, the mitigation shall replace the functions as quickly as possible following the impact.

4.1.2.7 Regulations – Surety

1. The applicant/property owner shall provide assurance to the satisfaction of the Administrator, that the restoration area (including off-site mitigation) will be maintained in perpetuity. The assurance can be in the form of notice on title, conservation easement, or similar mechanism as approved by the City Attorney.
2. Except for projects undertaken by public entities, performance and/or maintenance bonds or other security shall be required by the City to assure that work is completed, monitored, and maintained. The bond/surety shall be refunded to the depositor upon completion of the mitigation activity and any required monitoring.

4.1.2.8 Regulations – Monitoring and Maintenance

1. When mitigation is required, a periodic monitoring program shall be included as a component of the required mitigation plan. To ensure the success of the required mitigation, monitoring shall occur for a minimum duration of five years from the date of the completed development. The monitoring plan may also require that periodic maintenance measures be included as recommended by a qualified professional. The duration of monitoring may be extended if the project performance standards set forth in the approved mitigation plan fail to be accomplished, or, due to project complexity, the approved mitigation plan requires a longer period of monitoring.
2. Monitoring programs may be forwarded for review and comment to state and/or federal resource agencies and affected tribes with jurisdiction.
3. Monitoring programs shall meet the requirements established in Monitoring Requirements, Appendix B, B-6(C)(2)(e).

4. All new and replacement shoreline stabilization projects shall complete and submit a minimum five-year monitoring and maintenance program that addresses the shoreline stabilization mitigation measures, and shall at a minimum include:
 - a. An annual site visit by a qualified professional for each of the five (5) years to assess the effectiveness of the mitigation; and
 - b. A progress report submitted to the Administrator annually, which includes any monitoring or maintenance recommendations of the qualified professional.

4.1.3 Vegetation Management

4.1.3.1 Applicability

Vegetation management is required for protection and conservation within the shoreline jurisdiction. Dimensional and other development standards, including buffers, are established based on site-specific development and conditions or as specified for that particular shoreline designation. The purpose of vegetation management is to protect and enhance the Island's natural character, water quality, native plant communities, and wildlife habitat within the shoreline jurisdiction. Vegetation management activities will be reviewed under the no net loss provisions of Section 4.1.2, Environmental Impacts, and may also be reviewed under Section 4.0, General (Island-wide) Policies and Regulations; Section 4.1.4, Land Modification; Section 4.1.5, Critical Areas; Section 4.1.6, Water Quality and Stormwater Management; Appendix B; and BIMC Chapter 15.18, Land Clearing, when applicable. Other portions of this Program may also apply.

Vegetation management includes conservation activities to protect and restore vegetation along or near marine and freshwater shorelines that contribute to the ecological functions and processes of shoreline areas. Vegetation management provisions include vegetation restoration, the prevention or restriction of plant clearing and earth grading, and the control of invasive weeds and nonnative vegetation species.

The Vegetation Management provisions apply to all shoreline development, and regulated uses and activities, including those that do not require a shoreline permit. Similar to other master program provisions, vegetation standards do not apply retroactively to existing uses and structures unless changes or alterations are proposed. Standards for vegetation management are established using current scientific and technical information pursuant to WAC 173-26-221(5)(b) and 173-26-201(2)(a), and are based on the use category, shoreline characterization and the designation. Standards are provided in Section 4.0, and Tables 4-2 and 4-3.

4.1.3.2 Goal

Protect and restore shoreline vegetation to maintain and enhance ecological functions and processes, shoreline views and vistas, human safety, and personal property.

4.1.3.3 Policies

1. Maintain existing shoreline vegetation to protect ecological functions and/or processes from adverse impacts of uses, activities and developments within the shoreline jurisdiction.

2. Emphasize the use of native vegetation species to maintain the ecological functions and/or processes and mitigate the direct, indirect, and/or cumulative impacts of shoreline development, uses and activities.
3. Provide flexible dimensional standards for buffers and setbacks that are based on performance standards designed to protect ecological functions and ecosystem-wide processes, including considering alternatives to planting native vegetation species if it can be demonstrated that the equivalent ecological functions can be provided.
4. Use monitoring programs to ensure the protection of shoreline ecological functions and ecosystem-wide processes, particularly when non-native vegetation species are used as an alternative to native vegetation.
5. Encourage the restoration or enhancement of shoreline vegetation through incentive programs.
6. Establish buffers immediately upland of OHWM for each shoreline designation, recognizing the pattern of development, shoreline ecological functions and ecosystem-wide processes, and using current science and technical information, as described in WAC 173-26-201(2)(a). In establishing buffers, consideration should be given to the land use patterns to minimize the number of existing structures that would not conform to buffer dimensional standards.
7. At the time of a proposal, allow site-specific dimensional standards for vegetation management areas for shoreline development, use or activity. Dimensional standards must protect shoreline ecological functions and ecosystem-wide processes.
8. Implement a public education program emphasizing the importance of shoreline vegetation management.
9. Allow selective vegetation clearing for views for new development and to maintain views from existing residences when slope stability and ecological functions and ecosystem-wide processes are not compromised. Trimming and pruning are generally preferred over removal of native shoreline vegetation.
10. Develop specific regulations for Point Monroe, based on vegetation and management practices appropriate for dune communities, sand spits, barrier beaches, barrier estuaries or barrier lagoons.

4.1.3.4 Regulations – Exceptions

1. Vegetation management standards shall not apply retroactively to existing lawfully established conforming and nonconforming uses and developments, including maintenance of existing residential landscaping, such as lawns and gardens. Property owners are strongly encouraged to voluntarily improve shoreline vegetation conditions over the long term.
2. Existing buffers and setbacks that have been established through previously approved subdivisions and indicated on the face of an approved plat shall be recognized and adhered to.
3. The following shall be exempt from the provisions of Section 4.1.3.

- a. Maintenance trimming of vegetation that has a main stem or supporting structure which is less than three (3) inches in diameter; except that tree topping or other vegetation removal is not exempt.
- b. Buffer enhancement through the removal of noxious or invasive weeds, provided the following are met:
 - i. The vegetation removal is based on consultation with the Kitsap County Noxious Weed Board or the species being removed are on the Washington State Noxious Weed List (WAC 16-750, or its successor); and
 - ii. The vegetation removal is conducted in a manner consistent with best management practices (BMP); and
 - iii. Replanting occurs in the disturbed area in accordance with Section 4.1.2.5, Revegetation Standards.
- c. Removal of hazard trees, as defined in Appendix B, where a report by an arborist or other qualified professional demonstrates to the satisfaction of the Administrator that trimming is not sufficient to address the hazard provided:
 - i. Mitigation is provided in accordance with Section 4.1.2, Environmental Impacts, including:
 - A. Requiring that the downed tree be retained on the site to provide or enhance wildlife or marine habitat; and/or
 - B. When possible, require that the hazard tree be topped for safety and remain as a wildlife snag; or
 - ii. When a hazard tree is located in a geologically hazardous area, the applicant shall submit a Bluff Management Plan pursuant to Section 4.1.5, Critical Areas. The hazard tree may be removed prior to the approval of the plan if it is necessary to protect life and property.
- d. Commercial forest practices and the removal of trees pursuant to a Forest Practices Permit (Class II, III and IV-S only) issued by the Washington State Department of Natural Resources under the Washington State Forest Practices Act (RCW 76.09), except where such activities are associated with a conversion to other uses or other forest practice activities over which local governments have authority. For the purposes of this Program, preparatory work associated with the conversion of land to non-forestry uses and/or developments shall not be considered a forest practice and shall be reviewed in accordance with the provisions for the proposed non-forestry use, the general provisions of this Program, including Appendix B, and shall be limited to the minimum necessary to accommodate an approved use.

4.1.3.5 Regulations - General

1. Development within the shoreline jurisdiction shall be located and designed to protect existing native vegetation from disturbance to the fullest extent possible, to mitigate impacts to existing vegetation, and to meet the standard of no net loss of ecological functions and processes, Section 4.1.2, Environmental Impacts.
2. Vegetation clearing, or grading, may not be undertaken within the shoreline jurisdiction without prior review and approval by the Administrator, unless otherwise exempt under Section 4.1.3.4, Regulations – Exceptions, or as provided in subsection 7 below, with an

approved Standard Operation Procedure (SOP) manual. Clearing and grading may be subject to Section 4.1.4, Land Modification.

3. Two alternative methods may be used to meet the goals and policies of the Vegetation Management Section, as provided below, except the Point Monroe District shall meet the special provisions provided in subsection 9:
 - a. Site-Specific Vegetation Management Areas
 - i. As an alternative to the Shoreline Buffer dimensions provided in subsection b, below, an applicant may propose specific dimensional standards that meet the Vegetation Management goals and policies as determined through a Habitat Management Plan prescribed in Appendix B, Section B-4, provided that the plan demonstrates the following:
 - A. The proposed development is for a residential use.
 - B. The site-specific proposal assures there is no net loss of the property's specific shoreline ecological functions and associated ecosystem-wide processes pursuant to Section 4.1.2, Impact Analysis and No Net Loss; and
 - C. The site-specific proposal uses the scientific and technical information* compiled to support the Shoreline Buffer standards of Section 4.1.3.5(3)(b), and/or other appropriate technical information which, as determined by a qualified professional, demonstrates how the proposal protects ecological functions and processes and how it meets the goals and policies of this Section.
 - ii. The Habitat Management Plan shall be reviewed by the Administrator in accordance with provisions in Appendix B. The Administrator may approve, approve with conditions, or deny the request. The Administrator shall have the Habitat Management Plan reviewed by an independent third party, the cost of which will be borne by the applicant.
 - iii. If the Site-specific Vegetation Management Area is approved, prior to permit issuance, the applicant shall record with the County Auditor a notice on title, or other similar document subject to the approval of the Administrator.

*Footnote: Scientific and technical information supporting the Shoreline Buffer standards is provided in the following documents available at the City of Bainbridge Island's Department of Planning and Community Development: *Documentation of Marine Shoreline Buffer Recommendation Discussions*, Memorandum, 2011, Herrera Environmental; *Addendum to Summary of Science*, 2011, Herrera Environmental; *Bainbridge Island Current and Historic Coastal Geomorphic/Feeder Bluff Mapping*, 2010, Coastal Geologic Services, Inc.; *Best Available Science*, 2003, Battelle; *Bainbridge Island Nearshore Habitat Characterization and Assessment*, 2004 Battelle.

7. Vegetation clearing and maintenance activities, except those which are part of new construction, are allowed consistent with an approved SOP manual for vegetation maintenance and management of public parks, public trails, public rights-of-way or easements, publicly-owned property, and/or other areas normally maintained by the City. A shoreline substantial development permit may be required for the SOP manual. The SOP manual shall include the following prescriptive elements:
 - a. Procedures for maintaining vegetation on shoreline properties, shoreline trails or shoreline rights-of-way and easements, including procedures for noxious weed removal;
 - b. Procedures for maintaining vegetation in Critical Areas, Shoreline Buffers, or Site-specific Vegetation Management Areas, or other sensitive land areas, including areas with cultural resources;
 - c. Procedures for mitigation and vegetation replanting including appropriate species list; and
 - d. Procedures for review and approval of allowed activities occurring under the scope of the SOP, including procedures for documenting activities.
8. Minor vegetation removal outside the shoreline buffer or site-specific vegetation management area on a developed property not associated with new construction may be allowed, as provided in this program with an approved clearing permit provided:
 - a. The Administrator may grant approval of minor vegetation clearing if it meets the provisions of this Program and the following:
 - i. The minor vegetation clearing allowed within a three (3) year period will include an area no greater than 200 square feet in area and/or no more than 3 non-significant trees per 20,000 square feet up to a maximum of six (6) trees; and
 - ii. Native vegetation will not be removed from the Shoreline Buffer or Vegetation Management Area; and
 - iii. All applicable standards of an approved Vegetation Management Plan are met; and
 - iv. The replanting is performed pursuant to Section 4.1.2.5, Revegetation Standards; and
 - v. A Bluff Management Plan is provided pursuant to Section 4.1.5, Critical Areas for any vegetation alteration in a geologically hazardous area.
 - b. Proposed clearing must meet the provisions of Sections 4.1.2, Environmental Impacts and 4.1.4, Land Modification.
9. **Special Provisions for Point Monroe District.** Shoreline Buffers or Site-specific Vegetation management Areas are not required for properties located in the Point Monroe District;-the following specific vegetation provisions shall apply:
 - a. All properties in the Point Monroe District shall retain existing native vegetation and shall be subject to a Point Monroe vegetation management area (PVMA).
 - b. The PVMA shall include areas that are:
 - i. Within thirty (30) feet of the OHWM and within the required side yard and the salt marsh fringe; and

- ii. Outside any designated development area as approved pursuant to Section 5.9.6(2).
- c. The PVMA shall be managed and maintained in vegetation communities appropriate to dune, sand spit, barrier beach, barrier estuary, or barrier lagoon, including salt marsh.
- d. Developed properties shall retain existing native vegetation (including dune grass and salt marsh plant communities) in those areas that are not developed with legally established impervious surfaces.
- e. Any new development or alterations and expansion of existing development shall assess impacts to existing vegetation and meet the no net loss standard pursuant to Section 4.1.2, Environmental Impacts.

4.1.3.6 Regulations – Shoreline Buffer – Location and Design Standard

1. The total depth of the Shoreline Buffer is based on the shoreline designation and the physical and most predominant geomorphic characteristics of the property. The depth of the Shoreline Buffer will be determined by the Administrator according to criteria below.
 - a. Property-specific physical and geomorphic characteristics of the particular lot will determine the maximum width (Category A) or minimum width (Category B) of the Shoreline Buffer, as follows:
 - i. Shoreline Buffer Category A: The property contains or abuts a spit/barrier/backshore, or marsh, or lagoon; or
The property contains or abuts a low bank and the existing native tree and shrub vegetation cover is at least 65% of the area of Shoreline Buffer Zone 1.
 - ii. Shoreline Buffer Category B: The property is shallow (200 feet in depth or less, as measured landward), or located on a high bluff, or does not meet any of the characteristics of Category A.
 - b. Shoreline Buffer standard depth in Table 4-3
 - c. As determined by the Administrator, buffers do not extend beyond an existing public paved street or an area which is determined by the Administrator to be functionally isolated from the shoreline or critical area. In these limited instances the no net loss of shoreline ecological function and processes still apply to properties within the shoreline jurisdiction.
2. The total area of the Shoreline Buffer shall be the equivalent of the length of the property along the shoreline, multiplied by the required buffer depth as prescribed for the specific shoreline designation in which the property is located. See Figure 4-1.
3. The Shoreline Buffer consists of two zones. The depth of each of the two zones within the Shoreline Buffer is determined as follows:
 - a. Zone 1 shall extend from the ordinary high water mark (OHWM) a minimum of 30 feet, or to the limit of existing native vegetation whichever is greater. The native vegetation limit is determined through a site-specific analysis of existing

conditions, and in no case shall Zone 1 be greater than the depth of the Shoreline Buffer.

- b. Zone 2 shall be established immediately landward of the Zone 1 and extend no further than the depth of the Shoreline Buffer.
4. The following zone specific planting regulations apply to the Shoreline Buffer:
- a. New lawns are not permitted in Zone 1.
 - b. In Zone 2, one-third (1/3) of the area may be planted in a combination of grass lawns and approved structures provided:
 - i. Significant native trees are not removed to establish such use, or
 - ii. The buffer has been reduced through view provisions of Section 4.1.3.11.
 - c. The remaining two-thirds (2/3) of Zone 2 shall be maintained in a native vegetative state.
 - d. Planted areas in which fertilizers might be applied shall be located as far landward of Zone 1, as feasible.

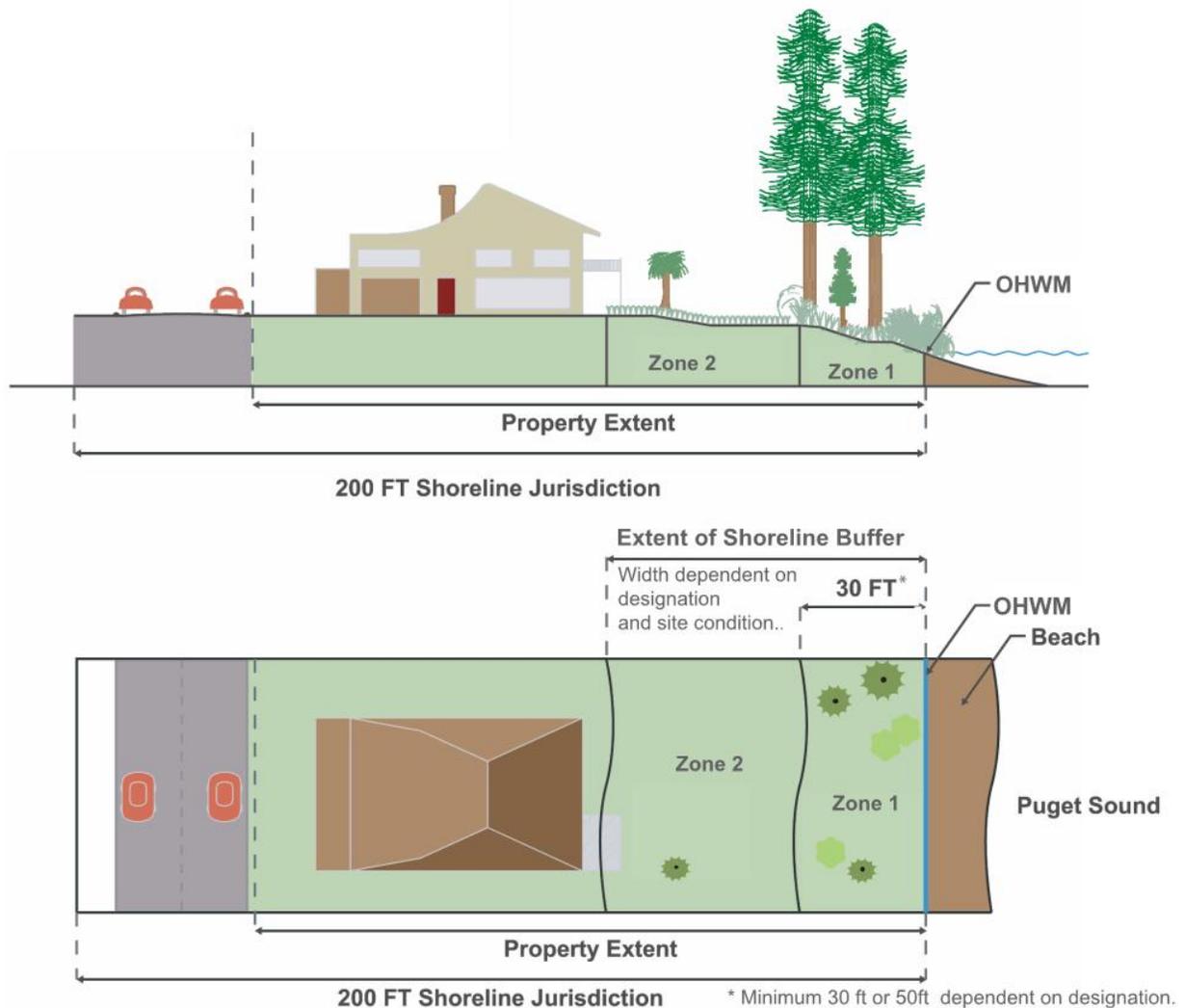


Figure 4-1 Dual Shoreline Buffer

4.1.3.7 Regulations – General Vegetation Alterations in Shoreline Buffers or Site-specific Vegetation Management Areas

1. The following activities are allowed within the Shoreline Buffer and Site-specific Vegetation Management Area with an approved clearing permit. Such activities shall meet the standards of Section 4.1.4, Land Modification.
 - a. Existing landscape areas may be retained within the Shoreline Buffer or Site-specific Vegetation Management Area. However, any changes from the existing landscape to a different landscaping use or activity will require that the modified area comply with the provisions of 4.1.3, Vegetation Management, and the intent of providing native vegetation to maintain ecological functions and processes.

- b. **Minor Pruning.** Tree pruning, including thinning of lateral branches to enhance views, or trimming, shaping, thinning or pruning necessary for plant health and growth and which does not harm the plant, is allowed consistent with the following standards:
 - i. All pruning shall meet the American National Standard Institute (ANSI) tree pruning standards;
 - ii. In no circumstance shall removal of more than one-fourth (1/4) of the original crown be permitted within a three year period;
 - iii. Pruning shall not include topping, stripping of branches or creation of an imbalanced canopy; and
 - iv. Pruning shall retain branches that overhang the water.
 - c. **Vegetation Removal Related to Construction.** Tree or vegetation removal within the Shoreline Buffer or Site-Specific Vegetation Management Area that is associated with new construction may be allowed, but must retain significant trees and shall meet the requirements of Section 4.1.2, Environmental Impacts, including replanting provisions.
 - d. **Vegetation Removal Related to Public Facility Maintenance.** Tree or vegetation removal within the Shoreline Buffer or Site-specific Vegetation Management Area that is associated with maintenance of existing public facilities (including: roads, paths, bicycle ways, trails, bridges, sewer infrastructure facilities, storm drainage facilities, fire hydrants, water meters, pumping stations, street furniture, potable water facilities, and other similar public infrastructure), may be approved by the Administrator if no significant trees are removed, the requirements of Section 4.1.2, Environmental Impacts are met, and the maintenance is measures meet the goals and policies of Section 4.1.3, Vegetation Management, or as approved in a SOP manual as provided in Section 4.1.3.5(7). The following activities are exempt from this requirement:
 - i. Removal of vegetative obstructions required for sight distance and visual clearance at street intersections provided in the Public Works Design and Construction Standards and Specifications.
 - e. **Underground Utilities.** Utilities that run approximately perpendicular to the buffer (for example, a stormwater tightline to the water to protect a slope or a sewer line to a marina), may be allowed within the Shoreline Buffer or Site-specific Vegetation Management Area, provided that disturbance is minimized and the disturbed area is revegetated after construction; and
 - f. **Other Approved Development in the Shoreline Buffer or Site-specific Vegetation Management Area.**
 - i. Potable water wells; and
 - ii. Approved shoreline stabilization;
2. **Shoreline Buffer Reductions.**

- a. When the prescriptive buffer depth is reduced or dimensions altered through provisions of this Program, the applicant shall record a notice on title, or other similar document with the County Auditor prior to permit issuance, subject to the approval of the Administrator.
 - b. If the required depth of a Shoreline Buffer for a single-family residential property is reduced in accordance with the Shoreline Structure Setback provisions of Section 4.1.3.11 or other reductions allowed through this Program, Zone 1 must be restored in accordance with provisions of Section 4.1.2.5.
- 3. Stairways to the shoreline shall not exceed 300 square feet for private use, the minimum necessary for public use and are not included in the total square footage allocations prescribed in subsections 4.1.3.8(3) of this Program.
 - a. Larger stairways serving a single-family residence may only be allowed through approval of a Shoreline Variance.
 - i. As an alternative to a stairway larger than 300 square feet and to reduce environmental impacts, a tram may be allowed without a variance.
 - b. Stairway design shall meet the following minimum criteria:
 - i. International Codes for:
 - A. Hand Railings;
 - B. Stairway width; and
 - C. Tread Depth.
 - ii. Landings are required, unless demonstrated not to be necessary, and shall be determined by:
 - A. Existing site topography;
 - B. Personal safety; and
 - C. Slope stability.

4.1.3.8 Vegetation Alterations Standards – Residential Development

Minor clearing, grading or construction may be allowed within the Shoreline Buffer or Site-specific Vegetation Management Plan for a residential development with approval of the Administrator pursuant to Section 4.1.3.7(1)(a), and only for the following activities as prescribed below and pursuant to Section 4.1.4, Land Modification:

1. Maintenance of existing residential landscaping is allowed subject to Sections 4.1.3.5(8) and 4.1.3.7. 2. One (1) hand installed pervious trail to the shoreline not more than four (4) feet in width, which may include hand installed steps, and shall be designed to minimize environmental impacts. No significant trees shall be removed. The trail may be wider when required for handicapped or public access. For single-family residential development vegetation trimming is limited to two (2) feet on either side of the trail.
3. Non-habitable structures appurtenant to a single-family use, such as a boat house, deck/patio and/or stairway may be allowed consistent with the following standards, except

that all structures are prohibited in Zone 1 when upland of a Priority Aquatic –_Category A designation.

- a. For Site-specific Vegetation Management Areas, the total square footage of all buildings or structures must not exceed 300 square feet in area.
- b. For Shoreline Buffer areas, the total square footage of all buildings or structures must not exceed 400 square feet or 10% of the Shoreline Buffer area, whichever is less.
- c. For Shoreline Buffer areas, only 10% of the total allowed square footage or 300 square feet, whichever is less, can be located in Zone 1, except when upland of Priority Aquatic B, the total allowable square footage is 5% of Zone 1 or 150 square feet, whichever is less.
- d. All structures must be designed to not significantly impact views from adjoining property primary buildings.
- e. All structures must meet the following standards:
 - i. Only water-related structures are allowed within 30 feet of the OHWM or in Zone 1, including a boathouse, permeable deck, boat storage, or staircase.
 - ii. Shall not exceed 12 feet in height above existing grade.
 - iii. Decks and/or patios shall be permeable and shall not exceed 30 inches in height above existing grade.

4. View Maintenance – Single-family Residential Only.

Shoreline residential use and development shall use all feasible techniques to maximize retention of existing native shoreline vegetation within the Shoreline Buffer and the Site-specific Vegetation Management Area.

- a. Limited removal of existing trees or vegetation located on the same property as a single-family residence may be allowed for maintenance of a pre-existing view from the primary structure, or to establish a view for a new primary structure provided the following are met:
 - i. The applicant demonstrates to the satisfaction of the Administrator that the vegetation removal is the minimum necessary to re-establish or establish a view of the water similar to that enjoyed by other residences in the area and that pruning methods are not sufficient to provide an adequate view of the water similar to that enjoyed by other residences in the area; and
 - ii. Existing significant native trees are not removed within the Shoreline Jurisdiction, unless exempt; and
 - iii. In no instance, including accounting for other approved alterations as provided in Section 4.1.3, shall vegetation removal exceed twenty (20) percent of the required Shoreline Buffer area or Site-specific Vegetation Management Area or reduce the vegetation canopy coverage to less than 65% in the Shoreline Buffer or Vegetation Management Area.

- A. Vegetation removal occurring adjacent to the shoreline shall also be limited to fifteen (15) linear feet of the water frontage; and
 - iv. The applicant shall obtain an approved Bluff Management Plan pursuant to Section 4.1.5, Critical Areas for any vegetation alteration in a geologically hazardous area. The cost and preparation of the plan is the responsibility of the applicant; and
 - v. All vegetation removal complies with other applicable requirements of this Program (such as clearing and grading, forest practices, and protection standards for fish and wildlife habitat), including the no net loss and/or revegetation standards in Section 4.1.2.
- b. The Administrator may deny a request or condition approval for vegetation alteration proposals for view maintenance if it is determined that the action will result in an adverse effect to any of the following:
- i. Slope stability;
 - ii. Habitat value;
 - iii. Health of surrounding vegetation;
 - iv. Risk of wind damage to surrounding vegetation;
 - v. Nearby surface or ground water; or
 - vi. Water quality of a nearby water body.

4.1.3.9 Vegetation Alteration Standards – Commercial and Industrial Development in Shoreline Buffers

Minor clearing, grading, or construction may be approved within the Shoreline Buffer for a commercial or industrial development with approval of the Administrator pursuant to Section 4.1.3.7(1)(a) and only for the following activities as prescribed below and pursuant to Section 4.1.4, Land Modification:

1. Primary appurtenant structures to a commercial use that either support public access or are necessary to support a water-dependent use shall be allowed within the buffer when the applicant has demonstrated a need for the shoreline location, except that all structures are prohibited in Zone 1 when upland of a Priority Aquatic designation.
2. When appurtenant structures are allowed they must be the minimum necessary to meet the needs of the water-dependent use or public access requirements of Section 4.2.4, Public Access.

4.1.3.10 Vegetation Alteration Standards – Public Park Development in Shoreline Buffers

Minor clearing, grading, or construction may be allowed within the Shoreline Buffer for a public park development with approval of the Administrator consistent with the following or pursuant to Section 4.1.3.7:

1. Vegetation clearing and maintenance is allowed in accordance with an approved SOP manual that meets Section 5.1.3.5(7) and the standards of this Program.
2. Maintenance of existing public trails, provided the vegetation trimming is limited to four (2) feet on either side of the trail and no significant trees are removed.
3. Alterations that are included in a Park Development or Concept Plan. Minor clearing, grading, or construction for which the size and extent of proposed disturbed areas located within the Shoreline Buffer have been determined as part of a park development plan or concept park plan, with due consideration of the intended park use; and provided all proposed disturbance areas meet the no net loss standards pursuant to in accordance with Section 4.1.2. Environmental Impacts; and provided appropriate permits are obtained, including those pursuant to Section 4.1.4, Land Modification;
4. Alterations that are not part of a Park Development or Concept Plan. The following minor clearing, grading, or construction activities may be allowed without an approved park development plan or conceptual park plan:
 - a. Maintenance of existing public trails is allowed, provided maintenance is limited to the existing size of the trail, any vegetation trimming is limited to four (4) feet on either side of the trail, and no significant trees are removed.
 - b. New public pathways or trails to the shoreline provided it is demonstrated that the size and extent of the public pathways has been determined with due consideration of the intended park use.
 - c. Structures.
 - i. Primary appurtenant structures to a public park and recreational use that either support public access or are necessary to support a water-dependent recreation use shall be allowed within the Shoreline Buffer when a need for the shoreline location is demonstrated, except that all structures are prohibited in Zone1 when upland of a Priority Aquatic designation. When appurtenant structures are allowed, they must be the minimum necessary to meet the needs of the water-dependent use or public access requirements of Section 4.2.4, Public Access.
 - ii. The total square footage of all buildings or structures must not exceed 6,000 square feet or 10% of the Shoreline Buffer area, whichever is less.
 - A. Only 10% of the total allowed square footage or 1,000 square feet, whichever is less, can be located in Zone 1.
 - iii. All structures must be designated to not significantly impact views from adjoining property primary buildings.
 - iv. All structures must meet the following standards:
 - A. Only water-related recreational furniture, amenities and structures are allowed in Zone 1, including but not limited to, picnic tables, benches, interpretive kiosks, viewing platforms, boardwalks, pervious trails or staircases, recreational furniture, signs, pervious

trails, and staircases are not included in the maximum square footage allocations prescribed in subsection 4.c.ii, above;

- B. Accessory recreation buildings, including restrooms, picnic pavilions and service roads that serve such structures may be allowed in Zone 2 and buildings shall not exceed 12 feet in height above existing grade;
- C. Stairways may exceed 300 square feet, provided that it is demonstrated that a greater area is necessary to meet public access and public use demands. Stairways shall conform to the standards of the Building Code as adopted in BIMC Chapter 15.04.; and
- D. Boat ramps and other boating facilities may be allowed pursuant to Section 5.4, Boating Facilities.

4.1.3.11 Regulations – Shoreline Structure Setback View Requirement

1. To protect existing predominate shoreline views and accommodate shoreline views for a new single-family primary residential structure or addition to a primary residential structure, the Administrator may allow Zone 2 of the Shoreline Buffer to be altered when there is an existing primary residential structure located within 100 feet of the property line of the subject property and topographical or other relevant information indicates that the view of the shoreline from the subject property or the adjacent residence would be impacted by existing or proposed development. The shoreline structure setback line may also require that new structures be set farther away from the shoreline to preserve existing views enjoyed by an adjoining single-family primary structure that was established earlier. These provisions apply to single-family residences only, except in the Point Monroe District.
 - a. Setbacks for the purpose of this subsection are based on the location of primary residential structure(s) existing at the time a new primary residential building permit is submitted. A primary residential structure constructed in compliance with the required shoreline setback is not made nonconforming by the later construction of a primary residential structure in a different location on an adjoining lot.
 - b. The shoreline structure setback provisions apply only to primary single-family residential structures located within the 200-foot shoreline jurisdiction, where an existing primary single-family residential structure is located within 100 feet of the subject property line. All measurements are to the closest primary residential structure on either side of the subject property as measured parallel to the shoreline.
 - c. In determining the shoreline structure setback line, the Administrator may also consider topography or other physical property constraints in addition to the provisions of subsection 4 and 5, below. Applicants may submit detailed information regarding how property constraints impact the predominate shoreline views from either the subject property's proposed primary residential structure or adjoining properties' primary residential structure(s).

2. The Shoreline Buffer on the subject property may be reduced below the depth requirements identified in Table 4-3 to allow a new primary residential structure to be located within Zone 2 provided the conditions in Section 4.1.3.7(2) are met.-Mitigation of proposed residential development shall be required pursuant to Section 4.1.2, Environmental Impacts.
3. In no case shall the subject property be permitted to locate a new primary residential structure within the site's specified Zone 1 of the Shoreline Buffer, unless a Shoreline Variance is granted.
4. Adjoining Development Located Within Shoreline Buffer. The setback requirement for the subject property shall be based on the location of the adjoining properties' primary residential structure(s) as described in subsections (a) through (d) below.
 - a. Primary Residential Structure Located on One Side. When an existing primary residential structure is located on one side of the subject property, the shoreline structure setback line shall be determined as follows:
 - i. If the adjoining primary residence is partially or wholly located within Zone 2, the shoreline setback line is determined by drawing a line from the most waterward point of the adjoining primary residential structure to the point at which the subject property's Shoreline Buffer boundary intersects the subject property's opposite property line. (See Figure 4.1.a below).
 - ii. If the adjoining primary residence is located partially or wholly in Zone 1, the shoreline structure setback line shall be determined by drawing a line from the point of intersection of the subject property and the adjoining property's Zone 1 boundary, to the point at which the subject property's Shoreline Buffer boundary intersects the subject property's opposite property line. (See Figure 4.1.b, below).
 - b. Primary Residential Structure Located on Both Sides. When existing primary residential structures are located on both sides of the subject property, the shoreline structure setback line shall be determined as follows:
 - i. If both the adjoining primary residential structures are located partially or wholly in Zone 2, then the shoreline structure setback line shall be determined by drawing a line between the most waterward points of each of the adjoining primary residential structures. (See Figure 4.1.b, below)
 - ii. If one of the adjoining primary residences is partially or wholly in Zone 1, and the other adjoining primary residence is partially or wholly in Zone 2, the shoreline structure setback line shall be determined by drawing a line from the point of intersection of the subject property and the adjoining property's Zone 1 boundary (for that adjoining residence located in Zone 1), to the most waterward point of the other adjoining primary residential structure located in Zone 2. (See Figure 4.1.b, below).
 - iii. If both of the adjoining primary residences are located partially or wholly within Zone 1, the shoreline structure setback line shall be determined by drawing a line from the point of intersection of the subject property's Zone 1 boundary and the adjoining property's Zone 1 boundary to the same

intersection point on the subject property's opposite property line. (See Figure 4.1.c. below)

- c. **Primary Residential Structure Located on a Shoreline Forming a Cove or Headland.** The Administrator shall make the determination whether a shoreline forms a cove or headland. When existing primary residential structures are located on a cove or headland, the shoreline structure setback line shall be determined as follows:
 - i. If there is a primary residential structure on only one side of the subject property, then the shoreline structure setback line for the subject property shall be either the distance from the OHWM to the most waterward portion of the primary residence structure of the adjoining property, or the subject property's Zone 1, whichever is greater.
 - ii. If there are adjoining primary residential structures located on both sides of the subject property, the shoreline structure setback line shall be determined by averaging the distance from OHWM to the most waterward portion of the two adjoining property's primary residential structures. (See Figure 4-1(c) ii, below)
5. **Adjoining Development Located Outside the Shoreline Buffer.** The setback requirement for the subject property shall be based on the location of the adjoining properties' primary residential structure(s) as described in subsections (a) and (b) below.
 - a. **Primary Structure Located on One Adjoining Property, Outside Shoreline Buffer.** When an existing primary residential structure is located on one side of the subject property, the shoreline structure setback line shall be determined by drawing a line from the most waterward point of the primary residential structure of the adjoining property to a point at which the subject property's Shoreline Buffer boundary intersects the subject property's opposite property line. (See Figure 5-1(a), below).
 - b. **Primary Structures Located on Both Adjoining Properties, Outside the Shoreline Buffer.** When existing primary residential structures are located on both sides of the subject property, the shoreline structure setback line shall be determined by drawing a line between the most waterward points of each of the adjoining primary residential structures. (See Figure 5-1(b), below).
 - c. **Primary Structures Located on Both Adjoining Properties, Outside the Shoreline on a Cove or Headland.** When existing primary residential structures are located on both sides of the subject property, the shoreline structure setback line shall be determined by averaging the distance from OHWM to the most waterward portion of the two adjoining property's primary residential structures. (See Figure 5-1(c), below).

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4.1.2 Environmental Impact Mitigation

4.1.2.1 Applicability

All proposed shoreline development, uses and activities require an analysis of environmental impacts of the proposal and shall include measures to mitigate environmental impacts not otherwise avoided or mitigated by compliance with this Program and other applicable regulations. The analysis of such environmental impacts shall be conducted consistent with the preferred mitigation sequence listed in WAC 173-26-201(2)(e).

In approving new shoreline development, uses and activities the City shall ensure that shoreline development, uses and activities will result in no net loss of ecological functions and ecosystem-wide processes necessary to sustain shoreline resources, including loss that may result from the cumulative impacts of similar developments over time consistent with constitutional and statutory limitations on the regulation of private property. To this end, the City may require modifications to the site plan and/or adjustments to proposed project dimensions, intensity of use, and screening, as deemed appropriate. If impacts cannot be avoided through design modifications, the City shall require compensatory mitigation commensurate with the project's adverse impacts.

4.1.2.2 Goal

Minimize environmental impacts of shoreline development, uses and activities during all phases of development (e.g. design, construction, and management).

4.1.2.3 Policies

1. Ensure all shoreline development, uses and activities are designed and located in a manner that prevents or mitigates adverse impacts to shoreline ecological functions and ecosystem-wide processes, including the use of the mitigation sequence (avoid, minimize, rectify, reduce, compensate); and make available flexible alternatives to accommodate preferred shoreline uses.
2. Ensure, through appropriate monitoring and enforcement measures that all required conditions are met, and improvements are installed and properly maintained.
3. Promote shoreline uses and activities within critical areas which do not cause significant adverse impacts to ecological functions and ecosystem-wide processes, such as public access on publicly owned lands.
4. In assessing the potential for new uses, activities and developments to cause adverse impacts, take into account all of the following:
 - a. Effects on ecological functions and ecosystem-wide processes, including temporal loss of functions; and

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- b. Effects that occur on-site and effects that may occur off-site; and
 - c. Direct and indirect effects and long-term effects of the project; and
 - d. Effects of the project and the incremental or cumulative effects resulting from the project added to other past, present, and reasonably foreseeable future actions; and
 - e. Compensatory mitigation actions that offset adverse impacts of the development action and/or use.
5. To provide for comprehensive management strategies for shoreline areas, integrate planning and regulatory measures, such as those within the comprehensive plan, regional watershed plans, or state and federal regulations.

4.1.2.4 Regulations-Impact Analysis and No Net Loss Standard

1. All shoreline development, uses and activities, including preferred uses, and uses that are exempt from a shoreline substantial permit, shall be located, designed, constructed, and maintained in a manner that protects ecological functions and ecosystem-wide processes. All proposed shoreline development, uses and activities shall:
- a. Utilize the required mitigation sequence of Section 4.1.2.5, Regulations – Mitigation; and
 - b. Utilize effective erosion and scour control methods during project construction and operation; and
 - c. Minimize adverse impacts to critical salt water habitat, fish and wildlife conservation areas, and/or other ecological functions and ecosystem-wide processes, such as those provided by shoreline vegetation; and
 - d. Minimize interference with beneficial natural shoreline processes, such as water circulation, sand and gravel transport movement, erosion, and accretion; and
 - e. Avoid hazards to public health and safety; and
 - f. Minimize the need for shoreline stabilization measures and flood protection in the future; and may require a geotechnical analysis to ensure that the proposed activity meets this regulation (See Section 6.2, Shoreline Stabilization); and
 - g. Result in no net loss of ecological functions and processes necessary to sustain shoreline resources, including loss that may result from the cumulative impacts of similar developments over time.
2. In reviewing and approving shoreline development, uses or activity, regardless of whether a permit is required the following shall apply:
- a. The Administrator shall condition the shoreline development, use, and/or activities such that it will:
 - i. Meet provisions in subsection 1 above; and
 - ii. Employ measures to mitigate adverse impacts on shoreline functions and processes, if necessary; and

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- iii. Modify the site plan and/or adjust the project dimensions, intensity of use, or screening as deemed appropriate to address impacts. If impacts cannot be avoided through design modification, the Administrator shall require compensatory mitigation, pursuant to regulations in Sections 4.1.2.5, Regulations – Mitigation and 4.1.3, Vegetation Management.
 - b. If a proposed shoreline development, use or activity is determined by the Administrator to result in significant short-term, long-term, or cumulative adverse environmental impacts lacking appropriate compensatory mitigation, it shall be sufficient reason for the Administrator to deny a permit.
3. An applicant for any shoreline development, use or activity must demonstrate compliance with the no net loss provisions pursuant to subsection 1 and 2 above, as follows:
- a. Demonstrate use of applicable mitigation measures in the Single Family Residence Shoreline Mitigation Manual provided in the City’s Administrative Manual. Proposed mitigation measures and the manual’s “Checklists for Mitigation Approval” must be included in the application; or
 - b. If the project site or proposal does not qualify for use of the Single Family Residence Shoreline Mitigation Manual, submit a site-specific impact analysis in accordance with the guidance provided in the City’s Administrative Manual. A mitigation plan must be included when determined to be necessary as a result of the analysis.

Note: Old Section 4.1.2.5 Regulations – Revegetation Standards moved to various locations in Section 4.1.3. Existing language from Section 4.1.2.5 is noted in Section 4.1.3. Language not related to environmental impacts mitigation was relocated.

4.1.2.5 Regulations – Mitigation

1. To ensure the no net loss standard is met, any adverse impacts must be mitigated in accordance with mitigation sequencing pursuant to WAC 173-26-201(2)(e):
 - a. Avoiding the impact altogether by not taking a certain action or parts of an action;
 - b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;
 - c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
 - d. Reducing or eliminating the impact over time by preservation and maintenance operations;
 - e. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and

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- f. Monitoring the impact and the compensation projects and taking appropriate corrective measures.
2. Unless the Single Family Residence Shoreline Mitigation Manual is being used, mitigation sequencing must be documented in a site-specific impact analysis. If mitigation is necessary as a result of the site-specific impact analysis, a mitigation plan meeting the applicable provisions in Appendix B-6, including a periodic monitoring program, is required.
3. When compensatory mitigation is necessary to offset impacts, mitigation measures in the immediate vicinity of the impact shall be the preferred mitigation option. Property owners may be required to perform the balance of compensatory mitigation off-site if the property cannot support required mitigation or when off-site mitigation can be demonstrated to the satisfaction of the Administrator to be more beneficial to shoreline ecological functions and processes. For example, off-site mitigation may be the better choice if large, cohesive areas are available off-site while only small fragmented areas are available on-site for mitigation. Mitigation shall be located and designed in the following order of priority, except for the Point Monroe District, which shall meet special provisions in subsection 3.
 - a. Within Zone 1, plant vegetation to obtain a minimum of 65% native vegetation canopy coverage;
 - b. In Zone 2, plant to increase canopy coverage, in a manner that promotes contiguous native vegetation or in areas nearest the shoreline;
 - c. In the Shoreline Buffer, plant in a manner that promotes a contiguous native vegetated corridor that connects to the shoreline;
 - d. Outside of the Shoreline Buffer, plant in a manner that promotes a contiguous native vegetated corridor to the shoreline;
 - e. Outside of the Shoreline Buffer; or
 - f. At an off-site location approved by the Administrator, within the Shoreline Buffer or Site Specific Vegetation Management Area, plant to meet the standard of subsections a through c.
3. Special Mitigation Provisions for Point Monroe District. When vegetation mitigation is required for new development, uses, or activities in the Point Monroe District, the mitigation plan shall include new vegetation communities appropriate for dune, sand spit, barrier beach, barrier estuary, or barrier lagoon, including salt marsh that shall be installed within the spit-specific vegetation management area (SVMA) as defined in Section 4.1.3.5(9), thirty (30) foot setback between the OHWM and the primary structure, or where area is available on the site.
4. When compensatory mitigation measures are required, all of the following shall apply:
 - a. The quality and quantity of the replaced, enhanced, or substituted resources shall be the same or better than the affected resources; and
 - b. Unless the Single-Family Residence Shoreline Mitigation Manual is being used, the required mitigation plan shall be informed by pertinent scientific and

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technical studies, including but not limited to the Shoreline Inventory and Characterization Report, the Shoreline Restoration Plan and other background studies prepared in support of this Program; and

c. All mitigation activities shall be monitored and maintained to ensure that they achieve their intended functions and values, pursuant to Section 4.1.2.7, Mitigation Monitoring and Maintenance; and

d. Mitigation actions shall not have a significant adverse impact on other preferred shoreline uses promoted by the policies of the Shoreline Management Act; and

e. Any new plantings shall be in proportion to the identified impact and may be protective of views from the primary structure of the subject property.

5. For vegetation mitigation in the Shoreline Buffer or Site-specific Vegetation Management Area, all new plantings shall meet the provisions in Section 4.1.3.10.2, except for the Point Monroe District which shall meet special provisions in subsection 3.

6. Where feasible, mitigation should be required prior to impact and prior to final inspection and approval of building occupancy and shall replace the functions as quickly as possible following the impact.

7. To encourage shoreline property owners to remove bulkheads and perform other beneficial shoreline restoration actions in advance of shoreline development or redevelopment, the City may give mitigation credit to any beneficial restoration action that occurred within 10 years of the proposed development/redevelopment activity provided that:

a. The applicant/property owner declares the intent of the restoration or enhancement project as mitigation credit at the time of the restoration permit application; and

b. The City can confirm via site inspection, photographs, or other evidence that the restoration actions have improved shoreline conditions.

8. When mitigation is required for shoreline stabilization projects due to site disturbance, the required planting plan shall also include the following, unless an alternative planting plan is approved by the Administrator:

a. Replant 75 percent of the shoreline area located along the upland edge of the shoreline stabilization structure to a minimum depth of ten (10) feet, unless demonstrated to be infeasible to the Administrator;

i. The depth may be reduced to five (5) feet to allow for landscape design variation, provided that the total square footage of the area planted equals the required 75% of the shoreline;

b. Planting plans shall meet provisions in 4.1.3.10.2 and shade bearing plants shall be provided at suitable-fish spawning sites; and

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- c. Include plantings equivalent to one tree per ever 20 linear feet of shoreline and one shrub per ever five linear feet, which may be planted with due consideration of views from the primary structure of the subject property.

4.1.2.6 Regulations – Mitigation Surety

1. When mitigation is required, the applicant/property owner shall provide a notice on title, conservation easement, or similar mechanism as approved by the City Attorney and recorded with the County Auditor, that the mitigation area (including off-site mitigation) will be maintained in perpetuity.
2. When mitigation is required, except for projects undertaken by public entities, performance and/or maintenance bonds or other surety shall be required by the City to assure that work is completed, monitored, and maintained. The bond/surety shall be refunded to the depositor upon completion of the mitigation activity and any required monitoring.

4.1.2.7 Regulations – Mitigation Monitoring and Maintenance

1. When mitigation is required as demonstrated either by a site-specific impact analysis or use of the Single-Family Shoreline Residence Mitigation Manual, a periodic monitoring program is required to ensure that proposed mitigation actions achieve their intended functions and values.
2. Monitoring programs shall meet the requirements established in Monitoring Requirements, Appendix B, B-6(C)(2)(e).
3. To ensure the success of the required mitigation, monitoring shall occur for a minimum duration of (5) five years from the date of the completed development. The duration of monitoring may be extended if the project performance standards set forth in the approved mitigation plan fail to be accomplished, or, due to project complexity, the approved mitigation plan requires a longer period of monitoring.
4. Monitoring programs may be forwarded for review and comment to state and/or federal resource agencies and affected tribes with jurisdiction.
5. The monitoring program may also require that periodic maintenance measures be included as recommended by a qualified professional to ensure the mitigation site and associated vegetative planting is nurtured and maintained such that healthy native plant communities can grow and mature over time.
6. Monitoring programs for all new and replacement shoreline stabilization projects shall include:
 - a. An annual site visit by a qualified professional for each of the five (5) years to assess the effectiveness of the mitigation; and
 - b. A progress report submitted to the Administrator annually, which includes any monitoring or maintenance recommendations of the qualified professional.

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4.1.3 Vegetation Management

4.1.3.1 Applicability

The intent of vegetation management provisions is to protect and restore the ecological functions and ecosystem-wide processes performed by vegetation along shorelines and to protect human safety and property, increase the stability of marine bluffs, reduce the need for structural shoreline stabilization measures, improve the visual and aesthetic qualities of the shoreline, protect plant and animal species and their habitats, and to enhance shoreline uses.

The vegetation management provisions apply to all new shoreline development, uses and activities, including those that do not require a shoreline permit. Similar to other provisions of this Program, vegetation standards do not apply retroactively to existing uses and structures. Standards for vegetation management provisions are established using current scientific and technical information pursuant to WAC 173-26-221(5)(b) and 173-26-201(2)(a), and are based on the use category, shoreline characterization and the designation. Standards are provided in Section 4.0, and Tables 4-2 and 4-3.

4.1.3.2 Goal

Protect and restore shoreline vegetation to maintain and enhance ecological functions and processes, shoreline views and vistas, human safety, and personal property.

4.1.3.3 Policies

1. Maintain existing shoreline vegetation to protect ecological functions and/or processes from adverse impacts of uses, activities and developments within the shoreline jurisdiction.
2. Emphasize the use of native vegetation species to maintain the ecological functions and/or processes and mitigate the direct, indirect, and/or cumulative impacts of shoreline development, uses and activities.
3. Provide flexible dimensional standards for buffers and setbacks that are based on performance standards designed to protect ecological functions and ecosystem-wide processes, including considering alternatives to planting native vegetation species if it can be demonstrated that the equivalent ecological functions can be provided.
4. Use monitoring programs to ensure the protection of shoreline ecological functions and ecosystem-wide processes, particularly when non-native vegetation species are used as an alternative to native vegetation.
5. Encourage the restoration or enhancement of shoreline vegetation through incentive programs.
6. Establish buffers immediately upland of OHWM for each shoreline designation, recognizing the pattern of development, shoreline ecological functions and ecosystem-wide processes, and using current science and technical information, as described in WAC 173-26-201(2)(a). In establishing buffers, consideration should be given to the land use

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patterns to minimize the number of existing structures that would not conform to buffer dimensional standards.

7. At the time of a proposal, allow site-specific dimensional standards for vegetation management areas for shoreline development, use or activity. Dimensional standards must protect shoreline ecological functions and ecosystem-wide processes.
8. Implement a public education program emphasizing the importance of shoreline vegetation management.
9. Allow selective vegetation clearing for views for new development and to maintain views from existing residences when slope stability and ecological functions and ecosystem-wide processes are not compromised. Trimming and pruning are generally preferred over removal of native shoreline vegetation.
10. Develop specific regulations for Point Monroe, based on vegetation and management practices appropriate for dune communities, sand spits, barrier beaches, barrier estuaries or barrier lagoons.

4.1.3.4 Regulations – Exceptions

1. Vegetation management standards shall not apply retroactively to existing lawfully established conforming and nonconforming uses and developments, including maintenance of existing residential landscaping. Property owners are strongly encouraged to voluntarily improve shoreline vegetation conditions over the long term.
2. Existing buffers and setbacks that have been established through previously approved subdivisions and indicated on the face of an approved plat shall be recognized and adhered to.
3. The following shall be exempt from the provisions of Section 4.1.3.
 - a. Removal of noxious or invasive plants, provided:
 - i. Noxious weed removal is based on consultation with the Kitsap County Noxious Weed Board or the species being removed are on the Washington State Noxious Weed List (WAC 16-750, or its successor);
 - ii. The vegetation removal is conducted in a manner consistent with best management practices (BMP); and
 - iii. Any bare ground over 200 square feet is replanted in accordance with a list of proposed native plants and their spacing and size approved by the City prior to noxious or invasive plant removal.
 - b. Removal of hazard trees, as defined in Appendix B, where a report by an arborist or other qualified professional demonstrates to the satisfaction of the Administrator that trimming is not sufficient to address the hazard provided:
 - i. When possible, require that the hazard tree be topped for safety and remain as a wildlife snag;
 - ii. Replanting is provided to ensure the no net loss standard is met pursuant to Section 4.1.2.4;

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- iii. When a hazard tree is located in a geologically hazardous area, the applicant shall submit a geotechnical engineering report providing a geotechnical analysis of slope stability and addressing vegetation management for slope stability and ecological functions and processes for a ten year period. Replanting shall be provided to ensure the no net loss standard is met pursuant to Section 4.1.2.4. The hazard tree may be removed prior to the approval of the plan if it is necessary to protect life and property.
- c. Commercial forest practices and the removal of trees pursuant to a Forest Practices Permit (Class II, III and IV-S only) issued by the Washington State Department of Natural Resources under the Washington State Forest Practices Act (RCW 76.09), except where such activities are associated with a conversion to other uses or other forest practice activities over which local governments have authority. For the purposes of this Program, preparatory work associated with the conversion of land to non-forestry uses and/or developments shall not be considered a forest practice and shall be reviewed in accordance with the provisions for the proposed non-forestry use, the general provisions of this Program, including Appendix B, and shall be limited to the minimum necessary to accommodate an approved use.

4.1.3.5 Regulations – Existing Landscaping

1. Existing landscape areas are areas of living plants including trees, shrubs, flowers, herbs, groundcovers and fruits and vegetables for personal consumption. Existing landscape areas may be retained in their size and configuration existing prior to adoption of this Program.
2. Vegetation management standards do not apply to normal and routine maintenance, tending and cultivating of landscape areas and gardens.
3. Vegetation management standards do not apply to maintenance trimming or limbing of vegetation. Such maintenance is limited to the removal of branches or limbs that are less than three (3) inches in diameter and does not include tree topping. Dead plants may be removed for maintenance purposes.
4. Existing landscape areas may be altered provided that:
 - a. There is no change in the location, size at the ground level, and configuration; and
 - b. Any alteration is entirely inside the existing boundaries at ground level of the landscape area.
5. Any expansion of existing landscape areas will require that the modified area comply with the provisions of Section 4.1.3, Vegetation Management, and the intent of providing native vegetation to support shoreline ecological functions and processes.
6. Minor pruning, including thinning of lateral branches to enhance views, or trimming, shaping, thinning or pruning necessary for plant health and growth and which does not harm the plant, is allowed consistent with the following standards:

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- i. All pruning shall meet the American National Standard Institute (ANSI) tree pruning standards;
- ii. In no circumstance shall removal of more than one-fourth (1/4) of the original crown be permitted within a three year period;
- iii. Pruning shall not include topping, stripping of branches or creation of an imbalanced canopy; and
- iv. Pruning shall retain branches that overhang the water.

4.1.3.6 Regulations – General Standards

1. Development within the shoreline jurisdiction shall be located and designed to protect existing native vegetation from disturbance to the fullest extent possible, to mitigate impacts to existing vegetation, and to meet the standard of no net loss of ecological functions and processes, Section 4.1.2, Environmental Impacts.
2. Vegetation clearing or grading may not be undertaken within the shoreline jurisdiction without prior review and approval by the Administrator, unless allowed under Section 4.1.3.4, Regulations – Existing Landscaping and Section 4.1.3.5, Regulations – Exceptions. Clearing and grading may be subject to Section 4.1.4, Land Modification.
3. Vegetation replanting is required for all development, uses or activities within the 200-foot shoreline jurisdiction, whether a permit is required or not, that either:
 - a. Alters existing native vegetation; or
 - b. Alters any vegetation in a required Shoreline Buffer or Site-Specific Vegetation Management Area. Moved from Section 4.1.2.5
4. Vegetation replanting is required for invasive species removal in accordance with Section 4.1.3.4.3.a. Moved from Section 4.1.2.5
5. When vegetation replanting is required, the following information shall be submitted for approval prior to vegetation disturbance as part of a project proposal or clearing permit:
 - a. Residential, Industrial and Commercial Development.
 - i. Vegetation disturbance of 200 square feet or less requires submittal of an annotated list of proposed plants and their spacing specifications and location.
 - ii. Vegetation disturbance greater than 200 square feet requires a planting plan completed by a qualified professional or that applicant may use the Single Family Residence Shoreline Mitigation Manual.
 - b. Public Park and City Maintained Areas.
 - i. Vegetation disturbance of 2,500 square feet or less requires submittal of an annotated list of proposed plants and their spacing specifications and location.

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- ii. Vegetation disturbance greater than 2,500 square feet requires a planting plan completed by a qualified professional. Moved from Section 4.1.2.5
- 6. Significant tree removal shall only be permitted to allow for locating a single-family residence and normal appurtenances. The Administrator may require alterations of a site plan in order to retain significant trees. This may include adjustments to the location of building footprints, the location of driveways and access ways, or the location of walkways, easements or utilities.
- 7. Non-native vegetation removal outside the shoreline buffer or site-specific vegetation management area on a developed property not associated with new construction may be allowed with an approved clearing permit provided:
 - a. Vegetation removal does not exceed:
 - i. An area greater than 200 square feet within a three (3) year period; and
 - ii. More than 3 non-significant trees per 20,000 square feet up to a maximum of six (6) trees.
 - b. No significant trees are removed; and
 - c. Replanting is provided pursuant to Section 4.1.3.10.2; and
 - d. A Bluff Management Plan is provided pursuant to Section 4.1.5, Critical Areas for any vegetation alteration in a geologically hazardous area. See Section 4.3.5.8

4.1.3.7 Regulations – Establishment of Shoreline Buffer or Site-Specific Vegetation Management Area

- I. Two alternative methods may be used to meet the goals and policies of the Vegetation Management Section, as provided below, except the Point Monroe District shall meet the special provisions provided in subsection 2:
 - a. Alternative 1: A Shoreline Buffer shall be maintained immediately landward of the OHWM and managed according to provisions of this Program and shall meet the location and design standards of Section 4.1.3.8, Regulations – Shoreline Buffer – Location and Design Standard. See Section 4.1.3.3.b
 - b. Alternative 2: As an alternative to the Shoreline Buffer dimensions provided in subsection a, above, an applicant may propose specific dimensional standards for a Site-Specific Vegetation Management Area that meets the Vegetation Management goals, policies and applicable regulations as determined through a Habitat Management Plan prescribed in Appendix B, Section B-4, provided that the plan demonstrates the following:
 - A. The proposed development is for a residential use.
 - B. The site-specific proposal assures there is no net loss of the property's specific shoreline ecological functions and associated ecosystem-wide processes pursuant to Section 4.1.2, Impact Analysis and No Net Loss; and

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C. The site-specific proposal uses the scientific and technical information* compiled to support the Shoreline Buffer standards of Section 4.1.3.5(3)(b), and/or other appropriate technical information which, as determined by a qualified professional, demonstrates how the proposal protects ecological functions and processes and how it meets the goals and policies of this Section.

ii. The Habitat Management Plan shall be reviewed by the Administrator in accordance with provisions in Appendix B. The Administrator may approve, approve with conditions, or deny the request. The Administrator shall have the Habitat Management Plan reviewed by an independent third party, the cost of which will be borne by the applicant.

iii. If the Site-specific Vegetation Management Area is approved, prior to permit issuance, the applicant shall record with the County Auditor a notice on title, or other similar document subject to the approval of the Administrator.

*Footnote: Scientific and technical information supporting the Shoreline Buffer standards is provided in the following documents available at the City of Bainbridge Island's Department of Planning and Community Development: *Documentation of Marine Shoreline Buffer Recommendation Discussions*, Memorandum, 2011, Herrera Environmental; *Addendum to Summary of Science*, 2011, Herrera Environmental; *Bainbridge Island Current and Historic Coastal Geomorphic/Feeder Bluff Mapping*, 2010, Coastal Geologic Services, Inc.; *Best Available Science*, 2003, Battelle; *Bainbridge Island Nearshore Habitat Characterization and Assessment*, 2004 Battelle.

2. Special Provisions for Point Monroe District. Shoreline Buffers or Site-specific Vegetation management Areas are not required for properties located in the Point Monroe District; the following specific vegetation provisions shall apply:

- a. All properties in the Point Monroe District shall retain existing native vegetation and shall be subject to a Point Monroe vegetation management area (PVMA).
- b. The PVMA shall include areas that are:
 - i. Within thirty (30) feet of the OHWM and within the required side yard and the salt marsh fringe; and
 - ii. Outside any designated development area as approved pursuant to Section 5.9.6(2).
- c. The PVMA shall be managed and maintained in vegetation communities appropriate to dune, sand spit, barrier beach, barrier estuary, or barrier lagoon, including salt marsh.
- d. Developed properties shall retain existing native vegetation (including dune grass and salt marsh plant communities) in those areas that are not developed with legally established impervious surfaces.

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- e. Any new development or alterations and expansion of existing development shall assess impacts to existing vegetation and meet the no net loss standard pursuant to Section 4.1.2, Environmental Impacts.

4.1.3.8 Regulations – Shoreline Buffer – Location and Design Standard

1. The total depth of the Shoreline Buffer is based on the shoreline designation and the physical and most predominant geomorphic characteristics of the property. The depth of the Shoreline Buffer will be determined by the Administrator according to criteria below.
 - a. Property-specific physical and geomorphic characteristics of the particular lot will determine the maximum width (Category A) or minimum width (Category B) of the Shoreline Buffer, as follows:
 - i. Shoreline Buffer Category A: The property contains or abuts a spit/barrier/backshore, or marsh, or lagoon; or
The property contains or abuts a low bank and the existing native tree and shrub vegetation cover is at least 65% of the area of Shoreline Buffer Zone 1.
 - ii. Shoreline Buffer Category B: The property is shallow (200 feet in depth or less, as measured landward), or located on a high bluff, or does not meet any of the characteristics of Category A.
 - b. Shoreline Buffer standard depth in Table 4-3
 - c. As determined by the Administrator, buffers do not extend beyond an existing public paved street or an area which is determined by the Administrator to be functionally isolated from the shoreline or critical area. In these limited instances the no net loss of shoreline ecological function and processes still apply to properties within the shoreline jurisdiction.
2. The total area of the Shoreline Buffer shall be the equivalent of the length of the property along the shoreline, multiplied by the required buffer depth as prescribed for the specific shoreline designation in which the property is located. See Figure 4-1.
3. The Shoreline Buffer consists of two zones. The depth of each of the two zones within the Shoreline Buffer is determined as follows:
 - a. Zone 1 shall extend from the ordinary high water mark (OHWM) a minimum of 30 feet, or to the limit of existing native vegetation whichever is greater. The native vegetation limit is determined through a site-specific analysis of existing conditions, and in no case shall Zone 1 be greater than the depth of the Shoreline Buffer.
 - b. Zone 2 shall be established immediately landward of the Zone 1 and extend no further than the depth of the Shoreline Buffer.

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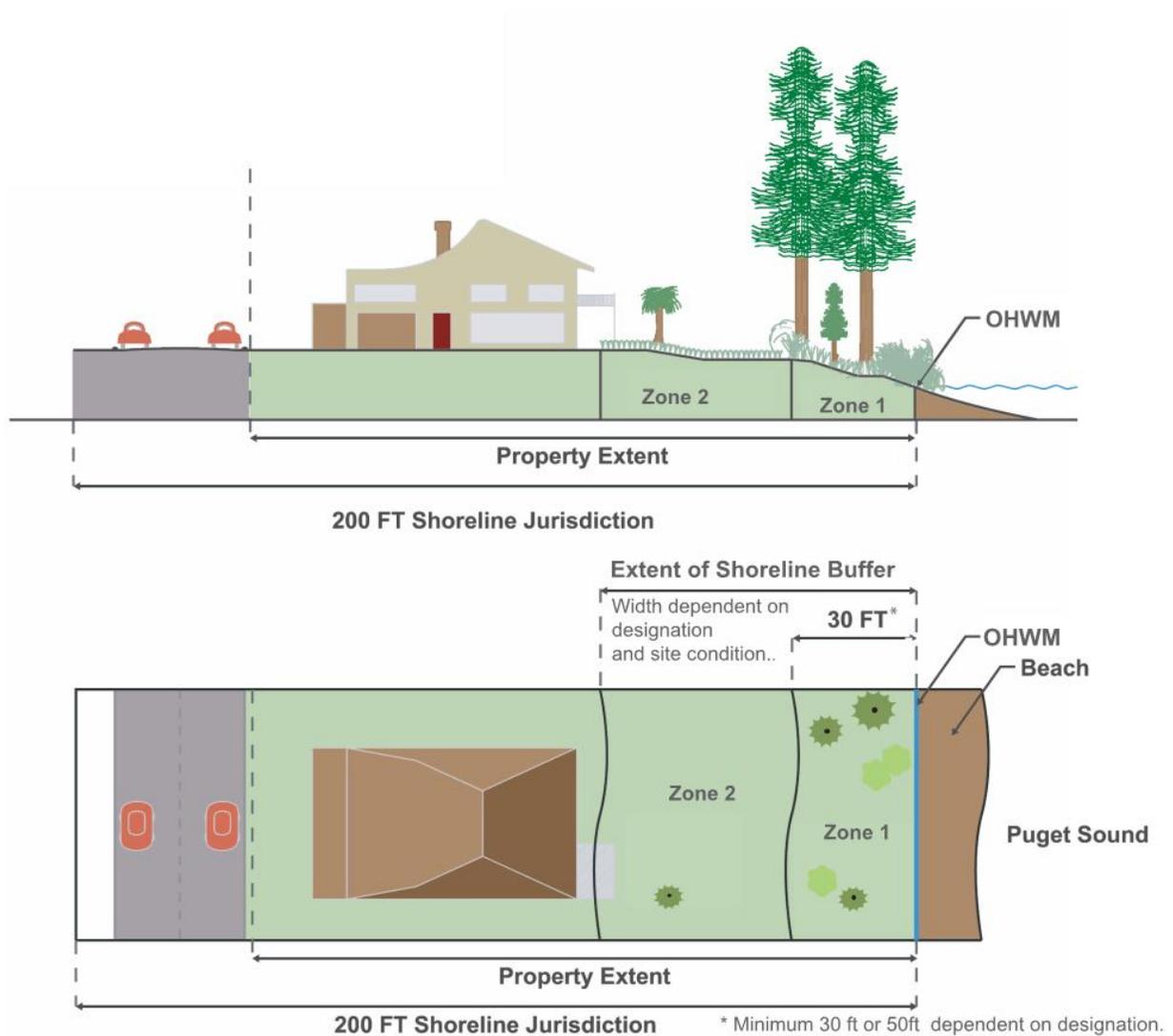


Figure 4-1 Dual Shoreline Buffer

4.1.3.9 Regulations – Shoreline Buffer Reductions

1. When the prescriptive buffer depth provided in Table 4-3 is reduced or dimensions altered through provisions of this Program, the applicant shall record a notice on title, or other similar document with the County Auditor prior to permit issuance, subject to the approval of the Administrator.
2. Any shoreline buffer reduction must be approved by the Administrator prior to any development, use or activity and must demonstrate compliance with the no net loss

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standard pursuant to Section 4.1.2.4 either through a site-specific impact analysis or use of the Single Family Residence Shoreline Mitigation Manual.

3. The total area of Zone 2 of the Shoreline Buffer may be reduced to accommodate shoreline views in accordance with Section 4.1.3.14 for a new single family primary residential structure or addition to a primary residential structure as follows:
 - a. There is an existing primary structure located within 100 feet of the property line of the subject property; and
 - b. Up to one-third (1/3) of the area of Zone 2 may be comprised of non-native vegetation and an approved primary structure. The remaining two-thirds (2/3) of Zone 2 must be established and/or maintained in native vegetation. If less than one-third (1/3) of the area of Zone 2 is reduced to accommodate views, the Administrator may reduce the required area of native vegetation to less than two-thirds (2/3); and
 - c. Significant trees are not removed to allow for the buffer reduction. See Section 4.1.3.6.4
4. If the prescriptive buffer depth for a single-family residential property pursuant to Table 4-3 is reduced in accordance with this section, Section 4.2.1, Nonconforming Uses, Non-Conforming Lots, and Existing Development, or a shoreline variance, the following shall occur in Zone 1:
 - a. Retain existing native vegetation; and
 - b. Plant the entire area of Zone 1 with native vegetation. Obtain 65% vegetation canopy coverage within 10 years. See Section 4.1.3.7.2.b
5. Zone 1 and Zone 2 of the Shoreline Buffer may be reduced in overall size to allow for those minor clearing, grading and construction activities permitted in Section 4.1.3.10 through Section 4.1.3.13. In no case may the area of Zone 2 be reduced over one-third (1/3) of its total area without a shoreline variance.

4.1.3.10 Regulations – General Vegetation Standards in Shoreline Buffers and Site-specific Vegetation Management Areas

1. The Shoreline Buffer or Site-specific Vegetation Management Area shall be maintained in a predominantly natural, undisturbed and vegetated condition. Unless specifically allowed by this program, the following standards shall apply:
 - a. All existing native groundcover, shrubs and significant trees located within the Shoreline Buffer or Site-specific Vegetation Management Area shall be retained;
 - b. New lawns are not permitted in Zone 1.
 - c. All activities shall be performed in compliance with the applicable standards contained in the Vegetation Management section, unless the applicant demonstrates that alternate measures or procedures are equal or superior in

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accomplishing the purpose and intent of the Vegetation Management Section, including no net loss of ecological functions and ecosystem-wide processes.

d. The use of pesticides are prohibited unless specifically allowed in Section 4.1.6, Water Quality and Stormwater Management.

e. Planted areas in which fertilizers might be applied shall be located as far landward of Zone 1 as feasible.

2. New vegetation planted in the Shoreline Buffer or Site-specific Vegetation Management Area, unless otherwise provided for in zone-specific requirements Section 4.1.3.9, shall be:

a. Native species using a native plant-community approach of multi-storied, diverse plant species that are native to the Central Puget Lowland marine riparian zone.

b. Other plant species may be approved that are similar to the associated native species in diversity, type, density, wildlife habitat value, water quality characteristics, and slope stabilizing qualities, excluding noxious/invasive species provided that, as submitted by a qualified professional, it is demonstrated to the satisfaction of the Administrator that the selected ornamental plants can serve the same ecological function as native plant species.

3. The following activities are allowed within the Shoreline Buffer and Site-specific Vegetation Management Area with an approved clearing permit. Such activities shall meet the standards of Section 4.1.4, Land Modification.

a. Vegetation Removal Related to Construction. Tree or vegetation removal within the Shoreline Buffer or Site-Specific Vegetation Management Area that is associated with new construction may be allowed, but must retain significant trees and shall meet the requirements of Section 4.1.2, Environmental Impacts, including replanting provisions.

b. Vegetation Removal Related to Public Facility Maintenance. Tree or vegetation removal within the Shoreline Buffer or Site-specific Vegetation Management Area that is associated with maintenance of existing public facilities (including: roads, paths, bicycle ways, trails, bridges, sewer infrastructure facilities, storm drainage facilities, fire hydrants, water meters, pumping stations, street furniture, potable water facilities, and other similar public infrastructure), may be approved by the Administrator if no significant trees are removed, the requirements of Section 4.1.2, Environmental Impacts are met, and the maintenance measures meet the goals and policies of Section 4.1.3, Vegetation Management. The following activities are exempt from this requirement:

i. Removal of vegetative obstructions required for sight distance and visual clearance at street intersections provided in the Public Works Design and Construction Standards and Specifications.

c. Underground Utilities. Utilities that run approximately perpendicular to the buffer (for example, a stormwater tightline to the water to protect a slope or a

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sewer line to a marina), may be allowed within the Shoreline Buffer or Site-specific Vegetation Management Area, provided that disturbance is minimized and the disturbed area is revegetated after construction; and

- d. Potable water wells provided that disturbance is minimized and the disturbed area is revegetated after construction. See Section 4.1.3.7.1.f

4. Stairways to the shoreline shall not exceed 300 square feet for private use, or the minimum necessary for public use, and are not included in the total square footage allocations prescribed in Section 4.1.3.11.

- a. Larger stairways serving a single-family residence may only be allowed through approval of a Shoreline Variance.

- b. As an alternative to a stairway larger than 300 square feet and to reduce environmental impacts, a tram may be allowed without a variance.

- c. Stairway design shall meet the following minimum criteria:

- i. International Codes for:

- A. Hand railings;

- B. Stairway width; and

- C. Tread depth.

- ii. Landings are required, unless demonstrated not to be necessary, and shall be determined by:

- A. Existing site topography;

- B. Personal safety; and

- C. Slope stability.

4.1.3.11 Vegetation Alteration Standards – Residential Development

Minor clearing, grading or construction may be allowed within the Shoreline Buffer or Site-specific Vegetation Management Area associated with a residential development with approval of the Administrator as follows:

1. One (1) hand installed pervious trail to the shoreline not more than four (4) feet in width, which may include hand installed steps, and shall be designed to minimize environmental impacts. No significant trees shall be removed. The trail may be wider when required for handicapped or public access. For single-family residential development, removal and/or maintenance of vegetation is allowed only within two (2) feet of either side of the trail.
3. Non-habitable structures appurtenant to a single-family use may be allowed consistent with the following standards, except that all structures are prohibited in Zone 1 when upland of a Priority Aquatic – Category A designation.
 - a. For Site-specific Vegetation Management Areas, the total square footage of all buildings or structures must not exceed 300 square feet in area.

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- b. For Shoreline Buffer areas, the total square footage of all buildings or structures must not exceed 400 square feet or 10% of the Shoreline Buffer area, whichever is less.
- c. For Shoreline Buffer areas, only 10% of the total allowed square footage or 300 square feet, whichever is less, can be located in Zone 1, except when upland of Priority Aquatic B, the total allowable square footage is 5% of Zone 1 or 150 square feet, whichever is less.
- d. All structures must be designed to not significantly impact views from adjoining property primary buildings.
- e. All structures must meet the following standards:
 - i. Only water-related structures are allowed within 30 feet of the OHWM or in Zone 1, including a boathouse, permeable deck, boat storage, or staircase.
 - ii. Shall not exceed 12 feet in height above existing grade.
 - iii. Decks and/or patios shall be permeable and shall not exceed 30 inches in height above existing grade.

4. View Maintenance – Single-family Residential Only.

Shoreline residential use and development shall use all feasible techniques to maximize retention of existing native shoreline vegetation within the Shoreline Buffer and the Site-specific Vegetation Management Area.

- a. Limited removal of existing trees or vegetation located on the same property as a single-family residence may be allowed for maintenance of a pre-existing view from the primary structure, or to establish a view for a new primary structure provided the following are met:
 - i. The applicant demonstrates to the satisfaction of the Administrator that the vegetation removal is the minimum necessary to re-establish or establish a view of the water similar to that enjoyed by other residences in the area and that pruning methods are not sufficient to provide an adequate view of the water similar to that enjoyed by other residences in the area; and
 - ii. Existing significant native trees are not removed within the Shoreline Jurisdiction, unless exempt; and
 - iii. In no instance, including accounting for other approved alterations as provided in Section 4.1.3, shall vegetation removal exceed twenty (20) percent of the required Shoreline Buffer area or Site-specific Vegetation Management Area or reduce the vegetation canopy coverage to less than 65% in the Shoreline Buffer or Vegetation Management Area.
 - A. Vegetation removal occurring adjacent to the shoreline shall also be limited to fifteen (15) linear feet of the water frontage; and

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iv. The applicant shall obtain an approved Bluff Management Plan pursuant to Section 4.1.5, Critical Areas for any vegetation alteration in a geologically hazardous area. The cost and preparation of the plan is the responsibility of the applicant; and

v. All vegetation removal complies with other applicable requirements of this Program (such as clearing and grading, forest practices, and protection standards for fish and wildlife habitat), including the no net loss and/or revegetation standards in Section 4.1.2.

b. The Administrator may deny a request or condition approval for vegetation alteration proposals for view maintenance if it is determined that the action will result in an adverse effect to any of the following:

i. Slope stability;

ii. Habitat value;

iii. Health of surrounding vegetation;

iv. Risk of wind damage to surrounding vegetation;

v. Nearby surface or ground water; or

vi. Water quality of a nearby water body.

4.1.3.12 Vegetation Alteration Standards – Commercial and Industrial Development in Shoreline Buffers

Minor clearing, grading, or construction may be approved within the Shoreline Buffer for a commercial or industrial development with approval of the Administrator pursuant to Section 4.1.3.7(1)(a) and only for the following activities as prescribed below and pursuant to Section 4.1.4, Land Modification:

1. Primary appurtenant structures to a commercial use that either support public access or are necessary to support a water-dependent use shall be allowed within the buffer when the applicant has demonstrated a need for the shoreline location, except that all structures are prohibited in Zone 1 when upland of a Priority Aquatic designation.
2. When appurtenant structures are allowed they must be the minimum necessary to meet the needs of the water-dependent use or public access requirements of Section 4.2.4, Public Access.

4.1.3.103 Vegetation Alteration Standards – Public Park Development in Shoreline Buffers

Minor clearing, grading, or construction may be allowed within the Shoreline Buffer for a public park development with approval of the Administrator consistent with the following or pursuant to Section 4.1.3.7:

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1. Vegetation clearing and maintenance is allowed in accordance with Best Management Practices and the standards of this Program.
2. Maintenance of existing public trails, provided the vegetation trimming is limited to four (4) feet on either side of the trail and no significant trees are removed.
3. Alterations that are included in a Park Development or Concept Plan. Minor clearing, grading, or construction for which the size and extent of proposed disturbed areas located within the Shoreline Buffer have been determined as part of a park development plan or concept park plan, with due consideration of the intended park use; and provided all proposed disturbance areas meet the no net loss standards pursuant to in accordance with Section 4.1.2. Environmental Impacts; and provided appropriate permits are obtained, including those pursuant to Section 4.1.4, Land Modification;
4. Alterations that are not part of a Park Development or Concept Plan. The following minor clearing, grading, or construction activities may be allowed without an approved park development plan or conceptual park plan:
 - a. Maintenance of existing public trails is allowed, provided maintenance is limited to the existing size of the trail, any vegetation trimming is limited to four (4) feet on either side of the trail, and no significant trees are removed.
 - b. New public pathways or trails to the shoreline provided it is demonstrated that the size and extent of the public pathways has been determined with due consideration of the intended park use.
 - c. Structures.
 - i. Primary appurtenant structures to a public park and recreational use that either support public access or are necessary to support a water-dependent recreation use shall be allowed within the Shoreline Buffer when a need for the shoreline location is demonstrated, except that all structures are prohibited in Zone 1 when upland of a Priority Aquatic designation. When appurtenant structures are allowed, they must be the minimum necessary to meet the needs of the water-dependent use or public access requirements of Section 4.2.4, Public Access.
 - ii. The total square footage of all buildings or structures must not exceed 6,000 square feet or 10% of the Shoreline Buffer area, whichever is less.
 - A. Only 10% of the total allowed square footage or 1,000 square feet, whichever is less, can be located in Zone 1.
 - iii. All structures must be designated to not significantly impact views from adjoining property primary buildings.
 - iv. All structures must meet the following standards:
 - A. Only water-related recreational furniture, amenities and structures are allowed in Zone 1, including but not limited to, picnic tables, benches, interpretive kiosks, viewing platforms, boardwalks,

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pervious trails or staircases, recreational furniture, signs, pervious trails, and staircases are not included in the maximum square footage allocations prescribed in subsection 4.c.ii, above;

- B. Accessory recreation buildings, including restrooms, picnic pavilions and service roads that serve such structures may be allowed in Zone 2 and buildings shall not exceed 12 feet in height above existing grade;
- C. Stairways may exceed 300 square feet, provided that it is demonstrated that a greater area is necessary to meet public access and public use demands. Stairways shall conform to the standards of the Building Code as adopted in BIMC Chapter 15.04.; and
- D. Boat ramps and other boating facilities may be allowed pursuant to Section 5.4, Boating Facilities.

4.1.3.14 Regulations – Shoreline Structure Setback View Requirement

1. To protect existing predominate shoreline views and accommodate shoreline views for a new single-family primary residential structure or addition to a primary residential structure, the Administrator may allow Zone 2 of the Shoreline Buffer to be altered when there is an existing primary residential structure located within 100 feet of the property line of the subject property and topographical or other relevant information indicates that the view of the shoreline from the subject property or the adjacent residence would be impacted by existing or proposed development. The shoreline structure setback line may also require that new structures be set farther away from the shoreline to preserve existing views enjoyed by an adjoining single-family primary structure that was established earlier. These provisions apply to single-family residences only, except in the Point Monroe District.
 - a. Setbacks for the purpose of this subsection are based on the location of primary residential structure(s) existing at the time a new primary residential building permit is submitted. A primary residential structure constructed in compliance with the required shoreline setback is not made nonconforming by the later construction of a primary residential structure in a different location on an adjoining lot.
 - b. The shoreline structure setback provisions apply only to primary single-family residential structures located within the 200-foot shoreline jurisdiction, where an existing primary single-family residential structure is located within 100 feet of the subject property line. All measurements are to the closest primary residential structure on either side of the subject property as measured parallel to the shoreline.
 - c. In determining the shoreline structure setback line, the Administrator may also consider topography or other physical property constraints in addition to the provisions of subsection 4 and 5, below. Applicants may submit detailed information regarding how property constraints impact the predominate

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shoreline views from either the subject property's proposed primary residential structure or adjoining properties' primary residential structure(s).

2. The Shoreline Buffer on the subject property may be reduced below the depth requirements identified in Table 4-3 to allow a new primary residential structure to be located within Zone 2 provided the conditions in Section 4.1.3.7(2) are met. Mitigation of proposed residential development shall be required pursuant to Section 4.1.2, Environmental Impacts.
3. In no case shall the subject property be permitted to locate a new primary residential structure within the site's specified Zone 1 of the Shoreline Buffer, unless a Shoreline Variance is granted.
4. Adjoining Development Located Within Shoreline Buffer. The setback requirement for the subject property shall be based on the location of the adjoining properties' primary residential structure(s) as described in subsections (a) through (d) below.
 - a. Primary Residential Structure Located on One Side. When an existing primary residential structure is located on one side of the subject property, the shoreline structure setback line shall be determined as follows:
 - i. If the adjoining primary residence is partially or wholly located within Zone 2, the shoreline setback line is determined by drawing a line from the most waterward point of the adjoining primary residential structure to the point at which the subject property's Shoreline Buffer boundary intersects the subject property's opposite property line. (See Figure 4.1.a below).
 - ii. If the adjoining primary residence is located partially or wholly in Zone 1, the shoreline structure setback line shall be determined by drawing a line from the point of intersection of the subject property and the adjoining property's Zone 1 boundary, to the point at which the subject property's Shoreline Buffer boundary intersects the subject property's opposite property line. (See Figure 4.1.b, below).
 - b. Primary Residential Structure Located on Both Sides. When existing primary residential structures are located on both sides of the subject property, the shoreline structure setback line shall be determined as follows:
 - i. If both the adjoining primary residential structures are located partially or wholly in Zone 2, then the shoreline structure setback line shall be determined by drawing a line between the most waterward points of each of the adjoining primary residential structures. (See Figure 4.1.b, below)
 - ii. If one of the adjoining primary residences is partially or wholly in Zone 1, and the other adjoining primary residence is partially or wholly in Zone 2, the shoreline structure setback line shall be determined by drawing a line from the point of intersection of the subject property and the adjoining property's Zone 1 boundary (for that adjoining residence located in Zone 1), to the most waterward point of the other adjoining primary residential structure located in Zone 2. (See Figure 4.1.b, below).

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- iii. If both of the adjoining primary residences are located partially or wholly within Zone 1, the shoreline structure setback line shall be determined by drawing a line from the point of intersection of the subject property's Zone 1 boundary and the adjoining property's Zone 1 boundary to the same intersection point on the subject property's opposite property line. (See Figure 4.1.c. below)
- c. Primary Residential Structure Located on a Shoreline Forming a Cove or Headland. The Administrator shall make the determination whether a shoreline forms a cove or headland. When existing primary residential structures are located on a cove or headland, the shoreline structure setback line shall be determined as follows:
 - i. If there is a primary residential structure on only one side of the subject property, then the shoreline structure setback line for the subject property shall be either the distance from the OHWM to the most waterward portion of the primary residence structure of the adjoining property, or the subject property's Zone 1, whichever is greater.
 - ii. If there are adjoining primary residential structures located on both sides of the subject property, the shoreline structure setback line shall be determined by averaging the distance from OHWM to the most waterward portion of the two adjoining property's primary residential structures. (See Figure 4-1(c) ii, below)
- 5. Adjoining Development Located Outside the Shoreline Buffer. The setback requirement for the subject property shall be based on the location of the adjoining properties' primary residential structure(s) as described in subsections (a) and (b) below.
 - a. Primary Structure Located on One Adjoining Property, Outside Shoreline Buffer. When an existing primary residential structure is located on one side of the subject property, the shoreline structure setback line shall be determined by drawing a line from the most waterward point of the primary residential structure of the adjoining property to a point at which the subject property's Shoreline Buffer boundary intersects the subject property's opposite property line. (See Figure 5-1(a), below).
 - b. Primary Structures Located on Both Adjoining Properties, Outside the Shoreline Buffer. When existing primary residential structures are located on both sides of the subject property, the shoreline structure setback line shall be determined by drawing a line between the most waterward points of each of the adjoining primary residential structures. (See Figure 5-1(b), below).
 - c. Primary Structures Located on Both Adjoining Properties, Outside the Shoreline on a Cove or Headland. When existing primary residential structures are located on both sides of the subject property, the shoreline structure setback line shall be determined by averaging the distance from OHWM to the most waterward portion of the two adjoining property's primary residential structures. (See Figure 5-1(c), below).

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Table 4-3 Shoreline Buffer Standards Table

Additional Use restrictions for BIMC Titles 17 and 18 may apply

SHORELINE USE	UPLAND DESIGNATION				
	Natural	Island Conservancy	Shoreline Residential Conservancy	Shoreline Residential	Urban
<p>The shoreline buffer consists of two management areas Zone 1 and Zone 2. Zone 1 is located closest to the water; it is a minimum of 30 feet in all designations, except in Natural and Island Conservancy the minimum is 50' and expands to include existing native vegetation. Zone 2 is the remaining area of the shoreline buffer. See figure XXX</p>					
<p>Category A: Low bank lots with 65% Canopy Area in Zone 1, OR spit/barrier/backshore, marsh lagoon, or rocky shores. Category B: Low bank with less than 65% Canopy Area in Zone 1, or lots with a depth < 200' or High Bluff. <i>Geomorphic Class (i.e. low bank, High Bluff) shall be determined by Battelle 2004 Nearshore Characterization and Inventory.</i></p>					
Developed lots					
Category A	200'	150'	115'	75'	30'
Category B	200'	100'[1]	75'[1]	50'[1]	30 [1]
Undeveloped lots					
	200'	150'	150'	75/150'[2]	30'
<p>1. For High bluff properties the greater distance of 50' from the top of the bluff or the standard shoreline buffer. 2. If adjacent to the Priority Aquatic designation then 150' is required.</p>					

Table 4-3 Shoreline Buffer Standards Table

Additional Use restrictions for BIMC Titles 17 and 18 may apply

SHORELINE USE	UPLAND DESIGNATION				
	Natural	Island Conservancy	Shoreline Residential Conservancy	Shoreline Residential	Urban
Developed lots					
Category A	200'	150'	115'	75'	30'
Category B	200'	100'[2]	75'[2]	50'[2]	30 [2]
Undeveloped lots					
	200'	150'	150'	75/150'[3]	30'

1. Geomorphic class (i.e. low bank, high bluff) shall be determined by Battelle 2004 Nearshore Characterization and Inventory.
2. For high bluff properties, the buffer is the greater distance of 50' from the top of the bluff or the prescriptive shoreline buffer. Zone 1 is still measured from OHWM and extends to the limit of existing vegetation.
3. If adjacent to the Priority Aquatic designation then 150' is required.

Property-specific physical and geomorphic characteristics[1] of the particular lot will determine the maximum width (Category A) or minimum width (Category B) of the Shoreline Buffer, as follows:

Shoreline Buffer Category A:

- The property contains or abuts a spit/barrier/backshore, marsh/lagoon, rocky shore; or
- The property contains or abuts a low bank and the existing native tree and shrub vegetation cover is at least 65% of the area of Shoreline Buffer Zone 1.

Shoreline Buffer Category B:

- The property is shallow (200 feet in depth or less, as measured landward from OHWM); or
- The property is located on a high bluff, or
- The property does not meet any of the characteristics of Category A.

The Shoreline Buffer consists of two zones (See figure 4.1). The depth of each of the two zones within the Shoreline Buffer is determined as follows:

- a. Zone 1 shall extend from the ordinary high water mark (OHWM) a minimum of 30 feet (50 feet in the Natural and Island Conservancy designations), or to the limit of existing native vegetation whichever is greater. The native vegetation limit is determined through a site-specific analysis of existing conditions, and in no case shall Zone 1 be greater than the depth of the Shoreline Buffer.
- b. Zone 2 shall be established immediately landward of the Zone 1 and extend no further than the depth of the Shoreline Buffer.



CITY OF
BAINBRIDGE ISLAND

DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT

MEMORANDUM

DATE: APRIL 7, 2016
TO: PLANNING COMMISSION
FROM: JENNIFER SUTTON, AICP
SENIOR PLANNER
SUBJECT: STUDY SESSION ON *WATER RESOURCES ELEMENT*

I. REVIEW *WATER RESOURCES ELEMENT*

The Commission continued to review the *Water Resources Element* at a special meeting on March 17, immediately following the 3rd Community Conversation on Water. A [video](#) of the water meeting and [technical memorandum from Aspect Consulting](#) regarding “carrying capacity” can be viewed on the City’s website. The Commission provided some policy direction at the March 17 meeting, and the drafting committee (Commissioners Gale and Quitslund) met on March 24 to work on amending the *Water Resources Element*. The *Vision* included in the DRAFT *Water Resources Element* at the end of the Introduction is a combination of the *Vision* proposed on March 17 by Commissioner Killian and the *Vision* initially drafted by Commissioner Quitslund.

The *Existing Conditions and Future Needs* section of the *Water Resources Element* has been updated, as shown in the attached DRAFT. Additional updates to the existing conditions-surface water section will be brought to the Commission on April 14.

At the second Community Conversation on Water on January 12, 2016 the community heard a presentation from City staff and Aspect Consulting about recharge areas for deep and shallow aquifers on Bainbridge Island (see attached map). At the March 17 meeting, the Commission discussed if “aquifer conservation policies” should apply Islandwide or if there should be different policies or regulations that apply to areas that recharge the deeper aquifers or areas with faster surface recharge rates. The Commission did not come to consensus on this issue. Staff suggests that the groundwater management goals and policies in the DRAFT *Water Resources Element* recognize that recharge happens Island-wide, and that the conservation of the aquifers shall take place Island-wide (see Goal 2, page 5). Staff recommends that the 2016

Low Impact Development (LID) regulations be strictly applied to development and redevelopment, and that the City consider promoting stormwater LID retrofits for existing development.

Planning Commission Action: Review and confirm amendments and reorganization of the DRAFT *Water Resources Element*. The Commission should ask questions of staff about the information presented.

II. NEXT STEPS

Based on the Planning Commission recommended policies related to conservation, staff will bring forward amendments to “aquifer conservation regulations” in May. The Planning Commission will begin review of the DRAFT *Housing Element* at the April 14 meeting.

WATER RESOURCES ELEMENT

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SURFACE AND STORMWATER EXISTING CONDITIONS & FIGURES ONLY PARTIALLY UPDATED; TO BE COMPLETED BY APRIL 14TH.

WATER RESOURCES ELEMENT

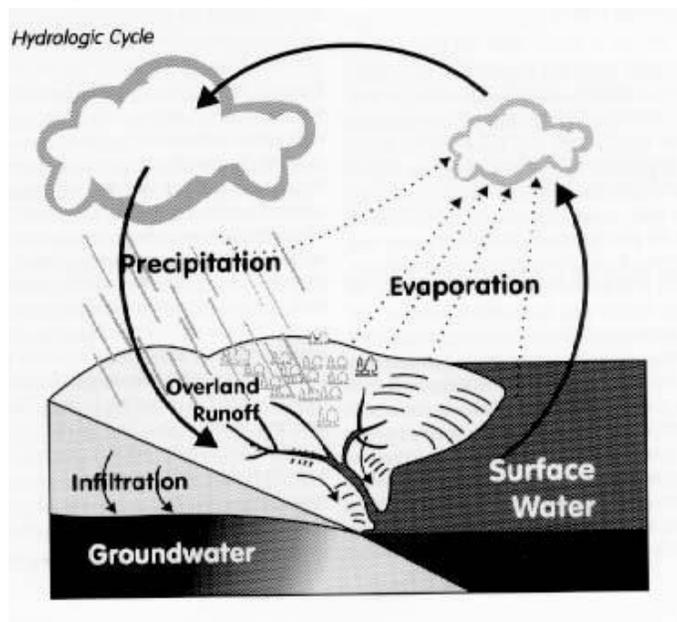
INTRODUCTION

Bainbridge Island is a quasi-enclosed environment that requires a holistic perspective to understand the interdependence among the Island's three primary water resources: groundwater, surface water, and stormwater. Although these waters are typically regulated and managed independently, they are, in nature, intimately connected. In fact, it is all the same water, simply given a different name and managed according to where it resides in the hydrologic cycle at any given time (see Figure 1).

When rain falls, rainwater that is not evaporated or taken up by plants, will take one of three paths. It may infiltrate into the ground where it is called groundwater. It may drain directly into streams and harbors where it is called surface water, or it may be captured by manmade infrastructure such as street drains, ditches, or detention/retention ponds where it is called stormwater.

Rainwater that infiltrates into the ground (groundwater) may be pumped from wells to provide drinking water or irrigation or seep out of the ground into streams, springs, and harbors where it is, again, called surface water. Likewise, stormwater may discharge into a nearby stream or harbor and become surface water or infiltrate into the ground and become groundwater.

Figure 1. The Hydrologic Cycle



In order to successfully protect and manage any one of these waters, one must protect and manage all three. To address these interrelationships, a separate Water Resources Element has been developed as follows:

- General water resources management policies
- Groundwater protection and management and protection policies
- Surface water protection and management and protection policies
- Stormwater protection and management and protection policies
- Residential on-site sewage system policies
- Contaminated sites policies
- Public education and outreach policies

Land Use Connection

In the development of policies related to the management of our Island water resources, it is important to understand the links between water resources quality and quality and land use. Most water quality and habitat integrity impacts are caused by the way land was or is used. Developed land allows for rapid runoff and inundation of natural conveyance systems such as wetlands and streams. Rapid runoff can cause damage through flooding, erosion, and water-borne contamination.

In addition, households create sewage which needs disposal either by a wastewater treatment plant or by residential on-site sewage systems. Wastewater treatment plants are reasonably effective at cleaning wastewater, but do not at present provide complete removal of nitrogen nor treat for contaminants of emerging concern which include, but are not limited to, byproducts of medications, recreational drugs, health and beauty products, and caffeine.

Residential on-site sewage systems can fail and cause contaminants to enter the surface water and/or groundwater. Even functioning systems, depending upon density and proximity to surface water and groundwater, can contribute to accumulations of nitrogen and contaminants of emerging concern in these waters.

Use of fertilizers, pesticides, and other chemicals for cropland, lawns and gardens, and vehicle and household cleaning and maintenance as well as improper pet and livestock waste management can add significant contamination to surface water, stormwater and/or groundwater.

Commerical and industrial uses, past and present, leave behind pollutants in our soils. In particular, historic land uses such as large row crop agriculture, lumber, petroleum, and others have left behind legacy pollutants in sediments both on upland properties and in the sediments along the bottoms of our streams, harbors, and nearshore areas.

Without proper coordination of the regulations that will implement policy statements, conflicting signals may be given when dealing with water resources issues. For example, a surface water problem may be resolved by efficiently collecting and removing all water

from the area, whereas a groundwater recharge issue may require that the water be kept on-site to allow for infiltration.

Another conflict arises when infiltration of stormwater competes for space with on-site sewage system drainfields. There are physical limitations to the rates of infiltration and absorption based on soil types, which may make it impossible to have both of those facilities on the same site. Where development occurs in important aquifer recharge areas, special consideration is needed to preserve the volume of recharge available to the aquifer and to protect the groundwater from contamination.

A key component of the water resources protection strategy is adequate monitoring and assessment, and the overriding theme that runs through all of the policies and goals is the preservation of water quality, water quantity, and ecological and hydrologic function.

Climate Change

Climate change projections indicate that over the coming decades, sea level may rise up to four feet in the Puget Sound region, the ocean will become more acidic, and climatic conditions are likely to become warmer. This will result in more intense rain events during the wet season with longer, drier summers, though overall annual volume of rainfall will remain approximately the same.

Ocean acidification will likely impact aquatic species survival and assemblages in our marine areas and sea level rise will likely impact habitat and built infrastructure in our nearshore areas to include homes, businesses, and public facilities such as roads and sewer facilities.

Wetter conditions during the wintertime will increase water availability, but may cause flooding or diminish water quality. More intense and frequent storms or heavier rainfall events can cause stormwater inundation and localized flooding, chronic flooding, non-infiltrated run-off, erosion and landslides. Increased intensity of rainfall may also diminish aquifer recharge rates as saturated soils are less able to absorb large amounts of water falling over short periods of time.

Warmer, drier conditions in the summertime will increase evaporation rates and water demand by plants, wildlife and people, and may diminish water quality. Dry conditions decrease water availability, resulting in reduced stream flow and diminished aquifer recharge. Warmer and drier conditions can also reduce water quality, by both increasing in-stream temperatures and by concentrating contaminants in smaller volumes of water.

² *City of Bainbridge Island Level II Assessment: An Element of the Water Resources Study, 2000, Kato & Warren, Inc., Robinson & Noble, Inc*

VISION

Bainbridge Island's water resources (precipitation, on the surface, and in the ground) are climate resilient, and quality and quantity are adequate for all forms of life on the Island. Achieving this vision will require monitoring, conservation, protection of aquifer recharge, and careful maintenance of the quantity and quality of the Island's waters, recognizing that the Island's carrying capacity is limited.

GOALS AND POLICIES

GOAL 1 General Water Resources

Protection of water resources is of primary importance to the Island. Therefore, the goal is to manage the water resources of the Island in ways that restore, enhance, and preserve their ecological and hydrologic function, for present and projected land uses, recognizing that they are ~~are the sole water supply and that:~~

- Degradation of groundwater quality and quantity water resources is not allowed.
- ~~Water supplies and systems are efficiently utilized.~~
- The long-term sustainability of the Island's water resources is maintained, taking into account future climatic conditions and their effects on the water cycle.
- ~~The wWater resources needs of new development approved under the Comprehensive Plan are adequately can be met for the indefinite future. by the existing resources.~~
- Groundwater, surface water, and stormwater monitoring, data assessment, and reporting Adequate data of the water resource are current and available including future projections of availability, quality and need.
- Use current and future technology to maintain and protect water resources.

General Water Resources Policies

Policy WR 1.1

The City shall study future climate and demand scenarios to accurately understand future water resource conditions.

Policy WR 1.2 1.1

~~The City shall coordinate with other major private water purveyors, government agencies and citizens to ensure protection and preservation of water resources and to provide efficient high quality Island wide water service.~~ Groundwater, surface water, and stormwater are resources that shall be protected and managed to preserve water quality and quantity and to retain natural ecological and hydrologic function to the maximum extent practicable.

Policy WR 1.3 1.2

~~To foster sustainable water resources, planning, protection, management, monitoring and on-going education outreach that is based on watersheds and natural systems should be provided by the City in coordination with appropriate agencies.~~ To foster sustainable water resources, planning,

protection, management, monitoring and on-going education and outreach should be provided by the City in coordination with Tribes, government agencies at all levels, drinking water purveyors, watershed management groups, Tribes, land trusts, health non-profit organizations, conservation and restoration groups, local integrating organizations for regional recovery and protection, and other stakeholders.

Policy WR 1.4 1.3

The policies in this element work in tandem with the protective measures set by the City's Shoreline Management Master Program, Critical Areas Ordinance, and any other environmental or water resources management ordinance established by the City.

Policy WR 1.5

Identify the areas of the Island that are the most vulnerable to pollution from concentrations of fecal coliforms and nitrates (for example, from septic fields, agricultural activities, or fertilizers), and monitor those areas to determine if and when preventative or restorative measures are warranted. NOTE: MOVED FROM POLICY WR 3.10

GOAL WR-2 Groundwater Protection and Management Protection Policies

Policy WR 2.1

Recognize that the entire Island functions To protect groundwater resources, areas identified as a high-aquifer recharge area. should be maintained in low impact uses.

Discussion: Low impact uses and low impact development are appropriate for areas with high aquifer recharge. Low impact uses includes development for buildings, roads or parking that has a reduced area of impact on the land. Low impact uses do not depend on regular applications of fertilizers or pesticides. Low impact development is an environmentally-friendly approach to site development and stormwater management, emphasizing the integration of site design and planning techniques that conserve and protect the natural systems and hydrologic functions of a site.

Policy WR 2.2

To protect Island promote efficient use of groundwater resources, the City shall encourage the development and expansion of public and private water systems, rather than encouraging shallow or individual residential wells.

Policy WR 2.3

The City shall assess the impacts of proposed activities and development on the flow of springs and streams and levels of wetlands that are either sustained by groundwater discharge or contribute recharge to groundwater, and require by requiring a hydrologic assessment report. Activities or development may be restricted and restricting the activities or development based on if the report indicates any adverse impacts, and/or mitigating impacts.

Policy WR 2.4

The City, in cooperation with the appropriate regulatory agencies (e.g., Washington State Department of Health and the Kitsap **County Public Health District**) **should will** institute new wellhead protection procedures.

Policy WR 2.5

~~For the purpose of protecting surface and groundwater quality, the City Parks Department and School District shall develop plans to eliminate the use of biocides on their properties through the use of integrated pest management techniques.~~

Policy WR 2.5 2.6

The City shall ~~promote the use of develop~~ **encourage the use of** integrated pest management techniques and the reduction of pesticide and herbicide use within the City boundaries.

Policy WR 2.6 2.7

Establish a stakeholder group to develop an Island-wide **G**roundwater **M**management **P**lan.

Policy WR 2.7 2.8

Encourage exempt well owners to regularly monitoring the quality of their well water and self-report to the Kitsap Public Health District.

Policy WR 2.8

Recognizing that the Island aquifer system is a Sole Source Aquifer as designated by EPA, institute an added level of development and re-development permit review to prevent or mitigate potential pollutant-generating activities associated with proposed land use.

Policy WR 2.9

Develop an Island-wide seawater intrusion policy.

Policy WR 2.10

Water conservation should be aggressively pursued by the City to promote the efficient use of water and to protect the resource. Water conservation programs should encourage the use of vegetation that prevents soil erosion, protects habitat for wildlife, retains surface water for recharge, and which does not require additional water during normally dry months.

Policy WR 2.11

Water re-use and reclamation will be encouraged to serve as a supplementary source for high-water users such as industry, parks, schools, and golf courses, as approved by the Washington State Department of Health.

Policy WR 2.12

Develop a program that encourages homeowners to explore innovative methods for recapturing and reusing surface water runoff and grey water, as approved by the Washington State Department of Health and the Kitsap Public Health District.

Policy WR 2.13

Maintain a comprehensive program of groundwater data gathering and analysis. The program shall include modeling, hydrogeologic and geologic studies, and monitoring of static water levels, water use, water quality, surface water flows, and acquisition of other data as necessary.

NOTE: GOALS 3 AND 4 HAVE BEEN BROUGHT OVER FROM THE ENVIRONMENTAL ELEMENT WHERE THEY WERE LABELED “AQUATIC RESOURCES (GOALS 6 & 7)”

Aquatic Resources GOAL 4 WR-3 Surface Water Protection and Management

Preserve and protect the Island’s remaining aquatic resources. Achieve no net loss of ecological functions and processes necessary to sustain aquatic resources¹ including loss that may result from cumulative impacts over time.

Discussion: Aquatic resources include marine nearshore, wetlands, streams, lakes, creeks, and associated vegetated areas.

Over the past recent decades, awareness has grown of the importance of preserving and protecting aquatic resources particularly wetlands, in our natural and built environment. Aquatic resources have a number of important ecological functions, processes and values. These functions vary from wetland to wetland, stream to stream, but include providing water quality protection, flood plain control, shoreline stabilization, contributions to groundwater and stream flows and wildlife and fisheries habitat. Wetlands and streams Aquatic resources also have values as natural areas providing aesthetic, recreational and educational opportunities that need to should be preserved for future generations.

AQ 1.1

Achieve no overall net loss of the City’s remaining, regulated, aquatic resources.

AQ 1.2 Policy WR 3.1

Development shall not be approved in regulated wetlands, streams, or buffer areas, unless a property owner would be denied all reasonable use of property.

Development should not be approved in regulated aquatic critical areas or their associated water quality buffer unless the subject property is encumbered to such an extent that application of development regulations would deny all reasonable use of property.

Discussion: In some cases, buffer configurations and widths can be modified to allow normal usage of legally established lots. In other cases, the development and implementation of a habitat management plan may provide resource protection to allow development. A variance process should be available to accommodate development in buffer areas. Reasonable use

¹ Aquatic resources – Marine nearshore, wetlands, streams, lakes, creeks and associated vegetated areas.

~~exception should be reserved for development in the critical area if no other process will allow for a reasonable use of the property. A Reasonable Use Exception (RUE) is a form of variance from regulations that allows some use of a legally established lot. A reasonable use must minimize the impact to critical areas. The RUE process is included in the critical areas regulations of the Bainbridge Island Municipal Code, which implements policies of this document.~~

AQ 1.3 Policy WR 3.2

Require that vegetated buffers be maintained between proposed development and the aquatic resource in order to protect the functions and values of such systems. Degraded buffers should be restored to enhance their function. Allow ~~Reductions~~ in vegetated buffers ~~shall be allowed~~ only in areas where such reductions, if consistently applied, would not result in significant cumulative impacts to aquatic resources and fish and wildlife habitat.

AQ 1.4 Policy WR 3.3

Require that buffers be retained in their natural condition wherever possible, while allowing for appropriate maintenance. Where buffer disturbance has occurred, require revegetation with appropriate species, with a preference for native species, to restore the buffers' protective values.

Discussion: Vegetated buffers facilitate infiltration and maintenance of stable water temperatures, provide the biological functions of flood storage, water quality protection and groundwater recharge, reduce amount and velocity of run-off, and provide for wildlife habitat.

AQ 1.5 Policy WR 3.4

Ensure that development activities are conducted so that aquatic resources and natural drainage systems are maintained and water quality is protected.

AQ 1.6 Policy WR 3.5

Prior to any clearing, grading, or construction on a site, all wetlands, streams, and buffer areas should be specifically identified and accurately located in the field in order to protect these areas during development. ~~After construction, permanent visual markers should be placed around the buffer areas.~~

Discussion: ~~The purpose of this policy is to educate future home owners and users of aquatic resources (i.e., trail users) of the boundary of the aquatic resources.~~

AQ 1.7

~~New development using flexible lot design should include any wetlands, streams, or required buffers in separate tracts or easements to remain in common ownership.~~

AQ 1.8 Policy WR 3.6

Herbicides and pesticides ~~should~~ shall not be used in aquatic resource areas ~~wetlands, streams,~~ and buffers areas, and should be discouraged in the areas that drain into them.

Discussion: Encourage alternatives to the use of herbicide and pesticide in areas adjacent to buffer areas by providing technical information and educational programs including the use of native vegetation.

AQ 1.9 MOVE TO GOAL 4

Develop a community wide program to educate Island residents about alternatives to using and disposing of herbicides, pesticides, and other household chemicals to reduce impacts to marine shoreline areas, wetlands, streams, and other environmentally sensitive areas.

AQ 1.10 Policy WR 3.7

Prohibit ~~Access to regulated wetlands~~ aquatic critical areas by farm animals ~~should be discouraged~~. Agricultural activities within proximity of aquatic resources should complete a farm management plan addressing water quality and other natural resource protection ~~must be in conformance with Best Management Practices~~.

AQ 1.11 Policy WR 3.8

Mitigation shall be required to compensate for unavoidable impacts to aquatic critical areas. Mitigation should be designed to achieve no net loss in functions and processes of aquatic resources. Restoration, creation or enhancement of wetlands, streams, and their buffers shall be required in order to offset the impacts of alteration of a wetland/stream or buffer area. Compensation for loss of aquatic resources should be determined according to function, acreage, type, location, time factors, and an ability to be self-sustaining.

Policy WR 3.9

Promote watershed-based mitigation to meet federal regulations, improve mitigation success and better address the ecological priorities of the island's watersheds.

Policy WR 3.10 MOVE TO GOAL 1

Identify the areas of the Island that are the most vulnerable to pollution from concentrations of fecal coliforms and nitrates (for example, from septic fields, agricultural activities, or fertilizers), and monitor those areas to determine if and when preventative or restorative measures are warranted.

Policy WR 3.10

Work with state and local health departments to evaluate the merits of new technologies such as **greywater capture, package treatment plants and composting toilets**, as alternatives to septic and sewer systems and determine which of those systems should be allowed and/or encouraged to better protect the quality and capacity of the Island's **groundwater**, surface water and nearshore environment.

Policy WR 3.11

The City will ~~e~~Consider the **implications impacts** of climate change, **and ocean** acidification, **and their impacts** when developing regulations or approving capital projects related to aquatic resources, including marine nearshore, wetlands, streams, lakes, creeks, associated vegetated areas and frequently flooded areas.

Wetlands

AQ 1.12

Maintain the Island's wetlands in their natural state by:

- ~~Preservation of native vegetation in and next to the wetlands.~~
- ~~Restoration of areas that have already been degraded.~~
- ~~Protection of areas that have not been disturbed.~~

AQ 1.13 MOVED TO GOAL 4

~~The City should make every effort to purchase or obtain conservation easements for significant wetlands and areas of the shoreline critical to natural habitat.~~

Streams

AQ 1.14

Maintain the Island's streams and creeks in their natural state by:

- ~~Preservation of their courses, their banks, and the vegetation next to them.~~
- ~~Restoration of areas that have already been degraded.~~
- ~~Protection of areas that have not been disturbed.~~

AQ 1.15 Policy WR 3.12

Allow stream relocation only where relocation would result in improved stream habitat ~~and or~~ when a property owner would otherwise be denied all reasonable use of the property.

AQ 1.16 Policy WR 3.13

Degraded channels and banks should be rehabilitated by various methods (e.g., culvert replacement, volunteer efforts, public programs or as offsetting mitigation for new development) to restore the natural function of the riparian habitat for fish and wildlife.

AQ 1.17 Policy WR 3.14

Resident and migratory ~~Anadromous~~ fish streams and adjacent land should be preserved and enhanced to ensure a sustainable fishery ~~the propagation of salmonid fish~~.

AQ 1.18 Policy WR 3.15

Require the construction of public facilities ~~necessary roads and utility corridors~~ to avoid ~~wetland and stream crossings and~~ encroachment into and disturbances of aquatic resources.

Policy WR 3.16

Maintain a comprehensive program of surface water data gathering and analysis. The program shall include monitoring and assessment of physical, chemical, and biological health of surface water ecosystems to include streams, lakes, wetlands, and marine waters. This may include water, flow, sediment, habitat, submerged aquatic vegetation, fish and shellfish tissue, aquatic species diversity and other ecosystem health indicators.

GOAL WR-4

Promote the maintenance, restoration and enhancement of aquatic resources.

AQ 1.9 Policy WR 3.17

Develop a Support community-wide program to educate Island residents about alternatives to using and disposing of herbicides, pesticides, and other household chemicals to reduce impacts to marine shoreline areas, wetlands, streams, and other environmentally sensitive areas.

Policy WR 3.18

Promote and support volunteer or community driven restoration projects.

AQ 1.13 Policy WR 3.16

The City should make every effort to purchase or obtain conservation easements for significant wetlands and areas of the shoreline critical to natural habitat.

Policy WR 3.17

After construction, permanent visual markers should be placed around the buffer areas of protected aquatic resources.

THIS GOAL MOVED TO UTILITIES ELEMENT
Drinking Water Service Policies

GOAL WR-4 Stormwater Protection and Management

Stormwater is a resource that, rather than be captured and carried away as a wastestream, should be protected from pollutants and retained on site to replenish aquifers and maintain wetland and summer stream flows, preserving or mimicking the natural water cycle to the maximum extent practicable.

Policy WR 4.1 Comply with all requirements of the City's National Pollutant Discharge Elimination System Phase II Municipal Stormwater Permit (NPDES Permit).

Policy WR 4.2 Continue to provide ongoing opportunities for the public to participate in the decision-making process involving the development, implementation and update of the City's Stormwater Management Program (SWMP) through advisory councils, public hearings, and watershed committees.

Policy WR 4.3 Continue to improve and maintain an education and outreach program designed to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts and encourage the public to participate in stewardship activities.

Policy WR 4.4 Continue to identify and eliminate sources of pollutants to the City's stormwater drainage system through proactive field screening techniques such as effluent monitoring, system inspections and cleaning, and commercial and industrial business inspections

and through the enforcement of the City's Illicit Discharge Detection and Elimination ordinance (BIMC 15.22).

Policy WR 4.5 Ensure development of, and adherence to, required public and private stormwater pollution prevention plans (SWPPPs) for public facilities, construction sites, and commercial and industrial landuse. Encourage the use of such plans where not specifically required.

Policy WR 4.6 Ensure development of, and adherence to, erosion and sediment control plans on all construction and development sites of any size.

Policy WR 4.7 Develop and actively enforce a strong Low Impact Development (LID) ordinance to require any and all methods and practices for new development and redevelopment to the maximum extent practicable and reasonable. LID is a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Policy WR 4.8 Prioritize LID-based retrofit of public and private stormwater drainage systems and built assets through the inventory, management and fiscal planning process.

Policy WR 4.9 Incentivize LID retrofit of current built environment.

Policy WR 4.10 Use watershed and basin plans as a means to reduce stormwater impacts and nonpoint pollution.

Policy WR 4.11 Comply with all requirements specifically identified by the City's permit for any Total Maximum Daily Load (TMDL) in which the City is a stakeholder.

Policy WR 4.12 Conduct effectiveness monitoring and assessments to continue to adaptively manage stormwater to ensure optimal protection.

GOAL WR-5 Sanitary Sewer Residential On-Site Sewage Systems

Ensure that sewage is collected, treated, and disposed of properly to prevent public health hazards and pollution of groundwater, Island surface water, ~~including and the waters of the Puget Sound, and to promote recharge of the waters of Puget Sound.~~

~~Sanitary Sewer On-Site Systems Policies~~

Policy SSP 1.1

~~Properly designed and maintained on-site wastewater disposal systems that are approved by the Kitsap County Health District or the State Department of Health are a long-range solution to sewage disposal in most areas of the Island. However, there may be areas of the Island determined by the Kitsap County Health District to be unsuitable for on-site wastewater disposal systems due to site conditions (such as steep slopes, geological or soil conditions, lot size, or proximity to sensitive bodies of water).~~

Policy WR 5.1 SSP 1.2

Regulations and procedures of the Washington State Department of Health and the Kitsap County Public Health District shall apply to all on-site disposal systems. The City shall work with these agencies to assure regular inspection, maintenance and repair of all sanitary sewer and on-site systems located on the Island.

Policy SSP 1.3

~~Certification of adequate design and proper operation of septic systems shall be required prior to issuance of permits for remodeling of existing buildings.~~

Policy SSP 1.4

~~Prior to issuance of a building permit, on-site drainfield and reserve areas should be identified and marked, and a protection plan should be approved for any building lot.~~

Policy WR 5.2 SSP 1.5

The City shall request notification of all waivers or variances of Kitsap County Public Health Department District requirements, such as modification of setbacks, vertical separation, minimum lot size, reserve drainfield, etc., prior to issuance and subsequent modifications by the Kitsap Public Health District of an approved Building Site Application.

Policy WR 5.3 SSP 1.6

Kitsap County Public Health District approved alternative systems, such as sand filters, aerobic treatment, composting toilets, living systems, etc., should be encouraged for sites where conventional on-site systems are not suitable or feasible.

Policy WR 5.4 SSP 1.7

Regulations shall require coordination between the on-site septic and storm drainage disposal systems designs to ensure the proper functioning of both systems.

Policy WR 5.5 SSP 1.8

The City shall assist the Kitsap County Public Health District in developing a program to require proper maintenance of all on-site waste disposal systems in order to reduce public health hazards and pollution. This program shall include periodic system inspection and pumping when necessary.

Policy WR 5.6 SSP 1.9

The City and the Kitsap County Public Health District should work together on a collaborative program to fund and pursue grants or low-cost loans for low and moderate-income households to repair failed septic systems. Incentivize maintenance, repair and replacement of system for any income level.

Policy WR 5.7 SSP 1.10

On-site waste disposal systems serving more than one household should be allowed only with assurance of proper design, operation, management and approval from the Kitsap Public Health District.

Policy WR 5.8 SSP 1.11

The City may provide the service of operation and maintenance management for approved large on-site sanitary sewer systems (LOSS) or community sanitary sewer systems in coordination with the Kitsap County Public Health District.

Policy WR 5.9 SSP 1.12

The City should support the Kitsap County Public Health District in establishing maintaining and improving a public education program to foster proper construction, operation, and maintenance of on-site septic systems.

Policy WR 5.10 SSP 1.13

The City should support the Kitsap County Public Health District in developing and maintaining an ongoing inventory of existing on-site disposal systems to provide needed information for future studies.

**THIS GOAL MOVED TO UTILITIES ELEMENT
Public Sanitary Sewer Policies**

**THIS GOAL MOVED TO UTILITIES ELEMENT
Stormwater Management and Protection**

GOAL WR-7 Monitoring Policies(Incorporated these in each of the sections above)

Policy WR 6.1 M 1.1

~~The City should Maintain institute a comprehensive program of water resource data gathering and analysis. The Such a program shall include geologic studies and monitoring of static water levels, water use, water quality, surface water flows, and acquisition of other data as necessary.~~

Policy WR 6.2 M 1.2

~~Periodic monitoring and reporting of water quality and quantity of public water systems² is required by the Kitsap County Health District. Single units shall be encouraged by the City to provide well data to the Kitsap Public Utility District and the Department of Health regarding water level recordings, quality degradation, etc.~~

Policy WR 7.3 M 1.3 DELETE: SAME AS POLICY 6.85.5

~~The City should Ssupport the Kitsap County Health District in developing a program for proper maintenance of on-site waste disposal systems in order to reduce public health hazards and pollution. This program should include periodic system inspection and pumping when necessary.~~

² A public water system is defined as a system with two or more hookups.

Policy WR 7.3 M 1.4 DELETE: SAME AS POLICY 5.10

The City should support the Kitsap County Health District in developing and maintaining an ongoing inventory of existing on-site disposal systems to provide needed information for future studies.

GOAL WR-6 Contaminated Sites

Policy WR 6.1

The City will assemble and maintain an inventory of contaminated sites on the Island to track site location, contaminant(s) of concern, cleanup status, and potential to impact nearby surface or groundwater.

Policy WR 6.2

The City will collaborate with EPA, Washington State Department of Ecology, and the Kitsap Public Health District to address contaminated site assessment and cleanup efforts within the purview of those agencies to achieve remediation/cleanup as quickly as reasonably possible.

Policy WR 6.3

The City will consult the contaminated site inventory prior to property acquisition and weigh cost/benefit of acquiring such a property.

Policy WR 6.4

The City will make every reasonable attempt to clean-up/remediate city-owned sites that are known to be or discovered to be contaminated.

Policy WR 6.5

The City will consult the contaminated site inventory as part of development or redevelopment site plan review and take potential impacts into consideration when making land use decisions.

Policy WR 6.6

The City will consult the contaminated site inventory as part of capital infrastructure construction or maintenance.

GOAL WR-87 Public Education and Outreach

The City, in concert with federal, state, and local governments; public water purveyors; watershed councils; non-profits; citizens; and other appropriate entities, will continue to improve and implement a comprehensive public education and outreach program in the protection and management of all water resources.

Policy WR 7.1

Educate and inform the public about the purpose and importance of aquatic environments, their vulnerabilities, and observed status and trends in ecological health and function.

Policy WR 7.2

Educate and inform the public about expected climate change impacts and how these will effect the Island's water resources and their beneficial uses.

Policy WR 7.3PE 1.1

~~The City, special districts, and water purveyors will develop and implement a comprehensive public education program in water resource management and protection. The program should address all aspects of water conservation and groundwater protection, including septic system maintenance, spill management and non-point pollution impacts from farm animal/agricultural activities, and homeowner maintenance practices.~~

Educate the public about the characteristics of the aquifer system, the Island's dependency upon it, and its vulnerability to contamination (including seawater intrusion) and depletion.

Policy WR 7.4PE 1.2

~~Water conservation should be aggressively pursued by the City to promote the efficient use of water and to protect the resource. Water conservation programs should encourage the use of vegetation that prevents soil erosion, protects habitat for wildlife, retains surface water for recharge, and which does not require additional water during normally dry months. (Moved to Groundwater Protection and Management, 2.10.)~~

Educate the public about EPA's Sole Source Aquifer Designation Program and what this designation means for the Island's aquifer system.

Policy WR 7.5PE 1.3

~~Water re-use and reclamation will be encouraged to serve as a supplementary source for high-water users such as industry, parks, schools, and golf courses, as approved by the Washington State Department of Health. (Moved to Groundwater Protection and Management, 2.11.)~~

Educate the public about well head protection and the critical importance of restricted chemical use or storage within the protection area around wells.

Policy WR 7.6 PE 1.4

~~The City should Ddevelop a program that encourages homeowners to reduce impervious surface area and explore innovative methods for recapturing and reusing surface water runoff and grey water, as approved by the Washington State Department of Health and the Kitsap County Public Health District. (Moved to Groundwater Protection and Management, 2.12.)~~

Educate the public about Critical Aquifer Recharge Areas (or other special conservation areas) and the purpose that they serve to the aquifer system.

Policy WR 7.7 PE 1.5

~~The City should Ssupport the Kitsap County Health District in maintaining establishing a public education program to foster proper construction, operation, and maintenance of on-site septic systems.~~

Inform the public about how to report spills or illicit dumpings of hazardous waste or other pollutants and how to access information about location and status of contaminated sites.

Policy WR 7.8

Inform the public about how to find information about their well and how to properly maintain it.

Policy WR 7.9

Educate, and provide technical assistance to, the public on methods to identify wasted water indoors and outdoors and practices to conserve water such as native landscaping (zenoscaping) and water use reduction or reuse.

Policy WR 7.10

Provide “how to” or “dos and don’ts” resources for streamside and shoreline landowners.

Policy WR 7.11

Provide information and guidance on water resources protection best management practices for commercial, industrial, residential, agricultural, and other land uses to prevent or reduce pollution. These practices include, but are not limited to, septic system maintenance; pet and livestock waste management; landscaping and gardening; farm plans; hazardous materials and other chemical use, storage, and waste disposal; on-site drainage system maintenance, and automotive care.

Policy WR 7.12

Provide and promote opportunities for citizen stewardship and involvement.

Policy WR 7.13

Provide LID technical guidance and workshops to businesses and contractors working on the Island.

WATER RESOURCES ELEMENT

EXISTING CONDITIONS AND FUTURE NEEDS

SURFACE AND STORMWATER CONDITIONS PRESENTED HERE ARE PARTIAL UPDATES ONLY; UPDATE COMPLETION ANTICIPATED APRIL 14, 2016

The following outlines the present conditions and understanding of the water resources of the Island and the future needs for restoration, enhancement, and protection of these resources.

Groundwater

Groundwater is the sole source of drinking water on Bainbridge Island. It is found in underground reservoirs called aquifers. An aquifer is defined as a permeable sand and/or gravel formation that is capable of yielding a significant amount of water to a well. Wells on Bainbridge Island penetrate several distinct aquifers to allow withdrawal of drinking water by individual homeowners and municipal water purveyors. Most individual household wells penetrate to depths of less than 300 feet. Some residents are still using hand-dug wells less than 40 feet deep, completed in the permeable sediments known as the Vashon Recessional Outwash. Groundwater found at this level also feeds the base flow (summer flow) for Island streams. High capacity wells have been drilled as deep as 1,200 feet to find adequate marketable quantities of water for public and private water purveyors. While few in number, these wells produce a large portion of the Island's potable water. The Blakely Formation, a sedimentary bedrock formation, dominates the geology on the southern end of the Island and limits groundwater production in this area.

~~Aquifer systems on the Island have been mapped where there is sufficient geologic and hydrologic data available to define them. Our understanding of the Island's water resources has been enhanced through historical studies such as the *City of Bainbridge Island, Level II Assessment*⁴ prepared by Kato & Warren and Robinson Noble in 2000 and monitoring and assessments completed in the last ten years by the City's Groundwater Management Program. This work includes the development, improvement, and utilization of a groundwater model; the development of a well monitoring network; and the implementation of long-term monitoring. The following information on existing conditions was drawn from the Level II Assessment by Hydrogeologists and Bainbridge Island residents Doug Dow, Russ Prior, and Mark Shaffer and is subject to change with further study. These aquifers are described in detail in the *Kitsap County Groundwater Management Plan, Volumes I II, dated April 1991, and more recently in the Level II Assessment. Brief descriptions of each aquifer system identified are as follows:*~~

Bainbridge Island has six principal aquifers (Kato & Warren and Robinson & Noble, 2000), the extents of which were refined in the *Conceptual Model and Numerical Simulation of the Groundwater-Flow System of Bainbridge Island, Washington* (USGS, 2011). The six aquifers delineated below reflect updated understanding based on the United States Geological Survey (USGS) model. Additional details about the aquifers, including detailed maps and discussion regarding the extent, thickness, and other characteristics, can be found in the USGS report.

Perched Aquifer (PA)—This aquifer is comprised predominantly of Vashon Advance glacial outwash (Qva). The top of the aquifer ranges from sea level to more than 300 feet above mean sea level [ft MSL], with a thickness of 20 to 200 feet, and is utilized predominantly by domestic wells. About 4 percent of wells are reported to be completed in this unit.

Semi-Perched Aquifer (SPA)—This semi-perched aquifer exists within permeable interbeds (QC1pi) of the upper confining unit (QC1). The top of the aquifer ranges from sea level to more than 200 ft MSL, with a thickness of 10 to 50 feet. About 25 percent of wells are reported to be completed in this unit.

Sea Level Aquifer (SLA)—The Sea Level aquifer (QA1) is extensive, widely used, and mostly confined by QC1. The top of the aquifer ranges from -200 to 200 ft MSL, with a typical thickness of 25 to 200 feet. Fifty-three percent (53%) of wells are completed in the SLA.

Glaciomarine Aquifer (GMA)—This aquifer consists of water-bearing units within a thick sequence of fine-grained glaciomarine drift (QA2). The top of the aquifer ranges between more than -500 to -300 ft MSL, with a typical thickness of 20 to 300 feet. Several of the Bainbridge Island's production wells and at least 4 domestic wells are completed in this aquifer, representing about 2 percent of wells.

Fletcher Bay Aquifer (FBA)—The FBA (QA3) is the deepest identified aquifer on Bainbridge Island. Several large production wells are completed in this aquifer including the Fletcher Bay Well. The top of the aquifer ranges between more than -900 to slightly less than 600 ft MSL, with a typical thickness of 50 to 300 feet. While representing only about 1 percent of wells on Bainbridge Island, the metered KPUD and COBI FBA wells provide approximately 30 percent of the estimated total Island groundwater production.

Bedrock Aquifer—Less than 1 percent of the wells are completed in the sedimentary Blakely Harbor and Blakeley formations on the south end of Bainbridge Island.

Other wells on Bainbridge Island are either completed in water bearing zones within confining units or have an indeterminate aquifer completion zone.

COBI's monitoring well network is distributed across the six Bainbridge Island aquifers as follows: 16 in the Perched Aquifer, 7 in the Semi-Perched Aquifer, 32 in the Sea Level Aquifer, 5 in the Glaciomarine Aquifer, 9 in the Fletcher Bay Aquifer, and 1 in the Bedrock Aquifer. Aspect has updated the USGS groundwater model to include one new public supply well (KPUD North Bainbridge Well #10), for a total of 1,470 Group A and B public wells and exempt wells estimated to be active on Bainbridge Island.

Aquifer Concerns and Observed Conditions

There are two primary concerns in protecting an aquifer system. These are quality and quantity.

Quality

Seawater Intrusion

One of the most common groundwater quality concerns for Islands or other saltwater shorelines is saltwater intrusion, which is the movement of saltwater into a freshwater aquifer. Where the source of saltwater is marine water such as Puget Sound, this process is known as seawater intrusion. Seawater intrusion occurs when the saltwater/freshwater interface moves inland from

offshore. Freshwater is less dense than saltwater and so freshwater will float above saltwater. It is the pressure of the overlying freshwater that keeps the interface offshore. Excessive pumping or overuse of the overlying freshwater will pull the interface toward the shoreline and possibly inland.

Some of our aquifers such as the shallow Perched and Semi-Perched aquifers are, generally, not in contact with saltwater and, therefore, generally not susceptible to seawater intrusion (an exception being where these aquifers are present near the shoreline).

The Sea Level Aquifer and our deeper aquifers can be susceptible. How susceptible can vary from aquifer to aquifer and, even within the same aquifer, depending upon local conditions.

In order to monitor for potential seawater intrusion, the most common practice is to measure chloride concentration and specific conductivity in groundwater. The City's Groundwater Management Program conducts annual chloride sampling in aquifers or wells susceptible to seawater intrusion. The established Early Warning Level, or EWL, is a chloride concentration >100 mg/L or any 4 consecutive samples showing an increasing trend. To date, no wells in the City's monitoring network (including Kitsap Public Utility District and the City's Water Utility wells) exceeded the EWL, and no trends in chloride results were noted.

Chloride concentrations typically varied between 2 mg/L and 15 mg/L. Results in 2013 and 2014 in the Fletcher Bay Aquifer indicate slightly elevated chloride above historic baseline concentration, but not upward trending results. However, these should be monitored for continued changes.

Additionally, the City's groundwater model was run by USGS in 2010 and updated, recalibrated and run again by Aspect Consulting in 2016 to examine the potential for seawater intrusion under different water production (e.g., growth) scenarios. Model projections indicated no seawater intrusion. It should be noted that the model is designed to observe regional scale conditions, but the scale is not fine enough to assess very localized conditions such as one or two wells along the shoreline. Therefore, it is important to continue to monitor in vulnerable areas to catch potentially developing local conditions.

One example is an elevated chloride level measured in one well in the Seabold area in 2006 prior to the development of the City's Groundwater Management Program. As there was no established program in place at the time, there was no immediate follow up sampling/study to confirm seawater intrusion rather than a source other than seawater intrusion. Other common sources of chloride in groundwater include connate, or very-old, groundwater, septic system effluent, very hard groundwater, windblown sea spray, and recharge from irrigation, agricultural practices, and well disinfection. Chloride from any of these sources can result in elevated levels of chloride in an aquifer or well. Erroneously interpreting chloride concentration data without more detailed study may result in what is called a "false positive," where a test identifies a problem that does not in fact exist. That is why follow up investigation using site-specific assessments, is necessary before seawater intrusion can be confirmed. The City, the Kitsap Public Health District, and the Kitsap Public Utility District have teamed up to scope a localized, focused study in the Seabold area for potential funding in 2017.

Nitrate

According to USGS research, nitrate is the most commonly found pollutant in groundwater nationwide, particularly in rural areas. Nitrate levels in drinking water above EPA's Maximum Contaminant Level (or MCL) of 10 mg/L can have serious health effects primarily for infants, but also pregnant women and individuals undergoing treatment with antioxidant medications. Nitrate converts to nitrite in the digestive track which causes a condition call methemoglobinemia which lowers the oxygen in the blood stream. In infants this is called "Blue Baby Syndrome." Brain damage, even death, can occur.

High nitrate levels in groundwater can also indicate the possibility that other contaminants may be present in the water such as bacteria or pesticides.

The typical sources of nitrate in groundwater include the application of fertilizers and pesticides, mostly from agricultural row crop farming, but commercial and residential use can be significant sources as well (such as lawns, parks, golf courses, ballfields, nurseries, and extensive gardens). Other sources include industrial processes and wastewaters, the land application of wastewater treatment plant sludge or biosolids, and on site septic system returns.

Although the Groundwater Management Program does not, at present, routinely monitor nitrate in groundwater, the City's consultant examined nitrate data from the Kitsap Public Health District (KPHD) as part of the 2015-2016 assessment. Nitrate data were not found to exceed EPA's MCL of 10 mg/L. Nitrate data for Group A and B public wells and exempt wells did not indicate any trends. Data submitted to KPHD for exempt wells are typically single results and are insufficient to calculate any trends. However, the maximum result during the last 15 years (2000–2014) was 5.17 mg/L in 2007. There are no apparent trends over time or geographically across the island.

Other Water Quality Concerns

Generally, groundwater quality on the Island is very good. However, moderate levels of iron and manganese are naturally-occurring and common. Although neither of these minerals normally exceed EPA's standards for drinking water, they can influence odor and taste and stain fixtures. Many public water systems and some private systems use filtration devices to remove or reduce these minerals.

Sole Source Aquifer Designation

In 2013, the Bainbridge Island Aquifer System was designated a Sole Source Aquifer. Sole Source Aquifer Designation can apply to one aquifer or a system of multiple aquifers as is the case with Bainbridge Island.

The Sole Source Aquifer Designation Program is an EPA program authorized under the Safe Drinking Water Act of 1974. Section 1424(e) defines a sole source aquifer as "the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health."

The EPA more specifically defines a sole or principal source aquifer as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, and that these areas have no alternative drinking water source(s) which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water.

The program and designation are specifically designed to protect the quality of drinking water by helping to prevent contamination of the aquifer system. It provides this protection by raising the level of awareness of the vulnerability of the aquifer system to contamination and our dependence upon the system as a drinking water supply.

Further, it requires additional EPA scrutiny of federally-funded projects. EPA inspects proposed projects for potential to contaminate the underlying aquifer, and, where appropriate, requires modifications and mitigations to prevent contamination.

However, this additional scrutiny applies to federally-funded projects only, and some projects such as highways and agriculture may be exempt if they meet criteria laid out in pre-established memorandums of understanding between the EPA, the Department of Transportation, the Department of Agriculture, or other agencies.

Quantity Water Levels

The City's Groundwater Management Program currently monitors water levels in public and domestic wells Island-wide and in all six aquifers. Water level is an indicator for water quantity, and water level data are assessed against the program's early warning level, or EWL, for safe yield. The EWL for safe yield is a declining water level equal to or greater than ½ foot or more per year over a 10-year period that cannot be attributed to below average rainfall.

Individual well levels were reviewed for trends and compared against the EWL for safe yield. All wells were found to be below the EWL, and water levels in the aquifers did not indicate any aquifer-wide trends, and only two individual wells were noted for further review.

An exempt well (25N/02E-21P03) in the Sea Level Aquifer showed an apparent average decline of approximately 0.56 feet/year over the 8-year period of record. However, further review of the water level measurement method history showed that it changed twice over the period of record from a steel tape to a sonic water level meter and, then, back to steel tape. The results collected via sonic water level meter appeared to be inconsistent compared to the results before and after using the steel tape, a more rudimentary but more reliable measurement method. Therefore, the sonic level readings were removed from the analysis. Once removed, the remaining data were below the EWL. Water-use data were not available for the well. However, the well owner indicated to COBI that no known change in water use occurred over the period of record. Continued long-term monitoring of this well using the steel tape method, as planned by COBI, will determine if there is a significant trend in water level decline over time.

Group A system well 'Island Utility Well #1' (25N/02E-34F07) in the Fletcher Bay Aquifer has shown an average decline of approximately 0.49 feet/year from 2004-2014. Although this does not yet exceed the EWL, it is very close to approaching it. Therefore, further monitoring and assessment are warranted. The well is situated next to two other Fletcher Bay Aquifer production wells (Island Utility Well #2, Island Utility Well #4) within the same water system. Production data have not been available for these wells, which makes it unclear if declines are related to changes in water use over the period. This system has just transitioned to operation by KPUD in mid-2015, and they are now reviewing available information to understand the current conditions within that water system. Additional data review will continue as the system infrastructure is updated to see if additional water use, system loss, or some other factor

contributed to the historical decline. No other Fletcher Bay Aquifer wells monitored exhibited a similar declining trend, so it appears that this issue is specific to this well and not an aquifer-wide concern.

Aquifer System Carrying Capacity

The City, as a community, has yet to fully-define or characterize a sustainable aquifer system. Some initial characteristics are keeping the saltwater/freshwater interface offshore and saltwater out of the freshwater supply, and maintaining a balanced water budget for the aquifer system in order to prevent depletion.

To help provide some baseline information about these initial characteristics and expected impacts to the system due to climate change, Aspect Consulting conducted a system carrying capacity model assessment. The aquifer system carrying capacity assessment was based on those safe-yield indicators with EWLs described above using aquifer water levels and chloride concentration. The on-Island groundwater balance for the entire aquifer system (water budget) was also evaluated. The groundwater balance components do not have EWLs, but were evaluated to provide additional context on the predicted changes in groundwater conditions.

Water Level Changes: The following rates of groundwater level change were based on comparing current and predicted groundwater levels in 100 years:

- The Perched Aquifer system showed an average 0.10 foot per year of water level decrease at 25 locations simulated across the Island;
- The Semi-Perched Aquifer system showed an average 0.13 foot per year of water level decrease at 12 locations simulated across the Island;
- The Sea Level Aquifer system showed an average 0.09 foot per year of water level decrease at 49 locations simulated across the Island;
- The Glaciomarine Aquifer showed an average 0.02 foot per year of water level decrease at 6 locations simulated across the Island; and
- The Fletcher Bay Aquifer showed an average 0.15 foot per year of water level decrease at 9 locations simulated across the Island.

The predicted groundwater level changes over a 100-year timeframe were less than the COBI EWLs.

Saltwater/freshwater Interface: The predictive model results indicated that, despite these slow declines, groundwater from the Bainbridge Island aquifer system flows to Puget Sound and keeps the freshwater/seawater interface at a distance from the Bainbridge Island shoreline. All wells within the Bainbridge Island shoreline maintained chloride concentrations less than 100 mg/L, and no trend in concentrations was observed based on predictive model results.

Water Budget: Though the predicted groundwater level declines did not appear to induce seawater intrusion, they can have impacts on other components in the system such as discharge to streams to help maintain summertime flows. Therefore, it is important to examine the components to the system's water budget.

Similar to a financial budget, a water budget represents a balance of inputs and outputs. If one

component goes up or down, some other component(s) must go up or down to compensate. Groundwater balance components are typically difficult to measure directly (such as recharge and groundwater underflow). Thus, this groundwater balance assessment relies on modeling results without actual field measurements.

Based on the 2011 USGS Report, the relationship between groundwater balance inputs and outputs for the Bainbridge Island aquifer system is shown in the following equation:

$$R_{ppt} = W_{ppg} + D_{sw} + (GW_{ps} - GW_{kp})$$

Where:

Inputs include:

R_{ppt} is precipitation recharge.

Outputs include:

W_{ppg} is groundwater withdrawals;

D_{sw} is groundwater drainage to surface water (such as seeps to bluffs, creeks, streams, etc.);

and

$(GW_{ps} - GW_{kp})$ is the net lateral groundwater underflow (groundwater flow toward Puget Sound submarine seeps (GW_{ps}) and groundwater flowing from the Kitsap peninsula in deeper aquifers (GW_{kp})).

To balance the modelled 50-percent increase in groundwater withdrawals and the 20-percent decrease in recharge due to climate change, the model showed projected changes in groundwater drainage to surface water (approximately 40-percent decrease) and lateral groundwater flow (approximately 24-percent decrease). Figure 6, excerpted from Aspect's technical memorandum (*Bainbridge Island Groundwater Model: Aquifer System Carrying Capacity Assessment (Task 3 Scenario)*, 2016) compares the water balance components under current and projected conditions, based on model results.

The Bainbridge Island groundwater model results showed aquifer storage will be reduced by approximately 11,000 million gallons between current and projected conditions, reflecting the water level decreases described above. These groundwater balance results should be carefully interpreted, considering that the limited grid resolution may not be sufficient to accurately simulate groundwater discharge to surface water, and that the model has not been calibrated to observed flows.

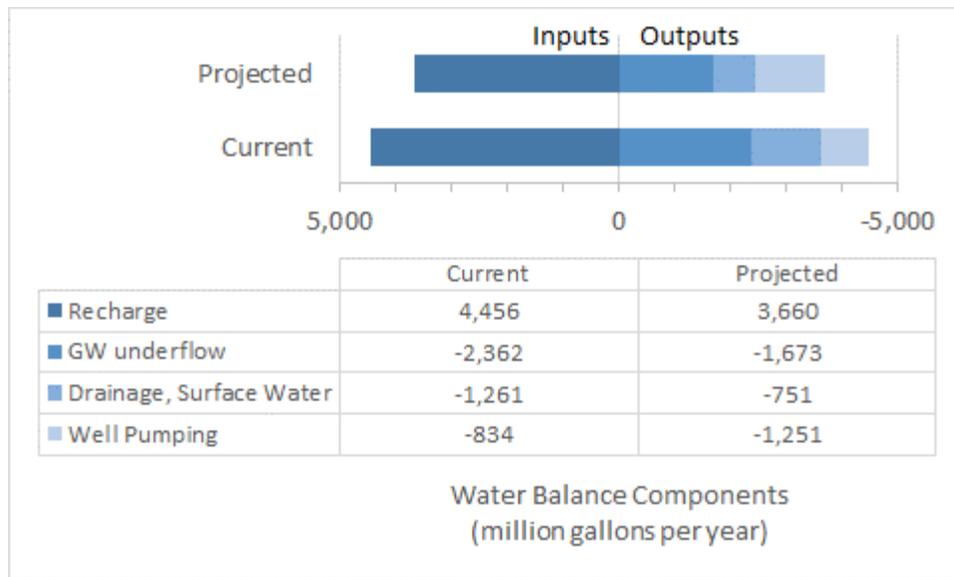


Figure 6. Current and Projected Groundwater Balance Components.

In this figure, well pumping (also called production) is the amount of water taken out of the system through wells (water use). The 50% increase in this component represents the expected increase in water use due to population growth.

Drainage to surface water is groundwater contribution to surface water features such as wetlands, lakes, and streams. The 40% reduction shown here may have an impact on maintaining summer baseflows and water temperatures. It is cautioned that the model as it is currently constructed is not specifically designed to provide an estimate as to how much stream flow will be impacted, but it could be modified to answer specific questions around this topic in future model runs.

Groundwater underflow is the amount of groundwater that seeps or discharges into Puget Sound at the shoreline. This value is influenced by the water levels in the aquifers, and the reduction shown here represents the impact from project water level decreases. The key importance to this component is that there has to be enough underflow to provide the pressure to keep the saltwater/freshwater interface offshore and prevent seawater intrusion.

Recharge is the portion of precipitation or rainfall that infiltrates the ground and reaches the aquifer. The estimated 20% reduction shown in the water balance accounts for climate change impacts.

The amount of groundwater underflow and discharge to streams is driven by the geological makeup of the aquifer system. Therefore, we have no direct ability to control these budget components. Rather it is the components of well pumping and recharge that we have more ability to directly control. We can reduce well pumping by reducing our water use through aggressive water conservation measures.

Though we cannot control precipitation patterns, we can take measures to enhance recharge through creative water capture and return measures (from the rain barrel scale to large scale infrastructure) and through protective land use measures such as low impact development and

protection of aquifer recharge areas and other aquifer conservation areas.

Aquifer Recharge Areas

To help the City assess recharge areas for special protection or designation, the model was run to determine recharge areas on the Island.

The Bainbridge Island model results indicate that areas across much of the Bainbridge Island area may have a critical recharging effect on aquifers that are sources of drinking water.

Primary findings include:

- Wells in shallow aquifers (including the Sea Level Aquifer and above) may withdraw water that originates as recharge relatively close to the well head and is younger than 100 years old. See figure below which shows the recharge areas for shallow aquifers (green squares).
- Wells in deep aquifers (including the Glacio-Marine Aquifer and the Fletcher Bay Aquifer) may withdraw water that originates as recharge relatively distant from the wellhead and is greater than 100 years old. See figure below which shows the recharge areas for deep aquifers (cross-hatched area).
- Not all groundwater on Bainbridge Island comes from recharge on Bainbridge Island. Model results indicate several wells tapping the deeper aquifers withdraw water that originates as recharge from areas on the Kitsap Peninsula and is greater than 1,000 years old.

Wells in bedrock were not simulated in the Bainbridge Island model as the method of water particle tracking was not appropriate for fractured bedrock. However, the bedrock is also considered a CARA, because water supply wells have been installed at various depths in bedrock, and potable water supply is from recharge. Bedrock recharge area is shown at hatched area.

Perched Aquifer (PA)

~~The Perched Aquifer is a sand and gravel aquifer system under the major upland areas. It is found above 200 feet elevation and averages 90 feet in thickness. This aquifer underlies nine square miles (33%) of the Island's land surface and serves a number of domestic wells, with yields averaging 16 gpm. It is recharged from leakage through overlying sediments and discharges through underlying sediments into deeper aquifers or through springs where the aquifer intercepts land surface.~~

⁺Subtitled *An Element of the Water Resource Study*, dated December 2000.

Semi-Perched Aquifer (SPA)

~~The Semi-Perched Aquifer is found under approximately 20 square miles (73%) of the land surface and averages about 30 feet in thickness. Where identified, it is found between 20 feet below and 100 feet above sea level. Approximately 25% of the domestic wells on the Island obtain an average of 19 gpm from this aquifer. However, uncharacteristically high yields from wells completed for Meadowmeer provide local yields over 300 gpm. The aquifer is recharged from leakage through overlying sediments and discharges into deep cut stream valleys, deeper aquifers, or to Puget Sound.~~

Sea Level Aquifer (SLA)

~~The Sea Level Aquifer underlies 85% (23.5 square miles) of the Island's land surface but is noticeably absent south of Blakely Harbor where bedrock is found above sea level. The~~

aquifer's average thickness is 110 feet. It is found from 40 feet above to 230 feet below sea level. The Sea Level Aquifer is the Island's primary aquifer system, supplying water to approximately 53% of Island wells. Several of the Island's larger water purveyors obtain yields of more than 300 gpm from this aquifer. The average yield to the majority of (domestic) wells is 20 gpm. The aquifer accepts recharge from leakage through overlying sediment with natural discharge into Puget Sound. The City's wells at the head of Eagle Harbor are completed in the SLA.

Glaciomarine Aquifer (GMA)

The Glaciomarine Aquifer is the shallower of the two deep aquifer systems present below Bainbridge Island. The data available confirms estimates of a depth of 400 to 760 feet below sea level under approximately 9.5 square miles (35%) of the Island and an average thickness of 120 feet. This aquifer may exist under a greater portion of the Island but lack of exploration precludes a definitive analysis. Only 2% of Island wells penetrate this fine-grained aquifer which yields an average of 18 gpm. Notable wells completed in the GMA are the City's Taylor Avenue well and the old and new wells completed at the former creosote plant site at Bill Point. Recharge to the aquifer is obtained through leakage from overlying sediments. Discharge is likely to deeper areas in Puget Sound.

Fletcher Bay Aquifer (FBA)

The Fletcher Bay Aquifer is named for a pair of wells drilled into the deep aquifer system near Fletcher Bay. Several other wells are also completed in this permeable sand and gravel formation found from 690 to 1,280 feet below sea level. Because very few wells penetrate to this depth, the extent of the aquifer is not well defined. The aquifer is believed to underlie 55% (15 square miles) of the Island, mainly in the north central area. The City obtains the majority of the drinking water for the Winslow water system from the FBA through its Fletcher Bay and Sands Road wells. Yields from this aquifer average 330 gpm. Because of the depth of this aquifer, it has been theorized that it is connected to a similar aquifer identified at this depth on the Kitsap Peninsula. However, this connection has not been proven and recharge to the FBA can only have been assumed to originate on the Island through leakage from overlying sediments.

Hydrologic Cycle and the Water Budget

Understanding the Island's water budget requires a look at the components of the water system. These components are defined as:

- Precipitation (rain or snow);
- Evapotranspiration: the combined amount of water that evaporates directly from the surface plus the amount that is taken up by vegetation and transpired back into the air;
- Runoff: the amount of water that flows directly off the Island via streams;
- Recharge: the amount of water that infiltrates into the aquifer; and
- Discharge: well pumpage, springs, streams and direct discharge into Puget Sound.

Although the variability of the natural system is great, educated assessments of the individual components are commonly used to predict sustainable use of the groundwater.

All water entering the Island's natural water system originates as precipitation. Only a portion of the precipitation is available for recharge because some of it exits the system

before it percolates into the ground. Water exits the system through evapotranspiration, surface runoff and discharge. The quantity of groundwater available for use is a function of the water balance: water entering the system is equal to water flowing out of the system, plus or minus the change in storage of water within the aquifer.

Precipitation on Bainbridge Island averages about 35 inches per year. In the absence of more precise water budget data it is generally thought that one half to one third of all precipitation is lost through evaporation from surface water and evapotranspiration from trees, plants and grass. It is estimated that approximately one quarter to one third of the precipitation is discharged to springs and stream flow or directly to Puget Sound.

The remaining precipitation infiltrates the surface sediments through direct absorption, supplemented to some extent through on-site stormwater infiltration, to recharge the Island aquifers. An unknown quantity of recharge is discharged from the Perched and Semi-Perched Aquifer, and to a lesser extent the Sea Level Aquifer providing (base) stream flow for fish and other wildlife. However, only a portion of the remaining recharge that reaches the major aquifers is available for use without serious disruption of the hydrologic system. Withdrawing too much water will cause aquifer water levels to decline and may cause seawater intrusion into the Sea Level Aquifer and deeper aquifers.

Hypothetical groundwater (aquifer) yield

A simplistic approach for determining the “hypothetical groundwater yield” is the product of the general recharge rate times the recharge area (27.5 square miles or 17,600 acres) producing a volume of water in acre feet per year. The Level II study provided a hypothetical groundwater recharge of 19,000 acre feet per year (afy). However, it is recognized that the sustainable yield of an aquifer can be more accurately determined by monitoring aquifer water levels for many years. Such monitoring would include: flow metering of typical wells for water use or measurement of surface water diversions; well water monitoring; and stream flow monitoring. Management of the groundwater resources of Bainbridge Island will require balancing withdrawals from specific aquifers to sustainable water levels. Actual sustainable withdrawal rates are unknown.

Aquifer Recharge Areas

Springs and streams reflect a natural system of discharge for Island groundwater. All of the remaining land surface (except for portions of the southern end of the Island) serves as aquifer recharge area. Soil type, slopes, vegetative cover and impervious surfaces significantly affect the distribution of recharge. The identification of aquifer recharge areas is important both from the standpoint of groundwater quantity and quality. Aquifer recharge areas have geologic and soil conditions which allow high rates of surface water infiltration, which also means they are particularly susceptible to contamination. Increasing impervious surfaces through development reduces the amount of recharge available to the Island’s aquifers. At the same time, runoff from impervious surfaces in developed areas contains increased contaminants. Efforts to protect and preserve the Island’s natural water supply are warranted, as the resources that would be required to clean up after contamination or to secure a new source would be prohibitive.

Where development overlays aquifer recharge areas, special considerations need to be made

to preserve the volume of recharge available to the aquifer and to protect the groundwater from contaminants such as nitrates, biocides and heavy metals found in septic systems and stormwater runoff. The most extensively used aquifer underlies 85% of the Island and occurs under all zoning classifications.

The Recharge Areas Map (Figure 5) was developed by Russ Prior with assistance from Mark Shaffer, Doug Dow and Kitsap County PUD. This recharge map is based on a spreadsheet model produced by Robinson and Noble for the Level II Assessment (December 2000). Figure 5 identifies high, moderate and low aquifer recharge areas on Bainbridge Island. Generally recharge depends on the ease with which precipitation can move from the land surface to the aquifer based on the types of conditions in the area. The elements used in the Level II spreadsheet model include: amount of rainfall, surficial soil types (based on USDA Soil Survey of Kitsap County), slope, ground cover and water holding capacity.

Aquifer recharge areas have been mapped for the Island using available assessment information described in the Level II Assessment. The mapping identifies high, moderate, and low aquifer recharge areas in accordance with the following definitions:

Susceptibility	Characteristics
High	Greater than 20 inches of infiltration into the groundwater system per year – generally areas with high recharge have permeable surficial soils and shallow slopes.
Moderate	Between 10 and 20 inches per year of infiltration into the groundwater system – includes many areas underlain by Vashon till which allows significant quantities of infiltration.
Low	Less than 10 inches per year of infiltration into the groundwater system – generally areas with low recharge have surficial soils of low permeability and steep slopes.

Source: 2000 Bainbridge Island Level II Assessment

Aquifer Concerns

~~The Island has many shallow and deep aquifers, some of which may be connected vertically as well as horizontally. No data has been developed to date to determine how much water can be withdrawn from any of the Island aquifers without causing over-drafting. Monitoring is important to further our understanding of the Island's aquifer systems.~~

~~Based on current water quality data, the 2000 *Bainbridge Island Level II Assessment* concluded there was no evidence of extensive seawater intrusion on the Island nor was there evidence of increasing salinity~~

Surface Water

The surface waters of Bainbridge Island provide aesthetic, recreational, economic, and ecological benefits to Island citizens. Boating, fishing, and shellfish harvest are important recreational and economic activities, and the Island's streams, lake, harbors, shorelines, and wetlands provide habitat for a diversity of fish and wildlife species.

The harbors and numerous coves around the Island host anchorage, moorage, marinas, boat launches, waterfront access, and swimming beaches. Eagle Harbor, specifically, hosts marinas which provide permanent moorage for live-aboards and an open water mooring and anchoring area for the Island's live-aboard community.

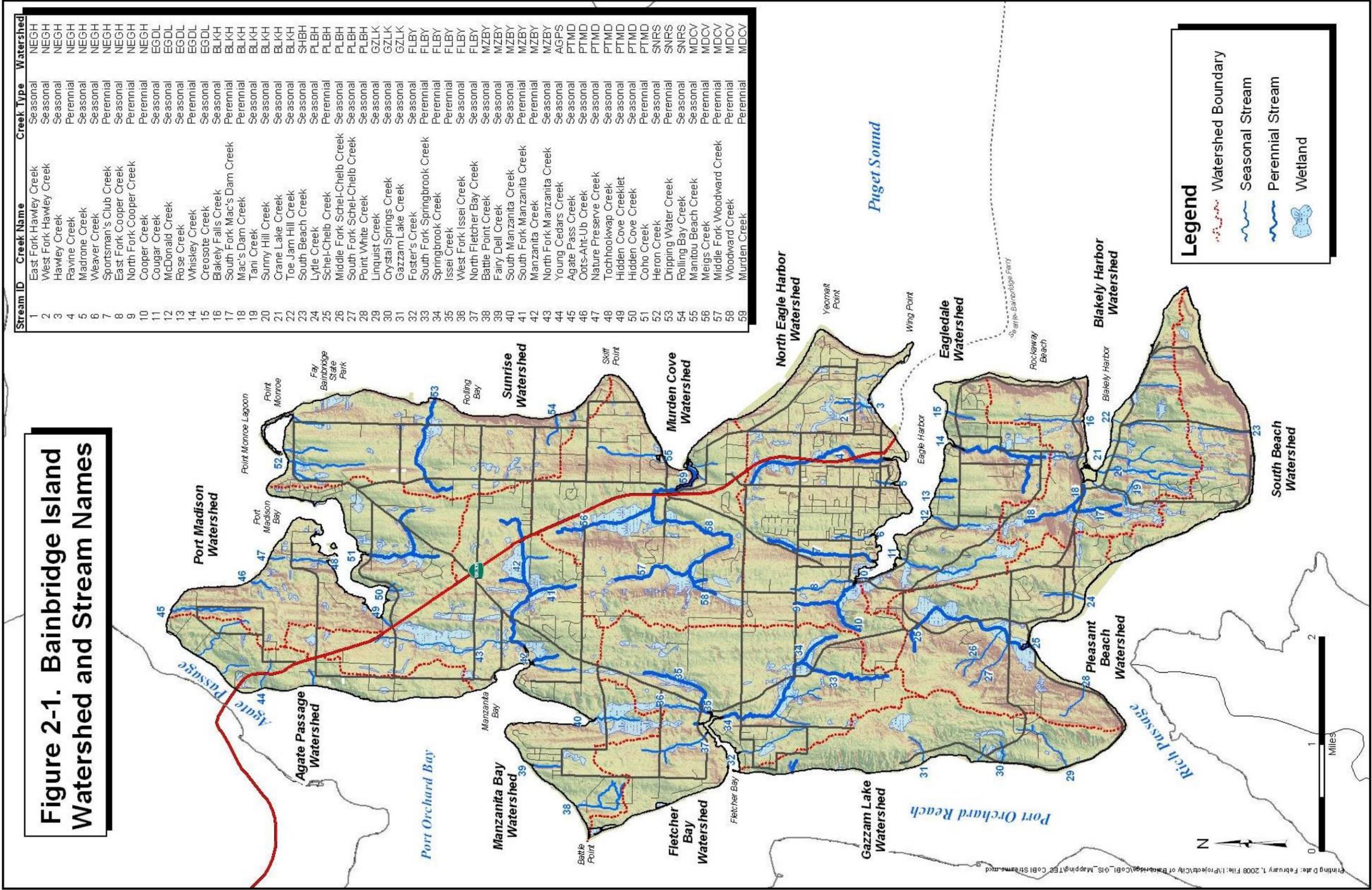
In addition to providing forage and habitat for salmon, otter, sea lions, and waterfowl and swimming, boating, and fishing areas for people, the majority of the Island's shorelines and adjacent nearshore areas are commercial shellfish growing and harvest areas. Many shoreline residents recreationally harvest shellfish such as clam and geoduck as well.

Watersheds

Surface water flows from high geographic points to lower elevations collecting in streams and wetland systems within the watersheds of the Island. Watershed boundaries are determined by Island topography where ridgelines define the boundaries.

Bainbridge Island contains twelve distinct watersheds with 59 seasonal and perennial streams that contribute fresh water to Puget Sound (see Figure 2.1 below excerpted from the Water Quality and Flow Monitoring Program Final Monitoring Plan, 2008). Five harbors, twelve estuarine wetlands, one lake, 1,242 acres of wetland, and 53 miles of shoreline comprise the remainder of the surface water system.

Figure 2-1. Bainbridge Island Watershed and Stream Names



Land cover

Bainbridge Island encompasses an area of 17,471 acres, or approximately 28 square miles. The primary land cover is tree-cover at 73%, or 12,760 acres. Grass/scrub lands, developed areas with impervious surfaces and other coverages comprise 15%, 11% and 1%, respectively, with combined coverage of 4,712 acres (Table 1 next page).

Land use type does not vary widely by any great degree across the island due to a low percentage of industrial or commercial land development and the lack of available or developed farm/range land. The island's land use is consequently dominated by residential uses (75%). Other land uses such as recreation land (7%), agricultural (6%), transportation corridors (6%), commercial/light manufacturing (2%), forest land-use (2%) and public facilities (2%), make up the remainder of the land use as a percentage of the total acreage on the island. With a total overall population of 23,630 the greatest population density occurs at the towns of Winslow, Island Center, Lynwood Center and around the coastline of the island. Outside of urbanized areas, the Island is generally characterized by scattered, small communities, homes on acreage, and large parcels of undeveloped land.

Stream type

In 2014, the Wild Fish Conservancy (WFC) completed stream typing for Bainbridge Island as part of the [West Sound Watersheds, Kitsap Peninsula \(WRIA 15\) Stream Typing Project](#).

WFC's website states, "Water typing is the state-sanctioned process of mapping the distribution of fish and fish habitat. Regulatory water type maps are used to regulate land use decisions adjacent to streams, ponds, and wetlands. Because existing (modeled) regulatory maps often significantly misrepresent the presence, location, and extent of fish habitat, the effectiveness of state and local government fish habitat protection regulations is compromised. More information about the water typing process and its significance is available at: <http://wildfishconservancy.org/resources/maps/what-is-water-typing>."

WFC classified fish and fish habitat in Island streams and ground-truthed regulatory maps of stream presence and location, identifying an additional # previously unknown/unmapped miles of stream on Bainbridge Island. The City is currently using WFC's updated stream data.

Table 1. CoBI Watershed Land Cover Statistics

<u>Watershed Name /Code</u>	<u>Watershed Area (Acres)</u>	<u>Watershed Size Ranking</u>	<u>Breakdown of Total Watershed Landcover (% of Total Area)</u>								
			<u>Forest</u>	<u>Wetlands</u>	<u>Natural</u>	<u>Grass & Turf</u>	<u>Bare Ground</u>	<u>% Total Impervious Area</u>	<u>Developed</u>	<u>Surface Water</u>	<u>Other</u>
<u>Agate Passage / AGPS</u>	<u>599.96</u>	<u>12</u>	<u>79.52</u>	<u>2.75</u>	<u>82.28</u>	<u>4.25</u>	<u>3.08</u>	<u>9.17</u>	<u>16.51</u>	<u>0.17</u>	<u>1.04</u>
<u>Blakely Harbor / BLKH</u>	<u>1,369.73</u>	<u>7</u>	<u>87.04</u>	<u>1.08</u>	<u>88.13</u>	<u>2.25</u>	<u>3.62</u>	<u>5.75</u>	<u>11.62</u>	<u>0.22</u>	<u>0.04</u>
<u>Eagledale / EGDL</u>	<u>1,094.12</u>	<u>9</u>	<u>65.10</u>	<u>2.95</u>	<u>68.04</u>	<u>8.83</u>	<u>4.36</u>	<u>18.45</u>	<u>31.63</u>	<u>0.33</u>	<u>0.00</u>
<u>Fletcher Bay / FLBY</u>	<u>2,114.01</u>	<u>3</u>	<u>75.83</u>	<u>1.09</u>	<u>76.92</u>	<u>8.60</u>	<u>6.04</u>	<u>7.89</u>	<u>22.52</u>	<u>0.56</u>	<u>0.00</u>
<u>Gazzam Lake / GZLK</u>	<u>886.45</u>	<u>10</u>	<u>83.96</u>	<u>0.79</u>	<u>84.74</u>	<u>3.96</u>	<u>1.86</u>	<u>7.82</u>	<u>13.64</u>	<u>1.62</u>	<u>0.00</u>
<u>Manzanita Bay / MZBY</u>	<u>2,296.34</u>	<u>1</u>	<u>72.25</u>	<u>1.92</u>	<u>74.18</u>	<u>9.76</u>	<u>6.76</u>	<u>8.85</u>	<u>25.37</u>	<u>0.46</u>	<u>0.00</u>
<u>Murden Cove / MDCV</u>	<u>2,046.36</u>	<u>4</u>	<u>73.65</u>	<u>2.34</u>	<u>75.99</u>	<u>7.65</u>	<u>6.46</u>	<u>9.48</u>	<u>23.58</u>	<u>0.43</u>	<u>0.00</u>
<u>North Eagle Harbor / NEGH</u>	<u>2,184.91</u>	<u>2</u>	<u>50.64</u>	<u>2.46</u>	<u>53.11</u>	<u>8.30</u>	<u>10.57</u>	<u>26.95</u>	<u>45.82</u>	<u>0.44</u>	<u>0.63</u>
<u>Pleasant Beach / PLBH</u>	<u>1,437.63</u>	<u>5</u>	<u>70.66</u>	<u>3.00</u>	<u>73.66</u>	<u>6.01</u>	<u>6.64</u>	<u>13.56</u>	<u>26.21</u>	<u>0.13</u>	<u>0.00</u>
<u>Port Madison / PTMD</u>	<u>1,388.31</u>	<u>6</u>	<u>81.85</u>	<u>1.18</u>	<u>83.03</u>	<u>6.26</u>	<u>3.75</u>	<u>6.36</u>	<u>16.37</u>	<u>0.30</u>	<u>0.31</u>
<u>South Beach / SHBH</u>	<u>711.89</u>	<u>11</u>	<u>76.59</u>	<u>1.20</u>	<u>77.79</u>	<u>4.16</u>	<u>10.88</u>	<u>6.54</u>	<u>21.58</u>	<u>0.63</u>	<u>0.00</u>
<u>Sunrise / SNRS</u>	<u>1,342.24</u>	<u>8</u>	<u>79.08</u>	<u>1.92</u>	<u>81.00</u>	<u>4.49</u>	<u>6.41</u>	<u>7.97</u>	<u>18.87</u>	<u>0.13</u>	<u>0.00</u>
<u>TOTAL ACREAGE</u>	<u>17,471.95</u>	<u>-</u>	<u>12,760.4</u> <u>4</u>	<u>333.49</u>	<u>13,093.9</u> <u>2</u>	<u>1,194.7</u> <u>6</u>	<u>1,089.2</u> <u>7</u>	<u>1,994.28</u>	<u>4,278.31</u>	<u>74.84</u>	<u>24.88</u>

Notes:

** Statistical sources include: Battelle GIS database, CoBI GIS data, and CoBI Level II Assessment (Kato & Warren, 2000)

(Water Quality and Flow Monitoring Program – Final Monitoring Plan, COBI, 2008)

Stormwater

Stormwater is generated when the ground becomes saturated and rainwater drains overland to the nearest surface water body or rainfall encounters hard or impervious surfaces.

The amount of stormwater runoff generated from road, roof, parking lot, and other impervious surfaces ~~created by urban developments~~ can be of a higher volume than what existed in the natural state. Peak flows that follow immediately after a storm can be much greater than existed when the land was in a natural state with vegetative cover.

The volume of stormwater generated by impervious surfaces has tremendous force and can cause erosion if allowed to flow into natural drainage systems provided by streams and wetlands. Stormwater can loosen soil and stream banks in the natural drainage way causing suspended particulates to flow into other bodies of water.

Excessive stormwater runoff may cause streams to expand and overflow, creating flooding conditions on adjacent lands. Any sedimentation will eventually drop as the water slows down and loses its force, causing siltation and the degradation of wetlands, particularly of salmon spawning habitat.

Stormwater runoff from driveways and parking lots also transports pollutants such as gas and oil as well as residues from pesticides, fertilizers, and other chemicals used in lawn care, as well as animal waste in agricultural areas. Non-point source pollution accumulates as water runs over hard surfaces and is carried to the nearest body of water.

(more to come; will speak to permit requirements related to monitoring, illicit discharge detection and elimination, and education and outreach; and low impact development requirements)

Observed Surface and Stormwater Conditions

Department of Ecology Surface Water Quality Assessment

Every two years the State Department of Ecology (Ecology) identifies polluted water bodies and submits a list of impaired water bodies, called a 303(d) list, to the Environmental Protection Agency (EPA) for approval in accordance with the federal Clean Water Act. This assessment is based on the assumption that each water body should support certain designated uses. Some of these uses are swimming and boating, fish and shellfish rearing and harvest, and wildlife habitat.

Ecology designates water bodies that frequently or consistently fail to meet standards or criteria as *Impaired*. Water bodies that only infrequently fail to meet standards are classified as *Waters of Concern* or *Sediments of Concern* if the sampled matrix was sediment. These assessments use water, fish/shellfish tissue, habitat, and sediment data.

Ecology's [2012 Water Quality Assessment](#) determined that one stream, one harbor, two coves, one lagoon, and three Island-adjacent nearshore marine areas on Bainbridge Island were *Impaired* by one or more pollutants and were not able to provide the full recreational, habitat, and aesthetic benefits they once offered.

An additional one bay, one harbor, and 28 other Island-adjacent nearshore marine areas were identified as *Waters of Concern* and/or *Sediments of Concern* for periodic excursions beyond the allowable standard or criteria for one or more pollutants.

Ecology's proposed [2014 Water Quality Assessment](#) (under review by the EPA at the time of this printing), designated an additional two streams as *Impaired* by at least one pollutant.

Tables 2-5 on the following pages detail those water bodies classified as *Impaired* or of *Concern* according to the analyzed matrix (water, tissue, habitat, and sediment, respectively).

It should be noted that much of the sediment data were collected prior to 2003, some as early as the 1990's. These may not be representative of current conditions. Further, many of the identified pollutants are legacy pollutants resulting from historic land use such as large-scale, row-crop farming and the active lumber industry at the turn of twentieth century. The City's sediment sampling data collected in 2008 and 2013 may be more representative of current inputs to these water bodies. These data are summarized in the next section, *City Surface Water Quality Assessment*.

One example of legacy pollution is the former [Wyckoff Creosote Facility](#) located at the mouth of Eagle Harbor. Sites where sediments are contaminated by hazardous waste are regulated and managed through the Model Toxics Control Act (MTCA). Sites such as the former Wyckoff Creosote Facility, due to the complexity and size, are normally addressed through [EPA's Superfund program](#).

However, water bodies listed on the 303(d) list require TMDLs (Total Maximum Daily Loads) where identified sources of the pollutant of concern are allocated a pollutant load reduction in order for that water body to meet criteria. Currently, the City is a stakeholder in the [Sinclair and Dyes Inlets Fecal Coliform Bacteria Total Maximum Daily Load \(TMDL\)](#). Four of the Island's watersheds are captured within the TMDL drainage basin boundaries (Fletcher Bay, Gazzam Lake, Pleasant Beach, and South Beach Watersheds).

Table 2. Ecology Approved 2012 and Proposed 2014 Water Quality Assessment - Water

Waterbody	Parameter or Pollutant	2012	2014 (Proposed)
Eagle Harbor (Middle)	Bacteria	Impaired	Impaired
	Copper	Waters of Concern	Waters of Concern
Eagle Harbor (Inner)	Dissolved Oxygen	Waters of Concern	Waters of Concern
	Temperature		
Agate Passage - Bridge	Dissolved Oxygen	Waters of Concern	Waters of Concern
Agate Passage - Agate Point	Dissolved Oxygen	Waters of Concern	Waters of Concern
	Temperature		
Rich Passage - Pleasant Beach Cove/Pleasant Beach	Bacteria	Impaired	Impaired
	Dissolved Oxygen		
	pH	Waters of Concern	Waters of Concern
Rich Passage - Point White	Dissolved Oxygen	Waters of Concern	Waters of Concern
Rich Passage - Fort Ward	Bacteria	Waters of Concern	Waters of Concern
	Dissolved Oxygen		
	pH		
Port Orchard Passage - Lower Crystal Springs	Dissolved Oxygen	Impaired	Impaired
	Bacteria		
	Temperature	Waters of Concern	Waters of Concern
Port Orchard Passage - Upper Crystal Springs	Bacteria	Waters of Concern	Waters of Concern
Port Orchard Passage - Fletcher Bay	Bacteria	Waters of Concern	Waters of Concern
Port Orchard Passage - Battle Point	Bacteria	Waters of Concern	Waters of Concern
Port Orchard Passage - South of Rolston	Bacteria	Waters of Concern	Waters of Concern
Puget Sound (Central) - Blakely Harbor (Mouth)	Bacteria	Waters of Concern	Waters of Concern
Puget Sound (Central) - Blakely Harbor (Middle)	Bacteria	Waters of Concern	Waters of Concern
Puget Sound (Central) - Blakely Harbor (Inner)	Bacteria	Waters of Concern	Waters of Concern
Puget Sound (Central) - Murden Cove	Bacteria	Impaired	Impaired
Puget Sound (Central) - Rolling Bay	Bacteria	Waters of Concern	Waters of Concern
Port Madison Bay - Point Monroe	Bacteria	Waters of Concern	Waters of Concern
Port Madison Bay - Mouth	Bacteria	Waters of Concern	Waters of Concern
Springbrook Creek	Bacteria	Impaired	Impaired
Ravine Creek	Bacteria	---	Impaired
Murden Creek	Bacteria	---	Impaired

Table 3. Ecology Approved 2012 and Proposed 2014 Water Quality Assessment - Tissue

Waterbody	Parameter or Pollutant	2012	2014 (Proposed)
Eagle Harbor (Outer)	Benzo(a)pyrene	Impaired	Impaired
	Benzo(a)anthracene		
	Benzo[b]fluoranthene		
	Benzo[k]fluoranthene		
	Chrysene		
	Dibenzo[a,h]anthracene		
	Indeno(1,2,3-cd)pyrene		
	PCB		
Puget Sound (Central) - Rockaway	Chrysene	Impaired	Impaired

Table 4. Ecology Approved 2012 and Proposed 2014 Water Quality Assessment - Habitat

Waterbody	Parameter or Pollutant	2012	2014 (Proposed)
Puget Sound (Central) - Murden Cove	Habitat	Impaired	Impaired
Port Madison - Point Monroe Lagoon	Habitat	Impaired	Impaired

Table 5. Ecology Approved 2012 and Proposed 2014 Water Quality Assessment - Sediment

Waterbody	Parameter or Pollutant	2012	2014 (Proposed)
Eagle Harbor (Outer)	1,2,4-Trichlorobenzene	Impaired	Impaired
	1,2-Dichlorobenzene		
	1,4-Dichlorobenzene		
	2,4-Dimethylphenol		
	2-Methylnaphthalene		
	2-Methylphenol		
	4-Methylphenol		
	Acenaphthene		
	Acenaphthylene		
	Anthracene		
	Arsenic		
	Benzo(a)anthracene		
	Benzo(a)pyrene		
	Benzo(g,h,i)perylene		
	Benzo(a)fluoranthene (b+k+j), Total		
	Benzoic Acid		
	Benzyl Alcohol		
	Bis (2-Ethylhexyl) Phthalate		
	Bioassay		
	Butyl Benzl Phthalate		
	Cadmium		
	Chromium		
	Chrysene		
	Copper		
	Dibenzo(a,h)anthracene		
	Dibenzofuran		
	Diethyl Phthalate		
	Dimethyl Phthalate		
	Di-n-butyl Phthalate		
	Di-n-octyl Phthalate		
	Fluoranthene		
	Fluorene		
	Hexachlorobenzene		
	Hexachlorobutadiene		
	HPAH		
	Indeno(1,2,3-c,d) Pyrene		
	Lead		
	LPAH		
	Mercury		
	Naphthalene		
N-Nitrosodiphenylamine			
PCB			
Pentachlorophenol			
Phenanthrene			
Phenol			
Pyrene			
Silver			
Zinc			
Rich Passage - Pleasant Beach	Benzoic Acid	Sediments of Concern	Sediments of Concern
Rich Passage - Pleasant Beach Cove	Benzoic Acid	Sediments of Concern	Sediments of Concern
Port Orchard Passage - Upper Crystal Springs	Benzoic Acid	Sediments of Concern	Sediments of Concern
Port Orchard Passage - South of Rolston	1,2,4-Trichlorobenzene	Sediments of Concern	Sediments of Concern
	1,2-Dichlorobenzene		
	Benzyl Alcohol		
Port Orchard Passage - Manzanita Bay	1,2,4-Trichlorobenzene	Sediments of Concern	Sediments of Concern
	1,2-Dichlorobenzene		
Puget Sound (Central) - Wing Point	1,2-Dichlorobenzene	Sediments of Concern	Sediments of Concern
	1,2,4-Trichlorobenzene		
	1,4-Dichlorobenzene		
	2,4-Dimethylphenol		
	Hexachlorobenzene		
	Pentachlorophenol		
Puget Sound (Central) - Rockaway	1,2-Dichlorobenzene	Sediments of Concern	Sediments of Concern
	1,2,4-Trichlorobenzene		
	1,4-Dichlorobenzene		
	2,4-Dimethylphenol		
	Hexachlorobenzene		
	Hexachlorobutadiene		
	Naphthalene		
N-Nitrosodiphenylamine			
Puget Sound (Central) - Blakely Harbor (Middle)	1,2-Dichlorobenzene	Sediments of Concern	Sediments of Concern
	1,2,4-Trichlorobenzene		
	1,4-Dichlorobenzene		
	2,4-Dimethylphenol		
	Dibenzo(a,h) anthracene		
	Hexachlorobenzene		
	Hexachlorobutadiene		
	N-Nitrosodiphenylamine		
Pentachlorophenol			

Commercial Shellfish Growing Area and Recreational Harvest Area Assessment

Department of Health (DOH) routine bacterial and biotoxin assessments of recreational shellfish harvest areas and commercial shellfish growing and harvest areas demonstrate a significant loss of designated uses. The entire east, north, and west shorelines are closed to recreational butter and varnish clam harvest, and the southern shoreline is closed to recreational varnish clam harvest. Only one small area around Point White is open to recreational harvest.

Most commercial shellfish growing area around the Island is open to harvest. However, two segments of commercial shellfish growing areas along Agate Passage and Crystal Springs are currently closed due to bacterial contamination in shoreline drainages to include private drains, stormwater outfalls, and streams. Point Monroe Lagoon is restricted for commercial harvest, requiring that shellfish be transplanted to approved growing area waters for a specified amount of time in order to naturally cleanse themselves of contaminants before they are harvested for market. Commercial Geoduck Tract 07850 at Restoration Point was closed four times in 2012-2013 for biotoxin. Commercial Geoduck Tract 07000 at the mouth of Manzanita Bay has been closed 14 times in the last five years for biotoxin, and is currently closed at the time of this printing.

In addition to annual commercial growing area reports, DOH publishes an annual threatened areas report to bring attention to monitoring sites where bacteria concentrations are close to exceeding the criteria. The 2015 report (based upon 2014 data) identified one monitoring site (#457) immediate outside of the north side of the mouth of Fletcher Bay as a threatened site and one site (#418) along the southern shore of Blakely Harbor as a site of concern.

Swimming Beach Assessment

The Departments of Ecology and Health's BEACH Program conducts swimming beach monitoring for bacteria during the swimming season (Memorial Day through Labor Day). Typically, bacteria levels in marine waters tends to be fairly low in the summertime. In fact, most beach closures on the Island have been associated with sanitary sewer spills such as the Kitsap Sewer District #7 Fort Ward spill in 2012, and the City's sewer main breaks along the north side of Eagle Harbor in 2014.

In 2015, three of the Island's swimming beaches (Fay Bainbridge Park, Joel Pritchard Park, and Eagle Harbor Waterfront Park) were monitored. Bacterial concentrations in 2015 were acceptable, and there were no beach closures in 2015.

City Surface Water Quality Assessment

In 2007, the City received a Centennial Clean Water Fund Grant from Ecology to design and implement a long-term monitoring program to assess the ecological health of the Island's freshwater (streams and lakes), marine water (harbors, bays, and nearshore areas), and stormwater discharge.

The Water Quality and Flow Monitoring Program (WQFMP) was pilot-tested in 2007-2008 and expanded to Island wide long-term status and trends monitoring in 2010. The program currently conducts routine monitoring for stream and stormwater chemistry, stream and nearshore sediment chemistry, rainfall, stream and stormwater flow, and stream biodiversity (benthic macroinvertebrates). Every five years, the program also conducts targeted storm event monitoring to assess stormwater runoff impacts in streams and nearshore marine waters.

Although the program's [Final Monitoring Plan](#) is comprehensive, staffing and funding are limited. Current monitoring gaps are stormwater best management practice effectiveness monitoring, lake monitoring, marine biological assessments (fish, aquatic macrophytes, phytoplankton, and benthic invertebrates), routine marine water chemistry, and freshwater and marine habitat assessments.

The program released its first edition *State of the Island's Waters* report in 2012 which summarized findings from data collected through Water Year 2011 (September 2011). Program staff are currently assessing data collected through Water Year 2015 (September 2015) and working on a second edition of the report. The following summary reflects assessments completed at the time of this printing.

Bacteria

All of the seven nearshore marine waters monitored during WY2014 targeted storm event monitoring failed to meet the state criteria for fecal coliform bacteria, while 13 (86%) of the 15 streams monitored on a monthly basis failed to meet the state criteria in WY2015. Given these results and the number of state listings for bacterial impairment (see Table 2 above), bacteria has proven to be the most prevalent pollutant in freshwater and marine water resources Island wide.

As described above in *Commercial Shellfish Growing Area and Recreational Shellfish Harvest Area Assessment*, commercial shellfish harvest areas along approximately twelve miles of shoreline are currently closed due to elevated bacteria in shoreline drainages, and nearly the entire Island is closed to recreational harvest of varnish and butter clams due to the biotoxins usually associated with bacteria.

Bacterial contamination is common to every season and every watershed, urban or rural, and its sources are as varied as the landscape itself. In rural watersheds, the most common sources of bacteria are failing septic systems, improperly-managed pet and livestock wastes, and wildlife. In urban watersheds, the most common sources are improperly-managed pet waste, improper food handling, poorly-maintained food waste receptacles, failing septic systems, poorly-maintained or failing stormwater drainage infrastructure (private and public), failing sanitary sewer infrastructure, and illicit cross-connections between the sanitary sewer and the stormwater drainage systems.

In marine environments, common sources of bacteria aside from discharges from upland sources are improper boat waste disposal, failing sanitary sewer infrastructure, and wildlife.

Nutrients

Although they are essential to all plant, human, and aquatic life, phosphorus and nitrogen concentrations, if excessive, can overstimulate growth of aquatic vegetation and algal blooms. Applying Ecology's Water Quality Index using the ratio of total nitrogen to total phosphorus, Island streams generally rate of low to moderate concern during the wet season and moderate to high concern during the dry season relative to other Puget Lowland streams. In 2013, a year of below average rainfall, most streams rated of moderate concern even in the wet season, and 3 streams reached a high level of concern. During the drought in the summer of 2015, 7 streams climbed to a level of high concern.

Nuisance algal blooms have increased along eastern shorelines and harbors (see Ecology's [Eyes Over Puget Sound](#)). These blooms are not only aesthetically unpleasant, but dying and decomposing algae use up aquatic life-sustaining oxygen and render aquatic habitat unusable such as in Murden Cove and Point Monroe Lagoon which are covered year-round with ulvoid macroalgae (see Table 4 above).

Though more study is needed to establish natural background levels for Island streams and it is well-understood that a significant amount of nitrogen-loading in Puget Sound comes from the ocean through the Strait of Juan de Fuca via tidal action, ecosystems with naturally high background levels are particularly sensitive to any additional loading from human sources.

Aside from the natural sources of nutrients from forests and wetlands, human inputs include agricultural and residential fertilizers, phosphate-based laundry detergents and commercial washing agents, yard waste such as grass clippings and other vegetation dumped along shorelines and streams, failing residential septic systems (in some cases even functioning systems), failing municipal sewer infrastructure, and improperly handled pet and livestock waste.

Ammonia

Ammonia is considered a priority pollutant by the EPA, since it is deadly to both humans and aquatic life. Therefore, there are established acute and chronic criteria for ammonia in surface waters. Acute criterion is the concentration of a substance at which injury or death to an organism can occur as a result of short-term exposure. Chronic criterion is the concentration of a substance at which injury or death to an organism can occur as a result of repeated or constant exposure.

Out of the 11 fish-bearing streams monitored on a routine basis, 8 (73%) consistently exceeded the chronic criteria, while the remaining 3 had seasonal exceedances only. During WY2014 targeted storm event monitoring, all 7 streams and corresponding nearshore areas

monitored exceeded the chronic criteria. Murden Cove frequently exceeded the acute criteria. The cove exceeded acute criteria 14 times during the 3-year Murden Cove Watershed Nutrient and Bacteria Reduction Project (see project highlight below).

Sediment and Metals

During rain events, sediment-laden stormwater runoff is a prominent pollutant on the Island. Not only does sediment cause excessive scouring and erosion, de-stabilizing slopes and stream banks and threatening property, but subsequent downstream deposition clogs stream bottoms, smothers fish eggs, and increases siltation rates in the Island's harbors and bays. Sediment also reduces fish's ability to find food and damages their gills as well.

Sediment-intolerant macroinvertebrate species (an important food source for fish) have diminished, some entirely, from half of the Island streams monitored, especially Ravine and Murden Creeks. (King County work here!) Sensitive to fine grains – what does % fines in sediment sampling tell us?

Equally concerning are the pollutants that sediment carries with it such as heavy metals. Monitoring results have shown significant increases in concentrations of metals in both streams and nearshore marine waters and stormwater outfall discharge during rain events.

Anywhere soil is exposed to rain there is a risk of sediment-laden runoff. Construction sites, croplands, sand and gravel pits or accumulations, and any other cleared or grubbed land surfaces are all potential sources of sediment. Likewise, poorly-maintained parking lots, stormwater drainage systems, and roadways become significant sources of sediment, particularly sediment laden with heavy metals.

Metals are also carried to streams from uncontrolled discharges from auto washing wastewater.

In-situ Physical Chemistry

Several Island streams and nearshore areas experience periodic excursions in pH, temperature, and dissolved oxygen. Weaver, Hawley, Murden, Schel Chelb, and Mac's Dam Creeks and Murden Cove suffer chronically low levels of dissolved oxygen, significantly impairing their ability to support aquatic life. While not as prevalent, two nearshore areas (Eagle Harbor at Ravine Creek, and Murden Cove) frequently exceed temperature criteria as well. MCWP...habitat driven, lack of canopy cover, low base flows, and stream flow flashiness due to stormwater runoff (reference KC work).

Flow and Impacts on the Biological Community

In 2015, the City contracted with King County Department of Natural Resources and Parks, Water and Land Resources Division to conduct a stream benthos and hydrologic evaluation of the City's stream benthic macroinvertebrate data and continuous flow gauging data.

Project Highlight – Murden Cove Watershed Nutrient and Bacteria Reduction

In 2013 – 2015, the City brought together and led a partnership of agencies, schools, business....sampling, training volunteers, what each partner brought to the project, targeted shoreline and upland stream side properties – Health District visits. Monitoring identified habitat-driven temperature and dissolved oxygen impairments (shows in King county’s assessment bio)Though remaining work needs to be done to address land cover/land use impacts such as sediment, nitrate, and ammonia watershed-wide, significant reductions in phosphorous and bacteria concentrations in the watershed were achieved. Critical to retain and protect riparian buffers and reduce stormwater runoff.

The 2016 stormwater discharge permit-required low impact development requirements for new and re-development should help alleviate some of the stressors, sediment, flow, over time.

Freshwater and Marine Water Habitat
(to come)

Fish Passage Barrier Inventory

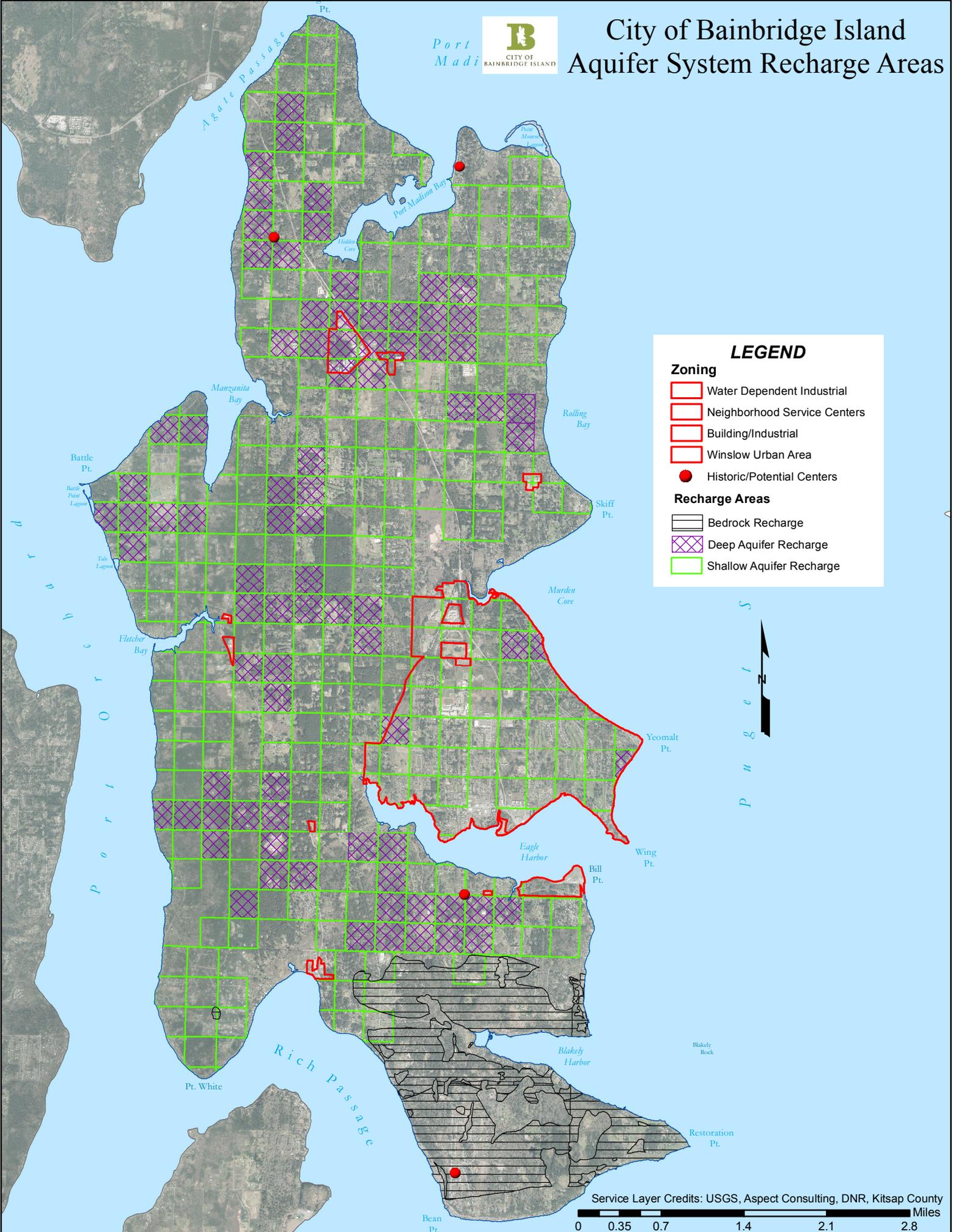
In 2014 the Washington Department of Fish and Wildlife (WDFW) completed fish passage assessments on Bainbridge Island streams. As part of this assessment, WDFW identified 43 total passage barriers (40 road crossings and 3 dams) and 45 partial passage barriers (43 road crossings, 1 dam, and 1 miscellaneous) (see Figure 2).

Figure 2. WDFW Fish Passage Barrier Inventory



(<http://wdfw.maps.arcgis.com/home/webmap/viewer.html>)

City of Bainbridge Island Aquifer System Recharge Areas



LEGEND

Zoning

- Water Dependent Industrial
- Neighborhood Service Centers
- Building/Industrial
- Winslow Urban Area
- Historic/Potential Centers

Recharge Areas

- Bedrock Recharge
- Deep Aquifer Recharge
- Shallow Aquifer Recharge

