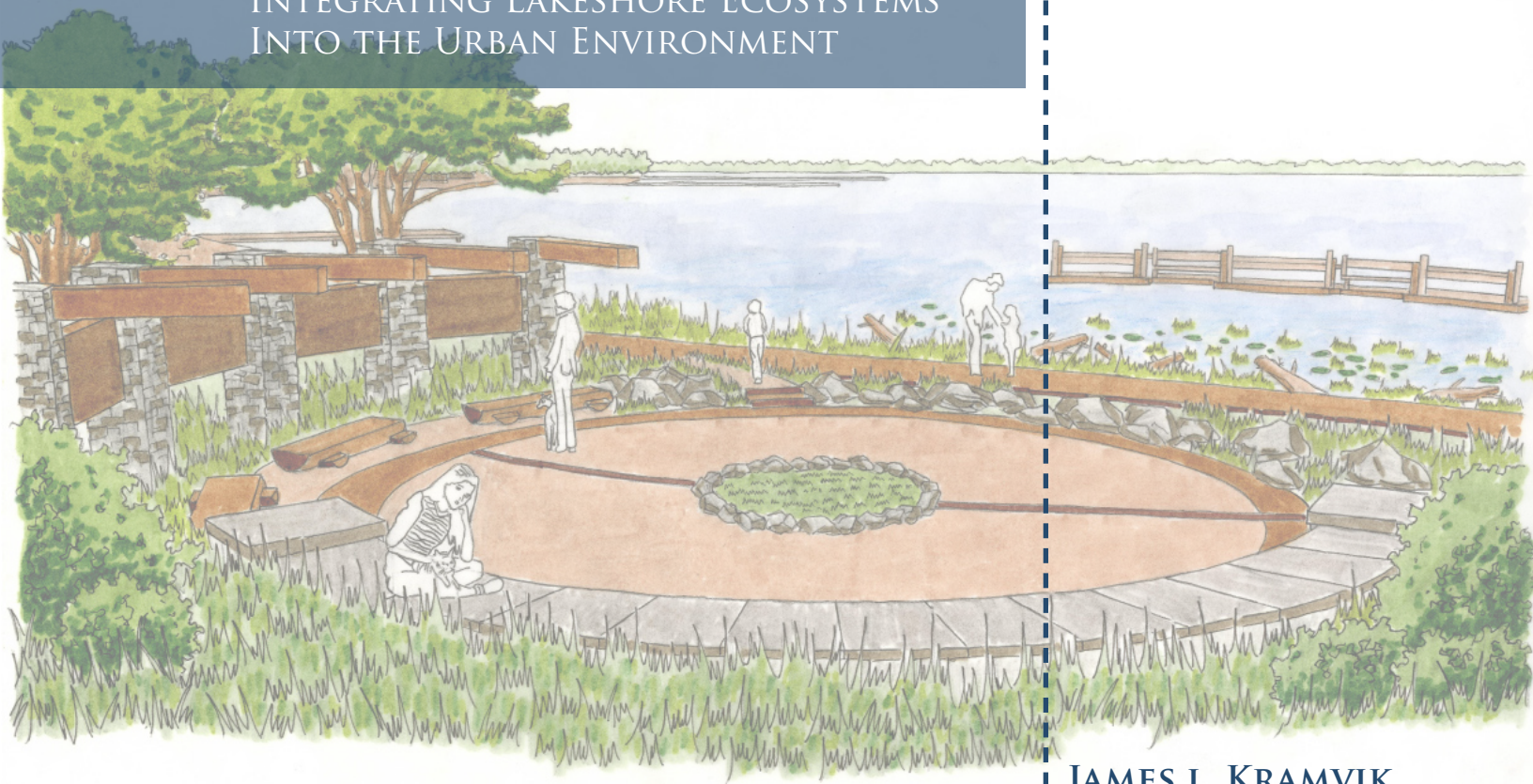


# SUSTAINABLE LAKESHORE DEVELOPMENT:

INTEGRATING LAKESHORE ECOSYSTEMS  
INTO THE URBAN ENVIRONMENT



**JAMES L. KRAMVIK**  
Landscape Architecture Thesis  
2011



SUSTAINABLE LAKESHORE DEVELOPMENT:  
INTEGRATING LAKESHORE ECOSYSTEMS  
INTO THE URBAN ENVIRONMENT

A Design Thesis Submitted to the Department of  
Architecture and Landscape Architecture of  
North Dakota State University

By

James Kramvik

In Partial Fulfillment of the Requirements  
for the Degree of:  
Bachelors of Landscape Architecture



---

Primary Thesis Advisor



---

Thesis Committee Chair

May, 2011  
Fargo, North Dakota

# PERMISSION RIGHTS

## NON-EXCLUSIVE DISTRIBUTION LICENSE

By signing and submitting this license, I, James Kramvik (the author(s) or copyright owner) grants to North Dakota State University (NDSU) the non-exclusive right to reproduce, translate (as defined below), and/or distribute my submission (including the abstract) worldwide in print and electronic format and in any medium, including but not limited to audio or video.

I agree that NDSU may, without changing the content, translate the submission to any medium or format for the purpose of preservation.

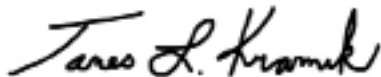
I also agree that NDSU may keep more than one copy of this submission for purposes of security, back-up and preservation.

I represent that the submission is my original work, and that I have the right to grant the rights contained in this license. I also represent that my submission does not, to the best of my knowledge, infringe upon anyone's copyright.

If the submission contains material for which I do not hold copyright, I represent that I have obtained the unrestricted permission of the copyright owner to grant NDSU the rights required by this license, and that such third-party owned material is clearly identified and acknowledged within the text or content of the submission.

IF THE SUBMISSION IS BASED UPON WORK THAT HAS BEEN SPONSORED OR SUPPORTED BY AN AGENCY OR ORGANIZATION OTHER THAN NDSU, I REPRESENT THAT I HAVE FULFILLED ANY RIGHT OF REVIEW OR OTHER OBLIGATIONS REQUIRED BY SUCH CONTRACT OR AGREEMENT.

NDSU will clearly identify my name(s) as the author(s) or owner(s) of the submission, and will not make any alteration, other than as allowed by this license, to my submission.



05 / 12 / 2011

---

Signature

Date

# TABLE OF CONTENTS

Abstract	<b>3</b>
Problem Statement	<b>4</b>
Statement of Intent	<b>5-6</b>
The Narrative	<b>9-10</b>
User/Client Description	<b>11-12</b>
Major Project Elements	<b>13-18</b>
Site Information	<b>19-22</b>
Project Emphasis	<b>23</b>
A Plan for Proceeding	<b>23</b>
Previous Studio Experience	<b>24</b>
Theoretical Premise Research	<b>27-38</b>
Typological Research	<b>39-46</b>
Historical Context	<b>47-49</b>
Thesis Goals	<b>50</b>
Inventory / Analysis	<b>51-60</b>
Programmatic Requirements	<b>61-62</b>
Reference List	<b>63-64</b>
Master Plan	<b>67-68</b>
Stormwater Management	<b>69-71</b>
Pedestrian Corridors	<b>72</b>
Urban Learning Plaza	<b>73-74</b>
Outdoor Learning Facility	<b>75-78</b>
Personal Identification	<b>80</b>





# STATEMENT

---

## OF INTENT:

abstract  
problem statement  
typology  
theoretical premise  
project justification

---

## ABSTRACT

This project is meant to explore sustainable lakeshore design ideas within private and public community property that share a common water body resource. A community surrounding a water body forms a social-ecological system and relies on the vital natural resource for economic development and to sustain life (United Nations Conference, 1992).

According to the Minnesota Department of Natural Resources (2009 *The Water's Edge*), lakeshores have become overdeveloped as people migrate from the city to the natural environment. An overdeveloped lakeshore includes any nearshore alterations that damage or destroy important fish and wildlife habitat that includes native vegetation, bottom materials, and natural debris. Overdeveloped lakeshores can't support the wildlife habitat, fish, and clean water that attract people to the environment in the first place. Current management practices still do not address harmful development around the common resource and the lakes continue to be polluted, primarily through contaminated stormwater runoff (Henderson, 1998).

The results of this research will help communities adopt sustainable design practices to revitalize the ecosystem of an overdeveloped lake with natural vegetation. "Sustainable design meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations Conference, 1992). Sustainable design alterations must protect **human health and well-being, economic vitality, and environmental health**. Detroit Lakes, Minnesota is a community of 8,000 residents that surrounds Detroit Lake. This project will propose an urban design plan with an emphasis on restoring wildlife habitat. It will encompass public and private property with the overall goal of creating ecosystem resiliency in the lakefront environment for the future environmental, social, and economic stability of the community.





## PROBLEM STATEMENT

How can sustainable design interventions revitalize and restore overdeveloped lakeshore to a healthy social-ecological system while increasing urban development?

## KEY WORDS

sustainable lakeshore design, social-ecological system, overdeveloped lakeshores, ecosystem resiliency

# STATEMENT OF INTENT

## TYOLOGY

An ecological design intervention on a community that has formed a social-ecological system dependent on a large lake.

## CLAIM

Overdeveloped lakeshore must be redesigned to adapt to social pressure on the surrounding ecological habitat.

## PREMISES

According to the Minnesota DNR, lakes are continually polluted by private homeowner development and urban stormwater management practices. Lakeshore habitat is continually degraded to offer optimal swimming areas with no regard for important pollution controlling habitat. The DNR states that this “leads to the leaching of harmful chemicals into the lake, lakeshore erosion, and destruction of wildlife habitat” (1998).

Ecological redesign of existing lakeshore will be important in helping the ecosystem recover from a polluted state. Sustainable management practices will be instrumental in ensuring that the lake will not exceed pollution levels that would restrict current recreational usage.

Natural plantings surrounding a water body will help reduce harmful pollutants from entering the water source in conjunction with creating vital spawning and nesting areas for wildlife. An increase in wildlife will positively affect wildlife based tourism such as fishing and birdwatching.



## THEORETICAL PREMISES / UNIFYING IDEA

The United Nations World Water Development Report (2010) says clean water is one of nature's most valuable resources. Detroit Lake is shared by the community and must be protected from improper development, sedimentation, and urban stormwater contamination. The lake is aesthetically and economically important and should be protected for all future generations through sustainable land use and landscaping.

## PROJECT JUSTIFICATION

The scope of this project goes far beyond helping a single community or water body. Detroit Lake is connected to a chain of surrounding lakes forming the Pelican River Watershed. The Minnesota DNR says that by redesigning existing lakeshore and enforcing sustainable policies, the lake will be able to recover from a polluted state and benefit many other water bodies (Henderson, 1998). The United Nations states that clean usable water continues to dwindle from our earth through pollution and over development (United Nations, 2010). This project will demonstrate how a community can act in the present to benefit future inhabitants to ensure that this public resource will continue to be healthy and usable. Cities around the world suffering from water shortages and water pollution can replicate this project to address their problems with clean water. Sustainable shoreline alterations will positively impact a community's economic vitality, human health and well-being, and environmental health (United Nations Conference, 1992).





# PROPOSAL:

---

narrative  
user/client description  
major project elements  
site information  
project emphasis  
plan for proceeding  
studio experience

---



Lake Pose, MN  
[http://en.wikipedia.org/wiki/  
File:Pose\\_lake\\_Minnesota.jpg](http://en.wikipedia.org/wiki/File:Pose_lake_Minnesota.jpg)

## NARRATIVE

---

Some say Minnesota is one of the country's most beautiful states due to the abundance of lakes, rivers, and streams. As a result, these water bodies experience considerable development to take advantage of their recreational and economic value. Fresh water is a vital resource and it must be protected from overdevelopment and unsustainable practices for the survival of the planet. Many Minnesota cities and towns have developed their economies around lakes forming a social-ecological system. This means that the town relies upon the environment for viability and economic stability. In recent years, however, many communities have taken these water sources for granted and destroyed vital habitat for recreational purposes.

Functioning lakeshore habitat is a very important topic to me. Growing up in Minnesota, my dad often took me fishing, camping, and canoeing in many of the lakes surrounding the Detroit Lakes region. I was immersed in this awesome environment as I climbed trees, caught frogs, and fished. I'll never forget my early childhood experiences enjoying the natural wonders of Minnesota's lakes.



The revitalization of the public beach in Detroit Lakes is important to me because I see this area as a perfect place for kids to play and discover in a natural environment. The one half mile of public beach can be an ideal location for schools and families to bring their kids and allow their imaginations to run wild.

Not only can ecosystem restoration have a positive impact on creativity and intellectual development of Detroit Lakes' youth, but it will also benefit the lake's wildlife and water quality. The Minnesota DNR says that "a natural shoreline habitat can act as a buffer zone cleaning harmful toxins before they enter the lake and help the overall water quality" (Henderson, 1998). The challenging aspect of this project will be the incorporation of natural habitat into its current usage of swimming and sunbathing. This project is intended to investigate shoreline development to ensure that future generations of children will be able to enjoy the same experiences of my Minnesota youth.

# USER/ CLIENT DESCRIPTION

## CLIENT/ OWNER

The client/owner for this redevelopment project will be the city of Detroit Lakes. The decision makers will work with the city parks department and private developers in development of commercial and residential buildings. The city will assume responsibility for the redesign of the public beach and nearby parks.

## USERS

### **Tourists**

This site will be appropriately designed to maximize tourist use year-round by providing a multitude of activities. An emphasis on year round activities will reinsure businesses of a stable and viable economy. Tourists on this site will have access to activities that include fishing, boating, shopping, walking, wildlife watching, resort amenities, dining, swimming, ice skating, sledding, ice fishing, snowmobiling, cross country skiing, and many other unique experiences. Peak usage by tourists will continue to be holiday weekends including Memorial Day, the 4th of July, We Fest on the first weekend of August, and Labor Day.

### **Business Owners**

Business Owners are integral to the economy of Detroit Lakes and for expanding development in the shoreline district. This design will help businesses thrive in this setting by creating a unique sense of place for tourists. Stimulating the local economy requires planning strategies that support small businesses and entrepreneurship over incentives for chain commercial development.





# USER/ CLIENT DESCRIPTION

## USERS

### **Community Residents**

Community residents will use this site year-round and help with the economic growth and development of this site. Area residents can use this site for fishing, jogging, walking, bike riding, outdoor learning classrooms, and many of the other activities designed for tourists. A special emphasis will be placed on connecting and designing paths for residents access and enjoyment.

### **Students**

Area students will use the restoration site to learn about a functioning lake ecosystem through self discovery and outdoor class sessions. Students who experience the natural environment will have a better understanding of ecology and learn the importance of lakeshore habitat. Rossman Elementary and the local high school are located within walking distance from this site.

# MAJOR PROJECT ELEMENTS: ENVIRONMENTAL HEALTH

## STORM WATER MANAGEMENT PRACTICES

According to the Detroit Lakes shoreline district policy, stormwater management practices are an integral part of sustainable lakeshore development. By managing stormwater runoff completely from the same properties, the amount of development along West Lake Drive can increase while the pollution levels entering the watershed decrease.

## WASHINGTON PARK SWIMMING AREA

The Washington Park swimming area is the desired location for families because of the shallow lake drop off. However, this area is next to one of the city's storm outfalls that run directly into the lake, adding hydrocarbons, pesticides, and lawn chemicals to the lake. A portion of the park could be converted into a wetland to store and clean water until it is safe to enter the lake. Another alternative is managing the water further inland before it enters the storm sewer.

## SHORELINE RESTORATION

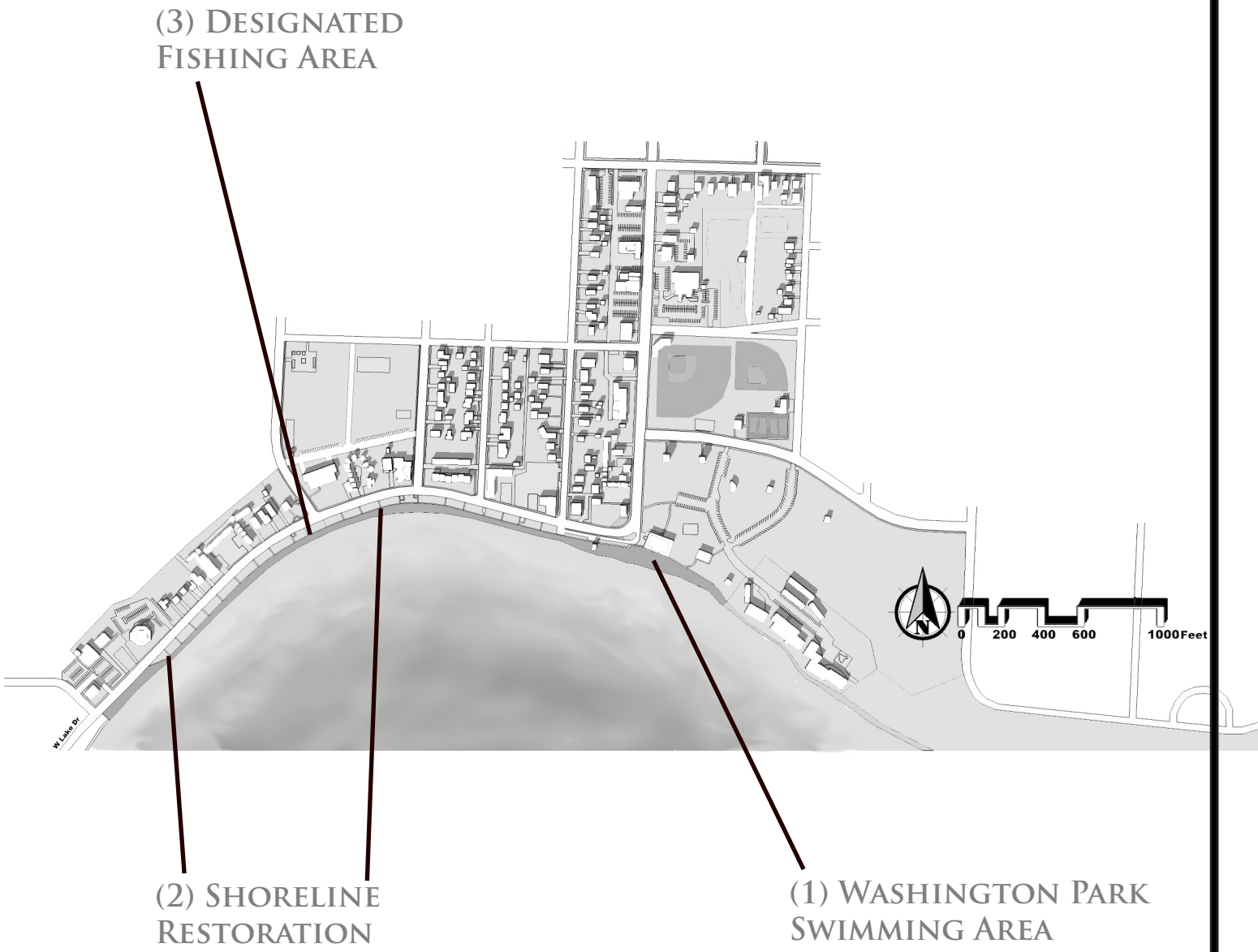
Detroit Lakes Beach looks nothing like the original habitat that once surrounded the lake. Natural aquatic vegetation was destroyed and filled in with sand to accommodate swimming. The beach in its current state is a major summer attraction for tourists but does little to help the water quality of the lake. The redesign should examine ways to integrate vegetation, manage invasive plant species, and keep certain beach areas ideal for swimming. A natural vegetated buffer zone can collect surface water runoff between West Shore Drive and Detroit Lake. This would serve as a biofiltration system and allow storm water to percolate into the ground. The establishment of native aquatic vegetation would be beneficial to reduce the management of invasive species.

## DESIGNATED FISHING AREA

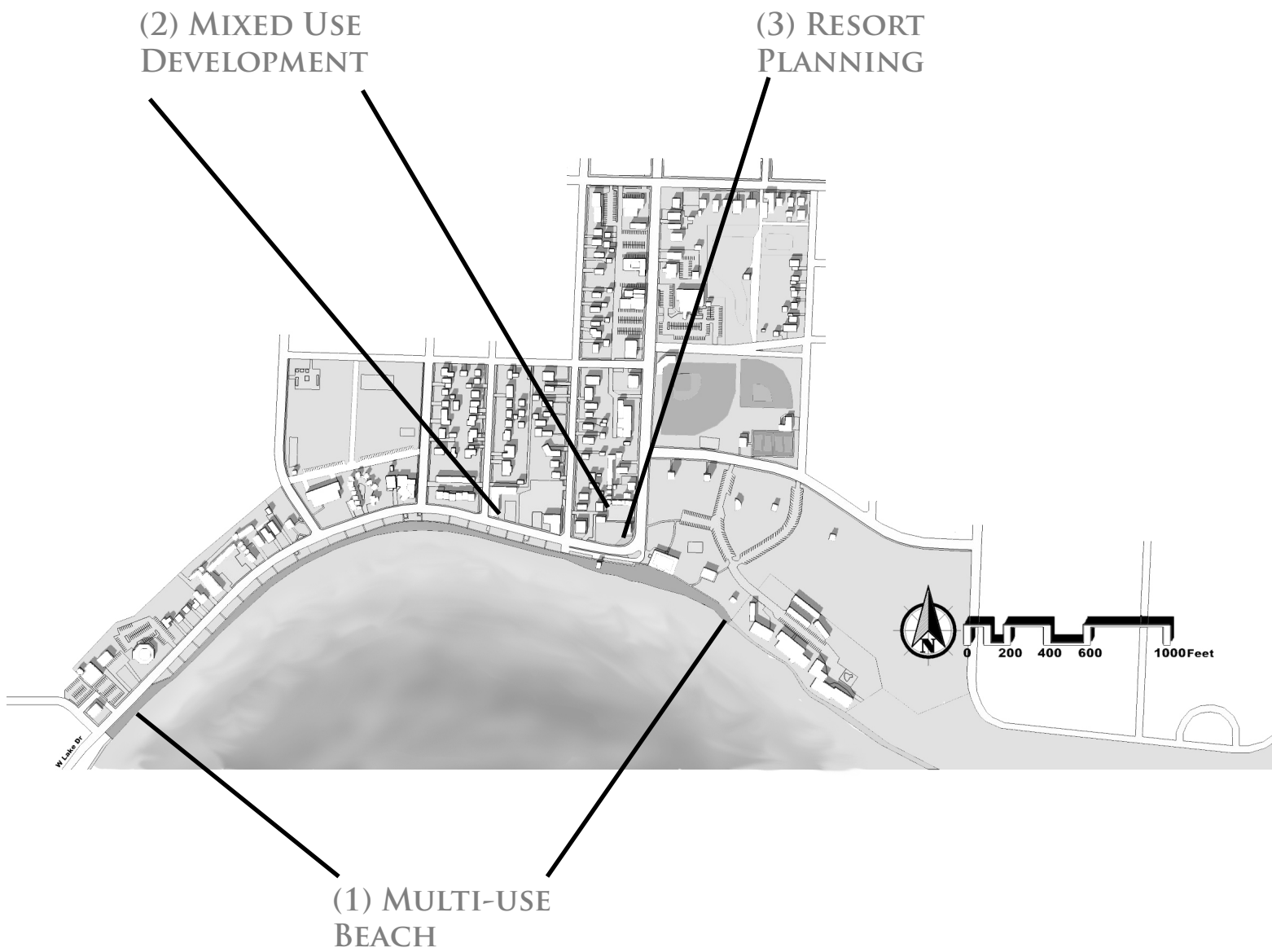
The beach currently lacks proper habitat to support large quantities of fish. The implementation of native aquatic vegetation near the fishing pier will create vital spawning areas for fish species and attract food sources for larger fish. The beach can become a destination for community residents and a great place to teach kids fishing techniques.



# LAKESHORE DEVELOPMENT: PROGRAMMATIC ELEMENTS



# LAKESHORE DEVELOPMENT: PROGRAMMATIC ELEMENTS



# MAJOR PROJECT ELEMENTS: ECONOMIC VITALITY

---

## MULTI-USE BEACH

The design of a multi-use beach will be important for adding additional use and biodiversity on the site. Currently the beach accommodates swimmers, sun bathers, and pub users. This type of use focuses on a target audience and does not maximize the wildlife-based tourism possibilities of the site. A multiuse beach could incorporate current use with other attractions, such as fishing, wildlife viewing, outdoor learning facilities, pedestrian-friendly boardwalk, and shopping.

## MIXED USE DEVELOPMENT

Mixed use development will be important for creating density along West Lake Drive. A mixture of residential and commercial real estate will be ideal for the economy of this area year-round.

## RESORT PLANNING

West Lake Drive once had an abundance of resorts lining Detroit Lakes Beach. In recent years many of the resorts have become vacant and sold for condominium development. According to the Detroit Lakes Redevelopment Plan, weekend tourists provide an abundance of economic revenue for the town and support restaurants and stores. Resorts along the beach are integral to the economy and must be included in the redevelopment plan.

## THEMING/ SENSE OF PLACE

Theming the new development will be an important attraction to tourists, and as a result will stimulate the economy and attract more local businesses. Current well-themed buildings on this site reflect the beach setting and resemble a Cape Cod style of architecture. This theme should be carried through in the rest of the design and adjacent streets to make this area cohesive and better strengthen its existing character. Tourists who ideally visit this beach will have a distinctive experience.

## MAJOR PROJECT ELEMENTS: HEALTH AND WELL-BEING

### WEST LAKE DRIVE REDESIGN: PEDESTRIAN SAFETY

West Lake Drive should be redesigned to accommodate a pedestrian-friendly environment. Current parking lanes can be removed and the street width shortened to provide a prominent boardwalk for bike riders, joggers, and pedestrians. This redesign will also allow for the space needed to implement the vegetated buffer zone.

### ADJACENT STREET DESIGN: TRAFFIC FLOW

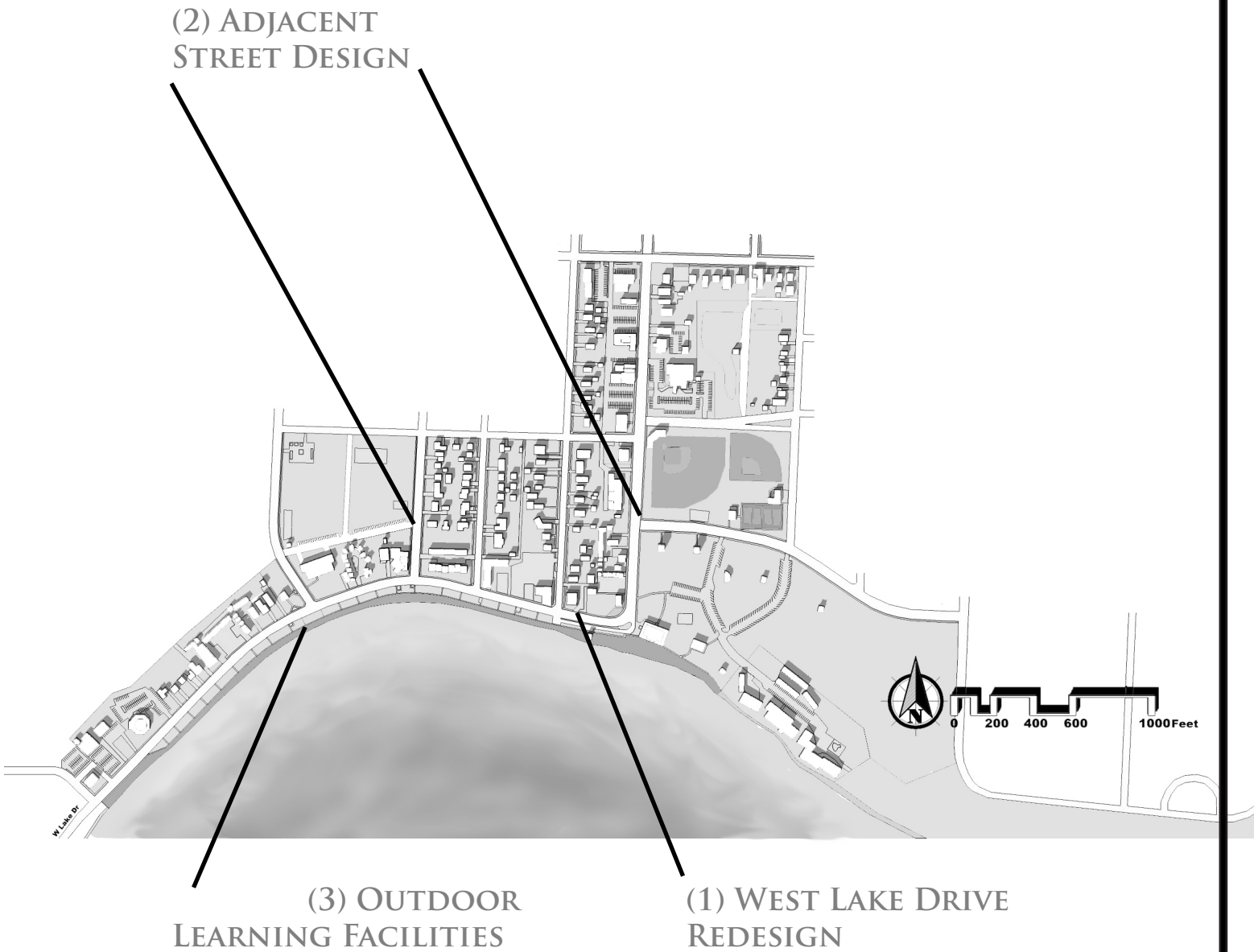
An adjacent street that runs parallel to West Shore Drive will be important to reduce traffic congestion along the beach. The street design should implement additional parking spaces lost in the West Shore Drive redevelopment. The street will also provide the city with the ability to shut down West Shore Drive during peak summer usage.

### OUTDOOR LEARNING FACILITIES: EDUCATING THE COMMUNITY

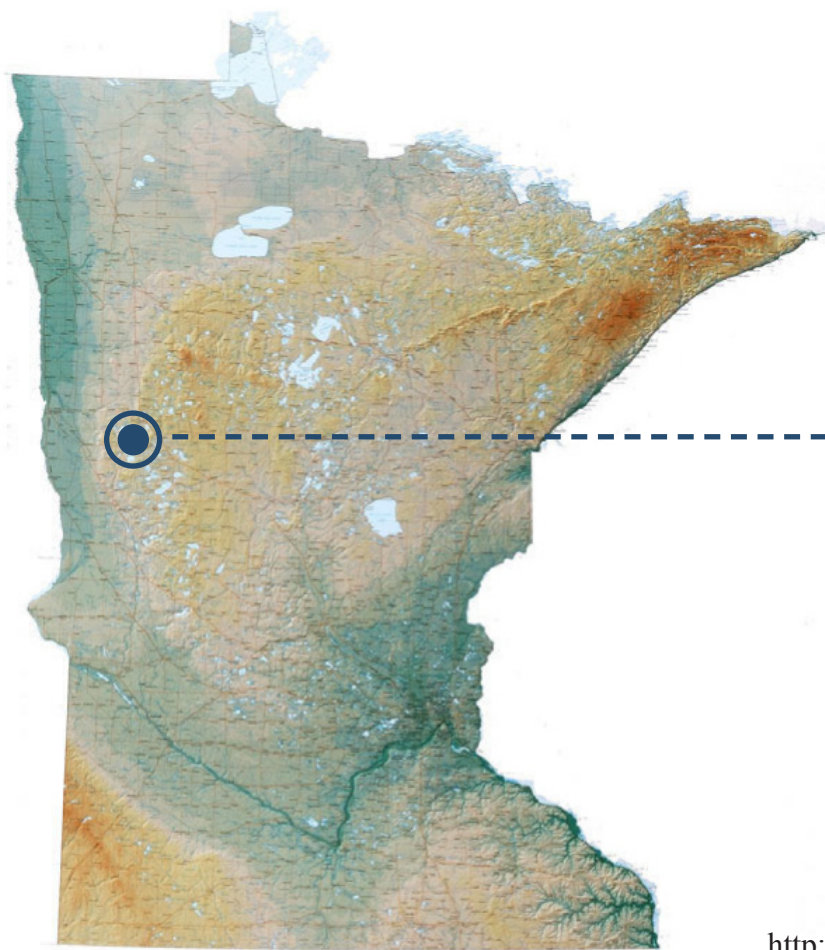
The proximity of Rossman Elementary and Detroit Lakes High School make this public beach a perfect location for students to immerse themselves in a natural environment. An excerpt from *The Last Child in the Woods*, explains that, “environment-based education produces student gains in social studies, science, language arts, and math; improves standardized test scores and grade-point averages; and develops skills in problem-solving, critical thinking, and decision-making” (Louv, 2006). Experiencing a functioning ecosystem, rather than textbook learning, will allow students to improve their knowledge of the natural world. In addition to student learning, private lake homeowners can learn to practice sustainable aspects of landscaping to improve their own lakeshore property. A specific portion of the beach will be programmed for outdoor learning.



# LAKESHORE DEVELOPMENT: PROGRAMMATIC ELEMENTS



# SITE INFORMATION



MACRO : REGIONAL

DETROIT LAKES

<http://www.worldmapsonline.com/hs963minnesotastatemapr.htm>

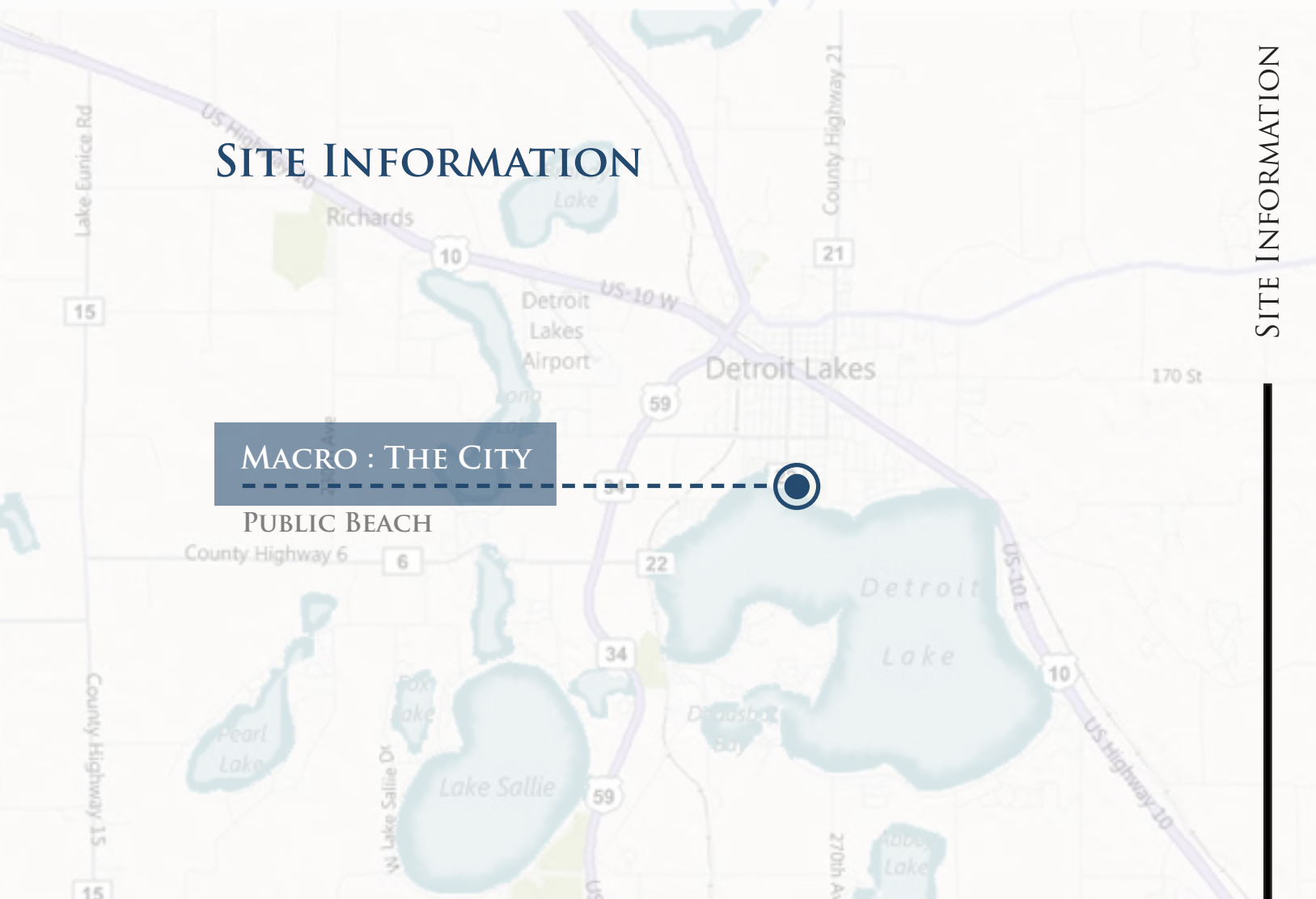
## WEST CENTRAL MINNESOTA

Regionally, this site is located in Minnesota's west central lakes region in the city of Detroit Lakes, which exhibits a moderate climate with all four seasons. This area contains an abundance of recreational lakes surrounded by rolling hills. The land uses are primarily agricultural with a mixture of deciduous forests surrounding the lakes. Towns in this region are classified as small rural towns and their economies are centered on summer tourism. Important activities in this region include boating, fishing, golfing, shopping, hiking on scenic trails, and snowmobiling. The central location of this region attracts visitors from all major Minnesota cities including Duluth, Fargo-Moorhead, and the Twin Cities (Detroit Lakes Regional Chamber of Commerce, 2010).





## SITE INFORMATION



### DETROIT LAKES

Detroit Lakes is located in the heart of Minnesota's west central lakes region. The city's population is estimated at over 8,200 residents, making it one of the largest cities in this region. The population greatly increases in the summer months as tourists and seasonal residents flood the city for many summer activities. Peak use occurs on holiday weekends when the population of the city can double and sometimes triple. Detroit Lakes is a destination for summer tourism because of its proximity to over 400 lakes within 25 miles; the city itself surrounds Detroit Lake. Tourists are attracted to the city's special events, lake recreation, and public city beach (Detroit Lakes Regional Chamber of Commerce, 2010).

Today Detroit Lakes emphasizes on creating the ideal place to attract summer visitors from all around the country. Planning and redevelopment projects are always striving to offer more activities for tourists so they can leave having experienced a unique setting (RDG Planning and Design, 2008).

# SITE INFORMATION

## MICRO : THE SITE

WEST LAKE DRIVE, DETROIT LAKES



# SITE INFORMATION

## MACRO: THE SITE



① **Lakeside Tavern**



② **City Beach**



② **City Beach**

## DETROIT LAKES PUBLIC BEACH

The location of the site is in the heart of the city along the northwest portion of Detroit Lake. The public beach and shoreline development runs parallel with West Lake Drive. This site is one of Detroit Lake's most heavily used areas, but lacks proper commercial and residential development.

The public beach redevelopment project of the 1960's was constructed to help combat shoreline erosion and increase tourism. The town adopted a \$250,000 redevelopment plan to re-grade the shoreline and divert stormwater to a pumping station (Larson, 2005). This project addressed shoreline erosion, but stopped short of restoring a naturally functioning lakeshore habitat.

Today the redevelopment project has seen major success in increasing local tourism. However, the depletion of natural lakeshore and wildlife habitat, important for managing toxins in stormwater runoff, remains undeveloped. Storm culverts are still used around the lake during many heavy summer rains to discharge water directly into the lake. The site lacks proper stormwater management and proper commercial and residential density.

## PROJECT EMPHASIS

This project will appropriate vanguard methods to restore natural lakeshore habitat and apply them to a small town setting. The formation of a dense urban setting in conjunction with cleaning the natural habitat will be the focal point of this redesign. The newly developed natural ecosystem must coexist and enhance current popular beach activities. This design will challenge current practices, and if successful, educate other communities on the benefits of sustainable beach design ideas. The redesign of this public site will create community awareness for other lake shore residents to adopt sustainable shoreline development practices. According to the Minnesota DNR, these shoreline practices will not only benefit Detroit Lake, but the overall water quality of the Pelican River watershed district (Henderson,1998).

## A PLAN FOR PROCEEDING

The following areas will be investigated in proceeding with this thesis project: the theoretical premise/unifying idea, project typology, historical context, site, case studies, and programmatic requirements.

This thesis will utilize an in-depth, mixed-method quantitative/qualitative research approach. Qualitative information will be gathered from experiencing the site and surrounding areas. This includes visiting other beach-themed towns and documenting, sketching, and analyzing its sense of place. Quantitative data will be collected from books, journals, archives, and government documents.

Attention is paid to the continual and regular documentation of the design process. Weekly submittals will occur to maintain a digital collection of all hand sketches/drawings and computer models/maps. To supplement the digital compilation, a physical collection of all design processes will be organized in a binder that will be available to anyone wishing to explore this thesis topic.



## PREVIOUS STUDIO EXPERIENCE

### LA 271: FALL SEMESTER 2007

Instructor: Kathleen Pepple

Klai Hall outdoor classroom and landscape – Fargo, ND

Walster Hall Courtyard, NDSU – Fargo, ND

Kennedy Court Park – Fargo, ND

### LA 272: SPRING SEMESTER 2008

Instructor: Mark Lindquist

Pioneer Park – Valley City, ND

### LA 371: FALL SEMESTER 2008

Instructor: Stevie Famulari

Dike West land form art – Fargo, ND

Metal Reverberation: ephemeral landscapes of sound – Fargo, ND

### LA 372: SPRING SEMESTER 2008

Instructor: Kathleen Pepple

Sustainable Residential Design – Fargo, ND

Pioneer Park Redesign – Battle Lake, MN

Community Garden Charete – Fargo, ND

### LA 471: FALL SEMESTER 2009

Instructor: Mark Lindquist

Urban Planning – Portland, OR

Urban Design – Portland, OR

### ARCH 474 INTERNATIONAL DESIGN STUDIO: SPRING 2010

Instructor: Mike Christenson, David Crutchfield

Urban Plaza Redesign and Stormwater Management Policy – Jaipur, India

### LA 571: FALL 2010

Instructor: Catherine Wiley

Sheyenne Grasslands Recreational Tourism: Ransom County, ND





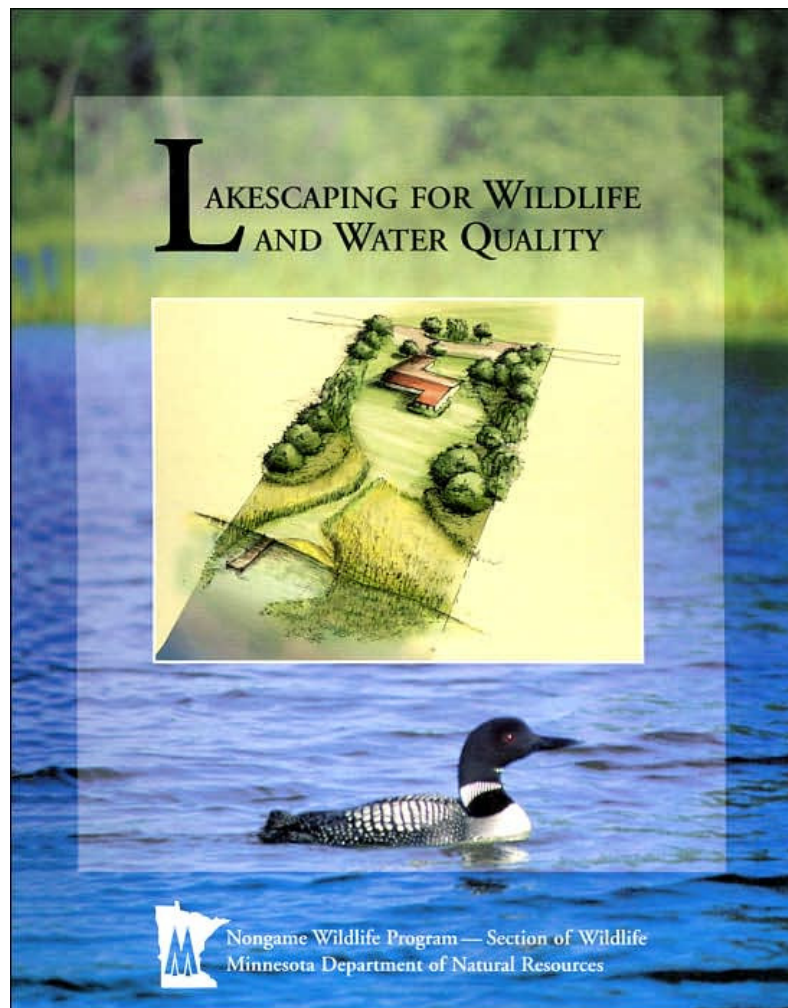
# PROGRAM:

research goals  
theoretical premise research  
research summary  
typological research  
historical context  
research goals  
site analysis  
programmatic requirements

# THEORETICAL PREMISE RESEARCH

## LAKESCAPING FOR WILDLIFE AND WATER QUALITY

*Lakescaping for Wildlife* is a compilation of proper landscape and revitalization techniques for the Minnesota lakeshore. Three authors, with master's degrees in a biology-related field, worked in conjunction with the Minnesota Department of Natural Resources to write this book in hopes that it "serves as a catalyst to help change public attitudes about what the ideal lakeshore property should look like" (Henderson, 1998). Besides the three authors, other professionals and academics were contacted because of the many implications of lakeshore habitat, which include fisheries, wildlife, non-native plant and wildlife control, water quality, use of native plants, landscape design, forest management, lawn and garden management, management of swimming beaches, and control of shoreline erosion.



<http://www.goodreads.com/review/show/46697272>





## Walleye



<http://www.olfishinghole.com/night-fishing-walleye.html>

## Turtles



Bill Marchel

## American Loon



<http://www.whitesandlake.org/wildlife.shtml>

## INSPIRATION

The inspiration for this book originated with Jack Mooty, a nongame wildlife specialist for the Minnesota DNR. Mooty believed that “natural, undeveloped lakeshore habitat was fast becoming one of Minnesota’s most endangered habitats” (Henderson, 1998). The pressures of lakeshore development were present on lakeshores throughout the state and across the Midwest. When large lake lots with natural vegetation are sectioned off and sold, new owners clear their lots of brush, aquatic weeds, dead trees, and live trees in an effort to resemble the suburban landscape. This book is meant to show homeowners, nurseries, and designers alternative options for lakeshore development that can benefit the environment while still setting aside land for recreational purposes.

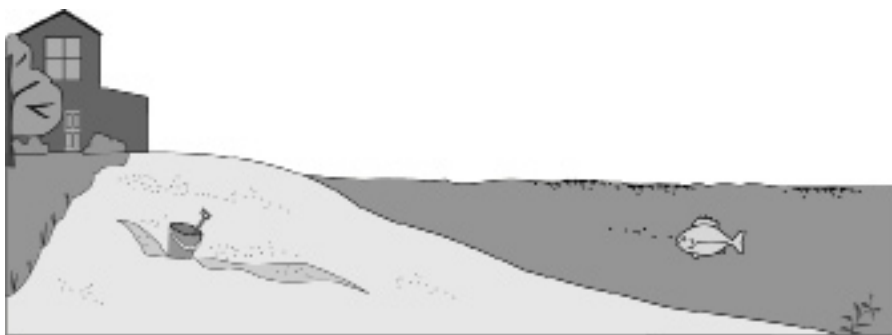
## PROBLEMS

“The first step in understanding wise lakeshore management is to consider the lakeshore as habitat and not just property” (Henderson, 1998). Minnesota lakes are in danger from bank erosion, nitrogen and phosphorous loading, and loss of wildlife habitat. Lakeshore owners, along with the surrounding community, are responsible for the well being of the lake because “Lakes have integral relationships with their watersheds, and understanding the ecology of a lake means realizing that it is a system that reaches well above its shores to include all the dry land where we live” (Henderson, 1998). The lake benefits or suffers from the actions of the community surrounding the shared water body.

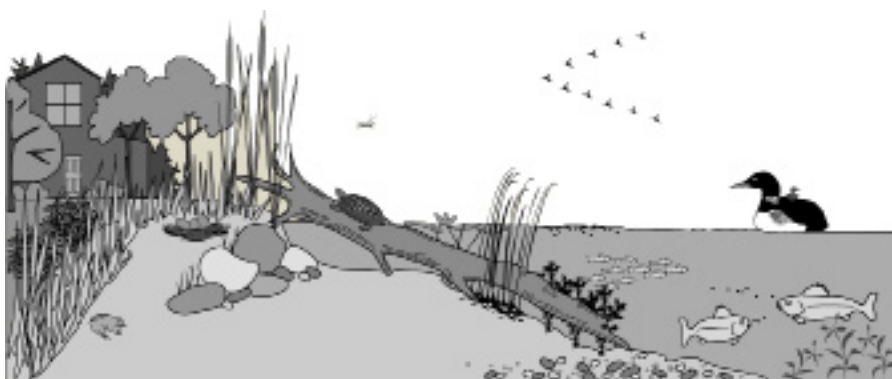
## PROBLEMS

The destruction of natural vegetation along rivers and lakes is the main cause of the problems experienced by Minnesota's lakes. When natural grasses, aquatic vegetation, and trees are no longer part of the shoreline, the bank experiences erosion problems. Erosion can lead to a loss of water clarity which is integral to underwater plant species used by fish for spawning areas and habitat. A reduction in the population of fish directly affects the entire food web of the lake ecosystem, and birds that once flourished on particular fish species can no longer survive. The creation of the Detroit Lakes beach has many ecological problems, including erosion. "Once a sand beach has been created, wave action and surface runoff may erode the sand. Additional loads of sand then need to be deposited on the beach. When the sand washes into the water, it may also cover aquatic plant beds and degrade fish and wildlife habitat" (Henderson, 1998).

## OVERDEVELOPED LAKESHORES LACK WILDLIFE



## NATURAL LAKESHORES PROMOTE WILDLIFE



<http://files.dnr.state.mn.us/assistane/backyard/shorelandmgmt/savewateredge.pdf>





<http://www.exteriordesignsofalexandria.com/lakeshore.htm>



<http://homes.mitula.ca/homes/for-sale-columbia-beach>

## NATIVE SHORELINE IMPLEMENTATION VS RECREATION

A buffer zone includes native trees, shrubs, wildflowers, grasses, and sedges on land, and emergent, floating, and submergent aquatic plants in the water. It should consist of 75% of the lake frontage and extend 25 feet to 100 feet inland. This statistic leaves the remaining 25% for a swimming beach. If a swimming beach is maintained, it can be next to the dock area and can be partially screened from the lake by a native vegetative buffer zone. The vegetation will help prevent the sand in the swimming area from becoming suspended by wave action as well as provide a buffer for stormwater runoff (Henderson, 1998).

## BENEFITS OF NATURAL SHORELINE

### **Outlined by Lakescaping for Wildlife and Water Quality**

Native plant communities in the water and on the shoreline filter rainwater and melting snow that drain into the lake from the surrounding watershed. When that water contains pollutants, the vegetation helps purify it (p.10).

Lakeshore plants help protect the shoreline by absorbing the energy of waves that might otherwise erode the soil (p.10).

Broadleafed cattail, bulrush, arrowhead, and duckweed create underwater habitat important for spawning fish (p.10).

The natural vegetation serves as a filter strip that helps prevent lawn fertilizers and pesticide runoff from reaching the lake (p.12).

Aquatic vegetation helps purify the lake water by removing contaminants and by calming water, which allows suspended soil particles to settle at the lake bottom (p.12).

Submergent and emergent plants provide underwater cover for fish, amphibians, birds, insects, and many other organisms (p.16).

# PLANTING RECOMENDATIONS

## FORBS

Common Name	Scientific Name	Habitat	Spacing (ft)	Flower
Sweet flag	<i>Acorus calamus</i>	wet soil	2.5	yellow
White baneberry	<i>Actaea pachypoda</i>	upland-moist	2	white
Blue giant hypssop	<i>Agastache foeniculum</i>	upland-dry	2	blue
Water plantain	<i>Alisma plantago-aquatica</i>	shallow-water	2-3	white
Prairie wild onion	<i>Allium stellatum</i>	upland-dry	1	pink
Canada anemone	<i>Anemone canadensis</i>	wet soil	2	white
Angelica	<i>Angelica atropurpurea</i>	shallow-water	3-5	green
Indian hemp	<i>Apocynum sibirica</i>	upland-moist	3	white
Columbine	<i>Aquilegia canadensis</i>	upland-dry	1.5	red
Prairie sage	<i>Artemisia ludoviciana</i>	upland-dry	3	yellow
Marsh milkweed	<i>Asclepias incarnata</i>	wet-soil	2-3	pink
Panicles aster	<i>Aster lanceolatus</i>	upland-moist	2-3	blue
Aromatic aster	<i>Aster oblongifolius</i>	upland-dry	2-3	purple
Canada milk-vetch	<i>Astragalus canadensis</i>	upland-moist	3	yellow
Water shield	<i>Brasenia schreberi</i>	deep-water	3	purple
Wild calla	<i>Calla palustris</i>	shallow-water	2-3	white
Harebell	<i>Campanula rotundifolia</i>	upland-dry	1	blue
Water hemlock	<i>Cicuta maculata</i>	shallow-water	3	white
Star toadflax	<i>Comandra umbellata</i>	upland-moist	1	white
Purple prairie clover	<i>Dalea pupureum</i>	upland-dry	1-2	purple
Purple coneflower	<i>Echinacea angustifolia</i>	upland-dry	1-2	pink
Grass-leaved goldenrod	<i>Euthamia graminifolia</i>	wet-soil	2	yellow
Northern bedstraw	<i>Galium boreale</i>	upland-moist	1-2.5	white
Stiff gentian	<i>Gentianella quinquefolia</i>	wet-soil	1	blue
Cow parsnip	<i>Heracleum lantatum</i>	wet-soil	4	white
Stargrass	<i>Hypoxis hirsuta</i>	upland moist	1	yellow
Dotted blazing star	<i>Leatris punctata</i>	umpland-dry	1-1.5	rose
Great blue lobelia	<i>Lobelia sipilitica</i>	upland moist	1.5	blue
Prairie losestrife	<i>Lysimachia quadriflora</i>	wet-soil	1	yellow
Swamp candles	<i>Lysimachia terrestris</i>	shallow-water	1.5	yellow
Wild mint	<i>Mentha arvensis</i>	wet soil	1.5	pink
White water lily	<i>Nymphaea tuberosa</i>	deep-water	5	white
Water smartweed	<i>Polygonum amphivium</i>	water	3	pink
Yellow water buttercup	<i>Ranunculus flavellaris</i>	submerged	5	yellow
Wild celery	<i>Vallisneria americana</i>	submerged	3	green

\* selection taken from Lakescaping for Wildlife and Water Quality



## GRASSES, SEDGES, AND RUSHES

Common Name	Scientific Name	Habitat	Spacing (ft)	Height (ft)
Big bluestem	<i>Andropogon gerardii</i>	upland dry	3	2-6
Blue grama	<i>Bouteloua gracilis</i>	upland dry	1	0.5-1
Blue-joint grass	<i>Clamagrostis canadensis</i>	upland moist	1.5	3-6
Water sedge	<i>Carex aquatilis</i>	shallow-water	2	2-5
Caterpillar sedge	<i>Carex crinita</i>	wet soil	1.5	1-2
Lake sedge	<i>Carex lacustris</i>	shallow-water	1.5-3	2-4
Sun sedge	<i>Carex pensylvanica</i>	upland-dry	1.5	0.5
Beaked sedge	<i>Carrex rostrata</i>	shallow-water	2	1-4
Pointed broom sedge	<i>Carex scoparia</i>	wet soil	1-2	0.5-2.5
Awl-fruited sedge	<i>Carex stipata</i>	wet soil	1.5	2-3
Tussock sedge	<i>Carex stricta</i>	shallow-water	1.5-2	2-3
Fox sedge	<i>Carex vulpinoidea</i>	upland-moist	1.5	1-3
Canada wild rye	<i>Elymus canadensis</i>	upland-moist	1	1-2
Horsetail	<i>Equisetum fluviatile</i>	shallow-water	1-2	0.5-3
Cotton grass	<i>Eriophorum spissum</i>	shallow-water	1-2	1-2.5
Soft rush	<i>Juncus effusus</i>	wet soil	1-2	1.5-4
Knotted rush	<i>Juncus nodosus</i>	shallow-water	1	1-1.5
Path rush	<i>Juncus tenuis</i>	upland-moist	1-2	0.5-2
Torrey rush	<i>Juncus torreyi</i>	upland-moist	1-2	1-3
Junegrass	<i>Koeleria macrantha</i>	upland-dry	1	1-2
Wood rush	<i>Luzula acuminata</i>	upland-moist	1	0.5-1.5
Swamp satin grass	<i>Muhlenbergia glomerata</i>	wet soil	1-1.5	1.5-4
Mexican satin grass	<i>Muhlenbergia mexicana</i>	upland moist	1-1.5	1.5-3
Switchgrass	<i>Panicum vergatum</i>	upland moist	2-3	3-5
Little bluestem	<i>Schizachyrium scoparium</i>	upland-dry	1.5-2	1-3
Hardstem bulrush	<i>Scirpus acutus</i>	shallow-water	1-3	3-9
Dark green bulrush	<i>Scirpus atrovirens</i>	wet soil	2-3	2-5
Woolgrass	<i>Scirpus cyperinus</i>	wet soil	2-3	3-5
River bulrush	<i>Scirpus fluviatilis</i>	shallow-water	1-3	4-8
Three-square bulrush	<i>Scirpus pungens</i>	shallow-water	2-4	2-4
Softstem bulrush	<i>Scirpus validus</i>	shallow-water	1-3	3-9
Indian grass	<i>Sorghastrum nutans</i>	upland-moist	2-3	3-5
Prairie cordgrass	<i>Spartina pectinata</i>	wet-soil	2-3	3-6
Prairie dropseed	<i>Sporobolus heterolepis</i>	upland-dry	1.5-2	2-4
Porcupine grass	<i>Stipa spartea</i>	upland-dry	1-2	3-4
Broad-leaved cattail	<i>Typha latifolia</i>	deep-water	2-4	3-9
Wild rice	<i>Zizania aquatica</i>	shallow-water	NA	6-10

\* selection taken from Lakescaping for Wildlife and Water Quality

## TREES & SHRUBS

Common Name	Scientific Name	Habitat	Interest	Height (ft)
Balsam fir	<i>Abies balsamea</i>	upland-moist	evergreen	40-75
Red maple	<i>Acer rubrum</i>	upland-moist	red fall color	40-60
Silver maple	<i>Acer saccharinum</i>	wet-soil	yellow fall color	75-100
Serviceberry	<i>Amelanchier arborea</i>	upland-dry	white flowers	20-30
Black chokeberry	<i>Aronia melanocarpa</i>	upland-moist	white flowers	3-6
Bog birch	<i>Betula glandulifera</i>	wet soil	yellow fall color	6
River birch	<i>Betula nigra</i>	wet soil	yellow fall color	50-70
Paper birch	<i>Betula papyrifera</i>	upland-moist	yellow fall color	40
Hackberry	<i>Celtis occidentalis</i>	upland-moist	white flowers	60-100
Sweet fern	<i>Comptonia peregrina</i>	upland dry	white flowers	1.5-2
Silky dogwood	<i>Cornus amomum</i>	wet soil	white flowers	6-12
Grey dogwood	<i>Cornus racemosa</i>	upland-dry	white flowers	6-15
Hawthorne	<i>Crataegus mollis</i>	upland-dry	yellow flowers	15
Winterberry	<i>Ilex verticillata</i>	wet soil	evergreen	3-12
Creeping juniper	<i>Juniperus horizontalis</i>	upland dry	evergreen	1
Red cedar	<i>Juniperus virginiana</i>	upland dry	evergreen	20-60
Ironwood	<i>Ostrya virginiana</i>	upland-moist	yellow fall color	35-60
Common ninebark	<i>Physocarpus opulifolius</i>	upland-dry	yellow fall color	6
White spruce	<i>Picea glauca</i>	upland-moist	evergreen	40-75
Black spruce	<i>Picea mariana</i>	wet-soil	evergreen	30-70
Jack pine	<i>Pinus banksiana</i>	upland-dry	evergreen	60
White pine	<i>Pinus strobus</i>	upland-moist	evergreen	210
Cottonwood	<i>Populus deltoides</i>	upland-moist	glossy leaves	90
Quaking aspen	<i>Populus tremuloides</i>	upland-moist	yellow fall color	60-80
Wild plum	<i>Prunus americana</i>	upland-dry	fragrant bloom	10-15
Pin cherry	<i>Prunus pensylvanica</i>	upland-moist	white flowers	10-30
Chokecherry	<i>Prunus virginiana</i>	upland-dry	red fall color	30
Bur oak	<i>Quercus macrocarpa</i>	upland-moist	yellow fall color	70-80
Red oak	<i>Quercus rubra</i>	upland-moist	red fall color	150
Prairie rose	<i>Rosa arkansana</i>	upland-dry	pink flowers	1-3
Sandbar willow	<i>Salix exigua</i>	wet soil	deep green	4.5-9
Prairie willow	<i>Salix nigra</i>	wet soil	yellow fall color	35-50
Basswood	<i>Tilia americana</i>	upland-dry	yellow fall color	60-100
Blueberry	<i>Vaccinium angustifolium</i>	upland-dry	red fall color	0.5-2
Nannyberry	<i>Viburnum lentego</i>	upland-moist	red fall color	3-6

\* selection taken from Lakescaping for Wildlife and Water Quality



# WEST LAKE DRIVE PLANT SELECTION

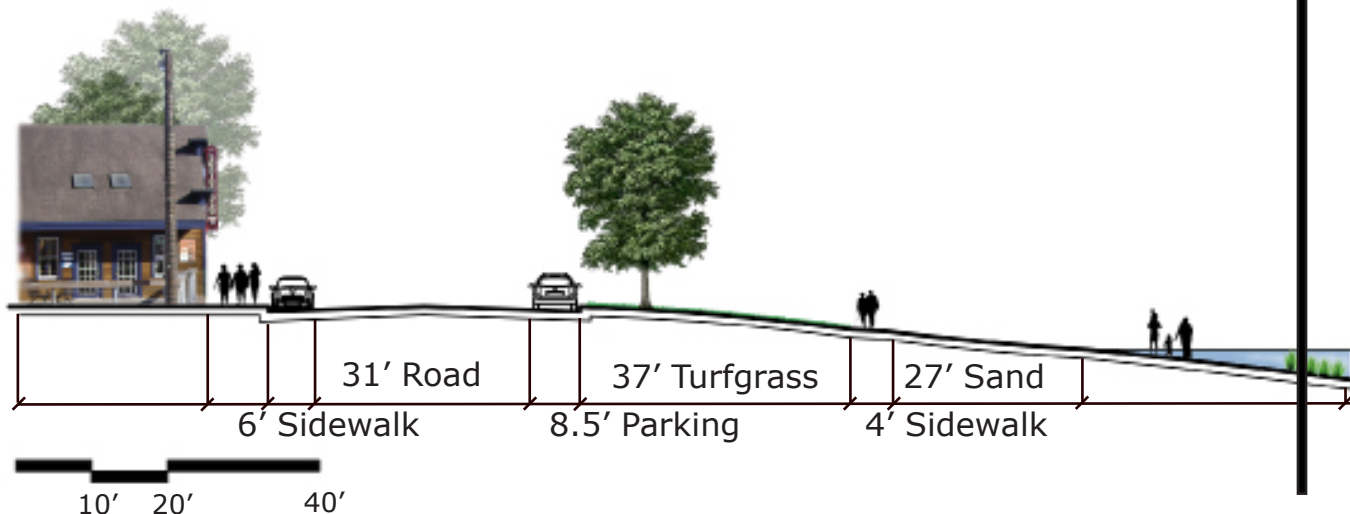
## PLANT RECOMMENDATIONS

The plant selection for forbs, grasses, shrubs and trees were based on a selection that will excel in the sunny conditions of Detroit Lakes Public Beach and are native to Minnesota lakeshores. Along with a native selection, it is important to recommend a variety of species that differ in their need of moisture content in soils. This recommendation chart includes plants that needs soil that is upland-dry, upland-moist, wet, shallow-water, and deep-water.

## FLOWERING RUSH INVASION

Flowering rush is an invasive aquatic plant species that has been introduced into many of Minnesota's Lakes. It was likely brought to North America from Europe as a decorative garden plant, but in recent years it has taken over as a dominant emergent shoreline plant in lakes and rivers. This plant species forms dense stands that interfere with recreational lake use such as swimming, boating, and fishing (Jensen, 2009). In 2010 the city of Detroit Lakes spent \$50,000 removing Flowering Rush weeds from the city beach. The invasive plant must be cleaned up daily during peak use periods to maintain the beach for swimmers and boaters (PRWD, 2008).

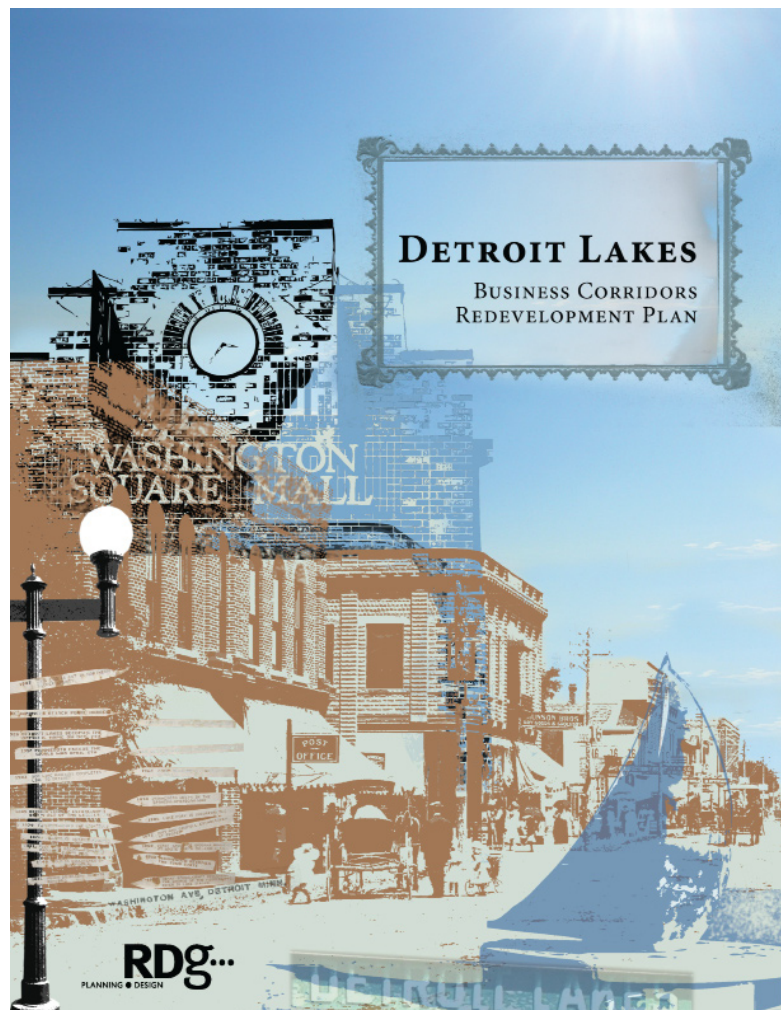
## EXISTING SITE CONDITIONS



# THEORETICAL PREMISE RESEARCH

## DETROIT LAKES REDEVELOPMENT PLAN

The business corridor redevelopment plan focuses on creating greater stability for existing businesses, rewards for reinvestment in buildings, and new business starts. Detroit Lakes downtown economy has recently declined as a result of Highway 10 business formation that includes K-mart, Wal-Mart, and Menards. The program for redeveloping downtown centers upon attracting tourists through the West Lake Drive corridor and the highway 10 corridor. Connecting these two major thoroughfares to downtown will create conditions for economic growth. My thesis proposal will examine ideas set forth by the business corridor plan and further develop a sustainable lakeshore solution for West Lake Drive (RDG Planning and Design,2008).



<http://www.ci.detroit-lakes.mn.us/>



**Programmatic Elements for West Lake Drive**

- ▶ Creating opportunities for both future retail and residential development.
- ▶ Establishing a redevelopment concept for the strategic but commercially underused block of West Lake Drive between Washington and Lake avenues.
- ▶ Improving bicycle and pedestrian accommodations along the beachfront.
- ▶ Improving parking and traffic circulation throughout the district.

## CITY OF DETROIT LAKES POLICY GUIDELINES

**Shoreline Development District:** The city of Detroit Lakes zoning ordinance proposes the following guidelines for the redevelopment of the shoreline district (City of Detroit Lakes, 2011).

Impervious surface coverage of residential lots must not exceed 25 percent of the lot area. Impervious surface coverage of commercial lots must not exceed 35 percent of the lot area.

Each building must be set back at least 200 feet from the ordinary high water level.

At least 50 percent of the total project area must be preserved as open space. Dwelling units or sites, road rights-of-way, or land covered by road surfaces, parking areas, or structures are developed areas and shall not be included in the computation of minimum open space.

No more than 25 percent of a lake's shoreline can be in duplex, triplex, or quad developments.

In addition to meeting impervious coverage limits, setbacks, and other zoning standards in this Ordinance, the uses must be designed to incorporate topographic and vegetative screening of parking areas and structures.

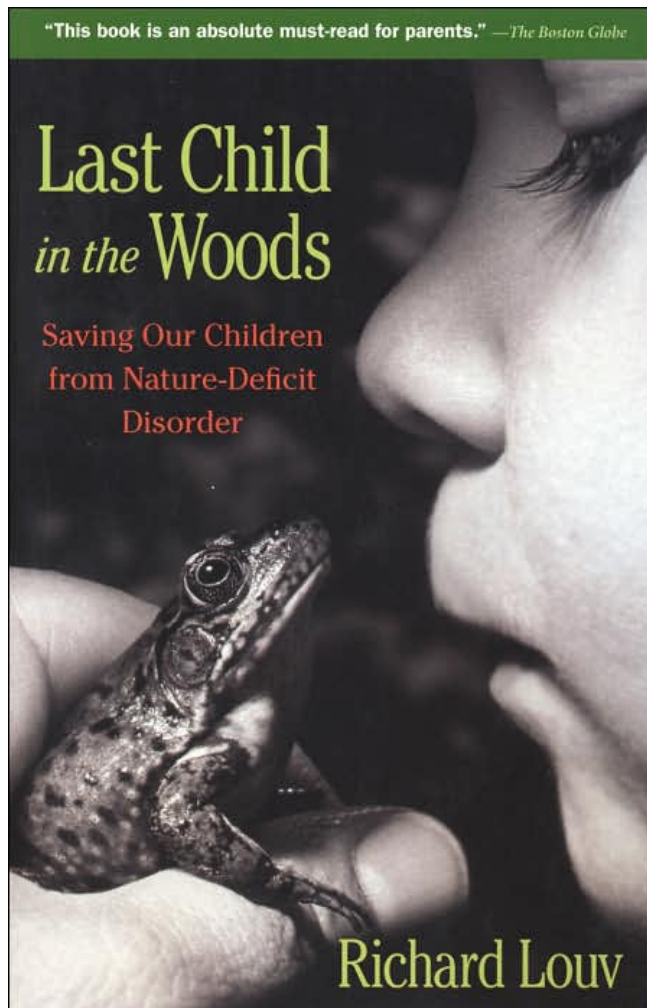
Alterations of vegetation and topography will be regulated to prevent erosion into public waters, fix nutrients, preserve shoreland aesthetics, preserve historic values, prevent bank slumping, and protect fish and wildlife habitat.

When possible, existing natural drainage-ways, wetlands, and vegetated soil surfaces must be used to convey, store, filter, and retain stormwater runoff before discharge to public waters.

# THEORETICAL PREMISE RESEARCH

## LAST CHILD IN THE WOODS

Author Richard Louv, a journalist and child advocate, directly links the absence of nature in the lives of today's wired generation to some of the most disturbing childhood trends: the rise in obesity, attention disorders, and depression. A 2002 British study reported that "eight year olds could identify PokEmon characters far easier than plant and animals" (Louv, 2006). Nature can teach kids science and nurture their creativity while educating the youth to be future stewards of the landscape. Educating the youth is important for my thesis proposal of West Lake Drive, and the proximity of Rossman Elementary makes this site a perfect location for an outdoor classroom to coincide with the redeveloped lakeshore.



[http://insideoregon.uoregon.edu/uo-lecture-author-richard-louv-on-family-nature-community/louv-last\\_child\\_in\\_the\\_woods/](http://insideoregon.uoregon.edu/uo-lecture-author-richard-louv-on-family-nature-community/louv-last_child_in_the_woods/)



# RESEARCH SUMMARY

## THEORETICAL PREMISE

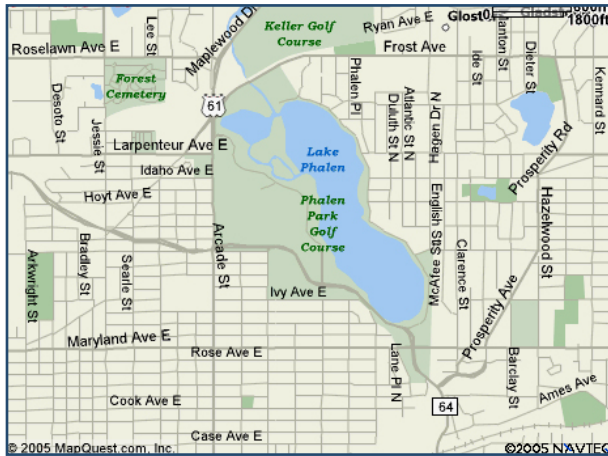
Americans continue to be out of touch with the natural environment, opting for a suburban life with sprawling lawns rather than practicing sustainability. The environment continues to suffer as more and more land that was once natural is converted into turf grass. This desire is especially detrimental when the development occurs along a lakeshore. The lake experiences many problems that include soil erosion, algae growth, loss of water clarity, and destruction of wildlife habitat. We risk losing vital fresh water, wildlife habitat, and recreational sources if something is not done about unsustainable development on lakeshores.

According to the Minnesota DNR's publication on *Lakescaping for Wildlife and Water Quality*, the solution to unsustainable lakeshores is creating natural buffers of vegetation to collect harmful chemicals from entering into the lake. The implementation of natural vegetation will stop the effects of pollution on the lake and eventually clean the water. A major obstacle in this type of development is educating private lake home owners on the benefits of a natural lakeshore. My thesis site of West Lake Drive in Detroit Lakes serves as a major public area perfect for educating the community about sustainable lakeshore development. By educating the public now we can hope to reverse the trends of poor development practices and protect vital resources and wildlife for future generations.

# TYOLOGICAL RESEARCH

## CASE STUDY 1 : LAKE PHALEN, ST. PAUL, MINNESOTA

### Location



[http://www.minnesotalakes.com/LakePages\\_TC/Minnesotalakes\\_Ramsey\\_County.htm](http://www.minnesotalakes.com/LakePages_TC/Minnesotalakes_Ramsey_County.htm)

### SHORE RESTORATION OF A HIGH-USE URBAN LAKE

Today Lake Phalen in St Paul, Minnesota has many summer visitors who enjoy the 3.1-mile bike path, sandy swimming beach, and wildlife viewing areas. The lake was acquired by the park district in 1899 and shoreline work (immediately began). Original shore improvements included filling in marsh land and the conversion of lakeshore to lawn spaces. The lawn maintenance used sheep to manicure the shoreline edge, which caused excessive erosion. According to the Minnesota DNR, 80 percent of the lakeshore was in a degraded state with an abundance of invasive species in.

In 2000 the park district adopted a five-year plan for the shoreland ecological restoration project. The goal of the plan was to reintroduce diverse native plant shoreland communities in areas that experienced moderate to severe erosion. This approach reduced sediment inputs, provided quality fish and wildlife habitat, and made the shoreland aesthetically pleasing (Bartodziej).





### Phase 1 - Excavation



### Phase 2 - Shoreline Stabilization



### Phase 3 - Shoreline Restoration

Shore Restoration of a High - Use Urban Lake

## BEFORE IMPROVEMENTS

- 80% of the Phalen lakeshore was in a degraded state
- Various blends of rip-rap
- Bank slumping
- Decreasing water clarity
- Invasive species
- Excessive turfgrass

## AFTER IMPROVEMENTS

- 1.8 km of shoreline restored to natural vegetation
- Reduction in bank erosion
- Improved water clarity
- Wildlife Viewing Areas
- Increase in spawning beds for fish
- Increase in wading bird species
- Increase in frog species
- Decrease in maintenance

## RESTORATION

Revegetation methods in transitional and emergent zones used in the project included prevegetated erosion control blankets, 4" fiber pots with plants, and coconut rolls to protect plants from wave action. The most successful plants to take root in the lakeshore habitat were hardstem bulrush, soft-stem bulrush, three-square bulrush, and river bulrush. School and civic groups donated 75 percent of the labor to make this project possible.

This case study displays successful aspects of shore restoration methods, public involvement, and results over the long-term. My thesis proposal of West Lake Drive in Detroit Lakes, MN should include ideas used for Lake Phalen. The steps used in the implementation of native plants proved successful. Natural lakeshore along West Lake Drive would help control sedimentation caused by sand, and erosion, and control invasive aquatic species. The diversification of aquatic plants would benefit the wildlife habitat of Detroit Lake (Bartodziej).

# TYPOTOLOGICAL RESEARCH

## CASE STUDY 2 : SUNSET BEACH, LAKE SAMMAMISH, WA

### Location



<http://sammamishreview.com/2010/07/20/shootings-rock-lake-sammamish-state-park>

### Statistics

**Firm:** The Watershed Company

**Client:** Washington State Parks and Mountains to Sound Greenway Trust

**Location:** Lake Sammamish, WA

**Dates:** 2008 - 2009

## BEACH RESTORATION

Lake Sammamish is part of the Washington State Park system. There is an abundance of activities at the park that include athletic fields, walking trails, a swimming beach, and boat landing. Lake Sammamish's shoreline was in a deteriorated state from erosion caused by swimming along the shoreline. The Watershed Company oversaw the design and construction of a 665-foot shoreline restoration project on the lake in 2008 (The Watershed Company, 2009).





## PROJECT GOALS

The goal of the project was to stop shoreline erosion, enhance salmon habitat and fish passage, and preserve opportunities for recreation. A major focus of this project was Sunset Beach, a previous area used for swimming and sunbathing. The plan incorporated common shoreline stabilization practices described in the Lake Phalen Case Study. Another important aspect of this project was to deter human use while the shoreline restabilized with natural aquatic vegetation. To accomplish this goal, 34 pieces of large woody debris were placed along the shoreline or near the ordinary high water mark. The shoreline now exhibits natural sustainability as a result of the aquatic vegetation. The success of this project merited an award from the Washington Chapter of American Society of Landscape Architects for its excellent environmental planning and design (The Watershed Company, 2009).

## THESIS RELATIONSHIP

This case study explores ways to intertwine human recreation with the natural environment. Sunset Beach was previously used for swimming, but with another swimming beach in the state park, this area was redeveloped into a natural lakeshore habitat for wildlife. Detroit Lakes currently has a quarter-mile public swimming beach along West Lake Drive. Portions of this beach could be redeveloped back to natural lakeshore while still preserving opportunities for recreation. Lake Sammamish State Park demonstrates that a smaller swimming beach with redeveloped lakeshore is beneficial to the health of the lake and the wildlife habitat.

# TYOLOGICAL RESEARCH

## CASE STUDY 3 : GRAND MARAIS, MINNESOTA



<http://www.grandmaraisgolfcourse.com/location.htm>

### Location

The city of Grand Marais received its name from early French traders, referring to the "great marsh" that ran along the shore of Lake Superior. Today the coastal wetland of Grand Marais is the harbor and centerpiece of the city. Tourists from around the country come to this small community of 1,418 residents to enjoy dining, shopping, and nature-based tourism in this unique city (Grand Marais Area Tourism Association, 2011).

### CHARACTER : SENSE OF PLACE

Grand Marais' sense of place is seen in the built environment and the landscape. I traveled to the city to immerse myself in the environment and determine the city's "sense of place" through pictures and sketching. The landscape of the city relates to the surrounding Lake Superior coastline through its use of rock, natural vegetation, and themed details. The harbor park redevelopment project received \$96,323 from Minnesota's Lake Superior Coastal Program, The Minnesota DNR, and the National Oceanic and Atmospheric Administration for the construction of an outdoor classroom program and the shoreline revitalization project at the city beach (Goat, 2008).



**Multifamily Residential**



**Bookstore / Retail**



**Downtown**





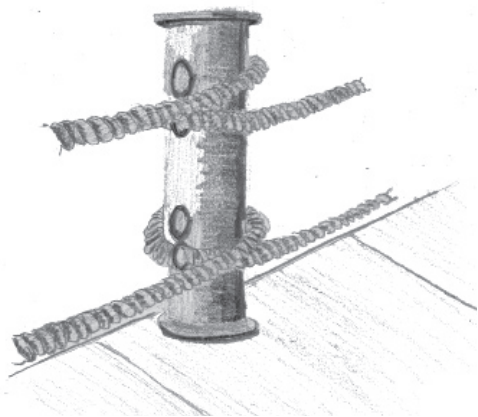


## CHARACTER

The downtown and primary shopping district encompasses many shoreline characteristics into construction details. The overall shoreline and northern Minnesota theme of the city carries through the entire downtown area in the building facades, signage, and seating. Wherever people are within the city, they know that they are visiting a coastal town and that Lake Superior is only a few blocks away. The themeing of the city through these characteristics helps draw thousands of tourists annually and it positively stimulates the economy of this small town.

# CHARACTER

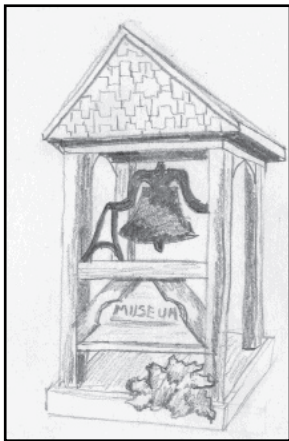
## SKETCHES



**Harbor Walk Fence**



**Crooked Spoon Outdoor Light**



**Lighthouse Bell**



**Red Pine Realty Sign**



**Street Lamp**

# RESEARCH SUMMARY

## TYOLOGY

The results from my case studies demonstrate the effectiveness of lakeshore revitalization. According to the Minnesota DNR, natural lakeshore buffers have a positive impact on preventing soil erosion, preventing nitrogen and phosphorus from entering the lake, and fostering wildlife habitat. Natural shoreline habitat is integral to a healthy watershed. A major concern among citizens, especially of Detroit Lakes, is that the revitalization from sand to natural vegetation would greatly hurt the shoreline district's economy, believing tourists would no longer see it as a beach environment. The Sunset Beach case study demonstrates that a natural shoreline and a sandy beach can coexist in the same area. A reduction in the size of the Detroit Lake public beach is beneficial to the health of the lake while popular portions of the sandy beach would remain intact for recreational purposes. The beach then becomes a multi-use facility for both swimming and wildlife viewing.

Funding for the redevelopment of the site is made possible by government grants encouraging sustainable design and nature education. My thesis proposal has the ability to bring the community together with a common goal of protecting their important water body with an emphasis of educating homeowners on Detroit Lake of the benefits of natural shoreline development.

# HISTORICAL CONTEXT

## HISTORY OF LAKESHORE DEVELOPMENT

Before cabins surrounded the lakeshore, natural grass, shrubs, and trees were abundant, providing ideal wildlife habitat. The natural beauty and wildlife is what first attracted people to summer homes around the lake. They loved the peace and serenity of the landscape so they could escape the everyday pressures and stresses of the city (Larson, 2005). The 1950s saw a major increase in the amount of lakeshore property construction. It was during this same time that the working middle class began to adopt the suburban lifestyle. Suburbia offered expansive lots with an endless sea of turf-grass. The ideas of the suburban landscape were adopted in their lakeshore lots. Natural grasses, shrubs, and trees were cut down in an effort to have the “perfect lawn.” The removal of the natural lakeshore buffer zone has a detrimental impact on the lake environment. The Minnesota DNR says, “The lack of vegetated buffer zones causes bank erosion, which negatively impacts aquatic plants, fish species, and the water clarity” (Larson, 2005). Even with the knowledge of the negative impacts on lake habitat, homeowners continue to practice unsustainable practices in lakeshore landscaping.



# HISTORICAL CONTEXT

## HISTORY OF THE CITY OF DETROIT LAKES

The city of Detroit Lakes was originally a stopping point for fur traders because of the pristine and beautiful lake. As time went on an ox trail ran along the shoreline of what is today West Lake Drive. It wasn't until 1854 that the first structure was built on the shores of Detroit Lake. Donald McDonald, a fur trader, built a log cabin on the northeast shore of Big Detroit Lake, near the entrance of the Pelican River. A small community called Tyllerville sprung up around this cabin. The construction of the Northern Pacific Railroad was the catalyst for the development of the current city of Detroit Lakes (Larson, 2005).



**Indian Settlement in the 1920s**

<http://www.lakesnwoods.com/DetroitLakesGallery.htm>



**Park Hotel - 1920s**

<http://www.lakesnwoods.com/DetroitLakesGallery.htm>

## HISTORY OF THE LAKE

The lake and town got their name from a French Catholic Priest stopping to rest on his way to St. Paul. While camping with the Matis he admired the sandbar glimmering in the bright moonlight. He exclaimed, "see what a beautiful detroit." Detroit was the French word for "straight," and it is that name that forever stuck with the city. The first major construction project to affect Detroit Lake was the dam at Muskrat Lake. This raised the level of the lake by half a foot and made the river navigable to Lake Sallie through a system of locks called Dunton Locks. This trip became a form of nature-based tourism as hundreds of people every weekend crowded on steam boats for the day trip from Detroit Lake to Lake Sallie (Larson, 2005).

# HISTORICAL CONTEXT

## HISTORY OF WEST LAKE DRIVE

The public beach redevelopment project of the 1960s was constructed to help combat shoreline erosion and increase tourism. Before this project, West Lake Drive had major problems with shore bank erosion. Along with shoreline stabilization, this project was planned due to the city's early stormwater management practices that had negative impacts on the ecosystem and water clarity when stormwater runoff was drained directly into the lake. As a result, the town adopted a \$250,000 redevelopment plan to re-grade the shoreline and divert stormwater to a pumping station. The West Lake Drive bank is now a gradual slope with a sandy beach. The formation of this beach has been a major economic draw to the city. It has led to the construction of many resort cottages and taverns along the public beach lakeshore (Larson, 2005).



**West Lake Drive in the 1920s**



**Small Public Beach of the 1940s**



**West Lake Drive post-1960  
1/4-Mile Long Beach**

Images from : <http://www.lakesnwoods.com/DetroitLakesGallery.htm>



# THESIS GOALS

## ACADEMIC GOALS

The academic goals for this thesis project center on educating the public about the many beneficial aspects of sustainable lakeshore development. The final design will educate private lakeshore homeowners on the feasibility of implementing native shoreline on their property. The redevelopment project will prove that wildlife habitat can coexist with recreational watersports. The hope is that this project will curb negative attitudes toward natural lakeshores.

## CAREER GOALS











My future career aspirations focus on community development with an emphasis on sustainable improvements in stormwater management. This project will progress my knowledge of this subject. Water will be a very important resource for future generations and I would like to make a difference in the world.

## PERSONAL GOALS

My personal goals for this project include the production of a well-formulated and articulated thesis project that one day might make a difference in the way lakescapes are designed. Hard work and dedication are necessary to create a successful design.

# LAND USE MAP

*West Lake Drive,  
Detroit Lakes, MN*

- |   |                           |   |                 |
|---|---------------------------|---|-----------------|
|  | Retail / Dining           |  | Residential     |
|  | Resort Motels             |  | Public Facility |
|  | Office                    |  | Vacant          |
|  | Service                   |  | Public Beach    |
|  | Civic                     |   |                 |
|  | Residential/ Multi-Family |   |                 |





# SENSE OF PLACE

## RETAIL AND RESTAURANTS



### ① Lakeside Tavern

Lakeside Tavern's use of wood material, street signage, and building character relates very well to Minnesota's sense of place.



### ③ Zorbaz

Zorbaz lacks a design direction, but it makes up for it with memorabilia and objects related to the beach theme.



### ⑤ Beach Front

Beach Front has unique characteristics in its building design. However, an enormous amount of money was spent on design details unrelated to Minnesota.



### ② Lake Shirts

Lake Shirts exhibits beach qualities with its boardwalk and building design.



### ④ J & K Marine

J & K Marine is in an ideal spot at Detroit Lakes Harbor. However, the building has no sense of place with its metal siding and poor design.

# ECONOMIC VITALITY

*Economic vitality along West Lake Drive is integral for urban sustainability.*

**Local & Tourist Land Use**

LOW      MODERATE      HIGH



# UNDER-UTILIZED PROPERTY

WEST LAKE DRIVE, DETROIT LAKES, MN



## ① Vacant Lot

The program for this site has changed more than any other area on West Lake Drive. It currently remains unoccupied after Giovanni's left. This property is at a major node between West Shore Drive and North Shore Drive and should be a focal point of the community.



## ② Vacant Motel

The Capri Motel is in a state of disrepair and can longer be used for its original purpose. This property in conjunction with the other vacant lot should be redeveloped and take full advantage of the favorable location.



## ③ Holiday Haven

Holiday Haven has been a mainstay along West Lake Drive since its construction in the 1950s. However, current use is minimal as a result of larger resort construction on other parts of Detroit Lake. This area sits adjacent to the vacant lots and provides opportunities for redesign and economic growth.



## ④ Viking Resort

Viking Resort is for sale like many of the other small resorts that were once popular along West Lake Drive. Developers are buying these properties for condominium construction. The people who end up buying the condominiums rarely stay there year-round and do little to increase the economic growth of the district.

# ENVIRONMENTAL HEALTH

*Environmental Health is integral for assuring recreational use of Detroit Lakes for future generations.*

- Map Legend**
-  Pollution Points
  -  Storm Drain
  -  Low Elevation
  -  Flowering Rush
  -  Sand Beach
  -  Turf Grass
  -  Storm Outlet Watershed





## ① Flowering Rush

This invasive plant species forms dense stands that interfere with recreational lake use such as swimming, boating, and fishing. In 2010 the city of Detroit Lakes spent 50,000 dollars removing Flowering Rush weeds from the city beach.



## ② Storm Sewers

The current sewer system backs up during heavy rains and stormwater flows directly into the lake.



## ③ Storm Outfall

Storm Outfalls that directly drain into the lake are still used during heavy summer rains when the system cannot meet the demands of the stormwater runoff.








## ④ City Beach

Detroit Lakes beach is half sand and half turf grass. According to the Minnesota DNR both of these two ground materials are unsustainable in large quantities like the 1/4-mile public beach.

# HUMAN HEALTH & WELL-BEING

*Human Health & Well-Being is integral for pedestrian safety and comfort along with educating the city's youth.*

## Map Legend

-  Connection to School
-  Arterial Road
-  4 ft Beach Walk
-  Crosswalk Intersections
-  Possible Connection





**Existing 4 ft Beach Sidewalk**

## PEDESTRIAN SAFETY

West Lake Drive should be redesigned to accommodate a pedestrian-friendly environment. Current parking lanes can be removed and the street width shortened to provide a prominent boardwalk for bike riders, joggers, and pedestrians. To enhance the walkability of West Lake Drive, designated crosswalk patterns should be used in intersections to slow down traffic and add to the aesthetics of the new development.





**Students from Rossman Elementary**

<http://connect.in.com/gilson-theater/images-shelly-gilson-s-class-at-rossman-elementary-school-in-detroit-lakes--1-502682104321.html>

## OUTDOOR CLASSROOM

The proximity of Rossman Elementary and Detroit Lakes High School make this public beach a perfect location for students to immerse themselves in a natural environment. Experiencing a functioning ecosystem, rather than textbook learning, will allow students to improve their knowledge of the natural world. In addition to student learning, private lake homeowners can learn to practice sustainable aspects of landscaping to improve their lakeshore property.

# WEST LAKE DRIVE ANALYSIS MAP

-  The addition of two 8 ft. pedestrian boardwalks would enhance the shopping experience and lakeshore experience, while making it safe and ADA accessible.
-  The connection of North Shore Drive and People Street would help alleviate traffic congestion along West Lake Drive during peak use days.





1

The inventory maps indicate that this area still relies on a storm outlet to manage water runoff during heavy summer rains. The excessive turf grass in the park and the asphalt in the parking area contain phosphorus and hydrocarbons that flow directly into the lake through the storm sewer network. Bioswales should be properly placed in the park in areas with storm drains and low elevations.

2

The new urban center for West Lake Drive will be strengthened by extending North Shore Drive to People Street. This location is under-used property based on the inventory map. This area can become a major focal point of the city and attract tourists from surrounding communities. The added tourism, along with new retail stores, will help stabilize the city's economy, especially during winter months.

3

The urban plaza will add a large green space to enhance any visit to the new West Lake Drive retail center. The addition of this area meets city code by allocating space for vegetation while also creating a gathering space between major shopping nodes.

4

This area exhibits the best qualities for the installation of the new outdoor learning facility. The low-use beach section coincides with the connection to Rossman Elementary School. Kids will be able to interact with the natural lakeshore environment and fully immerse themselves in the local wildlife. A new fishing and observation pier will further enhance the learning center and produce an ideal fishing habitat for the area's youth.

# PROGRAMMATIC REQUIREMENTS

WEST LAKE DRIVE, DETROIT LAKES, MINNESOTA

## LAKESHORE DEVELOPMENT: PROGRAMMATIC ELEMENTS



## WEST LAKE DRIVE PROGRAM

### ① **Shoreline Restoration**

The shoreline restoration project of the public beach must adhere to the guidelines set by *Lakescaping for Wildlife and Water Quality* and follow Detroit Lakes city codes for the shoreline district.

- \* 25 percent of the beach must be revitalized to natural lakeshore while reaching a minimum of 25 feet inland.

### ② **Designated Fishing Area**

The designated fishing area will take advantage of the habitat surrounding the fishing pier. An aquatic plant installation will be important to create better habitat for fish.

- \* This should be specifically designed to teach kids how to fish.

### ③ **Outdoor Classroom**

An outdoor learning facility is important for educating the youth about the natural landscape.

- \* There should be a connection to Rossman Elementary and the proposed walking path through the natural shoreline.

### ④ **West Lake Drive Redesign**

West Shore Drive will be redesigned to accommodate a pedestrian-friendly environment.

- \* Loss of parking on the beach side of the road with curb cutouts on the opposite side.
- \* Creation of a 10 foot wide boardwalk running the length of the beach to increase pedestrian use.

### ⑤ **Extension of People Street**

Buy the vacant motel and houses behind Lakeside tavern to create an adjacent road to West Lake Drive.

- \* It should accommodate street parking on both sides with curb cutouts.
- \* It will have walking paths that connect to West Lake Drive.

### ⑥ **Mixed-Use Development**

Mixed-use development will occur after the vacant buildings are removed.

- \* Commercial lots must not exceed 35 percent of the lot area.

### ⑦ **Stormwater Management**

Design of the site should strive for 100% water retention.

- \* Divert stormwater from the Washington Park swimming beach by managing inland stormwater.

## REFERENCE LIST

- Bartodziej, William., & Blood, Simba. Shore restoration of a high-use urban lake. Retrieved from [http://www.ser.org/serbc/pdf/Shore\\_restoration\\_of\\_a\\_high-use\\_urban\\_lake.pdf](http://www.ser.org/serbc/pdf/Shore_restoration_of_a_high-use_urban_lake.pdf)
- City of Detroit Lakes. (2011). Zoning ordinance. Retrieved from <http://www.ci.detroit-lakes.mn.us/>
- Detroit Lakes Regional Chamber of Commerce. (2010). Visit detroit lakes. Retrieved from <http://www.visitdetroitlakes.com/>
- Goad, Jean. (2008). Grants Awarded by Minnesota's Lake Superior Costal Program. Retrieved from <http://files.dnr.state.mn.us/waters/lakesuperior/yr10grants.pdf>
- Grand Marais Area Tourism Association. (2011). Only in grand marais minnesota. Retrieved from <http://grandmarais.com/lake/lake.php?page=Marina%20and%20Harbor>
- Henderson, Carol L., Dindorf, Carolyn J., & Rozumalski, Fred J. (1998). *Lakescaping for wildlife and water quality*. Minnesota: Department of Natural Resources.
- Jensen, Doug. (2009). Flower rush. Minnesota Sea Grant. Retrieved from <http://www.seagrant.umn.edu/ais/floweringrush>
- Larson, Winston C. (2005). *A bit of history of detroit lake and the need for lakeshore improvements and the city beach*. Detroit Lakes, Minnesota.
- Pelican River Watershed District. (2008). *Flowering rush in the detroit lakes area*. Retrieved from <http://www.prwd.org/files/Flowering%20Rush%202008/2008%20FR%20brochure-PDF.pdf>
- RDG Planning and Desing. (2008). Detroit lakes business corridors redevelopment plan. Retrieved from <http://www.ci.detroit-lakes.mn.us/>



## REFERENCE LIST

- State of Minnesota, Department of Natural Resources. (2009). *The Water's Edge*. Retrieved from <http://files.dnr.state.mn.us/assistane/backyard/shorelandmgmt/savewateredge.pdf>
- The Watershed Company. (2009). Sunset beach restoration at lake sammamish state park. Retrieved from <http://www.watershedco.com/shorelines/sunset.php>
- World Water Assesment Program. (2010). Water in a changing world. Retrieved from <http://www.unesco.org/water/wwap/wwdr/wwdr3/>
- United Nations Conference. (1992). *The dublin statement on water and sustainable development*. Retrieved from <http://www.un-documents.net/h2o-dub.htm>





# PROJECT:

sustainable lakeshore development  
master plan  
mixed-use development  
stormwater management  
pedestrian corridors  
mixed-use development  
outdoor learning facility

# MASTER PLAN



**Park Bioswale**

**Stormwater Management**

**Mixed-Use / Hotel**

**Pedestrian Corridor**  
**Urban Learning Plaza**

**Mixed-Use / Condo**

**People St. Extension**

**Townhouses**

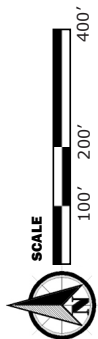
**Swimming Beach**

**Natural Lakeshore**

**Fishing Pier**

**Outdoor Learning Facility**

**Swimming Beach**



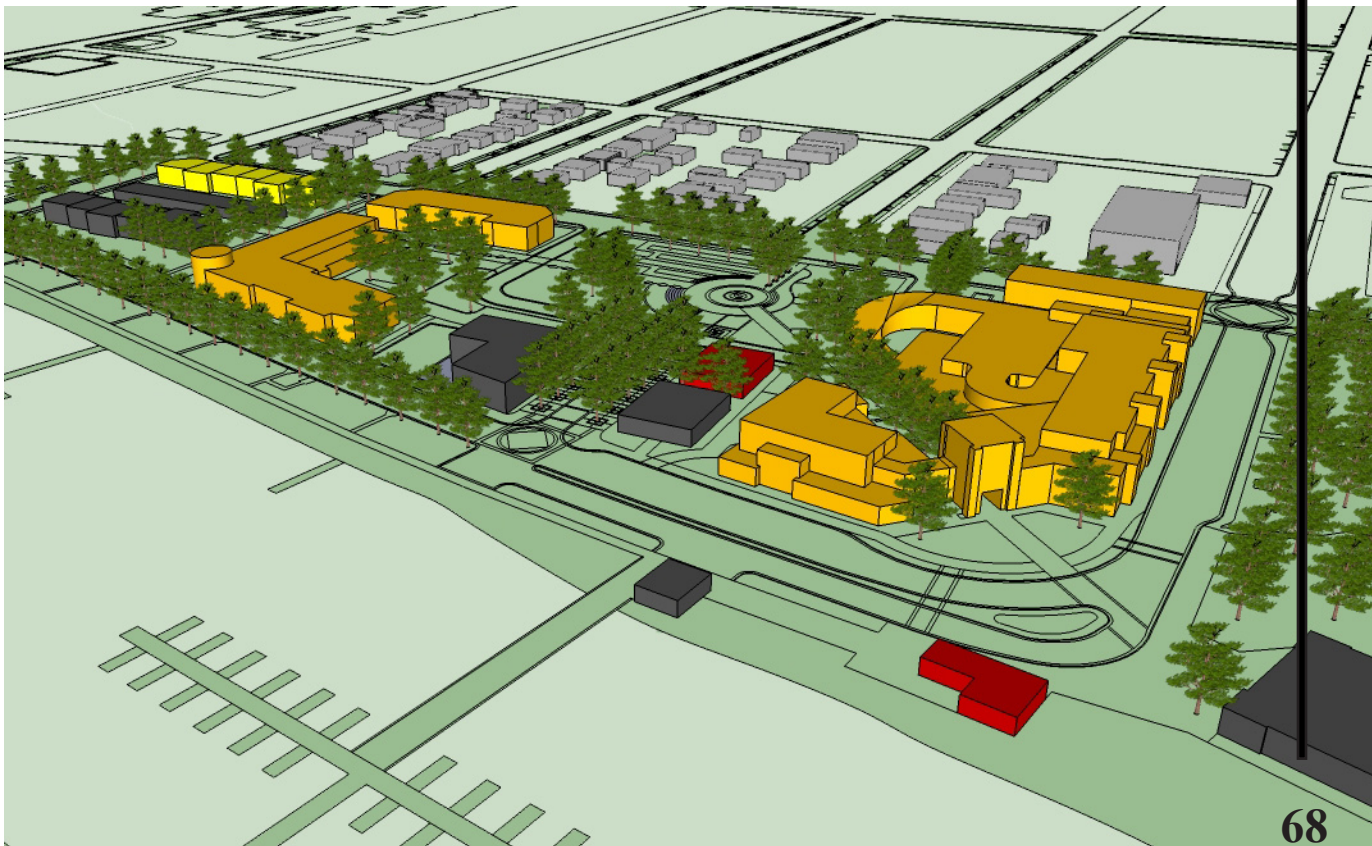


# REVISED LAND USE

-  Retail / Dining
-  Residential
-  Mixed-Use
-  Existing

## MIXED USE DEVELOPMENT

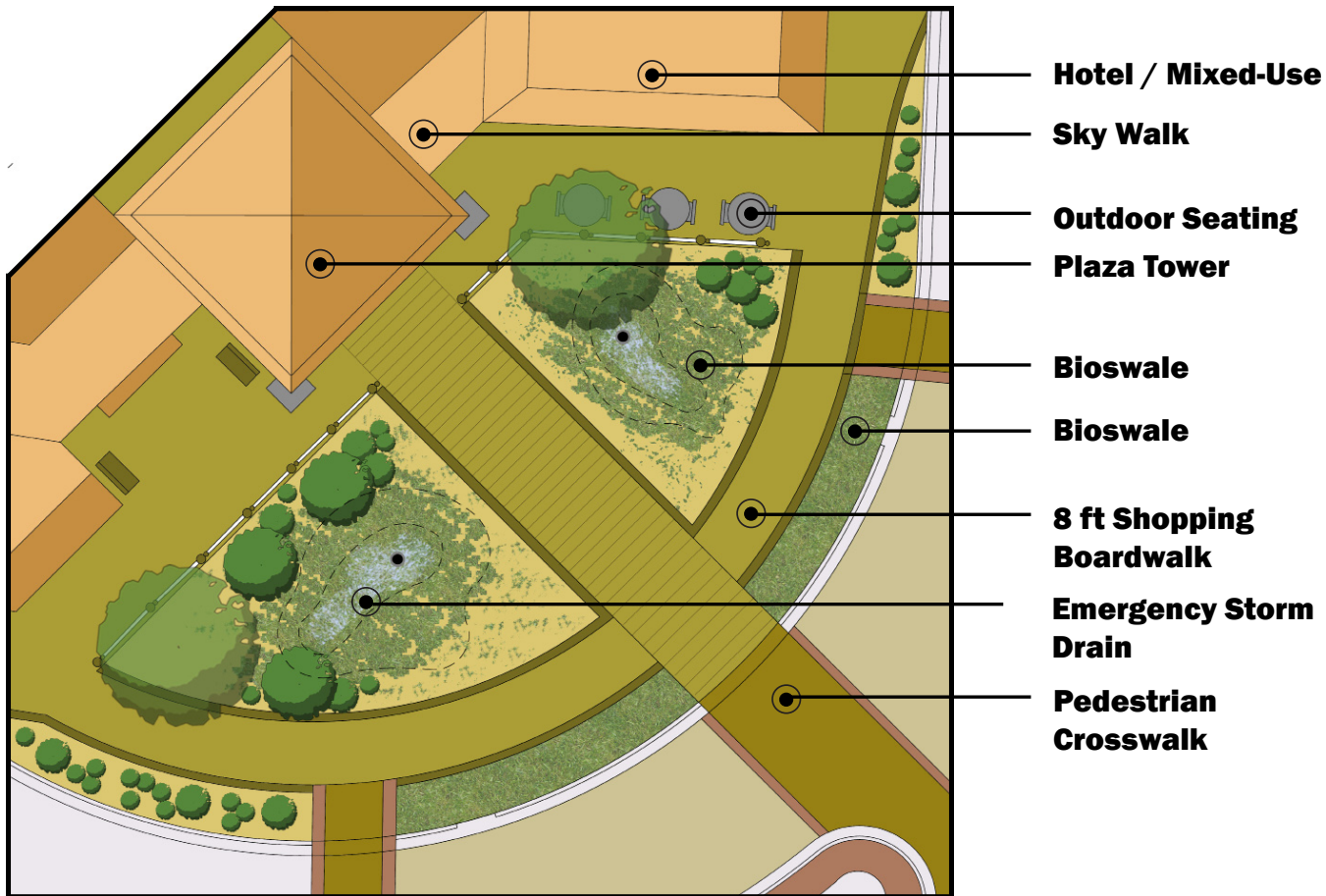
Mixed use development will be important for creating density along West Lake Drive. A mixture of residential, resort, and commercial real estate will be ideal for the economy of this area year-round. The extension of North Shore Drive to People Street will help define the boundary for this new development project. The street connection will add additional parking to this site as well as creating an alternative route during holiday weekends when West Lake Drive must be closed.



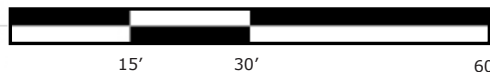
# STORMWATER MANAGEMENT

## STORMWATER MANAGEMENT PRACTICES

According to the Detroit Lakes shoreline district policy, storm water management practices are an integral part of sustainable lakeshore development. By managing stormwater runoff completely from the same properties, the amount of development along West Lake Drive can increase while the pollution levels entering the watershed will decrease. This area collects water from the adjacent street and diverts it to the large ponding area. If the water becomes too high the existing storm drains channel the water to area wetlands. The integration of lakeshore vegetation helps manage stormwater while enhancing the pedestrian landscape.



SCALE

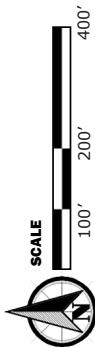




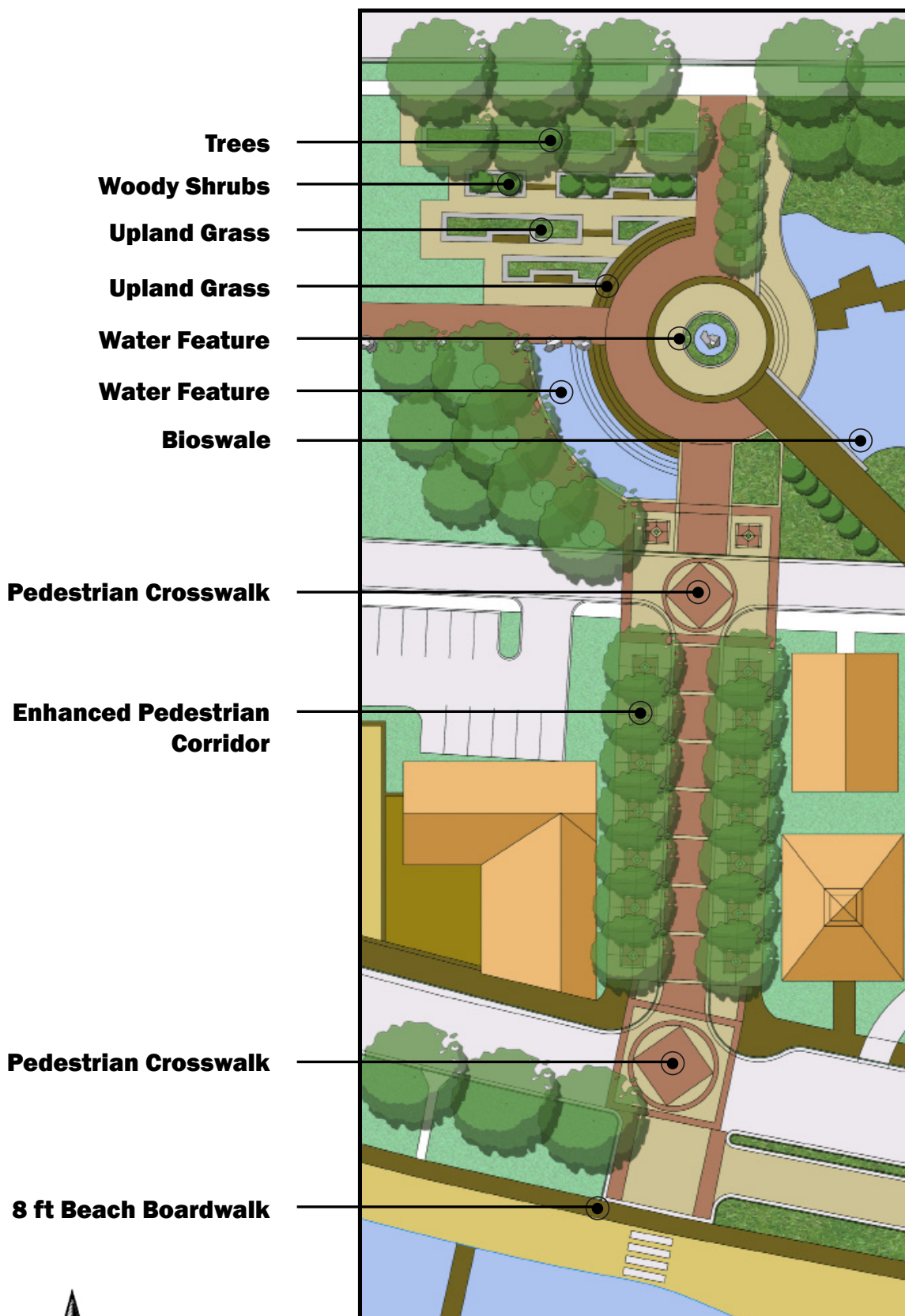


## SURFACES

- Bioswale Sites
- Natural Vegetation
- Turf Grass
- Sand



# CONNECTING PEDESTRIAN CORRIDORS



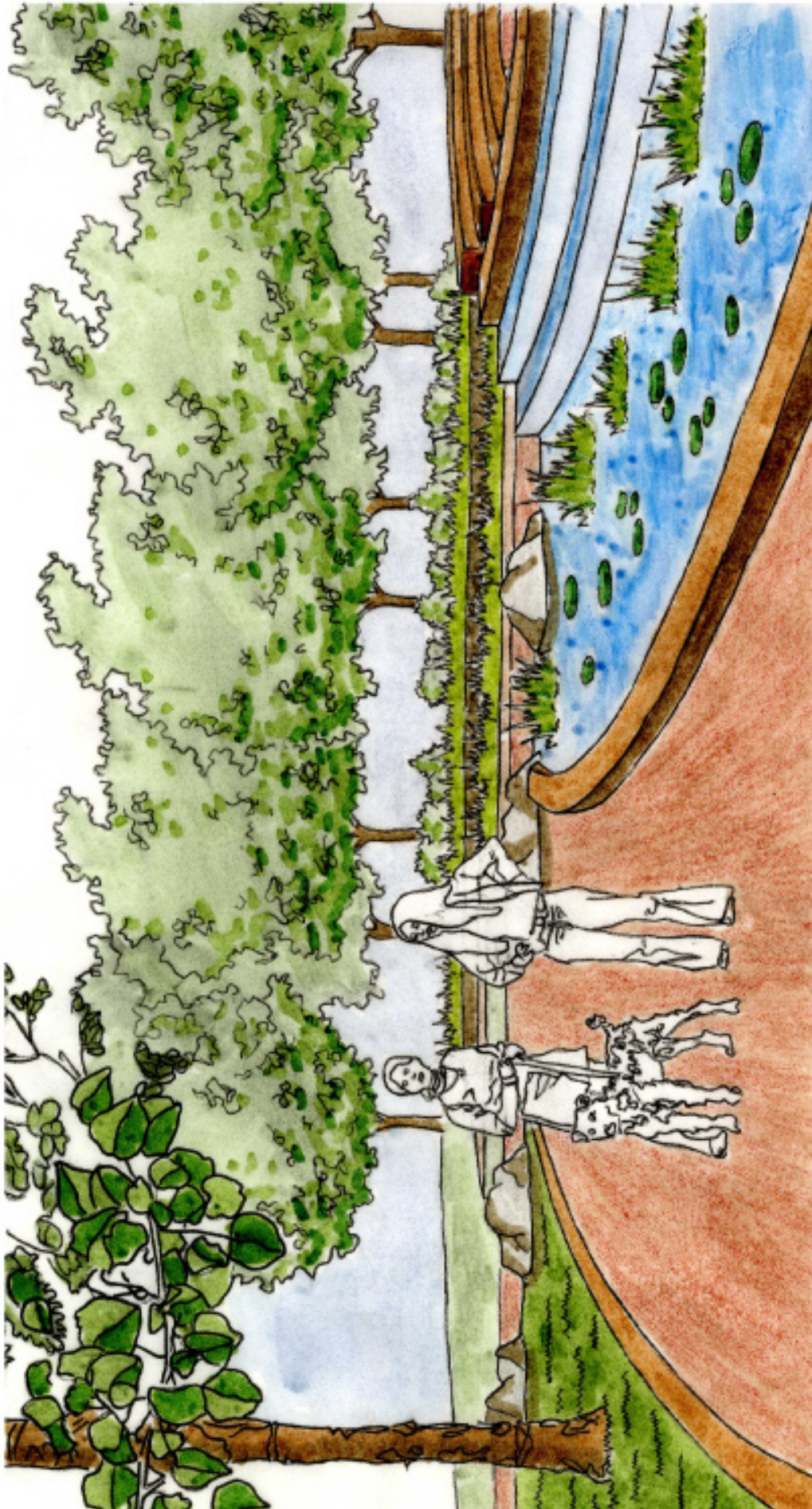
**SCALE**



30'

60'

120'



# URBAN LEARNING PLAZA

The urban learning plaza is an interactive walk-through exhibit that displays the four different varieties of plants in the lakeshore environment: trees, woody shrubs, upland grasses, and aquatic vegetation. As one navigates their way from north to south in this space, they can encounter and learn the many beautiful plants that exist along the lakeshore with each elevated area. The walk-through ends with a water feature that is planted with bulrushes and water lilies. This is an ideal resting spot in the summer because of a cool micro-climate created from the running water and the shade trees.

## URBAN LEARNING PLAZA PLANTING SELECTION

*Their are four levels of plants to consider when restoring a natural lakeshore habitat that include: trees, woody shrubs, upland grass, and aquatic vegetation.*

### WOODY SHRUBS

**Sandbar Willow**

*Salix exigua*

**Silky Dogwood**

*Cornus amomum*

**Nannyberry**

*Viburnum lentago*

### UPLAND GRASS

**Caterpillar Sedge**

*Carex crinita*

**Lake Sedge**

*Carex lacustris*

**Canada Blue-Joint Grass**

*Calamagrostis canadensis*

### TREES

**Quaking Aspen**

*Populus tremuloides*

**Bur Oak**

*Quercus macrocarpa*

**River Birch**

*Betula nigra*

### AQUATIC VEGETATION

**White Water Lily**

*Nymphaea tuberosa*

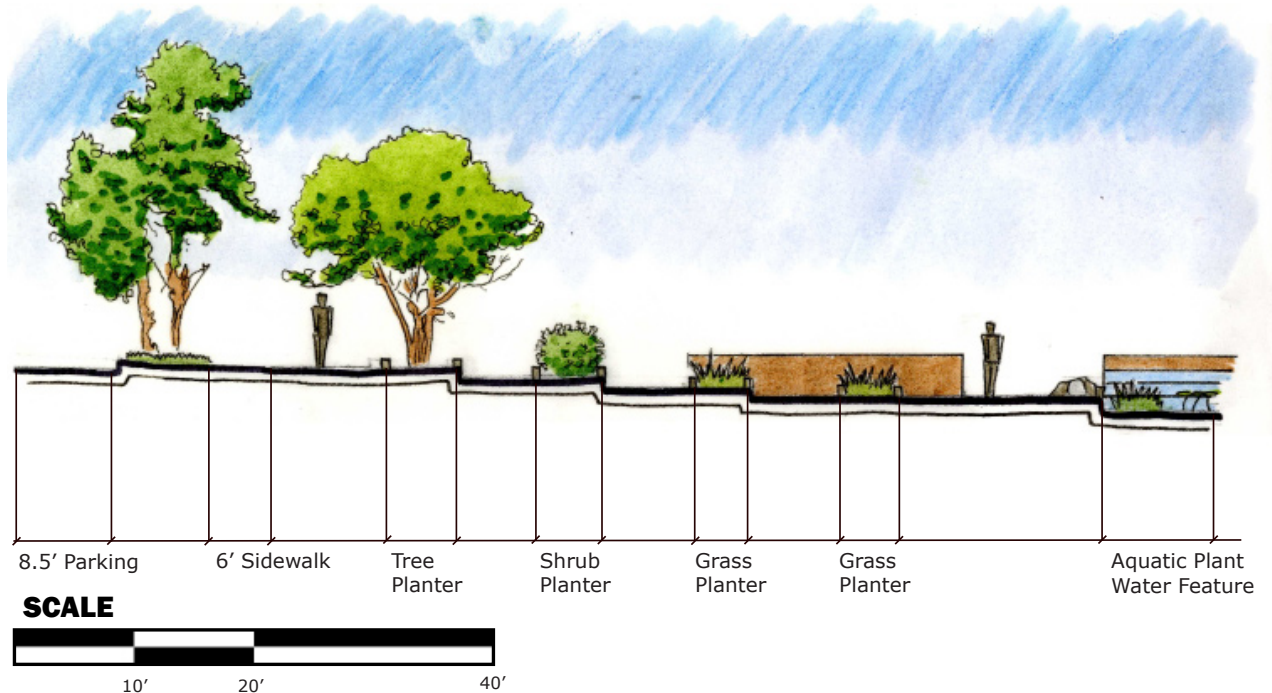
**Softstem Bulrush**

*Scirpus validus*

**Soft rush**

*Juncus effusus*

## LEARNING PLAZA SECTION



# OUTDOOR LEARNING FACILITY

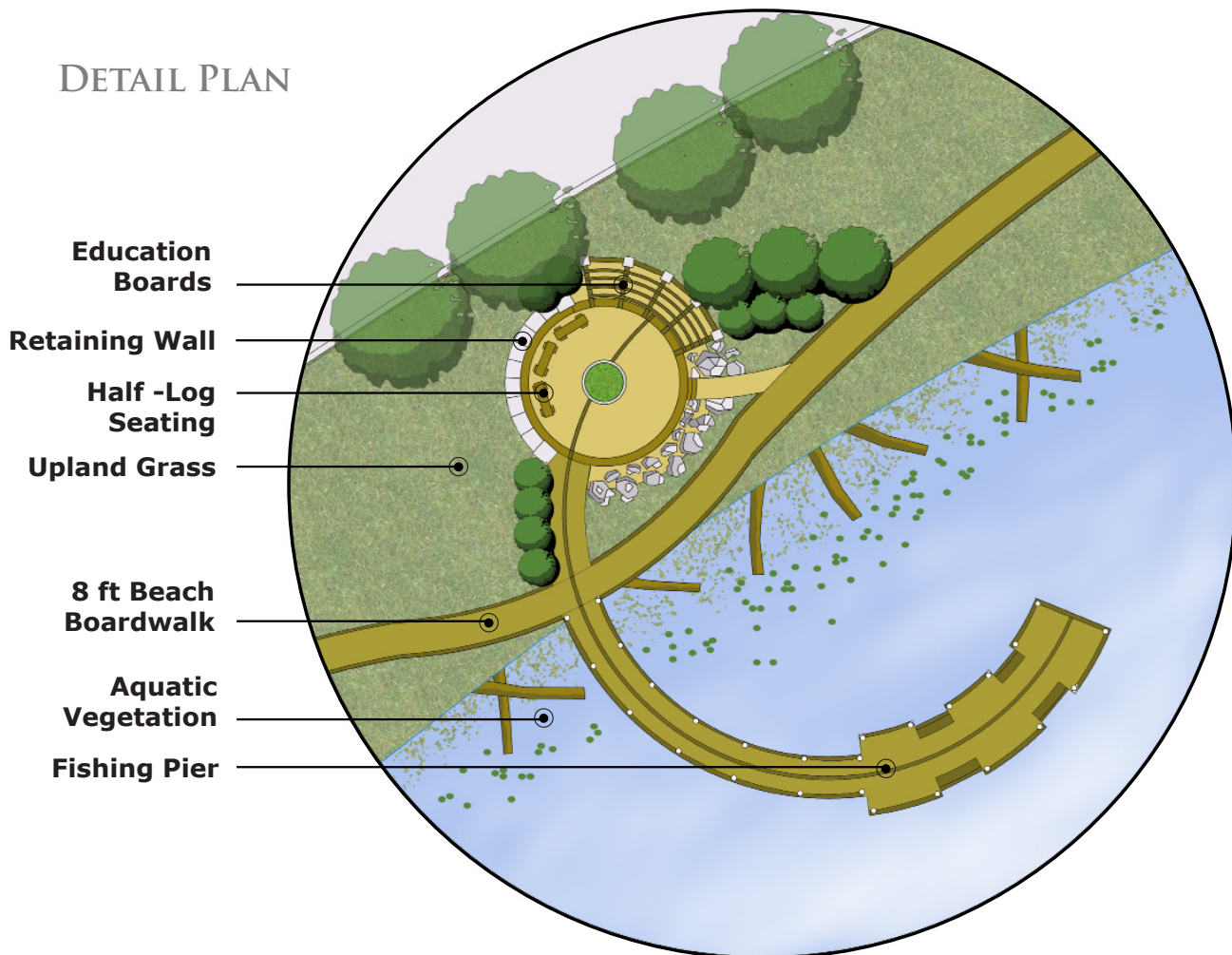
## FISHING PIER

The beach currently lacks proper habitat to support large quantities of fish. The implementation of native aquatic vegetation near the fishing pier will create vital spawning areas for fish species and attract food sources for larger fish. The beach can become a destination for community residents and a great place to teach kids fishing techniques.

## OUTDOOR LEARNING FACILITY

Area students will use the restoration site to learn about a functioning lake ecosystem through self discovery and outdoor class sessions. Students who experience the natural environment will have a better understanding of ecology and learn the importance of lakeshore habitat. The learning facility integrates natural shoreline vegetation and creates an ideal environment for learning. Area residents can learn about the implementation of natural lake shorelines and its benefits through education boards.

## DETAIL PLAN





# PLANTING PLAN

## UPLAND GRASSES

- Canada blue-joint grass**  
*Calamagrostis canadensis*
- Big bluestem**  
*Andropogon gerardii*
- Blue grama**  
*Bouteloua gracilis*




## WETLAND SEDGES

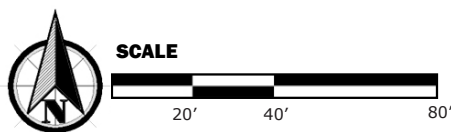
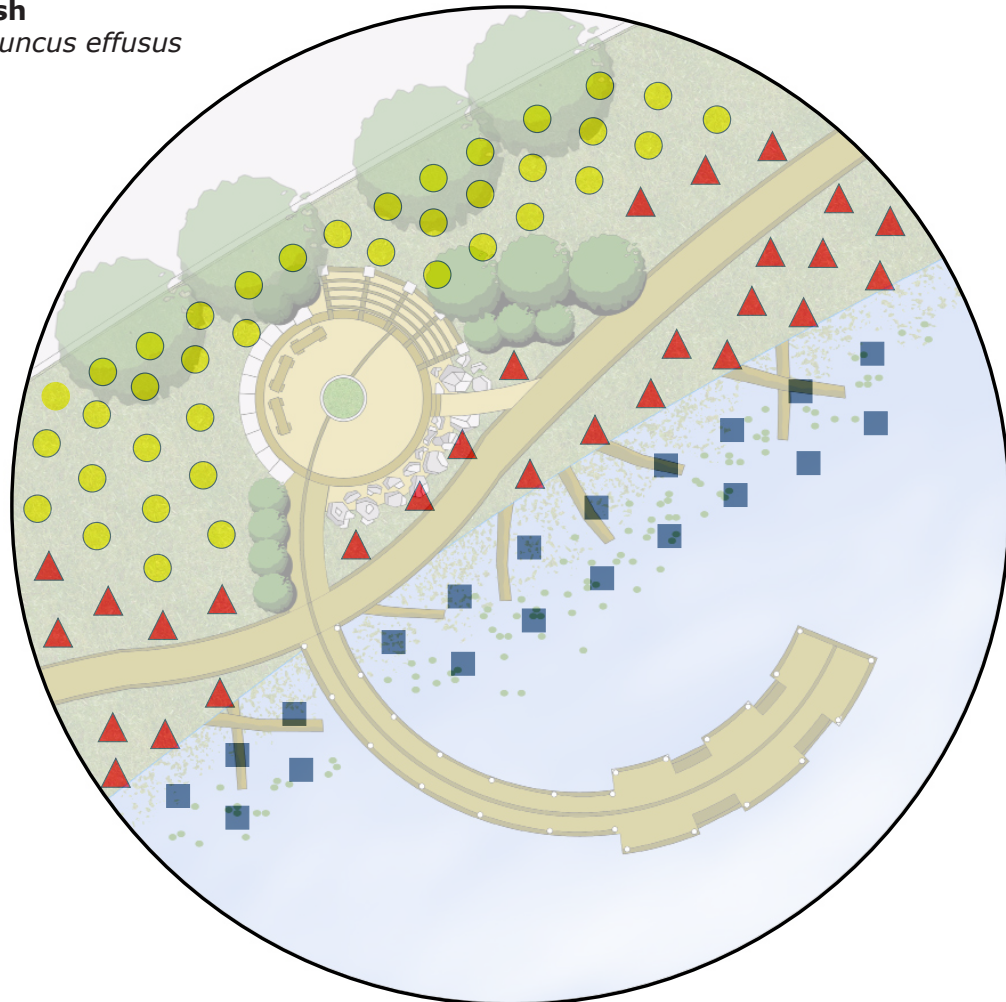
- Caterpillar sedge**  
*Carex crinita*
- Lake sedge**  
*Carex lacustris*
- Tussock sedge**  
*Carex stricta*

## AQUATIC VEGETATION

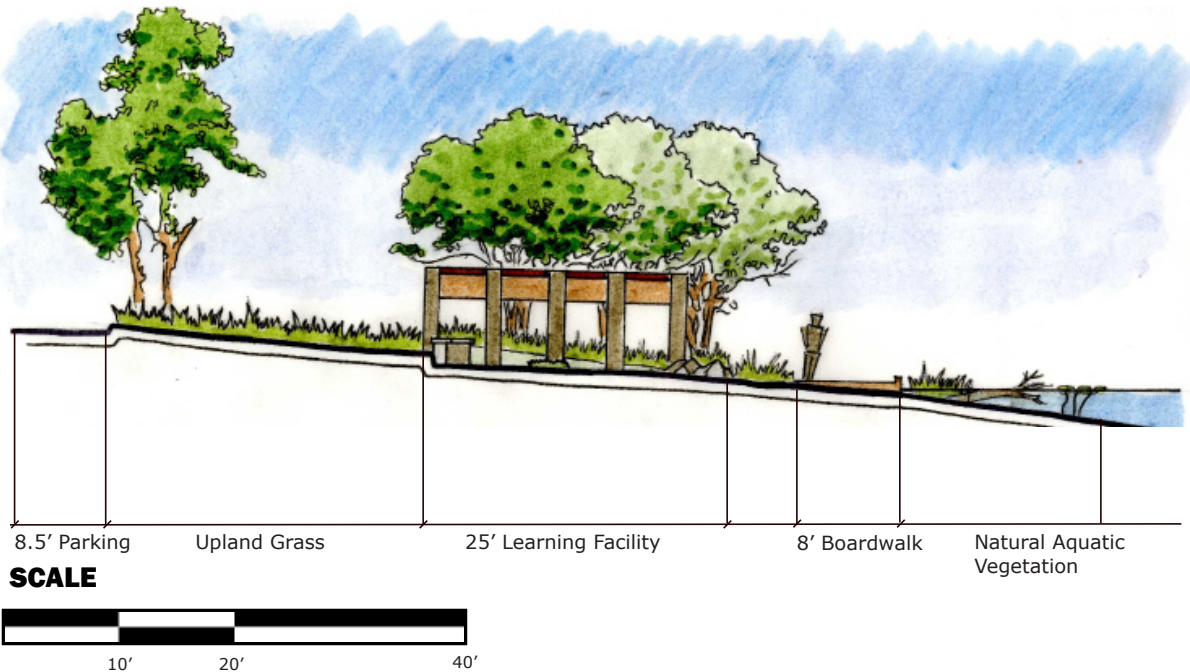
- White Water Lily**  
*Nymphaea tuberosa*
- Softstem Bulrush**  
*Scirpus validus*
- Soft rush**  
*Juncus effusus*

## PLANTINGS

-  Upland Grass
-  Wetland Sedges
-  Aquatic Vegetation

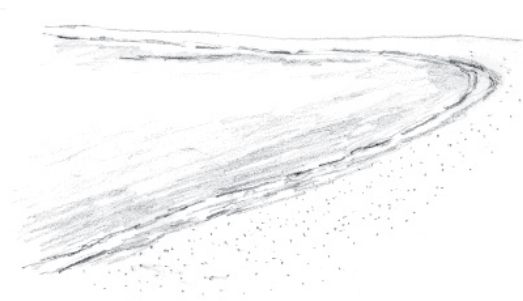


# LEARNING FACILITY SECTION



## PHASE 1 SKETCH : ERADICATION

**1** Phase 1 is the eradication process in which all the weeds and invasive species are removed through hand picking or chemical herbicides. The removal of Flowering Rush will be important in the lakeshore restoration process.



## PHASE 2 SKETCH : EROSION CONTROL

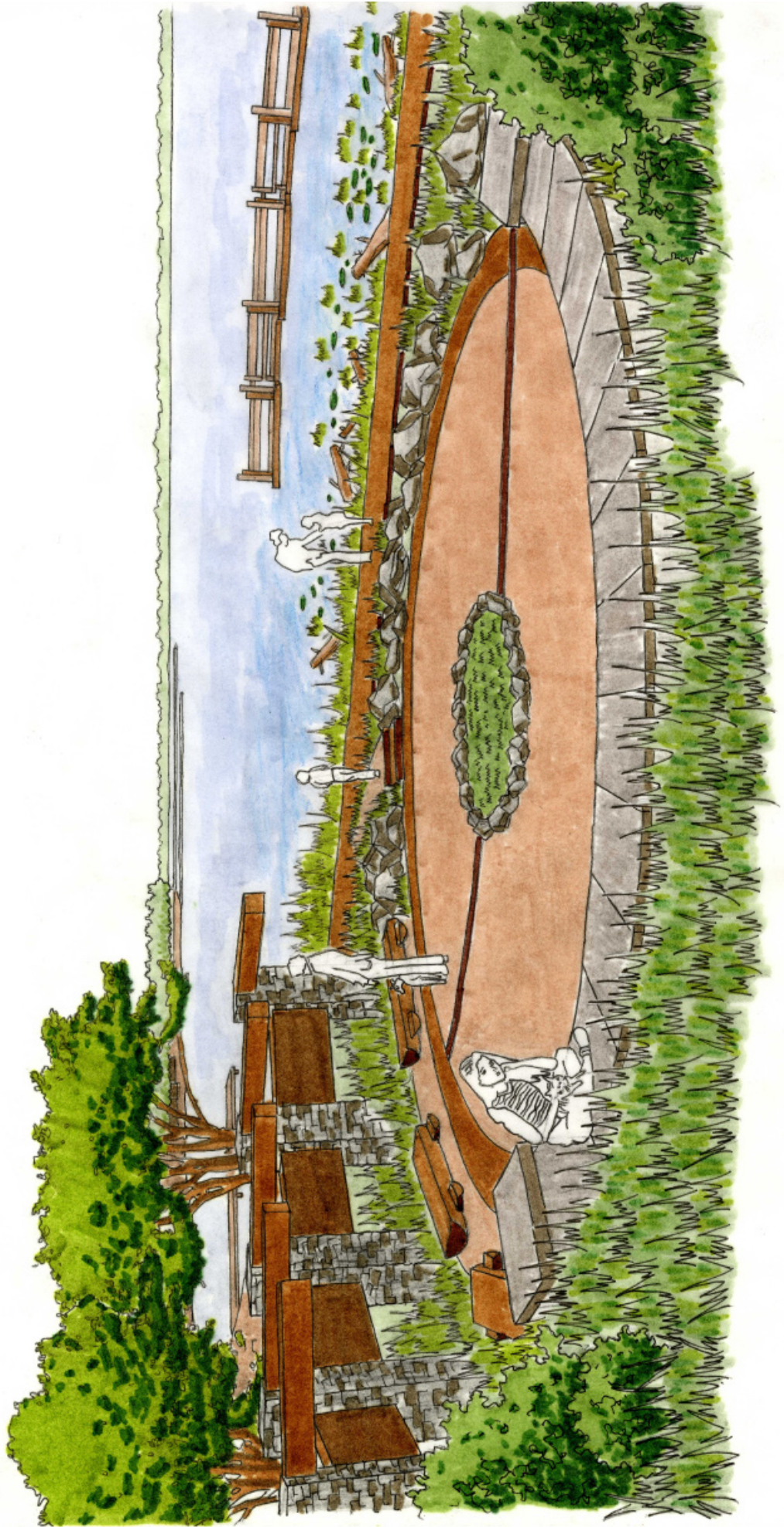
**2** Phase 2 is the erosion control process in which a floating coconut roll along with large tree limbs are placed along the shore to allow the plants to properly take root and minimize sedimentation along the beach.



## PHASE 3 SKETCH : PLANT

**3** Phase 3 is the planting process in which the beach is transformed to a natural habitat that attracts fish, birds, and other wildlife. The erosion logs also help form the animal habitat.







# PERSONAL IDENTIFICATION



1402 12th St. N.  
Moorhead, MN 56560

(218) 790-4630

[james.kramvik@my.ndsu.edu](mailto:james.kramvik@my.ndsu.edu)

Hometown: Moorhead, MN

“The NDSU Landscape Architecture program has pushed me to maximize my potential.”