



CONFLUENCE
ENVIRONMENTAL COMPANY

**Camp Thunderbird Upgrades
DETAILED MITIGATION PLAN, REVISED**

Prepared for:

Pacific Harbor Council, Boy Scouts of America
February 2023



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Prepared for:

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	BACKGROUND	3
3.0	EXISTING SITE CONDITIONS	3
4.0	PROJECT DESCRIPTION	7
5.0	MITIGATION SEQUENCING	9
6.0	IMPACT ANALYSIS	11
6.1	Wetland Impacts	11
6.1.1	Dredging of Aquatic Bed Habitat to Non-vegetated Habitat	11
6.1.2	Removal of Emergent/Scrub-Shrub Habitat	13
6.1.3	Overwater Coverage	13
6.2	Wetland Buffer Impacts	13
7.0	PROPOSED MITIGATION	13
7.1	Overview	13
7.1.1	Mitigation for Dredging of Aquatic Bed Habitat	16
7.1.2	Mitigation for Removal of Emergent/Scrub-Shrub Habitat	16
7.1.3	Mitigation for New Overwater Coverage	16
7.1.4	Mitigation for Wetland Buffer Impacts	17
7.1.5	Additional Proposed Enhancement	17
7.2	Mitigation Design	18
7.2.1	Wetland Creation	18
7.2.2	Wetland Enhancement	18
7.2.3	Wetland Preservation	18
7.2.4	Wetland Buffer Enhancement	19
7.3	Planting Plan	21
7.4	Schedule	22
7.5	Cost Estimate and Financial Guarantee	22
8.0	GOALS, OBJECTIVES, PERFORMANCE STANDARDS AND CONTINGENCIES	23
8.1	Objective 1—Wetland Creation	23
8.1.1	Performance Standard 1	24
8.1.2	Contingency Measure 1	24
8.2	Objective 2—Dominated by Native Plants	24
8.2.1	Performance Standard 2a	24
8.2.2	Contingency Measure 2a	24
8.2.3	Performance Standard 2b	25
8.2.4	Contingency Measure 2b	25
8.2.5	Performance Standard 2c	25

8.2.6	Contingency Measure 2c	25
8.3	Objective 3—Wetland Preservation.....	25
8.3.1	Performance Standard 3.....	25
8.3.2	Contingency Measure 3.....	26
9.0	MAINTENANCE PLAN	26
9.1	Watering	26
9.2	Weeding	26
9.3	Mowing	26
9.4	Mulching	26
9.5	Dead Plant Removal.....	27
10.0	MONITORING PLAN	27
10.1	Monitoring Events.....	27
10.1.1	Frequency.....	27
10.1.2	As-Built Survey	27
10.1.3	Year 0 Monitoring.....	28
10.1.4	Spring Monitoring.....	28
10.1.5	Fall/Yearly Monitoring	28
10.2	Monitoring Methods	28
10.2.1	Meander Survey.....	28
10.2.2	Transects and Photo Points.....	28
10.2.3	Wetland Determination and Boundary Delineation	28
10.2.4	Plant Survival	29
10.2.5	Percent Cover	29
10.3	Reports.....	29
10.3.1	As-Built	29
10.3.2	Year 0 Monitoring.....	29
10.3.3	Spring Monitoring.....	29
10.3.4	Fall/Yearly Monitoring	30
11.0	REFERENCES.....	31

TABLES

Table 1.	Summary of wetlands characteristics.....	7
Table 2.	Summary of impacts to critical areas	11
Table 3.	Summary of proposed mitigation.....	14
Table 4.	Proposed species and densities to be planted.....	21
Table 5.	Summary of success criteria.....	23

FIGURES

Figure 1. Site vicinity 2
Figure 2. Existing site conditions: buildings and facilities 4
Figure 3. Existing site conditions: critical areas 5
Figure 4. Proposed development 8
Figure 5. Proposed impacts 12
Figure 6. Proposed mitigation areas 15
Figure 7. Proposed wetland preservation area 20

APPENDICES

- Appendix A—Existing and New Dock Plans
- Appendix B—Credit-Debit Worksheets
- Appendix C—Bond Worksheet

1.0 INTRODUCTION

Camp Thunderbird is located on the shore of Summit Lake at 11740 Summit Lake Road NW, Olympia, Washington, at the western end of Summit Lake in unincorporated Thurston County (Figure 1). The campground comprises of several parcels, totaling 125.93 acres.

Camp Thunderbird is home to the Boy Scouts of America (BSA) Pacific Harbors Council's (PHC's) Cub Scout and Boy Scout camping programs. The PHC is undertaking a significant capital project upgrading Camp Thunderbird (see Section 4.0 for more details).

This document describes the proposed mitigation and accounting plan to demonstrate that the project meets and exceeds mitigation requirements and will meet the goal of no net loss of wetlands. In fact, the proposed plan is intended to significantly improve the ecological function of Camp Thunderbird and its associated wetlands, including a major upgrade to the headwaters of Kennedy Creek. This mitigation plan has also been designed to comply with Thurston County Code (TCC) 24.35.380. The following permits will be required for this project:

- Thurston County Shoreline Development Permit
- Thurston County Critical Areas Determination
- Thurston County On-site Sewage Permit
- Thurston County Building Permit
- Thurston County Reasonable Use Exemption
- Certification of Water Availability
- Washington Department of Fish and Wildlife Hydraulic Project Approval
- Washington Department of Ecology (Ecology) Section 401 Water Quality Certification
- US Army Corps of Engineers (Corps) Section 404 Permit

This report has been prepared by Kerrie McArthur, PWS, CERP, FP-C. Kerrie McArthur has 28 years of experience in wetland and stream science, restoration, and mitigation design; aquatic and terrestrial habitat evaluation; and environmental planning and permitting. Kerrie is an extremely versatile field biologist who conducts wetland and stream reconnaissance and delineations, ordinary high water mark determinations, aquatic and terrestrial habitat evaluation, functional assessment of aquatic ecosystems, water quality monitoring, stream-channel characterization, and mitigation site monitoring. She evaluates a site and develops strategies to avoid or minimize impacts to wetlands and, when needed, designs wetland mitigation that uses the landscape and ecology to maximize project success. Kerrie creates mitigation plans and restoration designs for sensitive species and habitats including salmonids and wetlands.

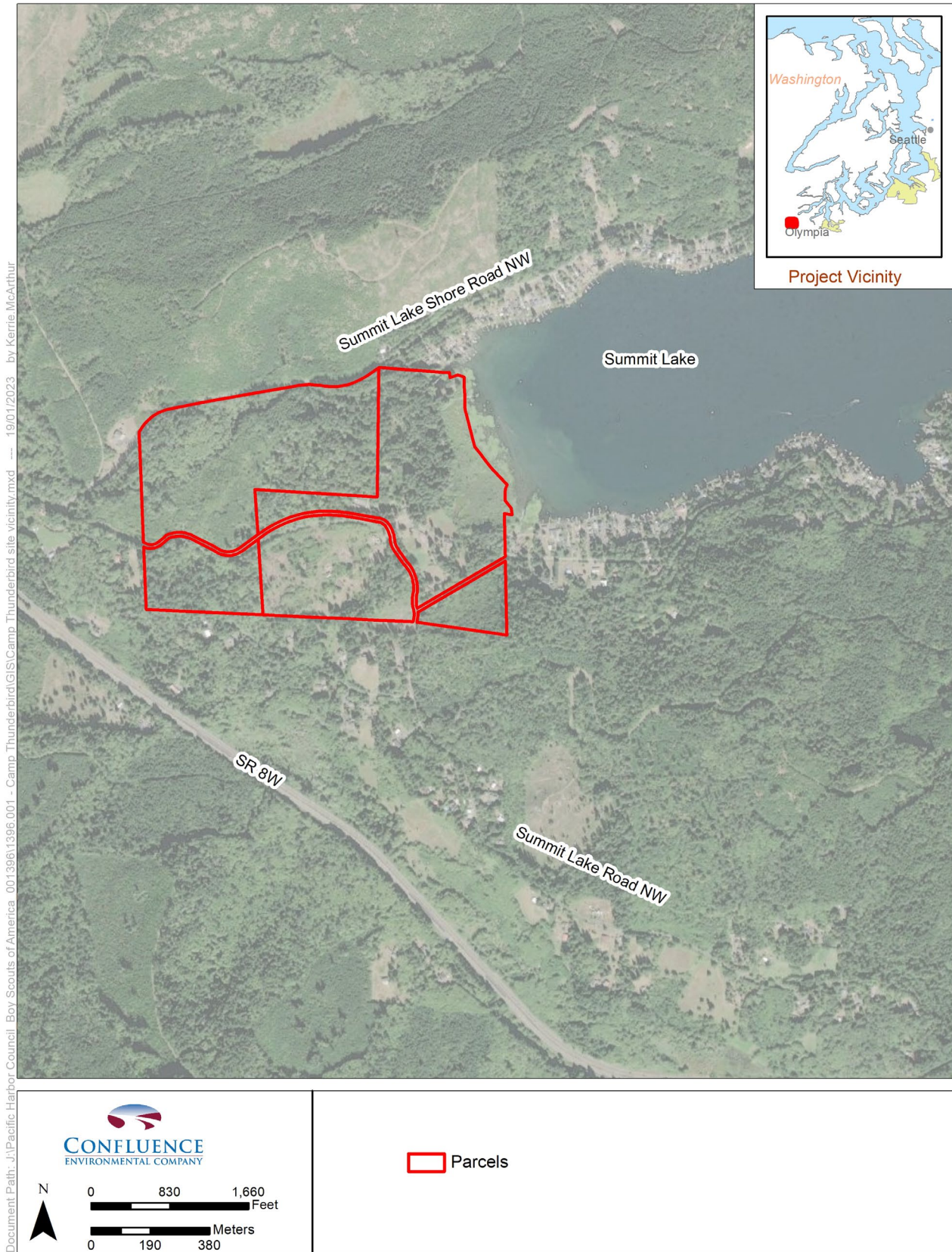


Figure 1. Site vicinity

2.0 BACKGROUND

Camp Thunderbird, PHC's premier campground, has been in operation since the mid-1940s. Camp Thunderbird offers an array of camping options, multiple classrooms, a swimming area, a boating area, waterfront, shooting ranges, a first-class outdoor chapel, a campfire bowl, and more.

A robust aquatics program is foundational in the success of any scout camp. In 1946, the Corps excavated a swim pond at the campground, and in the mid-1960s, the Corps expanded the swim pond and added a boating area for the campground where an existing dock is located. The swim pond and boating area continually fill in with soft, fine sediments and aquatic vegetation and therefore have to be routinely dredged to maintain adequate swimming and boating depths. Campers can also swim or boat from an old and failing dock at the lake edge, southeast of the excavated pond. However, that area and the adjacent shoreline between the dock and the old swim pond are also periodically overgrown with aquatic and wet-tolerant vegetation, and the dock is becoming increasingly unsafe.

Additionally, the vegetation adjacent to the shoreline in the vicinity of the docks in the swim pond and Summit Lake are maintained to provide safe access to the docks.

3.0 EXISTING SITE CONDITIONS

A Critical Areas Report was prepared for the project by SCJ Alliance (SCJ 2022). A detailed description of the existing conditions of the site, especially details about Summit Lake, Kennedy Creek, and on-site wetlands are discussed in the Critical Areas Report. In summary, the site is predominantly forested acreage with well-maintained trails and campsites interspersed among wetlands of varying sizes (Figures 2 and 3). Kennedy Creek runs west along the northern edge of the site, while the eastern boundary of the site is Summit Lake.

Located at the eastern property boundary, Summit Lake is a designated shoreline of the State and is regulated under the Thurston County Shoreline Master Program (SMP). According to information provided by the applicant, the northern onsite portion of Summit Lake's shoreline is an earthen berm historically constructed by the Corps from spoils excavated during creation of the existing swim pond to allow lake access from the camp.

The berm is mostly mowed grass with a narrow strip of shrubby wetland vegetation at the lake edge. The lake surface directly east of the berm is seasonally dominated by the nonnative, invasive water lily (*Nymphaea odorata*). The old and degrading boat dock is located to the south, extending more than 100 feet into the lake from the lakeshore. It is also seasonally surrounded by the invasive water lily as the water is relatively shallow in this area.

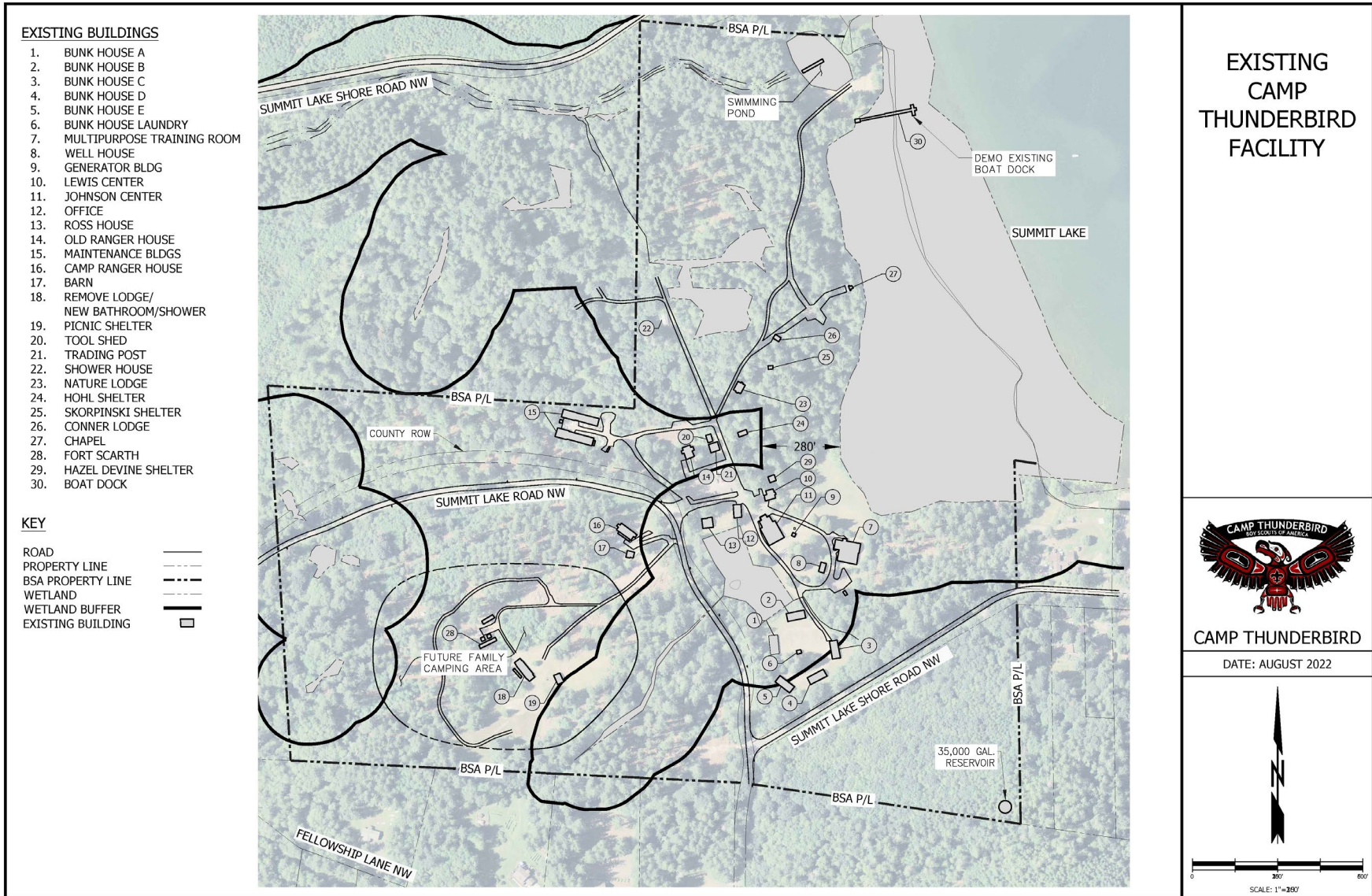


Figure 2. Existing site conditions: buildings and facilities

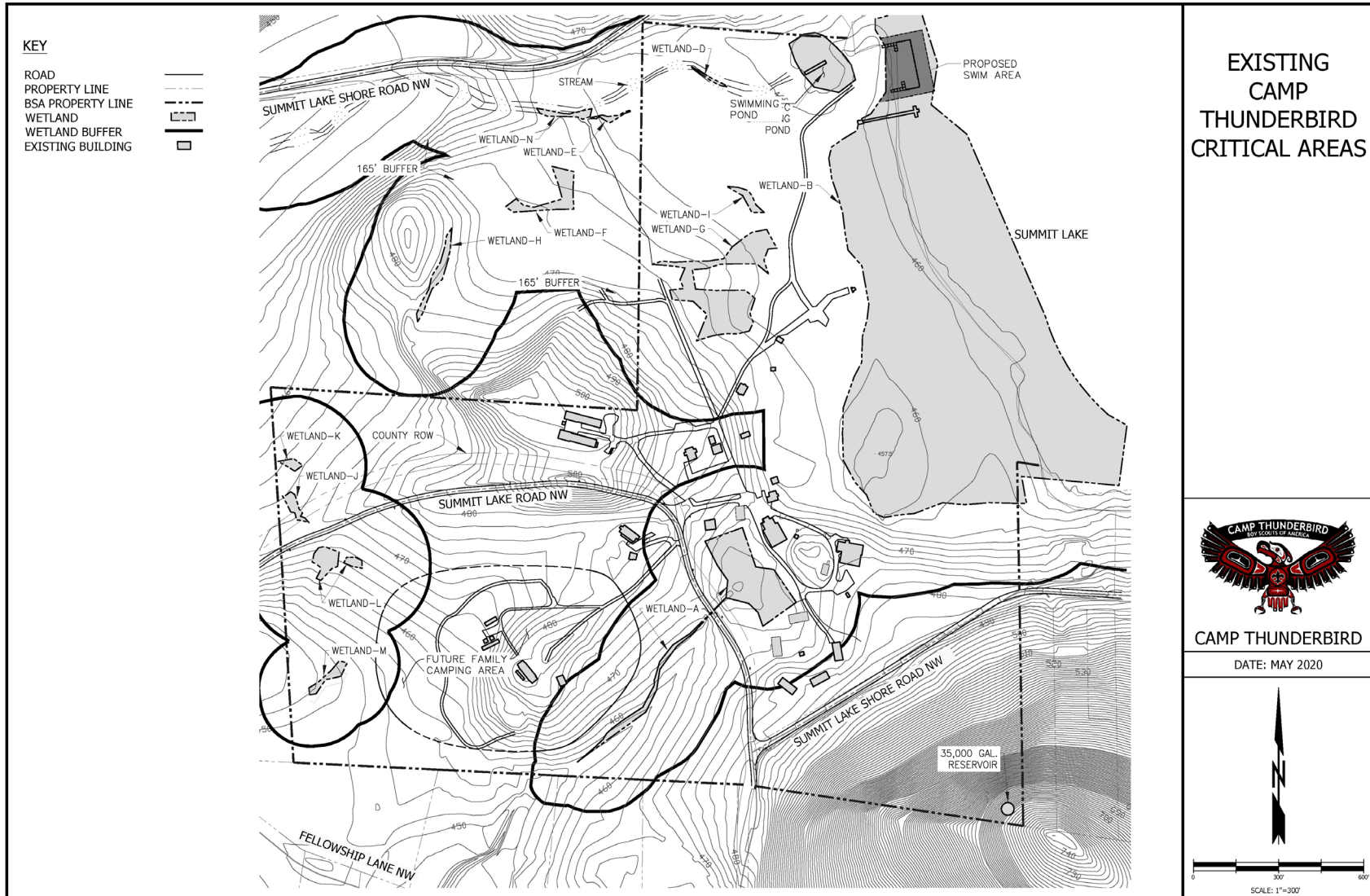


Figure 3. Existing site conditions: critical areas

Water from Summit Lake flows past this berm into the swim pond on the opposite side of the berm and then continues flowing west as Kennedy Creek, a Type F stream. A dammed overflow structure located on the south side of Kennedy Creek, directly downstream from the outlet of Summit Lake, sets the lake elevation and outflow to Kennedy Creek. This overflow structure needs to be retained, maintained, and operated, as mandated by Thurston County.

The southern shoreline area is the most cleared and permanently developed area of the camp. It includes several buildings (the ranger cabin, staff cabins, camp office, an event space, a ranger station, and bathrooms), an assembly field that extends to the ordinary high water mark of Summit Lake, and a mowed field between buildings that includes a highly disturbed wetland.

Kennedy Creek runs along the northern property boundary. The creek and associated riparian buffer are regulated under the Thurston County Critical Areas Ordinance (TCC 24.25) as a Fish and Wildlife Habitat Conservation Area. Several other drainage features were identified across the property, which may be classified as Type Ns streams. Upland forested vegetation communities are characteristic of second growth forests in the region. The overstory was dominated by Douglas-fir (*Pseudotsuga menziesii*) and interspersed with big-leaf maple (*Acer macrophyllum*) and red alder (*Alnus rubra*), with a well-developed understory that varied across the property, containing dense salal (*Gaultheria shallon*) in some areas and Indian plum (*Oemleria cerasiformis*), salmonberry (*Rubus spectabilis*), and sword fern (*Polystichum munitum*) in others. Based on historical aerials, it appears that forests on the property have not been logged since before 1951, an observation supported by the maturity of the forests and forest understories onsite. A series of existing gravel and wood chip roads and pathways are located throughout the site.

Wetland vegetation included a wide array of native species and varied across the property. In general, presence of invasive or noxious weed species was low in the wetlands, and species diversity throughout the site was high. Only 2 out of 14 wetlands were significantly disturbed and contained abundant non-natives such as pasture grasses and invasives such as reed canarygrass (*Phalaris arundinacea*) and knotweed (*Polygonum* sp.).

Within Camp Thunderbird property, there are 14 wetlands regulated under the Thurston County Critical Areas Ordinance (TCC 24.30) (Figure 3). Table 1 summarizes the wetlands delineated on-site.

Table 1. Summary of wetlands characteristics

Name	Area (square feet)	Hydrogeomorphic Classification	Cowardin Classification ¹	Category	Habitat Rating ²	Standard Buffer (feet)
WL-A	55,369	Depressional	PSS/PEM	III	HML	220
WL-B	1,053,696	Lacustrine	PFO/PSS/PEM/PAB	I	MHH	280
WL-C	30,463	Lacustrine / Depressional	PEM/PAB	III	HHL	260
WL-D	888	Riverine	RSS/REM	II	HML	220
WL-E	1,461	Riverine / Depressional	PSS	II	HHL	260
WL-F	12,625	Depressional	PSS/PEM	II	HMM	280
WL-G	54,960	Depressional	PSS/PEM	II	HMM	280
WL-H	6,855	Depressional	PSS	III	HHL	260
WL-I	3,049	Depressional	PSS/PEM	III	HHL	260
WL-J	3,361	Depressional	PSS/PEM	III	HMM	240
WL-K	1,896	Depressional	PSS	III	HML	220
WL-L	8,513	Depressional	PFO/PSS	II	HMM	240
WL-M	4,071	Depressional	PEM	III	HLL	180
WL-N	733	Riverine	PSS	II	HML	220

¹ PAB = Palustrine Aquatic Bed, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub-Shrub, REM = Riverine Emergent, RSS = Riverine Scrub-Shrub

² H = High, M = Medium, L = Low

4.0 PROJECT DESCRIPTION

The proposed camp redevelopment includes a new dining hall; upgraded bathroom and shower room facilities across the campground; improved campsites; a new climbing tower; a new water reservoir; and a new swimming, lifesaving, and boating area in Summit Lake. All buildings and facilities except the new swimming, lifesaving, and boating area and an adjacent bathroom and shower facility have been sited outside of critical areas and their buffers (Figure 4).

Most of the camp redevelopment will occur either at existing structures or outside of critical areas or buffers. Campsite improvements are located at existing campsites scattered throughout the property and will include the use of 4-8 person mini-dak tents instead of traditional tents to provide better camping conditions. Like traditional tents, mini-dak tents are not permanent structures. Since mini-dak tents will be placed at existing campsites and no additional clearing is needed, there is no change in use of the area. The new climbing tower and water reservoir are located outside of buffers. Upgraded bathroom and shower facilities will occur where existing facilities exist, therefore there will be no impact to critical areas or buffers. The exception to this is the upgraded bathroom and shower facility by the new swim area, which would be located within the wetland buffer. Existing roads and paths within critical areas and buffers are well maintained and wide enough for emergency and maintenance vehicles, therefore no new access routes within critical areas or buffers are needed. Therefore, these improvements will not have impacts to critical areas or buffers.

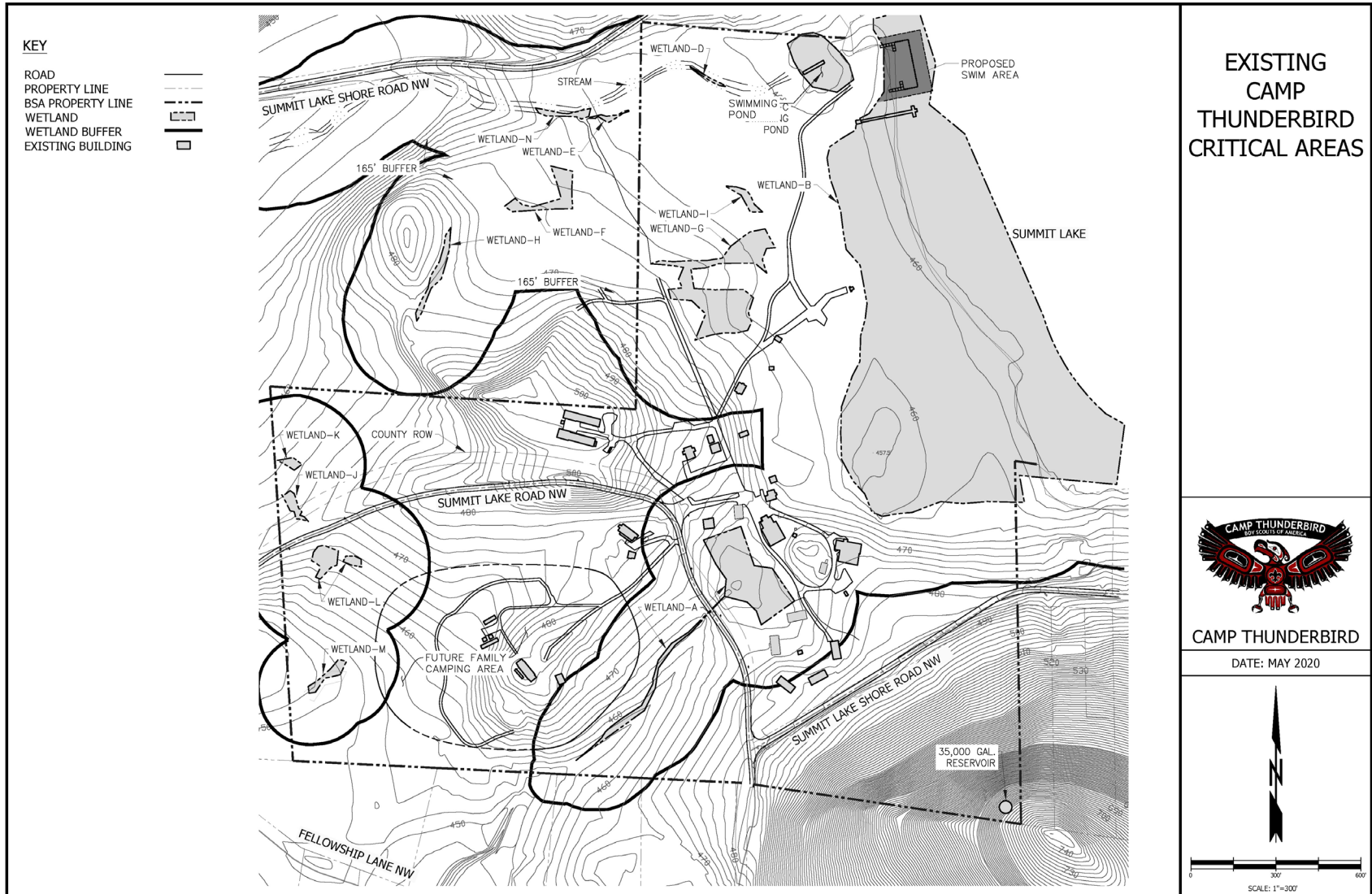


Figure 4. Proposed development

The proposed upgrades also include the development of a new septic system. Currently, there are multiple septic systems across the campground, including existing drainfields located within wetland buffers. The new septic system will abandon all existing drainfields and construct a new, larger drainfield outside of any buffers. The new sewer lines will be placed within existing roadways and paths.

A major component of the proposed upgrades is the new swimming, lifesaving, and boating area. This will consist of a new swim area with two flanking swim docks and shoreline bank access at the edge of the lake, east of the existing swim pond and north of the existing dock on Summit Lake. As part of the project, the old swim pond beside Kennedy Creek will be abandoned but retained as wetland, and the existing docks in the old swim pond and lake will be removed.

5.0 MITIGATION SEQUENCING

As required by TCC 24.35.015, the project has gone through several site layout designs to avoid impacts to critical areas and their buffers. These have included the following changes:

- Relocating all buildings except for the swimming, lifesaving, and boating area bathroom/shower facility to be outside of critical areas and buffers.
- Keeping all new septic lines within the footprint of existing roads and pathways.

Due to the need for water dependent uses (i.e., swimming, lifesaving, and boating area) and the location of the existing lacustrine wetland (WL-B), impacts to wetlands cannot be avoided. If the camp is to retain its swim program, it must either improve and maintain the existing swim pond and lakeshore recreation areas or replace them with a new swimming, lifesaving, and boating area. A new swimming, lifesaving, and boating area has been designed to reduce overall impacts to the wetlands and lakeshore. If the existing swim pond and lakeshore recreation areas are retained, maintenance impacts to the existing swim pond and lakeshore would be allowed to continue.

The wetlands along the western edge of Summit Lake (defining the eastern edge of Camp Thunderbird) include a rich, relatively untouched, diverse Category 1 lacustrine system. However, the lacustrine system is impacted at its northern end by existing swimming and lakeshore recreation infrastructure near the Summit Lake outlet to Kennedy Creek, which has been at that location for decades.

During the planning period for this project, discussions were centered around how to best manage the waterfront swimming and lakeshore access, which is needed to support a first class youth camp. The team chose the new swimming, lifesaving, and boating area location to concentrate water recreational impacts to one area; to eliminate further use of the old, degraded

swim pond (which will be abandoned and converted to wetland conditions); and to take advantage of existing access infrastructure (roads and trails) associated with this part of the lakeshore. The highly valued lacustrine wetlands to the south were deemed a key feature for environmental education, and for that reason, it was decided that the more pristine wetland areas farther south from the outlet to Kennedy Creek were to be avoided. Instead, all proposed impacts will be concentrated in the already impacted water access areas at the northern end. The new and improved swimming, lifesaving, and boating area will be sited between the two existing swimming and recreation access areas (the existing swim pond at Kennedy Creek and the old dock in Summit Lake), combining the functions of those 2 facilities into 1.

The new swimming, lifesaving, and boating area is at the edge of Summit Lake near the Kennedy Creek outlet, adjacent to the existing berm that was constructed by the Corps in the 1960s. The design team looked in detail at the minimum requirements for the range of BSA aquatic activity merit badges (e.g., swimming, lifesaving, rowing) to ensure impacts to the wetlands, creek, and lakeshore from these activities were concentrated and minimized. The new proposed swimming area will include docks at both sides set at the minimum distance apart for successful completion of required swim tests. Limited dredging in the swimming area and directly adjacent to the docks will be needed for safe watercraft access and related swimming activities. Because youth will be required to get out of swamped watercrafts and right and re-enter them, lake bottom sediments and associated aquatic bed vegetation will need to be periodically cleared and dredged to reduce the safety hazard that occurs when trying to right a boat or swim in thick sediment or vegetation. The swim area design identifies a minimum area between and adjacent to the docks that will need to be dredged periodically, allowing for the youth to safely perform these merit badge swimming and boating exercises. The dredging will also serve to increase water depth enough to minimize potential for future seasonal impacts in the swimming and boating area from the invasive water lily. Proposed maintenance dredging at the new swimming area will be similar to current periodic maintenance necessary in the existing swim pond and dock areas but will impact less wetland and lake area overall than the current maintenance.

While the entire shoreline wetland at the west end of Summit Lake is regulated and rated as a single Category I wetland system, taken by itself, the wetland area in the immediate vicinity of the proposed new swimming, lifesaving, and boating area is more impacted from past permitted dredging and related lakeshore recreation activities and thus has lower functions and values than the pristine majority of the wetland to the south. Siting the new swimming facility in this already impacted shoreline area, in concert with abandonment of the old swimming area and both old docks is intended to decrease overall impacts from BSA merit badge water recreation in this area and to increase functions and values of the previously impacted lacustrine wetland between the new facility and the higher quality wetland areas to the south as well as the old swim pond to the west.

The new swimming, lifesaving, and boating area will impact less wetland area than the existing facilities. While careful site design has avoided and minimized impacts to critical areas, the project cannot avoid all impacts because of the locations of wetlands and associated buffers. Section 6.0, below, describes the unavoidable impacts.

6.0 IMPACT ANALYSIS

Due to the location of critical areas and their associated buffers, impacts from the proposed capital project cannot be avoided. The impacts, summarized in Table 2 and shown on Figure 5, are discussed in detail in the following sections.

Table 2. Summary of impacts to critical areas

Impact	Wetland ID	Impact Area (square feet)
Dredging of aquatic bed habitat to create new swimming, lifesaving, and boating area at Summit Lake	WL-B	23,959
Removal of emergent/scrub-shrub habitat at new swimming, lifesaving, and boating area at Summit Lake	WL-B	1,237
Overwater coverage (new dock in Summit Lake)	WL-B	1,400
Wetland buffer impacts from new bathroom and shower building	WL-B/WL-C Overlapping Buffer	1,892

6.1 Wetland Impacts

Three types of impacts to WL-B would occur from the creation of the new swimming, lifesaving, and boating area: dredging of aquatic bed habitat, removal of emergent/scrub-shrub habitat, and overwater coverage.

6.1.1 Dredging of Aquatic Bed Habitat to Non-vegetated Habitat

Creation of the new swimming, lifesaving, and boating area will require the removal of all aquatic vegetation between and around the new docks within a 23,959-square-foot area. Removal of the aquatic vegetation is necessary to provide a safe swimming and boating environment.

Aquatic vegetation will be removed using a suction dredge. Dredging will remove recently deposited fine sediment and plant material and will increase water depths to greater than 6 feet in some areas. Dredging will not remove the consolidated lakebed material that underlies the recently deposited fine sediment deposits. The dredged material will be dewatered in a nearby upland area and the dirt then spread in an upland area, outside of wetland buffer.

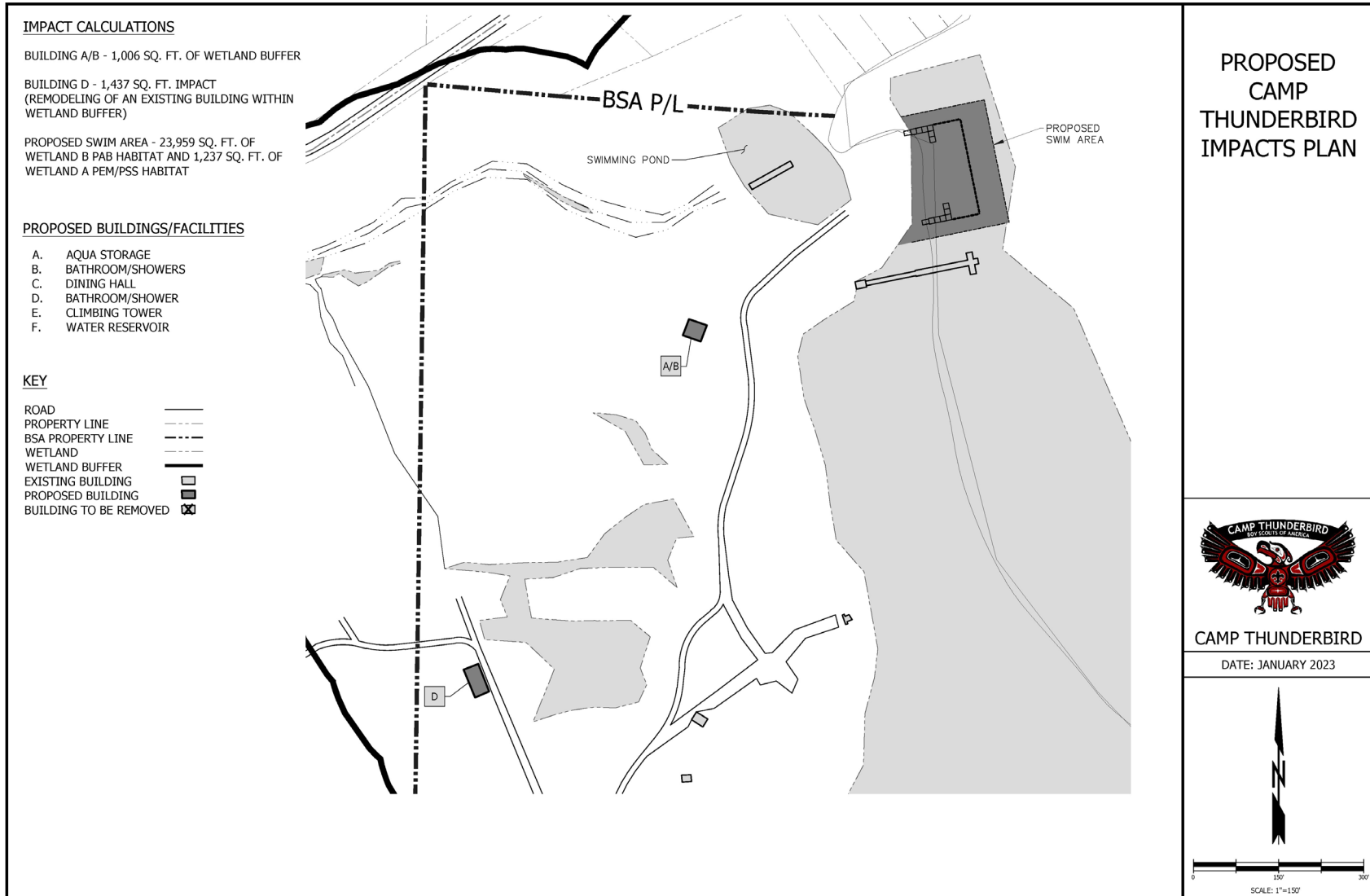


Figure 5. Proposed impacts

6.1.2 Removal of Emergent/Scrub-Shrub Habitat

Removal of emergent and scrub-shrub habitat is necessary for the new dock landings and to allow safe access from the docks and beach into the water. Approximately 1,237 square feet of emergent and scrub-shrub wetland vegetation will be removed and replaced with grasses that will be maintained (mowed). Configuration and dimensions of the new dock are in Appendix A.

6.1.3 Overwater Coverage

As stated above, Summit Lake is a designated shoreline of the State and is regulated under the Thurston County SMP. The construction and use of the new dock is an allowed use under the SMP. The proposed project will result in 1,400 square feet of new overwater coverage. Configuration and dimensions of the new dock are in Appendix A.

6.2 Wetland Buffer Impacts

Due to the need for bathroom and showers facilities adjacent to the proposed swimming, lifesaving, and boating area and the location of WL-B, impacts to wetland buffer cannot be avoided. The bathroom and shower building will be 23 feet by 22 feet with a 10-foot cleared perimeter around the building for maintenance access. The building and surrounding 10-foot cleared area will impact 1,892 square feet of wetland buffer.

7.0 PROPOSED MITIGATION

To compensate for unavoidable impacts, the following mitigation plan is proposed. This mitigation plan followed mitigation guidance provided by Ecology and Thurston County through numerous meetings and site visits. Proposed wetland mitigation meets or exceeds the recommended wetland mitigation ratios (Ecology et al. 2021).

7.1 Overview

A combination of wetland protection, creation, and enhancement is proposed, as summarized in Table 3. Locations of mitigation areas are shown on Figure 6.

Table 3. Summary of proposed mitigation

Plan Element	Wetland ID	Impact	Mitigation				
			Type	Goal ^{1,2}	Achieved	Area (square feet)	Description
Dredging of aquatic bed habitat	WL-B	23,959 sq ft (18.75 acre-points)	Protection	18.75 acre-points	22.82 acre-points	397,572	Preservation of WL-B. Put WL-B in a protective covenant to prevent future development
Removal of emergent/ scrub-shrub habitat	WL-B	1,237 sq ft	Creation	1:1	1.24:1	890	Creation at WL-B. Remove earthen ramp and existing buffer area adjacent to ramp in WL-B. Wetland hydrology is controlled by lake levels, so creation will be successful.
						644	Creation at WL-C. Excavate (widen) around edge of WL-C. Wetland hydrology is controlled by lake levels, so creation will be successful.
			Enhancement	12:1	12:1	4,044	Enhancement of WL-A. WL-A enhancement through removal of reed canarygrass and planting native scrub-shrub/forested plants.
						800	Enhancement of WL-B. WL-B emergent/scrub-shrub enhancement through removal of old swim dock and natural recruitment of native emergent/scrub-shrub plants.
						10,000	Enhancement of WL-C. WL-C enhancement through stopping of dredging, removal of invasives, and planting of native emergent/scrub-shrub plants.
Overwater coverage	WL-B	1,400 sq ft	Enhancement	1:1	2.3:1	3,225	Removal of existing docks. The project will result in a net decrease in overwater coverage. Removal of the existing docks at WL-B will result in a net decrease of 2,175 square feet, and removal of the existing docks at WL-C will result in a net decrease of 1,050 square feet.
Wetland buffer impacts	WL-B/ WL-C Buffer	1,892 sq ft	Enhancement	1:1	2.35:1	4,447	Enhance existing, herbaceous buffers. Preventing vehicle access and planting native woody vegetation in the WL-B buffer (3,200 square feet) and WL-C buffer (1,247 square feet) will improve function.
Additional benefit ³	—	—	Enhancement	—	—	40,956	Enhancement of WL-A. Enhancement through removal of reed canarygrass and planting native scrub-shrub/forested plants.
Additional benefit ³	—	—	Enhancement	—	—	1,550	Enhancement of WL-B aquatic bed habitat. WL-B aquatic bed enhancement through removal of old swim dock and natural recruitment of native aquatic bed plants.

¹ Ecology et al. (2021); TCC 24.30.080

² As required by Ecology et al. (2021), the credit-debit method was used to calculate acre-points for preservation only mitigation. Appendix B contains the credit-debit worksheets/calculations.

³ Enhancement of WL-A and WL-B is in addition to mitigation required under TCC 24.30.080 to address project impacts.

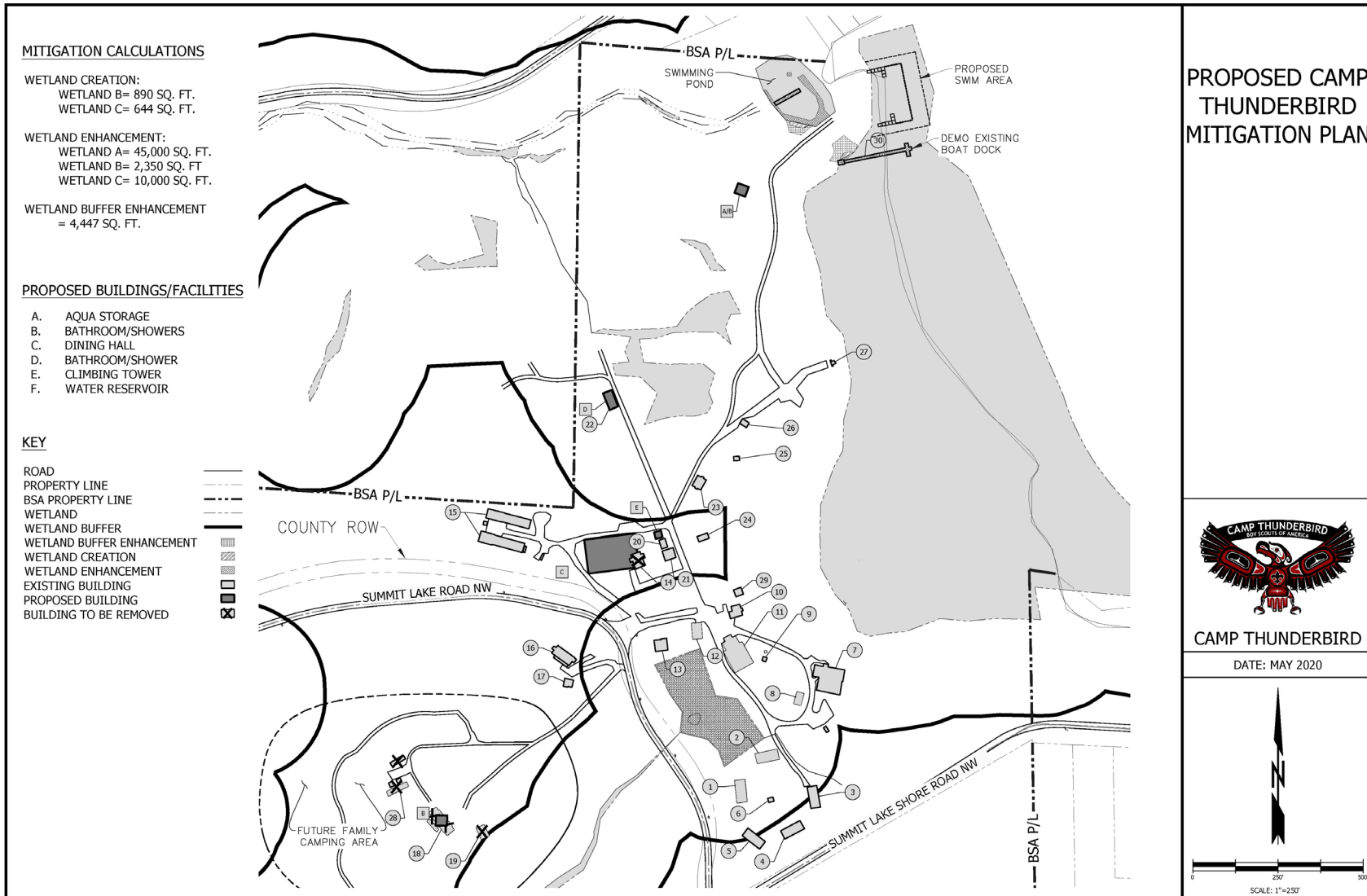


Figure 6. Proposed mitigation areas

7.1.1 Mitigation for Dredging of Aquatic Bed Habitat

To compensate for impacts to 23,959 square feet of aquatic bed habitat within WL-B, wetland preservation is proposed. Specifically, 397,572 square feet (9.127 acres) of WL-B—outside of the swimming, lifesaving, and boating area—will be permanently preserved by placing it within a protective covenant protecting it from future development and fragmentation (see Section 7.2.3, below). As required in Ecology’s mitigation guidance document (Ecology et al. 2021), the credit-debit method was used to determine the amount of preservation area needed for mitigation. Using the credit-debit method to determine mitigation needs is allowed under TCC 24.30.080.D. The credit-debit worksheets for preservation only were completed (Appendix B). The aquatic bed impacts result in a debit of 18.75 acre-points, and the proposed preservation of WL-B results in a credit of 22.82 acre-points.

7.1.2 Mitigation for Removal of Emergent/Scrub-Shrub Habitat

To compensate for the loss of 1,237 square feet of emergent and scrub-shrub vegetation within WL-B from the new swimming, lifesaving, and boating area, a combination of wetland creation and wetland enhancement is proposed, as allowed in TCC 24.30.080, Table 24.30-3. In TCC 24.30.080, use of a combination of creation and enhancement requires a mitigation ratio of 1:1 for creation and 12:1 for enhancement.

A total of 1,534 square feet (1.24:1 ratio) of wetland will be created. Specifically, 890 square feet of fill will be removed from Wetland B in the vicinity of the existing dock. Some of this fill is the earthen ramp that connects the existing dock to land. An additional 644 square feet of wetland will be created through the removal of upland soils adjacent to Wetland C.

Enhancement of 14,844 square feet (a 12:1 ratio) is proposed in WL-A, WL-B, and WL-C. Wetland enhancement of 4,044 square feet of WL-A would occur through planting native woody species (see Section 7.3 for details on the planting plan). Wetland enhancement of WL-B would occur through the removal of the existing swim dock. Removal of the existing swim dock will enhance 800 square feet of emergent and scrub-shrub habitat by removing overwater coverage and allowing natural recruitment of native aquatic bed vegetation. Wetland enhancement of 10,000 square feet of WL-C would occur through the removal of the existing swim dock and through removing invasive species, such as invasive lily pad and yellow flag iris (*Iris pseudacorus*) and planting these areas and currently unvegetated areas with native emergent and scrub-shrub vegetation.

7.1.3 Mitigation for New Overwater Coverage

To compensate for 1,400 square feet of new overwater coverage, existing docks, totaling 3,225 square feet, will be removed. This results in a mitigation ratio of 2.3:1 and a net decrease of 1,825 square feet of overwater coverage.

7.1.4 Mitigation for Wetland Buffer Impacts

To compensate for 1,892 square feet of impacts to wetland buffer, 4,447 square feet of wetland buffer will be enhanced by planting native woody vegetation in existing buffer areas currently dominated by herbaceous vegetation (i.e., lacking woody vegetation). This results in a mitigation ratio of 2.35:1, which is greater than the 1:1 ratio identified in TCC 24.30.080.A. See Section 7.3 for details of the planting plan.

7.1.5 Additional Proposed Enhancement

In addition to the mitigation described above for specific project impacts, enhancing a total of 42,506 square feet of WL-A and WL-B is proposed: 40,956 square feet in WL-A and 1,550 square feet in WL-B.

A total of 45,000 square feet of WL-A will be enhanced through planting native woody species (see Section 7.3 for details on the planting plan). Of this total, 4,044 square feet is applied to the removal of emergent/scrub-shrub habitat and the remaining 40,956 is included as additional benefit. Enhancement of WL-B will occur in the vicinity of the new swimming, lifesaving, and boating area through the removal of the existing swim dock. Removal of the existing swim dock will enhance 1,550 square feet of aquatic bed habitat by removing overwater coverage and allowing natural recruitment of native aquatic bed vegetation.

The enhancement in WL-A and WL-B was originally discussed as mitigation for dredging of aquatic bed habitat before Ecology suggested that preservation of WL-B would be an appropriate mitigation for this impact. The enhancement is still included in this mitigation plan although it is not required to meet mitigation requirements for project impacts. During the earlier discussions with Ecology and the County on mitigation design development, it was agreed that a reduced mitigation ratio of 1:1 wetland enhancement was appropriate for the partial loss of some functions of the aquatic bed portion of WL-B resulting from dredging the new swimming, lifesaving, and boating area. A reduced mitigation ratio was agreed upon because dredging of the aquatic bed habitat within WL-B will not result in the elimination of all functions of the wetland. Since the mitigation ratios presented in TCC 24.03.080 are intended for elimination of all wetland functions (e.g., filling of wetlands), it was appropriate to reduce the required mitigation ratio for partial impacts. The proposed enhancement of 42,506 square feet of WL-A and WL-B would have resulted in a ratio of 1.8:1, exceeding the recommendation. Although preservation of WL-B was chosen instead of enhancement to address the aquatic bed impact, this enhancement is still included in the plan to provide additional ecological benefits.

7.2 Mitigation Design

7.2.1 Wetland Creation

A total of 1,534 square feet of wetland creation is proposed. Wetland creation will be accomplished through the removal of old fill and upland soils adjacent to WL-B and WL-C. A total of 142 cubic yards of fill and soil will be excavated (82.4 cubic yards adjacent to Wetland B and 59.6 cubic yards adjacent to Wetland C). The grading plans for the proposed wetland creation are provided in Appendix A. The wetland creation area will be planted with native vegetation (see Section 7.3).

7.2.2 Wetland Enhancement

A total of 60,575 square feet of wetland enhancement is proposed. Wetland enhancement will occur in WL-A, WL-B, and WL-C.

WL-A will be enhanced through the removal of reed canarygrass and installation of native woody species (see Section 7.3).

WL-B will be enhanced by the removal of the existing dock and allowing the native vegetation to colonize. Natural colonization is proposed because the areas adjacent to the dock consist of robust, native vegetation. However, this mitigation plan has contingency measures in place so that if natural colonization is not successful, then the areas will be planted (see Section 8.0).

WL-C will be enhanced through the removal of the existing dock, the cessation of dredging in the wetland, removal of invasive lily pad and yellow flag iris, and the installation of native plants (see Section 7.3).

The removal of existing dock in WL-B and WL-C will result in a net decrease in overwater coverage of 1,825 square feet, thus, improving fish habitat.

7.2.3 Wetland Preservation

The BSA may need to sell assets to pay claimants from a class action lawsuit against the BSA. Between the lawsuit settlement, COVID, and declining scouting membership in some areas, without the upgrades to Camp Thunderbird to provide the state-of-the-art facility, the camp could be at risk of being sold. Selling the campground would likely result in proposed development of the site, whether as a park or housing development. In any case, any future development of the property would likely include public access (e.g., trail system and docks) to Summit Lake. Public access to the lake is not only allowed but is a goal under the Thurston County Shoreline Management Plan.

As part of the mitigation plan, a total of 9.127 acres of Category I wetland (WL-B outside of the swimming, lifesaving, and boating area) will be permanently protected from future development. Outside of the proposed swimming, lifesaving, and boating area footprint, WL-B

is a highly functioning wetland that meets several of the features critical to the health and ecological sustainability of the watershed: WL-B is a Category I wetland that provides aquatic habitat that is rare in Summit Lake (i.e., much of the lake is developed); it provides habitat for juvenile salmonids; it is a large wetland complex with a high diversity of plant species (forested, scrub-shrub, emergent, and aquatic bed); and it is contiguous with Summit Lake. Preservation of WL-B would prevent future development of the shoreline.

As required by Ecology et al. (2021), a credit-debit worksheet was completed to calculate the debits associated with impacts to WL-B and the credits gained from preserving the remaining undisturbed portion of WL-B (Appendix B). In calculating credits and debits, calculations were separated into the aquatic bed impact area and the emergent/scrub-shrub/forested preservation area. The credit-debit worksheets are in Appendix B. In summary, 23,959 square feet of aquatic bed impacts to WL-B associated with the new swimming, lifesaving, and boating area results in a debit of 18.75 acre-points, and the preservation of 9.127 acres of WL-B results in a credit of 22.82 acre-points. The preservation area includes a 150-foot buffer around the wetland. The buffer does not extend into Lake Summit because that area is owned and protected by Thurston County. Figure 7 shows the location of the preservation area and associated buffer.

7.2.4 Wetland Buffer Enhancement

A total of 4,447 square feet of wetland buffer currently lawn will be enhanced through planting of native woody vegetation (see Section 7.3).

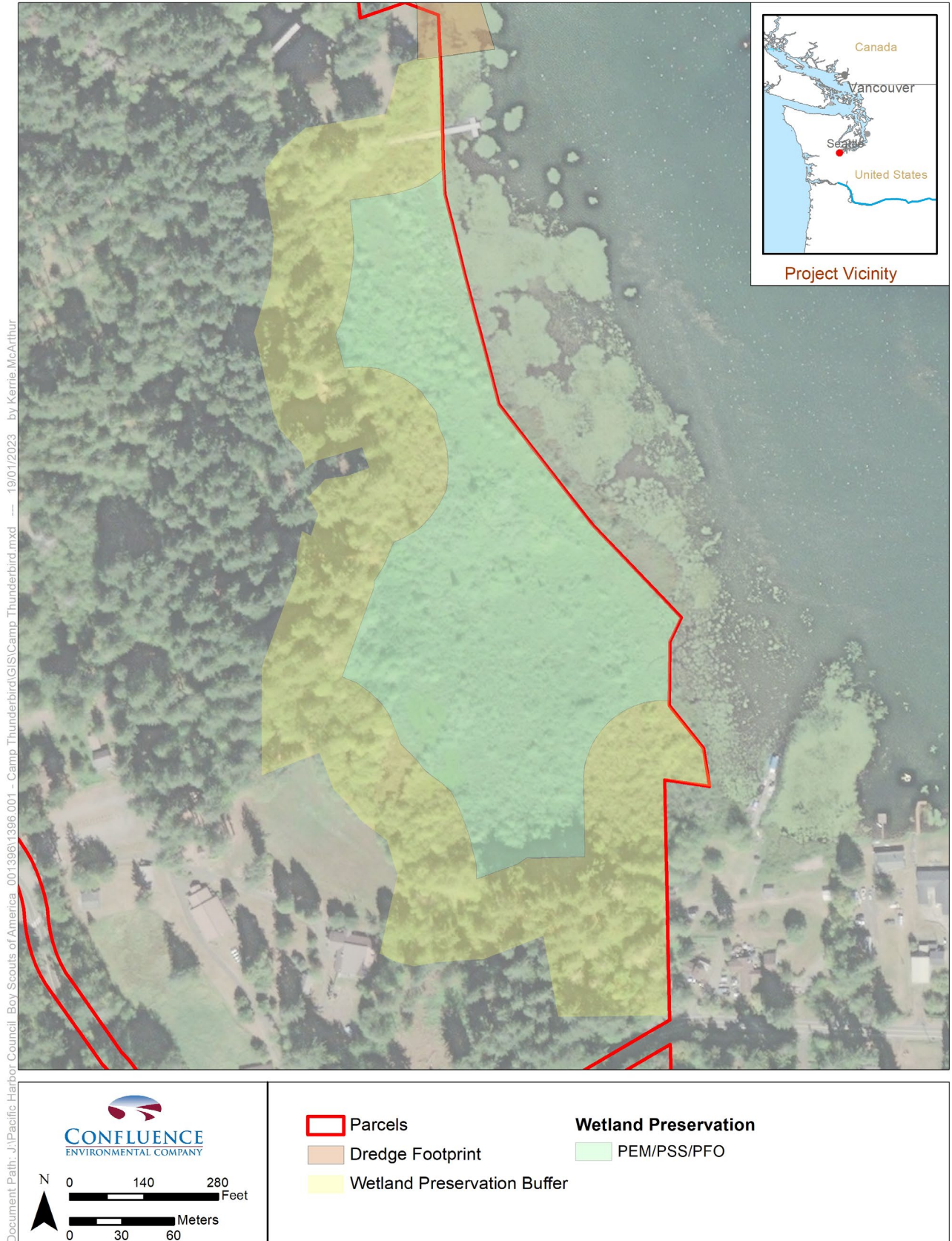


Figure 7. Proposed wetland preservation area

7.3 Planting Plan

Native plants are proposed to be installed within WL-A, WL-B, WL-C, and the wetland buffer between WL-B and WL-C. Table 4 summarizes the planting plan.

Table 4. Proposed species and densities to be planted

Common Name	Scientific Name	Container/Plant Size	Spacing (feet on center)	Quantity ¹	Wildlife Benefit ²
WL-A (45,000 square feet)					
Hooker willow	<i>Salix hookeriana</i>	live stake	4	800	Buds are eaten by birds and small mammals. Small mammals also eat bark. Provides nesting habitat for birds and mammals.
Oregon ash	<i>Fraxinus latifolia</i>	5 gallon	4	412	The winged seeds of Oregon ash are eaten by birds and small mammals. The foliage is food for butterfly larvae and may be consumed by passing browsers.
Pacific willow	<i>Salix lucida</i>	live stake	4	800	Fruits are eaten by birds. Provides nesting and habitat for song birds. Provides pollen for pollinating insects and birds.
Red-osier dogwood	<i>Cornus sericea</i> (<i>Cornus stolonifera</i>)	live stake	4	800	Fruit is eaten by birds and mammals. Pollinators collect nectar from flowers.
Total				2,812	
WL-C (10,644 square feet)					
Hardstem bulrush	<i>Schoenoplectus acutus</i>	4-inch	3	262	Waterfowl and wetland birds eat the seeds and use the thick stands for nesting. Muskrats build their shelters out of the stems and will eat the young shoots and roots.
Hooker willow	<i>Salix hookeriana</i>	live stake	4	220	Buds are eaten by birds and small mammals. Small mammals also eat bark. Provides nesting habitat for birds and mammals.
Pacific willow	<i>Salix lucida</i>	live stake	4	220	Fruits are eaten by birds. Provides nesting and habitat for song birds. Provides pollen for pollinating insects and birds.
Red-osier dogwood	<i>Cornus sericea</i> (<i>Cornus stolonifera</i>)	live stake	4	220	Fruit is eaten by birds and mammals. Pollinators collect nectar from flowers.
Skunk-cabbage	<i>Lysichiton americanus</i>	4-inch	3	262	Provides forage for deer, elk, and bear. Insects use spike structure for food and as a mating site.
Total				1,183	

Common Name	Scientific Name	Container/Plant Size	Spacing (feet on center)	Quantity ¹	Wildlife Benefit ²
Wetland Buffer (4,447 square feet)					
Black twinberry	<i>Lonicera involucrata</i>	1-gallon	4	62	Fruits are eaten by various herbivores and upland game birds. Leaves and twigs are eaten by browsers. Provides nesting habitat for song birds.
Nootka rose	<i>Rosa nutkana</i>	1-gallon	4	62	Fruits are eaten by herbivores and birds, and thickets provide nesting and escape habitat for song birds.
Red flowering currant	<i>Ribes sanguineum</i>	1-gallon	4	62	Leaves are browsed by herbivores, and the fruits are eaten by a wide variety of wildlife species.
Salmonberry	<i>Rubus spectabilis</i>	1-gallon	4	62	Fruit is eaten by a variety of wildlife and bird species.
Western red-cedar	<i>Thuja plicata</i>	1-gallon	12	30	Snags are valuable habitat for cavity nesting birds. Provides cover for several wildlife species. The seeds, twigs, and foliage are eaten by wildlife. Small mammals use cavities for dens.
Total				278	

¹ Total plant quantities based on square spacing

² Bressette (2019); Cooke (1997); SAS (U.D.); Stark (2018); Stuart and Sawyer (2001); USDA (2008); NRCS (2018); WNPS (2007)

7.4 Schedule

Construction of the wetland creation and enhancement areas will occur following receipt of all permits and will be completed within 180 days of when impacts occur.

7.5 Cost Estimate and Financial Guarantee

TCC 24.020 requires that a performance or maintenance security is required in the amount estimated by the director of public works as sufficient to cover the costs of the developer’s failure to comply with the agreements provided for by Section 18.24.010, including all related engineering and incidental expenses, final survey monumentation and certified original reproducible mylar as constructed improvement plans. To assist in determining the amount of the financial security, the King County Critical Areas Bond worksheet was used. The worksheet is in Appendix C.

8.0 GOALS, OBJECTIVES, PERFORMANCE STANDARDS AND CONTINGENCIES

The goals of this mitigation plan are to do the following:

- Create 1,534 square feet of emergent and scrub-shrub wetland, dominated by native vegetation.
- Enhance 57,350 square feet of wetland and 4,447 square feet of buffer.
- Preserve 9.127 acres of lacustrine wetland and associated buffer.

To determine when these goals are met, the following objectives are proposed. Each objective has at least one performance standard used to determine if the objective has been met. Contingency measures are also proposed as possible adaptive management actions to be taken if performance standards are not met. Performance standards are summarized in Table 5.

Table 5. Summary of success criteria

Performance Standard	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Objective 1—Wetland Creation						
PS1—Wetland Creation	NC	NC/NM	NC/NM	1,534 square feet of wetland has been created	NC/NM	1,534 square feet of wetland has been created
Objective 2—Dominated by Native Plants						
PS2a—Plant Survival (%)	NC	100	80	80	NC/NM	NC/NM
PS2b—Native Species (% cover)	NC	≥30%	≥405	≥50%	>50%	≥70%
PS2c—Invasive Species (% cover)	NC	<25%	<25%	<25%	<25%	<25%
Objective 3—Wetland Preservation						
PS3—Record Protective Covenants	The protective covenant or easement will be recorded within 8 months after receiving all required permits.					

PS Performance Standard
 NC No Criterion
 NM No monitoring for that year

8.1 Objective 1—Wetland Creation

The wetland creation areas will meet the intended design and technical criteria for wetlands.

8.1.1 Performance Standard 1

Wetland determinations and boundary delineations will be conducted in Years 3 and 5 to ensure 1,534 square feet of wetland area has been created. Table 5 shows the success criteria for wetland creation.

8.1.2 Contingency Measure 1

The absence of wetland indicators would suggest that wetland hydrology is not present. If wetland hydrology and hydric soil indicators are not present, the previous year's weather will be reviewed to determine if drought conditions are in effect. If drought conditions are in effect, no action will need to be taken. If drought conditions are not in effect, then an investigation will occur to evaluate current hydrological conditions and determine the best course of action to establish wetland hydrology. The investigation could result in redesigning the wetland creation area (including excavation and replanting).

8.2 Objective 2—Dominated by Native Plants

The wetland creation and enhancement areas will be dominated with healthy, native plants.

8.2.1 Performance Standard 2a

Planted vegetation and natural recruits will be monitored for survival for 3 years (Year 0 [as built], Year 1, Year 2, and Year 3). Monitoring will not occur after Year 3 because it is expected that plant growth and natural recruits will make identifying planted vegetation extremely difficult. Additionally, some plants are expected to be shaded out and die as a result of other tree and shrub growth. Table 5 shows the success criteria for plant survival.

Monitoring for plant survival will cease after 4 years and switch to the percent cover criteria (PS2b and 2c) to determine if Objective 2 is met.

8.2.2 Contingency Measure 2a

Plant survival could be negatively affected by improper installation, diseased or infested plants, inadequate watering, or extreme weather. If more than 25% of plants die, an evaluation of the causes of mortality will occur before dead plants are replaced. Dead plant material will only be removed after that year's scheduled monitoring. If less than 80% of the total plants installed have survived during the Year 2 monitoring, additional plants will be installed to bring the planting schedule back into original specifications, and yearly monitoring will continue for 2 additional years (i.e., monitoring for plant survival would occur in Years 4 and 5).

8.2.3 Performance Standard 2b

Planted vegetation and natural recruits will also be monitored for percent cover for 5 years (Year 0 [as-built], Year 1, Year 2, Year 3, Year 4, and Year 5). Table 5 shows the success criterion for percent cover for each year of monitoring.

8.2.4 Contingency Measure 2b

Plant growth, as determined by percent cover, could be negatively affected by improper installation, diseased or infested plants, inadequate watering, or extreme weather. If the native species percent cover success criterion is not met, the cause will be investigated and corrected. Correction measures may include increased watering, soil amendments, fertilizing, or revision of planting palette and additional plantings.

8.2.5 Performance Standard 2c

The percent cover of invasive species will be monitored for 5 years (Year 0 [as-built], Year 1, Year 2, Year 3, Year 4, and Year 5). All state and county listed noxious weeds shall not collectively exceed 25% cover in all monitoring years. Table 5 shows the success criterion for invasive species cover for each year of monitoring.

8.2.6 Contingency Measure 2c

Dominance by invasive species could result from disturbance of the soil, a high mortality rate of the native planted vegetation, or colonization by windborne seeds. To reduce colonization by invasive species, a site maintenance plan is described in Section 9.0. If more than 25% of the area is covered by invasive species, the cause of infestation will be investigated, and corrective actions will be taken before weeds are removed. Contingency measures could include increasing the frequency of weeding until native vegetation can grow and dominate the area, increasing the density of native vegetation with additional plantings, or planting the buffers with woody species to shade out invasive species in the buffer (namely, reed canarygrass).

8.3 Objective 3—Wetland Preservation

A total of 23.6 acres of Category I wetland will be permanently protected.

8.3.1 Performance Standard 3

A protective covenant or easement will be recorded with the property title to prevent future development of WL-B outside of the proposed swimming, lifesaving, and boating area. This protective covenant or easement will have a duration of “in perpetuity.” The protective covenant or easement will be recorded within 8 months after receiving all required permits.

8.3.2 Contingency Measure 3

No contingency measures are proposed for this performance standard because this performance standard is an administrative task.

9.0 MAINTENANCE PLAN

9.1 Watering

Watering may be necessary depending on the date of planting and the amount of rainfall that year. No plant installation would occur between December and February. Monitoring of rainfall will be used to determine the need for watering.

Watering will occur so that the plants will receive at least 1.5 inches of water (or equivalent of rainfall) twice per month during the first year following planting. Watering may be necessary for several years after plant installation to assist survival and establishment of plantings.

Watering may be accomplished using a temporary irrigation system or water truck.

9.2 Weeding

Weeding around trees and shrubs will be important during the growing seasons to ensure establishment and prevent stress to the plants from competition for resources. Weeding will occur twice a month during the early growing season (typically between March and July) and late growing season (typically September through October). During the remainder of the year, weeding will occur monthly. All invasive species will be weeded. This schedule of weeding will occur until the plants have established themselves and out-compete the invasive species.

Weed whacking will be allowed around plantings with protective tubing. Control of the highly invasive species such as Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), and reed canarygrass is especially important in the Northwest, and emphasis will be given to their removal to prevent invasion into the planted areas.

9.3 Mowing

Mowing will not occur in the mitigation areas.

9.4 Mulching

Mulching may occur around shrub and tree plantings to help retain water. Mulch around plantings will be no thicker than 4 inches. Thick layers of mulch (more than 6 inches) may also be used to control reed canarygrass in areas between plantings. Mulch will be placed when plants are installed, and additional mulch may be placed as needed throughout the monitoring period.

9.5 Dead Plant Removal

Dead plant material will only be removed after scheduled monitoring. This will allow for the accurate assessment of planting success needed for the monitoring program. Replacement planting will be detailed in a section of the report from the monitoring program. This will include species recommendations to maintain the desired diversity in the plant communities of the buffer areas.

10.0 MONITORING PLAN

The following monitoring plan has been developed to comply with TCC 24.35.017 and Ecology et al. (2006) guidance.

The mitigation areas will be monitored for wetland creation, plant survival, and plant cover to ensure that the mitigation plan is trending towards meeting the goals described in Section 8.0. As shown in Table 5, a monitoring period of 10 years is proposed.

Should the ecologist determine that any portion of the mitigation area needs to be replanted, a survey will be conducted after the replanting has been completed to document the location of the newly installed plants. This survey will then become the baseline for subsequent monitoring surveys. For example, if the survival success criterion is not met in Year 2 and the ecologist determines that additional trees or shrubs need to be planted, a survey will be conducted after the addition of new plants.

10.1 Monitoring Events

10.1.1 Frequency

To comply with TCC 24.35.017, the mitigation areas will be monitored and associated reports will be prepared at the following frequency:

- At completion of construction of mitigation project (as-built)
- Thirty days after completion (Year 0)
- Early in the first and second growing seasons after construction (spring monitoring)
- End of the first and second growing seasons after construction (fall monitoring)
- Once in years 3, 4, and 5 (yearly monitoring).

10.1.2 As-Built Survey

Once construction and planting of the mitigation areas are complete, an as-built survey will be done to ensure the mitigation areas were constructed per the design and to document any changes or modifications made during construction.

10.1.3 Year 0 Monitoring

The Year 0 monitoring event will establish the locations of transects and photo points (see Section 10.2.2).

10.1.4 Spring Monitoring

The Year 1 and 2 spring monitoring events will be meander surveys conducted to take photos and assess progress toward annual monitoring goals (see Section 10.2.1). Spring monitoring will occur after deciduous plants have flowered or leafed-out for easier identification.

10.1.5 Fall/Yearly Monitoring

The Year 1 and 2 fall monitoring events and the subsequent yearly monitoring events will include a quantitative study of the mitigation areas, as described in section 10.2. Fall/yearly monitoring will occur before all the leaves fall off.

10.2 Monitoring Methods

10.2.1 Meander Survey

For spring monitoring events, a meander survey of the mitigation area will be completed to assess progress toward annual monitoring goals. Overall plant health, invasive species colonization, additional maintenance needs, and any other emergent needs will be noted.

10.2.2 Transects and Photo Points

Using rebar sheathed in white PVC pipe, permanent transects will be established within the wetland mitigation areas for Year 1 and 2 fall monitoring and yearly monitoring thereafter. The actual locations of the transects will be determined in the field after plant installation, during the Year 0 monitoring. Coordinates for the location of the end points of each transect will be recorded using a global positioning system (GPS) system and reported in the Year 0 Report.

Permanent photo points will be established at each end of each transect to document the site over time. At each of the photo points, a fixed-lens digital camera will be used to take photographs, either a panoramic photo or 1 at every 90 degrees of the compass.

10.2.3 Wetland Determination and Boundary Delineation

Interim and final success will be defined by meeting the success criteria shown in Table 5. Wetland creation areas will be determined by delineating their boundaries using the methods described in the Corps of Engineers Wetlands Delineation Manual (Corps 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Corps 2010). Wetland boundaries and data plot locations will be recorded using GPS.

10.2.4 Plant Survival

Interim and final success will be defined by meeting the success criteria shown in Table 5. Plant survival within the mitigation area will be determined by comparing the number and species of plants recorded on the as-built drawings to site conditions at the time of monitoring. The percent survival is calculated by dividing the number of plants (by species) identified as alive during the monitoring event by the number of plants (by species) identified on the as-built plan.

10.2.5 Percent Cover

Interim and final success will be defined by meeting the success criteria for native and invasive species percent cover shown in Table 5. The line-intercept method will be used to determine the percent cover of trees and shrubs along each of the permanently marked transects (USDA and USDI 1999). After laying a tape measure along a transect, the lengths of tape directly under the branches and foliage of a tree or shrub will be recorded along with the species. The percent cover of each species is then calculated by dividing the sum of lengths intercepted for that species by the total length of the transect.

10.3 Reports

For each monitoring event, the ecologist will prepare a report. One copy of each report will be provided to the County project manager and Ecology. The sections below document what will be included in each type of monitoring report.

10.3.1 As-Built

The As-built report will document the actual construction of the mitigation areas and will include the following:

- Drawing showing final grading
- Actual planting density (container size, average offset)
- Description of any changes from the original design

10.3.2 Year 0 Monitoring

The Year 0 monitoring report will document the locations of transects and photo points and summarize conditions observed.

10.3.3 Spring Monitoring

Spring monitoring reports will summarize the observations made during the meander surveys and will discuss any maintenance or contingency actions needed.

10.3.4 Fall/Yearly Monitoring

Fall and yearly monitoring reports will include the following:

- Date of survey
- Data tables
- Wetland Determination Data Forms (in Years 3, 5, and 10 only)
- A narrative description of methods and contingency measures taken
- Identified planted and naturally recruited trees and shrubs
- Interpretation of results
- Discussion of results in relation to success criteria
- Color photos from each of the permanent photo points

11.0 REFERENCES

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USDA (U.S. Department of Agriculture). 2008. *The Woody Plant Seed Manual – Agriculture Handbook 727*. Available at https://www.fs.usda.gov/nsl/nsl_wpsm.html (accessed March 29, 2018).

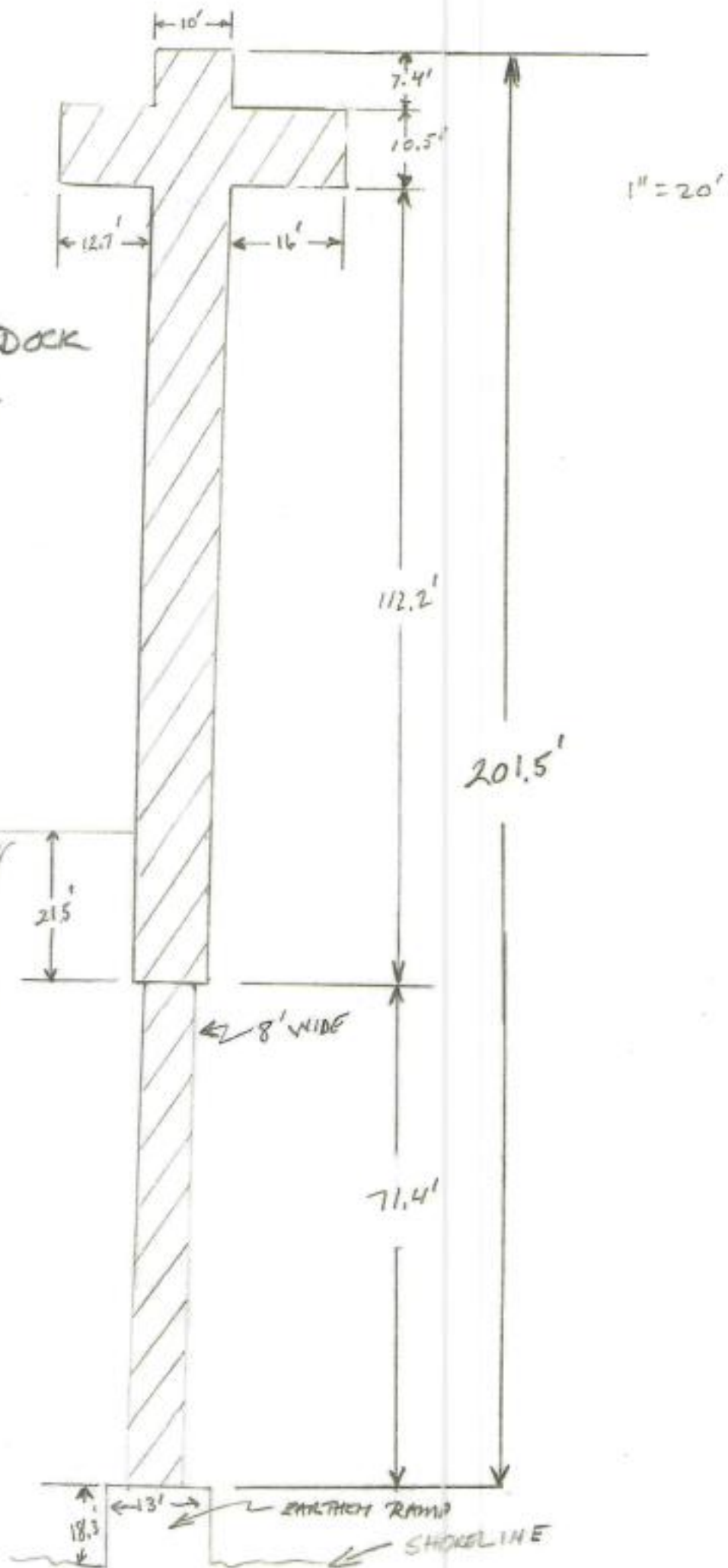
USDA and USDI (U.S. Department of Agriculture and U.S. Department of the Interior). 1999. *Sampling vegetation attributes*. USDI, Bureau of Land Management's National Applied Resource Sciences Center, Interagency Technical Reference BLM/RS/ST-96/002+1730, Denver, Colorado.

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A light blue abstract graphic element consisting of several overlapping, curved shapes that sweep across the page from the left side towards the right. The shapes are semi-transparent and create a sense of movement and depth.

Appendix A

Existing and New Dock Plans



EXISTING BOIFT DOCK
TO BE REMOVED.

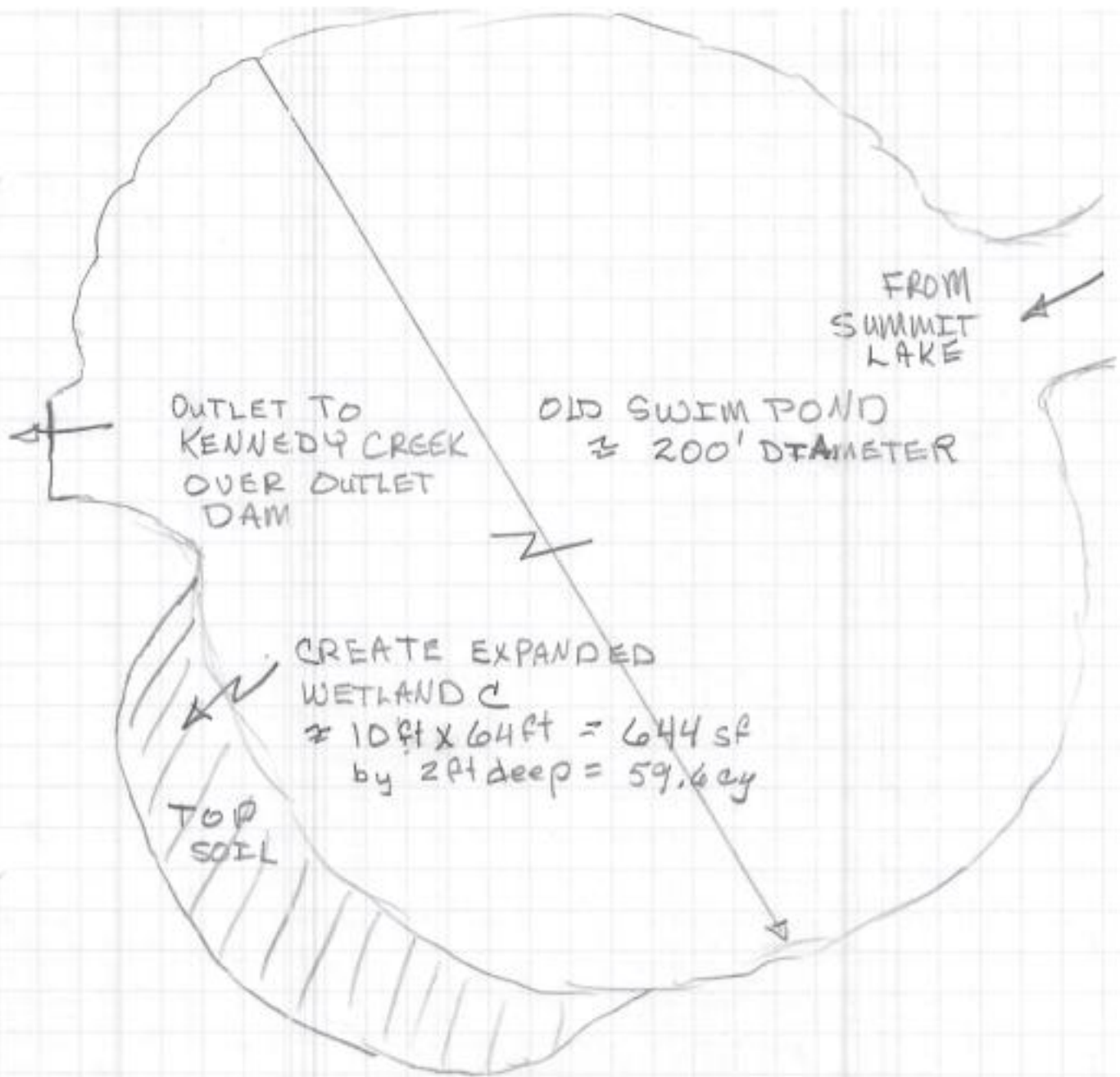
VEGETATION
IN THE
LAKE



REMOVE 890 sf of TOP SOIL
 AVERAGE of 2.0 ft deep = 82,4 cy

- 1) Remove TOP SOIL to 6" Below normal Lake level
- 2) slope new shoreline 1 to 3 1/3
- 3) Plant created wetland Per Report
- 4) Remove old dock deck and cut off dock piles at mudline

OLD DOCK REMOVAL
 CAMP THUNDERBIRD
 WETLAND B
 CONSTRUCTION
 RLW - NOV 28, 2022



- 1) Remove TOP SOIL to 6" Below normal lake level
- 2) Slope new shore line 1 to 3 1D
- 3) Plant created wetland per Report³
- 4) Remove old docks & floats from pond

SWIM POND WETLAND
 CAMP THUNDER BIRD
 WETLAND C
 CONSTRUCTION
 RLW - NOV 28, 2022

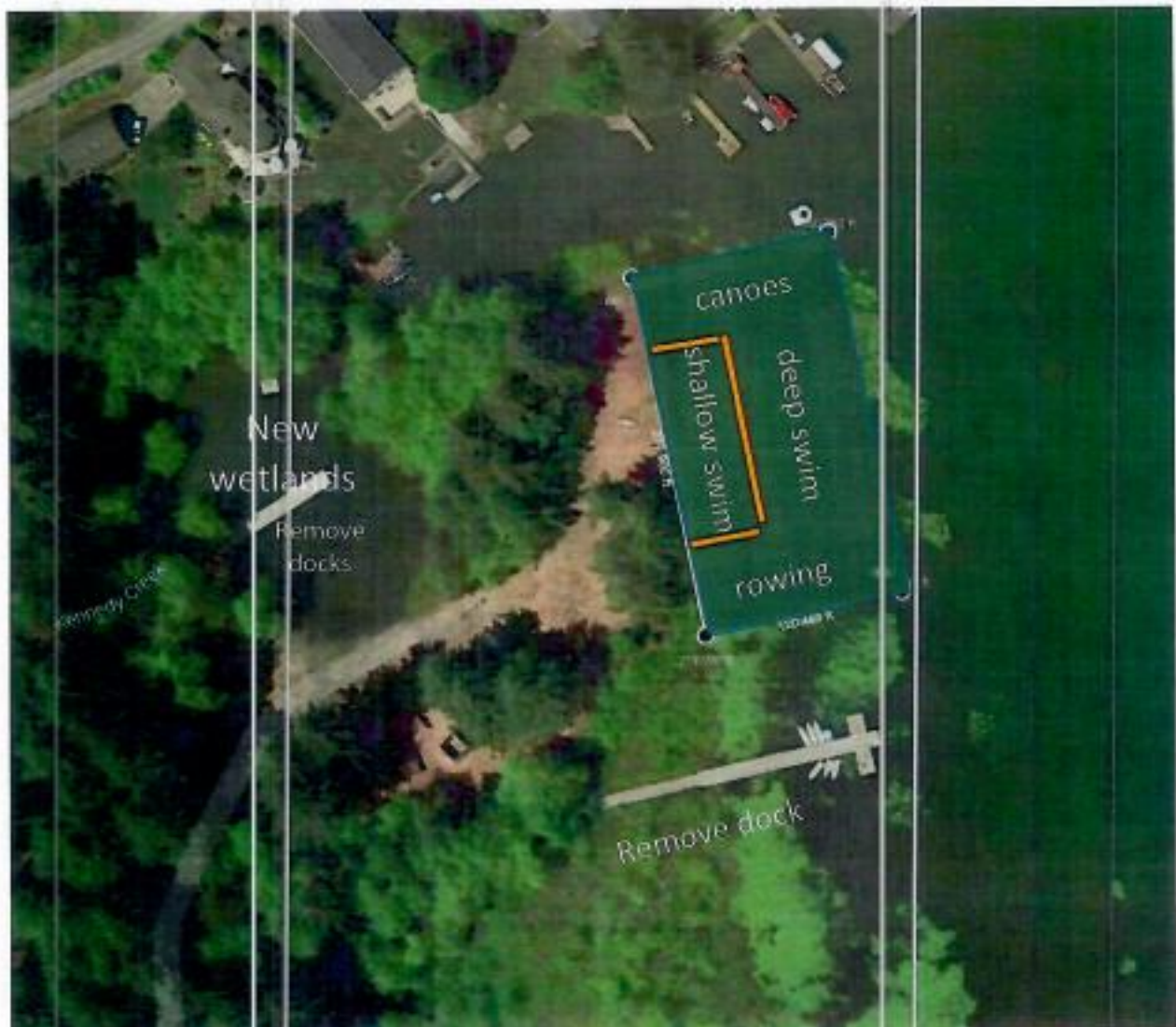


Figure 3) Summary layout of proposed uses (not to be used for dimensional purposes)

The history of Camp Thunderbird and its waterfront can be informative in understanding the current proposal and weighing its merits. It seems a good place to start.

The waterfront area in the early 1960s was simply the outfall to Kennedy Creek from the lake. There was no pond or wide spot in the creek.

The Army Corp of Engineers undertook a project in the mid 1960s to build a swimming area in the Kennedy Creek outfall and to build a land berm for lake boating access. That swim area is seen in Figure 1. The constructed berm is the area east of the swim area where the single canoe can be seen.

Figure 4 is a clip out of "The History of Camp Thunderbird", ref 1.



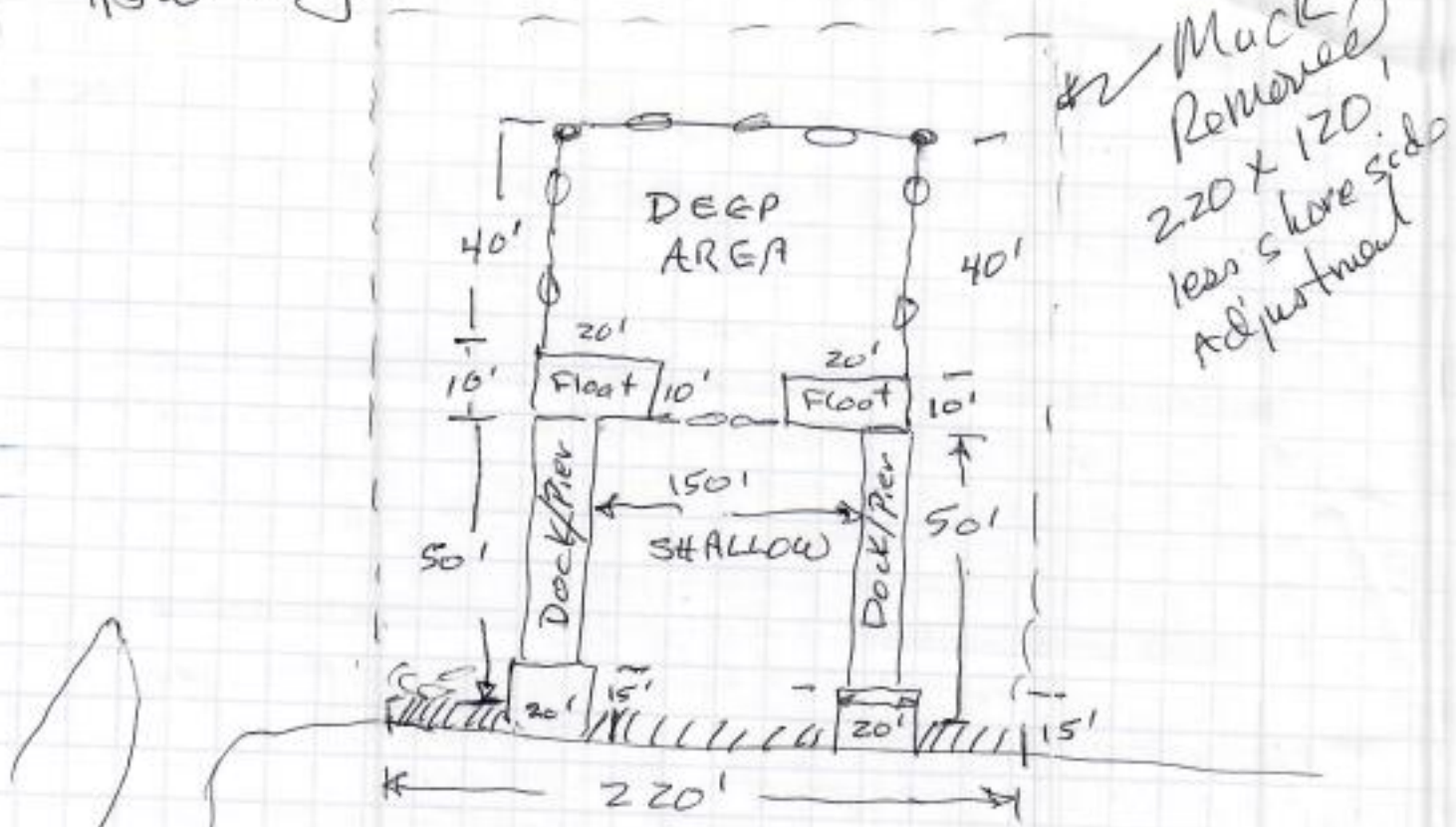
Figure 5) Annotated photo of a wall hanging photo of the camp area, late 1960s.

No other significant earthworks have been completed but a significant amount of maintenance and upkeep work has gone on over the decades. The primary issue has been the quality and size of the swimming area. It has been limited to primarily a recreational swimming area as it was not a good area for the programmatic elements of the scouting aquatic program. It did not provide the distances, depth, or water clarity needed for successful execution of a top-notch scouting swim or aquatic program.

Regular clean out of the swimming area has been required to provide any useable access for the Scouts to swim in the pond. The last clean out of the swimming hole was in 2016. Permits and the HPA are discussed in Attachment B.

Permits to remove lily pads have also been in place to permit better canoeing and rowing access to Summit Lake. These permits covered a lake area of approximately

RW July 2, 2021



Muck Removed
220 x 120
less shore side
adjustment



Note County/Ecology Suggests

- 1) Protect Wetland Plants in 1st 10' from shore & mitigate the 2 entry areas. cleared 2x(15' x 20) = 600 SF - the rest of the shoreline plants left undisturbed
- 2) Noxious water lilies in remainder of 220 x 120 area that has muck removed requires minimal mitigation
- 3) Old swim pond now available a high quality mitigation per earlier mappings
- 4) Remove old boat dock high value mitigation

A light blue abstract shape, resembling a stylized arrow or a brushstroke, pointing from the left towards the right. It has a rounded, organic form with a white cutout on the left side.

Appendix B

Credit-Debit Worksheets

Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Washington

Debit Worksheet (corrected 2/20/18)

Project

Mitigation Project is: Advanced Concurrent: Delayed:

Only fill in boxes that are highlighted. Use Temporal Loss Factors from the table below (Appendix E).

Input Ratings for Functions from Scoring Sheet

	Wetland Unit Altered (#1)			Wetland Unit Altered (#2)			Wetland Unit Altered (#3)		
	Improving Water Quality	Hydrologic	Habitat	Improving Water Quality	Hydrologic	Habitat	Improving Water Quality	Hydrologic	Habitat
Site Potential (H,M,L)	H	M	M	H	M	M			
Landscape Potential (H,M,L)	H	H	H	H	H	H			
Value (H,M,L)	H	H	H	H	H	H			
Score for Wetland Unit	9	8	8	9	8	8	3	3	3
Acres of non-forested areas impacted	<input type="text" value="0.5"/>			<input type="text"/>			<input type="text"/>		
Basic mitigation requirement (BMR)	4.5	4	4	0	0	0	0	0	0
Temporal loss factor (see below)	<input type="text" value="1.5"/>			<input type="text" value="1.5"/>			<input type="text"/>		
DEBITS	6.75	6	6	0	0	0	0	0	0
Acres of Deciduous forest impacted	<input type="text"/>			<input type="text"/>			<input type="text"/>		
Basic mitigation requirement (BMR)	0	0	0	0	0	0	0	0	0
Temporal loss factor	<input type="text"/>			<input type="text"/>			<input type="text"/>		
DEBITS	0	0	0	0	0	0	0	0	0
Acres of Evergreen Forest impacted	<input type="text"/>			<input type="text"/>			<input type="text"/>		
Basic mitigation requirement (BMR)	0	0	0	0	0	0	0	0	0
Temporal loss factor (see below)	<input type="text"/>			<input type="text"/>			<input type="text"/>		
DEBITS	0	0	0	0	0	0	0	0	0
Acres of Cat. 1 Deciduous forest	<input type="text"/>			<input type="text"/>			<input type="text"/>		
Basic mitigation requirement (BMR)	0	0	0	0	0	0	0	0	0
Temporal loss factor (see below)	<input type="text"/>			<input type="text"/>			<input type="text"/>		
DEBITS	0	0	0	0	0	0	0	0	0
Acres of Cat. 1 Evergreen forest	<input type="text"/>			<input type="text"/>			<input type="text"/>		
Basic mitigation requirement (BMR)	0	0	0	0	0	0	0	0	0
Temporal loss factor (see below)	<input type="text"/>			<input type="text"/>			<input type="text"/>		
DEBITS	0	0	0	0	0	0	0	0	0

TOTALS

Function	Wetland Unit Altered (#1)			Wetland Unit Altered (#2)			Wetland Unit Altered (#3)		
	Improving Water Quality	Hydrologic	Habitat	Improving Water Quality	Hydrologic	Habitat	Improving Water Quality	Hydrologic	Habitat
Acres-points	6.75	6	6	0	0	0	0	0	0

Total Debits by Function

Acres-points	6.75	6	6
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Timing of Mitigation	Temporal Loss Factor
Advance – At least two years has passed since plantings were completed or one year since “as-built” plans were submitted to regulatory agencies.	1.25
Concurrent – Physical alterations at mitigation site are completed within a year of the impacts, but planting may be delayed by up to 2 years if needed to optimize conditions for success.	
For impacts to an emergent or shrub community	1.5
For impacts to a deciduous forested wetland community	2.0
For impacts to an evergreen forested wetland community	2.5
For impacts to a deciduous Category I forested wetland community	3
For impacts to an evergreen Category I forested wetland community	3.5
Delayed - Construction is not completed within one year of impact, but is completed (including plantings if required) within 5 growing seasons of impact.	
For impacts to an emergent or shrub community	3
For impacts to a deciduous forested wetland community	4
For impacts to an evergreen forested wetland community	5
For impacts to a deciduous Category I forested wetland community	6
For impacts to an evergreen Category I forested wetland community	7

	WL-B PAB			WL-B PEM/PSS/PFO		
	WQ	Hydro	Habitat	WQ	Hydro	Habitat
Score	9	8	8	9	8	8
Acres				9.127	9.127	9.127
Basic score	0	0	0	82.143	73.016	73.016
Scaling Factors						
Wetland Category	0.05	0.05	0.05	0.05	0.05	0.05
Locaiton	0.025	0.025	0.025	0.025	0.025	0.025
Threat	0.025	0.025	0.025	0.025	0.025	0.025
Sum of scaling factors	0.1	0.1	0.1	0.1	0.1	0.1
Credits (Acre-points)	0	0	0	8.2143	7.3016	7.3016
Total Acre-points		0			22.8175	

A light blue abstract graphic element consisting of several overlapping, curved shapes that create a sense of depth and movement, primarily located in the lower half of the page.

Appendix C

Bond Worksheet

Critical Areas Mitigation Bond Quantity Worksheet

Project Name: Camp Thunderbird Upgrades

Date: 11/28/22

Prepared by: Kerrie McArthur

Project Number: _____

Project Description: Wetland and Wetland Buffer Mitigation

Location: 11740 Summit Lake Road NW, Olympia,
Washington

Applicant: Pacific Harbors Coun Email: frherber@aol.com

PLANT MATERIALS (includes labor cost for plant installation)					
Type	Unit Price	Unit	Quantity	Description	Cost
PLANTS: Potted, 4" diameter, medium	\$5.00	Each	524.00		\$ 2,620.00
PLANTS: Container, 1 gallon, medium soil	\$11.50	Each	278.00		\$ 3,197.00
PLANTS: Container, 5 gallon, medium soil	\$36.00	Each	412.00		\$ 14,832.00
PLANTS: Slips (willow, red-osier)	\$2.00	Each	3060.00		\$ 6,120.00
TOTAL					\$ 26,769.00
GENERAL ITEMS					
ITEMS	Unit Cost	Unit			Cost
Fencing, split rail, 3' high (2-rail)	\$10.54	LF			\$ -
Signs, sensitive area boundary (inc. backing, post, install)	\$40.00	Each			\$ -
TOTAL					\$ -

OTHER				<i>(Construction Cost Subtotal)</i> \$ 26,769.00	
ITEMS	Percentage of Construction Cost	Unit			Cost
Mobilization	10%	1			\$ 2,676.90
Contingency	30%	1			\$ 8,030.70
				TOTAL	\$ 10,707.60
<p>MAINTENANCE AND MONITORING</p> <p>NOTE: Projects with multiple permit requirements may be required to have longer monitoring and maintenance terms. This will be evaluated on a case-by-case basis for development applications. Monitoring and maintenance ranges may be assessed anywhere from 5 to 10 years.</p>					
Maintenance, annual (by owner or consultant)					
Larger than 1,000 sq. ft. but less than 5,000 sq.ft. of buffer mitigation	\$ 180.00	Event	30.00	30 events over 5 years (event is 4 hrs @\$45/hr)	\$ 5,400.00
Larger than 1 acre but < 5 acres - buffer and / or wetland or aquatic area mitigation	\$ 1,440.00	Event	30.00	30 events over over 5 years (event is 32 hrs @\$45/hr)	\$ 43,200.00
Monitoring, annual (by owner or consultant)					
Larger than 1,000 sq.ft. but less than 5,000 wetland or buffer mitigation	\$ 720.00	EACH	8.00	(16 hrs @ \$90/hr)	\$ 5,760.00
Larger than 1 acre but < 5 acres - buffer and / or wetland or aquatic area impacts	\$ 1,440.00	DAY	8.00	32 hrs @ \$90/hr)	\$ 11,520.00
				TOTAL	\$ 65,880.00
					Total \$103,356.60

