

**FINAL**

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**Cumulative Impacts Analysis Component of the Shoreline  
Master Program Update for the City of Lake Forest Park**

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**Project Title: Shoreline Master Program Update  
Task 10: Cumulative Impacts Analysis**

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The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

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# **CITY OF LAKE FOREST PARK SHORELINE MASTER PROGRAM UPDATE CUMULATIVE IMPACTS ANALYSIS**

## **1.0 INTRODUCTION**

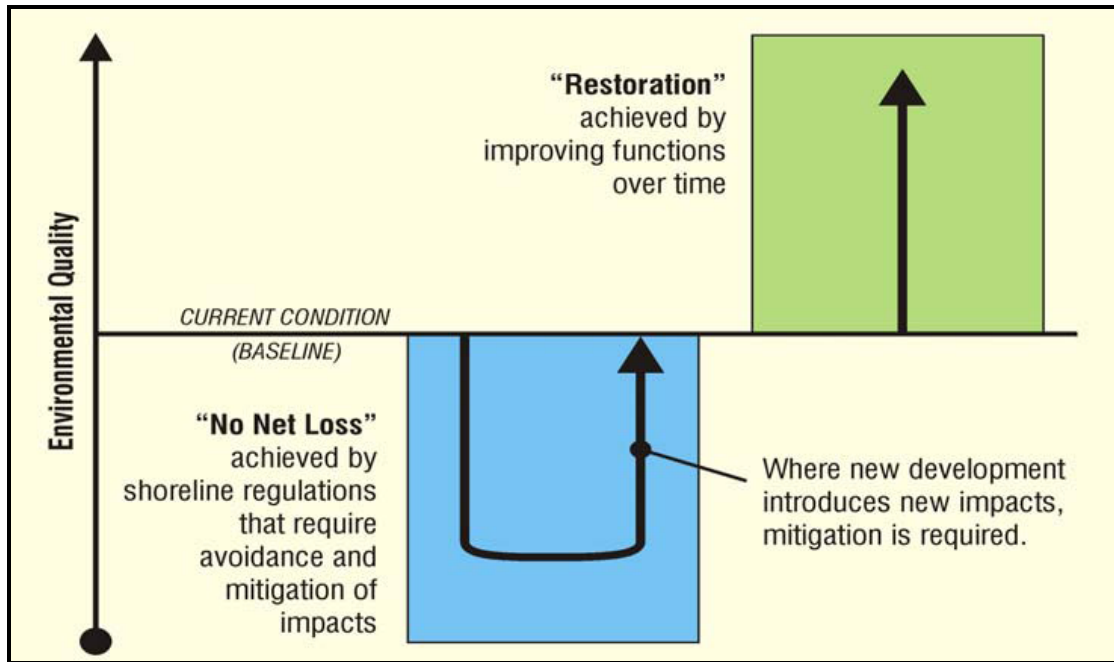
The Shoreline Management Act guidelines require local shoreline master programs to regulate new development to “achieve no net loss of ecological function.” The guidelines (WAC 173-26-186(8)(d)) state that, “To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts.”

The guidelines further elaborate on the concept of net loss as follows:

“When based on the inventory and analysis requirements and completed consistent with the specific provisions of these guidelines, the master program should ensure that development will be protective of ecological functions necessary to sustain existing shoreline natural resources and meet the standard. The concept of “net” as used herein, recognizes that any development has potential or actual, short-term or long-term impacts and that through application of appropriate development standards and employment of mitigation measures in accordance with the mitigation sequence, those impacts will be addressed in a manner necessary to assure that the end result will not diminish the shoreline resources and values as they currently exist. Where uses or development that impact ecological functions are necessary to achieve other objectives of RCW 90.58.020, master program provisions shall, to the greatest extent feasible, protect existing ecological functions and avoid new impacts to habitat and ecological functions before implementing other measures designed to achieve no net loss of ecological functions.”  
[WAC 173-206-201(2)(c)]

In short, updated SMPs shall contain goals, policies and regulations that prevent degradation of ecological functions relative to the existing conditions as documented in that jurisdiction’s characterization and analysis report. For those projects that result in degradation of ecological functions, the required mitigation must return the resultant ecological function back to the baseline. This is illustrated in the figure below. The jurisdiction must be able to demonstrate that it has accomplished that goal through an analysis of cumulative impacts that might occur through implementation of the updated SMP. Evaluation of such cumulative impacts should consider:

- (i) current circumstances affecting the shorelines and relevant natural processes;
- (ii) reasonably foreseeable future development and use of the shoreline; and
- (iii) beneficial effects of any established regulatory programs under other local, state, and federal laws.”



Source: Department of Ecology

As outlined in the *Shoreline Restoration Plan* prepared as part of this SMP update, the SMA also seeks to restore ecological functions in degraded shorelines. This cannot be required by the SMP at a project level, but Section 173-26-201(2)(f) of the Guidelines says: “master programs shall include goals and policies that provide for restoration of such impaired ecological functions.” See the *Shoreline Restoration Plan* for additional discussion of SMP policies and other programs and activities in Lake Forest Park that contribute to the long-term restoration of ecological functions relative to the baseline condition.

The following summarizes for each shoreline environment (Figure 1) the existing conditions, anticipated development, relevant Shoreline Master Program (SMP) and other regulatory provisions, and the expected net impact on ecological function.

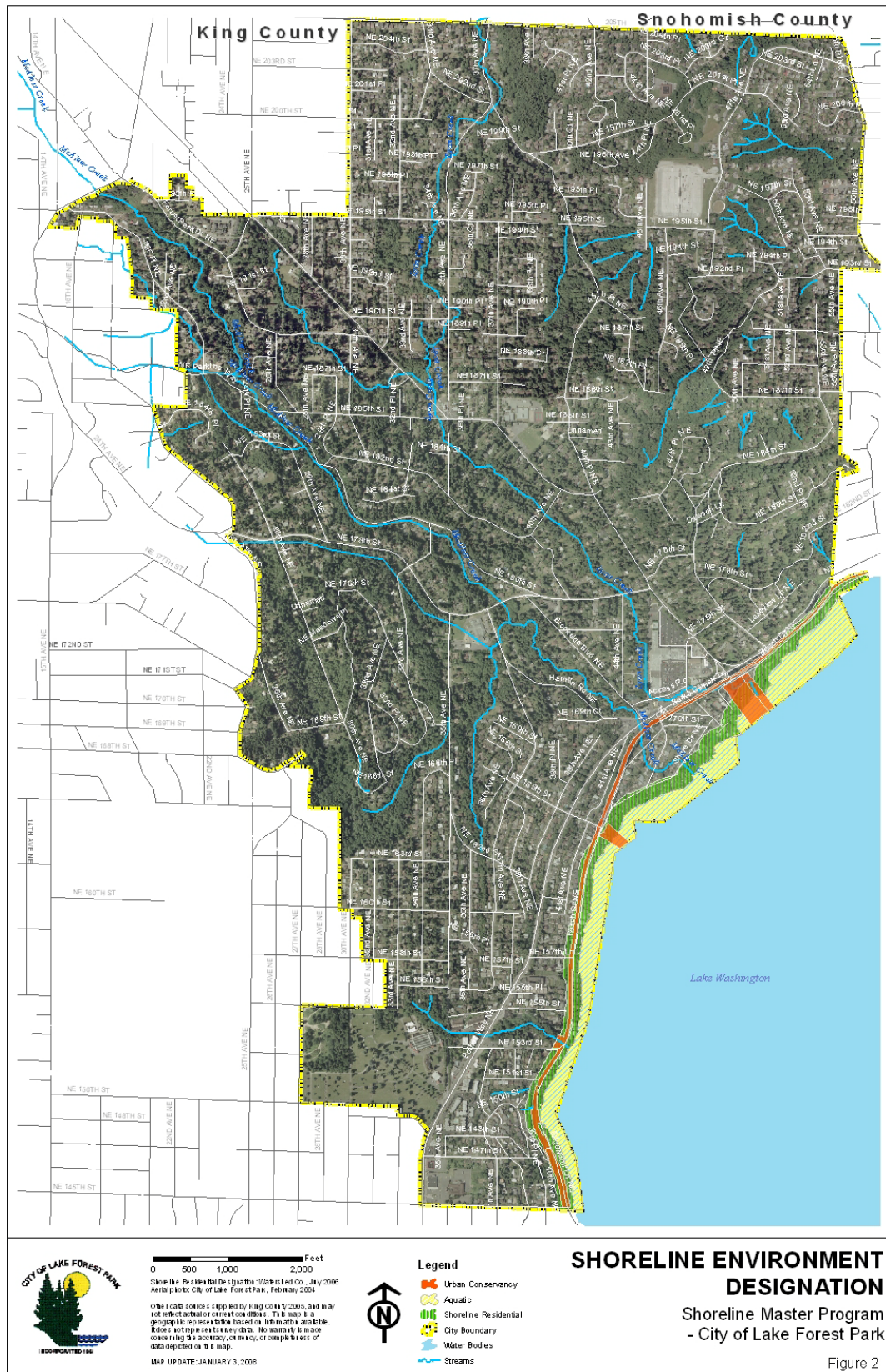
## 2.0 EXISTING CONDITIONS

The following summary of existing conditions is based on the *Final Shoreline Analysis Report* (The Watershed Company, May 2007), and additional analysis needed to perform this assessment. The full report includes a more in-depth of discussion of the topics below, as well as information about transportation, stormwater and wastewater utilities, impervious surfaces, and historical/archaeological sites, *among others*.

### 2.1 Shoreline Residential Environment

Approximately 69 percent of the City’s upland shoreline jurisdiction is in the Shoreline Residential environment.

Figure 1. Shoreline environment designations in Lake Forest Park.



### **2.1.1 Existing Land Use**

The City's entire shoreline is zoned single-family residential, high (RS 7,200). In general, the land area designated as Shoreline Residential is fully developed, with the exception of four vacant lots (Figure 2). Each one of these "vacant" lots is owned by property owners that are either adjacent to the vacant lot or are separated from the lot by the Burke-Gilman Trail. Two additional lots are also vacant, but shoreline jurisdiction only extends onto the lots for a few feet. Any development proposal on those lots would not be in shoreline jurisdiction, as the property line setbacks would likely encompass the extent of shoreline jurisdiction. These two lots are not discussed further in this report.

Under the current SMP, the standard structure setback is 20 feet from the ordinary high water mark (OHWM), although it may be reduced to 15 feet under certain circumstances. The actual median setback in the Shoreline Residential environment is 19.65 feet, and the mean is 24.20 feet. Table 1 presents data on existing setbacks on parcels within the Shoreline Residential environment. Figure 3 graphically illustrates the approximate shoreline setback from the ordinary high water mark.

Table 1. Existing shoreline setback data for the Shoreline Residential environment.

Measure	Number of Waterfront Parcels
Structures < 20 ft from OHWM (non-conforming)	68
Structures ≥ 20 ft. from OHWM	64
≥ 40 ft. from OHWM	26
≥ 50 ft. from OHWM	19
Total Waterfront Parcels	132

### **2.1.2 Parks and Open Space/Public Access**

There are no formal or informal parks or open spaces within the Shoreline Residential environment.

### **2.1.3 Shoreline Modifications**

The Lake Forest Park shoreline in the Shoreline Residential environment is heavily modified with close to 81 percent of the shoreline armored at or near the ordinary high water mark (Table 2) (see Figures 7a-7d in the *Final Shoreline Analysis Report*) and a pier density of approximately 59 piers per mile (Table 3). This compares to 71 percent armored and 36 piers per mile for the entire Lake Washington shoreline (Toft 2001). Thus, for Lake Forest Park's Shoreline Residential environment, pier density is much higher and shoreline armoring is slightly higher than the lake-wide figures. Many of the piers have one or more boatlifts, and approximately one-quarter of the boatlifts have canopies. Based on a review of 2004 aerial photographs, only approximately 6 out of the 135 shoreline parcels were without a pier. Of these six lots, only one appears undeveloped.



Figure 2. Vacant lots in Lake Forest Park Shoreline jurisdiction.

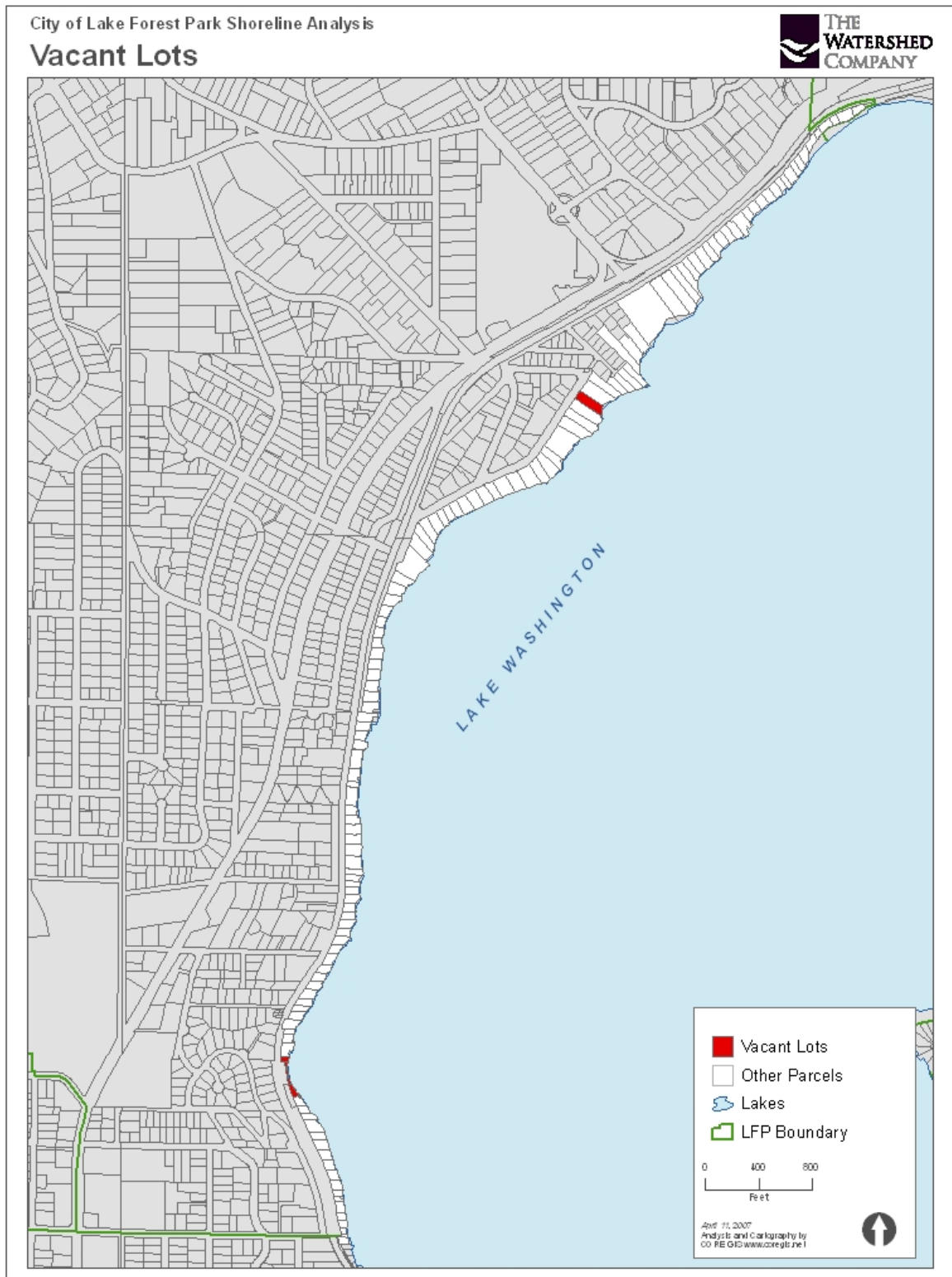


Figure 3. Shoreline setbacks from the Lake Washington ordinary high water mark.

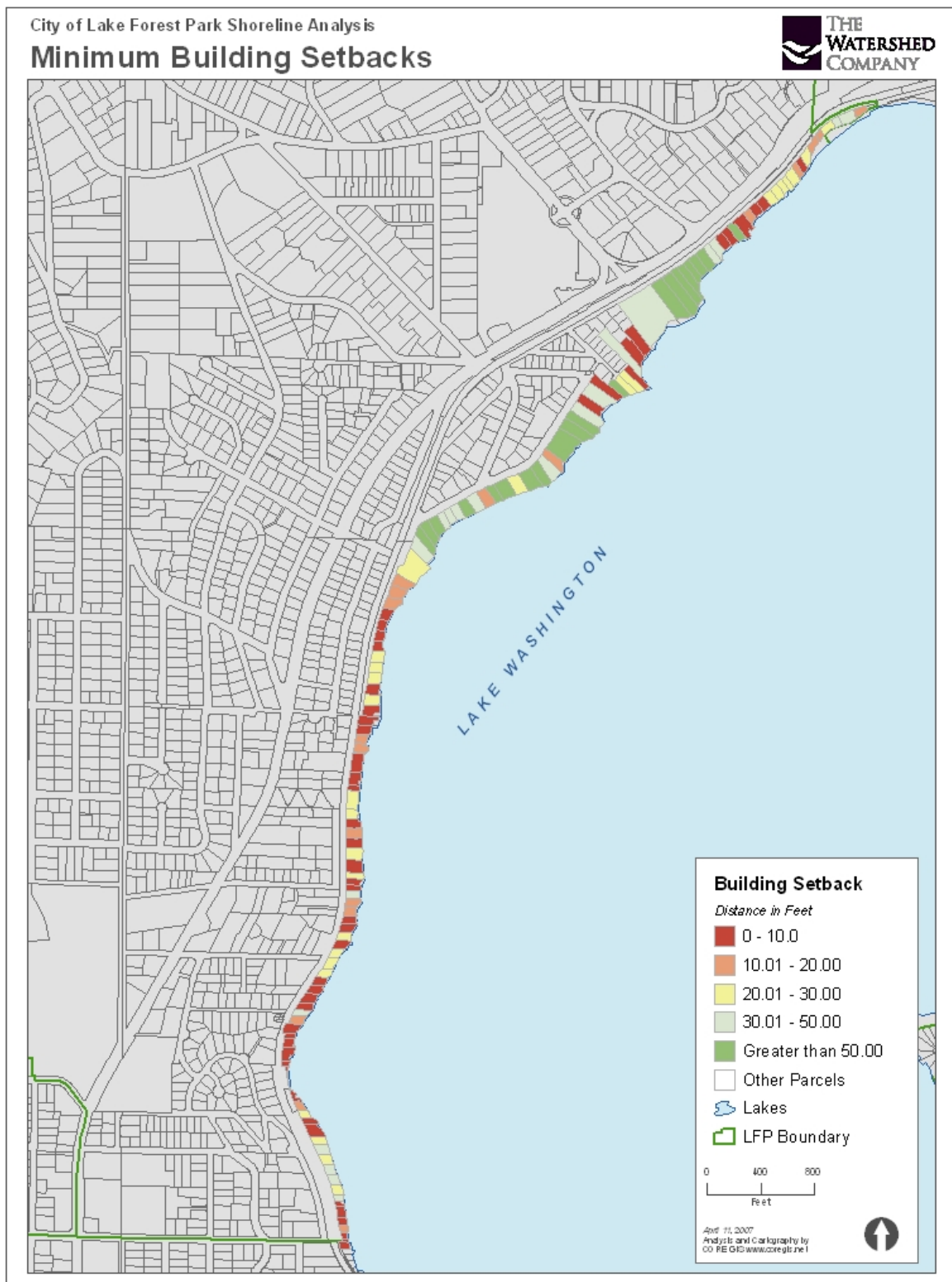


Table 2. Shoreline armoring in the Shoreline Residential environment.

Lake Edge Condition (linear feet)		
Vertical <sup>1</sup>	Boulder <sup>2</sup>	Natural / Semi-Natural <sup>3</sup>
5,275 (47%)	3,790 (34%)	2,088 (19%)

<sup>1</sup> "Vertical" shorelines encompass concrete, wood and mortared boulder armoring types. The key characteristic, besides a generally vertical orientation, is the lack of interstitial spaces in the face of the bulkhead that could provide some habitat.

<sup>2</sup> "Boulder" shorelines are typically angular or rounded granite or basalt. They may be vertical or sloped, but they all contain interstitial spaces, which provide some habitat and may absorb or attenuate some wave energy.

<sup>3</sup> "Natural/Semi-Natural" shorelines captures those areas that are not solidly armored at the ordinary high water line; they may include some scattered boulders or woody debris at or near the ordinary high water line. Except in areas of Segment B, "natural/semi-natural" designation is not intended to describe the environmental condition upland of ordinary high water.

Table 3. In-water structures in the Shoreline Residential environment.

Piers	Piers / mile	Boatlifts	Boatlifts w/ Canopy	Moorage Cover	Boathouses	Jetski Lifts	Platform Lifts
124	59	95	23	30	2	44	8

It is not uncommon around Lake Washington for some historic fills to be associated with the original bulkhead construction, usually to create a more level or larger yard. Most of these shoreline fills occurred at the time that the lake elevation was lowered during construction of the Hiram Chittenden Locks.

## 2.2 Urban Conservancy Environment

Approximately 31 percent of the City's shoreline jurisdiction is in the Urban Conservancy environment.

### 2.2.1 Existing Land Use

The City's entire shoreline is zoned single-family residential, high (RS 7,200). In general, the City of Lake Forest Park shoreline area is fully developed. The few areas not occupied by residential uses are either vacant lots, private recreation property, or a formal City park. The latter two uses and the Burke Gilman trail comprise the Urban Conservancy environment.

Under the current SMP, the standard structure setback is 20 feet from the ordinary high water mark (OHWM), although it may be reduced to 15 feet under certain circumstances. The actual median setback in the Urban Conservancy environment is 37.15 feet, and the mean is 66.00 feet. Table 4 presents data on existing setbacks on waterfront parcels within the Urban Conservancy environment. Figure 3 graphically illustrates the approximate shoreline setback from the ordinary high water mark.

Table 4. Existing shoreline setback data for the Urban Conservancy environment.

Measure	Number of Waterfront Parcels
Structures < 20 ft from OHWM (non-conforming)	0
Structures ≥ 20 ft. from OHWM	3
≥ 50 ft. from OHWM	1
Total Waterfront Parcels	3

The Burke-Gilman Trail is a substantial element of the public recreation and open space, which is generally separated from the shoreline by single-family development. There is one City park and two private recreational clubs on the waterfront. There are two privately owned recreational properties on the Lake Washington shoreline within Lake Forest Park. The Lake Forest Park Civic Club is a private waterfront recreation club that includes a clubhouse, picnic areas, swimming beach, large fixed-pile pier, boat launch and other amenities. The second privately owned recreational property is the Sheridan Beach Community Club. The Beach Club includes sport courts and an outdoor heated swimming pool, in addition to beach access and a large fixed pier. Both of these private recreational properties are open to residents of specific subdivisions that are located in their immediate area and their guests.

### **2.2.2 Parks and Open Space/Public Access**

Physical public access to the water is limited in Lake Forest Park itself, and consists only of Lyon Creek Waterfront Preserve. The park is 0.89 acre and was formerly a single-family home site. The home and related improvements have been removed and the area has largely been restored with native plants. The small park includes a small accessible parking area, short trails, grass sitting areas, benches, and a fixed pier. The park also includes a bridge that crosses Lyon Creek and has a structure and configuration that allows users to observe the creek in a center “cut-out” portion of the structure. The park has a natural shoreline and is located at the mouth of Lyon Creek. This park does not allow swimming or the launching of small boats and is intended to be a passive park and nature preserve.

One additional very small, City-owned, waterfront property exists near the 15700 block of Beach Drive NE (PIN 6744701130). According to tax records, this property is approximately 210 square feet in size and approximately 2 feet wide. Other potential public use areas may include unopened City street rights-of-way. In addition, because the private recreational clubs are open to residents of adjacent subdivisions and their guests and also allow non-residents access for certain special events, they may be viewed as quasi-public access areas by some Lake Forest Park residents.

A 2.1-mile section of the Burke-Gilman Trail runs through the entire length of the City near the Lake Washington shoreline. The Burke-Gilman Trail literally serves as the backbone for public access to the Lake Washington Shoreline for Lake Forest Park residents and visitors. Although the actual trail corridor does not provide physical access to the shoreline, it provides visual access and a critical physical connection between residential areas, the Town Center, Sheridan Beach Club, Lake Forest Park Civic Club, Lyon Creek Park and Tracy Owen Station/Log Boom

Park. The trail also abuts a very narrow strip of private land near the southern terminus of Beach Drive NE and the northern terminus of Edgewater Lane NE around the 14900 Block. This private waterfront property has the general visual appearance of a park has been known to be used in the past by neighbors and trail users.

### 2.2.3 Shoreline Modifications

The Lake Forest Park shoreline in the Urban Conservancy environment has been modified with close to 47 percent of the shoreline armored (Table 5) (see Figures 7a-7d in the *Final Shoreline Analysis Report*) at or near the ordinary high water mark and a pier density of approximately 43 piers per mile (Table 6). This compares to 71 percent armored and 36 piers per mile for the entire Lake Washington shoreline (Toft 2001). Thus, for Lake Forest Park's Urban Conservancy environment, pier density is slightly higher and shoreline armoring is much lower than the lake-wide figures. None of the five piers within the Urban Conservancy environment have boatlifts or canopies. Based on a review of 2004 aerial photographs, each of the three shoreline parcels had at least one pier.

Table 5. Shoreline armoring in the Urban Conservancy environment.

Lake Edge Condition (linear feet)		
Vertical <sup>1</sup>	Boulder <sup>2</sup>	Natural / Semi-Natural <sup>3</sup>
292 (47%)	0 (0%)	324 (53%)

<sup>1</sup> "Vertical" shorelines encompass concrete, wood and mortared boulder armoring types. The key characteristic, besides a generally vertical orientation, is the lack of interstitial spaces in the face of the bulkhead that could provide some habitat.

<sup>2</sup> "Boulder" shorelines are typically angular or rounded granite or basalt. They may be vertical or sloped, but they all contain interstitial spaces, which provide some habitat and may absorb or attenuate some wave energy.

<sup>3</sup> "Natural/Semi-Natural" shorelines captures those areas that are not solidly armored at the ordinary high water line; they may include some scattered boulders or woody debris at or near the ordinary high water line. Except in areas of Segment B, "natural/semi-natural" designation is not intended to describe the environmental condition upland of ordinary high water.

Table 6. In-water structures in the Urban Conservancy environment.

Piers	Piers / mile	Boatlifts	Boatlifts w/ Canopy	Moorage Cover	Boathouses	Jet ski Lifts	Platform Lifts
5	43	0	0	0	0	0	0

It is not uncommon around Lake Washington for some historic fills to be associated with the original bulkhead construction, usually to create a more level or larger yard. Most of these shoreline fills occurred at the time that the lake elevation was lowered during construction of the Hiram Chittenden Locks.

## 2.3 Aquatic Environment

The Aquatic Environment encompasses all areas waterward of the ordinary high water mark of Lake Washington contained within the City limits. The purpose of this designation is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the

ordinary high water mark. Regulations and performance standards that apply to individual uses and developments are evaluated under Shoreline Residential and Urban Conservancy designations and uses.

## **2.4 Biological Resources and Critical Areas**

The shoreline zone itself is generally deficient in high-quality biological resources and critical areas, primarily because of the extensive residential development and its associated shoreline modifications. The highest-functioning shoreline area is Lyon Creek Waterfront Preserve, which has a natural shoreline and has been revegetated with native plants. There are also a few narrow bands of forest, but these are surrounded by development and are not generally contiguous with Lake Washington. Landslide hazard areas are located within the shoreline zone south of about the 15700 block of Beach Drive NE. No wetlands are mapped within shoreline jurisdiction, although a narrow wetland fringe may be present along the tributary streams and along some of the unarmored lakefronts. Important streams in the shoreline zone include Lyon and McAleer Creeks, tributaries to Lake Washington within the City of Lake Forest Park. These streams are used by salmon, but have been impacted extensively by basin development, resulting in increased peak flows, unstable and eroding banks, loss of riparian vegetation, and fish and debris passage barriers. These changes have altered their contributions of sediment, organic debris, and invertebrates into Lake Washington. Both the Lyon and McAleer Creek systems continue to be targeted for restoration by one or more local or regional restoration groups. There are also four other mapped smaller streams in the shoreline zone, including Bsche'tla Creek that flows through a steep wooded ravine, entering the Lake near the 15300 block of Beach Drive NE.

## **3.0 ANTICIPATED DEVELOPMENT AND POTENTIAL EFFECT ON FUNCTION**

### **3.1 Patterns of Shoreline Activity**

The City reviewed its shoreline permitting records for the past four and a half years and found only 17 issued Exemptions, one issued Substantial Development Permit, and one denied Substantial Development Permit application. Table 7 presents the shoreline permitting history.

Table 7. Shoreline permitting history, 2003-2007.

<b>Proposed Activity</b>	<b># of Permit Applications</b>	<b>Type of Permit</b>	<b>Action</b>
New pier	2	Shoreline Substantial Development	1 Approved 1 Denied
Pier maintenance/repair	5	Shoreline Exemption	Approved
New boatlift/boatlift repair (under \$5000)	3	Shoreline Exemption	Approved
Bulkhead repair/installation	2	Shoreline Exemption	Approved
New residence	2	Shoreline Exemption	Approved
Utility maintenance/repair	4	Shoreline Exemption	Approved
Mooring buoy monitoring system repair	1	Shoreline Exemption	Approved

As indicated by the data presented above, new pier, bulkhead and residence proposals are very infrequent, averaging less than one proposal every two years. The most commonly proposed shoreline activities are pier repair/maintenance and utility repair/maintenance, averaging approximately one proposal per year.

### **3.2 Residences**

With the possible exception of limited additional residential lands being acquired for public open space, land use in the Shoreline Residential environment is not expected to change over the next 20 years, although some re-builds and substantial remodels are anticipated. As mentioned above, there are only four vacant lots in the Shoreline Residential environment, and these lots are contiguous with lots owned by the same property owner or are separated from the property owner's occupied lot by the Burke Gilman trail.

Typically, development of vacant lots into residential uses would result in replacement of pervious, vegetated areas with impervious surfaces and a landscape management regime that often includes chemical treatments of lawn and landscaping. These actions can have multiple effects on shoreline ecological functions, including:

- Reduction in ability of site to improve quality of waters passing through the untreated vegetation and healthy soils.
- Potential contamination of surface water from chemical and nutrient applications
- Increase in surface water runoff due to reduced infiltration area and increased impervious surfaces, which can lead to excessive soil erosion and subsequent in-lake sediment deposition.
- Elimination of upland habitat occupied by wildlife that use riparian areas.

An examination of the specific four waterfront lots that are vacant indicates that only one has some development potential. The lot is owned by an adjacent shoreline property owner, who has not given the City any indication that sale and development of the lot are anticipated in the near future. Limited investments in landscaping appear to have been made on that lot and there do not appear to be any accessory structures. However, that lot does appear to be maintained and utilized along with the occupied lot. Two of the remaining lots are on the waterward side of the Burke-Gilman trail, with the associated property owner living on a parcel on the landward side of the trail. Each of these lots has a pier and are sized or shaped such that any kind of upland residential development is largely precluded. The lots appear to be for private recreation and lake access. The fourth lot is owned by an adjacent shoreline property owner. A pier structure arcs from one property to the other, and there appears to be landscaping and accessory upland and in-water structures on the "vacant" parcel. The level of alteration and integration of the vacant lot with the occupied parcel suggest that the property owner does not plan to sell the parcel, at least not in the near future.

In summary, new residences on vacant lots are not expected in the next 20 years. Expansions and remodels of existing residences are likely to occur relatively frequently during that time period. Many of these activities would not change the baseline condition of ecological function,

although expansions that increase impervious surfaces may occur. Runoff from most expanded residences is clean, however, and water quantity is not an issue in the Lake Washington environment. Improperly managed runoff during and post construction could increase erosion, and could cause sediments and pollutants to enter the lake.

The original Shoreline Master Program had a residential setback of 20 feet, although it could be reduced to as little as 15 feet depending on the location of the adjacent residences (Table 8). As outlined above (see Table 1), the actual median setback in the Shoreline Residential environment is 19.65 feet and the mean is 24.20 feet. Under the proposed SMP (Chapter 7, Residential Development), the standard shoreline setback will vary from 40 to 50 feet depending on parcel depth, and can be reduced to a minimum of 20 feet provided that the property owner implements a number of impact minimization and compensation measures divided between upland and water-related actions. As shown in Figure 4, only 46 of 135 waterfront parcels are less than 100 feet deep, and as shown in Table 1 nearly half of the shoreline waterfront properties have a residence that is more than 20 feet from the shoreline edge.

Minimization and compensation measures to obtain a setback reduction include removing bulkheads, preserving existing and/or restoring native vegetated buffers, daylighting piped streams, limiting impervious surfaces and lawn area, or committing to limited and appropriate use of landscape chemicals. In a “worst-case” scenario, all of the property owners farther than 20 feet from the water’s edge would construct a new residence 20 feet from the water’s edge, taking advantage of the setback reduction options. Although the average setback would be less than 20 feet because of the contribution of the non-conforming residences (assuming that these non-conforming residents would choose to remain in their current location) less than 20 feet from the water’s edge, shoreline function would be improved. Because each property owner would make slightly different choices among the various options, the exact benefits cannot be quantified. However, the options are broken into two broad categories (upland and water-related), and the full reduction can only be obtained by including at least one of the water-related actions.

Further, beyond the measures described above that allow for setback reductions, the proposed SMP includes a requirement that all residential properties undertaking a development activity either plant new or preserve native existing vegetation in at least 75 percent of the nearshore riparian area located along the lake’s edge. The presence of native vegetation in this area will help to improve overall ecological functions by helping to maintain water temperature, removing excessive nutrients and toxic compounds, attenuating wave energy, stabilizing sediment, and providing woody debris and other organic matter to the aquatic environment.

For urban Lake Washington, the condition of nearshore environments, the amount of impervious surfaces, and the extent of chemical usage on lawns and landscaping, are better indicators of shoreline health than the amount of space between the shoreline and a structure. Currently most of that space, whether it is 20 feet or 100 feet wide, is mowed lawn with some ornamental landscaping, much of it presumably treated routinely or occasionally with pesticides, herbicides or fertilizers. Relative to the existing condition, the implementation of the setback reduction measures would increase the amount of native vegetation, decrease the amount of runoff from impervious surfaces, decrease the amount of pesticides/herbicides entering the lake, and decrease



shoreline armoring. Over time, ecological functions will improve through implementation of the impact minimization and compensation measures that are part of approved setback reductions.

Even if no property owners elect to utilize the shoreline setback reduction options, the shoreline ecological function may improve slightly since the potential replacement structures would be located up to 40 or 50 feet from the water's edge. If the vacant lots were developed, which as described above is unlikely, the setback of the house would be 40 or 50 feet depending on lot depth. Only 20 percent of the waterfront lots are currently set back farther than 40 feet from the ordinary high water mark. These lots, while lacking a single-family residence, are modified and may even have a pier, shoreline armoring, or other upland structures. The loss of functional shoreline vegetation would be negligible, if any, and pollution-generating impervious surface would only increase slightly (driveway/parking).

In summary, new residences on vacant lots are not expected in the next 20 years. Expansions and remodels of existing residences are likely to occur relatively frequently during that time period. As noted in Table 1, more than half of shoreline waterfront parcels would be legal nonconforming lots under the proposed SMP (e.g., <40 or 50 feet setback). Non-conforming residences would either expand away from the water, which would not appreciably change the baseline condition of ecological function, although expansions that increase impervious surfaces may occur. Runoff from most expanded residences is clean, however, and water quantity is not an issue in the Lake Washington environment. Alternatively, those residences and redevelopment on lots with existing setbacks greater than 40 or 50 feet could take advantage of the setback reduction options and improve ecological functions of their shoreline. Required installation or preservation of native vegetation in the nearshore area will also help to improve shoreline functions. Improperly managed runoff during and post-construction could increase erosion, and could cause sediments and pollutants to enter the lake. If construction occurs consistent with the regulations in the Water Quality section of Chapter 6 of the SMP and the City's other stormwater management regulations, significant construction-related impacts should not occur.

Figure 4. Parcel depth in Lake Forest Park Shoreline jurisdiction.

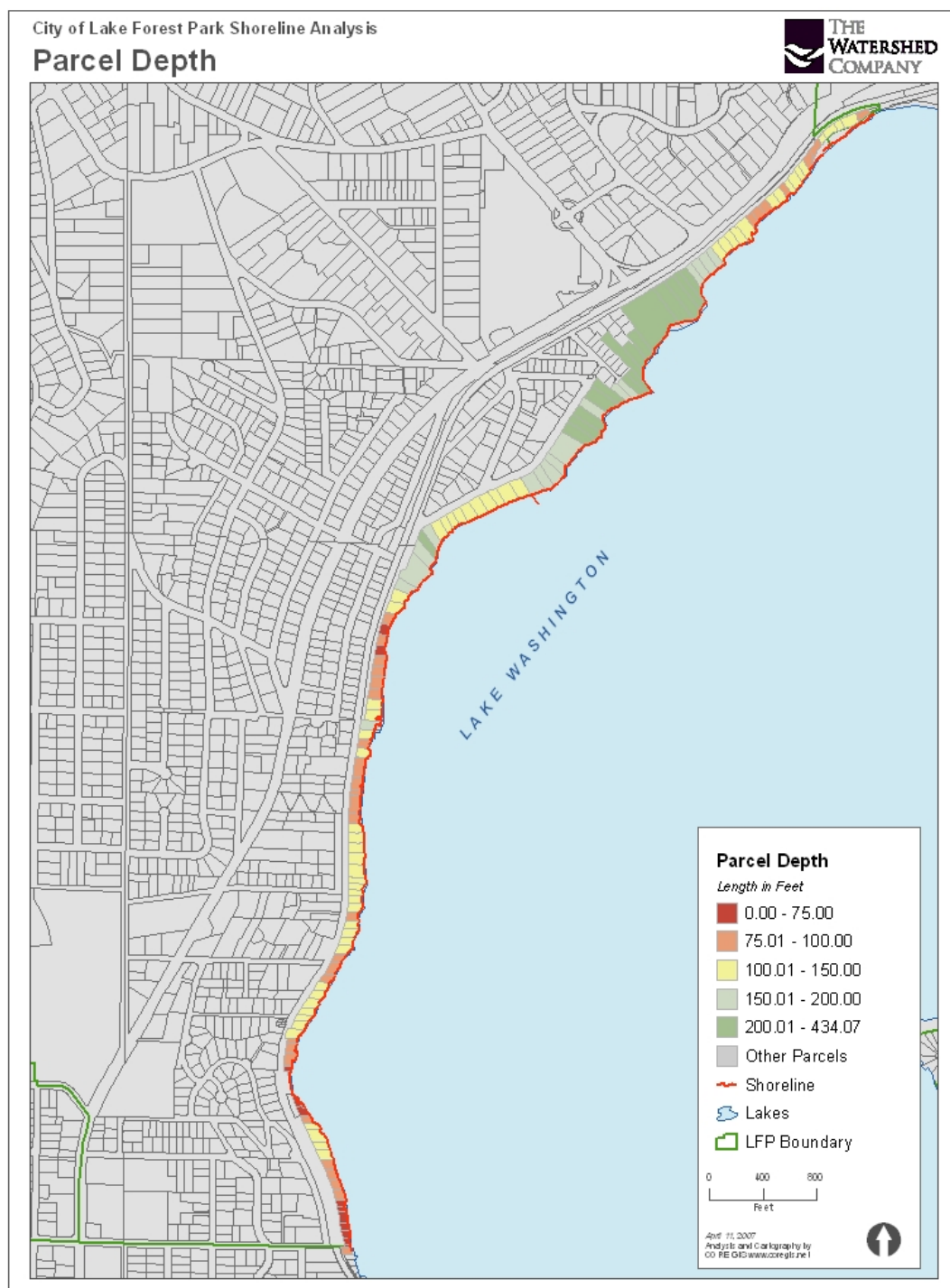


Table 8. Comparison of setbacks between the original and proposed SMP.

Shoreline Environment	Original SMP	Proposed SMP
Shoreline Residential	Single-family <ul style="list-style-type: none"> <li>• 20 ft standard</li> <li>• Average of adjacent setbacks if adjacent properties are non-conforming, but no less than 15 ft</li> </ul> Duplex <ul style="list-style-type: none"> <li>• 50 ft standard</li> </ul>	Lots < 100 ft deep <ul style="list-style-type: none"> <li>• 40 ft standard</li> <li>• 20 ft with enhancement</li> </ul> Lots ≥ 100 ft deep <ul style="list-style-type: none"> <li>• 50 ft standard</li> <li>• 20 ft with enhancement</li> </ul>
Urban Conservancy	NA	<ul style="list-style-type: none"> <li>• 50 ft standard</li> <li>• 30 ft with enhancement</li> </ul>

### 3.3 Overwater Structures

Overwater structures encompass a variety of uses, from in-water structures, such as fixed-pile piers and floating docks, to moorage covers, such as canopies and boathouses with associated boatlifts. It is difficult to determine exactly how many waterfront properties do not have a pier or pier access, particularly as many piers are located near property lines and thus it is possible that those may be shared with the adjacent property. In total, it is estimated that six waterfront properties do not have a pier or pier access and only one of these properties is currently undeveloped. Piers can adversely affect ecological functions and habitat in the following ways:

- Alter patterns of light transmission to the water column, affecting macrophyte growth and altering habitat for and behavior of aquatic organisms, including juvenile salmon.
- Interfere with long-shore movement of sediments, altering substrate composition and development.
- Contribute to contamination of surface water from chemical treatments of structural materials.

Given the current rate of new pier proposals, it could take 12 years or more for all of the non-pier properties to apply for and obtain permits. If all of the properties add a pier, that would represent a 4.7 percent increase in the total number of piers in all environments, with a final density of 62 piers per mile.

Table 9 outlines some of the primary differences between the original and proposed SMP (see Draft SMP Chapter 8, Overwater Structures) provisions for piers including differences between standard and alternative design requirements.

Table 9. Comparison of key differences between original and proposed SMP provisions for over-water structures.

Pier Feature	Original SMP	Proposed SMP – Standard Requirements	Proposed SMP – Administrative Approval for Alternative Design
Length	80 ft standard	120 ft	120 ft

	CUP: 150 ft		
Width	8 ft from 0-80 ft 6 ft from 80-150 ft	4-ft walkway 6-ft ell and float 2-ft finger	4-ft walkway in the nearshore area & 6-ft otherwise 6-ft ell and float 2-ft finger
Deck material	No specification	Entire pier must be fully grated	Entire pier must be fully grated
Size	No specification	480 ft <sup>2</sup> single-family 700 ft <sup>2</sup> joint-use by 2 residences 1,000 ft <sup>2</sup> joint-use by 3+ residences	No larger than authorized through state and federal approval

Under the proposed SMP, new and replacement piers will likely be smaller and narrower than piers approved under the original SMP. Based on input from the U.S. Army Corps of Engineers (Corps) about trends they have observed over the past 8 years, some applicants will likely pursue approval under the Administrative Approval for Alternative Design process from the City for pier area and pier width, particularly those applicants that receive a Corps permit for a design that is not fully compliant with their Regional General Permit (RGP). Most deviations from the RGP have resulted in pier widths of 6 feet, rather than 4 feet, and a pier area of about 600-1000 square feet, rather than 480 square feet. New and replacement piers will also include light-transmitting decking material, which will reduce the effect of the overwater cover. This compensation element is more universally complied with, particularly as the Washington Department of Fish and Wildlife (WDFW) also requires grating. Nevertheless, if new piers were the only pier-related activity in Lake Forest Park and state and federal agencies did not also have jurisdiction over above- and in-water activities, ecological function would still marginally decline. The decline would be due to an unavoidable net increase in in-water structures and overwater cover that cannot be mitigated.

However, pier repair and pier maintenance activities are more common, and it is anticipated that pier replacement proposals may become even more common as existing piers degrade or do not meet the property owner's needs in their current configuration or location. Based on Biological Evaluations completed for Lake Washington pier projects by The Watershed Company from 1999 through 2003, pier replacements occurred twice as often as new piers (26 replacement, 13 new).

The Washington Department of Fish and Wildlife, in particular, is actively requiring replacement of solid-surface decking with grating (60 percent open space) on all residential deck replacement or pier repair projects on Lake Washington. In addition, new, expanded and replacement piers require a permit from the Corps, on whose guidelines the proposed SMP pier provisions are based. The Corps must consult with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service regarding potential Endangered Species Act issues. As part of those agencies' efforts to minimize and compensate for impacts, the federal agencies require implementation of native shoreline planting plans.

Over time, the combined effects of the City's proposed SMP, and permit approvals from the Washington Department of Fish and Wildlife and the Corps will likely result in a reduction over time of the net amount of overwater coverage, an increase in the amount of light-transmitting

decking, and an increase in shoreline vegetation. A quantitative analysis is provided below (Table 10), based to some degree on lake-wide trends and assumptions. This analysis assumes approximately 25 percent of all existing piers will need replacement over the next 20 years. Given the rate of permitting activity around Lake Washington, this number may be conservative. Assuming that all new and replacement pier structures will be required to install grated decking (this evaluation assumes that all new and replacement piers will utilize the Administrative Approval for Alternative Design provisions of the SMP, thereby maximizing the square footage of new and replaced overwater structures) does not take into account the likelihood of reduced pier size per these regulations), the total area of overwater structure may decline by 13 percent over this time period.

Table 10. Comparison of build-out conditions for overwater structures.

Pier Feature	Existing	Build-Out	Net Change	% Change
Number of Piers	136	142	+6	4
Average Length (ft)	77	77-78.8 <sup>1</sup>	0-1.8	2
Average Area (ft <sup>2</sup> ) (considering affect of new piers)	1,177 / (1,101) <sup>2</sup>	1,068 <sup>3</sup>	-33	-3
Average Area (ft <sup>2</sup> ) (considering probable affect of replacement piers and grated decking)	1,177 / (1,101) <sup>2</sup>	910 <sup>4</sup>	-191	-17
Total square footage of overwater structures (ft <sup>2</sup> )	160,072 / (144,296) <sup>2</sup>	125,520 <sup>5</sup>	-18,776	-13

<sup>1</sup> Range based on 6 new piers at either 77 feet (current average) or 120 feet (maximum allowed without a variance)

<sup>2</sup> Second average number based on removing top 5 outliers.

<sup>3</sup> Assumes 6 new fully grated piers at 816 ft<sup>2</sup> each (816 ft<sup>2</sup> is the estimated typical maximum size that can be built through the Administrative Approval process that includes maximum thresholds on length and width.) (removing top 5 existing outliers)

<sup>4</sup> Assumes 25 percent of existing piers will be replaced over 20 years and will include light transmitting grating which has 60 percent open space (removing top 5 existing outliers).

<sup>5</sup> Assumes 6 new piers with grated decking at 480 ft<sup>2</sup> each and 25 percent replacement of existing piers (removing top 5 existing outliers).

### 3.4 Shoreline Stabilization

New bulkheads typically have the following effects on ecological functions:

- Reduction in nearshore habitat quality for juvenile salmonids and other aquatic organisms. Specifically, shoreline complexity and emergent vegetation that provides forage and cover may be reduced or eliminated. Elimination of shallow-water habitat may also increase vulnerability of juvenile salmonids to aquatic predators.
- Reduction of natural sediment recruitment from the shoreline. This recruitment is necessary to replenish substrate and preserve shallow water conditions.
- Increase in wave energy at the shoreline if shallow water is eliminated, resulting in increased nearshore turbulence that can be disruptive to juvenile fish and other organisms.

Repairs and replacements of existing bulkheads perpetuate those conditions. There have only been two bulkhead repair/installation proposals in the last 4.5 years, and future proposals are likely to be repairs and replacements (based on trends observed in other Lake Washington jurisdictions with more shoreline activity).

Under the proposed SMP (see Draft SMP Chapter 8, Shoreline Stabilization subsection), new shoreline stabilization would only be allowed once “it has been demonstrated that shoreline stabilization is necessary for the protection of legally established structures and public improvements.” It must be demonstrated in a study prepared by a qualified professional that the proposed stabilization is the least harmful method to the environment. Replacement bulkheads must be installed in the same location as the existing bulkhead, or farther landward. Under no circumstances would a replacement bulkhead be allowed to encroach farther into the lake. Finally, all shoreline stabilization and modification proposals must avoid impacts to the maximum extent practicable and when impacts are unavoidable, must mitigate those impacts to achieve no net loss of ecological functions. Additional protective regulations are provided in Chapter 8 of the proposed SMP specific to sub-topics such as beach restoration and enhancement, bulkheads, bioengineering, and groins. Each of those subtopics includes provisions for additional avoidance, minimization and compensation of impacts. Independent of regulations by other regulatory agencies, the proposed SMP ensures that shoreline stabilization projects will not degrade the baseline condition.

Both the Corps and the WDFW have jurisdiction over new shoreline stabilization projects, and repairs or modifications to existing shoreline stabilization. As described above in Section 3.2.2, the Corps must consult with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service regarding potential Endangered Species Act issues. As part of those agencies’ efforts to minimize and compensate for shoreline stabilization-related impacts, the federal agencies require implementation of native shoreline planting plans. Further, the latter federal agency strongly promotes shoreline restoration and requires additional impact compensation measures for many bulkhead modification projects, including placement of gravel at the toe of the bulkhead to create shallow-water habitat, angling the bulkhead face landward to reduce wave turbulence, and shifting the bulkhead as far landward as feasible.

Over time, the combined effects of the City’s proposed SMP, and permit approvals from the WDFW and the Corps will likely result in a reduction over time of the net amount of hardened shoreline at the ordinary high water mark, an increase in shallow-water habitat, and an increase in shoreline vegetation.

## **4.0 LOCAL, STATE AND FEDERAL REGULATION**

### **4.1 City of Lake Forest Park Shoreline Master Program**

The first level of protection provided by the SMP is the recognition of three different shoreline environment types in Lake Forest: Shoreline Residential, Urban Conservancy, and Aquatic. These environments were assigned based primarily on existing and proposed land uses, which implicitly encompasses differing levels of ecological functions and different probabilities and potentials for improvements of ecological functions. The Shoreline Residential environment is

very developed, with small structure setbacks, increased shoreline modifications, and high imperviousness.

The proposed SMP contains numerous general policies, with supporting regulations (discussed above where relevant), intended to protect the ecological functions of the shoreline and maintain, at a minimum, the current level of function. Key relevant policies and regulations are referenced and described in Table 11.

Table 11. Shoreline Master Program policies and regulations that protect ecological functions.

<b>SMP Goal, Policy or Regulation</b>	<b>Purpose/Result of SMP Provision</b>	<b>Key ecological functions protected</b>
Chapter 4, Shoreline Use Element Goals and Policies	Ensures development is consistent with the environment designation and results in no net loss of ecological function, directs avoidance of habitat impacts	All
Chapter 4, Conservation Element Goals and Policies	Directs City to protect and preserve sensitive areas, protect processes and function, ensure state water quality standards are met, and require mitigation to achieve no net loss of ecological function.	All
Chapter 4, Restoration Element Goals and Policies	Directs City to pursue improvement of ecological functions by encouraging restoration and enhancement projects, implementing the Restoration Plan (Appendix B of the SMP), and modifying the SMP based on monitoring results and actual cumulative impacts identified during SMP implementation.	All
Chapter 6, Environmental Impacts Policies and Regulations	Requires uses/activities to be located, designed, constructed and managed to avoid, if feasible, then minimize and finally mitigate environmental impacts to processes and ecological functions. This includes protection of water quality and minimization of grading, clearing, filling, shoreline hardening.	All
Chapter 6, Environmentally Sensitive Areas	Refers to a modified version of the City's Environmentally Sensitive Areas Ordinance as set forth in Appendix A of the SMP. The Ordinance was updated in 2005, consistent with latest GMA requirement for use of best available science in protecting critical areas.	All (as provided by the specific critical areas)
Chapter 6, Vegetation Management	Requires installation or preservation of native vegetation in the nearshore riparian area. Encourages protection and maintenance of existing native plant communities, development of new native communities, and preservation of mature trees. Includes provisions for aquatic vegetation that limit control to certain objectives and methods; reminds applicants that approvals may be needed from State agencies. Also encourages property owners to use best management practices for landscape maintenance.	Water quality, aquatic and upland habitat, sediment removal/ shoreline stabilization, LWD/ organic matter recruitment
Chapter 6, Water Quality	"All shoreline development, both during and after construction, shall minimize impacts related to surface runoff through control, treatment and release of surface water runoff such that there is no net loss of	Water quality

<b>SMP Goal, Policy or Regulation</b>	<b>Purpose/Result of SMP Provision</b>	<b>Key ecological functions protected</b>
	receiving water quality in the shoreline environment.” Development must also comply with latest version of the King County Surface Water Design Manual and City stormwater codes.	
Chapter 7	Many uses with potentially significant impacts to ecological functions are prohibited in shoreline jurisdiction, including industry, primary commercial, agriculture, aquaculture, primary parking, and mining.	
Chapter 7, Residential Development	Requires that residential development be conducted such that there is no net loss of ecological function, and mitigation be provided for any necessary reductions in function. As discussed above, the proposed shoreline setback has been doubled or more than doubled from the existing setback, with reduction allowed only if the applicant proposes to implement certain upland and water-related enhancement and impact reduction measures.	Water quality, aquatic and upland habitat, LWD/ organic matter recruitment, shoreline stabilization
Chapter 8, Clearing and Grading	Minimizes land clearing, grading, filling, and alteration of natural drainage features and landforms to the minimum necessary, and encourages use of native plants for areas to be revegetated. Extensive use of lawns is discouraged. Removal of nonnative and invasive vegetation is allowed, but must be replaced with native species. In general, activities must be conducted such that there is no net loss of shoreline ecological functions.	Water quality, sediment removal, aquatic and upland habitat
Chapter 8, Shoreline Stabilization	“Shoreline stabilization and modification projects shall avoid adverse impacts to the environment to the greatest extent feasible, and where such impacts cannot be avoided, mitigation shall be provided to achieve no net loss of shoreline ecological functions.” New shoreline stabilization is limited to those circumstances where it can be demonstrated that no other option is feasible to protect existing legal structures and improvement that would have less environmental impact.	aquatic and upland habitat, bioengineered shoreline stabilization, attenuating wave energy, L:WD/ organic matter recruitment
Chapter 8, Dredging and Fill	Dredge and fill operations should be planned and conducted to protect water quality, aquatic habitat, wildlife habitat, and other functions and processes. Mitigation must be provided if needed to achieve no net loss of shoreline ecological functions.	Water quality, sediment removal, aquatic and upland habitat
Chapter 8, Overwater Structures	This section of the proposed SMP has been designed to be consistent to a large degree with the dimensional standards in the U.S. Army Corps of Engineers’ Regional General Permit 3 for overwater structures in Lake Washington. The standards were developed to avoid and minimize impacts to aquatic species and habitat, with specific emphasis on juvenile salmonids.	Aquatic habitat



## **4.2 Washington Department of Fish and Wildlife**

The Washington Department of Fish and Wildlife has jurisdiction over in- and over-water activities up to and including the ordinary high water mark, as well as any other activities that could “use, divert, obstruct, or change the bed or flow of state waters” (<http://www.wdfw.wa.gov/hab/hpapage.htm>). Practically speaking, these activities in the City of Lake Forest Park include, but are not limited to, installation or modification of shoreline stabilization measures, piers and accessory structures such as boatlifts, culverts, and bridges and footbridges. These types of projects must obtain a Hydraulic Project Approval from WDFW, which will contain conditions intended to prevent damage to fish and other aquatic life, and their habitats. In some cases, the project may be denied if significant impacts would occur that could not be adequately mitigated.

## **4.3 Washington Department of Ecology**

The Washington Department of Ecology may review and condition a variety of project types in Lake Forest Park, including any project that needs a permit from the U.S. Army Corps of Engineers (see below), any project that requires a shoreline Conditional Use Permit or Shoreline Variance, and any project that disturbs more than 1 acre of land. Project types that may trigger Ecology involvement include pier and shoreline modification proposals and wetland or stream modification proposals, among others. Ecology’s three primary goals are to: 1) prevent pollution, 2) clean up pollution, and 3) support sustainable communities and natural resources (<http://www.ecy.wa.gov/about.html>). Their authority comes from the State Shoreline Management Act, Section 401 of the Federal Clean Water Act, the Federal Water Pollution Control Act, the Federal Coastal Zone Management Act of 1972, the State Environmental Policy Act, the Growth Management Act, and various RCWs and WACs of the State of Washington.

## **4.4 U.S. Army Corps of Engineers**

The U.S. Army Corps of Engineers has jurisdiction over any work in or over navigable waters (including Lake Washington) under Section 10 of the Federal Rivers and Harbors Act of 1899, and discharges of dredged or fill material into waters of the United States (including Lake Washington, streams, and non-isolated wetlands) under Section 404 of the Federal Clean Water Act.

As a federal agency, any activity within Corps jurisdiction that could affect species listed under the Federal Endangered Species Act must be consulted on with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. These agencies ensure that the project includes impact minimization and compensation measures for protection of listed species and their habitats. Since salmon were first listed in Puget Sound, the Corps and the other federal agencies have been working closely to streamline the permitting process, particularly for new pier and pier modification projects. The result of those efforts for Lake Washington has culminated in Regional General Permit (RGP) 3. As mentioned above, RGP 3 has been the basis for the dimensional standards included in the proposed Lake Forest Park SMP. However, compliance with the RGP additionally requires development and implementation of a native shoreline planting plan.

## **5.0 OTHER ACTIVITIES AND PROGRAMS**

Chapter 4 of the *Shoreline Restoration Plan Component of the Shoreline Master Program for the City of Lake Forest Park* (The Watershed Company 2007) includes in-depth discussion of existing projects and programs that are active in the City of Lake Forest Park.

## **6.0 NET EFFECT ON ECOLOGICAL FUNCTION**

As described above, the proposed SMP provides a substantially increased level of protection to shoreline ecological functions relative to the existing SMP. On its own, the proposed SMP is expected to protect shorelines within the City of Lake Forest Park, resulting in no net loss of shoreline ecological function, and may improve ecological functions over time (see Section 3.0). State and federal regulations, acting in concert with this SMP, will provide further assurances of improved shoreline ecological functions over time.

## **7.0 REFERENCES**

The Watershed Company. 2007. Final shoreline analysis report including shoreline inventory and characterization for the City of Lake Forest Park's Lake Washington shoreline. Prepared for City of Lake Forest Park. 16 May 2007.

Toft, J.D. 2001. Shoreline and dock modifications in Lake Washington. Prepared for King County Department of Natural Resources. October 2001. SAFS-UW-0106.