



Meeting Date: September 14, 2016  
 Agenda Item No:

**Kitsap County Board of Commissioners**

**Department:** Commissioners Office  
**Staff Contact:** Eric Baker, Special Projects Manager  
**Title:** Lake Management District No. 3 for Long Lake Resolution

**Recommended Action:** Approve Resolution setting a public hearing on a Lake Management District No. 3 for Long Lake

<b>Summary:</b>	Long Lake has been suffering for decades with significant water quality issues that have promoted the growth of invasive aquatic plants and toxic algae blooms. These issues have been addressed in the past through state-funded management activities to reduce the accessibility of phosphorous and other nutrients within Long Lake. To fund future management activities, private funding will be necessary. To this end, the community and Kitsap County are proposing a lake management district for properties surrounding the Lake. Through annual assessments, properties within the proposed District boundary may fund lake management activities delineated by a specific scope of work. Approval of such a District first requires a public hearing noticed to all property owners within the boundary proposed for October 24, 2016. Such a hearing will be noticed to all affected property owners through mailing and legal ad. The public hearing would allow the Board to determine whether the proposal should be sent to the property owners for election. Only after majority approval at such an election can a district be formed to fund these improvements.
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<b>Attachments:</b>	1) Resolution w/ Attachments
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**Fiscal Impact**

<b>Expenditure required for this specific action:</b>	0
<b>Total cost including all related costs:</b>	0
<b>Related Revenue:</b>	0
<b>Cost Savings:</b>	0
<b>Total Fiscal Impact:</b>	0
<b>Source of Funds:</b>	N/A

**Fiscal Impact (DAS) Review**

**Departmental Coordination**

Department	Representative	Recommendation/Comments
Parks Department	Jim Dunwiddie	

**Contract Information**

Contract Number	Date Original Contract or Amendment Approved	Amount of Original Contract Amendment	Total Amount of Amended Contract

**RESOLUTION \_\_\_\_\_**  
**INTENTION TO FORM LAKE MANAGEMENT DISTRICT NO. 3 FOR LONG LAKE**

WHEREAS, Kitsap County's lakes provide environmental, recreational, economic and aesthetic benefits to the residents of Kitsap County, nearby property owners and the region; and

WHEREAS, Long Lake is Kitsap's largest lake, with substantial recreational and economic value from its shoreline improvements including a Kitsap County park and public boat launch; and

WHEREAS, the condition of Long Lake has been affected by decades of shoreline and watershed land uses as well as natural lake and soil conditions; and

WHEREAS, Long Lake's water quality issues have fueled toxic algae blooms and invasive species of water plants; and

WHEREAS, these algae blooms are harmful to the public, pets and wildlife often requiring the closure of the lake by the Kitsap Health District for recreational uses; and

WHEREAS, these invasive species of plants affect recreational uses including swimming and boating as well as creating additional water quality issues through their natural processes; and

WHEREAS, these various issues are not amenable to a single remedy and will require ongoing maintenance to address their impacts; and

WHEREAS, past maintenance efforts within the Lake, such as water quality testing and alum treatments, have made significant progress in reducing levels of phosphorous and other nutrients that led to algae blooms and the expansion of invasive vegetation; and

WHEREAS, these prior efforts were funded through 2010 by a \$1 million capital expenditure by the Washington State legislature; and

WHEREAS, the Kitsap County Surface and Storm Water Division and Kitsap Public Health District have expended significant resources in addressing contaminant discharges within the watershed that have contributed to Long Lake's issues; and

WHEREAS, property owners along the Long Lake shoreline, with special shoreline access or within a close proximity of the Lake enjoy great economic, recreational and aesthetical benefits from the Lake;

WHEREAS, the Citizens for Improving Long Lake (CILL) and other community groups have worked with Kitsap County, Washington State and the community for over 20 years to increase awareness of lake issues and promote the funding for past efforts; and

WHEREAS, CILL, in collaboration with TetraTech, have proposed a 5-year lake management strategy to address water quality issues and reduce the growth of toxic algae and invasive species; and

WHEREAS, this strategy has been reviewed by the Kitsap Health District and other Kitsap agencies for its applicability to the Lake's issues; and

WHEREAS, this strategy carries a cost of \$470,000 for a 5-year period; and

WHEREAS, Washington State statutes, RCW 36.61.010 *et seq.*, authorize the creation of a Lake Management District (LMD), including special assessments to address lake and beach issues; and

WHEREAS, such a District may engage in maintenance activities including improving water quality and/or controlling or removing aquatic vegetation; and

WHEREAS, the formation of a LMD requires many steps including the establishment of a specific boundary, determining special assessment amounts, public hearings and ultimately a vote of the property owners with a specified district boundary; and

WHEREAS, Washington State officials have indicated that the formation of a LMD is a prerequisite to acquiring any future state funding of algae and invasive species management.

**THEREFORE, BE IT RESOLVED:**

1. Intent to Form LMD. The Kitsap County Board of County Commissioners intends to form Lake Management District No. 3 for Long Lake.

2. Nature of Activities Proposed to be Financed under the LMD. The issues affecting Long Lake are predominantly excess phosphorus and other nutrients from adjacent and nearby land uses, ongoing loading from existing lake vegetation and surrounding soil conditions. These conditions, their impacts to the Lake and its uses and past efforts to enhance and maintain water quality are fully described in the December 2010, Final Report on Water Quality 2006-2010.

Based on the findings of the December 2010 Report, future activities have been identified. A future LMD will implement specific management efforts including, but not limited to:

- Long-term water quality monitoring
- Phosphorus inactivation through sediment large treatment and annual water column stripping
- Aquatic plant management
- Planning and permitting of maintenance activities
- Public education and outreach through public meetings and school programs
- Overall project management and transparent reporting.

Additional specific information regarding the LMD's proposed maintenance activities are included in the Proposed Long Lake Integrated/Adaptive Lake Management Plan, July 2016 (Attachment A), attached hereto and incorporated herein by this reference.

3. Funding of the LMD through Special Assessments. Based upon the proposed actions included in the Scope of Work, ongoing maintenance activities in Long Lake will cost an average of \$94,000 annually over a 5-year period, totaling \$470,000. The proposed LMD is intended to fund these costs in their entirety.

4. Proposed Boundaries and Annual Assessments of the LMD. The boundary of the Long Lake LMD was developed to specifically take into consideration properties with shoreline adjacency. The properties within the boundary are estimated to receive certain benefits from the Lake and its amenities. The proposed boundary is shown in Attachment B, attached hereto and incorporated herein by this reference.

Annual assessments for each property classification within the LMD boundary to fund the activities located in the Proposed Long Lake Integrated/Adaptive Lake Management Plan, July 2016 (Attachment A) shall be up to \$450 per tax parcel as delineated by Kitsap County Assessor records.

5. Duration of Lake Management District. Assessments to properties within the district shall be paid annually. The assessments shall be imposed over a 5-year period.

6. Public Hearing regarding the Formation of the Lake Management District. A public hearing on the proposal to form an LMD for Long Lake shall be held on **October 24, 2016** at 5:30PM in the Commissioners Chambers at the Kitsap County Administration Building located at 619 Division Street, Port Orchard, WA.

Resolved this \_\_\_ day of \_\_\_\_\_, 2016.

**BOARD OF COUNTY COMMISSIONERS  
KITSAP COUNTY, WASHINGTON**

\_\_\_\_\_  
**EDWARD E. WOLFE**, Chair

\_\_\_\_\_  
**ROBERT GELDER**, Commissioner

\_\_\_\_\_  
**CHARLOTTE GARRIDO**, Commissioner

ATTEST:

\_\_\_\_\_  
Dana Daniels, Clerk of the Board

**ATTACHMENT A**

**Proposed Long Lake Integrated/  
Adaptive Lake Management Plan**

**2017-2021**

**July 2016**

**Prepared for:  
Kitsap County and CILL**

**Tetra Tech, Inc.  
1420 Fifth Ave, Suite 550  
Seattle, WA 98101**



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## Restoration History

Long Lake was studied by personnel from the University of Washington for 20 consecutive years from 1976 to 1995 in order to evaluate the effectiveness of several restoration techniques (Welch, 1996). During the summer of 1979, the lake water level was drawn down about 6 feet (1.8 m) to desiccate previously submersed rooted plants and to consolidate the flocculent sediment. While lake sediments dried substantially in laboratory experiments, they failed to consolidate in the lakebed itself because seepage water prevented sediment drying. Although exposed plants were desiccated and biomass was low the following year (1980), the aquatic plants began to recover by 1981 and were back to maximum biomass by 1984 (Jacoby et al., 1982). A small area in the north end was dredged during the 1979 drawdown in order to widen and deepen the outlet, but the dredging was too localized to affect internal phosphorus (P) loading throughout the lake.

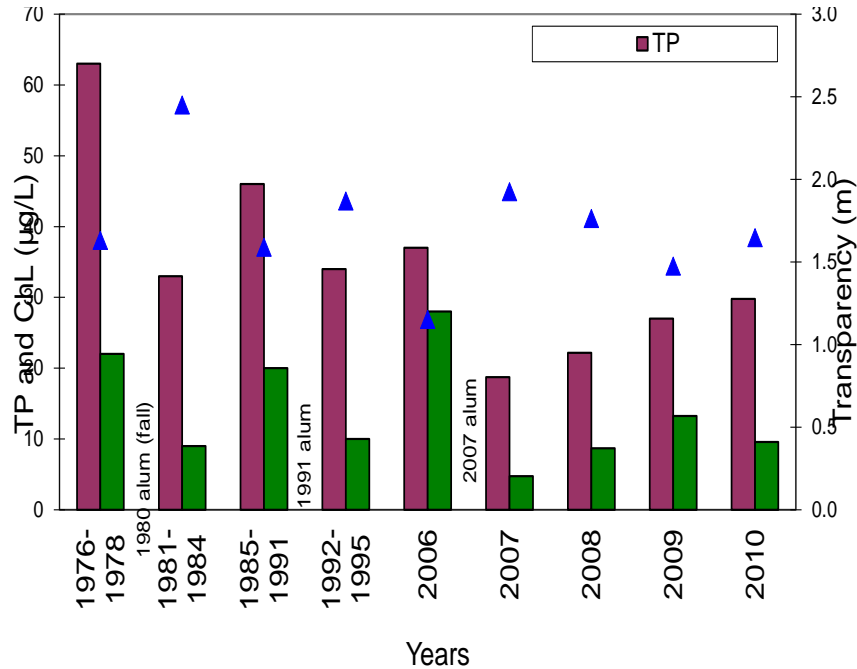
In the fall of 1990, the lake was treated with alum to inactivate sediment P. A dose of 5.5 mg/L aluminum (Al) was used. In the meantime, rooted plants were mowed with a harvester during the summer of 1988, 1989 and 1990, removing 10, 43 and 69% of the peak plant biomass per year, respectively.

The first alum treatment was highly effective for the first four years and maintained modest water quality improvement on average for the next seven years, compared to pretreatment total phosphorus (TP; Figure 1). The high summer mean TPs of 69 and 78  $\mu\text{g/L}$ , which occurred in 1977 and 1978, did not recur during that eleven-year period, although TP and chlorophyll (chl) were rather high (66 and 36  $\mu\text{g/L}$ , respectively) in 1985, due mostly to a rooted plant-die-off, and in 1990 (55 and 40  $\mu\text{g/L}$ ), prior to the second alum treatment (Figure 2). These were the highest chl concentrations during the twenty-year period. Note that transparency varied in inversely with chl, with the highest transparency occurring with the lowest chl (Figure 2). Transparency also varied directly with macrophyte biomass (Jacoby et al., 2001).

The second alum treatment was applied in late summer 1991 at the same dose of 5.5 mg/L Al. The following summer, TP averaged only 20  $\mu\text{g/L}$ , the lowest summer mean ever. The summer mean for the four-year post treatment was slightly above 30  $\mu\text{g/L}$  and chl averaged less than 10  $\mu\text{g/L}$ , similar to the four-year mean following the 1980 treatment (Figure 1).

Monitoring of the lake by UW ceased after 1995, but was resumed in 2006 as part of a long-term project by Kitsap County and Citizens for Improving Long Lake (CILL) to improve the lake's quality. As part of the planned control measures, alum was again added to the lake at a low dose of 2.5 mg/L Al during August 1-4, 2006 to achieve short-term control of TP and to minimize late summer algal blooms. Alum was applied again during April 11-14, 2007 at a high dose of 17.5 mg/L Al, based on sediment P concentration, for sediment P inactivation and long-term control (Welch and Gibbons, 2010).

Sampling of Long Lake for the previous long-term project by Kitsap County and CILL was continued through 2010. Historical data were compared with 2006-2010 data in the annual report on Long Lake Water Quality, February 2010. For that report, 2010 data were integrated with 2006-2009 data to show that summer TP gradually increased, but was still below the 2006 pretreatment level, while chl remained well below pretreatment levels averaging less than 10 µg/L (Figure 1). Transparency averaged about 0.5 m greater during the last four years of monitoring than the pretreatment depth of visibility in 2006 (Welch and Gibbons, 2010).



**Figure 1. Mean whole-lake summer (June-September) TP, chl and Secchi transparency for groups of study years before and after three alum treatments in Long Lake, Kitsap. Pre 2006 data from Welch (1996). Data for 2006 serves as a partial reference for post-alum years 2007-2010.**



## **Scope of Work - Long Lake Integrated/Adaptive Management Plan**

The following scope of work describes the specific activities that will be performed in order to enable the Kitsap County's Long Lake Management District to meet the requirements of the Long Lake Integrated/Adaptive Lake Management Plan. Building upon the 2006-2010 lake management efforts, an integrated/adaptive lake management plan will be prepared and implemented. Targeted lake management will lead to an ecologically sustainable and balanced ecosystem with aesthetic appeal that supports water contact recreation, sport fishery, and salmon migration. The lake management program will limit internal phosphorus loading in order to reduce excessive phytoplankton production, will control excessive growth of rooted aquatic plants, and will eliminate, where possible, non-native plants such as Eurasian watermilfoil. The integrated management program for Long Lake includes six basic elements. Specific scope of work elements are outlined below:

### **Task 1 – Project Management**

- 1.1 Project Management (PM) responsibilities shall include maintenance of project records, progress reports, and submittal of required performance items.
- 1.2 Efforts shall include conducting, coordinating, and scheduling project activities and assuring quality control.

#### ***Deliverables:***

1. Effective administration and management of this project.
2. Maintenance of all project records.
3. Submittal of all required performance items, progress reports, invoices, and maintenance of all project records.

#### ***Schedule of Activities:***

- a) PM activities will be carried out throughout the project, from authorization to proceed in 2017 through December 2021.

***Budget:*** \$24,000

## **Task 2 – Planning and Permitting**

- 2.1 Development of a QAPP for adaptive effectiveness evaluation.
- 2.2 Development of a 5-year integrated/adaptive management plan for the lake.
- 2.3 Application for necessary permits.
- 2.4 Citizen volunteer recruitment and training.

### ***Deliverables:***

1. A 5-year integrated/adaptive lake management plan that includes the QAPP.
2. Necessary permit applications for in-lake activities.

The Kitsap County PM will lead the permit process and will maintain the permits.

### ***Schedule of Activities:***

- a) Permit activities will be carried out annually throughout the project, from authorization to proceed in 2017 through December 2021.
- b) The integrated/adaptive management plan will be completed within 90 days of the formation of the LMD.

***Budget:*** \$38,000

## **Task 3 – In-lake Activities Design and Implementation**

- 3.1 Design phosphorus management activities (a sediment inactivation treatment and maintenance treatments).
- 3.2 Implement phosphorus management in-lake activities. The sediment inactivation treatment will be conducted in early spring 2017. Monitoring data will be used to assess the need for maintenance treatments, potentially in 2020.
- 3.3 Update the IAVMP (Integrated Aquatic Vegetation Management Plan) and prepare treatment specifications for management control effort for EWM (Eurasian Watermilfoil) and Brazilian elodea, as well as for management control of specific boating lanes.
- 3.4 Implement the annual aquatic plant management activities.

***Deliverables:***

1. Alum treatment design.
2. Implementation of in-lake phosphorus management activities – a sediment inactivation dose in 2017, and a water-stripping dose in 2020.
3. Updated IAVMP.
4. Implementation of aquatic plant management activities annually.

***Schedule of Activities:***

- a) Phosphorus design elements will be completed within the first 4 months of LMD formation. On-going review and annual modifications to activities will be carried out through September 2021.
- b) The sediment inactivation treatment will be conducted in early spring 2017. Maintenance water column stripping treatments will be conducted as needed, i.e. 2020.
- c) The IAVMP will be updated within 180 days of formation of LMD with annual updates based upon data results and lake requirements.
- d) Aquatic plant control activities will be implemented as needed.

***Budget:*** \$288,000

**Task 4 – Lake and Stream Monitoring**

- 4.1 Design and conduct an on-going monitoring program to track general water quality conditions, phosphorus concentrations, phytoplankton production and the growth of aquatic macrophytes in Long Lake. This information will be used to assess management progress relative to the long-term integrated/adaptive management program and will be used to adjust the plan's activities for subsequent years, as needed.
- 4.2 Coordinate with citizen volunteers to arrange the use of a volunteer's boat during monthly sampling events.
- 4.2 Collect water samples from Long Lake at the previously established mid-lake station on a monthly basis from April through October. Dissolved oxygen, conductivity, temperature, and pH will be measured at meter intervals within the water column on each sampling date. During each monitoring event, water samples will be collected at a depth of 0.5 m for analysis of total phosphorus (TP), soluble reactive phosphorus

(SRP), and chlorophyll concentrations. Between mid-May and mid-October, additional samples will be taken at 2.5 m depth for TP, SRP, and chlorophyll analysis. In conjunction with lake sampling, grab samples will be collected monthly from Salmonberry Creek for TP analysis. All collected water samples will be packed with ice and sent to a certified analytical laboratory on the same day as they are collected.

- 4.3 Survey the distribution and speciation of aquatic macrophytes within the lake twice each year, during the spring and late summer.
- 4.4 Obtain stream gage data for Curley Creek from continuous gage operated by the Kitsap County Public Works Stormwater Division.
- 4.5 Install a level logger on Salmonberry Creek, as Kitsap County does not maintain a gage on this creek. Collect flow readings to calibrate the recorded data.
- 4.6 Install and maintain a data logger that records water level in Long Lake.

***Deliverables:***

1. Limnological data collection and data management.
2. Stream data collection and data management.
3. Aquatic plant data collection and data management.
4. Inlet and outlet surface water flow data collection and data management.
5. Lake level data collection and data management.

***Schedule of Activities:***

- a) Monitoring activities will be carried out throughout the project from authorization to proceed in 2017 through December 2021.

***Budget:*** \$54,000

**Task 5 – Reporting**

- 5.1 Annual assessments of in-lake activities and monitoring data will be produced in a technical memorandum format. This memorandum will also recommend activities for the next year and will include revisions to the adaptive plan as dictated by the data.

5.2 Final project completion report will record data, finding and activities over the five-year LMD.

***Deliverables:***

1. Annual Summary Memos.
2. Draft and final LMD five-year report.

***Schedule of Activities:***

- a) Annual technical memorandum will be produced every December through 2021, starting in 2017.
- b) In December 2021 a draft and then final project report will be produced.

***Budget:*** \$38,000

**Task 6 – Public Education**

- 6.1 One (1) public information meeting will be held each year. At these meetings, the management activities will be discussed as will water quality and aquatic plant data. Public input will be taken relative to the perception of in-lake activities effectiveness and this information will be used to update the annual adaptive plan.
- 6.2 A Public Involvement and Education Plan (PIEP) for developing and implementing the public education and outreach for the citizens of Long Lake and its watershed will be produced by Kitsap County. The plan will specify the goals and objectives of the outreach efforts to inform citizens about water quality and aquatic plant data results, and to educate residents about actions they can take to reduce the amount of phosphorus that enters the lake.

***Deliverables:***

1. At a minimum, one public informational meeting annually.
2. Completion and implementation of a Public Involvement and Education Plan.

***Budget:*** \$28,000

**Total Budget**

**\$630,000**

**Itemized Budget by Task**

<b>Task</b>	<b>Total Cost from LMD</b>
Task 1 – Project Management	\$24,000
Task 2 – Planning and Permitting	\$38,000
Task 3 – In-Lake Activities	\$288,000
Task 4 – Lake and Stream Monitoring	\$54,000
Task 5 - Reporting	\$38,000
Task 6 – Public Education	\$28,000
<b>Total</b>	<b>\$470,000</b>

**References**

Jacoby, J.M., D.D. Lynch and E.B. Welch. 1982. Internal phosphorus loading in a shallow, eutrophic lake. *Water Res* 16:911-919.

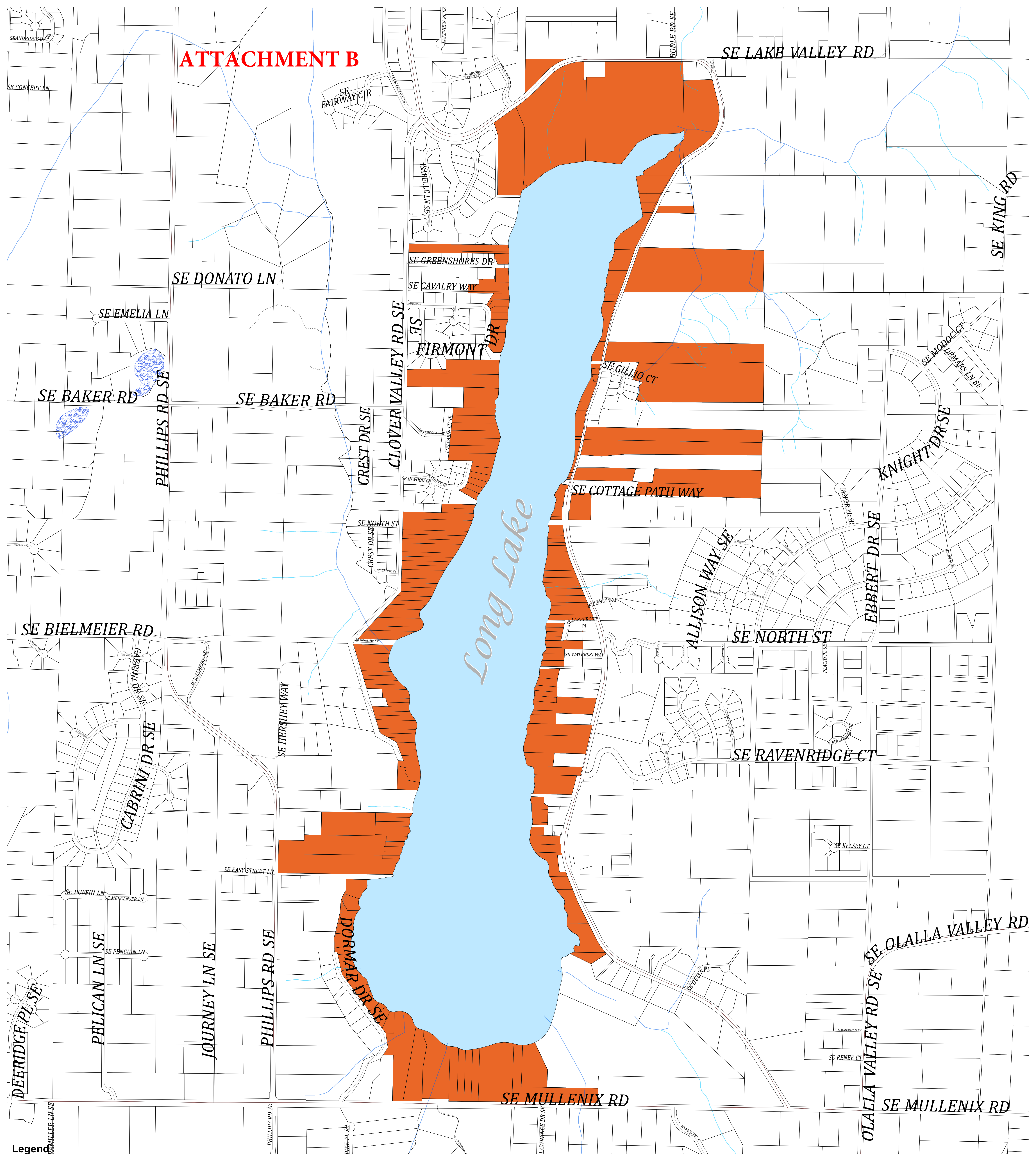
Jacoby, J.M., E.B. Welch and I. Wertz. 2001. Alternate stable states in a shallow lake dominated by *Egeria densa*. *Verh Int Verein Limnol* 27:3805-3810.

Welch, E.B. 1996. Control of phosphorus by harvesting and alum. Water Res. Ser. Tech. Rep. no 152, Univ. of WA, Dept. of Civil and Environmental Engineering.

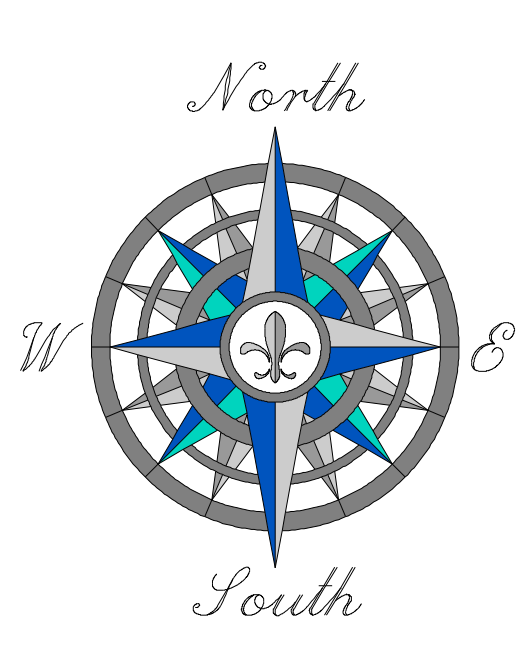
Welch, E.B. and H.L. Gibbons. 2010. Evaluating Effective restoration Techniques: Three Decades of Managing a shallow Eutrophic-Leaning Lake. *LakeLine* 30:38-44.



# ATTACHMENT B



- Legend**
- Subject Parcels
  - Tax Parcels (Full Ownership)
- Street Center Lines**
- HIERARCHY**
- Collector / Arterial
  - Local Access; Local Road
  - Long\_lake
- Waterbodies (defined in WAC 222-16-030)**
- WaterBody Cartographic Feature Code**
- Marsh, wetland, swamp, bog
- Watercourses (defined in WAC 222-16-030)**
- Fish Habitat Water Type Code**
- (F) Fish Habitat
  - (N) Non-fish Habitat
  - (U) Unknown, unmodeled hydrographic feature.



## Long Lake

Subject Parcels abutting the shoreline of Long Lake



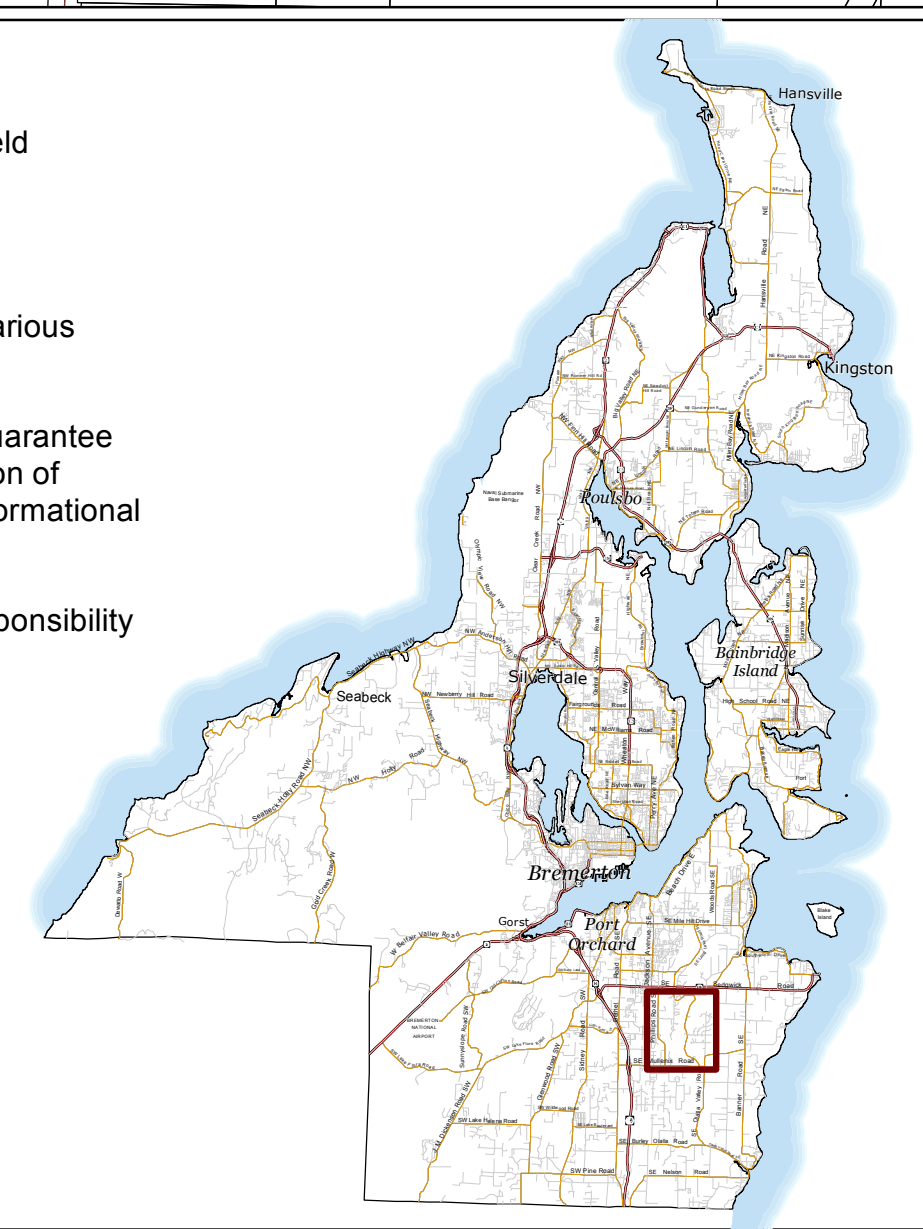
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The information on this map may have been collected from various sources and can change over time without notice.

While great care was taken in making this map, there is no guarantee or warranty of its accuracy as to labeling, placement or location of any geographic features present. This map is intended for informational purposes only and is not a substitute for a field survey.

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