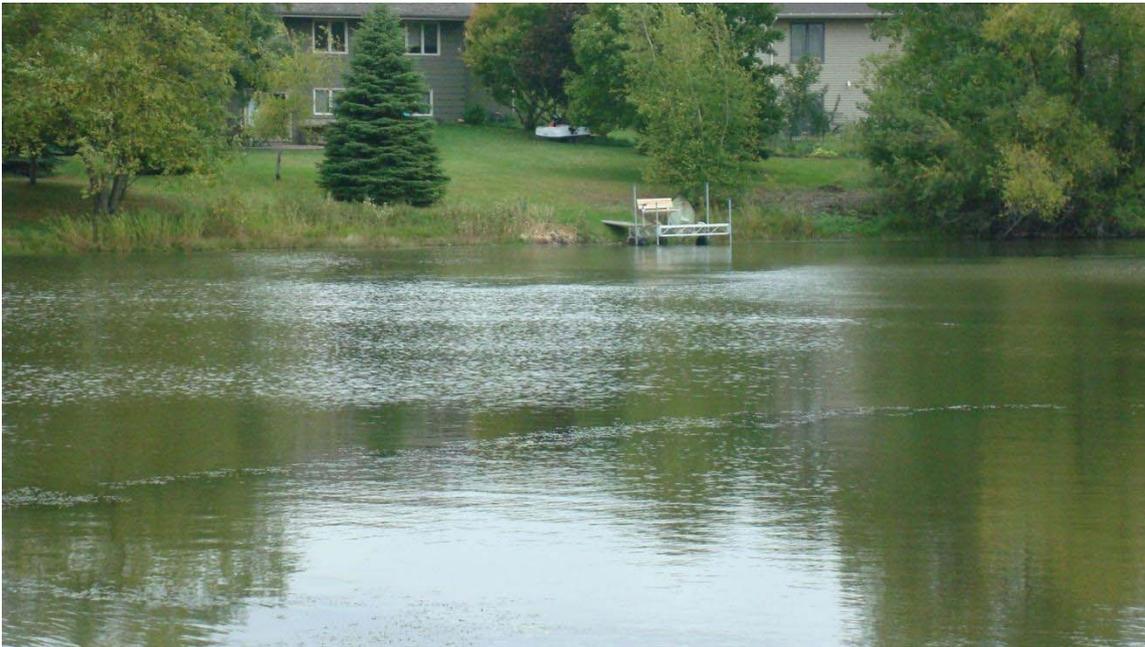




Wetland and Storm Pond Management Alternatives for a Sustainable Shoreview



ESPM 4041W: Problem Solving for Environmental Change

Report 3/8 Prepared for the City of Shoreview by:

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With only a few months to achieve outcomes such as the report, we have a new-found appreciation for the planning process and those who are a part of it. Thank you once again to all those who were involved.

Executive Summary

In 2009, the City of Shoreview developed a series of goals to achieve sustainability for the health and wellbeing of the community. Some of these goals were to live a healthy lifestyle, promote a “green” philosophy as well as preserve and protect the natural environment. To attain these goals, the City partnered with students from the course *Problem Solving for Environmental Change (ESPM 4041)* at the University of Minnesota to develop recommendations for specific topics: alternative energy, wetland education, wetland policy, landscape policy, sustainable parks, and urban vegetation and canopy assessment.

This project was designed to support sustainable behavior and policy changes that will establish Shoreview as a model for other communities. This specific report (3/8) focuses on wetland policy and management, to improve the health and function of Shoreview’s aquatic systems.

In the first six weeks of this project we focused on gathering information about Shoreview’s wetlands, storm ponds and runoff from lawns and roadways, conducted citizen and expert interviews to gather perceptions from city officials and residents, and collected additional information by creating GIS maps and reviewing secondary sources.

Our research showed that Shoreview is a well-developed city. There is a divide between some Shoreview residents and city officials who continue to have differing views regarding the use and management of storm ponds. The city has a strong Comprehensive Plan in place, however, monitoring and enforcement is lacking for specific areas, especially related to the voluntary use of best management practices for lawn care and organic waste disposal.

Based on these findings we developed the following recommendations that will help Shoreview solve water management problems and achieve sustainability for the future.

- Create and support community based wetland education programs,
- Create and implement a training program for city officials,
- Hire a staff intern to assist with the next step in water quality goals, and
- Strengthen and support existing ordinances.

Introduction

Shoreview is a city whose identity is built around their rather unique position, situated amongst an abundance of water bodies and wetlands. The lakes, ponds, and wetlands of this area contribute to the overall aesthetic quality of the environment as well as community pride. These features are highly valued among Shoreview citizens and serve as attractions that draw people to the city and make it a desirable place to live. People are naturally drawn to areas containing bodies of water and use the water quality as a gauge for the surrounding environment as a whole. However, development is the greatest threat to water quality and as a community develops changes in the local ecology may go unnoticed (Miltner 2004).

Currently, Shoreview is 96% developed, which creates a possibility for conflict between human activities and the integrity of ecological systems in the community. This is due in part to storm water runoff from the numerous impervious surfaces present in the highly developed area, because as water passes over these areas it picks up pollutants that are on the surfaces and deposits them directly into water systems, often without any prior treatment or filtration. Similarly, harmful inputs from treated lawns in residential sections of the city frequently flow into the streets or directly into backyard ponds connected to the water system. The remaining open spaces in Shoreview and the wetlands are providing valuable ecosystem services. These areas are dependent on city officials and citizens to effectively manage their health and function so they can continue to support a healthy and sustainable community.

In the fall of 2009, through collaboration with the City of Shoreview, senior students of the University of Minnesota course, *Problem Solving for Environmental Change* (ESPM 4041), were invited by the City of Shoreview to assist in planning for continued wetlands management. In addressing wetlands management, this report focus is primarily on policies, both regulatory and voluntary, that can be implemented to generate a positive change in the community's interaction with the local aquatic systems. Wetlands and storm ponds occur fairly consistently throughout the city and, therefore, we conducted general assessments in regards to these features as a whole. However, we placed specific attention on areas that were identified by city staff as currently experiencing conflict over use and declining water quality.

The environment found in the community of Shoreview benefits the residents by being aesthetically pleasing and by providing ecosystem services such as water filtration, purification, and storage for the people in this area (Wesolowski 2009). In particular, storm ponds in Shoreview are intended to supply the city with a means for naturally managing storm water flows and performing ecological functions. In addition to the ecological functions listed above, Shoreview wetland areas also serve as flood control for the city, preventing damage and lost property (Wesolowski 2009). Shoreview citizens are not the only beneficiaries of the wetlands; these areas also serve as habitats for many species, some of which are rare or threatened. These species play their own important

role in the ecological community of Shoreview by maintaining biodiversity in the environment.

However, the ecological systems outlined above are unable to function properly and provide ecological services when they are overloaded with harmful inputs from urban development, such as runoff from lawns and impervious surfaces or dumping leaves and other vegetation into aquatic systems. These inputs can be caused by both direct and indirect activities; however the damage is the same. Inputs from runoff disturb the functioning of both naturally occurring and human made aquatic systems to the point where they are unable to function as desired. Due to contaminated runoff, wetlands can no longer produce all the benefits that both human and ecological systems depend upon. Improperly disposed of yard waste and runoff can cause an increase in the amount of nutrients in the water, particularly phosphorus and nitrogen. This leads to an increased growth of algae, which is responsible for causing algal blooms. These blooms are often found to be unattractive because they discolor the water, typically to a pea green hue, while at the same time reducing the amount of oxygen in the water, which in turn kills vegetation and aquatic animals (EPA 2003).

In addition to ecological effects there are also social effects. Many negative effects occur due to misunderstandings among community members about storm pond function leading to dissatisfaction and even conflict among residents and between city officials and residents. A Shoreview example of these disputes is the Kerry Ponds area located in the northeastern section of the city. Residents use the storm ponds as recreational lakes, yet as storm water ponds they produce many undesirable outcomes. Misunderstandings tend to make management difficult in a system designed before the increase in development of the 1970s. The current condition of Shoreview wetlands reflect efforts to protect and conserve but, there are also signs of misuse as well as confusion and changing expectations about what Shoreview residents want from these valuable areas. Many of the storm ponds were specifically converted from wetlands to provide services and benefits to the people of Shoreview. Therefore, in order to maintain the integrity of ecological systems while providing the community with a desirable environment, Shoreview wants to consider and incorporate principles of best management practices and multiple use ecosystems into the land management process (Broughton 2000). Ultimately this will optimize the benefits of both utilitarian and aesthetic qualities that aquatic systems provide to the community.

Vision Statements

The eight groups that created the reports for this project identified their aspirations for this project and Shoreview's future as a sustainable community through a class vision statement. We envision a sustainable Shoreview: a city that balances social equity, economic vitality, and environmental integrity to maintain and improve the quality of life for current and future residents. We aim to further enable Shoreview by:

- Providing relevant tools and information,
- Encouraging an active and aware citizenry,
- Addressing perceived barriers to action, and
- Fostering responsible and collaborative resource management.

Our project strives to empower sustainable behavior and policy changes that will establish Shoreview as a model for other communities.

This specific report addresses the conflicts that stem from the close interaction between urbanized areas and ecological systems. The purpose of this report is to assist Shoreview in attaining their goals for effectively managing storm water, wetlands and storm ponds and to regulate negative human ecosystem interactions. We are committed to assisting Shoreview in its ability to manage the health and function of aquatic systems within the context of the present extensive residential development in order to provide a socially and ecologically healthy, thriving, and sustainable community.

Objectives

The report goal is to develop a set of recommendations that will give the community the opportunity and tools to strengthen its policies and management techniques as they relate to wetlands and storm ponds in order to maximize the benefits received by the city of Shoreview.

The report objectives include:

- Mapping the wetlands and storm ponds within Shoreview, identifying those that are in critical condition in order to inform city decision making.
- Inventorying existing policies at the federal, state, and municipal level concerning water quality standards, runoff, and storm pond and wetland use and restrictions.
- Evaluating existing environmental standards that impact water quality such as those regarding erosion control, vegetation and woodlands, storm water management, wetlands, and shore land management.
- Generating mitigation techniques and policy elements for wetland and storm pond management that could address identified issues.
- Making recommendations for tools that could be used to potentially influence city staff and resident behavior as it relates to storm pond and wetland use, function, and management.
- Developing a scenario-based decision tool for wetland and storm pond management implementation within Shoreview, in order to inform the city decision makers.

Our intention is to provide the City of Shoreview with valuable information and viable recommendations in order for the community to better achieve their goals regarding the management of wetlands and storm ponds while optimizing the environmental benefits for their citizens.

Methods

Area Description

Located in Ramsey County, Shoreview is a second-ring suburb approximately ten miles north of the Twin Cities in the metropolitan area (Figure 1). Bordered by nine similar suburbs, collaboration between these municipalities is essential for managing across political boundaries to preserve ecological systems. Within Shoreview, there are approximately 27,000 residents living in the 12.2 square miles that make up the city (US Census Bureau 2000). The city is close to full capacity with an expected growth of 3,000 more people by the year 2030 (City of Shoreview 2008). Today, Shoreview is a highly developed residential community with numerous parks, open spaces, and wetlands (City of Shoreview 2008).

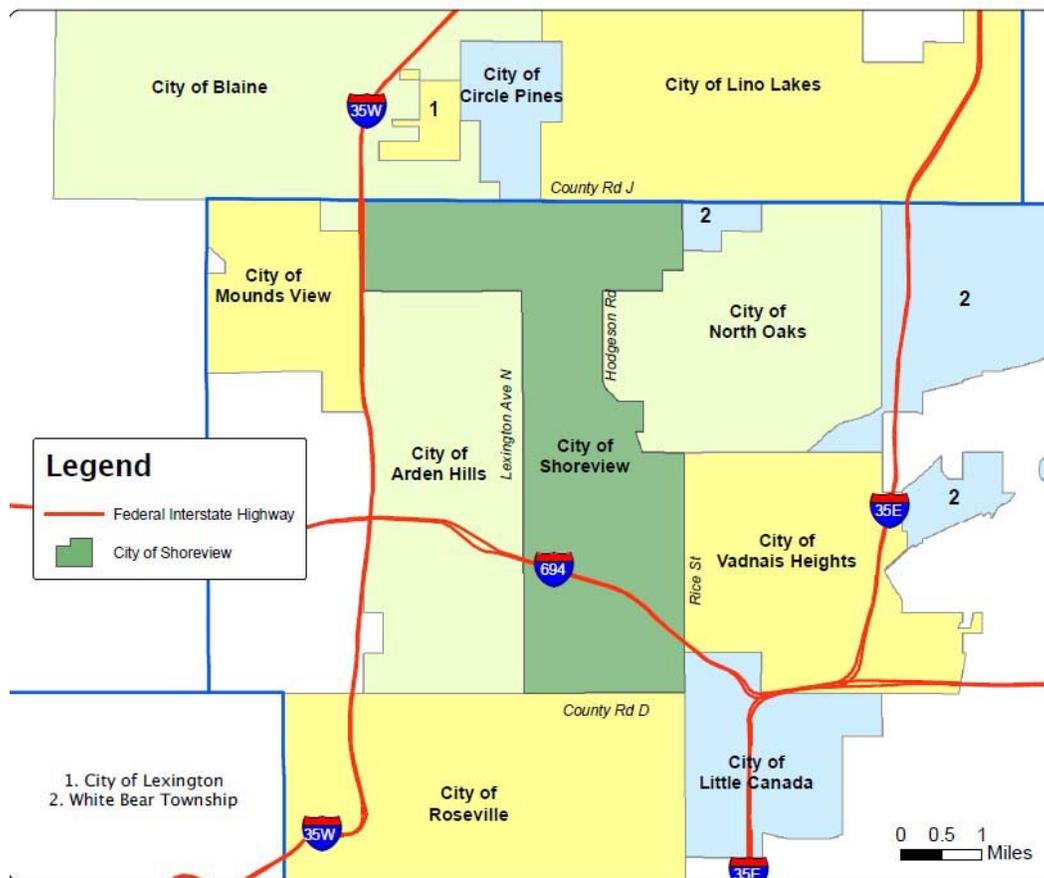


Figure 1: Map of Shoreview, Minnesota (Comprehensive Plan 2008).

The City of Shoreview was incorporated in 1957, although it did not experience rapid growth and development until the 1970s and 1980s. Development during this time, consisted primarily of constructing suburban low-density residential areas; however much of the public infrastructure was also created at this time, including storm water

treatment ponds that were converted from wetlands. By 1990, the city reached almost full capacity and development projects slowed dramatically; recently there has been an increase in redevelopment opportunities.

Shoreview is located within three separate watershed units; Rice Creek Watershed District, Grass Lake Watershed Management Organization, and the Vadnais Lake Watershed Management Organization (City of Shoreview 2008). The city contains more than 200 storm ponds, numerous wetlands and lakes, and Rice Creek (Figure 2). The importance of these management organizations becomes clear when looking at the ecological features within the city; much of the management and regulation of these aquatic features is under their jurisdiction or shared with Shoreview (City of Shoreview 2008).

The citizens of Shoreview are predominately comprised of white, middle class adults. According to the 2000 US Census, 96.4% of the population is white, the median household income is \$96,719, and 45.4% of the population falls between 35 and 54 years of age. More than 96% of the population is over the age of 25; approximately 45% received a bachelor's degree (US Census Bureau 2000).

Methods

Gathering data is vital to making relevant recommendations for Shoreview planning. To successfully complete this project we conducted expert interviews with city of Shoreview employees, interviewed Shoreview residents, reviewed secondary sources such as policies and planning documents, and utilized GIS data layers for mapping. By performing these activities, we were able to identify the strengths and weakness of current management practices as well as areas that could be addressed in the future.

Expert Interviews

To formulate recommendations for the City of Shoreview concerning wetland and storm water management expert knowledge was necessary. Interviews with Tom Wesolowski, Shoreview's Assistant City Engineer, provided insights about Shoreview storm ponds and wetlands from a Shoreview resident's point of view. This informal interview provided us with information regarding current storm water policies, contested areas, and a look at the political climate in Shoreview concerning wetland management. We used this information to inform recommendations provided in this report.

Citizen Interviews

On October 17, 2009, our group conducted interviews with 18 Shoreview residents. The interview was designed to understand how Shoreview residents view their wetlands and storm ponds and what they see as proper usage of these resources on their property. We conducted interviews with six residents with and ten residents without wetlands on their property. Two teams of two interviewers each spoke with a total of 18 Shoreview residents. Both teams attempted to speak with a total of 30 residents by going door to door on a Saturday afternoon but only 16 agreed to be interviewed. Team 1 began in

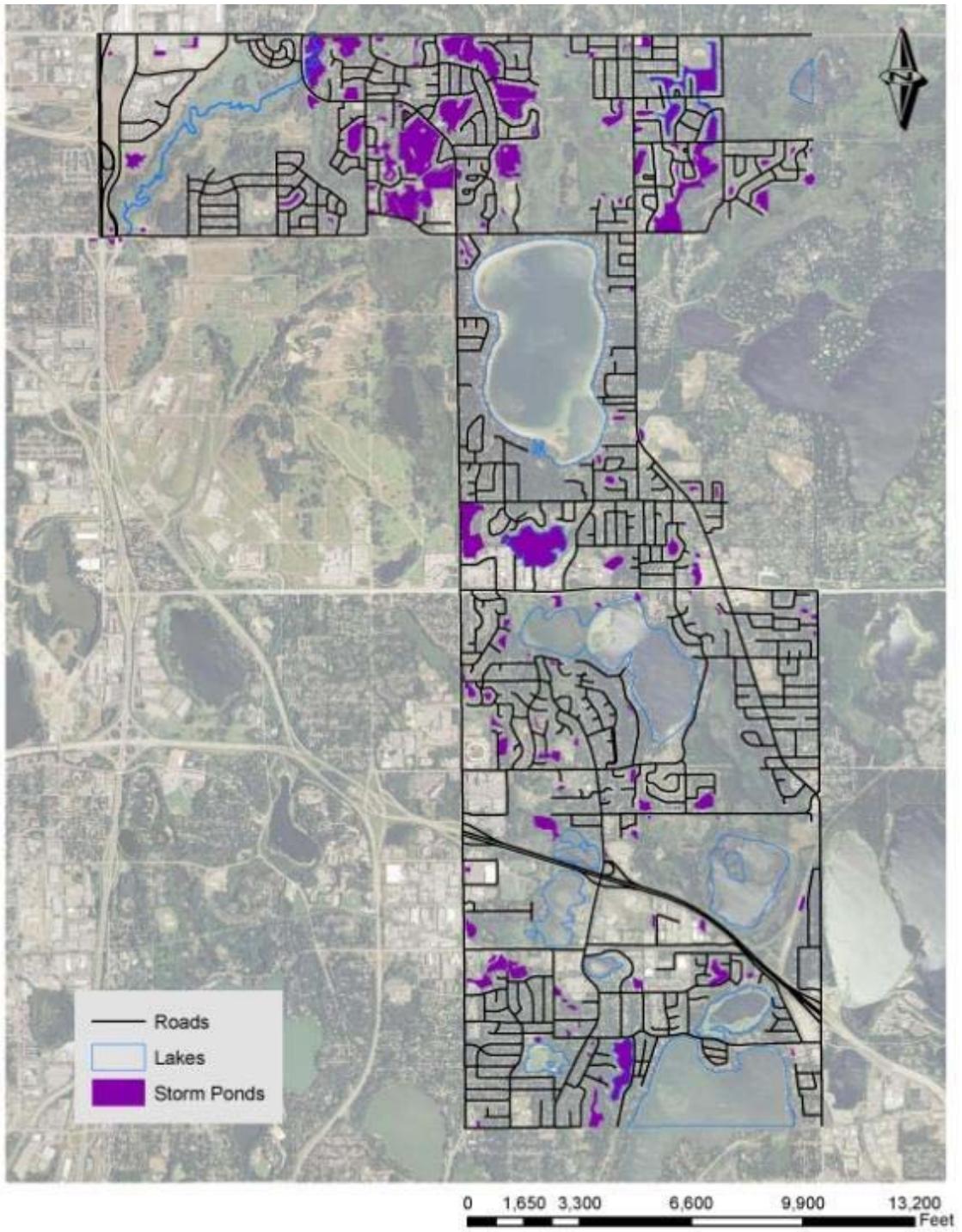


Figure 2: Storm ponds and lakes in Shoreview, Minnesota 2009. (Source: Shoreview, modified from 2008)

Kerry Lakes, interviewing six people, before moving to Martha Lake and interviewing four people. Team 2 began at Lois Lane in the northwestern section interviewing five people and moved to the central area of the city interviewing three residents. This allowed us to gather rich data about what wetland and storm water management strategies might be acceptable to Shoreview residents. The interview guide contained 16 questions (Appendix A). After compiling the interview responses, we analyzed the data in a number of different ways. First, all closed-ended questions were entered into Microsoft Excel and put into tables. To evaluate the open-ended questions, we separated responses into general patterns as well as noteworthy exceptions to trends (Appendix B).

Secondary Sources

To supplement our knowledge and research findings, we drew information from various internet sources and journal articles. Information from these sources included best management practices, storm pond functions, wetland management practices, and survey methods. In addition, the Shoreview Comprehensive Plan (2008) inclusions of storm water and wetland management allowed us to evaluate the current management practices and tailor recommendations for the city.

Policy and Statutes Inventory

Knowledge of policy options is an essential way to enforce environmental compliance within wetlands and storm ponds. Group members compiled a list of all wetland and storm water policies existing on the local level. These policies were summarized in a table to create a resource for Shoreview's future wetland policy considerations.

Map Construction

Maps are a valuable tool to visualize the locations and areas of interest in wetland and storm water management. Shoreview's Matthew Baker, a GIS/IS analyst, provided us with the following GIS layers to create the maps used in this report: lakes, storm ponds, development years, roads, trails, buildings and structures, parcel boundaries, and wetland inventory (Baker 2009). The Minnesota Department of Natural Resources Data Deli provided aerial photographs and topography of Shoreview (MNDNR 2008). These data layers including lakes, storm ponds, development progression, roads, trails, building and structures, and parcel boundaries were used as evidence for recommendations. Layers were combined in ArcMap to create an impervious surface and wetland map, Shoreview development by year, Shoreview storm ponds and wetlands, and Shoreview wetland management.

Maps Developed

- Impervious Surfaces Map: A layer of impervious surfaces and the wetland inventory map were uploaded to ArcMap and projected onto a topographic map of Shoreview from the Minnesota DNR Data Deli.
- Shoreview Development Progression Map: The progression of development in Shoreview from 1900 to present day was projected on a topographic map of Shoreview through ArcMap. Each layer was uploaded to demonstrate the location and scale of development in areas of Shoreview.

- Shoreview Wetland Management Map: The National Wetland Inventory of Shoreview wetlands, storm ponds, and lakes created data layers for Geographic Information Systems used in ArcMap to classify management practices for each wetland undertaken by the city. The wetland management layer was uploaded onto a topographic map of Shoreview to view each wetland and storm pond within Shoreview limits (Appendix C).

Findings

Development and Civic Involvement

Shoreview is a city that is almost entirely developed. According to GIS data, development has progressively become denser since the 1970s (Figure 3). This growth has been concentrated in the northern part of the city, which led to an influx of storm ponds throughout the city. Shoreview is currently developed to such an extent that there is virtually no space left to expand without encroaching on wetlands or the natural areas that remain in the city (Figure 3).

Considering the density of the city, it is important to plan for a sustainable future in terms of water resources. To gain cooperation amongst their constituents, Shoreview must actively involve citizens in city-level decision making processes. Research has shown that citizen participation has a large variety of benefits on the city level. Cities that have involved residents tend to be more confident in the local political system and how a city is being run (Florin and Wandersman 1990). This makes it easier to implement regulations and raise awareness amongst residents. According to the survey conducted on October 17, 2009, no respondents said they were active within city politics (Table 1). This low level of involvement is a potential reason why many wetland and storm pond policies in Shoreview have trouble being enforced.

Although resident involvement and participation is low within in the city of Shoreview, there is an expressed interest in education or training regarding how to best manage wetlands and storm ponds (Table 1). By involving the community of Shoreview more actively in city decisions, resident knowledge grows, contributes to a greater understanding reasons for policies and how they are enforced.

Storm Pond Use and Management

There are many conflicting views about the purpose of storm ponds and wetlands, and the role they have within the Shoreview landscape. Tom Wesolowski, the assistant city engineer for Shoreview, explained that the storm ponds are privately owned but there are several drainage easements the City holds. The ponds with no easements exist due to when they were developed—in the 1970s and 1980s—when there was a different standard for wetland regulations (Wesolowski 2009). During this period, Shoreview’s wetlands were converted into storm ponds. Unfortunately, the efficacy of the converted wetlands was is not adequate. Mr. Wesolowski explained that, “storm ponds are supposed to be

designed a certain way, to a certain depth in order to sedimentation removal, but a lot of these wetlands didn't have those criteria—water just flowed into them” (Wesolowski 2009). Storm ponds are approximately three to eight feet deep based on the volume that it is expected to treat and hold (MPCA 2000).

Shoreview Development 1913-2004

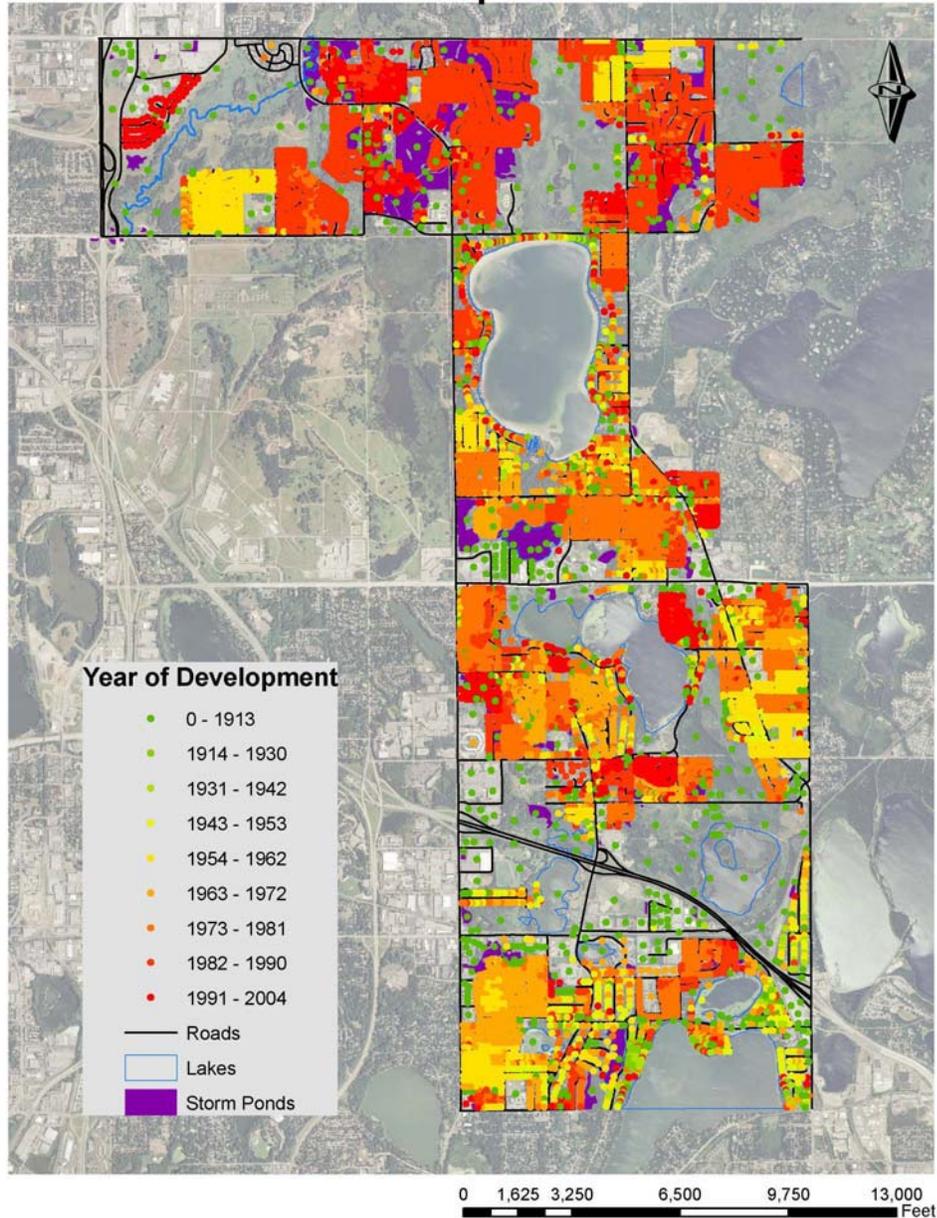


Figure 3: Shoreview Development 1913-2004 (source: Shoreview 2009).

Table 1: Respondent involvement in city politics and interest in city sponsored programming, 2009 (n=18).

How involved are you in city politics (1=not at all, 5=very involved)?					
Involvement	Not involved at all				Very involved
	1	2	3	4	5
Number of residents	11	5	2	0	0
Would you be interested in city suggested actions, education, or training?					
Interest (number of residents)	Yes (14)			No (4)	

Currently, there is no easy way to modify a converted wetland that is on private property. An important example of this is the Kerry Ponds area located in the northeast quadrant of Shoreview. The ponds, created in the 1970s, are used by the residents as lakes but the city considers them storm ponds. The main use for these ponds is to collect storm water from impervious surfaces, but residents use the ponds for recreational purposes such as paddle boating, canoeing, and swimming. There are a lot of recreational activities happening in the Kerry Ponds area that are important to the residents, but not to the city since that is not what the ponds are in place for. One example is a basketball hoop and dock in the water, while the property is developed right up to the water (Figure 4). In another example, a boat is resting on the shoreline with almost no buffer between the end of the lawn and the water (Figure 5).

Currently, storm pond management differs from wetland management primarily due to the maintenance work needed to keep storm ponds functional. Both types of waterbodies use the same vegetation, but this is where the basic commonality ends. Storm ponds are human-made and designed to accumulate sediment to prevent pollutants from entering lakes and streams. The management of these ponds requires coordination between land owners, city, state, and federal agencies (Wesolowski 2009). Recently, a pond cleaning program has been initiated in Shoreview to remove the sediment in storm ponds. According to Mr. Wesolowski, to conduct storm pond maintenance, the city must gain permission from the Minnesota Department of Natural Resources (MNDNR), the Army Corps of Engineers, local watershed districts, or the Minnesota Board of Water and Soil Resources, depending on the type of storm pond. Shoreview tries to contain their dredging to land they already own easements on, but in some cases they need to get a temporary easement from property owners. If no easement can be obtained, then the dredging of that particular storm pond cannot be completed (Wesolowski 2009).

Shoreview budgets to dredge two storm ponds a year. Storm ponds that empty into lakes and high quality wetlands are high priority and therefore will be dredged sooner (Wesolowski 2009). The city uses the following schedule (Table 2).



Figure 4: Shoreline on Kerry Ponds, Shoreview, Minnesota, 2009.



Figure 5: Shoreline on Kerry Lakes, Shoreview, Minnesota, 2009.

Table 2: Schedule for dredging process (Wesolowski 2009).

Schedule for dredging process	
August - September	Shoreview hires a company to survey ponds that are proposed for dredging. Residents are informed about the surveying project.
October	Shoreview hires a consultant to perform testing of sediment located in ponds to be dredged. Plans are sent to a contractor and the city receives bids for the work. When process of entry is determined, property owners can discuss project with the city.
December - January	Survey process completed and information given to consultant.
February - March	Dredging projects begin and are completed.
April - May	Restoration of disturbed soil completed.

During this process, residents are kept informed about the dredging process but conflict still arises pertaining to easements. If the city holds a drainage easement, then they are legally allowed to dredge on from the property. The city will clean up and restore a lawn or yard that has been damaged due to the dredging process, but if the property owner has a structure on the property the city does not have a legal responsibility to pay or replace that particular structure.

City staff members mentioned that residents who live next to these ponds would like the ponds to be pristine and water clear, and the city wants these ponds to serve their original purpose which is to take up nutrients. The dredging process benefits both the residents and the city in these ways. Benefits from storm ponds include improved water quality through sedimentation removal, a decrease in potential flooding, and a decrease in bank erosion (EPA 1999). If the ponds are not properly taken care of, then their effectiveness decreases resulting in negative effects on the water quality and the surrounding environment. The dredging for the Shoreview storm ponds is an important maintenance program, without this technique and other management practices; the ponds will have sediment storage which leads to a decrease in storage capacity (EPA 1999)

Runoff

The management of storm ponds and wetlands are also affected by the surrounding land use. Improper lawn and yard care practices as well as an increasing percentage of impervious surfaces lead to runoff problems in wetlands and storm ponds. These practices influence water quality, primarily through chemical use and yard waste disposal. Both of these practices can lead to an increase in nitrogen and phosphorus in the water resulting in eutrophication, an increase in algae and weed growth within a water body during the summer months (Figure 6). Lawns that are overfertilized and manicured have a greater chance of polluting waterbodies through runoff of chemicals such as nitrogen and phosphorus (Rosen and Horgan 2009). Although using fertilizer with phosphorus is currently illegal within the state of Minnesota, there are still problems with accumulation in the soil. In addition, fertilizer containing phosphorus is still available at local retailers in Shoreview and regulations are hard to enforce due to the availability of the fertilizer (Wesolowski 2009).



Figure 6: Algae and leaves in Kerry Ponds, Shoreview, Minnesota, 2009.

During the interviews conducted in October 2009, 88% of Shoreview respondents reported fertilizing their lawns, but only 16% claimed to use phosphorus enriched fertilizer. Many of these surveyed residents knew that using phosphorus enriched fertilizer is illegal in the Twin Cities area and only use it for potted plants and gardens.

One pressing issue with lawn maintenance is organic disposal. City staff members suggested that nutrient loading has more to do with grass clippings and weed removal; “you go see people [and] they think the storm pond is a dumping ground so all the leaves and clippings are going in there” (Wesolowski 2009). This problem in Shoreview is noticeable. While driving through the city in October 2009, we observed many areas where leaves were lining the sides of the streets, blocking storm drains, and littering storm water ponds. According to interview respondents, yard waste disposal is handled in a variety of ways (Table 3). The citizens of Shoreview are not only conscious of the proper disposal methods, but also have noticed the problem of improper disposal of yard waste, stating that lawn runoff is an area of concern in regards to water quality (Table 3).

Currently, the Shoreview has taken street management actions to address the previously mentioned water quality concerns. The Street Maintenance Department of Shoreview sweeps the entire city approximately four to five times a year. The street maintenance team is out almost every day from the beginning of summer to the first snow (Dunn 2009). The city is currently on track for reducing phosphorus overloading in wetlands and storm ponds. According to a study in Minneapolis, Minnesota, areas that were swept on a weekly basis had a phosphorus level that was 30% to 40% less than areas where no sweeping occurred (Rosen and Horgan 2009). Not only is there continuous sweeping for a majority of the year, Shoreview also has implemented spring sweeping for high risk areas such as around lakes (Dunn 2009). Even with these practices, 55% of Shoreview

respondents to our survey are concerned with runoff from lawns and roadways into local wetlands and streams (Appendix B).

Table 3: Respondent-mentioned yard waste removal methods and concerns regarding water quality, Shoreview, Minnesota, 2009.

How do you handle yard waste on your property?								
Disposal Method	Leave on yard	Compost	Association maintains waste	Mulching	Service pick-up	Waste disposal site	No answer	
Number of Respondents	1	8	3	4	3	3	1	
What are some areas of concern in regards to water quality?*								
Concerns	Polluting storm drains	Ponds contribute to mosquitoes	Lake water levels	Weed treatments	Water collection in backyards	Buffers around lakes	Pesticides	No concerns
Number of Respondents	2	2	4	2	4	1	2	4

*Respondents could mention multiple concerns.

Impervious Surfaces

Since Shoreview is a city that is almost entirely developed (Figure 3), it has experienced an increase in impervious surfaces. In 2000, a study conducted by the University of Minnesota’s Remote Sensing and Geospatial Analysis Laboratory demonstrated that Shoreview has 15.14% impervious area (2000). When impervious surfaces replace pervious areas, the quality of the storm water runoff is degraded leading to increased potential for polluted streams and watershed systems (Brabec, Schulte, and Richards 2002). In fact, with as little as 13.8% impervious surfaces, the health of streams can decline significantly. To combat potential degraded water quality due to high amounts of impervious surfaces, there is a need for large amounts of undeveloped wetland and riparian areas (Miltner, White, and Yoder 2003).

In eight years, Shoreview has had an increase in impervious surfaces by approximately 15%. In 2009, Shoreview has a total impervious area of 28.93%. The majority of impervious surfaces are houses, driveways and roads. The land cover in Shoreview has become homogenized towards dense development, leading to a reduction in pervious areas (Figure 7). To better understand Shoreview development, we created a map that divided Shoreview into eight subsections (Figure 8). For each subsection, we calculated and analyzed the percentage of lakes, wetlands, storm ponds, pervious surfaces, buildings, parking lots, roads, driveways, and trails (Table 4). When an area exceeds 27.1 percent impervious surfaces, there is a possibility of a complete loss of aquatic life (Miltner, White, and Yoder 2003). Since Shoreview has already surpassed this percentage, it is important to take action to make sure storm ponds are functioning properly, wetlands, streams, and lakes are being properly monitored, and if possible limit an increase in impervious surfaces.

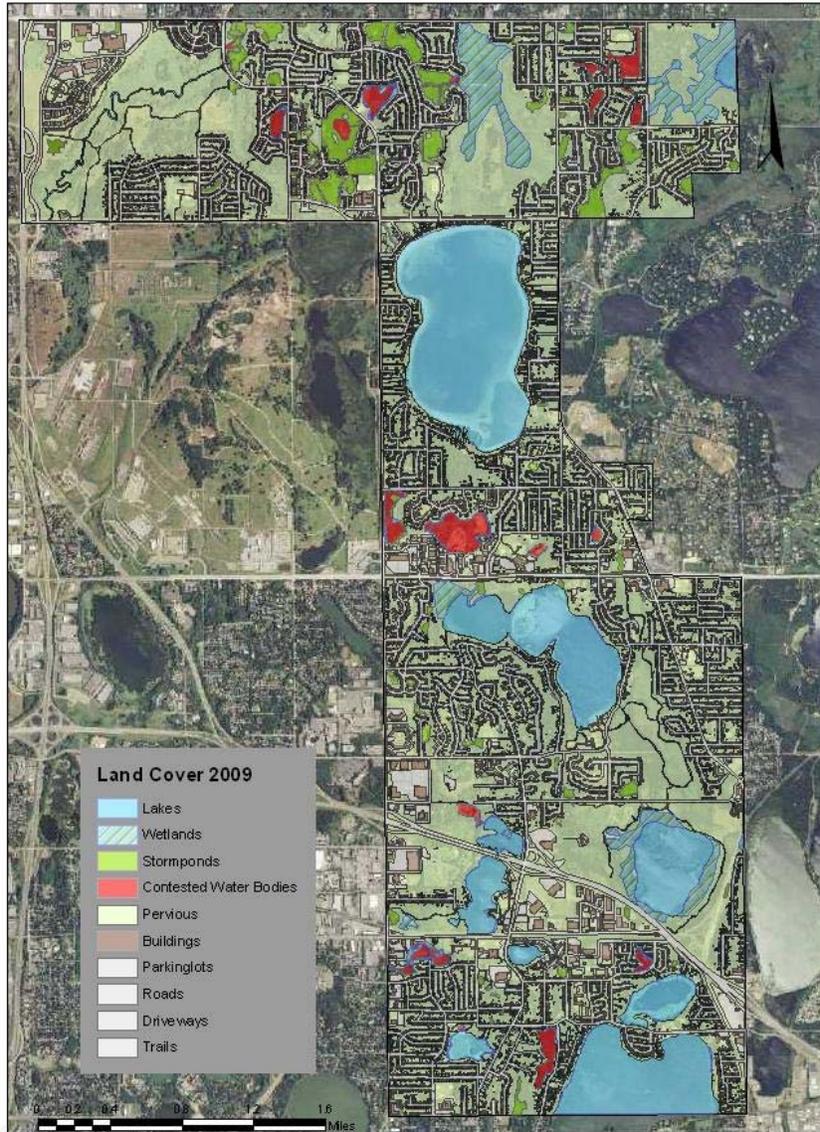


Figure 7: Land cover in Shoreview, Minnesota, 2009 (source: Shoreview, 2008).

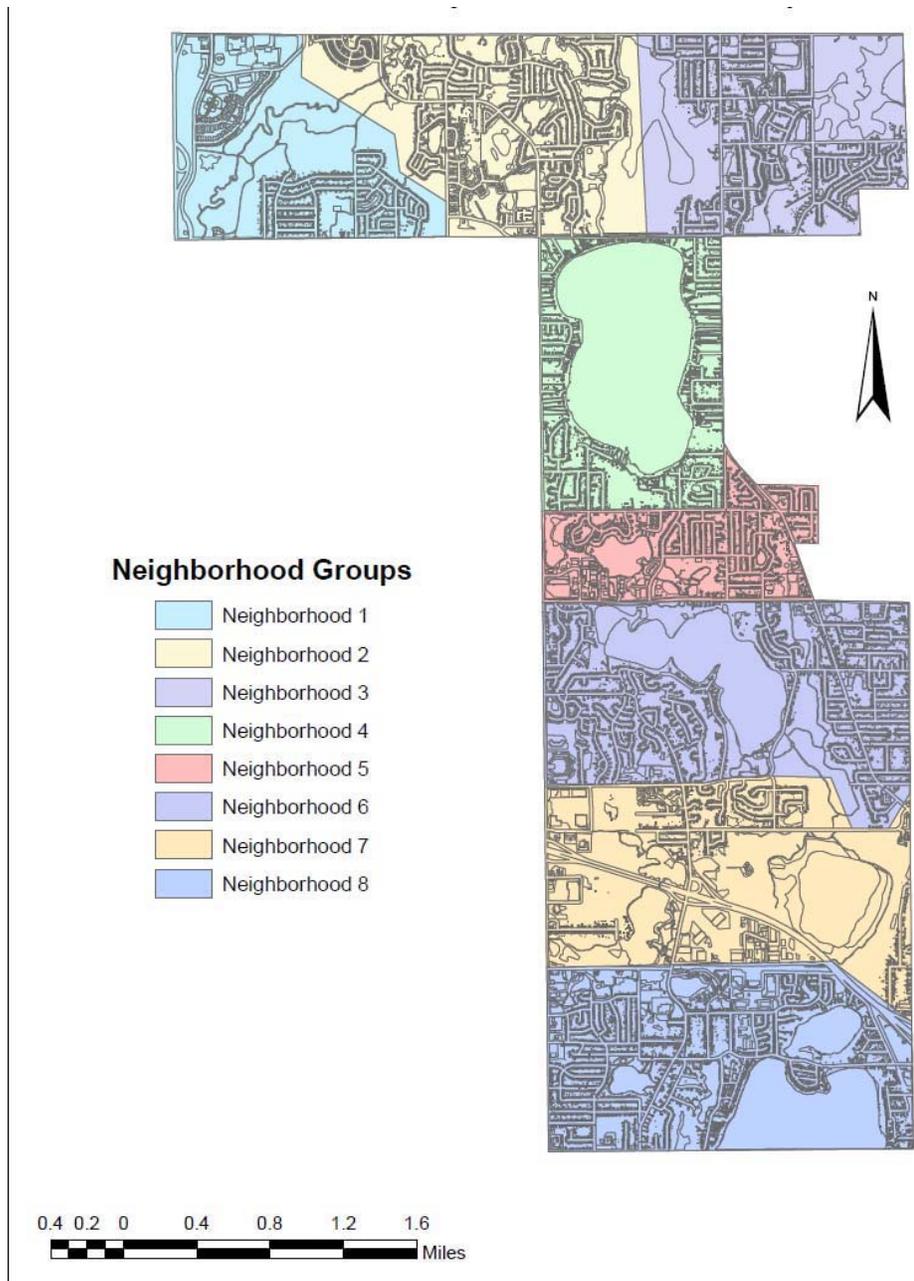


Figure 8: Subsections of neighborhood groupings in Shoreview, Minnesota, 2009 (source: Shoreview 2008).

To overcome the effects caused by impervious surfaces, there needs to be an increase in innovative solutions. The pervious surfaces within Shoreview include lawns and other green spaces such as parks, but it is important to distinguish that there are multiple levels of pervious intensity. For example, compacted soil would be less pervious than undisturbed grassland. The city has begun to mitigate this effect by the use of pervious roadways in high risk flood areas (Environmental Quality Committee 2009). Pervious

pavement allows rain water to infiltrate the surface and soak into the ground rather than siphoning into storm drains and low-lying lakes and wetlands (San Mateo County 2009). This method of mitigation needs to be combined with the restoration and rehabilitation of wetlands and streams to prevent further harm to these important ecosystems.

Table 4: Percentage of various land use types and uses, Shoreview, Minnesota, 2009.

Neighborhoods	1	2	3	4	5	6	7	8	Total
Lakes (%)	1.1	0.11	0.37	48.7	0.05	16.3	13.6	22.7	14.2
Wetlands (%)	0	3.7	12.0	0.04	0.61	1.4	4.6	0.79	3.02
Storm Ponds (%)	0.94	12.6	4.4	0.38	1.4	1.1	1.0	0.79	2.8
Pervious Surfaces (%)	68.6	52.1	55.3	32.3	44.0	51.2	54.2	39.5	49.4
Buildings (%)	6.4	7.8	5.9	4.7	10.9	8.0	5.2	7.9	6.9
Parking Lots (%)	5.8	0.77	0.22	0.0	7.4	1.6	7.2	4.8	2.4
Roads (%)	14.4	17.4	15.0	9.6	21.9	16.4	11.9	18.1	15.5
Driveways (%)	1.3	2.3	2.9	4.3	3.1	2.9	0.9	2.0	2.5
Trails (%)	1.5	0.74	0.37	0.05	1.2	1.6	1.0	0.19	.74

Regulatory Programs and Their Outlooks

In Minnesota, there are numerous policies governing all levels of wetland and storm pond management. The City of Shoreview has a responsibility to assist in implementing federal, state, and regional policy concerning wetland and storm pond activity. Shoreview’s challenges with enforcement of existing policies coupled with limited support staff has lead to limitations wetland management. Storm ponds in Shoreview are filling with sediment and have green algal layers that upset residents’ desire for clear waters (Wesolowski 2009). Shoreview staff members have expressed a desire to do more for wetland and storm pond quality but are unable to include it in addition to their regular workload, making some progress on an important issue for Shoreview residents (Wesolowski 2009). Almost every resident surveyed stated that water resources are among their biggest concerns within their community (Table 5).

Shoreview is currently meeting requirements under federal and state laws but is missing opportunities available due to the vague nature of local ordinances. Shoreview’s storm water ordinances leave the majority of management responsibility to the citizens with few management procedures outlined for city action. These policies with few administrative guidelines are difficult to implement and enforce and become ineffective. According to one expert interview, the city of Shoreview perceives storm ponds as having a single use, storm water runoff filtration; whereas the majority of resident respondents believe storm ponds can be multiple-use (Table 5). This exacerbates the disconnect between where the authority and responsibility of storm pond management of the city lies. During a Fall 2009 meeting, some city officials were concerned about suggestions to enforce current available ordinances. They stated that enforcement of wetland ordinances will upset some citizens.

Table 5: Frequency of responses to environmental concerns and multiple use of storm ponds in Shoreview, Minnesota, 2009 (n=13, (n=18).

What are Shoreview Residents' Environmental Concerns?				
Concerns (Number of Resondents)	Water levels (5)		Water quality (8)	
Can Storm Ponds be Multiple Use?				
Concerns (Number of Resondents)	Yes (11)	No (5)	I do not know (3)	No response (2)

In some cases, the established ordinances are unclear with few enforceable standards within them which leaves the City of Shoreview with difficulties in implementation. For example, wetland regulation 209.070 is worded to address only those wetlands under the jurisdiction of the MNDNR, this loop hole leaves a portion of wetlands within Shoreview unregulated and unmonitored, leading to further confusion between government and citizen responsibility (City of Shoreview Municipal Code). At this time, Shoreview officials feel that water clarity is not relevant to the purpose of storm ponds while residents desire clear waters.

The five Environmental Standards Ordinances are an example of effective and ineffective local ordinances (Appendix D). Ordinances concerning sediments and vegetation and woodlands have the potential to protect wetland and storm pond quality but the broad scope of storm water management and wetlands leave the city with little to do and enforce, leading to a lost opportunity to improve wetland quality (Table 6).

Scenario Based Decision Tool

Our group examined Shoreview's political, ecological and social context for with its wetlands and storm ponds in order to understand the current wetland and storm pond quality as well as present possible decision model for future scenarios. Using primary and secondary source knowledge from Shoreview employees, residents and water scientists, we created alternative scenarios for storm pond and wetland decision making (Appendix E). The first, *No Action Scenario*, is meant to demonstrate what can happen to storm ponds and wetlands if no further action or improvements are made. The second, *Add Water Quality and Policy Staff Support Scenario*, includes an additional staff member to focus on water quality issues within the city that have been overlooked by other city staff members. The third option, *Supplement Existing Environmental Standards Scenario*, acknowledges the political difficulties within storm pond and wetland management by supplementing existing ordinances to make management more effective. The last scenario, *Implement all Recommendations*, includes adapting all recommendations endorsed by our group to create a more sustainable Shoreview (Appendix E).

Table 6: Community-based education selection criteria based on percent land-use, waterbodies, and pervious and impervious surfaces, 2009.

Environmental Standards	Strengths	Weaknesses
209.040 Erosion Control	This erosion control mechanism is a good example of a specific and comprehensive policy. Best management policies are well defined and uniform standards are listed for clear and efficient implementation.	While the mechanism is comprehensive it does use some vague language including “reasonable effort”. Terms like this can lead to confusion on what is reasonable and to whose standards.
209.050 Vegetation and Woodlands	Required actions are outlined for proper vegetation management.	The ordinance does not mention storm pond management and no mention of who is responsible for the actions. In addition, there is also no means of enforcement mentioned for the required actions and standards given.
209.060 Storm Water Management	This ordinance is meant to couple with the surface water management plan and designates inspection authority for authorized city representatives.	The majority of management responsibility is placed on the citizen as voluntary efforts.
209.070 Wetlands	This ordinance is a good management tool for DNR waters within Shoreview.	The ordinance only provides management for DNR waters and not the multiple water bodies within Shoreview.
209.080 Shore Land Management	This ordinance has specific and thorough language and is a good management tool for protected waters.	While this ordinance is a good tool for protected water it does not apply to the other water bodies in Shoreview.

Recommendations

The following recommendations are specifically tailored to the current situation in Shoreview, they were chosen as being the most effective means to improve the quality of water resources within the city. They have Shoreview officials alone cannot improve the quality of water resources within the city unless the combined efforts of the citizens working towards the same goal. For our first recommendation, we propose implementing a community-based education program. Public education can both encourage citizens to mitigate storm water runoff from their own property and also promote community action. Through public education Shoreview citizens will learn how to make sustainable choices about their own actions that affect surface water runoff. We hope these citizens will serve as examples for adjacent communities by influencing their neighbors with their own

actions and sharing their knowledge (see report 2/8 for more information on educational programming).

Our second recommendation is to establish a training program for the city officials to guide their planning efforts and promote collaboration. With these first two recommendations our goal is to establish a shared vision and knowledge about the wetlands in Shoreview. This will establish the fundamental knowledge needed to implement and maintain an effective best management practices system for the various conditions found throughout Shoreview.

Recommendation 1. Support Community Based Education for Surface Water Runoff

There is considerable confusion among the Shoreview citizens about the use and management of the wetlands within the city (Table 5). To resolve this issue we recommend developing a citizen storm water and wetland education program. This program can be structured to promote neighborhood organizations. Based on the difficulty of enforcing new regulations on existing private property, this option will avoid enforcement of new regulations and ultimately result in a community-based social marketing initiative. This education program can provide citizens the knowledge and community support to utilize best management practices. Thereby reducing the quantity and improving the quality of surface water runoff within their community.

Educating the community about behavioral changes is one of the most cost effective methods to reduce runoff pollution (Clean Water Stewardship 2009). The limited funds to support a wetland and storm pond management program in Shoreview became apparent early in our research. However, this could be deferred by adding a storm water fee to the services provided by the city (i.e., water bill). We realize the funding for watershed organizations is also obtained through similar fees, but additional funds are necessary for the successful implementation of a long term program. Based on the current number of households (City of Shoreview), the addition of a small fee, such as three dollars per household per month, could provide the city with \$30,867 annually. These funds could be utilized to cover the additional costs associated with establishing a training program, ranging from paying for increased staff support to providing training and educational materials for community leaders.

Shoreview residents will benefit from, understanding the importance of their daily choices and actions that affect the quality of the water resources in their neighborhoods and throughout the city. Education programs can be based on best management practices concerning surface water runoff, focusing on property management choices citizens are making throughout the year. For example, choices regarding fertilizers or types of vegetation to use for landscaping can have a huge effect on water quality. Some examples of best management practices that could be utilized are provided in table 7.

Table 7: Best management practices (BMPs) (source: City of Minneapolis, 2000).

Neighborhood	Impervious surfaces	Waterbodies	Pervious areas	Contested waters
1	29.4	2.03	68.6	No
2	28.9	16.4	52.1	Yes
3	24.4	16.8	55.3	Yes
4	18.5	49.1	32.4	No
5	44.5	2.2	44.0	Yes
6	30.5	18.7	51.2	No
7	26.2	19.2	54.2	Yes
8	33.9	24.3	39.5	Yes

With current development in the city more than 90% complete, there is little room for 5new laws and regulations to control surface water runoff. Property owners are not bound by many regulations that have an effect on surface water runoff from their property and implementing new regulations for existing property rights may be politically difficult. However, the choices residents make throughout the year have the largest effect on the quality of the wetlands in their community (EPA 2009). If nothing is done to guide these choices, the condition of the storm ponds and lakes in Shoreview will continue to decline (Appendix E). This could result in increased conflicts among citizens and city officials, and an overall lower quality of life within the city due to the loss of healthy wetlands. Currently there are five bodies of water in Shoreview that are listed as impaired by the Minnesota Pollution Control Agency. However, total maximum daily load monitoring is very limited, so these water bodies are only the documented impaired waters. Shoreview is known for its close proximity to beautiful wetlands, however, the quality of these assets are quickly being compromised because of land planning decisions made in the 1970s and 1980s ,when the city was growing rapidly. The citizens and officials have lived with these decisions for too long, now is the time to make guided choices to change the trend of declining water quality in Shoreview to benefit current and future residents.

Shoreview citizens highly value their community wetlands and natural resources and they want to make responsible choices regarding their place in the community (Table 1). However, implementing an education program for an entire city is a difficult task. We have divided the city into eight manageable subcommunities (Figure 8).

We suggest neighborhood organizations be established in at least three areas that have the greatest need for immediate attention and are centrally located. These three areas were selected based on their percent impervious surface, degree of development, and whether these were contested waters (contested waters are bodies of water that have been labeled by the city as both storm ponds and lakes). Additionally we considered the location of the area dispersing the initial groups throughout the city. This will be beneficial in networking and altering social norms throughout the city and assisting in establishing future groups. The first three neighborhoods for this program are #2, #5, and #8. Focusing on these areas would allow city staff to implement workshop and programs that are effective and have the greatest impact before moving on to another neighborhood.

Once these neighborhood organizations have been established, they can be used as examples and their leaders can be mentors for new neighborhood training groups in adjacent locations. The groups can focus on best management practices, taking advantage of the cost share programs provided by the Rice Creek Watershed District and Grass Lake Water Management Organization (RCWD 2009, GLWMO 2009). Cost share programs are an effective way to reduce the barriers associated with personal investment for the public good. Residents are far more likely to install storm water mitigation measures if they split the cost of the initial investment with a public agency.

The EPA defines BMPs as “techniques, measures or structural controls that are used for a given set of conditions to manage the quantity and improve the quality of storm water runoff in the most cost-effective manor” (Storm Water Authority 2009). While there are hundreds of BMPs (EPA 2009), each community group can focus on the best management practice best suited for conditions found in their specific neighborhood (Table 8). Using smaller neighborhood groups improves the chances that the program will be appropriate for the location and accepted by the community. Neighborhood groups can be allowed to experiment with BMPs to find a combination that works for their yard and is accepted by their neighborhood. This will allow the residents to become personally involved in decisions about their wetland resources and provide them ownership of the solution.

Table 8: Environmental standards support decision making tool, 2009.

Examples of Best Management Practices	
Information and education	<ul style="list-style-type: none"> • Catch basin stencils • Erosion control information • Fertilizer and pesticide application • Illicit dumping and littering • Maintenance of lots • Proper storage of chemicals • Proper yard waste disposal • Information on hazardous waste and motor oils
Elimination of discharge	<ul style="list-style-type: none"> • Infiltration basins • Pervious structures • Diversion of off-line infiltration devices

Ideally this program would result in citizens who are not only concerned with water quality in their community but also making educated choices about their contributions to water quality. This requires the citizens to think about the effects of their choices, not only for their current neighbors but also future residents and visitors. Often programs such as this face some challenges, for example finding the time to plan and implement a successful program such as this might be difficult for Shoreview. While this is a volunteer program, initially it will require staff time for planning and logistics to get the three neighborhood groups started. Another challenge may be finding the volunteers to donate their time, 77% of Shoreview residents are concerned with water quality in their

community but this does not mean they will dedicate their time to help improve the situation (Table 3).

Despite some challenges, the potential benefits of implementing a widespread community-based storm water runoff program would be long lasting. By working with the community to overcome the challenges and develop solutions for surface water runoff, citizens are given ownership of not only the problem but also the solution. Through shared knowledge, the residents will be prepared to consider and compensate for the unique situations found in their neighborhood.

Recommendation 2. Create a Wetlands Training Program for City Staff to Increase Collaboration

To compliment and support the community-based wetland education programs, we recommend a training program for city officials focusing on best management practices and collaboration among city staff and watershed organizations. This training could include information about current conditions within the city as well as conditions in neighboring communities. They can use this information to form partnerships with adjacent communities and better evaluate the decisions being made by local governments. The key idea here is that ecological decisions cannot follow political boundaries, water quality and the condition of wetlands is both a political and ecological decision and therefore must be evaluated using watershed boundaries. Collaboration with cities bordering Shoreview and watersheds within the city are crucial to the future of Shoreview's wetlands (for more on this topic see report 4/8).

Improving water quality in Shoreview requires both the citizens and the city officials, local government can make well-informed decisions but more importantly they must actively engage in collaborative efforts to take advantage of every possible opportunity. Through these active engagements city officials can become part of the solution along with other community members. The city officials constantly make decisions that affect the quality of water in Shoreview and the only way these decisions can be fully informed is to assure all the city officials understand best management practices and the current ecological conditions within the city and adjacent communities.

These water quality decisions can be more effective with collaborative efforts among organizations and governments. Political boundaries were not designed to address ecological issues; they were designated with no regard to most watershed features as is obvious when comparing the watershed boundaries and Shoreview's political boundaries. These political boundaries are permeable to ecological effects and this is where the power of a single jurisdictional authority is not adequate for addressing ecological issues. A single jurisdiction is not ecologically autonomous, therefore, must collaborate and form partnerships in order to formulate an ecologically successful management plan. Adjacent communities can form a shared vision a sustainable future. Through partnerships and collaboration managing wetlands will no longer be limited by political boundaries. Instead the adjacent communities will develop a shared vision of wetland management by analyzing the issues according to the wetland boundaries.

City officials can utilize their knowledge to act as advisors and messengers for neighborhood groups. In this role, city officials can act as a liaison between the various city departments, watershed districts, and other watershed groups. The city official can support and monitor the efforts of the neighborhood groups and most importantly advise them on incentive programs offered by the watershed districts.

This training could be provided based on a regular schedule for all city officials. The main barrier to this recommendation is time. City officials are very busy and have little time to add another project to their schedules. The initial investment in time will be the main obstacle, after collaboration has been established the relationships must simply be maintained. An intern could be created to help staff prepare materials (see Recommendation 3). The dissemination of information and implementation of the mitigation practices will be handled by neighborhood groups. Not only will training and collaboration be extremely beneficial for effective water quality programs in Shoreview, it will serve as an example for surrounding communities.

Recommendation 3. Hire Additional Support Staff

The subject of water quality is vast and closely related to many natural resource issues and residential concerns. Shoreview officials expressed the need to do more for water quality and monitoring but do not have sufficient resources to expand programs. Hiring a college intern interested in water quality would be a first step toward solving this problem. College students in environmental majors would be interested in interning for a city needing assistance in environmental issues. This would be a great opportunity for a student because they will gain experience and knowledge about solving real problems occurring in a local setting. There is often a shortage of internship positions in the work place; therefore positions such as this one are especially competitive among peers. Guided by city staff, interns could perform tasks from monitoring wetland and storm pond quality to performing policy analyses for current ordinances. Their work could support ongoing staff responsibilities and decision making by public officials

There are numerous ways to find a reliable intern. Shoreview could advertise an internship position through the University of Minnesota Gold Pass (GoldPASS, 2009). Gold Pass is a website used by employers and volunteer organizations seeking interns and volunteers in a subject area relating to a student's major and future interests.

Another way to recruit an intern is through the Green Corps program (Green Corps, 2009). These environmental interns have been successful in creating environmental change. One of Green Corps central goals is environmental stewardship. Green Corps hires a variety of environmental interns every year "to fight and win tomorrow's environmental battles" (Green Corps 2009). Currently Green Corps interns gain hands-on experience by working on different causes around the nation in order to make a positive environmental impact on the planet.

Hiring an intern to work with Shoreview City staff would be a helpful and inexpensive resource for addressing water quality problems. An intern would provide support for on-

going staff responsibilities as well as aid decision making by officials having resulting in widespread benefit for Shoreview.

Recommendation 4. Strengthen and Support Existing Ordinances

Shoreview has access to five environmental ordinances for wetland and storm pond management. These five Environmental Standards are Shoreview’s primary regulatory tool for wetland and storm pond activity (Appendix D). We are focusing improvements on ordinances 209.060, 209.070, and 2090.080 governing storm ponds, wetlands, and shore land management respectively. We identified five criteria: management scope, presence of specific language, temporal scale, monitoring component, and designation of responsibility in order to evaluate the ability of the ordinance to be enforced, implemented and effective (Table 9). While maintaining the current strengths within these ordinances, weaknesses like role confusion, vague language, and inappropriate scope can be repaired to create effective tools for wetland and storm pond management.

Table 9: Five criteria to evaluate the ability of the ordinance to be enforced, implemented and effective.

	209.060 Storm Ponds	209.070 Wetlands	209.080 Shoreland
Appropriate Scope of Resource Management	Yes- targeted to all storm water management systems in Shoreview.	No- only applies to DNR protected wetlands, so the vast majority of wetlands are not managed.	No- only applies to DNR protected waters, so a large proportion of shoreland is not managed.
Specific Language	Yes- but must refer to the Surface Water Management Plan for most details.	Some- no information provided on where to find DNR regulations in order to be in compliance.	Yes- very thorough regarding management of the resources it pertains to.
Temporal Provisions	Yes- On an as needed or regular basis and otherwise outlined in the Surface Water Management Plan.	Not in ordinance.	No- only dates after which compliance is required.
Monitoring Component	Some- Heavy reliance on resident, but few city components.	Not in ordinance.	No- monitoring functions by DNR or City not included.
Designation of Responsibility (Oversight)	Some- Heavy reliance on resident for responsibilities of maintenance, implementation, and cost. Reports to be filed with the city.	Yes- DNR oversight only, no city components included.	Yes- City Manager, City Council, City officials issue permits and approval. Some actions also require DNR approval.

Vague language is frequently used within policies at all levels of government because it allows for some freedom in how the policies are carried out. Unfortunately, this can

result in the lack of specific parameters and details that provide for enforceability. The brevity of the wetlands ordinance limits its ability to supply the information of the purpose and process of the ordinance therefore, we suggest that the city expand the ordinance to include those specifics. The wetlands ordinance 209.070 is currently worded so it only includes the nine Shoreview wetlands protected and also managed by the MNDNR. This leaves the vast majority of Shoreview's wetlands without any management. Ordinance 209.080 governing shore land management has a similar problem with scope, in that it also only applies to the shores of MNDNR protected waters and so the remaining majority of shore land is unprotected in Shoreview. Therefore, we recommend the city strengthen these ordinances by supplementing them with similar, possibly less stringent, regulations and management practices that apply to all Shoreview's wetlands and shore lands.

All three of the ordinances we are targeting do not thoroughly articulate a monitoring component for the resources they govern. As previously stated, the wetlands ordinance is very brief and it includes no mention of whether monitoring will be done or how it would be conducted. The shore land ordinance, although it is very thorough, encounters the same problem in that it fails to outline a plan for monitoring. We feel it is important for all of the environmental standards to at least outline a structure and strategy for monitoring resources by the city and therefore that is what we recommend. Ordinance 209.060 regarding storm water management does in fact include monitoring and maintenance, however it predominantly relies on the efforts of residents. The responsibility of the city is not well defined and this can lead both parties confusing their responsibilities and in turn neglecting management. This report recommends ordinance 209.060 be strengthened by creating a more equitable distribution of responsibility.

Temporal provisions within ordinances is another criterion that can illustrate the effectiveness of a policy and which can facilitate the enforceability when applied to monitoring and implementation. Neither the wetlands nor the shore land ordinance include timelines for implementation, monitoring and maintenance, so it is recommended that schedules be created for these activities in resource management and outlined in the ordinances. The restructuring of these ordinances with specified monitoring, temporal provisions, appropriate scope and oversight will facilitate Shoreview city officials in their wetland and storm pond responsibilities.

The ordinance implementation and the procedures involved is the responsibility of Shoreview and its residents. However, implementation of restructured ordinances is important for the ecological health of Shoreview's ecosystems, the resident's enjoyment of their surroundings and the reduction of conflict over resource management and quality. No action by the city could lead to a growing number of problems, which relate to flooding, native species loss, and public health concerns. To help inform decision-making by the city we have created a scenario-based decision tool (Appendix E) for wetland policy and management, which can provide the city with a means for evaluating their situation as well as potential implementation actions. If improved enforceability of ordinances was created, better monitoring of these issues would be possible.

Conclusions

Shoreview's distinctive landscape, characterized by numerous lakes, ponds, and wetlands, is a valued resource that provides its residents with an aesthetic environment not frequently found only ten miles away from a metropolitan city center. However, as this report has outlined the natural landscape features found in Shoreview are experiencing degradation from intense development pressures. The city's 2008 Comprehensive Management Plan, which serves as a policy guide for decision-making regarding the development of the community, addresses this issue by describing the importance of maintaining and improving the environmental quality of the city's resources and outlines strategies for managing the city's resources and development. This document supports the 2005 Surface Water Management Plan that identified nine goals and the policies to designed to reverse the degradation of the city's water resources. The improvements that have been made to regulations and procedures are beneficial, but unfortunately some standards are still not specific enough to stop and reverse degradation of Shoreview water systems. Water resources are a fundamental component of Shoreview's identity, which is why one of the city's goals outlined in the Comprehensive Management Plan 2008 is to "manage the City's natural resources so that environmental quality is maintained and enhanced for future generations." Providing such quality requires additional protective actions be implemented in the future.

The Comprehensive Management Plan reflects the community's values, which provide the basis for Shoreview residents' desire for high environmental quality. Because the community value for environmental quality, and in particular water resources, is so deeply rooted in Shoreview's identity, a loss or depletion of the city's aquatic systems negatively affects Shoreview's identity as a water rich city. In addition to contributing aesthetically, the city's water resources carry out important functions such as water purification and flood control, which would otherwise be a financial expenditure for the city. As illustrated throughout this report it is important to manage these systems appropriately so that ecosystem services function optimally, adjustments to the current policies and processes for surface water management implementation, monitoring, and enforcement are necessary in order to maintain the ecological services and aesthetic benefits that Shoreview's aquatic systems supply, while also reducing conflict regarding use and function of storm ponds. Adopting the recommendations outlined in this report has the potential to reverse degraded water systems, position Shoreview as a leader in sustainable surface water management, and serve as a model for other communities to emulate.

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Appendices

Appendix A. Citizen Survey Questions

Appendix B. Citizen Responses to Survey, October 2009

Appendix C. Wetland Management Map, Shoreview, Minnesota, 2009

Appendix D. Shoreview Environmental Standard Ordinances

Appendix E. Scenario Decision-Making Tool, 2009

Appendix A. Citizen Survey Questions

Who: The City of Shoreview along with the students from the University of Minnesota, majoring in Environmental Science, Policy, and Management

What: The overall goal of this project is to assist the city of Shoreview as they move towards greater sustainability in their community. Each year students in ESPM 4041 work with a client to perform 'real world' projects that involve planning for a local city or organization. This year we are working with the City of Shoreview.

This will begin with a task force of students addressing the city's concerns of:

- Alternative Energy Strategic Planning
- Wetlands Environmental Communication and Education for Residents
- Wetlands and Pond Regulations and Policies
- Landscape Level Environmental Planning for Wetlands and Forests
- Sustainable Management of Parks: How People use Parks?
- Sustainable Management of Parks: Green/Gray Management
- Urban Vegetation Assessment: The Tree Resources
- Urban Canopy Cover Assessment: Trails, Forests, Waterways

Each group project involves the following related to their specific topic:

Inventorying the current natural resources, infrastructure, and/or programs
Reviewing the city's **Comprehensive Plan**, as well as ordinances and policies that impact natural resource management,
Reviewing the literature, as well as programs and policies in other municipalities in both Minnesota and across the country,
Assessing city of Shoreview **staff, relevant partners', & residents' interests and needs**,
Developing a vision statement, **identifying issues, and making recommendations** for policies, protocols, programs, and/or management.

Contacts and Questions:

The faculty supporting this study is Dr. Kristen Nelson. You may ask any questions you have now. If you have questions later, you may contact Kristen Nelson at (612) 624-1277. You may also write Dr. Nelson at 115 Green Hall, 1530 Cleveland Avenue North, Saint Paul, MN 55108.

If you have questions or concerns regarding this study and would like to talk to someone other than the researcher, contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455; telephone (612) 625-1650. The HSC project # is 0609E92806.

City of Shoreview Property with and without Wetlands Survey

[Script is bolded] [*notes to interviewer italics*]

Thank you for agreeing to participate in this study. Your feedback is important!

Your participation in this study is voluntary. You are a small number of randomly selected Shoreview residents who are being asked to complete this interview. We are interested in how people understand the purpose of Shoreview wetlands, and your thoughts on appropriate uses of wetlands by owners like yourself.

This questionnaire asks about your perceptions and use of Shoreview's wetlands in general. Your responses will help us identify and focus on areas and concerns that are important to you.

How long have you lived in Shoreview? (✓ check one)

Less than 1 year 1-5 years
 6-10 years 11+ years

Does your property contain part of a wetland or storm pond?

Yes No

Is your property abutting or adjacent to a wetland or storm pond?

Yes No

How would you rate the quality of water resources in the city of Shoreview?

Poor Good Excellent
 Fair Very Good

Are there any areas of particular concern?

Do you consider wetlands or storm ponds on your property a personal, or a public resource?

Personal Public Or Both

Please explain....

What is the difference between a wetland and a storm pond?

What do you consider to be the appropriate purpose for storm ponds? Can they be multi-use?

Are you concerned with run off from your lawn or roadways into local wetlands?

Yes No

Have you ever taken measures to address those concerns? If, so what?

Have you ever fertilized your yard?

Yes No

If so, did it contain phosphorus?

Yes No

Would you be interested in city suggested actions and education/training? If so what is your greatest interest?

For example...Would you like to see more regulation on the use, management, and development of wetlands and storm ponds in the City of Shoreview?

How do you handle yard waste (such as grass clippings and fallen leaves) on your property?

The Future:

Do you foresee any problems in the future with your water resources in Shoreview?

Are there any changes you would like to make to future regulations concerning wetlands in the city?

On a scale from 1 to 5 (1 being not active at all and 5 being very active), how involved are you with the city council and city politics?

1

2

3

4

5

No activity

Very active

FINAL SECTION - More about you...

Are you... Female Male Prefer not to answer

What is your age range? (✓ check one)

20 or younger

21-30

31-40

41-50

51-60

61-70

71 or older

Prefer not to answer

Appendix B. Citizen Responses to Surveys. October, 2009.

All survey participants	18 participants total # of residents
How long have you lived in Shoreview?	
Less than 1 year	1
1-5 years	3
6-10 years	4
11+ years	10
Does your property contain a wetland or storm pond	
yes	6
no	12

Is your property adjacent to a wetland/storm pond	
yes	9
no	9
Rate Water Quality	
poor	0
fair	6
good	8
very good	1
excellent	1
don't know	2
Areas of concern	
neighbors using phosphorus	1
polluting storm drains with grass clippings and leaves	2
ponds contribute to mosquitoes	2
Drinking water	1
streams and creeks in trouble	1
lakes are down	4
pesticides	2
water levels down	1
over fertilizing	1
weed treatments	2
Kerry lake	1
water collects in backyard and on streets	4
no concern	4
buffers around lakes	1
Public or Private Resource	
personal	4
public	5
both	9
Please explain.....	
own the land up to the water, should be treated like a lake	
these are private, but normally they are public	
everyone has a responsibility	
it's your land	
benefit both public and private	

if on personal property, owners should be responsible	
all personal property has a public component	
it is still public even though it's on private land	
everyone has a responsibility, but you can't tell people what to do with their property	
on my property	
How many knew the difference between wetland and storm pond	
did know difference	12
did not know difference	6
What is the appropriate use for storm ponds?	
Depends on the size	
to slow down water	
use can wreck storm ponds	
created to maintain natural habitats	
trap oils, slow surge of storm	
docks, swimming pool	
Can they be multiple use?	
yes	11
no	2
don't know	3
no answer	2
Are you concerned with runoff from your lawn or roadways into local wetlands?	
yes	10
no	8
no answer	0
Have you ever taken measures to address these concerns?	
use organic fertilizer	2
use proper chemicals, educate others	1
plant perennials	1
reduce fertilizer use	2
pick up dog poop, maintain vehicles	1
add buffers	1
put rocks in	1
Have you ever fertilized your yard?	
yes	16
no	1
not sure	1
If so, did it contain phosphorus?	
yes	3
no	10
don't know	5
Would you be interested in city suggested actions, education Training? If so what is your greatest interest?	
Yes	14
no	4

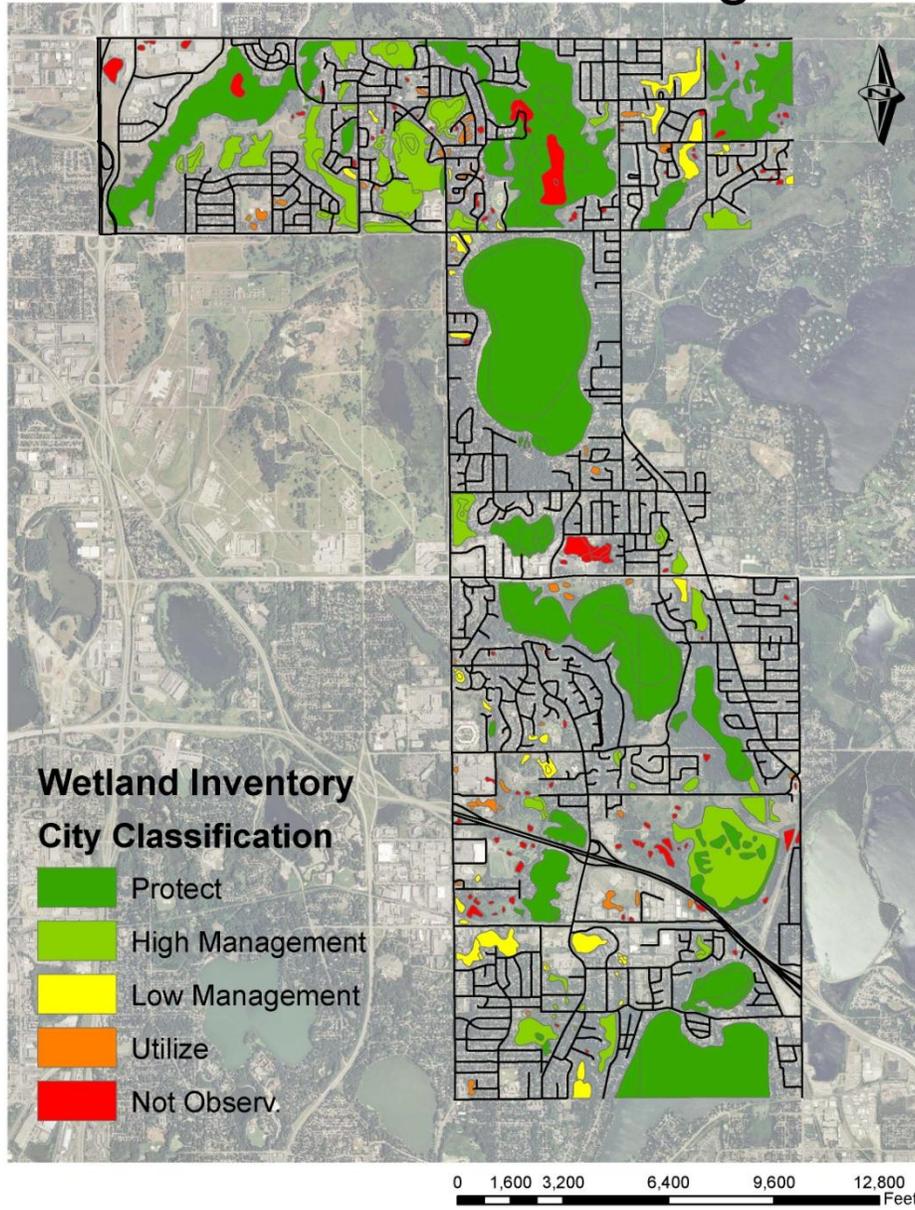
How do you handle yard waste on your property?	
Compost	8
town homes maintains lawns	3
Mulching	4
service pick up	3
waste disposal site	3
leave on yard	1
don't know	1
Do you foresee any problems in the future with your water resources?	
yes	7
With development	1
with DKNY, city needs to dredge	1
more use/stress	1
If not dredged it will get worse	1
heavily fertilized	1
turtle lake drying up	1
snail lake disappearing	1
worried about ponds	1
No	6
Don't know	5
Don't know enough about issues	1
continued weather patterns, drought, water/lawn restrictions	
Running on wells?	1
Are there any changes you would like to make with future regulations?	
No	4
Don't know	5
Don't know enough about regulations	1
Yes	9
Wetlands should not be destroyed	1
take action to reduce algae	1
more guidance to who is responsible for what	1
dredging is important	1
stop fertilizers	1
restrictions on dumping	1
none get eliminated	1
On a scale of 1-5 how involved are you with city politics?	
1	11
2	5
3	2
4	0
5	0
Male/Female	
Male	6
Female	11
Male and Female Participated in survey	1

Age	
20 or younger	2
21-30	1
31-40	1
41-50	4
51-60	8
61-70	2
71 or older	0
prefer not to answer	0

**Appendix C. Wetland Management, Shoreview, Minnesota,
2009.**

Modified from: (Baker, 2009)

Shoreview Wetland Management



Appendix D. Shoreview Environmental Standard Ordinances

209.040 Soils, Slopes, Grading, and Erosion and Sediment Control.

(A) Overview. The standards specified herein are intended to be used by all property owners, contractors and developers who perform land disturbing activity. All development activity, regardless of if the disturbance is subject shall conform to the standards of this chapter to provide protection from soil erosion, pollution, impaired surface water, and degradation of the natural resources of the City. Plans for all development activity must account for soil types and slopes. While corrections may be possible to permit development of land characterized by unsuitable soils or steep slopes, care must be taken to protect vegetative cover on the site and to insure there are no adverse impacts to nearby lands.

(B) Definitions of terms used in this Chapter:

(1) *Land disturbance activity* is any land change that may result in soil erosion from water or wind and the movement of sediments into or upon waters or lands within the City, including construction, clearing and grubbing, grading, excavating, transporting and filling of land.

(2) *Erosion control* refers to methods employed to prevent erosion. Examples include soil stabilization practices, horizontal slope grading, temporary or permanent cover, and construction phasing.

(3) *Permanent controls* are long-term methods employed to prevent erosion and sedimentation. Examples of such protection are swales, ponds, sediment basins, turf reinforcement mats, storm sewer systems, and riprap.

(4) *Temporary controls* are short-term methods employed to prevent erosion and sedimentation. Examples of such protection are silt fence, temporary sediment basins, check dams, straw, mulch, erosion control blankets, wood chips and erosion netting.

(5) *Best Management Practices (BMPs)* are methods for stormwater management that minimize the amount of runoff that occurs from a site and prevents pollution from running off. These represent a combination of land use, conservation practices and management techniques that result in an acceptable level of water quality and pollution prevention consistent with the City's NPDES and Stormwater Pollution Prevention Plan (SWPPP) permits.

(6) *Minnesota Stormwater Manual* is the most current version of the Minnesota Stormwater Manual, prepared by the Minnesota Pollution Control Agency (MPCA).

(7) *Final stabilization* means that all soil disturbing activities on the site or common plan of development have been completed, and that a uniform (evenly distributed, e.g., without large bare areas) perennial vegetative cover with a density of at least 80 percent of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures have been employed, and that all temporary erosion control devices are removed, including silt fence, temporary sedimentation basins, and temporary standpipes. Simply sowing grass seed and/or mulch is not considered final stabilization. Final stabilization of a "common plan of development" includes completion of building or home construction along with final restoration of all yards and adjacent drainage ways.

(8) *Rough grade* is the stage at which the grade and elevation approximately conforms to the approved plan.

(9) *Finish grade* is the final grade of the site that conforms to the approved plan within 0.2 feet of the approved elevations.

(C) General Development Standards. The following standards apply to all development.

(1) That all provisions necessary for management of the flood plain, surface waters and stormwater, as determined by City ordinances and those of other agencies having jurisdiction, have been met.

(2) That the principles of Better Site Design and Best Management Practices (BMPs), as detailed in the Minnesota Stormwater Manual, are incorporated into the development and reflected in the Development contract to insure all soil reclamation provisions are strictly monitored and enforced by the City.

(3) That a reasonable effort has been made to preserve the natural vegetation and that appropriate measures are taken to prevent shade tree disease transmission.

(4) That all temporary and permanent erosion and sediment control BMPs utilized on the development site meet the objectives of the Minnesota Stormwater Manual and have been incorporated into the development contract, and that slope stabilization is specifically addressed within the review process.

(D) Soils and Slopes. No development shall be permitted on poorly drained soils, somewhat poorly drained soils, very shallow soils, soils with high shrinkswell or frost potential or very steep or steep sloped, as defined by the Soil Survey of Washington and Ramsey Counties, and in State Statutes and Rules, unless the applicant provides plans designed by an engineer licensed by the State of Minnesota demonstrating that the soil stabilization and construction techniques are consistent with accepted engineering practice, as determined by the City Manager. Long term maintenance practices shall be specified in the engineered plans. These regulations shall not prohibit earth sheltered construction, as defined in State Statute.

(E) Soil Stabilization.

(1) Minimal Erosion. Development activities shall be conducted and staged to minimize soil erosion by:

(a) Keeping disturbed areas small.

(b) Stabilizing and protecting disturbed areas as soon as possible.

(c) Keeping storm water rate of runoff no greater than what it was before development.

(d) Protecting disturbed areas from storm water runoff.

(e) Controlling, reducing or delaying storm water runoff.

(f) Retaining sediment within the site area.

(2) Erosion and Sediment Control Plan. The developer shall prepare an Erosion and Sediment Control Plan, which shall define the temporary and permanent BMPs that will be implemented and maintained on the development site to protect surrounding property, and surface waters from the consequences of soil erosion resulting from grading and site development. The City Manager shall review the Erosion and Sediment Control Plan for compliance with the BMPs specified in the Minnesota Stormwater Manual.

(a) The storm water pollution prevention plan shall consist of three components: a temporary erosion and sediment control plan, a permanent erosion and sediment control plan, and a narrative.

i. A temporary erosion and sediment control plan shall be provided that indicates the location of perimeter controls, construction fence, temporary sedimentation basins, inlet protection, areas to be seeded, areas to be mulched or blanketed and all other required temporary erosion and sediment control measures. This plan shall also indicate staging of temporary erosion control measures.

ii. A permanent erosion and sediment control plan shall be provided that indicates areas to be seeded and sodded, sediment ponds, storm sewer systems and all other required permanent erosion and sediment control measures. Permanent storm water pollution controls including, but not limited to ponds, vegetated buffers, rain gardens or other infiltration areas, and structural measures shall be designed and constructed in accordance with standards specified in the City Code and the Minnesota Stormwater Manual, as well as the requirements of other agencies having jurisdiction.

iii. A narrative shall be provided that describes at a minimum, the nature of construction activity, person(s) responsible for inspection and maintenance of site erosion and sediment control including contact information, project phasing, schedules, along with the timing, installation and maintenance of erosion and sediment control measures and specifications necessary to carry out the project.

(3) New Vegetation. For all development where natural vegetation is disturbed, the permanent new landscaped vegetation must be established within 6 months from the date of certificate of occupancy issuance unless an extension is granted by the City Manager because for weather-related delays. The City Council may grant an extension if the delay is for any other reason. Temporary vegetation shall be established and maintained on the site per the approved plan until work to establish the permanent vegetation commences.

(F) Grading Standards. Land disturbance activity shall be controlled in accordance with the following criteria:

(1) The smallest amount of bare ground shall be exposed for as short a time as feasible.

(2) Temporary ground cover, shall be as specified in the Erosion and Sediment Control Plan and permanent vegetative cover, such as sod, shall be provided. Temporary and permanent vegetation shall be maintained in compliance with all applicable requirements of the Municipal Code.

(3) Methods to prevent erosion and trap sediment shall be employed.

(4) Fill shall be stabilized to accepted engineering standards.

(5) All fill and grading activity shall comply with all other standards of the City's Development Ordinance.

(3) All fill and grading activity shall comply with the performance standards set forth in Minnesota Statutes 307.08, Private Cemeteries Act.

(4) *Slope*. The slope of cut surfaces shall be no steeper than is safe for the intended use and shall be no steeper than two horizontal to one vertical, for a short term interim period, unless the owner furnishes appropriate soils engineering. Unless specifically approved, permanent slopes shall be no steeper than three horizontal to one vertical.

(G) Erosion and Sediment Control Standards.

(1) Generally. All sites with land disturbing activities shall be prepared and maintained to control against erosion as set forth in this chapter.

(a) *Erosion and sediment control*. Temporary and permanent erosion and sediment control measures shall be installed and maintained on all sites in conformance to the approved plan and as necessary to prevent erosion and sedimentation from impacting any adjacent property, rights-of-way, drainage system, lake, pond, wetland, watercourse, natural resource or other protected area.

(b) *Implementation of storm water pollution prevention plan*. All erosion and sediment control measures will be operational prior to the start of any land disturbing activity as specified in the erosion and sediment control plan, construction plans and specifications, or as deemed necessary by the City based on actual site conditions.

(c) *Inspection.* Inspection of the BMP measures shall be carried out by the developer as required in the permit approval, but at a minimum shall be inspected at least once a week and after rainfalls of more than 0.5-inches in a 24-hour period.

(d) *Maintenance.* All erosion and sediment control measures will be maintained throughout the duration of the project. Deficiencies found through inspection of a site shall be promptly repaired as necessary to bring the site into conformance with the approved plan and City requirements. At minimum, BMPs shall be maintained as follows:

(i) If a perimeter erosion control device is found to have sediment accumulation in excess of one third of the total device height, the sediment shall be cleaned and the device repaired within 24 hours of discovery.

(ii) If an erosion control device is found to be nonfunctional, it shall be repaired or replaced within 24 hours of discovery.

(iii) Temporary sediment basins shall be maintained when sediment reaches one half the outlet height or one half the storage volume within 72 hours after discovery.

(iv) Additional erosion and sediment control measures shall be installed as directed by the City Manager as found necessary to protect life and limb, the environment, properties or the stability of a property until final stabilization has been achieved.

(e) *Required Record Keeping.* The developer shall keep records of inspection dates, site conditions, rainfall events and maintenance work performed. Inspection reports shall include, at a minimum, date and time of inspection, name of person conducting inspection, findings of inspection including any recommended corrective actions, corrective actions taken since previous inspection, and the date and amount of rainfall events of 0.5-inches or greater. The required records and approved plans shall be open to inspection by the City during all municipal working hours.

(f) *Dewatering and Basin Draining.* Dewatering and basin draining related to construction activity that may have turbid or sediment laden water must be discharged to a temporary or permanent sedimentation pond on the project site. All water that leaves the site must be treated with the appropriate BMPs such that the discharge water is clear and does not adversely affect the receiving water or downstream landowners. Turbid or sediment laden discharge water shall not be discharged into any stormwater conveyance system or water body. (g) *Construction Site Waste.* The site shall be maintained in a clean and orderly manner. Waste shall be recycled when possible and stored on the site in appropriate waste and recycling containers, collected regularly, and disposed of properly, in conformance with the regulations of the City and requirements of the MPCA.

(i) *Solid Waste:* Collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other wastes must be stored and disposed of properly.

(ii) *Hazardous Wastes:* Oils, gasoline, paint, and any other hazardous substances must be properly stored to prevent spills, leaks, or other discharge. Storage and disposal of hazardous wastes shall comply with MPCA requirements. *Truck and Concrete Washing:* When feasible, truck washout should occur at the concrete plant. When washout is needed on the construction site a concrete washout area shall be used and contain the following components:

1. Signage identifying where concrete washout should be performed.

2. A rock entrance to prevent sediment tracking.

3. A containment area utilizing appropriate BMPs for concrete washout facilities, as identified by the MPCA. BMPs include, but are not limited to, manufactured watertight washout containers or a plastic-lined containment area such as a holding pit, bermed basin, roll-off bin, or portable tank. The plastic liner shall be a minimum of 10-mil thick and leak free. The containment area shall be inspected daily to insure the sidewalls are intact, leaks are absent, and

adequate capacity remains. Washout facilities must be cleaned, or new facilities constructed and ready to use, once the washout container is 75% full. If stored liquids have not evaporated when 75% capacity is reached, vacuum and dispose of the liquid in accordance with MPCA requirements. Hardened solids shall be disposed of as per the regulations of the MPCA.

(H) Shoreland Management. In addition to the regulations stated in this Section, development activities on riparian lots having frontage on Minnesota Department of Natural Resources (DNR) classified protected waters are subject to the provisions of 209.080(G) (Shoreland Management).

(I) Enforcement and Penalty. This ordinance shall be administered and enforced by the City Manager, as specified in Section 203.010(D). Any person, firm or corporation, who violates or refuses to comply with any of the provisions of this ordinance shall be guilty of a misdemeanor. Each day that a violation is permitted to exist shall constitute a separate offense. Violations may result in issuance of a stop work order for the entire project or any portion thereof, no inspections shall be performed by the City, and the City will withhold issuance of any and all Certificates of Occupancy until conditions on the site comply with the provisions of this Code.

209.050 Vegetation & Woodlands.

(A) Preservation. Vegetation shall be left intact to the maximum extent possible to retard surface run-off and soil erosion, to utilize excess nutrients, and to conserve nutrients in the soil and to preserve shoreland aesthetics.

(B) Removal. The removal of vegetation shall be controlled in accordance with the following criteria:

(1) All Properties.

(a) Vegetation shall be restored during and after all construction projects that require a building permit to retard surface runoff and soil erosion in accordance with Section 209.040(D), Soil Stabilization.

(b) Development shall be conducted so that the maximum number of trees, in particular landmark trees, are preserved by the clustering of structures in existing cleared areas and natural clearings, and the utilization of other site design techniques. Design of the site and construction activities shall be conducted in a manner to avoid likely injury to Landmark Trees.

(c) The developer shall remove seriously damaged, diseased or dead trees.

(2) New Development. All private-sector development proposals that involve the construction of a public street or private road and for all new non-single dwelling developments:

(a) The Tree Preservation Plan. A tree preservation plan shall be submitted. This plan shall identify the trees to be preserved on the site and the methods to be employed to insure that the identified trees are not damaged during construction. These methods must be acceptable to the City.

(b) A Tree Replanting Plan, acceptable to the City, shall be submitted. This plan shall provide for at least a one-for-one replacement, up to a maximum of 15 trees per acre, for any healthy tree(s) in excess of 4 inches in diameter, except the replacement threshold for boxelder, cottonwood, and willow trees shall be eight inches of diameter and except as required elsewhere in this Section for landmark trees. The replacement trees shall comply with the standards in Section 206.010(J). Trees preserved on the site shall count toward the 15 trees per acre maximum replacement requirement, except any trees required to be replaced to compensate for the removal of a landmark tree [Section 209.050(B)(2)(c)] shall be in addition to the requirements of this section.

(c) Landmark Trees.

(i) Landmark Trees Not Located Within a Shore or Bluff Impact Zone. Landmark trees shall not be removed unless authorized by the City. Such authorization shall not be granted unless:

(aa) A finding is made that the presence of the tree(s) unreasonably inhibits practical use of a property, the tree(s) is diseased, or it presents a public safety hazard.

(bb) A responsible party (property owner, developer, or city in the case of a public improvement, etc.) agrees to plant six (6) trees of a species and location acceptable to the City for each healthy landmark tree removed. The size of the new trees shall comply with the standards set forth in the Section 206.010(J) for new construction. If space is not available on the development site, the replacement trees shall be planted elsewhere in the community, as is acceptable to the City Council.

(ii) Landmark Trees Located Within a Shore or Bluff Impact Zone. See Section 209.050(B)(4).

(3) Single Family Residential.

(a) Single family residential development. Single family residential development is defined as any activity that requires a building permit or land use approval including but not limited to variance, conditional use permit, subdivision, or rezoning.

(i) Landmark Trees Not Located Within a Shore or Bluff Impact Zone. Landmark trees shall not be removed unless authorized by the City. Such authorization shall not be granted unless:

(aa) A finding is made that the presence of the tree(s) unreasonably inhibits practical use of a property, the tree(s) is diseased, or it presents a public safety hazard. (bb) A responsible party (property owner, developer, or city in the case of a public improvement, etc.) agrees to replace each healthy landmark tree removed with trees of a species and location acceptable to the City at the ratio below. The size of the new trees shall comply with the standards set forth in Section 206.010(J) for new construction. If space is not available on the development site, the replacement trees shall be planted elsewhere in the community, as is acceptable to the City Council.

Lot Area Replacement Trees

(replacement/landmark)

Less than 20,000 sf 1:1

20,001 to 40,000 sf 2:1

40,001 and more 3:1

(ii) Landmark Trees Located Within a Shore or Bluff Impact Zone. See Section 209.050(B)(4).

(aa) Existing Single Family Residential. Lots on which a single family residential home was constructed prior to the effective date of this ordinance are not subject to the replacement requirements for landmark trees unless development as defined in Section 209.050(B)(3)(a) is occurring.

(4) Shoreland Management. In addition to the regulations stated in this Section, development activities on riparian lots having frontage on Minnesota Department of Natural Resources (DNR) classified protected waters are subject to the provisions of 209.080(h) (Shoreland Management).

(5) Public Improvement Projects. For public street reconstruction and other public improvement projects, the

following tree replacement standards shall apply:

(a) A minimum of one-for-one replacement for any tree in excess of 4 inches of diameter that is to be removed as a result of the construction activity.

(b) The replacement tree species, size, and location shall be negotiated between the City and the property owner.

(6) Aquatic Vegetation.

(a) Vegetation located at or below the OHW elevation of a protected water shall not be removed unless a permit is obtained from the Department of Natural Resources.

(b) Vegetation located at or below the Regional Flood elevation for a wetland shall not be removed unless permission is granted by the City Manager or his/her designee.

(7) Public Drainage Easements. No person shall remove, cut, trim, or otherwise disturb terrestrial vegetation located within a drainage easement which adjoins a wetland unless authorized by the City Manager or his/her designee.

(8) Any disagreement regarding the enforcement of the rules set forth in Section 209.050(B) shall be presented to the Planning Commission for recommendation and to the City Council for a final decision.

(9) In addition to or in lieu of remedies permitted by state law for the violation of a Development Ordinance, the City may require a violator of any requirement in Section 209.050(B) to plant up to eight trees within the community or pay a fine equivalent to the cost of purchasing up to eight replacement trees for each violation.

(C) Tree Diseases.

(1) Declaration of Policy and Intent.

(a) Policy. The City Council has determined that the health of elm and oak trees within the City is threatened by fatal tree diseases commonly known as Dutch Elm and Oak Wilt diseases. It has further determined that the loss of elm and oak trees growing upon public and private property would substantially depreciate the value of property within the City and impair the safety, good order, general welfare and convenience of the public. It is declared to be the intention of the City Council to control and prevent the spread of these diseases and other epidemic diseases of shade trees, and this ordinance is enacted for that purpose.

(b) Intent. It is the intention of the City Council to implement a local pest control program pursuant to Minnesota Statutes Section 18.021 through 18.022 as amended, and a shade tree disease control program pursuant to Minnesota Statutes Section 18.023 as amended and the regulations of the Commissioner of Agriculture which are adopted by reference. The programs are directed specifically at the control and elimination of the Dutch elm disease fungus, elm bark beetles and the oak wilt fungus, and are undertaken at the recommendation of the Commissioner of Agriculture for the State of Minnesota. The City Manager or his/her designee shall act as coordinator between the Commissioner of Agriculture and the City Council in the conduct of these programs.

(2) Inspection and Investigation.

(a) Annual Inspection. The City Manager or his/her designee shall inspect all public and private places which might harbor plant pests, as defined in Minnesota Statutes Section 18.46, Subd. 13, as hereafter amended, as often as practicable to determine whether a public nuisance exists thereon. He/she shall investigate all reported incidents of infection or infestation by the Dutch Elm fungus, elm bark beetles, Oak Wilt fungus, or any other epidemic diseases of shade trees.

(b) Entry on Public and Private Places. The City Manager or his/her designee may enter upon all public and private places at any reasonable time for the purpose of carrying out any of the duties assigned herein. The term "private place" means every place except the private home.

(c) Diagnosis. The City Manager or his/her designee shall, upon finding conditions indicating Dutch Elm or Oak Wilt infestation, or other epidemic diseases of shade trees, immediately send appropriate specimens or samples to the Commissioner of Agriculture or to any qualified laboratory for analysis, or take such other steps for diagnosis as may be recommended by the Commissioner. Except as provided herein, no action to remove infected trees or wood shall be taken until there has been a positive diagnosis.

(3) Transporting Elm Wood Prohibited. It is unlawful for any person to transport within the City any bark-bearing elm or oak wood without having obtained a permit from the City Manager or his/her designee. The City Manager or his/her designee shall grant such permits only when the purposes of this code will be served thereby.

(4) Interference Prohibited. No person shall prevent, delay or interfere with the City Manager or his/her designee while they are engaged in the performance of duties set forth in this chapter.

(D) Nutrient Management.

(1) Purpose. The City has conducted studies and has reviewed existing data to determine the current and projected water quality of various lakes within its community. The data indicates that lake water quality may be maintained and improved if the City is able to regulate the amount of lawn fertilizer and other nutrients entering the lakes as a result of storm water runoff or other causes. The purpose of this ordinance is to define regulations which will aid the City in maintaining and improving lake resources which are enjoyed by its residents and other users.

(2) License Required. No person, firm, corporation or franchisee shall engage in the business of commercial lawn fertilizer application within the City unless a license has been obtained from the City Manager as provided in Section 705.

(3) Regulations for Property Owners.

(a) Random Sampling. Upon the City's request, the property owner shall provide the City with samples of lawn fertilizer to be applied by property owners. The quantity of the sample shall be large enough to permit laboratory testing.

(b) Use of Impervious Surfaces. Property owners shall not deposit leaves or other vegetative materials on impervious surfaces or within storm water drainage systems or natural drainage ways.

(c) Unimproved Land Areas. Except for driveways, sidewalks, patios, areas occupied by structures, or areas which have been improved by landscaping, all land areas shall be covered by plants or vegetative growth.

(4) General Regulations.

(a) Time of Application. Lawn fertilizer applications shall not be applied when the ground is frozen or between November 15 and April 15 of the succeeding year.

(b) Sample Analysis Cost. The cost of analyzing fertilizer samples taken from commercial applicators or property owners shall be paid by the commercial applicators or property owners if the sample analysis indicates that the phosphorus content exceeds the levels authorized herein.

(c) Fertilizer Content. No person, firm, corporation or franchise, shall apply fertilizer within the City of Shoreview which contains phosphorus.

(d) Impervious Surfaces and Drainage Ways. No person shall apply fertilizer to impervious surfaces, or to the areas within drainage ditches or waterways.

(e) Buffer Zone. Fertilizer applications shall not be made within ten feet of any wetland or water resource.

(f) Waterfowl. No person shall place feed for waterfowl on, in or within 50 feet of a wetland, pond, lake or water resource.

(5) Exemptions.

(a) Newly established turf areas shall not be limited by this ordinance on the quantity of phosphorus for the first growing season.

(b) The use of phosphorus on golf courses is permitted under the direction of an applicator certified by an organization approved by the Commissioner of Agriculture.

(c) These exemptions are subject to the recommended rates established by the University of Minnesota and the Commissioner of Agriculture.

(E) Warning Signs for Pesticide Application. All commercial or noncommercial applicators who apply pesticides to turf areas must post or affix warning signs to the property where the pesticides are applied. The warning signs shall comply with the following criteria and contain the following information: (1) The warning signs must project at least 18 inches above the top of the grass line. The warning signs must be of a material that is rain resistant for at least a 48-hour period and must remain in place up to 48 hours from the time of initial application.

(2) The following information must be printed on the warning signs in contrasting colors and capitalized letters measuring at least 1/2 inch, or in another format approved by the Minnesota Commissioner of Agriculture.

The signs must provide the following information:

(a) The name of the business, entity, or person applying the pesticide; and

(b) The following language: "This area chemically treated. Keep children and pets off until (date of safe entry)" or a universally accepted symbol and text approved by the Minnesota Commissioner of Agriculture as recognized as having the same meaning or intent. The warning signs may include the name of the pesticide used.

(3) The warning signs must be posted on a lawn or yard between two feet and five feet from the sidewalk or street. For parks, golf courses, athletic fields, playgrounds or other similar recreational property, the warning signs must be posted immediately adjacent to areas within the property where pesticides have been applied or at or near the entrances to the property.

209.060 Storm Water Management.

All development within the City shall comply with the policies set forth in the City's Surface Water Management Plan.

(A) Private Stormwater Management

(1) All stormwater best management practices shall be designed in a manner to minimize the need for maintenance and reduce the chances of failure.

(2) Stormwater easements and covenants shall be provided by the property owner for access for facility inspections and maintenance. Easements and covenants shall be recorded with Ramsey County prior to the issuance of a permit.

(3) Maintenance.

(a) All stormwater best management practices shall be maintained according to the measures outlined in accordance with the City's Surface Water Management Plan.

(b) The person(s) or organization(s) responsible for maintenance shall be designated in the Development Agreement. The property owner(s) shall be responsible for maintenance if the Development Agreement does not designate a party.

(c) The financial responsibilities for such maintenance shall be specified in the Development Agreements and be included in deed restrictions or other contractual agreements as approved by the City.

(d) Non-routine Maintenance. Non-routine maintenance includes maintenance activities are those infrequent activities needed to maintain the ponding areas and/or stormwater infrastructure so that it functions in accordance with the approved plans and specifications.

Examples of such activities include pond dredging or major repairs to stormwater structures.

(i) Nonroutine maintenance shall be performed on an as-needed basis based on information gathered during regular inspections.

(ii) If nonroutine maintenance activities are not completed in a timely manner or as specified in the approved plan, then the City may complete the necessary maintenance at the owner's/operator's expense.

(4) Inspections. The person(s) or organization(s) responsible for maintenance outlined in the Development Agreement or as required by the Minnesota Pollution Control Agency.

(a) Authorized representatives of the City may enter at reasonable times to conduct on-site inspections or routine maintenance.

(b) For best management practices maintained by the property owner or homeowner's association, inspection and maintenance reports shall be filed with the City as provided for in the Development Agreement.

(c) Authorized representatives of the City may conduct inspections to confirm the information in the maintenance reports.

209.070 Wetlands.

Utilization of protected wetland areas within the City shall be governed by Department of Natural Resources regulations. During construction, wetlands and other water bodies shall not be used as sediment traps.

209.080 Shoreland Management.

(A) Classification. In order to guide the development and utilization of the shorelands of protected waters for the preservation of water quality, natural characteristics, economic values and the general health, safety and welfare, certain protected waters in the City have been given a shoreland management classification. These protected waters in the City have been classified by the Commissioner of the Minnesota Department of Natural Resources (DNR) and shown on the Ramsey County Protected Waters Inventory map as follows:

(1) Natural Environmental Waters:

(a) 62-44 Poplar Lake

(b) 62-74 Grass Lake

(2) General Development Waters:

(a) 62-21 Turtle Lake

(b) 62-82 Wabasso Lake

(c) 62-64 Martha Lake

(d) 62-56 Owasso Lake

(e) 62-75 Island Lake

(f) 62-73 Snail Lake

(g) 62-81 Judy Lake

(h) N/A Rice Creek

(i) 62-80 Emily Lake

(j) Unnamed Stream from Turtle Lake (62-61) to Marsden Lake (62-59) (B) Purpose. The Shoreland Management Area is a component of the Environmental Overlay Zoning District as illustrated on the City of Shoreview's Zoning Map. Shoreland management regulations pertaining to such items as minimum lot size, structure placement, and alteration of shoreland area have been adopted to manage the effects of shoreland and water surface crowding, to prevent pollution of surface and ground waters, to provide ample space on lots for sewage treatment facilities, to minimize flood damage, to maintain property value, to maintain the historic value of significant historic sites, to minimize impairment of views of protected waters and their shorelines, and to the extent possible maintain the natural character of shorelands and their adjoining public waters.

(C) Permitted Uses. The uses permitted in the Shoreland Management Areas are those uses allowed and regulated by the applicable zoning district underlying the Environmental Overlay District.

(D) General Provisions. Except as hereinafter provided, the following standards shall apply to all shorelands of the protected waters designated in Section 209.080(A). Where the requirements of the underlying zoning district as shown on the official Zoning Map are more restrictive than those set forth herein, the more restrictive standards shall apply:

SHORELAND STANDARDS	NATURAL ENVIRONMENT WATERS	GENERAL DEVELOPMENT WATERS
(1) Minimum Lot Area		
(a) Riparian lot	40,000 sq. ft.	15,000 sq. ft.
(b) Other	40,000 sq. ft.	10,000 sq. ft.
(2) Minimum Lot Width		
(a) Riparian Lots (at OHW, Building Setback From OHW, and front lot line	200 feet	100 feet
(b) Nonriparian Lots	125 feet	75 feet
(3) Structure Setback from OHW	150 feet	50 feet
(4) Structure Setback from top of Bluff	30 feet	30 feet

(E) Calculation of Minimum Area and Width for Riparian Lots. Only that land located above the Ordinary High Water (OHW) Level shall be used in the calculations to determine compliance with minimum lot area requirements.

(F) Exceptions to Structure Setback Requirements.

(1) Principal structure setback from the OHW

(a) New Construction. In those case where there are existing dwelling units, including attached structures, on adjacent lots which have a lakeside setback of more than fifty (50) feet, the lakeside setback for a new dwelling unit, including attached structures, shall be equal to the average of the lakeside setbacks for the existing dwelling units, plus or minus 10 feet. In those cases where there is only one existing dwelling unit, including attached structures, on an adjacent lot, which has a lakeside setback of more than fifty (50) feet, the lakeside setback for the new dwelling unit, including attached structures, shall be equal to the average of 50 feet and the lakeside setback of the existing dwelling unit, including attached structures, plus or minus 10 feet. In any event, 50 feet shall be the minimum setback.

(b) Additions to the Existing Principal Structures. Where two or more existing adjacent dwellings, including attached structures, have lakeside setbacks which exceed the minimum lakeside setback by ten (10) or more feet, the lakeside setback for an addition to a dwelling shall not be less than the average of the lakeside setbacks for such existing adjacent dwellings, including attached structures, minus 10 feet. In any event, 50 feet shall be the minimum setback.

(2) Setback requirements set forth in this section from side property lines and the OHW level shall not apply to docks, piers, boat lifts, retaining walls, walks, required safety railings along steps and retaining walls, or vegetation (trees, shrubs, flowers, etc.). Fences may be permitted anywhere lakeward of the required structure setback, except within the shore impact zone, provided they are not taller than 3.5 feet above grade. The City Manager or his/her designee may authorize fences up to 6 feet in height that extent into the Shore Impact Zone when a property abuts a walkway, park, or similar facility.

(3) On residential property, only one water-oriented accessory structure may be located between the OHW level and the required structure setback, subject to compliance with the standards listed below in subsections (a) -

(c). Accessory structures that existed prior to June 21, 1993 and which do not comply with the provisions stated herein may be maintained, repaired, or rebuilt but cannot be expanded in floor area or height.

(a) The amount of impervious surface area on the lot will not exceed 30 percent of the lot area,

(b) The principal structure and any garage/storage structure comply with the required structure setback from the OHW level (principal structure means the dwelling, including any attached deck, porch, patio, etc.).

(c) The water-oriented accessory structure shall comply with the following requirements:

(i) It does not exceed 250 square feet in area, unless a boathouse which shall not exceed 288 square feet of area,

(ii) It is not wider than 12 feet as viewed from the water,

(iii) It does not exceed 10 feet of height above grade,

(iv) It is setback at least 20 feet from side property lines except where not possible due to lot width, in such case, the structure shall be located in the center of the lot or as otherwise deemed acceptable by the Planning Commission,

(v) It does not contain any sanitation facilities and is not used for habitation,

(vi) It is screened from view from the lake and from adjoining property as much as practical through landscaping, use of natural color(s), topography, and/or location.

(vii) No water-oriented structure (other than a lawful boathouse) or offseason storage of an ice fishing house is permitted within the Shore Impact Zone. This setback requirement may be waived, but shall not be reduced to less than 10 feet from the OHW, if the Planning Commission determines that a practical difficulty exists which renders strict compliance to be unreasonable. Practical difficulty shall be defined as due to topography or other circumstance acceptable to the City.

(viii) A boathouse may be located within the Shore Impact Zone, provided it is at least 10 feet landward of the OHW and it complies with the other requirements stated herein.

(4) Detached accessory structures may be located in the front yard (between dwelling and street) of a lakeshore property only upon approval of a riparian lot detached accessory structure permit, Section 203.039, Permits.

(5) Structures, except stairways and landings, shall not be placed within a Bluff Impact Zone.

(6) Stairways, lifts, and landings shall be used when accessing public waters across Bluff or Shore Impact Zones. Such facilities shall also comply with the following standards:

(a) Stairways shall not exceed four feet in width except for public recreation uses, including trails.

(b) Landings for stairways must not exceed 32 square feet in area, unless associated with a public recreation use.

(c) Shall be screened from view of the public water.

(G) Soils, Slopes and Grading. Natural grades shall be maintained to the extent feasible in order to protect water quality and preserve views from the public water. Furthermore, measures shall be taken to prevent erosion and negate the impacts on adjacent properties.

(1) Shore Impact Zones, Bluff Impact Zones and Steep Slopes. Land within steep slopes, shore and bluff impact zones on riparian lots shall maintain natural grades and shall not be altered, filled or excavated with the following exceptions:

(a) To accommodate the placement of stairways, landings, public recreation facilities, roads, trails, and water oriented accessory structures.

(b) To remedy slope failure utilizing acceptable methods for slope stabilization and protection. Retaining walls may be permitted provided the wall does not exceed four (4) feet in height. A greater height may be permitted if it is necessary to remedy the slope failure.

(c) To maintain, repair or reconstruct existing retaining walls provided the walls maintain the same height and length.

(d) In accordance with an approved mitigation plan. A Grading Permit is required for (b) and (c).

(2) Structure. The existing topographical grade and elevation for new, expanded or reconstructed single family residences shall be maintained to the extent feasible. The finished topographical grade and elevation shall not be less than five feet below the existing topographical grade and elevation. Reconstruction is defined in Section 209.080(M)(2)(b).

(H) Vegetation and Woodlands.

(1) Shore Impact Zones, Bluff Impact Zones and Steep Slopes:

(a) Removal and trimming of landmark trees is prohibited, except as necessary to remove branches that are dead, diseased, or which pose a safety hazard.

(b) Non-landmark trees may be removed only where necessary, in the judgment of the City, to accommodate the placement of stairways, landings, public recreation facilities, roads, trails, and water oriented accessory structures, or to provide a view of the public water from the principal structure, provided that sufficient vegetation cover remains or is planted to screen motor vehicles, dwellings and other structures when viewed from the water. Such trees may also be trimmed or removed as necessary where branches are dead, diseased, or pose a safety hazard.

(I) Roads, Trailways, Driveways, and Parking Areas. Public and private roads, trailways, driveways, and parking areas must be designed to take advantage of natural vegetation and topography to achieve maximum screening from view from public waters. They must also be designed and constructed to minimize and control erosion and to retard the runoff of nutrients in accordance with the following criteria:

(1) All roads, driveways, and parking areas shall meet the setback requirements established for structures and must not be placed within a bluff or shore impact zone when other reasonable and feasible placement alternatives exist as determined by the City. If the City Council finds that no other reasonable option exists, these facilities may be placed within these areas if designed to minimize adverse impacts.

(2) Parking areas for public watercraft access ramps and approach ramps shall be located at least 50 feet from the OHW unless no other practical alternative exists as determined by the City Council.

(3) Natural vegetation shall be used to screen parking areas when viewed from the water.

(4) Any grading, filling or excavation in the Shoreland Management Area which will change or diminish the course, current or cross-section of protected waters or wetlands shall be approved by the Commissioner of the Minnesota Department of Natural Resources.

(J) Maximum Impervious Surface Area Within Shoreland Areas.

(1) Detached Residential – Standard Riparian and Non-Riparian Lots. Impervious surface area shall not exceed 25 percent unless the following conditions are satisfied and, in no case, shall impervious surface area exceed 40 percent:

(a) No water-oriented accessory structures (except docks, boatlifts, and retaining walls) will be located within the shore impact zone.

(b) No more than 50 percent of the impervious area on the property drains directly to an adjoining protected water.

(2) Detached Residential – Substandard Riparian Lots. See Section 209.080(J)(2)(c)(i).

(3) Detached Residential – Substandard Non-Riparian Lots. See Section 207.050(D).

(4) All Other Uses. For uses other than Detached Residential, impervious surface area may be permitted to cover up to 60 percent of a site. Each of the following conditions must, however, be satisfied to cover more than 40 percent of these sites with impervious surface area:

(a) All required setbacks from the OHW level are proportionately increased up to double (100 percent increase) the standard requirements based upon percent of impervious surface area above 40 percent (e.g., a 75 percent increase in the standard lakeshore setbacks if 55 percent impervious area coverage is desired).

(b) A drainage easement is granted to the City for the purpose of maintaining natural (predevelopment) vegetative cover within the shore impact zone.

(c) Storm water drainage from all impervious surfaces shall be directed to a storm water detention pond before discharge to a protected water.

(5) Except for those structures located at or below the OHW, such as docks, boat lift, and piers, all structures, including water-oriented accessory structures, shall be included in the calculation to determine compliance with the maximum impervious area requirements.

(K) Nonconforming Uses and Substandard Structures. Any use of shoreland property or a structure in existence on August 1, 1983 (effective date of Ordinance 458 and adoption of the initial Shoreland Management Code), but which does not meet the requirements of the Shoreview Development Code shall be allowed to continue in accordance with the provisions of Section 207.050.

(L) Substandard Lots.

(1) All Substandard Lots.

(a) Adjacent lots of record in the Office of the County Recorder prior to August 1, 1983 in common ownership which do not meet the requirements of Section 209.080(D) must be combined and cannot be used as separate building sites unless all lots meet or exceed 60% of the minimum required lot width, area, and depth standards.

(b) Lots of record in the Office of the County Recorder prior to August 1, 1983, that are not adjacent lots of record in common ownership which do not meet the requirements of Section 209.080(D), may be allowed as separate building sites, provided:

(i) The lot meets or exceeds 60% of the minimum required lot width and area standards as defined in Section 209.080(D) and has a depth of at least 110 feet as defined in Section 202, or

(ii) The lot was occupied by a primary structure on or before March 20, 2000.

(c) No lot of record shall be used or reused as a separate home site unless it abuts an improved public right-of-way or, if the lot was legally accessed via a private way prior to December 10, 1992, said access may continue to be utilized provided:

(i) There is no practical way to extend a public street to the property;

(ii) The private access is protected by a permanent easement recorded to run with the title of the property; and

(iii) The private way complies with the fire apparatus requirements set forth in the Uniform Fire Code.

(2) Substandard Riparian Lots.

(a) No structures shall be expanded, constructed or reconstructed on a substandard lot of record unless design review approval is first obtained from the City in accordance with Section 203.034.

(b) Reconstruction of a structure is defined to mean replacement of three or more of the structure's six structural components (roof, floor, and four walls). Determination as to the extent of structural component replacement shall be made by the Building Official.

(c) Design Standards for Substandard Riparian Lots. Any structures expanded, constructed, or reconstructed on a substandard riparian lot shall comply with the following standards:

(i) Impervious Surface Coverage. The impervious surface coverage of the parcel shall not exceed 25 percent. A maximum impervious surface coverage of 30 percent may be permitted if there are no structures (except for docks, stairways, lifts, landings, retaining walls, and fences) in the required setbacks from the Ordinary High Water level and/or bluff. If the existing impervious surface coverage on a parcel exceeds the allowable impervious surface coverage, existing impervious surface coverage may remain but shall not be increased. Existing impervious surface coverage is the impervious surface coverage legally present on or before March 20, 2000 or approved thereafter by the City.

(ii) Building Height. The maximum building height shall not exceed 35 feet as measured from the highest roof peak to the lowest point at finished grade.

(iii) Foundation Area. The foundation area of all structures, including dwellings and attached accessory structures, cantilevered areas, detached accessory structures greater than 150 square feet, and covered porches, covered decks, and covered patios shall be limited to 18 percent of the lot area of 1,600 square feet, whichever is greater. If the existing foundation area exceeds the allowed foundation area, the foundation area percentage may be maintained but not increased. Existing foundation area is the foundation area legally present on the property on or before March 20, 2000 or approved thereafter by the City.

(iv) Building Setbacks.

(aa) Minimum Setback from the Property Front Line: 30 feet. However, in those cases where the existing setbacks for the two adjacent dwellings exceed this requirement, the setback of the new dwelling or any new addition shall be equal to the average setback of the two adjacent dwellings, plus or minus 10 feet. In those cases where there is only one existing adjacent structure which has a setback greater than 30 feet, then the setback for the new dwelling or addition shall be equal to the average of 30 feet and the setback of the existing adjacent structure, plus or minus 10 feet.

(bb) Minimum Setback from the Ordinary High Water Level. See Sections 209.080(D) and (F).

(cc) Minimum Setback from an Interior Side Property Line: 10 feet. However, in those cases where an existing principal structure is set back less than 10 feet but at least 5 feet from the side property line, then the existing setback may be maintained provided the expansion, addition or reconstruction is no more than one story as defined by the Uniform Building Code. A minimum setback of 10 feet is required for any part of the structure that exceeds one story in height.

(v) Architectural Mass.

(aa) The use of landscaping is encouraged to reduce the visual appearance of structures from the lakeshore.

(bb) The use of natural color(s) and/or materials on the exterior of the structure is also encouraged to reduce the visual impact. Natural colors are shades of brown, gray, and green. Natural materials include wood or stone that complement the setting of the structure.

(cc) If a variance is granted to any of these design standards or setback requirements, provisions (a) and/or (b) may be required as conditions of approval.

(3) Substandard Non-Riparian Lots. See Section 207.050(D).

(M) Shoreland Mitigation. A shoreland mitigation plan must be submitted for residential development that requires land use approval including but not limited to residential design review, variance, conditional use permit, subdivision or rezoning. The plan shall be designed to mitigate the adverse effects land development has on water quality and the lake environment. The mitigation plan shall be signed by the property owner, approved by the City

Manager and a Mitigation Affidavit recorded with the Register of Deeds prior to the commencement of development activity. Furthermore, mitigation plans shall be completed within one year of the plan's approval unless otherwise approved by the City.

(1) Mitigation Practices. The mitigation plan shall include at a minimum two of the following practices:

(a) Vegetation Protection Area. A vegetation protection area may be established which at a minimum shall include land area within the shore impact zone, bluff impact zone or steep slope. Within these areas, the removal of trees, shrubs and groundcover, grading, filling and other land disturbing activities are prohibited with the following exceptions: (i) Removal of vegetation is in accordance with Section 209.080(H).

(ii) Establishment of one viewing corridor by selective pruning and selective removal of trees and shrubbery. Sufficient trees and shrubbery shall be retained to screen development from view of the water but provide a filtered view of the water. The viewing corridor should be more or less perpendicular to the shore and not be more than 30 feet wide at any point, including at the lakeshore. Water-oriented structures, walkways, stairways and lifts shall be located within the view protection corridor. Clearing, filling, grading and other land disturbing activities are not permitted in this corridor with the exception of the following:

(aa) Construction of a water-oriented structure, walkways, stairways and lifts.

(bb) Shoreline protection activities as permitted by the DNR.

(cc) Erosion control measures approved by the City, which are designed to remedy existing erosion problems.

(dd) Beaches as permitted by the DNR.

(b) Vegetation Restoration. Vegetation restoration areas may be established which at a minimum shall include land within the shore and the bluff impact zones or steep slopes. Land area shall be restored from law, beach or other disturbances using native or natural landscaping.

(i) Steep Slope/Bluff Restoration. Steep slopes and bluffs that are vegetated with turf may be restored with deciduous and ornamental trees, evergreens and shrubs that are native to the area.

(ii) Shoreline Buffer Restoration. A buffer zone of at least 25 feet from and parallel to the ordinary high water mark shall be planted or restored and maintained with vegetation native to the area to fullest practicable extent possible with effective erosion and sediment control. Existing natural beaches or beaches which have been permitted by the DNR shall be allowed to continue and be maintained. A minimum of 30% of the lot's shoreline area shall be restored. This restoration area shall be contiguous unless otherwise approved as part of the mitigation plan.

(c) Architectural Mass. The use of natural color(s) and/or materials on the exterior of the structure shall be used to reduce the visual impact. Natural colors are shades of brown, gray, and green. Natural materials include wood or stone that complement the setting of the structure.

(d) Removal of Nonconforming Structures. The mitigation plan may include the removal of structures that do not comply with the required structure setbacks from the ordinary high water line or are located within a shore impact zone or bluff impact zone.

(e) Reduction of Impervious Surface Coverage. The mitigation plan may include a minimum 5% reduction of the existing impervious surface coverage. The preferable location of this reduction is within that portion of the lot that drains to the lake.

(2) Other practices. At the discretion of the City Manager, other restoration or protection activities may be approved as part of a mitigation plan provided they meet the objectives of this ordinance. Examples include the removal of artificial sand beaches, stormwater management and replacement of seawalls with bioengineering structures.

(N) Administration. The City shall notify and supply the Department of Natural Resources (DNR) with plans and information on the following: (1) Copies of all variance requests or public hearings for a Conditional Use Permit in a shoreland area shall be submitted to the Commissioner of the DNR at least ten (10) days prior to such hearing.

(2) A copy of the final decision granting variances or Conditional Use Permits shall be submitted to the Commissioner of the DNR within ten (10) days after the meeting.

(3) All preliminary plats within the shoreland area shall be submitted to the Commissioner of the DNR at least ten (10) days prior to the meeting.

(4) All approved final plats shall be submitted to the Commissioner of the DNR ten (10) days after the meeting.

(5) All Concept Planned Unit Developments shall be forwarded to and approved by the Commissioner of the DNR prior to approval by the City Council.

(6) All amendments to Section 209.080 must be approved by the Commissioner of the DNR to be effective.

Appendix E. Scenario Table Decision-Making Tool, 2009.

	ADVANTAGES	DISADVANTAGES
1. No Action Scenario	<ul style="list-style-type: none"> • Short-Term Cost Savings: <ul style="list-style-type: none"> - No need for tax increase - No need for additional city staff - No potential infringement on property rights • Ability of City to Focus Time and Effort on Other Interests 	<ul style="list-style-type: none"> • Loss of Wetland and Pond services: <ul style="list-style-type: none"> - Native Species are choked out including some that are rare/ threatened - Increased potential for invasive species - Higher dredging and maintenance cost • Increased Flooding: <ul style="list-style-type: none"> - Increased insurance premiums - Decreased property value - High cost repairs for damage to both public and private property - Damage to natural systems such as vegetation washout, habitat disturbance and loss of scenic beauty • Increased Public Health Concern: <ul style="list-style-type: none"> - Greater exposure to the pollutants in storm water (effluent) - More uncontrolled water presents greater opportunity for increased mold and mildew • - More waterfowl in close proximity to homes and public spaces creates greater risk from fecal coliform
2. Add Water Quality/Policy Staff Support Scenario	<ul style="list-style-type: none"> • Low or No Cost • Opportunity for Focused Study and Implementation: <ul style="list-style-type: none"> - Allows for greater level of attention within the city on water resources - Generation of new knowledge and data • Introduction of New Ideas and Strategies: <ul style="list-style-type: none"> - Current knowledge within field of study - Informed about current BMPs 	<ul style="list-style-type: none"> • Training Time Investment: <ul style="list-style-type: none"> - Introduce intern to the Shoreview government system and debrief on Shoreview specific knowledge and aquatic system issues
3. Supplement Existing Environmental Standards Scenario	<ul style="list-style-type: none"> • Create Enforceability of Ordinances: <ul style="list-style-type: none"> - Provides for ease in monitoring 	<ul style="list-style-type: none"> • Time Investment • Political Will
4. Implement all Recommendations Scenario	<ul style="list-style-type: none"> • Improved Water Quality: <ul style="list-style-type: none"> - Reduced nutrient loads and fine particulate • Increased Habitat: <ul style="list-style-type: none"> - More shoreline vegetation and riparian areas - Increased biodiversity and species abundance • More Active Citizenry • Shared Responsibilities: <ul style="list-style-type: none"> - Increased cooperation between city and residents on implementation, monitoring, and maintenance 	<ul style="list-style-type: none"> • Financial Investment: <ul style="list-style-type: none"> - Few large upfront costs necessary, but budget review and funding sources will be needed • Time Investment: <ul style="list-style-type: none"> - Extensive responsibility and action required from both city staff and residents. • Planning Required: <ul style="list-style-type: none"> - Development of extensive timeframe for implementation and plan for monitoring - Allocation of responsibilities to various parties and individuals