CRITICAL AREAS REPORT

Lake Sammamish State Park
Sunset Beach Restoration

Prepared for:

Washington State Park and Recreation Commission
P.O. Box 42668
Olympia, Washington 98504-2650

Prepared by:

THE WATERSHED COMPANY

750 Sixth Street South
Kirkland . WA 98033
p 425.822.5242
f 425.827.8136
watershedco.com

March 10, 2014

The Watershed Company Reference Number:
070927.2

The Watershed Company Contact Person:
Jennifer Creveling, Sr. Biologist, PWS
OR Sarah Sandstrom, Fisheries Biologist

Cite this document as:
The Watershed Company. July 2013. Lake Sammamish State Park Sunset Beach Restoration, Critical Areas Report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

CRITICAL AREAS REPORT

LAKE SAMMAMISH STATE PARK – SUNSET BEACH RESTORATION

1 PROJECT DESCRIPTION

In 2007, a master plan was produced to guide future redevelopment and restoration of Lake Sammamish State Park. Based on community input and project goals, the master plan sought to strike a balance between ecological preservation and local recreational needs.

This critical areas study was done in support of the current design phase of the park which includes renovating a segment of the Sunset Beach shoreline. Work includes improving the existing swimming area with excavation and backfilling, ADA access via a concrete walkway and water-access ramp, a restored sand beach with boulders and woody debris, and a turf lawn area. Consistent with the requirements of KCC 21A.25.140(B), the proposed project provides water-oriented public access and improves public safety of the popular access area.

Figure 1. Vicinity map of the project site from MapQuest.

Figure 2. Project area outlined in yellow. Photo from Mapquest.

The proposed project is located at Sunset Beach in Lake Sammamish State Park, on the southern shoreline of Lake Sammamish in Water Resource Inventory Area 8 (WRIA 8). The park is located at 5000 NW Sammamish Road, King County, WA 98027 (in Section 20, Township 24 North, Range 6 East; 47.55936 N Latitude, -122.06532 W Longitude; Figure 1). Tax parcel numbers are 2024069002 and 1724069005. Sunset Beach is bordered to the north and west by Lake Sammamish and to the south and east by the 512-acre Lake Sammamish State Park.

The project area is entirely within the mapped shoreline jurisdiction of King County. The shoreline area is designated as the Conservancy environment.

2 Existing Site Conditions

2.1 General Area Conditions

A stream and wetland delineation study was completed in the Sunset Beach area of Lake Sammamish State Park in 2009 (The Watershed Company 2009). The Sunset Beach study area covers approximately 43 acres of the 512-acre park,

which is at the south end of Lake Sammamish (Figure 2). Located in the alluvial floodplain of Issaquah Creek and Tibbetts Creek, the park is primarily a day use area that includes picnic tables and shelters, swimming beaches, a boat launch, and trails. Undeveloped areas in the park contain wetlands, salmon-bearing streams, meadows, forests, and a great blue heron rookery. The ordinary high water mark (OHWM) was flagged along the west bank of Issaquah Creek and the lakeshore within the study area. Seven wetland areas were classified and flagged within the project area.

Wetland ratings were updated per the most recent guidance from Washington Department of Ecology (Ecology). Current buffer requirements for wetland and aquatic areas were updated per the King County Code. A summary of the critical area classifications and associated buffer requirements per KCC 21A.24 is listed in Table 1 below.

Table 1. Critical Area Classification Summary

Critical Area	Classification	Habitat Score	Required Buffer
Wetland A	Category II	25	162.5 ft
Wetland B	Category IV	16	50 ft
Wetland C	Category IV	12	50 ft
Wetland D	Category II	20	125 ft
Wetland E	Category III	14	75 ft
Wetland F	Category IV	12	50 ft
Wetland G	Category II	24	155 ft
Lake Sammamish	Type S	NA	165 ft
Issaquah Creek	Type S	NA	165 ft

According to Washington Department of Fish and Wildlife's (WDFW) Priority Habitats and Species (PHS) online data, Lake Sammamish is a priority habitat area for waterfowl concentrations and the entire project area is within priority habitat for Townsend's big-eared bats.

The downstream end of Issaquah Creek is mapped for Coast Resident Cutthroat trout, Chinook, coho, kokanee, and sockeye salmon, and steelhead. All of these species are expected to pass through the in-water portion of the Lake

Sammamish project area. In particular, Chinook salmon fry are closely associated with the shoreline early in the outmigration period (Tabor et al. 2004, 2006). The Sunset Beach area is also mapped as a sockeye spawning area by WDFW.

Just north of the project area, the uplands are mapped as a biodiversity area and corridor. Although not mapped on WDFW's PHS website, Lake Sammamish State Park also supports a large great blue heron rookery.

Additionally, a cultural resource survey of select locations within Lake Sammamish State Park was done in 2008. No cultural resources were found in the study area, which included the Sunset Beach Area (NWAA 2008).

2.2 Conditions within the Sunset Beach Project Area

The project area includes an active recreational beach and swimming area. Existing upland site conditions are characterized by an open, gradually sloping sandy beach, with sparsely vegetated herbaceous ground cover (Figure 3).

Figure 3. View of project area looking north.

The proposed work area includes a portion of Wetland D. The portion of Wetland D within the work area consists of shallow surface depressions and sparse herbaceous vegetation (Figure 4). The proposed project area is a small portion of a more complex, larger wetland unit, which contains palustrine emergent, scrub-shrub, and forested vegetation communities. Vegetation within

the proposed wetland impact area consists of slender rush, spike rush, creeping Jenny, and narrowleaf plantain.

Figure 4. View of project area looking south toward Wetland D.

The proposed work area is surrounded by active recreational uses, as well as some passive use areas. Existing recreational use facilities include a concession stand, picnic tables, restrooms, and concrete pathways. The existing swim area is marked by swim buoys, and covers an area approximately three to four times larger than the proposed in-water work. The area sees significant use by swimmers and beach-goers during the summer months, and the lake gets heavy powerboat and jet-ski traffic. The park provides habitat for a variety of waterfowl as well as great blue herons, raptors, and other birds.

Aquatic vegetation within the proposed project area includes water milfoil (*Myriophyllum* sp.) and *Elodea* sp. Eurasian water milfoil is mapped to occur at Lake Sammamish State Park in King County's Aquatic Plant Survey Maps (King County, electronic reference). According to this report, King County METRO treated areas of Lake Sammamish around the State Park using aquatic weed harvesters in the 1980s. Eurasian water milfoil is a Class A noxious weed that locally degrades water quality by reducing dissolved oxygen levels below minimum requirements for salmonids (Kerwin 2001).

The shoreline substrate is characterized by a mix of sand and gravel. A dive survey conducted by K. Johnston on June 15, 2012 within the project area noted

that the bottom composition is sand, organic sediment, and clay (KJ Design 2012). Landward of the lakeshore, soils are mapped by NRCS as Puget silty clay loam. The average slope of the lake bottom is approximately 10 percent.

3 IMPACT ANALYSIS

3.1 Summary of Proposed Impacts

The proposed beach restoration plan will affect wetland, wetland buffer, aquatic buffer, and aquatic areas. Approximate area measurements of unavoidable adverse impacts are provided in Table 2. These impacts are discussed individually in the following sections

Table 2. Critical Area Impacts

Critical Area	Activity	Impact area
Wetland D	Excavation & backfill	21,541 SF (0.49 acre)
Wetland buffer	Concrete paving	5,953 SF (0.14 acre)
Lake buffer	Concrete paving & retaining wall	1,539 SF (0.04 acre)
Direct lake impact	Concrete ramp	300 SF (0.007 acre)

3.2 Wetland Impacts

A 21,541 square-foot area of Wetland D will be excavated and filled with beach sand as a part of the proposed project. Drainage patterns that presently contribute to wetland hydrology will be rerouted using subsurface drainage. These changes will result in the permanent removal of the wetland area.

Wetland D is a Category II lake-fringe wetland, which contains Palustrine forested, scrub-shrub, and emergent vegetation communities. Silty clay loam soils exhibit the Depleted Matrix (F3) hydric soil indicator; at the time of the wetland delineation study, wetland hydrology indicators were a High Water Table (A2) and Saturation (A3). As discussed above, the impacted area is characterized by shallow depressions along a uniform beach area with sparse herbaceous vegetation; it is a relatively degraded and low functioning portion of the total wetland.

3.3 Wetland Buffer Impacts

The wetland buffer consists predominantly of a sandy beach area with sparse herbaceous vegetation, as well as smaller areas of existing turf grass and an impervious path.

The only substantive wetland buffer impacts will be the installation of 5,953 square feet of impervious paths. The existing beach area will be excavated and replaced with beach sand. The replacement of substrate materials and removal of sparse herbaceous vegetation is not expected to have a significant effect on vegetative functions.

3.4 Aquatic Buffer Impacts

Existing lakeshore vegetation is very sparse within the project area outside of the proposed wetland impact area. Therefore, excavation and fill within the upland beach area will not affect hydrologic, vegetative, or water quality functions of the lake buffer area. An increase in 1,539 square feet of impervious path within the aquatic buffer (and outside of wetland buffer area) has the potential to affect hydrologic, habitat, and water quality functions; however, the actual impact of these changes is expected to be minimal given the surrounding environment and landscape setting.

The proposed project will also install a series of subsurface drains under the active beach area. Because the proposed beach is located amidst a large park area and over 400 feet from the nearest pollutant-generating impervious surface (parking area), it is not anticipated that this change will affect water quality in the lake. Furthermore, this change is not expected to affect the hydrology of the lake because the lake level is controlled by the static lake elevation.

3.5 Direct Aquatic Impacts

Temporary Impacts

Excavation and fill, both in-water and along the shore, have the potential to generate temporary turbidity. To minimize construction impacts associated with increased turbidity and the potential to release toxic chemicals during construction, timing restrictions and erosion and turbidity minimization measures will be implemented.

Sediment removal and placement may cause local reduction or alteration in the benthic or epibenthic invertebrate community at the site during the first outmigration season following construction. However, with the exception of the area under the access ramp, recovery of the benthic community is expected by the following year based on past studies of invertebrate response following dredging (Carline and Brynildson 1977 in Peterson 1981, Harvey and Lisle 1998, McCabe 1996). Benthic and epibenthic invertebrates have not been found to be a limiting factor for juvenile Chinook salmon diets in Lake Washington (Koehler et al. 2006), and they are not expected to be a limiting factor under the similar conditions of Lake Sammamish. Therefore, the project effects on benthic and epibenthic invertebrates in Lake Sammamish are expected to be temporary and insignificant.

Long-term Impacts

The long-term impacts of the project on Lake Sammamish are expected to result in a net benefit for ecological functions.

The project will remove invasive Eurasian milfoil and grade the shoreline to extend the area of shallow water, which provides a larger area of preferred shallow water rearing for salmonid fry (particularly juvenile Chinook salmon).

By removing milfoil at the site prior to the project and subsequently on an annual basis, the proposed project will maintain or improve water quality conditions in Lake Sammamish.

The project will shrink the area of high impact activities within the lake by reducing the size of the swimming area. Floating logs attached to concrete anchors by chain will be used as floating breakwaters to minimize waves and boat wakes within the swimming area, and this will result in a minor increase in over-water cover.

The proposed project will result in a net increase of 64 cubic yards of dry storage flood capacity (between 29.6 and 35 feet NAVD88). Because the elevation of Lake Sammamish is controlled by a static lake elevation, the project will not affect flood conveyance or flood elevations (Northwest Hydraulic Consultants 2012). There will be a net increase in fill volume below the lake outlet elevation, but this will not have a perceptible impact on flood conditions within Lake Sammamish (Northwest Hydraulic Consultants 2012). Therefore the effects of the proposed project on flood levels and conveyance are insignificant.

4 PROPOSED MITIGATION MEASURES

Mitigation sequencing was implemented as required under KCC 21A.24 and 21A.25. Under the proposed project, impacts would be first avoided, second minimized, then existing conditions improved or maintained, and lastly unavoidable critical area impacts would be mitigated. Any mitigation areas will be monitored and adaptively managed to ensure success.

4.1 Mitigation Approach

4.1.1 Avoidance

Given the extent of lake-fringe wetlands in the Sunset Beach area and the in-water restoration goals, a complete avoidance approach is not feasible for this project. The existing sandy beach area which provides access to the lake is approximately 800 feet long. The improved swim beach proposed with this

phase will be approximately 530 feet long. The majority of the beach restoration area is sited outside of the nearest lake-fringe wetland, Wetland D. Since Wetland D is centrally located directly in front of existing beach infrastructure, complete avoidance of wetland impacts is not practical. Relocating the swimming beach to the north was not deemed feasible from a public access or safety perspective.

4.1.2 Minimization

In general, proposed Sunset Beach area improvements minimize wetland, buffer, and lakeshore impacts by utilizing existing structural footprints and heavily trafficked recreation areas.

The proposed project minimizes wetland and buffer impacts by focusing the project on an existing swimming beach. Where the wetland extends within the existing active beach area, only a portion of the wetland that consists of sparse, simple vegetation with lower functions was included in the project area. By focusing on an existing active use area, the project avoids impacts to any shrubs or trees or areas of undisturbed vegetation.

Impacts to the lakeshore are minimized by focusing the project on an existing swimming beach and reducing the active recreation area compared to the existing condition. Additionally, the project limits the use of impervious surfaces within the wetland and aquatic buffers to the minimum necessary to accommodate ADA access and the high level of public use.

To minimize impacts of proposed in-water improvements, Agency-approved work window restrictions will be followed. Following a work window will reduce effects on aquatic fauna, and specifically on listed salmonids. The work window typically includes the period from July 16 to July 31 and the period from November 16 to December 31. For example, under KCC 21A.24.365 B, grading for allowed alterations in aquatic area buffers is only allowed from May 1 to October 1, except in marine shorelines to avoid conflicts with forage fish or migrating salmonids. Although the code does not specify that alterations in timing may be acceptable on freshwater shorelines outside of the summer timeframe, it is suggested that such an allowance be made if work is conducted in the winter in-water work period to minimize the total duration of impacts to aquatic resources.

To minimize buffer area impacts, topsoil disturbance and compaction will be limited to maintain infiltration functions in accord with KCC 21A.24.365(C).

4.1.3 Improvement and Maintenance

Proposed in-water work improves conditions within the project area by removing milfoil prior to project implementation, as well as on an annual basis

thereafter. Milfoil removal will follow King County Noxious Weed Control Best Management Practices (King County, electronic reference) for milfoil removal, including annual follow-up milfoil removal. Maintenance crews will be required to properly dispose of all removed milfoil at an upland site, so it cannot reenter a waterbody.

4.1.4 Project-specific goals

Washington State Parks (WSP) seeks to improve public safety in the swim beach area and revitalize this portion of the park. Striking a balance between their commitment to environmental stewardship and dedication to outdoor recreational, WSP plans to reduce the active swim beach area and further enhance surrounding wetland and shoreline habitats. This will result in a more clearly defined active recreation zone and limit intrusions into adjacent natural areas.

4.2 Compensatory Mitigation

4.2.1 Mitigation Site Selection

Proposed Mitigation Site

The proposed mitigation areas were selected based on proximity to the impact site, existing park uses, critical area enhancement opportunities, Master Plan objectives, and Restoration Plan objectives for Lake Sammamish State Park (LSSP). The mitigation areas are all within the Sunset Beach area of LSSP, located in the historic delta deposits of Issaquah Creek and Tibbetts Creek. Since this area is dedicated to active recreational use, existing wetlands are degraded and commonly maintained as mowed lawn. The Sunset Beach area is constrained by recreational use requirements, including open lawn for picnics and free play. However, targeted wetland enhancements can be incorporated into the site without compromising recreational value of the site.

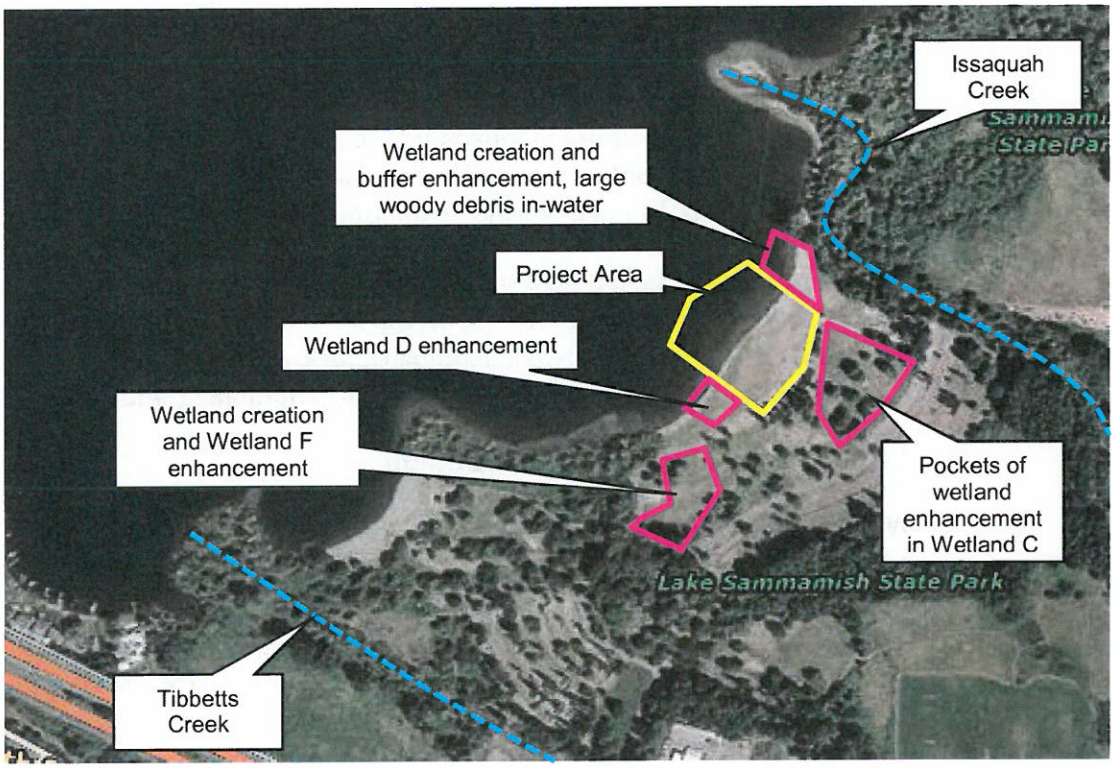


Figure 5. Approximate location of proposed mitigation areas. Photo from Mapquest.

Existing Condition of the Mitigation Site

The 43-acre Sunset Beach area lies between Issaquah Creek and Tibbetts Creek. It is a recreation area within the 512-acre park, which is busiest during the summer months. As documented in the *Wetland and Stream Delineation Study Lake Sammamish State Park Sunset Beach* (The Watershed Company 2009), seven wetlands were identified in the project vicinity. Open lawn areas, including mowed lawn wetlands (Wetlands B, C and F), are used for picnics and free play. The current swim beach spans approximately 800 lineal feet of lakeshore and includes a degraded portion of Wetland D. Seasonal fluctuations in the ground water table and lake level are the primary sources of hydrology for these wetlands. Critical area ratings and buffers are summarized in the table below.

Table 3. Mitigation site critical areas, ratings, and buffer widths.

Critical Area	Classification	Habitat Score	High Impact Buffer
Wetland C	Category IV	12	50 feet
Wetland D	Category II	20	125 feet
Wetland F	Category IV	12	50 feet
Lake Sammamish OHWM	Type S	N/A	165 feet

Historically, prior to construction of the Hiram Chittenden Locks in 1916, braided channels and wetland complexes characterized the Sunset Beach area (NWAA 2008). Site soils are mapped by NRCS as Puget silty clay loam. Today these delta deposits contain seasonally saturated wetland areas, which are maintained as mowed lawn or sandy shoreline.

This park provides habitat for a variety of waterfowl as well as great blue herons, raptors, and other birds. A heron rookery is located approximately half a mile north of the project area, between Issaquah Creek and Laughing Jacobs Creek. The park contains habitat niches for mammals, amphibians, and reptiles.

4.2.2 Mitigation Site Plans & Design

Wetlands and Aquatic Buffers

As discussed above, the proposed beach restoration will cause unavoidable wetland and buffer impacts. Wetland impacts will be offset through a combination of wetland creation, wetland enhancement, wetland buffer enhancement, and lake buffer enhancement. Project impacts and proposed mitigation are summarized in the table below.

Table 4. Critical area impact and mitigation summary

Critical Area Type (Name)	Impact Area	Mitigation Area	MitigationType / Location	Ratio
Wetland (Wetland D)	21,541 SF	21,606 SF	Wetland creation / North of Wetland D, Wetland F	1:1
		86,660 SF	Wetland enhancement / Wetlands C and F	4:1
Wetland buffer (Wetlands C and D)	5,953 SF	7,955 SF	Buffer creation and enhancement /New wetland creation areas	1.3:1
Lake buffer	1,539 SF	1,813 SF	Lake buffer enhancement / North of beach restoration area	1.2:1

The *Lake Sammamish State Park Wetland, Stream, and Lakeshore Restoration Plan* (The Watershed Company 2005) assessed mitigation and restoration opportunities throughout Lake Sammamish State Park including the Issaquah and Tibbetts Creek drainages. Several of the projects identified in this report have been implemented by Washington State Parks and Mountains to Sound Greenway Trust. The proposed mitigation draws upon and compliments the LSSP restoration plan and master planning efforts.

In 2009, a critical areas mitigation plan was prepared for improvements to the Sunset Beach area of Lake Sammamish State Park (The Watershed Company, April 2009). This plan included impact analysis and mitigation for a proposed boardwalk, bath house, and fire lane. The boardwalk was constructed in 2013; the bath house and fire lane are planned to be constructed in 2014. To preserve

mitigation identified for those planned improvements, a new mitigation plan was prepared for the beach restoration project.

As summarized in Table 4 above, the proposed mitigation meets or exceeds the mitigation ratios recommended by the state department of Ecology.

Aquatic Areas

King County Code 21A.24.380(A) requires that in aquatic areas, mitigation must achieve equivalent or greater aquatic area functions related to habitat, hydrologic, and geomorphic functions. As described in Section 3.5, because the proposed project is expected to have a net benefit on aquatic resource functions, no additional mitigation is proposed. Specifically, removal of milfoil and re-grading of the nearshore area to expand shallow water habitat will result in a net improvement of functions. These actions proposed over a 60,000 square-foot area are believed to be sufficient to account for the permanent adverse impact resulting from an alteration of sediment transport and macro-invertebrate production in the 300 square-foot area of the proposed concrete access ramp. Therefore, no additional aquatic mitigation is proposed.

4.2.3 Goals and Performance Standards

The mitigation plan aims to enhance and expand nearshore habitat for fish and seasonal ponds for amphibians. Buffer restoration and wetland enhancements are also designed to benefit local fauna, including birds and small mammals.

Goals and performance standards will be generated with specific requirements for survival, woody cover, diversity, and invasive species cover. Performance standards for wetland parameters, native cover, maximum invasive cover, species diversity and survival will be established. More specific standards will be developed in conjunction with the final mitigation plan.

4.2.4 Monitoring Methods

The applicant agrees to monitor wetland and buffer creation and enhancement areas, including wetland hydrology (for creation areas), planted vegetation, and log structures for three years following project implementation or until approved performance standards are achieved.

4.2.5 Site Protection

Proposed mitigation areas are on Washington State Parks (WSP) property and will be maintained in perpetuity in accordance with the parks guiding principles for recreation and natural resource stewardship. Fencing and signage will be posted as practical given the intensive recreational use of the Sunset Beach area and the layout of mitigation areas.

4.2.6 Maintenance and Contingency Plans

A three-year monitoring and maintenance program will be specified. If there is a significant problem with the mitigation areas meeting performance standards, WSP shall develop a contingency plan. If required a contingency plan will be specifically tailored to correcting key project failings. Contingency plans can include, but are not limited to, additional grading, soil amendments, additional plant installations, and plant substitutions of size, quantity, density, and/or location.

5 CONCLUSIONS

This report provides a summary of existing critical areas within the proposed project area at Sunset Beach, and defines the impacts and proposed mitigation options to comply with regulatory requirements.

All discussions, conclusions and recommendations reflect the best professional judgment of the author(s) and are based upon information available to us at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, State and Federal regulatory authorities. No other warranty, expressed or implied, is made.

6 REFERENCES

Granger, T. et. al. April 2005. Wetlands in Washington State – Vol. 2: Guidance for Protecting and Managing Wetlands. Washington State Department of Ecology Publ. 05-06-008. Olympia, WA.

Harvey, B.C., and T.E. Lisle. 1998. Effects of suction dredging on streams: a review and an evaluation strategy. Fisheries 23(8):8-17.

Hruby, T. August 2004. Washington State Wetland Rating System for Western Washington – Version 2. Washington State Department of Ecology Publ. No. 04-06-25.

Kerwin, J. 2001. Salmon and steelhead habitat limiting factors report for the Cedar-Sammamish Basin (Water Resource Inventory Area 8). Washington Conservation Commission. Olympia, WA.

King County. Appendix A: Lake Characteristics and Aquatic Plant Survey Maps. http://your.kingcounty.gov/dnrp/library/archive-documents/wlr/waterres/smlakes/app_a.pdf [Accessed on January 18, 2013]

King County Noxious Weed Control Program. Best Management Practices for Milfoil. http://your.kingcounty.gov/dnrp/library/water-and-land/weeds/BMPs/Milfoil_Myriophyllum_control.pdf [Accessed on July 10, 2013]

Koehler, M.E., K.L. Fresh, D.A. Beauchamp, J.R. Cordell, C.A. Simenstad, and D.E. Seiler. 2006. Diet and bioenergetics of lake-rearing juvenile Chinook salmon in Lake Washington. Transactions of the American Fisheries Society 135 (1580-1591).

McCabe, G.T., S.A. Hinton, and R.L. Emmett. 1996. Benthic Invertebrates and Sediment Characteristics in Wahkiakum County Ferry Channel, Washington, Before and After Dredging. Coastal Zone and Estuary Studies Division, Northwest Fisheries Science Center, National Marine Fisheries Service. Seattle, WA.

Northwest Hydraulic Consultants. 2012. Flood Impact Analysis – Lake Sammamish Beach Restoration. Memorandum from Peter Brooks, P.E. to Robert Droll. December 13, 2012.

NWAA (Northwest Archaeological Associates, Inc.). 2008. Cultural Resources Assessment of Select Lands in Lake Sammamish State Park, King County, Washington. NWAA Report Number WA08-039.

Peterson, S.A. 1981. Sediment Removal as a Lake Restoration Technique. Environmental Research Laboratory, US Environmental Protection Agency. Prepared for Office of Water Regulations and Standards Criteria and Standards Division. EPA-600/3-81-013.

Tabor, R.A., Gearns, H.A., McCoy III, C.M., and S. Camacho. 2006. Nearshore habitat use by juvenile Chinook salmon in lentic systems of the Lake Washington Basin. 2003 and 2004 annual report. US Fish and Wildlife Service, Lacey, WA.

Tabor, R.A., Scheurer, J.A., Gearns, H.A., and E.P. Bixler. 2004. Nearshore habitat use by juvenile Chinook salmon in lentic systems of the Lake Washington Basin. 2002 annual report. US Fish and Wildlife Service, Lacey, WA.

The Watershed Company. 2009. Wetland and Stream Delineation Study Lake Sammamish State Park, Sunset Beach, King County, Washington. Prepared for Washington State Parks and Recreation Commission. January 2009.

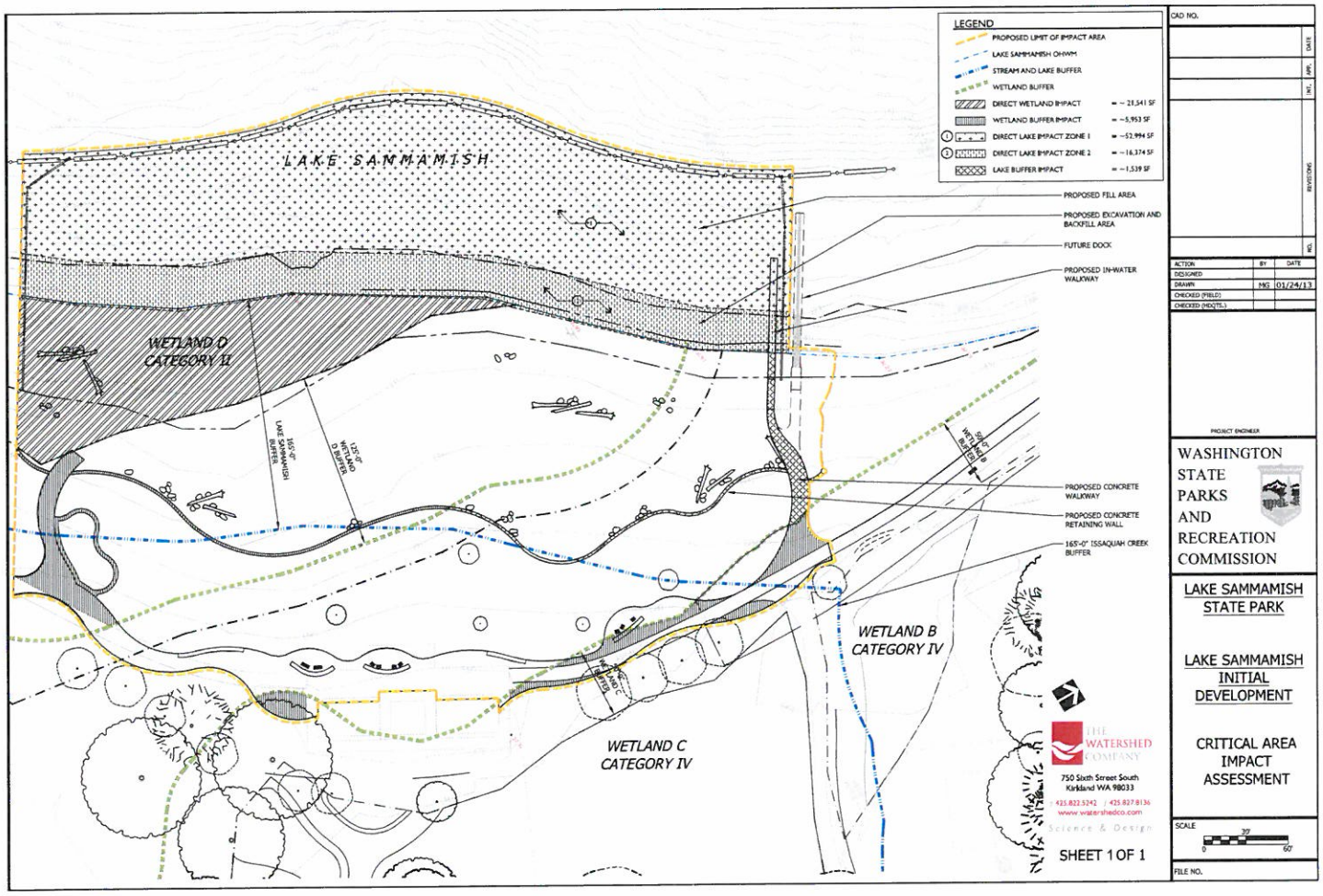
The Watershed Company. 2005. Lake Sammamish State Park Wetland, Stream, and Lakeshore Restoration Plan. Prepared for Washington State Parks and Recreation Commission.

Washington State Department of Ecology. 1997. Washington State Wetlands

Washington State Department of Ecology Identification and Delineation Manual. Publ. 96-94. Olympia, WA.

APPENDIX A

Critical Area Impact Assessment Map


LEGEND
PROPOSED LIMIT OF IMPACT AREA
LAKE SAMMAMISH OHWM
STREAM AND LAKE BUFFER
WETLAND BUFFER
DIRECT WETLAND IMPACT = ~ 21,541 SF
WETLAND BUFFER IMPACT = ~5,953 SF
1 DIRECT LAKE IMPACT ZONE 1 = ~52,994 SF
2 DIRECT LAKE IMPACT ZONE 2 = ~16,374 SF
LAKE BUFFER IMPACT = ~1,539 SF
LAKE SAMMAMISH
WETLAND D
CATEGORY II
165'-0" LAKE SAMMAMISH BUFFER
125'-0" WETLAND D BUFFER
WETLAND B
CATEGORY IV
WETLAND C
CATEGORY IV
PROPOSED FILL AREA
PROPOSED EXCAVATION AND BACKFILL AREA
FUTURE DOCK
PROPOSED IN-WATER WALKWAY
PROPOSED CONCRETE WALKWAY
PROPOSED CONCRETE RETAINING WALL
165'-0" ISSAQUAH CREEK BUFFER
CAD NO.
DATE
APP.
INT.
REVISIONS
NO.
ACTION
BY
DATE
DESIGNED
DRAWN
MG
01/24/13
CHECKED (FIELD)
CHECKED (HDQTRS.)
PROJECT ENGINEER
WASHINGTON STATE PARKS AND RECREATION COMMISSION
LAKE SAMMAMISH STATE PARK
LAKE SAMMAMISH INITIAL DEVELOPMENT
CRITICAL AREA IMPACT ASSESSMENT
THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
425.822.5242 / 425.827.8136
www.watershedco.com
Science & Design
SCALE
20'
0
60'
SHEET 1 OF 1
FILE NO.