



Lake Margaret Water Quality Management Strategy

Lake Margaret Water Quality Management Strategy

Public Information Centre

June 3, 2014





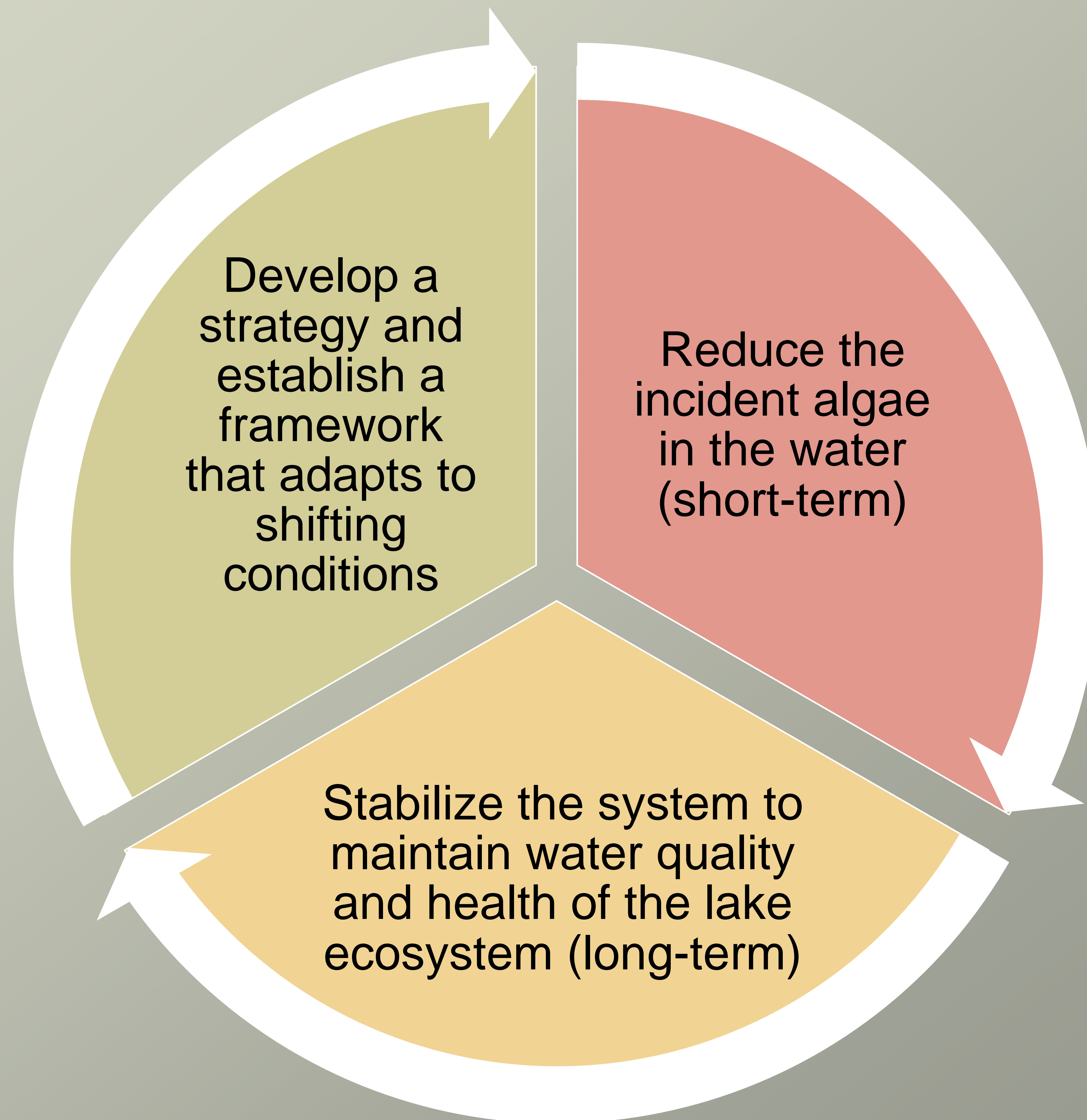
Lake Margaret Water Quality Management Strategy

Study Background

- Lake Margaret is a small lake, located on the periphery of the City of St. Thomas in an area of a growing residential community and along the edge of rural farm lands
- Nuisance algae blooms are common, odour is a minor issue and fish kills have been reported; caused by too much Phosphorous
- Sources of Phosphorous: fertilizer, detergent / soap, soil erosion, organic wastes
- Ensuring Lake Margaret's future has been identified as a priority by the City as they move toward transference of Lake Margaret lands from Doug Tarry Limited.
- The **Lake Margaret Water Quality Management Strategy** is a resource document to guide owners within the catchment area with options/strategies to maintain the water quality and health of the lake.
- This study builds on the recommendations of the Lake Margaret Environmental Management Plan (2010).

Lake Margaret Water Quality Management Strategy

Study Objectives





Lake Margaret Water Quality Management Strategy



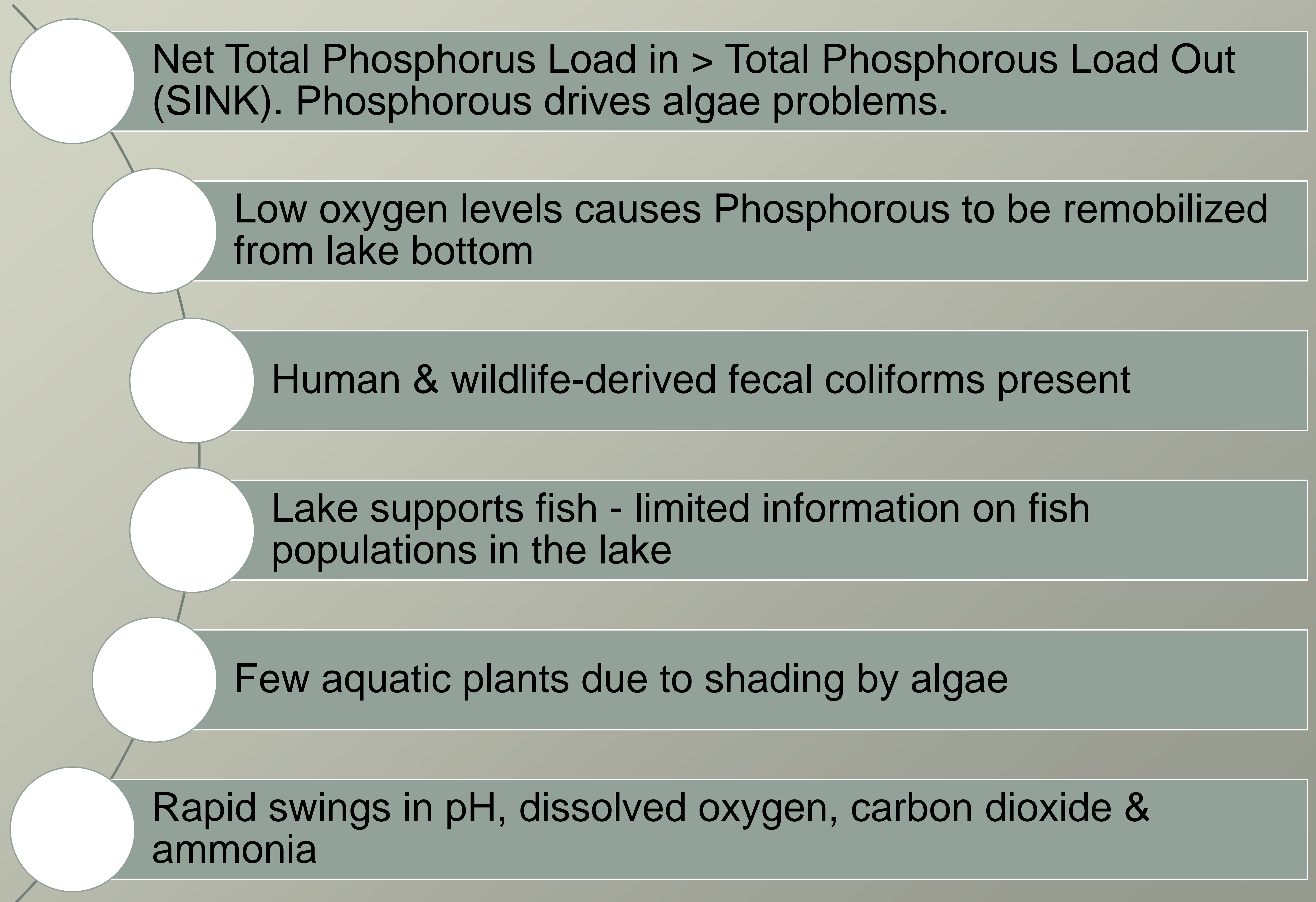
Project Schedule





Lake Margaret Water Quality Management Strategy

Diagnosis





Lake Margaret Water Quality Management Strategy



Prescription for Better Health

Actions In or Around the Lake

- Aeration/Bubblers
- Hypolimnion Withdrawal and Treatment
- Assess & Modify Fish Community
- Modify Outlet Structures
- Chemical Intervention (Lime)
- Dredging

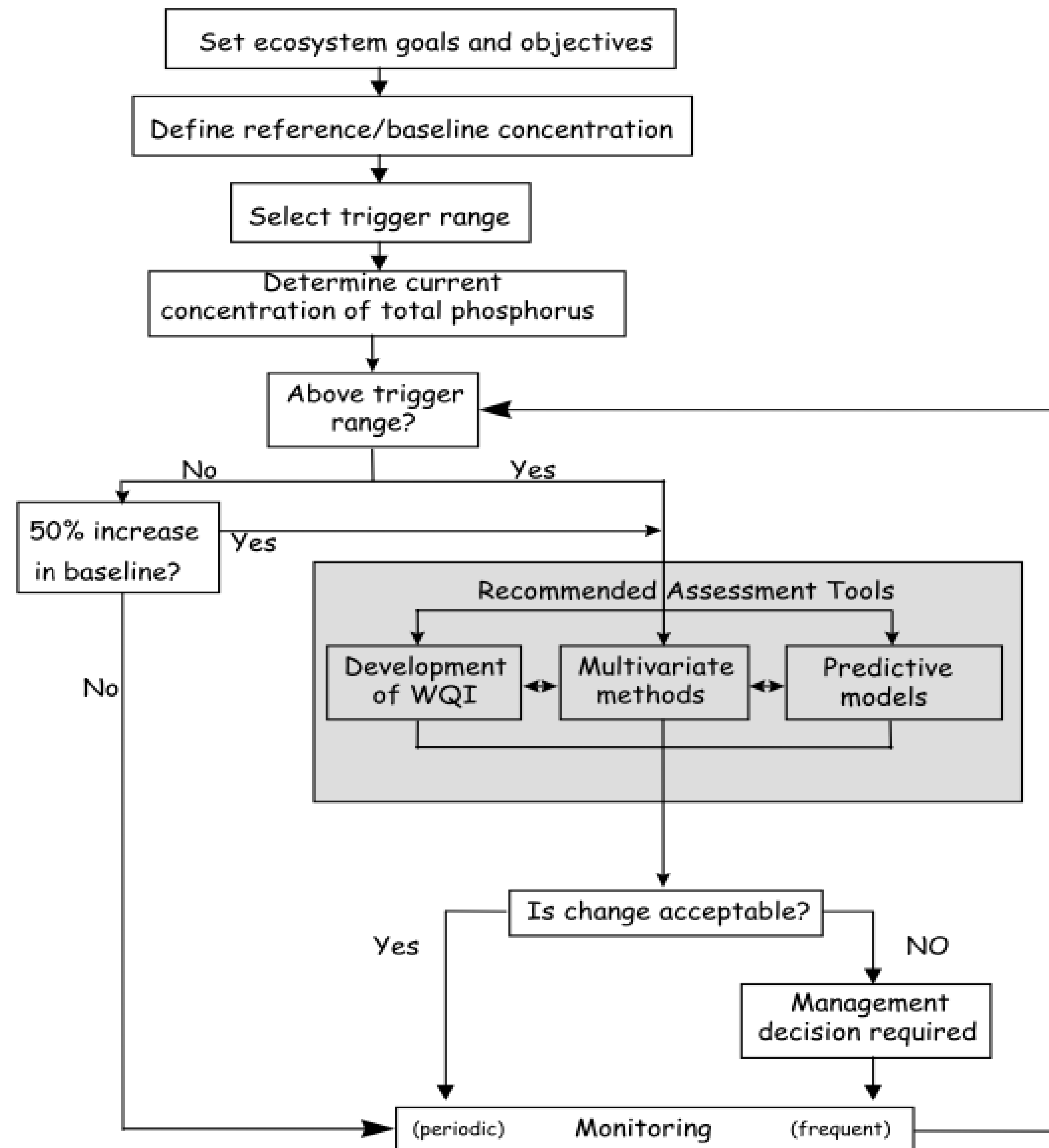
Actions In the Lake Catchment Area

- Eames Drain Wetland
- Phosphorous Removal Technologies
- Day-lighting Creek Concept
- Advanced Erosion and Sediment Controls during construction

Community Awareness Beyond Direct Actions

- Community Outreach Programs
- Watershed Report Cards
- Maintain Roof Leader Disconnection Program

Adaptive Environmental Management Approach





Lake Margaret Water Quality Management Strategy



Recommended Management Strategy

A detailed evaluation of Management Strategy actions was undertaken to establish the following Strongly Preferred Actions:

Select Long Range Water Quality Targets/Triggers

Assess Fish Populations & Modify Community

Modify Bottom Draw Outlet & Culverts

Alter pH Balance with Lime Addition

Identify source & address human-derived fecal coliforms

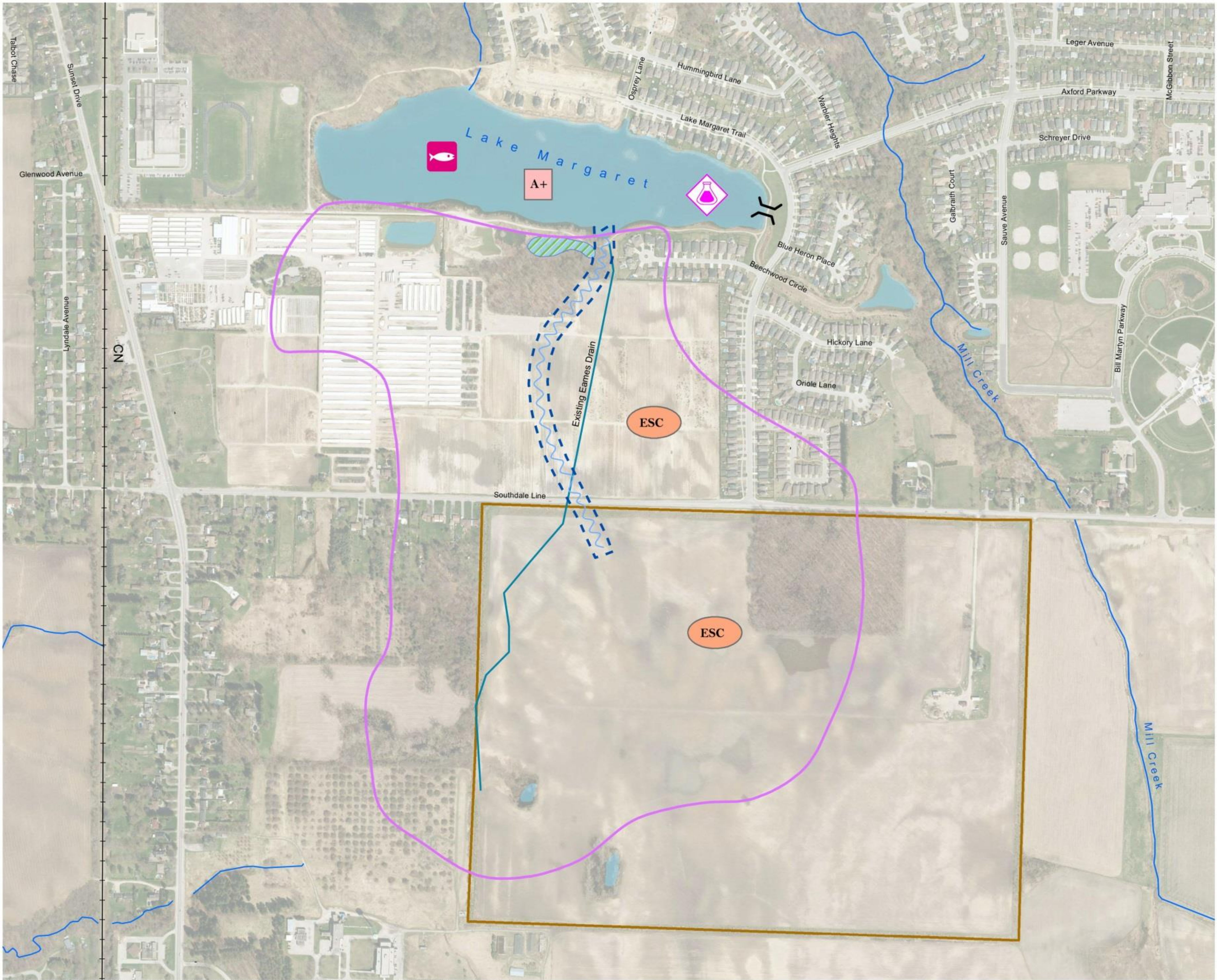
Eames Drain Wetland (Monitor and Allow Vegetation to Establish)

Erosion and Sediment Control/BMPs (During Construction)

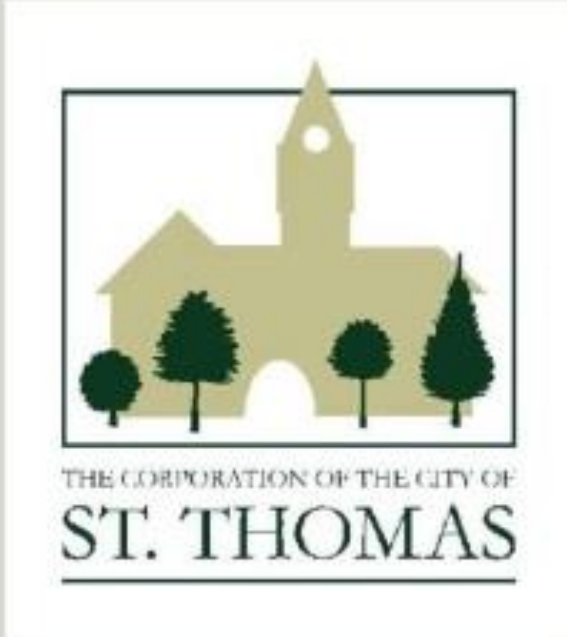
Day-lighting Creek Concept

Youth/Public Outreach Programs

Lake Margaret Watershed Report Card



FILE LOCATION: \\Dillon.ca\dillon_efs\Vancouver\Vancouver CAD\GIS\115117 Lake Margaret\Figure 12 Strongly Preferred Actions (April2014).mxd



City of St. Thomas
Lake Margaret Water Quality
Management Strategy

Strongly Preferred Actions
Figure 12

- Existing Eames Drain Alignment
- Wetland Features
- Lake/Waterbody/Existing SWM Pond
- Parish Property/Parish SWM Catchment
- Eames Drain Catchment
- Assess Fish Populations & Modify Community Trophic Levels
- Modify Bottom Draw Outlet
- Chemical Lime Addition
- Monitoring/Report Card
- Eames Drain Wetland (Monitor and allow Vegetation to Establish)
- Daylighting Concept
- Construction Erosion and Sediment Controls

Note: Stormwater Management Facilities are assumed to be implemented as part of future development approvals. These facilities may incorporate phosphorous removal technologies if required.



MAP DRAWING INFORMATION:
Dillon Created

MAP CREATED BY: ECH
MAP CHECKED BY: GT
MAP PROJECTION: NAD 1983 UTM Zone 17N



PROJECT: 11-5117
STATUS: DRAFT
DATE: 5/30/2014



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Assess & Modify Fish Populations

Current Conditions

Limited
information on
species &
abundance

Adaptive Environmental Management Tools

1-year
survey of
species
richness &
abundance

Determine
feeding
level &
depth of
water
inhabited

Stock under-
represented
species
(foragers,
grazers,
predators)

Selective
harvest of
top
predators

Habitat
restoration
of aquatic
plants



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Modify Bottom Draw Outlets

Current Conditions

Bottom draw outlets do not have capacity to draw anoxic water from lake bottom

Promotes retention & concentration of pollutants in the lake

Adaptive Environmental Management Tools

Reform outlets as a surface water outlet

Draws & removes water, skims zooplankton/phytoplankton from lake surface



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Alter pH Balance: Lime Addition

Current Conditions

Algae drives daytime & nighttime swings in pH, O₂ & CO₂

Adaptive Environmental Management Tools

Annual surface applications of non-toxic Agricultural Lime or Dolomitic Lime

Food chain becomes more effective at consuming & utilizing Phosphorous



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Identify source & address human-derived fecal coliforms

Current Conditions

Adaptive Environmental Management Tools

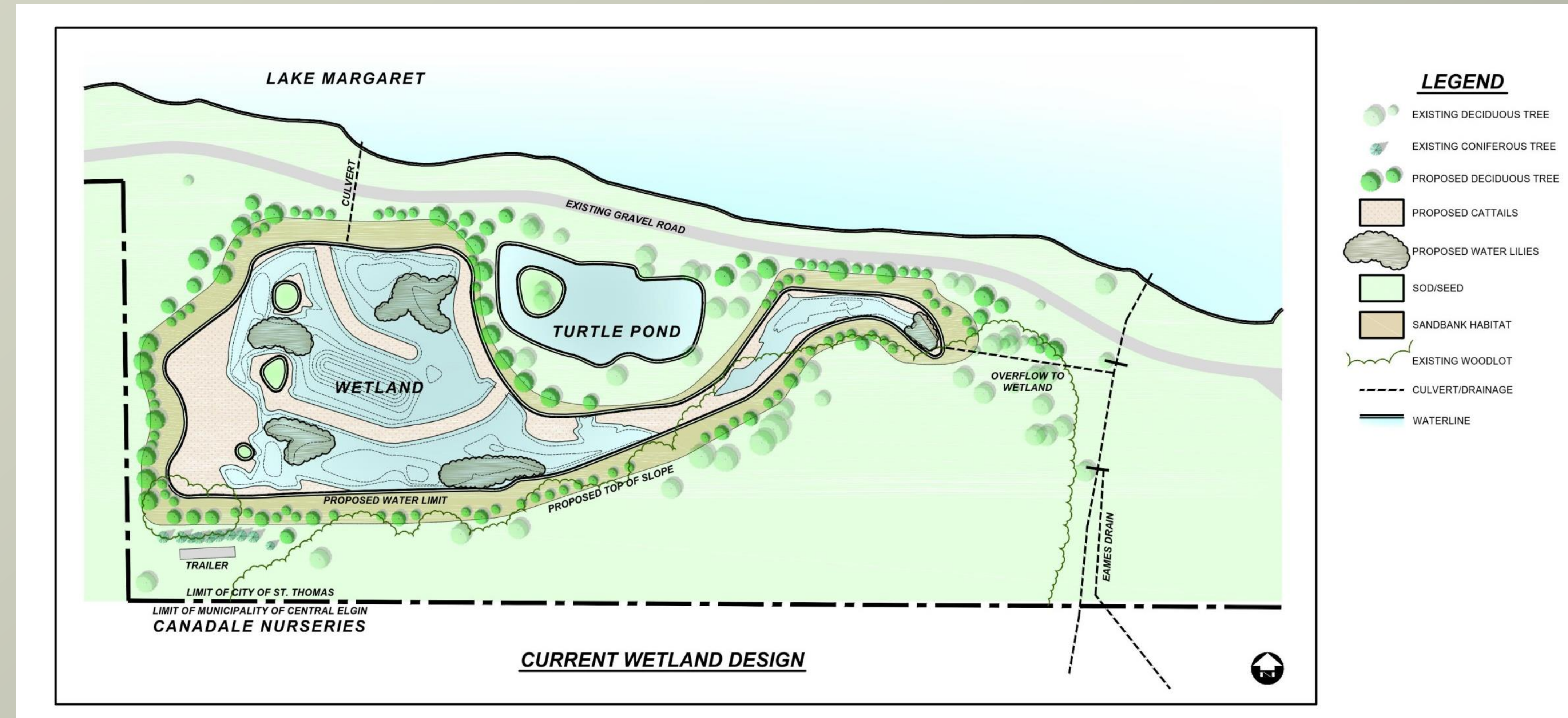
Human & wildlife-
derived fecal
coliforms present

Identify source of
human-derived
fecal coliforms in
the watershed

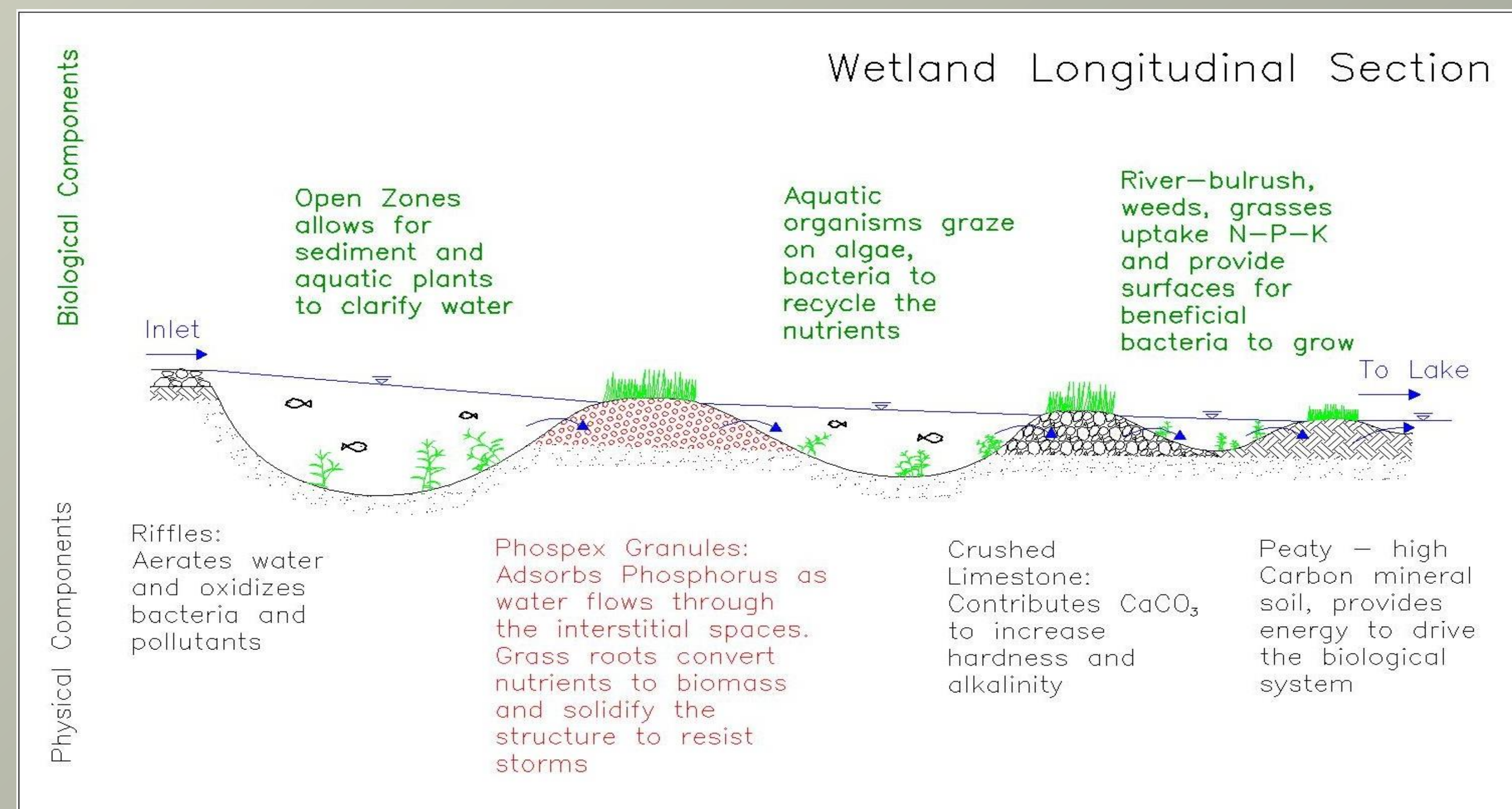
Repair faulty
septic systems

Address improper
drain connections

Eames Drain Constructed Wetland



Based on design provided by CJD L for Doug Tarry Limited



Potential changes to current wetland design



Lake Margaret Water Quality Management Strategy



Erosion & Sediment Controls

Current Conditions

Minimal topsoil runoff from farm/nursery operations

Risk of surface erosion increases during construction

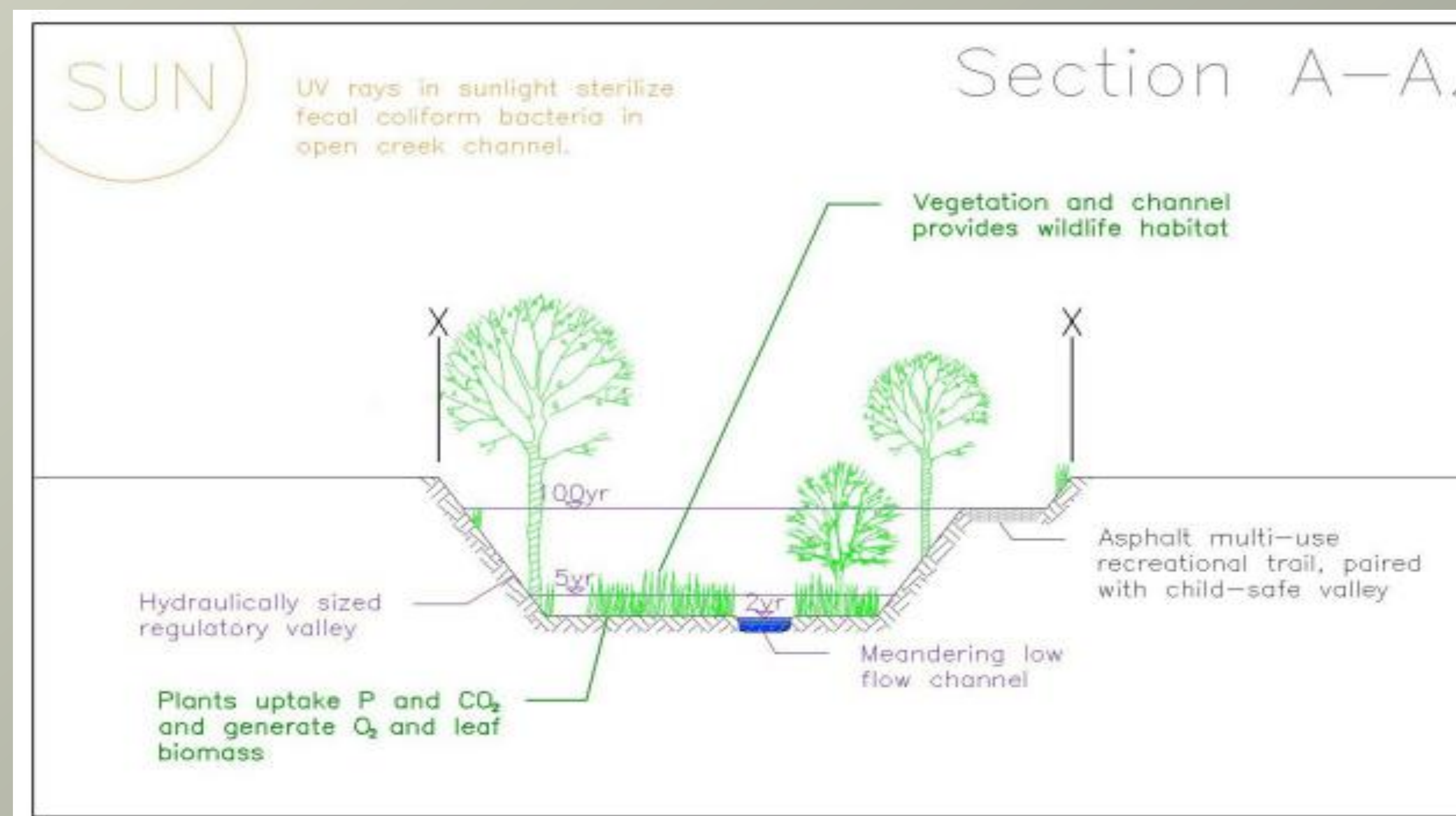
Increased sediment loads yield increased Phosphorous loadings

Adaptive Environmental Management Tools

Maintain land cover to reduce surface erosion

Construction staged with Erosion & Sediment Controls and Best Management Practices

Plans to be reviewed/approved by agencies





Lake Margaret Water Quality Management Strategy



Youth/Public Engagement Programs

Current Conditions

No youth engagement or public awareness program

Adaptive Environmental Management Tools

Environmental Summer youth program

Tree/shrub planting, habitat restoration & clean-up

Participate in water quality sampling, watershed reporting and annual lime applications

Public outreach about water use, fertilizer (mis)use & phosphorous contamination



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Lake Margaret Report Card

Current Conditions

KCCA
Reports on
health of
Mill Creek/
Kettle Creek

Adaptive Environmental Management Tools

Ongoing
monitoring
program

Adopt water
quality targets
&
performance
criteria

Pass,
Improving or
Failing grade

Regular
update on the
aquatic
ecosystem in
the lake



Lake Margaret Water Quality Management Strategy

Implementation Framework

Class 1

- Strongly preferred actions
- Should be implemented as soon as logistically feasible

Class 2

- Primarily strongly preferred actions
- May be completed as development proceeds & land uses change

Class 3

- Accessory/preferred actions
- Could be implemented as a result of the adaptive environmental management approach
- May be implemented through partnerships or when capital funds are available

Actions require additional (future) studies & monitoring programs in consultation with public and agency stakeholders.



Lake Margaret Water Quality Management Strategy



Next Steps



Thank You For Attending

- Please sign the attendance sheet
- Ask any questions you may have about the Management Strategy