PARK BOARD REGULAR MEETING AGENDA
Community Center
1808 Main Street, Lake Stevens
Tuesday, January 22, 2013

CALL TO ORDER:		6:00 pm	
ROLL CALL:			
GUEST BUSINESS:			
ACTION ITEMS:	A	Approval of November 27, 2012 Minutes*	Russ
	B	Election of Officers	Russ
DISCUSSION ITEMS:	A	2013 Park Plan Update Scope of Work & Schedule*	Russ
INFORMATION ITEMS:	A	Lake Stevens Phosphorous Plan*	Mick
	B	Centennial Trail Grant Map	Russ
COMMISSIONER REPORTS:			
PLANNING DIRECTOR'S REPORTS:			
ADJOURN:			
PROPOSED FUTURE AGENDA ITEMS:			

*ITEMS ATTACHED
**ITEMS PREVIOUSLY DISTRIBUTED
#ITEMS TO BE DISTRIBUTED

THE PUBLIC IS INVITED TO ATTEND

Special Needs

The City of Lake Stevens strives to provide accessible opportunities for individuals with disabilities. Please contact Steve Edin, City of Lake Stevens ADA Coordinator, (425) 377-3227, at least five business days prior to any City meeting or event if any accommodations are needed. For TDD users, please use the state's toll-free relay service, (800) 833-6388, and ask the operator to dial the City of Lake Stevens City Hall number.

CITY OF LAKE STEVENS
PARK AND RECREATION PLANNING BOARD
REGULAR MEETING MINUTES
Community Center
1808 Main Street, Lake Stevens
Tuesday, November 27, 2012

CALL TO ORDER: 6:04 pm by Co-Chair Jones

MEMBERS PRESENT: Co-Chair Chris Jones, Marlene Sweet, Carl Johnson and Terry Van Wyck

MEMBERS ABSENT: Will Brandt, Chair Leland Adams, Roger Schollenberger

STAFF PRESENT: Senior Planner Russ Wright and Public Works/Planning Coordinator Georgine Rosson

OTHERS PRESENT: Councilmember Suzanne Quigley

Excused absence. Motion to excuse Board Member Brandt by Board Member Sweet, second by Board Member Van Wyck, motion passed 4-0-0-3. Motion to excuse Board Members Adams and Schollenberger by Board Member Johnson, second by Board Member Van Wyck, motion passed 4-0-0-3.

Guest business. None

Approval of Minutes from September 25, 2012: Board Member Johnson motioned to approve minutes, Board Member Van Wyck second, motion passed, 4-0-0-3.

Discussion Items:

Photo Assignments: Senior Planner Wright discussed the photo assignments, reviewing what photos have been received and what is still needed. Board Member Sweet mentioned she was not able to take pictures at Eagle Ridge Park. Board Member Jones volunteered to take pictures at Eagle Ridge Park. Senior Planner Wright stated he would look at the photo assignments. The purpose of the photos is to create a new slide show on the website.

P*ark Plan Process*: Senior Planner Wright presented the framework for the parks element update process. Scoping/Information gathering is the first step, including an inventory of parks, reviewing level of service, and looking at ideas and programs from other jurisdictions. Community outreach is part of this step, which may include open houses and online surveys. The analysis and recommendation stage is the second step where the needs of the community are assessed and formal meetings are held. The comprehensive plan process is the final step, which includes public meetings/hearings with Planning Commission and ultimately City Council for adoption. Board Member Jones asked about “tot lots,” Senior Planner Wright responded that tot lots would be included in the parks inventory and addressed through the update.

Information Items:

Centennial Trail Sign Grant: Snohomish County has received a grant to install informational signage along the Centennial Trail, and the County has been soliciting ideas from the various cities along the trail. Senior Planner Wright presented suggestions the city has come up with so far. The signage should represent the local history of the area along with services available. Board Members discussed sign content and possible locations of the signs. Councilmember Quigley suggested placing a greater emphasis on the lake and activities on the lake.

Board members raised questions regarding ownership of an existing sign at the corner of Machias Rd and 20th St. NE. Planner Wright stated he would look into ownership.

Councilmember Quigley asked about the timeline for the sign project; Planner Wright will follow up on the timeline.

Board Member Jones asked about plans for better access from the trail into downtown. Planner Wright and Councilmember Quigley responded the city has received a grant to improve pedestrian access along 20th St. NE into downtown.

Board Member Reports: Board Member Johnson mentioned the work plan and asked about status. Board Members thought it would be a good idea to review the work plan at the January meeting and possibly go before the Council as a group in February 2013.

Planning Director's Reports: Senior Planner Wright mentioned a department project recently completed, staff put together a critical area inventory and map showing location and type of potential critical areas throughout the city. This map will be a great help reviewing future projects

Adjourn. Board Member Johnson motioned to adjourn at 6:41 p.m., second by Board Member Van Wyck, Motion passed (4-0-0-3).

Chris Jones, Co-Chair	Georgine Rosson, Planning/Public Works Coordinator

Staff Report
City of Lake Stevens
Park & Recreation Planning Board

Park Board Briefing
Date: **January 22, 2013**

Subject: **Parks & Recreation Meeting**
Contact Person/Department: **Russell Wright**, Senior Planner

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SUMMARY:
Discuss 2013 Park Plan Update Scope of Work & Schedule and receive information on draft Phosphorous Plan.

Discussion Item 1 – Park Plan Update
Staff has attached a draft Scope of Work and Schedule for the proposed city's Park and Recreation Plan 2013 update. The city would like to ensure its plan continues to address the recreational needs of the community. The city would also like to make sure that the plan contains all of the elements, recommended by the Recreation & Conservation Office (RCO), which enable the city to compete for grant funding for parks and recreation projects. Some of the important proposed revisions will include a current community survey, a review of the adopted Level of Service (LOS), and a needs analysis based on the recommended LOS. Staff will also develop an updated capital facilities list and provide a current fees survey to determine appropriate park impact fees.

Staff is looking to the Park Board to comment on the scope of work and proposed elements for inclusion in the updated Park Plan.

Staff will process the updated Park Plan as an amendment to the Comprehensive Plan during the annual docket process. Environmental review and public hearings may be held jointly with other amendments or individually.

Information Item 1 – Phosphorous Plan
Director Monken will discuss the proposed phosphorus plan for Lake Stevens.

Information Item 2 – Centennial Trail Grant Map
City staff has completed its coordination with Snohomish County and affected city's on the proposed interjurisdictional Centennial Trail Map. The map provides an overview of the trail from Snohomish to Arlington that highlights interesting facts and amenities for the cities along the route.

ATTACHMENT:
Draft Park Plan Scope of Work
Draft Park Update Schedule
Draft Phosphorous Plan

Draft Parks & Recreation Plan Update Scope of Work

I. Recreation & Conservation Office (RCO) Plan Requirements

A. Who Must Plan?

1. **Jurisdictions planning under the Growth Management Act**
2. **Jurisdictions seeking grant funding from the Recreation & Conservation Funding Board (RCFB)**

B. RCO Plan Recommendations

1. **Agencies must set a level of service (LOS) for park & recreation planning, including trails to identify system strengths & weaknesses**
   - *a) Number of Facilities (define percent between actual & desired)*
   - *b) Active Recreation Opportunities (percent of active facilities)*
   - *c) Facility Capacity (percent of demand met by existing facilities)*
   - *d) Agency Assessment (percentage of fully functional facilities)*
   - *e) Public Satisfaction (percentage of population satisfaction with facilities)*
   - *f) Population within Service Area (percentage of population with access to different facilities)*
   - *g) Access (percentage of facilities that can be accessed safely by pedestrian, cyclists, & transit*
2. **Estimate LOS for future need based on population growth**
   - *a) Consider participation by age group*
   - *b) User group organization & representation*
   - *c) Land use & land designations (greater density will require more parks)*
   - *d) Economic conditions*
3. **RCO required elements**
   - *a) Goals & objectives (goals describe desired outcomes, objectives are measurable & more specific)*
   - *b) Inventory (facilities & resources)*
   - *c) Public Involvement (description of public process e.g., meetings, surveys, publications, etc)*
   - *d) Demand & Need Analysis (analysis of public demand with your organization's capacity)*
   - *e) Capital improvement program (six year plan for acquisition, development, renovation, & restoration projects)*
   - *f) Plan adoption*

C. Growth Management Act & RCFB Plans

1. **Retain open space, conserve fish & wildlife habitat, increase access to natural resource areas, & develop parks/ recreational opportunities**
2. **Development regulations that protect critical areas**

3. **General distribution & general location & extent of land uses**
4. **Comprehensive plans include recreational elements, identify open space corridors within & between urban growth for wildlife habitat, trails, & connection of critical areas**
5. **Requesting agency must be party to a countywide planning policy**

D. RCO Review

1. **Agency submits a relevant plan to RCO**
   - *a) Agency submits draft plan to RCO for compliance review*
   - *b) RCO available to provide technical support*
   - *c) Agency submits final plan prior to funding cycle (March)*
2. **Certification**
   - *a) Agency completes manual requirements*
   - *b) Agency completes Self-Certification Form*
   - *c) Agency provides supporting planning, certification, & adopting documents to RCO*
3. **RCO approved plans eligible to apply for identified grant for six years**

II. Draft 2013 Park Plan Contents

A. Introduction

1. **Background of parks grogram**
2. **Relationship to Comprehensive Plan**
3. **Plan Mission & Vision Statements**
4. **Plan Purpose**
5. **Planning Process**
6. **Plan Accomplishments**

B. Community Profile

1. **Local & regional setting**
2. **Demographics**
   - *a) Population*
   - *b) Age*
   - *c) Economic Profile*
3. **Parks & Recreation Program**
   - *a) Park Board*
   - *b) Planning & Community Development*
   - *c) Public Works*
   - *d) Boys & Girls Club*
   - *e) Lake Stevens School District*

C. Parks Inventory

1. **Overview & Classification**
    - *a) Community Park*
    - *b) Neighborhood Park*
    - *c) Mini-Park*
    - *d) Special Use / Athletic Fields & Recreation Facilities*
    - *e) Partnerships*
    - *f) Open Space/Natural Areas*
    - *g) Trails*
2. **Public Parks & Recreation Facilities Inventory**
3. **Private Facilities Inventory**
4. **Open Spaces & Natural Areas**
    - *a) Lake Stevens*
    - *b) Streams*
    - *c) Wetlands*
    - *d) Native Growth Protection Areas*
5. **Present & Future Demand Analysis**

D. Level of Service

1. **LOS defined**
2. **Analysis of current LOS**
3. **LOS for Population Growth based on ROC Indicators**

E. Park Needs

1. **Goals & Objectives for needs (acquisition & development)**
2. **Goals & Objectives for recreation programs**
3. **Goals & Objectives for maintenance & operations**

F. Volunteers & Partnerships

G. Implementation

1. **Program expenditures**
2. **Impact fees rate survey**
3. **Other revenue sources**

H. Appendices

1. **Plan survey**
2. **Impact fee rate survey**
3. **LOS comparison**
4. **Capital System Improvement Plan**

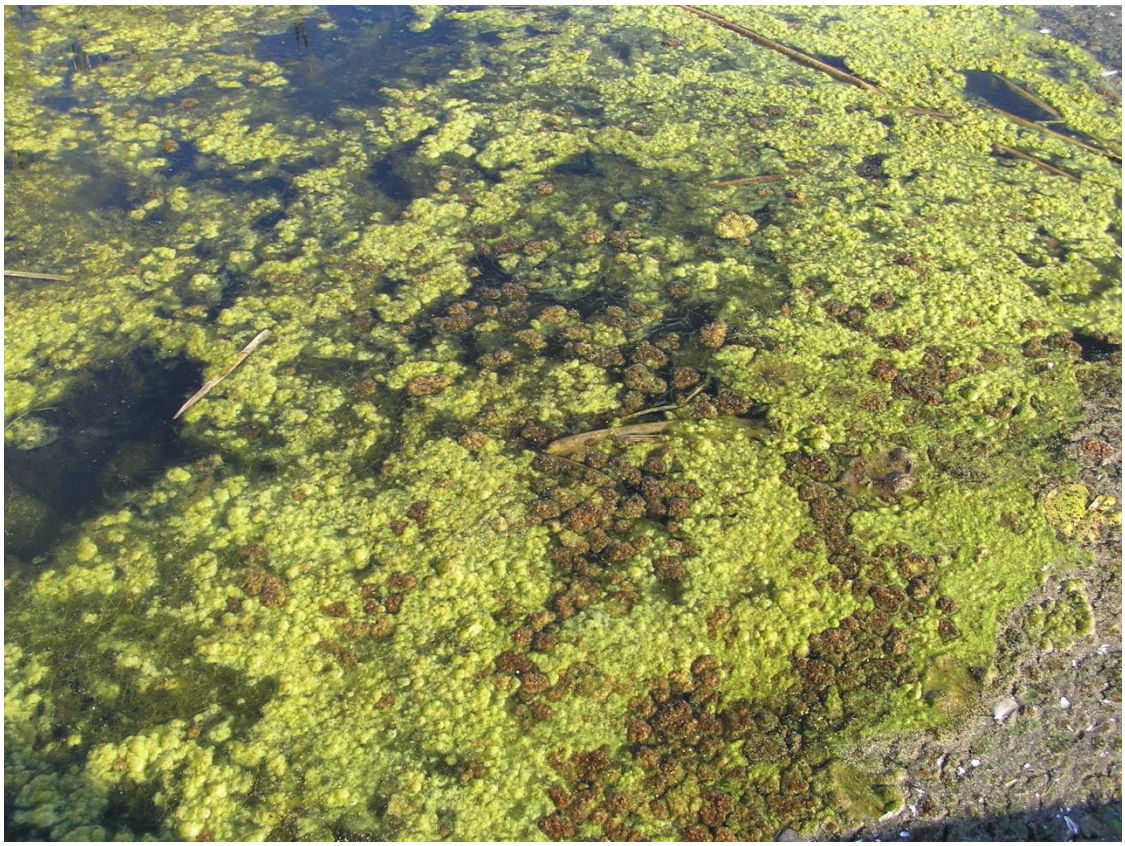
PROPOSED 2013 PARK PLAN UPDATE SCHEDULE

ACTIVITY	January	February	March	April	May	June	July	August
1. Introduce scope to Park Board	**1/22/13**							
2. Introduce scope to Planning Commission		**2/06/13**						
3. Staff reviews Park Plan, reviews plans from other jurisdictions & assembles facility inventory	1/2013 – 2/2013							
4. Staff update w/ Park Board & Public Visioning Open House		**2/26/13**						
5. Staff develops LOS analysis & needs survey based on LOS & community vision		2/2013 – 3/2013						
6. Staff update w/ Park Board			**3/26/13**					
7. Staff distributes needs survey to public				4/2013				
8. Staff prepares Goals & Objectives/plan outline			3/2013 – 4/2013					
9. Staff update w/ Park Board				**4/23/13**				
10. Staff assembles survey results & prepares 1st draft of Park Plan & implementation strategy				4/2013 – 5/2013				
11. Draft to Park Board for recommendation					**5/21/12**			
12. Staff presents revised draft to Planning Commission						**6/5/13**		
13. Staff introduces Park Plan to City Council						**6/17/13**		
14. Planning Commission public hearings							**7/3/13**	
15. City Council public hearing							**7/15/13**	
16. City Council approves Park Plan								**8/5/13**
17. Staff update w/ Park Board								**8/27/13**

DRAFT **January 18, 2013**

DRAFT

PHOSPHORUS MANAGEMENT PLAN 2013



(Algae bloom June 2012)

Revision: 3 January 2013

Plan Purpose

This phosphorus management plan defines: the existing condition of the lake and watershed; options to address these conditions; and a recommendation to provide for short and long term solutions to the excessive phosphorus loading of Lake Stevens. The plan services as a guide document and will be used for funding consideration.

Problem Statement

Lake Stevens continues to have an influx of internal and external phosphorus loading[1]. While phosphorus is important to the health of the lake, high levels of phosphorus can result in water quality deterioration and unwanted algae blooms. The aerator has provided an acceptable level of phosphorus reduction resulting from internal loading from the lake's sediment since 1994. However, the long-term viability of aeration as the single treatment method for excessive phosphorus is unsustainable because of the limitation of the iron bonding capacity within the lake being exceeded by the total volume of internal and external phosphorus loading. In addition, the aerator is very costly to operate and maintain and it is approaching the end of its life-span. With or without the use of the aerator, lake conditions will deteriorate unless a suitable in-lake treatment plan is implemented to help reduce phosphorus levels (TetraTech, 2009). The photo below shows a blue-green algae bloom that occurred in the spring of 2012 when oxygen levels were still high within the lake. This is an indicator of high phosphorus nutrients in the water column.

Figure 1 - June 2012 Algae bloom condition – indication of high phosphorus suspended in the water.

1 "Loading" refers to input of a nutrient per unit of time.

Background

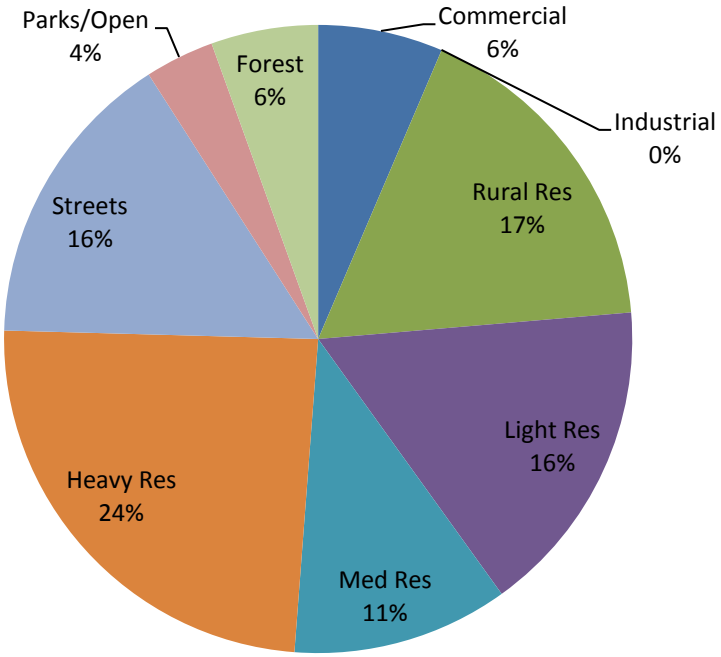
Lake Stevens is the largest natural lake in Snohomish County. The lake covers 1013 acres, and has an average depth of 62 feet (19 meters) and a maximum depth of 150 feet (46 meters). Lake Stevens is fed by Stevens, Lundeen, Kokanee, and Stitch creeks, which comprise the major sources of water feeding the lake. The Lake Stevens watershed area is 4,498 acres including the lake's surface. This 4:1 ratio is a relatively small drainage basin for a lake of this size. The outfall of the lake drains into Catherine Creek and then to the Pilchuck River.

From the 1950's and into the 1980's, Lake Stevens experienced frequent algal blooms, a decline in water clarity, and poor water quality due to increases in phosphorus loading. Initially, external loading was due to forestry and agricultural practices, and in later years, nutrients from housing and commercial developments (Snohomish County 2008). Internal loading was occurring simultaneously from a natural chemical cycling where phosphorus and iron bond in an oxygen enriched environment in the sediment. During the warmer summer months, the sediment in the lake doesn't receive enough oxygen and the chemical reaction which originally immobilized phosphorus is reverses, releasing phosphorus from its bond with iron. In 1994 an aerator system was installed to maintain the required dissolved oxygen levels into the sediment area (hypolimnion) to sustain iron and phosphorus bonding during months when oxygen levels at the lake bottom dropped.

Phosphorus is essential for plant and animal life in an aquatic ecosystem, however an excess of this nutrient acts as a fertilizer and stimulates the growth of algae. This increase dramatically accelerates the rapid growth and death of blue-green algae that clouds water, reduces dissolved oxygen, and can poison fish and wildlife – causing a threat to the health and overall quality of the lake and its surrounding environment (Ecology, 2011).

Phosphorus Sources

Phosphorus is a metal that is found is rocks, soils, and most life forms. It is a natural occurrence and important element to the life cycle of most organic life. As with most lakes, the phosphorus in Lake Stevens comes from internal and external loading sources. Internal loading is phosphorus that is already in the lake. In a review performed by Tetra Tech in 2012, it is estimated the average internal phosphorus load is 432 kg/year (952 lb/year). This comes mainly from two sources: 1) sediment release; and 2) cycling.



Graph A – Existing external P loading/land use shown

Sediment release is where phosphorus has attached to material in the sediment and has settled into the lake bottom. This phosphorus is released by disturbance of the sediment and through lack of oxygen (ie: iron bonding). Cycling is a natural occurrence in the plant and animal life system where organics uptake phosphorus in the growing and feeding stage and the phosphorus is recycled back into the water through waste and decay.

External loading comes from naturally released and imported sources of phosphorus. The natural sources come from erosion of rocks and soils (where phosphorus originates) and from plant and animal decay and waste. The imported sources comes from such things as fertilizers, soaps, dirt collected on vehicles, leaking septic/sewer waste, water fowl and from pets and livestock. While the exact amount of external phosphorus loading is not known, an estimate was prepared by TetraTech in 2012 using current land uses and King County's published loading coefficients for land-use types. The results are shown in Graph A and Table 1.

Table 1. Estimated Existing External TP Loads per Land-use Area (Tetra Tech 2012)

Land-use Categories	**Existing Phosphorus Loads kg/yr (lbs/yr)**
Commercial (Office/Commercial/Business)	25.2 (56)
Industrial	0.0 (0)
Light Rural Residential (<1.0 units/acre)	68.0 (150)
Light Urban Residential (1.0 to 4.0 units/acre)	65.0 (143)
Medium Urban Residential (4.0 to 6.0 units/acre)	43.8 (97)
Heavy Urban Residential (>6.0 units/acre)	95.8 (211)
Streets/ROW	61.2 (135)
Park/Open Space	14.2 (31)
Forested	21.8 (48)
Open Water	0.0 (0)
TOTAL PHOSPHORUS LOAD	395.1 (871)

From this table it is estimated that approximately 70% of the external loading comes from residential land uses with approximately 15% from streets. By comparison, internal loading makes up a little more that 50% of the total lake loading.

The external loading of phosphorus has substantially declined since 1986/87 levels. During that period, annual external phosphorus loading was estimated to be 1,385 kg per year (3,053 lbs/year). This reduction (over 70% of current P loading) was a result of restricting access of seagulls to a local land fill which were using Lake Stevens as their home.

Aerator

The aerator's function is to provide oxygen to the sediment to maintain a phosphorus-iron bond. During the summer months oxygen levels are depleted, especially in the deeper water, and the aerator is activated to replenish the oxygen in the water column. The aerator typically operates from late June through October. The activation is determined based on oxygen level readings of the lake (performed by Snohomish County).

The cost to operate and maintain the aerator system is share between with the City and the County with the City covering the majority of the costs. The share paid by each agency is based on the amount of watershed area contributing to the lake. The annual cost to operate the aerator is approximately $35,000 which includes power consumption and staffing. However, for the past six years the estimated average annual cost including maintenance (repairs) has been estimated at over $110,000 per year.

In 2012, the aerator system in the lake stopped functioning when the float support structure failed. Emergency temporary repairs were performed to keep the aerator system from sinking but it was not operational following the work. The repairs to make the system operational were estimated to exceed $100,000 and would take months to complete. In addition, it was discovered that there may other problems with the system that could not be inspected until the initial operational repairs were completed. A decision was made by the City and County to reassess the continued operations of the aerator system prior to expending further funds on repairs.

Phosphorus Management

A phosphorus managing strategy needs to focus on activities in the watershed and in-lake restoration techniques. According to Washington State Department of Ecology, lake management approaches fall into two categories: 1) the quick-fix; and 2) the long-term. The quick-fix is addressing the symptom, such as an algae treatment but does not address the underlying causes of the problem. A quick-fix being only a short term solution is not considered a good investment of resources. To be effective, a phosphorus management plan needs to be a long-term strategy and commitment.

Long-term management should consider the environmental, cultural, and biological factors affecting the lake and sets a priority on finding lasting solutions. It will require a coordinated effort of community groups, individuals, landowners, and the City and County.

It is important to understand that the phosphorus problem that Lake Stevens is experiencing is a combination of both internal and external loading. If the external source could be entirely eliminated, Lake Stevens would continue to have a phosphorus problem for possibly several decades. This is because phosphorus would continue to recycle within the lake from vegetation and animal life cycles, as well as release from the sediment, continuing the cyclic recurrence of algal growth, death, decay, and overall eutrophication[2] of the lake. Conversely, if only the internal loading is addressed, the phosphorus condition in the lake will improve but the introduction of new phosphorus would offset the initial benefits of the treatment. Therefore in order to be successful the program should strive to manage both external and internal nutrients.

Aluminum sulfate (alum) is the most commonly used nutrient inactivation chemical for lake projects. Managers may also apply alum in small doses to precipitate water column phosphorus. When applied to water, alum forms a fluffy aluminum hydroxide precipitate called a floc. As the floc settles, it removes phosphorus and particulates (including algae) from the water column (precipitation). The floc settles on the sediment where it forms a layer that acts as barrier to phosphorus. As sediments release phosphorus, it combines with the alum and is not released into the water to fuel algae blooms (inactivation). Algal levels decline after alum treatment because alum addition reduces phosphorus levels in the water. (Except from Washington State DOE web site)

2 Excessive richness of nutrients in a lake that stimulate excessive plant growth.

Phosphorus Control Alternatives

There are three basic alternatives to manage the phosphorus loading in Lake Stevens: 1) control internal loading within the lake; 2) reduce external loadings entering the lake; and 3) take no action. Within alternate one and two are possible options that can be considered standalones to accomplish some portion of the phosphorus control. A combination of option one and two is possible too.

Control Internal Phosphorus Loading

ID	Option	Discussion	Phosphorus Control	Estimated annual cost
IL 1	Operation of the aerator only	Aerator is near its life span and has required annual repairs. It is expected that the aerator will need some major repairs in the next five years to keep it operational. The estimated annual cost for O&M is $120,000 with an additional $400,000 estimated to the major repairs over the next five years. It may be possible to continue to extend the life of the system, vs replacement, by the performance of continued repairs and upgrades. While it is unknown the extent of this type of improvement needed to accomplish this, it is estimated that a set aside cost of $200,000 annually should be budgeted (include O&M)	Controls phosphorus bonded with iron in deep water lake sediment. Does not control phosphorus suspended in water column. Aerator abilities to control new phosphorus loading are currently near capacity and algae occurrences are expected to increase.	$200,000
IL 2	Aluminum sulfate (alum) Treatment only to water column	Aluminum is within the lake from natural occurrence. Addition of aluminum concentration in the lake water is an acceptable practice by the State DOE and would be applied to maintain within EPA drinking water standards very shortly after application.	Controls phosphorus loading in water column. Long term usage of alum is expected to result in a permanent reduction of internal phosphorus loading from the sediment. Algae occurrences are expect to decrease shortly after an application.	$100,000
IL 3	Aerator and Alum Treatment	Combination of Option IL 1 and IL 2. With the use of the aerator, alum treatment area could be reduced. However, this would result in some phosphorus remaining in the water column.	In the short term, results are expected to be a decrease in algae however, if a reduction in Alum is applied (over IL 2), the sediment could continue to release phosphorus from the deeper waters.	$250,000 to $300,000

Reduce External Source Loading – The following options were developed using information provided from the City of Bellingham for phosphorus control on Lake Whatcom in an effort to reduce algae. The cost-benefit is defined solely as phosphorus reduction though there may be other benefit (eg: street trees also have a benefit of shade, reduction in runoff, and aesthesis). The costs shown only reflect costs to the City and not to others such as developers.

ID	Option	Discussion	Cost Benefit $/lb/P*
X 1	Reducing development land use	This could include the City's acquisition of developable land for open space, down zoning, lot consolidation, and incentives for open space	$190,000
X 2	Restoration of natural function of City land	City owned land would be restored to a natural condition such as re-forestation	$50,0000
X3	Vegetated swales	Creation of bio-filtering swales	$6,000,000
X 4	Rain garden	This could be a private or public bio-retention system that retains surface water runoff into a system that filters and infiltrates water on site. Due to soils conditions and water table levels, there are limited portions of the City where this could be used.	$6,600,000
X 5	Street trees	Planting of street trees along open spaces on	$9,405,000
X 6	Lawn replacement to bio-retention	Development of lands to retain water, similar to a rain garden, to prevent offsite runoff	$5,000,000
X 7	Dry wells	This is not considered feasible due to ground conditions within the City.	NA
X 8	Infiltration trench	It is likely used on private property with very limited usage on public roads	$318,000
X 9	Pervious pavement	New road construction would need to have both an infiltration system under the pavement and a off-site drainage system to accommodate higher volume storm events. The cost for maintenance of a pervious pavement for a roadway could be significant higher that a traditional paved roadway. Private parking is likely a good application.	$1,111,000
X 10	Infiltration basin	Storm ponds would be the common application of this type and would be best applied to new development. Due to the City's high water table and soil conditions, this application would be limited.	$172,721
X 11	Rainwater reuse	Benefits would be too low to estimate a cost to benefit number	NA
X 12	Onsite dispersion	This could be a private or public system that retains surface water runoff into a system that filters and infiltrates water on site. Due to soils conditions and water table levels, there are limited portions of the City where this could be used.	$4,853,000
X 13	Media filters	Installation of filtration systems would need to be installed at key locations prior to entering the streams. This would be difficult to provide an effective system due to the high number in outfalls.	$258,000

X 14	Sizing culverts to eliminate erosion	Benefits would be too low to estimate a cost to benefit number	NA
X 15	Street sweeping	The City performs this service regardless of the phosphorus benefit so cost is considered part of existing operation budget.	$28,500
X 16	Stream erosion control	Could provide indirect phosphorus reduction. Would be very time consuming to investigate and permit for work.	NA**
X 17	Ban phosphorus fertilizer	City would need to pass a regulation banning the use of phosphorus fertilizer and then implement an enforcement effort. Cost for this would be determined based on level of enforcement. This could be covered as part of education.	NA**
X 18	Watershed signs	Education effort to post signs around City. Estimate 300 sign placements. Estimated material cost $24,000. Staff time is not included.	NA**
X 19	Mass mailing	Preparation and mailing of education material. Mailing could be included in a utility billing. This assumes the cost of printing. Estimated material cost $3,000/year. Staff time is not included.	NA**
X 20	Online information	Post information on the City's web page	NA**
X 21	Newspaper articles	A press release a few times a year reminding the public of the impacts of phosphorus into the lake and methods to help reduce it.	NA**
X 22	Video presentations	This could be performed through the High School which has video capacity. This would then be posted on the City's cable site (Channel 21).	NA**
X 23	Community events	This is currently being practiced. The City has generated several handout flyers that are provided during community events when the City has a booth setup.	NA**
X 24	Onsite training	This would likely be in partnership with Snohomish County that is set up to provide this type of service to contractors, developers, and the general public. This would require a ILA with the County and it is anticipated that the City would share in the cost for staffing and information. It is estimated that this would be in the range from $6,000 to $20,000/year.	NA**
X 25	Resident contacts	Enforcement or education efforts to contact individuals based on observations or suspected practices that are generating phosphorus into the runoff. This could require extensive time to locate.	NA**
X 26	Project consultation	City would provide a consultation service to individuals (such as contractors) on methods to help in the control of phosphorus	NA**
X 27	Incentives	A fund account can be set up that provides monetary incentives for volunteer compliance in City identified methods of phosphorus reduction.	NA**
X 28	Forest condition to pre-development conditions	Does not apply to the City	$80.65

X 29	Design standard change	Update standards to reduce runoff from future impervious surfaces such as roads and sidewalks the use of infiltration and bio-filtering.	$371,171
X 30	Reconfigure roadside ditches	Existing roadside ditches would be modified to reduce erosion and provide plants to help with the removal of phosphorus. This would have a significant increase in O&M.	$6,000,000
X 31	Reconfigure streets	Modify streets to reduce runoff and improve filtration of surface water.	$4,755,000
X 32	Reduce vehicle trips	This has been incorporated into the two subarea plans and the sidewalk plan that helps reduce the dependents of vehicle for travel within the City.	NA
X 33	Improve recreation facilities	Provide enhancement to City recreation areas to reduce runoff. This study showed that the benefits to be very low.	NA
X 34	Watershed-wide enforcement	This would likely be in partnership with Snohomish County that is set up to provide this type of service to contractors, developers, and the general public. This would require a ILA with the County and it is anticipated that the City would share in the cost for staffing and information. It is estimated that this would be in the range from $10,000 to $40,000/year.	NA
X 35	Animal waste	City provides pick up bags at some recreation areas. Education material has been produced by the City that is provided at community events.	NA
X 36	Septic system to sewer connection	It is unknown the level of this condition within the watershed. City is talking with Sewer District on this item.	NA

"*" Cost information provided by "The Lake Whatcom Management Program Work Plan 2010-2014" – July 2010 CH2M Hill

- Costs do not include on-going maintenance and operations.

"**" The cost benefit is difficult to estimate and impossible to measure. It is important though that education can result in an accumulative result in phosphorus reduction.

Italic These are current practices in part or whole within the budget.

<u>Take No Action</u> - This is not considered a viable option as it is suspected that algae bloom events would be on an increase with the current internal and external loading.

Discussion

Due to the high levels of phosphorus already in the lake water column and sediment, removal of external phosphorus sources is expect to not be enough to address the water quality problem with algae. The aerator has been the main method for managing phosphorus within the lake for the past 19 years. Its treatment has maintained the iron-phosphorus bond in the lakes sediments in the deepest part of the lake and has had no effect on water suspended phosphorus or the shallow sediments. It had been effective means to controlling most of the phosphorus problems but in recent years the loading has exceeded the aerator's capacity. In addition, the aerator is close to its operating life and is in need of some extensive repairs and on-going maintenance.

In accordance with a study prepared for Snohomish County by Tetra Tech in September 2012, "Alum treatment, at even a modest maintenance dose, should control internal loading more effectively than continued aeration. Moreover, alum should have more of an effect on reducing the spring cyanobacteria blooms (algae) than aeration." This would address the condition in the lake from both internal and external loading. While alum treatment in the lake is a very cost effective solution, and can function as the only solution to addressing the condition, it does nothing to reduce the external loading condition.

The City of Bellingham had performed an extensive study to manage phosphorus condition in Lake Whatcom. This had an extensive list for reducing external loadings which was used in the development of the Reduce External Loading Source section of this plan. While the costs to benefit numbers are applicable to Lake Whatcom, most of their costs were used in this document for comparison purpose against the different options. From this information, the cost for controlling external loading can be beyond the ability of most public agencies. Especially when compared to the benefits. However, any effort that may reduce the external loading can have a long term effect to water quality and public's awareness.

Recommendations

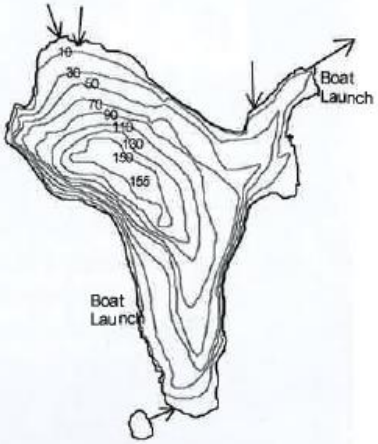
The recommendations are:

1. Control internal loading – Moderate level of Alum treatment to address seal in sediment and reduce internal loading. Alum treatment will also address phosphorus in
2. Reduce the external loading – education, regulations (code and standards), and annual monitoring in lake.
3. Phase out aerator – not a sustainable or long tern solution
4. Monitor and review – determine success of actions and revises as needed

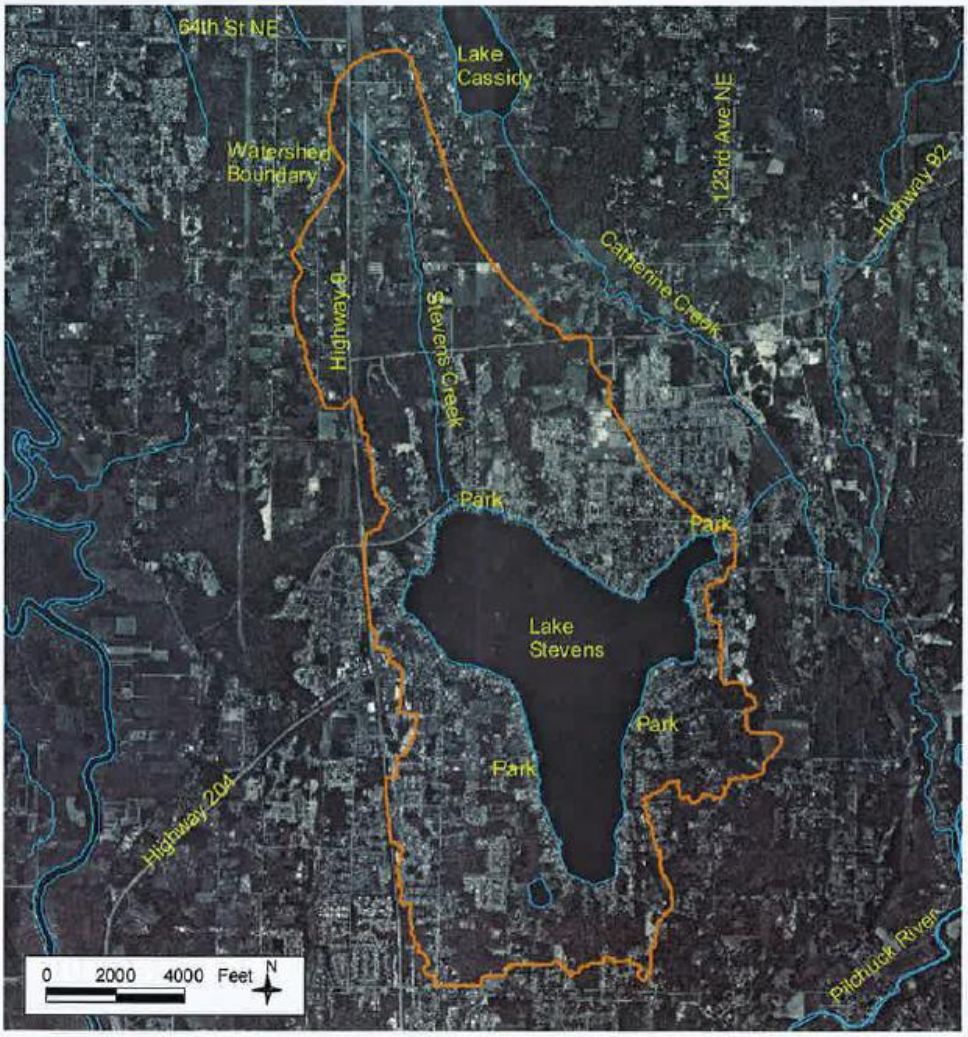
Attachment A

LAKE AND WATERSHED DATA

Lake Area:	1040 acres
Watershed Area:	4371 acres
Watershed to Lake Area Ratio:	4.2
Maximum Depth:	155 feet (47.3 meters)
Average Depth:	63 feet (19.4 meters)
Lake Volume:	65,000 acre-feet
Length of Shore:	7.1 miles



	1972	MID-90'S
# of nearshore homes	330	349
# of homes/1000' of shoreline	8.8	9.3
% of homes with bulkhead or fill		NA
% of homes with some native vegetation near shore		NA
% of watershed developed (residential or commercial)	20%	55% (est.)



Lake Stevens

Attachment B

PRESS RELEASE – 27 June 12

Algae Blooms in Lake Stevens

The City of Lake Stevens and Snohomish County Surface Water Management (SWM) have been monitoring a series of algae blooms occurring this spring on Lake Stevens. Most of the observed algae has been harmless filamentous algae which appears as green and brown free-floating mats. However, in mid-June, blooms of potentially toxic blue-green algae were also detected in isolated parts of the lake.

Also known as cyanobacteria, certain species of blue-green algae can produce toxins that affect the health of people and animals that recreate in lake water. Pets that drink lake water are of special concern. Blue-green algae look like blue, green, or even white paint floating on the surface of the water and will quickly dissipate if agitated.

Water samples were taken within hours of the initial confirmation of blue-green blooms. Since toxin testing takes several days, precautionary notifications were issued to nearby lakefront residents and CAUTION signs (see below) were posted at the public access location around the entire lake. The signs, warn people not to swim or ski in areas of scum, avoid drinking lake water, keep pets away from the water; clean fish well; and avoid areas of scum when boating.

Fortunately, the toxins of concern were found at levels below the recreational standards set by the Washington State Department of Health. The blue-green algae bloom has also since dissipated. Therefore, the CAUTION signs posted at all public access sites will be removed. The County and the City will continue to monitor the algae bloom. It is possible that blue-green algae blooms may re-occur this summer or fall. Citizens should exercise caution if blue-green algae scum is present.

Algae are microscopic organisms similar to plants that can be found in all freshwater lakes including Lake Stevens. Algae are a natural and essential component to the lake because they serve as the base of the aquatic food chain. However, excessive amounts of algae can occur in response to high levels of nutrients and favorable weather conditions. Typical nutrient sources are lawn fertilizers, runoff from roofs and driveways, and pet and animal wastes. Last year's Eurasian water milfoil treatment may also be contributing to the growth. The decomposing plant matter can become a localized source of nutrients feeding algae. This is typical in the first year following a treatment.

To find out more information, track conditions at Lake Stevens, report blooms, or sign up for email toxic algae updates visit the County's web site at: http://www.lakes.surfacewater.info.

Exhibit B

PHOSPHORUS TREATMENT
DRAFT FINANCIAL PLAN

The following table is the cost projections for the treatment of phosphorus only.

Year	Existing Budget/Forecast	Alum Treatment*	Aerator Only**	Aerator &Alum Treatment***
2013	$103,400	$100,000	$200,000	$250,000
2014	$105,300	$100,000	$200,000	$250,000
2015	$107,200	$100,000	$200,000	$250,000
2016	$109,100	$100,000	$200,000	$250,000
2017	$111,200	$100,000	$200,000	$250,000
2018	$113,200	$100,000	$200,000	$250,000
2019	$115,300	$100,000	$200,000	$250,000
TOTAL	**$764,700**	**$700,000**	**$1,400,000**	**$1,750,000**

Note:

'*' Includes application of alum and permitting. Not included is the removal of the aerator.

''** Includes operating costs, minor annual repairs, and one major repair. The major repair costs is spread over the time evenly. Not includes is replacement costs. It is assumed that the existing unit can be repaired for an extended time beyond a 20 year life (e.g.: 1994 to 2014).

'*'** Includes the same costs as the "Aerator Only" column plus a reduce dosage of alum treatment.

The following table is the cost projections for the aerator.

Alternative Treatment Type	Short Term (10 years)	Long Term (20 years)	Short Term Estimated Cost (10 year span)	Long Term Estimated Cost (replacement)
Alum Treatment	Aerator is left in place for 5 years during evaluation period	Aerator is surpluses and removed from lake	$300,000	$0
Aerator Only	Aerator is repaired as needed to keep operational with two major repairs expected	Aerator system is replaced	$2,000,000	$4,000,000
Aerator &Alum Treatment	Same as aerator only	Same as aerator only	$2,500,000	$4,000,000