AN ASSESSMENT AND RATIONALE FOR THE ALTERNATIVE SHORELAND MANAGEMENT STANDARDS

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STATE OF MINNESOTA
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DIVISION OF WATERS

This report is a companion to the Alternative Shoreland Management Standards (Version 1.0, December 12, 2005). It provides background and support for the standards based on the scientific and planning literature. The report is available in an alternative format on request, and it can be downloaded along with related fact sheets from the DNR Waters website: www.dnr.state.mn.us/waters

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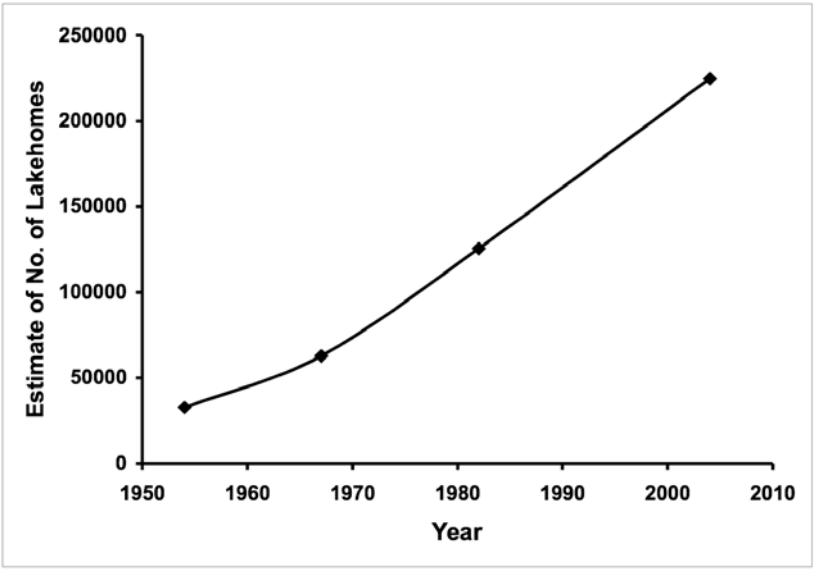
TABLE OF CONTENTS

I. INTRODUCTION

The Commissioner of the Department of Natural Resources is required by statute (see Minnesota Statutes, Section 103F.211) to promulgate standards for the subdivision, use, and development of shorelands in both unincorporated areas of counties and within cities. The Minnesota Department of Natural Resources (DNR) promulgated and adopted the first shoreland management standards for counties in 1970. These standards were subsequently amended in 1973 to also apply to Minnesota's cities, and then they were further revised in 1989. There are currently over 250 local units of government that administer and enforce these standards through their land use and subdivision controls.

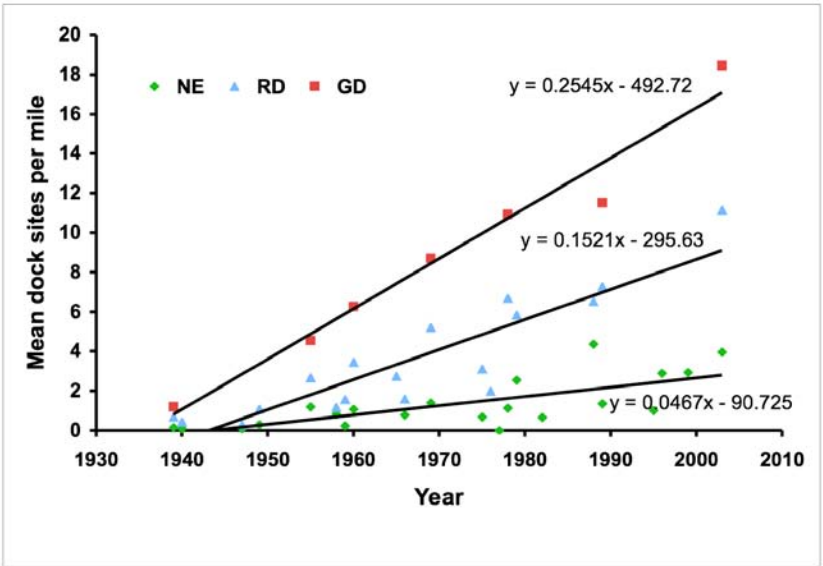
Pursuant to the Governor's 2003 Clean Water Initiative, the DNR was directed to undertake a pilot project to develop and promulgate an alternative set of shoreland management standards for a 5-county area in northcentral Minnesota. The five counties covered by the pilot project include Aitkin, Cass, Crow Wing, Hubbard, and Itasca counties. Nearly 21 percent of Minnesota's developable lakeshore property is located within these counties. In addition, these counties have experienced a rate of growth that was twice the statewide average between 1990 and 2000. These alternative standards could be adopted at the discretion of local governmental units within the 5-county area and elsewhere in the state to supplement or replace the existing shoreland management standards.

The major impetus for the Governor's initiative was the significant change in the pattern of development being experienced on the lakes in this area. During the 1960's and 1970's, most shoreland development was directed toward the traditional seasonal cabin or lake home. During the late 1970's and 1980's, the trend was to convert seasonal lakeshore dwellings into year-round lake homes. Finally, the advent of the internet and a diverse economy has allowed many people to work and live in the lake districts across the state. As a result, there are an ever-increasing number of large, modern homes being built on lakes. The Governor's Clean Water Initiative empowered the DNR to address these issues and develop a modernized set of shoreland management standards, using the 5-county North Central Lakes Region as a potential model for future statewide application.

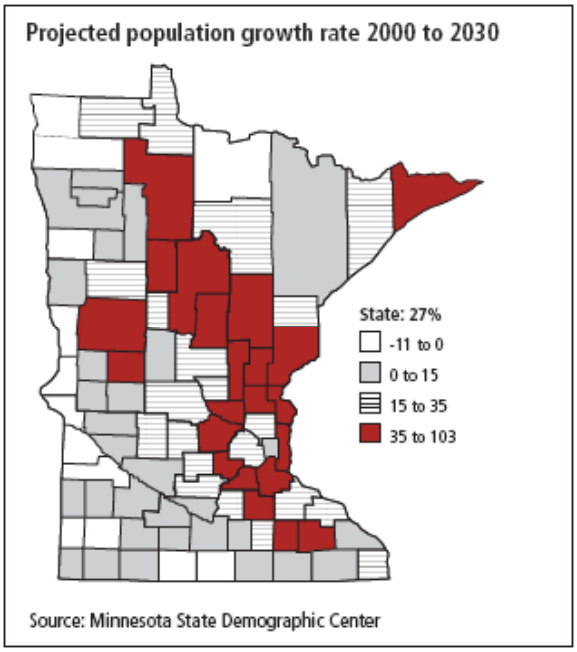


Development pressure is increasing with more dwellings per lake each year (Kelly and Stinchfield 1998). Based on estimates of the number of Minnesota lakehomes, which have some measurement error and uncertainty, development appears to be increasing at an average rate of over 4000 homes per year (Cohen and Stinchfield 1984; Minnesota DNR 1989). The estimate of Minnesota lakehomes in 1954

and 1967 of 33,000 and 63,000, respectively, were only from development records for lakes outside the 7-county metro area of size greater than 145 acres (1923 lakes surveyed). Payton and Fulton (2004) estimated that there were about 181,000 lakehomes in 2004 on fish lakes in the state. About half of all lakeshore homes are seasonal residences, and 75 percent are located on less than 200 feet of lakeshore frontage (median lot width was 130 feet). The DNR estimate for total lakeshore dwellings in 2004 was about 225,000 for all lakes in the state.



Development around northcentral Minnesota lakes, as indexed by dock sites per mile from DNR aerial photos, has varied by shoreland development class (Radomski 2006). General development lakes have had a faster rate of development than recreational development class lakes, whereas natural environment lakes were just beginning to be developed. In 2003, mean development density was 4.0 homes per mile for natural development lakes, 11.2 homes per mile for recreational development lakes, and 18.5 homes per mile for general development lakes. Jakes et al. (2003) modeled future development potential for Itasca County lakes by identifying seven constructs influencing lakeshore development: current general development, current housing development, and availability, accessibility, suitability, aesthetics, and proximity to services.



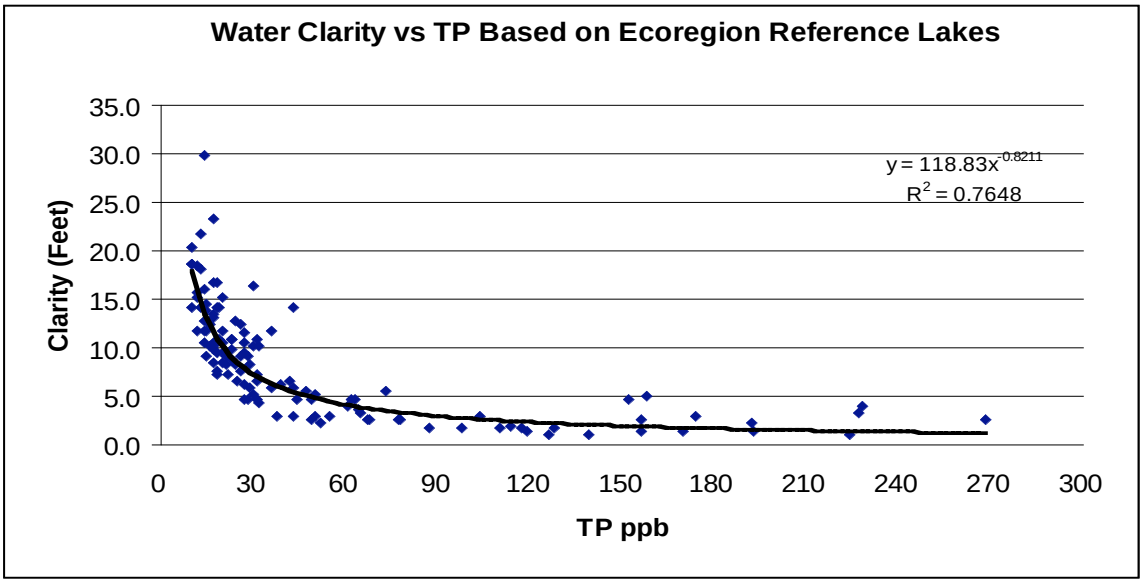
More people are choosing to live and recreate in the lakes counties of Minnesota. These areas are likely to see a large influx in migrants (Radeloff et al. 2001; Brown et al. 2005). The Minnesota State Demographic Center has projected growth in many of the lake-rich counties to exceed 35 percent in the next 25 years. The Brainerd lakes area is one of the nation's fasting growing micropolitans (4th fastest growing mini metro area in the Midwest and 28th nationally; U.S. Census Bureau 2005).

There is widespread concern about the consequences of poor development on water quality and fish and wildlife habitat. Population increase with the associated loss of vacant lakeshore areas appears to have led to

this greater public concern (Stedman 2003; Stedman and Hammer 2006). A recent study found that 33 to 42 percent responded that fishing, scenic quality, water quality, and condition of shoreline on their most-visited lake was "fair or poor" (Anderson et al. 1999). Respondents reported by a 2:1 margin that lake environments were becoming "worse" rather than "better". A survey of lake associations conducted at the University of Minnesota found that more than 50 percent of respondents felt that water quality, zoning, lake levels, agriculture, exotic species, plants and fishing were "very important" problems to their lake associations.

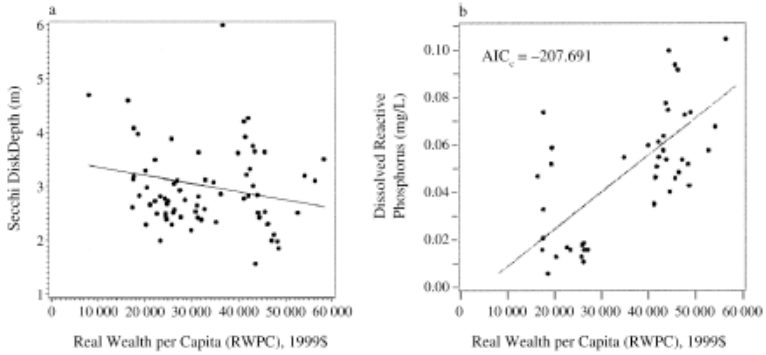
Limnological data support many of these perceptions. Human habitation along the shore usually has a cumulative effect on fish and wildlife habitat, water quality, and biota of lake ecosystems (Engel and Pederson 1998). The Minnesota Pollution Control Agency (PCA) has classified nearly half of Minnesota's "assessed" lakes as "impaired" or "partially supporting" of their designated uses. "Trophy" catches of northern pike, bluegill, and crappie have declined dramatically since the 1930's (Olson and Cunningham 1989). Shoreline development has been estimated to have reduced emergent and floating aquatic plant abundance by 20 to 28 percent in northcentral Minnesota lakes (Radomski and Goeman 2001). There is a growing problem with invasive species. Lakeshore development increases nutrient inputs to lakes. Many lakeshore homes are serviced by on-site septic systems. According to the PCA, 39 percent of individual sewage treatment systems are failing or pose "imminent" threats, creating a serious potential for nutrient and bacterial contamination (PCA 2004). In addition, shoreline development (impervious surfaces and lawns) increases both the amount of runoff and the quantity of nutrients reaching a lake.

Nutrients reaching the lake result in eutrophication (Wetzel 2001). Eutrophication conditions include: higher occurrence of noxious algae blooms, excessive plant growth, loss of water clarity, and low dissolved oxygen. The addition of phosphorus (P), a plant nutrient common in Minnesota soil, has been shown to dramatically reduce water clarity. Many lakes in northcentral Minnesota have good water clarity; however, small changes in the amount of total phosphorus in the water (TP; in parts per billion) can produce large reductions in clarity. Once a lake has an excess of phosphorus, water clarity becomes poor. For some lakes it is difficult to reverse the consequences of these phosphorus additions, as many lakes will fail to recover even after excessive nutrient additions are eliminated (Genkai-Kato and Carpenter 2005).



Water quality problems associated with eutrophication can be determined by measuring the volume of anoxic water in the hypolimnion (i.e., the bottom water layer in a lake). A study on a single forested, hourglass-shaped lake in northern Wisconsin, with two distinct basins of sharply differing levels of development, found that the more developed basin had a larger volume of anoxic water than the lesser developed basin (Ganske 1990). A 20-year study of a Michigan lake with three distinct basins used similar oxygen deficit methodology to track the rate of eutrophication at ten-year intervals. The most developed basin was found to be the most eutrophic (greatest oxygen deficit) over time, and a lesser developed basin had a consistently lower oxygen deficit, while one basin showed wide anomalous fluctuations (Lind and Davalos-Lind 1993). Two basins showed an increased rate in eutrophication during the time period of the study (1971 to 1991). By extrapolating their data backward and comparing with a measure of eutrophication in 1922, the authors approximate that the rate of eutrophication began increasing in about 1950, coincident with an increase in summer home construction during the postwar economic boom.

An interesting relationship was found for one Wisconsin lake. As wealth increased in the drainage basin, water clarity decreased and phosphorus concentrations increased (Gergel et al. 2004). This model could predict the future for Minnesota lakes.



Lakeshore development and drainage basin alterations have resulted in long-term declines in lake water quality. Because sediment naturally builds up on a lake bottom over time, an accurate record of environmental change can be found in the lake's sediment layers. Paleontologists drive plastic tubes into the bottom sediments and bring a core up to be analyzed. Researchers have found that certain tiny algae called diatoms live under very narrow environmental conditions. If the water quality is poor, all types of diatoms cannot exist there, so diatoms are good indicators of past water quality.

Many of us use our memories to determine how the lake we live on or the lake we visit has changed. Scientists, however, can use paleolimnology techniques, which allow reconstruction of past conditions (Garrison and Wakeman 2000; Heiskary and Swain 2002). Their studies have documented the consequences of shoreland development on lake water quality.

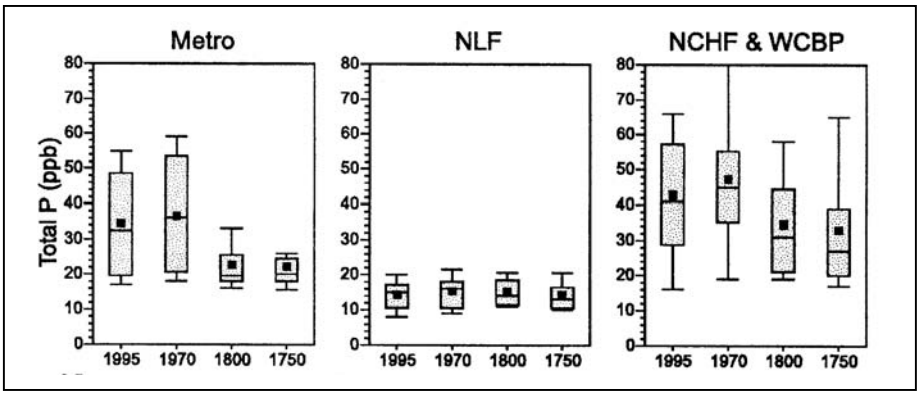
These studies usually show several key events for a lake.

- First, in many lakes, there is an increase in lake sediment accumulation in the early 20th century due to logging and other land disturbances.
- Second, the initial shoreland development on a lake generally had minimal impact on lake water quality.
- Third, the highest sediment accumulation often occurred during the peak construction phase of converting shoreland cabins to year-round homes. Water clarity may have

remained stable, however, in many low-alkalinity lakes, water clarity decreased with development.

- These studies found no difference in phosphorus levels or water clarity from 1750 to 1995 for undeveloped or lightly developed Itasca County lakes, however, substantial increases in phosphorus levels and resulting decreases in water clarity were found for this same time period for central Minnesota lakes due to urbanization or agriculture.

Ramstack et al. (2004) found about a third of metro and central (NCFH&WCBP) Minnesota lakes had a significant increase in total phosphorus between 1800 and the present. These changes were attributed to increases in nutrient runoff. Lakes in the forested region of the northeast (NLF) saw little change in lake total phosphorus concentrations.



Many of Minnesota lakes and rivers are impaired. A water body is "impaired" or polluted if it fails to meet one or more of the federal Clean Water Act's water-quality standards. Federal standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the PCA to identify and restore impaired waters. Minnesota's Impaired Waters list – updated every two years – identifies assessed waters that do not meet water quality standards. The 2006 list, currently in draft form, includes 2,274 impairments on 1,304 waters in Minnesota. Listed waters include 1,008 lakes and 296 rivers and creeks, many with multiple impairments. Assessments are complete on 10 percent of Minnesota's stream miles and 16 percent of the state's lakes. The list will expand as assessments continue throughout the state.

In addition to water quality degradation, there is loss of habitat. Initially the greatest impact of shoreland development is habitat alterations, which results in the decline of fish and wildlife populations. Then, as a lake's watershed becomes more urbanized, nutrient levels increase and water clarity decreases due to pollutant runoff, poor stormwater management, and shoreline phosphorus inputs from shoreland septic systems and lawns to the lake.

However, development done right can reduce the negative consequences, while increasing property values. In addition, for some deeper lakes that are resilient to the additions of nutrients and pollution, restoring shoreline vegetation, rehabilitating rainwater infiltration in the watershed, and using conservation or low-impact development designs may reverse lake quality degradation.

The State of Minnesota sets minimum shoreland development standards that guide the use and development of shoreland property. These guidelines include minimum lot size, minimum water frontage, building setbacks, and subdivision and planned unit development regulations. The

intent of these standards is to preserve and enhance the water quality, conserve the economic and natural environmental values of shorelands, and provide for wise use of water and land.

However, these standards were developed in 1970 when small cabins were the predominant form of development. At the time, many counties lacked any form of planning and zoning, and innovative designs such as cluster development went unused. By the early 1980's, the situation had changed. The Legislature funded the Shoreland Update Project that looked at the growing deficiencies in the rules in addressing new forms or development and land use. This led to the 1989 statewide standards for the management of shoreland areas. However, with high rates of population growth in many of the lake regions and development pressure on what would earlier have been considered unsuitable shoreline, even the existing standards give insufficient guidance to local governments in the management of shoreland areas. These shoreland standards needed to be updated to provide better tools to address water quality declines and habitat losses, while reflecting local resource conditions and needs.

Alternative Standards Development Process

The DNR chose to implement the pilot project through three separate phases. Phase 1 was completed in 2004 and identified issues and potential solutions. Phase 2, conducted during 2005, focused on developing optional, alternative rules and strategies to fulfill the Governor's Initiative. Phase 3 is the completion of the process through public outreach and education.

During phase 1, the DNR held more than 12 public informational meetings throughout the North-Central Lakes Area. Out of these public meetings, five primary areas of concern were identified:

Multiple Shoreland Classifications: Establish shoreland standards that look at multiple environmental criteria and permit development based on the unique characteristics of particular portions of a lakes shoreline;

Shoreland Access Lots: Prohibit parcels beyond the immediate shoreline of a lake (i.e. second and third tier development) from gaining access to the lake through a common access lot;

Planned Unit Development and Land Subdivision: Concerns centered around increased density of development in shorelands, common interest communities, preservation of open space, and the potential for resort conversions to planned unit developments;

Water Quality Issues: Issues included the amount of impervious surface allowed in shoreland areas, the effect of pesticide and fertilizer application in shoreland areas, the carrying capacity of lakes to assimilate pollutant loads, wetland setbacks, natural vegetation preservation, and shore and bluff impact zones conditions; and

Administration by State and Local Government: Issues focused on the lack of funding for local government enforcement of the rules, better guidelines from the Department of Natural Resources to local governments for shoreland variances, property tax relief for shoreland re-vegetation or preservation, stricter penalties for development violations, more education for

decision makers, and the need for an administrative appeal process to the Department of Natural Resources.

During the concept and rule development stage of the pilot project (phase 2), a 34-member citizen's advisory committee was established. This committee represented the many public, private, and commercial interests within the North-Central Lakes Region including developers, resort owners, conservationists, county commissioners, government representatives, and lakehome property owners. The following persons, with their representation, were members of the advisory committee:

1st Name	Last Name	Organization / Company / Representation
John	Alden	Environmental Planning & Consulting
Carol	Altepeter	Explore Minnesota Tourism
Tom	Beaver	Cullen Lake Association
Tom	Day	Hospitality Minnesota
Harold	Dziuk	Itasca COLA
Tom	Ebnet	Thirty Lakes Watershed District
John	Erickson	Erickson Pearson Law
Ed	Fussy	Pimushe Resort/Congress of Minnesota Resorts
Patty	Gould-St. Aubin	Real Estate Practioners
Ken	Grob	Hubbard COLA
Bryan	Harris	Eagle Nest Lodge
Phil	Hunsicker	1000 Friends of Minnesota
Garry	Johanson	Developer/Naterra Land
Karl	Koller	Minnesota Chapter of the American Fisheries Society
Scott	Lucas	Crow Wing SWCD
Dale	Lueck	Aitkin County Commissioner
Chuck	Marohn	Community Growth Institute
Dennis	McGibbon	Sand Lake Association
Catherine	McLynn	Itasca County Commissioner
David	Moe	Clamshell Beach Resort/Brainerd Lakes Area Chambers of Commerce
Brian	Napstad	Aitkin County Commissioner
Terry	Neff	Aitkin County Environmental Services Director
Swede	Nelson	Hubbard County Commissioner
Dana	Pitt	Bailey's Resort/Congress of Minnesota Resorts
Jim	Raboin	Developer/BlueStone Construction
Tim	Ramerth	Developer/Westwood Professional Services, Inc.
Tim	Schulke	Developer/Nor-Son Inc Alternate Representative: Kelli Wegscheid
Don	St. Aubin	Itasca COLA
John	Sumption	Cass County Environmental Services Director
Henry	Van Offelen	Minnesota Center of Environmental Advocacy
Greg	Wagner	City of Baxter
Jack	Wallschlager	Whitefish Area Property Owners Association
Reno	Wells	Minnesota Association of Townships
Paula	West	Minnesota Lakes Association

The advisory committee met once a month from January through December 2005. The advisory committee reviewed all of the issues identified during the first phase and assisted the DNR in developing specific amendments to the existing shoreland management rules to address these issues. From its onset, the DNR's position was that alternative standards should be thought of as added "tools in the toolbox" to deal with emerging shoreland issues. The advisory committee members provided important guidance on the alternative standards.

The advisory committee reached general agreement on the issues identified in phase 1. Although some of the alternative standards did not represent the views of all committee members, it was believed by the committee members that the standards are pragmatic tools. While some committee members favored forwarding these alternative standards to formal rule-making as new mandatory statewide standards, all agreed with the concept put forward by the DNR at the beginning of the process that these standards were "tools in the toolbox" for local governments to use.

II. STANDARDS ANALYSIS

This set of standards does not supersede existing state requirements. However, due to critical need or benefit of these standards, some or all may eventually make their way into state rules or local ordinances. If this occurs, all required processes for public input, review and comment will be adhered to, including the rights afforded to challenge such proposed changes. Many of these standards focus on new subdivisions, development, construction, or reconstruction within the shoreland. Other standards could affect all riparian owners. The standards could impact all resorts in the state.

The alterative standards would result in no or little cost to the Department or other agencies. There is already intensive and extensive consultation with local governments on shoreland ordinances through the Shoreland Management Program.

The alternative standards cover areas not addressed by federal law, and they do not involve any new regulatory, permit, or license fees or any other charges to the public, and would not affect farming operations.

The existing shoreland management rules state the rationale for the policy. The purpose of the alternative standards are not different. The uncontrolled use of shorelands adversely affects the public health, safety, and general welfare by contributing to pollution of public waters and by impairing the local tax base. The standards and criteria are intended to preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of water and related land resources of the state. These standards are intended to be incorporated into local government shoreland management controls. Each local government is responsible for administration and enforcement of its shoreland management controls adopted in compliance with existing shoreland rules. Nothing in the existing shoreland rules or these alternative standards shall be construed as prohibiting or discouraging a local government from adopting and enforcing controls that are more restrictive.

Economic consequences of local government adoption of the Alternative Standards

We are often contradictory in our opinions of lake development. We want to preserve the natural character of our lakes, yet we don't like limits to development. We do not want others to infringe on our freedom to enjoy our lakes, yet we want additional regulations on those who detract from our experiences. Our population continues to grow unabated and the miles of shoreline remain static, so conflict arises.

Today's human demand exceeds available natural resource supplies, whether it is ducks, sunfish, or lakeshore. The economics of supply and demand produce higher costs for lakeshore property, greater need for public boat launches, and more interest in private boat mooring areas. Increasingly, this leads to conflicts that are difficult for governments to address.

Shoreline property owners, local governments, and taxpayers benefit economically as a result of the amenities that good shoreland management preserves: clean water, fish and wildlife, and natural beauty (Dempsey 2006). Good water quality is critical to the tax base and economic assets of the state.

Water clarity is strongly related to the price people are willing to pay for lakefront property. In a five-year study of 900 shorefront properties on 34 lakes in Maine, declining water clarity was shown to reduce lakefront property values and could increase the tax burden of offshore properties (Michael et al. 1996). A 3-foot difference in average minimum water clarity was associated with property value declines of up to 22 percent. In a lake-rich township in Maine, it was predicted that a 3-foot decline in average minimum water clarity would cause a loss of 5 percent in total property value and likely an equivalent loss in taxes paid (Maine Department of Environmental Protection 1996).

A similar study showed a direct relationship between property values and water clarity for Minnesota lakes (Krysel et al. 2003). Lakes with clearer water were associated with higher property values, while lakes with less clarity were associated with lower property values. The study looked at 1,205 properties sold on 37 lakes in the communities of Aitkin, Brainerd, Grand Rapids, Walker, Park Rapids, and Bemidji. This study found that a 3-foot increase in water clarity has an economic worth of $50 per foot for lake frontage, or about $5,000 for a typical property with 100 feet of lakeshore. And, a 3-foot decrease in clarity has a much higher proportionate loss in economic worth, averaging $70 per foot of lake frontage. This study and those in Maine are evidence that protecting water quality of lakes is important in maintaining the economic assets of a region.

Shoreline frontage values in two Wisconsin counties (Vilas and Oneida) increased an average of 7 to 12 percent when towns placed stricter zoning requirements with a minimum 200 feet of water frontage for lots (Spalatro and Provencher 2000). The study was based on data collected on 892 vacant lakefront properties from 1986-1995. The research indicated that the zoning requirement, by preserving clean water and natural beauty, generated an economic gain that more than offset the economic loss resulting from the constraints on development.

People are willing to pay more to live on a lake that's protected from degradation and poorly developed. In 1999, Vilas County, Wisconsin, enacted development restrictions for lakes based

on the level of development and sensitivity to environmental change. The regulations, for example, required new lots on ecologically sensitive, undeveloped lakes to be at least 300 feet wide along the lakeshore, compared to the Wisconsin state minimum of 100 feet. To determine the overall effect of the classification system on property value, research looked at the actual market sales of more than 1,100 lakefront properties sold in Vilas County from 1997 to 2001 (Kratz et al. 2004). For transactions occurring after the zoning restrictions were implemented in 1999, the researchers compared the relationship between selling price and level of development restriction. The economic effect of the ordinance was generally positive, as reflected in higher property prices. The findings show, for example, that the zoning restrictions for Trout Lake - a less developed, 3,816 acre lake - increased the value of land along the lake 12.6 percent per foot of shoreline. Similarly, the price of land around Presque Isle Lake - a smaller and even less developed lake in the region - increased 24 percent. These results suggest that the lakefront homeowners are willing to exchange rights and money to live on a healthier lake. At the same time, the study suggests that preservation is valuable economically because it enhances the worth of land surrounding restricted lakes. Further analysis suggested that use of lake classification in Vilas County raised the value of shoreline, even for undeveloped parcels, and additional zoning restrictions would still likely increase parcel value for property owners (Papenfus and Provencher 2006).

Tourism in the lake regions of Minnesota is economically important. Our tourism industry is based primarily on Minnesota's water resources, so water quality is important to a healthy business economy. Clean water and lakes draw visitors and these amenities are important in the quality of life for local residents. The travel and tourism industry in Minnesota generated $9.2 billion in gross receipts and sales in 2003, resulting in $1 billion in state and local tax revenues (Explore Minnesota Tourism). Tourism is comparable to agriculture in terms of its contributions to gross state product. It has been estimated that the outdoor recreation industry alone—fishing, hunting and wildlife watching—contributes $4.2 billion annually to the gross state product and generates over 70,000 jobs in Minnesota. Thirty percent of Minnesotans fish, and fishing is the third most popular tourist activity in Minnesota. Ninety-eight percent of our resorts, 80 percent of our campgrounds, and nearly a fourth of Minnesota's hotels are located on lakes and rivers. Fishing generates $1.28 billion in expenditures per year. It has been estimated to create 49,700 jobs in the state and generates approximately $100 million per year in income and sales tax. The American Sports Fishing Association ranks Minnesota 4th in the nation in the overall economic output from fishing.

The highest ranked reasons visitors identified in selecting the Brainerd Lakes and Itasca areas were the natural environment; area lakes, streams, and rivers; boating/water recreation, and scenic views (Love et al. 2001). Unplanned development and inadequate shoreland zoning threaten these amenities.

Dziuk and Heiskary (2003) estimated that 10 Itasca County lakes generated an estimated total income of $7 million; whereas, real estate taxes for shoreland properties paid to the county accounted to about $333,000. They concluded that the substantial income from lakes is adequate justification for keeping them in a healthy state through use of best management practices. They hoped that recognition of the amount of income from healthy lakes would led to a greater

commitment on the part of local officials in supporting efforts to take better care of such resources.

Scenic quality attributions are generally higher for lightly developed than poorly or overly developed landscapes, and especially for lakes (Macbeth 1989). Stedman and Hammer (2006) found that when people perceived the lake they owned property around as more developed, then they were more likely to see that lake as polluted. The effect of shoreline development on the perception of polluted water was as strong as that of the actual measure of water greenness (i.e., chlorophyll or total phosphorus concentration). Therefore, the type of development and the perception of the development are both important if an area is to continue to attract tourist and resort business.

The alternative standards give more flexibility to resorts for cabin replacement or expansion. Resorts are vital to Minnesota's economy. Resort visits annually generate millions of dollars to local economies, and resort guests contribute to the success of other businesses when they explore restaurants, shops, and local entertainment.

While there are several large resorts in the state, many of which are located in the Brainerd Lakes area, 90 percent of the resorts in northcentral Minnesota have less than 20 cabins. About half the resorts are 10 acres or less in size, and most resorts are seasonal, being fully operational from May to September. Most resorts are also family businesses. Many of these entrepreneurs have gross sales between $25,000 and $100,000. Resort owners have noted that the increasing value of lakeshore property negatively affects their properties. For some resorts, the land value of the resort exceeds the value of the business. Add this factor to increasing operating costs from higher insurance and the necessity for more guest amenities, resort owners face issues of sustainability.

Resorts are classed as planned unit developments within Minnesota's shoreland development rules. However, higher standards for planned unit developments in the alternative standards, which are needed to address shortcomings of existing planned unit development standards, were determined not to be appropriate for resorts. Given their cultural and economic value to the state and specific references of promotion of resorts in local comprehensive plans, creating standards specific to resorts that gave flexibility in development, while improving rainwater management and promoting natural shorelines, was deemed beneficial.

County and municipal governments that adopt the alternative standards must administer the resulting zoning ordinances. The net cost to the local government of administering its shoreland ordinance is a public cost, which is borne by its taxpayers. The adoption of the alternative standards will increase monitoring and enforcement of compliance costs; however, increases are not anticipated to be large or excessive in reference to protection of the existing and future tax base.

Determination of the individual citizen costs and benefits of the alternative standards is beyond the scope of this document, but a summary is attempted. First, Minnesota's shoreland management rules adopted within local government zoning ordinances limit the use of private property. Any limit may result in loss of anticipated or wished benefits. Second, a property

owner may also incur some costs in complying with shoreland zoning regulations or in reducing existing non-conformity. Third, a property owner is limited in the number of lots into which a parcel can be subdivided, which may reduce profit.

Private property owner costs of zoning are reasonable if certain conditions are meet. Ordinances exist to protect the health, safety, and welfare of the community, and property rights in the U.S. are balanced against the needs of the community. The need for some regulation is universally recognized; the argument is over how much. Ordinances must be reasonable and applied with due process.

The Fifth Amendment of the U.S. Constitution states that "nor shall private ***property*** be taken for public use, without just compensation" by the government ('property' is emphasized to reflect that it protects property possession, and it does not say private property 'value'). Property rights are protected, according to the Supreme Court, to keep government from "forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole" [Armstrong v. United States, 1960]. Zoning authority is limited to only what is in ordinance and must be applied equally to all. All shoreland property owners must bear and comply with shoreland ordinances. Zoning exists to protect citizens from their neighbors, and society has determined that a private property owner should not be allowed to use their property to advance their own self-interests without regard to the rights of others and the general public.

Many government actions and regulations will affect property value. When do landowners deserve compensation? If a piece of land has a market value, that means the net benefits conferred upon it by the community are greater than the net costs. Location value is often far and away the most important component of land value -- and location value is often the result of services and infrastructure that the government provided or that value derived from natural features. The U.S. Supreme Court has ruled that having to reduce the intensity of use of one's land does not constitute a 'taking'. There is some confusion on this matter; however, the following suggests a guiding principle:

"A 'taking' may more readily be found when the interference with property can be characterized as a physical invasion by government than when interference arises from some public program adjusting the benefits and burdens of economic life to promote the common good." [Justices Rehnquist and Stevens, in Penn Central Transp. Co. v. New York City, 1978]

A regulatory taking of property occurs when a government enacts regulations that deprive all use of a parcel or any part of a parcel to the owner (e.g., acquiring property via easement through regulation). A taking will also occur when a rule mandates open access or constitutes an invasion. Courts have clearly demonstrated that laws designed to protect water quality or even the environment in general are justified in the interest of public health, safety, and welfare (Witten 1997; Zoeckler 1997). In general, a regulation that diminishes property value alone does not constitute a taking. In Minnesota, however, a regulation that is designed to benefit a government enterprise such as an airport and results in a substantial diminution in value may be a taking (Minnesota House of Representatives, House Research).

The frequent and often general assumption is that the private property right trumps that of the state regarding how a person uses and develops his/her/their property. But the Supreme Court in the case Ambler Realty v. the Village of Euclid, Ohio and subsequent rulings has determined that the law of the land was otherwise. Side yard setbacks, front and rear yard setbacks, building heights and bulk restrictions on how much of a footprint a structure can occupy on a given lot and what can or can not be built and where are all examples of aesthetic zoning within the legal definition of the same. So yes, a community can control the type of development and it can implement "traditional neighborhood design" and establish site line or visual standards, landscaping criteria, building materials and such.

The enabling laws for counties and municipalities to exercise land use controls over local development comes from Minnesota Statutes 394 and 462, respectively. These give local governments both the authority and the responsibility to effect land use controls that safeguard the community's future health, safety and welfare and the local resources and values upon which they depend. Minnesota is one of many state jurisdictions that follows the rule that aesthetics alone is sufficient basis for a zoning control. But like all zoning ordinances, care must be taken to insure that they are well written to assure that such factors as uniformity in application, understandability and support of a clear public wish are met; i.e., the tests that any ordinance must address and pass.

Riparian property owners benefit from zoning regulations through the protection and preservation of the valuable amenities associated with their waterfront property. Regulations limit the disturbances to the natural shoreline and near-shore water by their neighbors. Without shoreland ordinances, property owners would have to confront their neighbors to protect their private interests. Zoning controls are a much more effective mechanism than individual lawsuits. Density controls of shoreland management rules limit overall intensity of shoreline uses, which provides benefits to the individual property owner in greater privacy and greater enjoyment of nature. Shoreland zoning, if robust with regard to shoreline buffers and rainwater management, can maintain good water quality. Properties abutting public waters with high water quality and clarity have higher market value (Krysel et al. 2003).

For shoreland management rules to be effective, public decision-makers must recognize the important public values at stake. In most cases, it is the cumulative impact of uncontrolled shoreland development in concert with other watershed problems that degrade public waters. The public benefits of shoreland development regulations may not be clearly recognized until valued resources deteriorate due to inadequate protection. In contrast, the private costs of compliance are very well known to the regulated landowner, who may downplay the public benefit of the regulation by arguing that a particular activity, "doesn't hurt the resource that much" (Bernthal and Jones 1997).

III. ALTERNATIVE STANDARDS-BY-RULE ANALYSIS

The format of this section will follow the organizational structure of the current shoreland management rules (Minnesota Rules, parts 6120.2500 to 6120.3900), except that the alternate shoreland management standards will be prefixed with an "**ALT"** label and all references to the

current rules shall appear without this prefix. Furthermore, only those portions of the alternative shoreland management standards that are different than the existing rules will be included herein. This analysis builds on the existing shoreland management rule statement of need and reasonableness (SONAR; Minnesota DNR 1989), and efforts were made not to repeat the rationale for many of the unmodified standards. This report focuses on the differences, and readers are referred to previous SONARs and associated supplementary reports on this issue for explanations on the need for the current shoreland management rules.

Revisions were not made to the existing shoreland management standards parts 6120.2600 (Policy) and 6120.2800 (Scope).

The alternate shoreland management standards and are prefixed using an "**ALT"** label, followed by the corresponding part citation from the existing shoreland management rules (Minnesota Rules, parts 6120.2500 to 6120.3900). The intent is for local unit of governments to adopt any or all of these alternate shoreland management standards into their official controls, in lieu of the corresponding existing shoreland management rules. The adoption of these alternative shoreland management standards does not relieve the local governments from the responsibility to comply with provisions of 6120.2800. ALT6120.2500 DEFINITIONS will be skipped, with new and revised definitions addressed as they appear in subsequent parts.

There were no changes made to 6120.2600 POLICY, and 6120.2800 SCOPE.

ALT6120.2900 ALTERNATIVE STANDARDS

This new part is intended to clarify the use of alternative management standards by local governments. Flexibility provisions for alternative management standards are allowed in 6120.2800, Subp. 3. Alternative standards developed by the commissioner may have the benefit of increasing administrative and program efficiency. Given that numerous local governments have requested flexibility, having published alternative management standards that local governments can select from for common situations may have merit. Local governments would still have to comply with the existing flexibility provisions even if they wished to adopt published alterative standards. This allows the DNR the opportunity to track and monitor the use and efficacy of any developed alternative standards.

ALT6120.3000 SHORELAND MANAGEMENT CLASSIFICATION SYSTEM

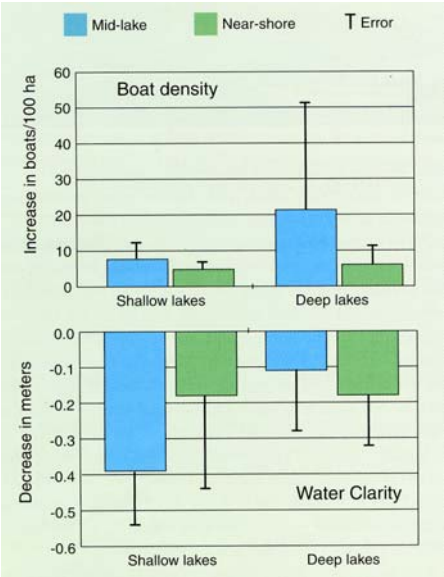
Subp. 1. Criteria.

Revisions to this subpart include some minor edits and additions. The additions in item B and C are to recognize that classifications were based on development and accessibility at the time of the original classification. The additions in item H through J allow the commissioner to classify public waters with the use of other criteria. Several local governments have applied such criteria to split natural environment lakes into different classes with standards more restrictive than the natural environment class. In addition, these additions are consistent with 6120.3100, Subp. 5, that allowed the commissioner to classify public waters based on unique characteristics.

Subp. 1a. Classes.
In addition to minor edits, a new lake class was created. The special protection lake class is needed for shallow lakes. Shallow lakes often have extensive areas with less than 15 feet water depth, and those healthy systems usually have abundant aquatic plant communities. Recent research has demonstrated that such waterbodies are very susceptible to nutrient loading. Shallow lakes are known to exhibit two alternating stable states (Scheffer et al. 1993). The first state is characterized by clear water, abundant aquatic vegetation, shallow bays covered with emergent vegetation, desirable fish and invertebrates, and enhanced waterfowl production. The second state, equally stable, is less species-rich and less diverse with very turbid water, little or no submerged vegetation, heavy algal blooms, poor fish communities, and limited waterfowl production. These shallow lakes can exist for years as either a clear or turbid water state. Both of these states are relatively stable and it takes a major perturbation to move from one state to another.

The degradation of Minnesota shallow lakes has been broad-based, cumulative and persistent (Minnesota PCA 2004). The majority of the lakes in central or southwest Minnesota are non-supporting of aquatic recreational uses. The reasons for non-support of swimmable use vary. Many northern and northcentral Minnesota shallow lakes do not support swimmable use due to some past or present source of excess phosphorus loading in their watershed, such as a wastewater treatment plant discharge. The vast majority of shallow lakes in the southwest or northwest have highly agricultural watersheds. Runoff from these agricultural lands is typically very high in phosphorus. This high nutrient loading from the watershed and shallowness of the lakes (which promotes poor retention of phosphorus by lake sediments and internal recycling of phosphorus) typically leads to high in-lake phosphorus concentrations and subsequently nuisance algal blooms and low transparency. The combination of high watershed nutrient loading and the limited assimilative capacity of shallow lakes often limit the degree to which water quality of these lakes might be improved.

Shallow lakes are also more vulnerable to water surface use. Asplund (1997) studied water clarity for both weekdays and weekends for shallow and deep lakes in Wisconsin. Boat density increased on weekends, and water clarity decreased by about 16 inches in the shallow lakes and about 8 inches in the near-shore areas of all lakes. Beachler and Hill (2002) found that at boat speeds near 6 to 8 mph, where the boat was near-plane, there was maximum turbulence to the lake bottom in shallow areas (less than 8 feet deep), and re-suspension of lake sediments was less at high or idle speeds. Boat traffic on shallow lakes can result in an increase in phosphorus concentrations (Yousef et al. 1980). This phosphorus can then stimulate growth of attached or planktonic algae, thereby degrading or eliminating important aquatic plant communities (Murphy and Eaton 1983). In addition, boat traffic on shallow lakes and in littoral areas can damage or destroy aquatic macrophytes (Asplund 2000).



Waterfowl production is reduced with overdevelopment of shallow lakes. Disturbance can cause female nesting ducks to take flight, leaving eggs exposed and chicks more prone to predation. Korschgen and Dahlgren (1992) reviewed over 200 journal articles which revealed that disturbance from development displaced waterfowl from feeding grounds, increased energetic costs associated with flight, and likely lowered productivity of nesting or brooding waterfowl. Kahl (1991) found that disturbance in a Wisconsin lake resulted in about a 50 percent reduction in feeding time for canvasbacks. Knapton et al. (2000) found that disturbance lead canvasbacks, redheads, and scaup to feed in less productive areas. Belanger and Bedard (1990) found for snow geese that disturbance caused a 5.3 percent increase in hourly energy expenditure.

Hunters and bird watchers are wondering what is happening to Minnesota duck populations. There appears to be fewer ducks nesting in the local area and fewer migrating ducks stopping over. In 2005, Minnesota's breeding duck population was the lowest since the drought years of the 1980's, according to annual aerial survey data. The duck hunting harvest was down 23 percent in 2004. So, why are there fewer ducks? Loss of habitat and reduced quality of remaining habitat are probably large factors.

In recent years, migrating ducks have seemed to find Minnesota waters less hospitable than in the past. This may be, at least in part, because today our waters generally have more disturbances from motorized watercraft, less aquatic vegetation, and fewer invertebrates for ducks to eat. Nesting ducks need quality places to raise their young. Minnesota once had vast areas of high quality wetland/grassland duck nesting habitat; however, development has largely reduced these quality duck rearing areas. Our vast prairies and associated wetlands are gone. With the loss of wetlands and prairies has come the loss of ducks.

Shallow lakes across Minnesota play an important role as well. These shallow lakes have an abundance of aquatic plants and invertebrates, which makes them valuable to ducks and other wildlife. However, these aquatic plant communities are vulnerable to shoreline activities. Lakeshore development in the forested region of the state has also resulted in a loss of duck habitat. Many north central Minnesota clear water lakes are extensively developed, leading to fewer wood ducks, hooded mergansers, and ring-necked ducks.

The few remaining pockets of undeveloped shoreline, both in the prairie and forested areas of the state, are under increased pressure for development. Given that realization, some citizens are advocating for higher development standards for lakes, especially on shallow lakes that offer quality duck habitat. Higher development standards include larger lot sizes, larger lot widths, and greater structure setbacks from the water. Such standards could help preserve significant natural resources, including those valuable to ducks.

In addition to better duck habitat, the higher standards would help protect water quality and other resources. Shallow lakes, as mentioned, are especially sensitive to the addition of nutrients like phosphorus – a nutrient that can lead to algae blooms. Wild rice is often found in these shallow lakes, and it is important food and cover for waterfowl broods and migrating ducks. Wild rice lakes also have important social and cultural value for many Minnesotans.

Subp. 3. Classification procedures.

All lakes not classified are to be automatically treated as natural environment lakes until such time that the commissioner classifies them. The existing public water definition (6120.2500, Subp. 13), which is not changed in the alternative standards, states that no lake, pond, or flowage of less than ten acres in size in municipalities and 25 acres in size in unincorporated areas need be regulated for the purposes of parts 6120.2500 to 6120.3900. Therefore, areas that are annexed by municipalities may include public waters that have not been classed (lakes between 10 and 25 acres). The alternative standards place natural environment class standards on public waters that would likely be classified as natural environment given their small size. This subpart gives a process for correcting errors in classification, and it allows for greater protection if it should be needed.

Subp. 4. Reclassification.
The alternative standards allow for more restrictive classification and prohibit the reclassification to a less restrictive class. Likewise, any local government may request more restrictive, not a less restrictive, classification.

Subp. 6. Multiple shoreland management classification.
This new section is intended to provide local governments with the option of having more than one classification on a given waterbody, for example, within a general development lake to have a natural environment bay. The alternative standards are consistent with the existing Subp. 5, which allows the commissioner to expand the shoreland classification system. Different development standards in bays and areas with critical fish and wildlife habitat are warranted and needed given documented and predicted losses to habitat from development.

Shorelines and shoreland are often heterogeneous with critical habitat clustered. For example, protected bays may possess a large portion of the valuable floating-leaf and emergent plant stands for a lake (Radomski 2006). Francl and Schnell (2002) suggest some areas of lower development density within shorelands may maintain regional diversity of birds and plants.

Loons may also benefit if critical nesting areas were reserved, protected, or had lower development densities (Robertson and Flood 1980; Heimberger et al. 1983). Loons prefer to nest near shore on vegetated hummocks, small islands, or masses of emergent vegetation.

Numerous fish species use protected embayments, wetland fringes, and the associated vegetative cover disproportionately to their availability (Wei et al. 2004). Fish prefer wetland embayment areas associated with lakes because they generally warm up faster in the spring, the presence of emergent and floating-leaf vegetation provides cover, and productivity is higher in these areas. In addition, such areas are often used for fish spawning and as nursery grounds.

The alternative standards limit application of this expanded shoreland classification system to lakes less than or equal to 250 acres or on a single embayment with less than or equal to 5 acres. These standards are reasonable to ensure that local governments avoid issues of spot zoning.

ALT6120.3100 LAND USE DISTRICTS

A minor change was made, such that a zoning district may be established to provide for non-motorized recreational use.

ALT6120.3200 CRITERIA FOR LAND USE ZONING DISTRICT DESIGNATION

Subp. 1. Criteria.
The alternative standards add two criteria for establishment of land use districts by local governments. First, districting could be based on a comprehensive lake management plan. Second, an approved local water plan could serve as a basis for districting. Comprehensive plans and local water plans are encouraged with the idea that additional foresight and planning would focus thoughts on appropriate land use for a specific waterbody or set of lakes and strive for sustainability.

Subp. 3. Land use district descriptions.
This subpart has a couple of revisions to clarify and simplify the district types. First, the special protection district was renamed sensitive area district due to the alternative standards allowing special protection lake classes. Potential criteria for establishing sensitive area districts are listed to guide local governments in their use. Shorelines along lakes may vary greatly with a variety of ecological characteristics that provide varying habitats for wildlife and fish species, and performing different water quality functions. Sensitive area districts are encouraged and, to aid in the creation of sensitive area districts, establishment criteria and development standards in these areas are included in the alternative standards. To simplify the districting system, the high-density residential district was eliminated, and those districts could become residential districts.

Subp. 4. Shoreland classifications and uses; lakes.
The alternative standards reflected in Items A through D set forth a general land use matrix which will guide the local government in establishing sound land use districts. This in turn will maintain and enhance the quality of development, provide for separation of uses which conflict, while allowing for uses that have a legitimate purpose on the lake. The list was not intended to cite every use conceivable, but to identify general categories under which most uses would fit. Proposed uses that do not fit into one area or where there is debate over the use, the board of adjustment would normally be the organization directed to make a formal determination on the question.

Two notable changes are included in the alternative standards. First, conventional subdivisions, planned unit developments, and conservation subdivisions are referenced in addition to where single residential use is found in the existing rules. Where conventional subdivisions are allowed, conditional use permits would be required. Conventional subdivisions are defined as the standard form of subdivision where lots are spread evenly throughout a parcel with little regard for natural features or common open space. This is compared to conservation subdivisions where lots are clustered and common open space is provided. Since conservation subdivisions and planned unit developments (with the improved principles in the alternative standards) provide greater community value over conventional subdivisions, preference is given to these forms of development.

Second, the change reflects current PCA rules related to feedlots (M.R. 7020). A new animal feedlot or a manure storage area cannot be constructed within the shoreland (7020.2005, Subp. 1). Expansions to existing feedlots with shoreland areas are also addressed in 7020.2005, under subpart 2, which states that animal feedlot or manure storage areas located in shoreland may not expand to a capacity of 1,000 animal units or more or the manure produced by 1,000 animal units or more. In addition, these rules state that an existing animal feedlot or a manure storage area expanding in shoreland shall not locate any portion of the expanded animal feedlot or the manure storage area closer to the ordinary high water mark than any existing portion of the animal feedlot or the manure storage area.

Subp. 5. Shoreland classifications and uses; rivers.
The minor changes in this subpart reflect the changes made to the previous subpart to have consistent standards for both lakes and rivers.

ALT6120.3300 ZONING PROVISIONS

Subp. 2. Residential lot size.
One of the primary reasons for specifying lot sizes is to control the long-term total density of dwelling units and people in each shoreland area. This is needed to prevent overcrowding of development on the land which can led to declines in property values, degradation of water quality by sewage systems, excessive rainwater runoff, and accelerated soil erosion. It can also cause overcrowding on the public water by recreational users, which in turn can led to declines in the quality of recreational experiences and degradation of surface water quality.

In item A, the deletion of the reference to planned unit developments reflects the changes made to the planned unit development standards (ALT6120.3800), which under the alternative standards are limited to typical residential densities.

The language in item B is necessary for consistency since sensitive area districts are assigned natural environment standards throughout the alternative standards. With regards to exclusion of triplexes and quad developments on natural environment lakes, there is a reasonable concern about high-density forms of development on these more vulnerable lakes.

Guest cottages have been increasing in size and local governments have seen an increase in variance requests related to the size of these developments. Item C provides an additional reasonable option to address these two trends. The alternative standards allow a larger guest cottage (up to 1200 square feet) on a lot meeting or exceeding the triplex lot dimension standards.

Several additions were included in the alternative standards for lots of record (item D). Many counties require that lots of record have some minimum size requirements if they are to serve as buildable lots, suitable for sale or development. For example, Aitkin, Crow Wing, Hubbard, and Itasca counties all have specific minimum lot area and width standards for developing nonconforming lots of record. The alternative standards require minimum lot area and minimum lot width standards, with those standards being 75 percent of the existing lot

dimension rules (6120.3300, Subps. 2a and 2b). This is reasonable given that many local governments have such requirements already in their ordinances, and there is some need and benefit in providing specific guidance to other local governments.

Additional requirements for evaluating variances for lots of record are included in the alternative standards. Stormwater runoff and vegetative buffers should be considered, in addition to sewage treatment and water supply. These provisions are reasonable requirements to ensure that existing lots, which do not meet current size requirements, are not developed in a manner which would cause significant pollution of ground and surface waters and declines in property values. The provisions do provide for development and use of these lots if this can be done in a manner which would not cause such problems. The need and reasonableness of provisions for shoreline buffer and stormwater management is also discussed below. Both areas are important for protecting water quality, and revisions to these areas are consistently woven throughout the alternative standards.

The alternative standards provide an option for setbacks on lots of record. The alternative standards would allow the use of a mitigation system instead of reliance on a variance process to setback requirements of a lot of record. The mitigation system must include the maintenance or restoration of natural vegetated shoreline buffer in addition to other actions that would reduce rainwater runoff, corrective measures to reduce non-conformity, and other conservation designed actions. Similar mitigation systems exist in Minnesota (e.g., Becker County), and they appear as an appropriate and reasonable alternative to a variance process, especially for local governments with a large number of non-compliant lots of record.

Since extensive changes were made for item E of the existing rules, it is handled in the alternative standards as a new part (ALT6120.36000). The new provision in item E is a provision prohibiting the creation of multiparty ownership access lots. As with control access lots, which were viewed as an emerging problem with the last revision of the shoreland management rules, multiparty ownership of lakeshore lots for the intention of obtaining access to public waters was a concern.

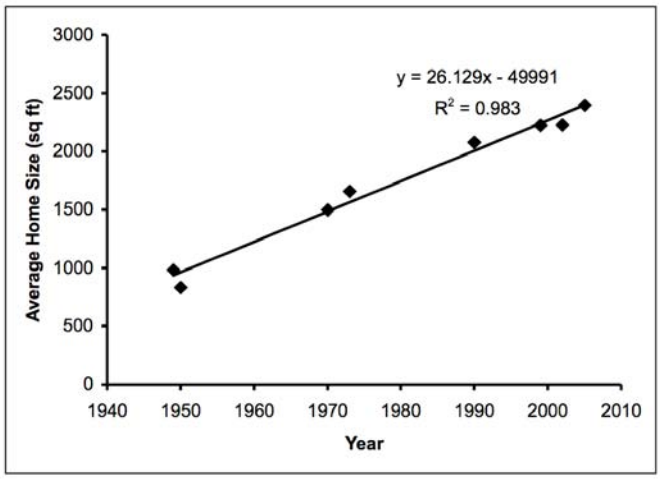
It is widely recognized that shoreland property owners regard "crowding" and "nuisance by users" as the two highest ranking inappropriate development characteristics. If developments that would allow even greater numbers of people to easily access and use lakes are not adequately managed, we can expect such concerns to grow in the future. Government managed public accesses are now more widely available, and this approach of providing public access to public waters is more acceptable to the public.

Subp. 2a. Lot width, lot size, and residential lot suitable area standards for minor subdivisions and density determinations for conservation subdivisions and planned unit developments; lake lots.
The main change is the elimination of the sewered lot standards for all lake classifications. It is now recognized that non-point source pollution from sources other than septic system drainfields are often a greater contributor to pollution and nutrient loading to lakes. Non-point source pollution comes from many diffuse sources. It is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away

natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, and underground sources of drinking water. These pollutants include: excess fertilizers, nutrients, pesticides from agricultural lands and residential areas; oil, grease, and toxic chemicals from urban runoff and energy production; sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks; and bacteria and nutrients from livestock and pet wastes. In addition, non-point source pollution generally results from land modifications that result in increasing rainwater runoff. Increasing runoff means higher sediment transport to lakes and rivers. Runoff is considered a major source of water pollution. Stormwater runoff in the U.S. may be responsible for up to 15 percent of river and lake water impairment (US EPA 1998). Perhaps the single greatest threat to Minnesota lakes from sediment is as a carrier for phosphorus to the lake (Minnesota PCA 2001). Sources of phosphorus are intrinsically tied to sources of sediment and, as such, land use practices that allow excess sediment to be exported off the land will typically export high amounts of phosphorus as well.

The lot width for natural environment lakes was increased from 200 feet to 250 feet for single residential developments and from 300 feet to 400 feet for riparian duplex developments. Several counties have lot widths similar to the alternative standards to reduce environmental degradation on these vulnerable public waters (e.g., Crow Wing, Itasca counties).

The riparian lot dimension standards for general development lakes was increased from a minimum lot size of 20,000 square feet and minimum lot width of 100 feet to 30,000 square feet and 120 feet. For the 1989 revisions, it should be noted that PCA staff expressed the concern of the potential for cumulative adverse environmental impacts to riparian ground and surface water quality of general development lakes that were developed at the existing rule's 20,000 square feet lot size requirement. According to the National Association of Home Builders, the average size of a new house in the US has more than doubled in the last half-century. This phenomenon is likely more pronounced for lakeshore homes, as most lakehomes were actually small seasonal cabins along Minnesota lakes and conversion of these small cabins to large homes has accelerated in recent years.



Finally, the concept of suitable area was incorporated into the alternative standards. This is necessary due to the increasing development of marginal lands, and these standards are set such that adequate space exists for development. Residential lot suitable area is defined in the

alternative standards as the minimum area on a residential lot or parcel of land that is the sum of the buildable area and the sewage treatment system suitable area for unsewered areas or the buildable area in sewered areas. Buildable area is defined as the minimum contiguous area remaining on a lot or parcel of land after all setback requirements, bluffs, areas with slopes greater than 25 percent, all easements and rights-of-way, historic sites, wetlands, and land below the ordinary high water level of public waters are subtracted for the purpose of placement of structures. And, sewage treatment system suitable area is defined as the area meeting or exceeding the site requirements of PCA individual sewage treatment system rules, Chapter 7080, for the purpose of soil treatment or drainfield areas and future additional sites. The residential lot suitable area standards are reasonable in that if the lot is sewered, then only a specific buildable area is needed. The standards for buildable area were determined using reasonable space for typical developments, and the standards for sewage treatment system suitable area were based on design standards from 7080.0125, Subp. 2, and 7080.0170, Subp. 2.

Subp. 2b. Lot standards for residential development; river classes.
As with lots in lake shorelands, the alternative standards add a minimum residential lot suitable area requirement (18,000 square feet with 50 percent contiguous). This provision seems reasonable in context to lake standards, and similar requirements can already be found in existing ordinances (e.g., Cass County).

Subp. 3. Placement and height of structures and facilities on lots.
In item A, the sewered structure setbacks were eliminated. The need and reasonableness for this change is the same as for the elimination of specific sewered lot dimension standards. Structure setbacks are needed to provide an adequate distance between the development of a shoreland area and the adjacent waterbody or near blufftops to control the resource damaging effects of non-point source pollution. Soil erosion and subsequent sedimentation in water bodies and the loading of nutrients, toxics and other pollutants to the water body from shoreland area surface water runoff are examples of non-point source pollution. Sensitive area districts have the same standards as the natural environment class, and special protection lakes have a 200 feet structure setback standard.

The provision to allow reduced setbacks due to placement of structures of adjacent lots is eliminated in the alternative standards. This existing provision fostered increasing nonconformity, and with increased cabin conversion to large lakehomes, this provision is inconsistent with the goal to protect water quality. The existing rule allowing relaxation of structure setback where there is an existing pattern of development creates a major loophole, weakening the ability of the standards to control the placement of structures. The result is increased fragmentation with destruction of shore cover and increased delivery of sediments and nutrients to water bodies as an undesirable pattern of development is perpetuated. By consisting applying the structure setback and prohibiting the practice of setback averaging or reduction would greatly reduce impacts to water quality, natural beauty, and shoreline buffers, and thus is reasonable.

With regard to bluffs, the alternative standards make a minor editorial change in the definition of bluff. The existing bluff definition was confusing with regard to potential buildable areas

within large bluff areas, and the alternative standards attempt to clarify what specific areas would be exempted from the bluff standards.

Clarification is provided in item B. The edits reflect changes necessary to be consistent with flood plain management controls. Crawl spaces and lowest floor are referenced, and the definition of each came from existing ordinances consistent with those controls or International Building Code.

In item G, the height standard has been expanded to include all areas and not just municipal residential districts as found in the existing rules. This recognizes both the higher densities and larger structures that are being built in rural settings. The definition for height of building has also been simplified to be consistent with the International Building Code that is recognized by many local governments. The height of building limit of 30 feet is intended to limit visibility of shoreland development viewed from across the water by keeping structures lower than the average height of trees.

Additional restrictions are imposed on accessory structures in the alternative standards. The proliferation in types and numbers of boat houses, fish houses, wood and metal storage buildings, free-standing decks, saunas, and other man-made facilities being placed on lots very near the shore continues to occur. In addition to creating a very developed and sometimes crowded appearance to these lots, the installation of these structures and facilities involves considerable destruction of vegetation, grading and filling. This in turn accelerates soil erosion and slumping. The close proximity of these facilities to the shore also frequently leads to their being damaged or destroyed by rising water levels, wave action during storms, and ice heaving.

First, in item H, additional reasonable limits are placed on the allowed single water-oriented accessory structure. The size of these structures is limited to 120 square feet with a maximum width of 10 feet, and that the structure must be located in the center third of the parcel with a 30 foot setback. The definition of water-oriented accessory structure was expanded to include platforms, which are defined similarly to decks (decks are currently included in the existing water-oriented accessory structure definition). Aitkin County currently has similar requirements for these accessory structures, and it was noted that these are reasonable allowances for these structures. The primary intent of these provisions is to control the visibility and associated vegetation and topographic alterations of these structures, while still providing each property owner with the opportunity to construct a reasonable structure or facility to enhance the use and enjoyment of the property. Second, boat houses are prohibited in the alternative standards. With the advent and popularity of boat stations and lifts, boat houses and their associated abuses can reasonably be eliminated.

Minor editorial changes were made to items I and J. For stairways, lifts and landings, the clause ‘if approved by the local government’ was added to those provisions which allowed wider or larger facilities. In item J, decks and platforms were added, where the definition of platform is similar to that of decks (such structures less than 3 feet in height). In the alternative standards, the deck or platform cannot encroach closer than 40 feet to the ordinary

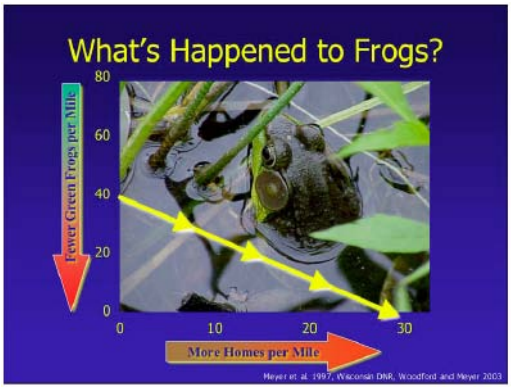
high water level. This limit provides space for vegetative buffers for water quality purposes and for vegetation to screen such developments from view from the water.

Subp. 4. Shoreline buffer standards.
The existing language on shoreland alterations was heavily revised and improved. It is necessary and important to require that alterations to vegetation and topography be controlled by local governments since the mismanagement of vegetation and soil has and will adversely impact the natural resources of shoreland areas. Examples of adverse impacts are: erosion and sedimentation to surface waters, which impairs or destroys fish and wildlife habitat; soil sedimentation; the intentional filling of areas that previously held and filtered surface water runoff for a period before drainage or discharge to a waterbody; and the clearing of shoreland vegetation that once provided natural screening of shoreland development and maintained the scenic vistas of our many lakes and streams. Most importantly, the conversion of the shoreline has adverse impacts on water quality.

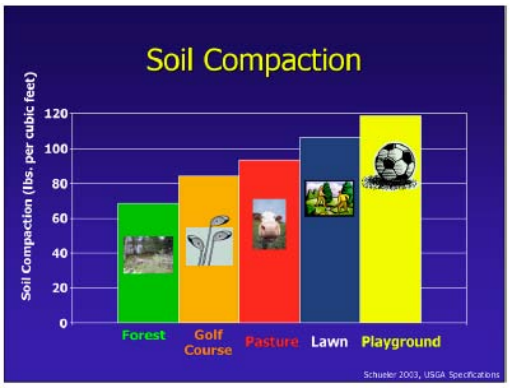
Recent research has shown that current shoreland rules are not providing enough protection. There are approximately 225,000 residential lake lots in Minnesota. And, while most lakeshore owners leave or restore native vegetation along the shore, more than 25 percent have a mowed lawn down to the lake (Payton and Fulton 2004). The cumulative impact of those lawns is substantial. A 'lawn to lake' destroys annual and perennial ground cover for small animals. With ground cover gone, amphibians lose shelter and songbirds lose habitat. In addition, nutrient runoff to the lake or river increases dramatically.

Biologists have found that trees, shrubs, and the forest understory near the shore declined over time on developed shoreline (Clark and Euler 1984; Elias and Meyer 2003). This change in lakeshore habitat leads to different bird communities. Common suburban-style birds like chickadees, cowbirds, blue jays, and grackles replace the uncommon 'species of special concern' birds like warblers, loons, and vireos along developed shores (Lindsay et al. 2002). Bald eagles will nest on developed, altered shores but most nest in areas of less alteration and disturbance; thus, they have to spend significantly more time and energy feeding (Fraser et al. 1985). Since loons are shoreline nesters that can be sensitive to human disturbance, it has been shown that the probability of loons on the lake decreases with increased housing density (Newbrey 2002; Caron and Robinson 1994). Loons will not likely nest on a groomed and manicured beach – they prefer to nest near shore on vegetated hummocks, small islands, or masses of emergent vegetation (McIntyre 1988). Therefore, excessive shore impact zone alteration has affected loons and the structure of native bird communities.

The loss of trees along shore means less trees that fall into the water. Fallen trees provide habitat for fish. Biologists have determined that this loss of trees due to development will negatively affect fish for centuries. Downed trees provide important in-lake structure, habitat, food, and shelter for fishes, frogs, turtles, waterbirds, and mammals. This woody habitat is also important for aquatic invertebrates like snails and bryozoans. Turtles need to bask on deadfalls or floating logs (Boyer 1965). Nearshore downed trees also blunt waves and ice action that scour the lake bed. Recent lakeshore development reduces the available amount of woody habitat through removal and loss of recruitment (Christensen et al. 1996; Jennings et al. 2003). The density of nearshore woody habitat was negatively correlated with dwelling density, and developed shore had only 15 percent of the average wood habitat (logs/mile) as forested shorelines (Christensen et al. 1996). Because tree growth is often slow and their density has been reduced due to past shoreline alterations, replenishing this important habitat element in Minnesota lakes may not occur without substantial efforts.

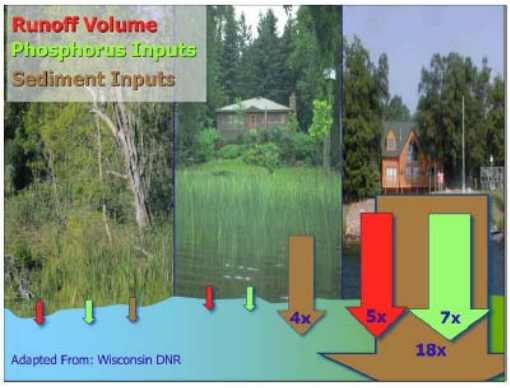


Green frogs, which are often common along shore, disappeared where development exceeded 30 homes per mile, or where the average lot width is 180 feet (Woodford and Meyer 2003). It was not the density of homes that was the causal mechanism, but the direct alteration of riparian areas associated with shoreline development. Male green frogs establish breeding territories within two feet of the lake's edge and disturbance to the shoreline vegetation eliminates their habitat (Oldfield and Moriarty 1994). It is these critical areas that are often altered or destroyed. 'Lawn to lake' management style of lakehome owners fragments the nearshore habitat. Fragmented habitat forces frogs and other amphibians to spend extra time and energy seeking access to nesting, basking, and feeding sites, and with extensive alteration, such as is now found on many Minnesota lakes, these animal species have become isolated or extirpated. Over time removal and alteration of the shore impact zone has destroyed or degraded habitat along most of Minnesota lakes, with increasing implications to wildlife populations.



Hydrologists and chemists have also found interesting differences with the 'lawn to lake' style of shoreline compared to a native vegetated shoreline. In residential areas, the largest source of phosphorus is runoff from lawns and impervious surfaces (Waschbusch et al. 1999). Rainwater runoff from 'lawn to lake' shoreline was measured to be 5 to 10 times higher than forested shorelines. Runoff from lawns occurs more frequently than previously thought with a high percentage of storms resulting in runoff (Garn 2002). Studies on hydrophobicity, or soil-water repellency, have revealed the complex interactions of soil and turf conditions. Lawns and urban soils are often very compacted (Barten 2005), and as the soil becomes more

compacted, rainwater runoff increases. Lawns often comprise the largest fraction of land area within residentially developed shoreland, and they often have similarities with impervious surfaces. Water flowing over lawn surfaces picks up dirt, pesticides, toxic chemicals, pet waste, and other pollutants.



Important to lake water quality, the 'lawn to lake' shoreline allows 7 to 9 times more phosphorus to enter the lake than a more natural native vegetated shoreline (Dennis 1986; Bernthal 1997; Graczyk et al. 2003). While absolute values of phosphorus entering the lake from a developed shoreline lot varies due to soil, slope, and other site specific conditions, a lawn to the lake lot has been estimated to average 0.2 pounds per summer compared to 0.03 pounds per summer for a lot with a native vegetated shoreline buffer (Bernthal 1997). For many lots, the phosphorus yield to the lake due to the alteration of the shore impact zone may exceed the phosphorus yield from all other sources. Phosphorus is a plant nutrient, and more of it entering the lake means more aquatic plants or algae resulting in lower water clarity (0.2 pounds of phosphorus can produce 100 pounds of algae). Minnesota soils are usually phosphorus rich. Excess nitrogen will also be transported to lakes from these land uses. Nitrogen will enter attached to soil particles, as organic matter, or dissolved in the form of nitrite, nitrate, or ammonia – forms that are readily useable by algae and rooted plants.

Shoreline buffers are corridors of natural vegetation along rivers, streams, and lakes which help to protect water quality by providing a transition between upland development and adjoining public water. A shoreline buffer of natural vegetation traps, filters and impends runoff. Buffers stabilize lake and river banks, offer scenic screening of shoreland development, reduce erosion, control sedimentation, and provide habitat for shoreline species.

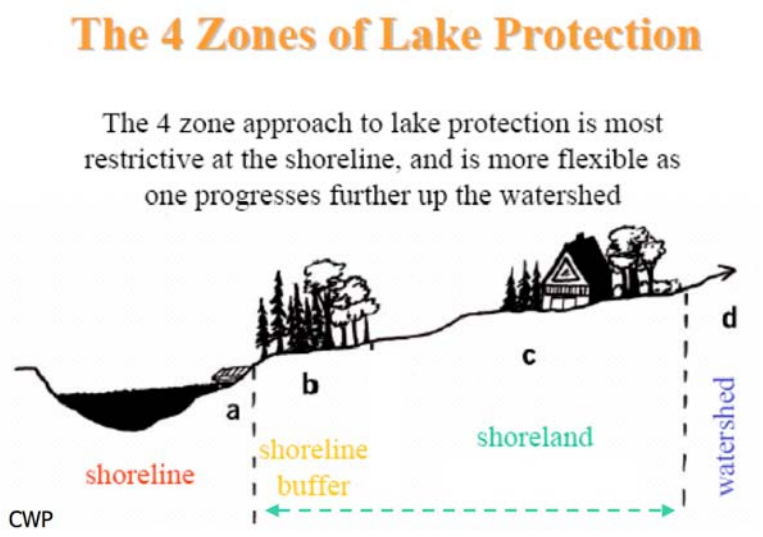
Most Minnesotans strongly agree that the aesthetical value of the state's lakes are important to protect and that they would support regulations that limit human use to protect lake resources (Schroeder et al. 2004). Waterfront residents often choose lakefront property based on water clarity, quality of swimming, and scenic beauty. Research has shown that people prefer to view lakeshores where the vegetation screens structures (Gobster 1982; Macbeth 1989; Macbeth 1992; Engel and Peterson 1998). The degree of vegetative screening and the attractiveness of the buildings were the most important predictors of overall aesthetic quality (Macbeth 1989). These studies support the benefit of robust shoreline buffer standards.

Many people like to look out across a beautiful lake or enjoy nature by fishing or boating. You can see the evidence of this on the highways heading north out of the cities on Friday afternoon. Visitor surveys note that the top reason people visit Minnesota lake areas is to escape to natural areas. Lakes that are seen as more developed are perceived as more degraded, which has important tourism and sense of place implications (Stedman and Hammer 2006).

Perhaps we should not put our best asset at risk. In a recent survey of Minnesotans, 85 percent cite development as a cause of decline in scenic quality (Anderson et al. 1999). But, development does not have to harm scenic quality. All of us, personally and as a community, can protect our lakes and shorelines, through individual acts and through shoreland development standards and ordinances that regulate development around our lakes.

A shoreline buffer can create many market and non-market benefits for a community or a property owner. 'Lawn to the lake' management is expensive for the lakehome owner, for example businesses save between $270 and $640 per acre in annual mowing and maintenance costs when they convert to natural buffers instead of lawns (Wildlife Habitat Enhancement Council 1992 - as cited in Schueler and Holland 2000). A national survey of 36 stream buffer program administrators indicated that stream buffers were perceived to have either a neutral or positive impact on property values, and none of the respondents indicated that buffers had a negative impact on land value (Heraty 1993). Lake shoreline buffers are also expected to have positive impacts on property values. These findings and expectations are consistent with other studies that have found that greenways and buffers increase property values. For example, housing prices in Colorado were found to be 32 percent higher if they were associated with a greenbelt buffer (Correl et al. 1978).

Activities in the immediate shoreland or riparian areas of lakes are an important part of the overall impact on the lake and its ecological integrity. The 4-zone approach to lake protection requires good shoreline buffer provisions (Cappiella and Schueler 2001). A lawn down to the lake is bad. It diminishes fish and wildlife, reduces water quality, and degrades the scenic quality of the lake. The alternative standards require lakehome owners to preserve or establish a native forest buffer along the lake, which represents about 20 percent of a standard riparian lot and only a small fraction of the shoreland (less than 5 percent for a typical general development lake). The timber harvest industry and farmers must leave a vegetative buffer along lakes and rivers to protect water quality, and it is reasonable to require such a responsibility for all riparian property owners.



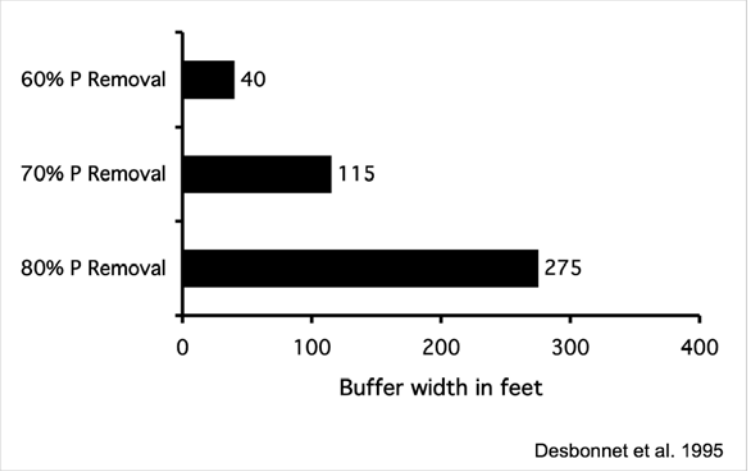
Buffers along streams, as well as with other best management practices, are also essential to control nutrient inputs to drainage lakes and impoundments, especially in agricultural watersheds. Shoreland vegetation reduces stream bank erosion and subsequent lateral migration of the stream channel because channel bank roots protect against fluvial erosion and anchor against collapse.

There are several shortcomings of the existing rules related to shoreline buffers. First, the existing rules for shoreland alterations are vague and apparently ineffective. Second, those rules have resulted in damaged lakes and streams. Finally, the failure to have buffers results in excessive nutrient runoff to lakes and rivers (in many places phosphorus loading from runoff exceeds septic drainfield loadings).

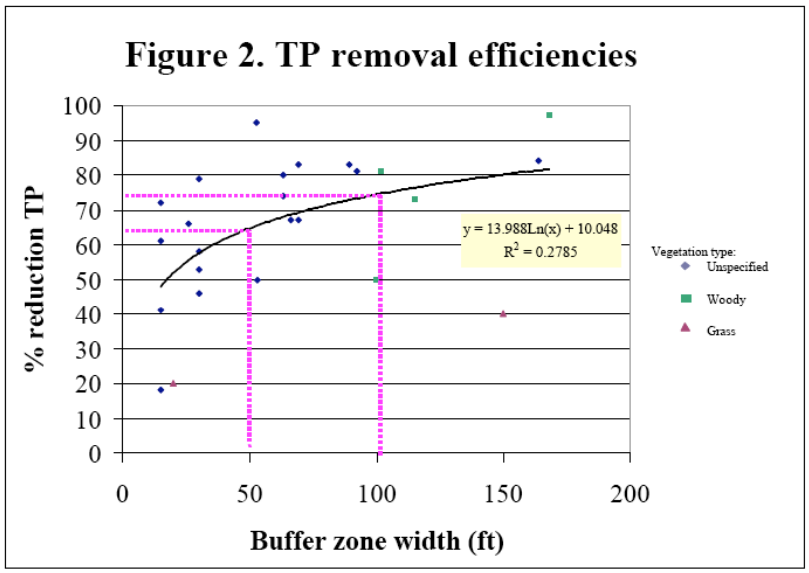
In the alternative standards, the shore impact zone cannot be less than 50 feet (i.e., a change to the definition of shore impact zone). The shore impact zone provides a management framework for: the reduction of non-point source pollution problems by managing vegetation and soil resources; the regulation of the size, type and placement of nearshore structures (water oriented accessory structures); and the maintenance and preservation of shoreline vegetation for the screening of shoreland area development activities. For river segments, implementation of a shore impact zone will also protect riparian soils and stream banks from the natural meandering characteristics of channels, thereby reducing accelerated erosion, sedimentation, and channel shift problems. Buffers less than 50 feet deep are generally inadequate to provide long-term water quality protection (Wenger 1999; Emmons and Olivier Resources, Inc. 2001), so it is reasonable to have such a standard.

As buffer width increases, wildlife benefits increase. Larger buffers offer a greater chance of undisturbed nesting, habitat variability, better foraging opportunities, and the chance to establish adequate territories for animals that live along the shoreline. Wider buffers will provide better habitat for most species, except for edge-adapted species, many of which are already common in our modern fragmented landscape. Wider riparian buffers can be expected to provide an adequate variety of microhabitats and thus offer a greater chance of avoiding predators, finding suitable habitat, and establishing adequate territories. Protecting wetlands can add significant fish and wildlife habitat to the shoreland area and preserve water quality. Wang et al. (2003) found that the amount of natural vegetated buffer along trout streams was an important variable for high stream quality and condition, and they conclude that buffers help ameliorate some of the negative effects of urban development.

Many chemicals easily adsorb or attach to individual sediment particles. Eroded particles frequently carry pollutants and nutrients, such as nitrogen and phosphorus, into lakes and streams. In addition, the sediment itself can be a pollutant, since it can impair the feeding and reproduction of many forms of aquatic life. Buffers act as a filter by reducing the amount of sediment reaching the water. By slowing the movement of rainwater runoff, buffer vegetation allows more time for sediment contained in the stormwater to settle out (Castelle et al. 1994).



Pollutant removal increases with increasing buffer width. A 50 foot vegetated buffer will generally remove about 65 to 70 percent of the phosphorus runoff. Much greater widths of natural vegetation are needed to gain the next increment of removal (Desbonnet et al. 1995). Compiled information indicates that the effectiveness of buffers for phosphorus removal is a function of both width and slope. In shallow slope situations, a 50 foot buffer appears be sufficient, but as slope increases, a wider buffer (100 foot) is warranted (Figure 2 in Emmons and Olivier Resources, Inc. 2001). Steeper slopes have been less likely to have been altered such that extensive native vegetation often still exists on such sites. Finally, a study has found that 95 percent of buffers less than 50 feet saw direct adverse results from human impact, whereas only 35 percent of those over 50 feet experienced a similar adverse impact (Castelle et al. 1994).



The nearshore areas adjacent to lakes and rivers are considered one of the richest zones for aquatic organisms, mammals, and birds (Castelle et al. 1992). Large numbers of birds, amphibians, reptiles, and mammals use Minnesota nearshore areas or those buffer transition areas. This area has an overlap of ecological zones between upland and aquatic habitats where species from both zones live. The tree canopy provides foraging and nest sites for many species of neotropical migratory birds. The understory is used by nesting birds and also provides cover, foraging sites, and travel corridors for mammals. Birds, such as thrushes and ovenbirds, nest among the ground cover on the forest floor, while shoreline grasses provide forage and shelter for small mammals.

An additional benefit of shoreline buffers is the shading function that it provides, which can keep the temperature down during the summer. This ecological service is especially important for trout streams. Buffer areas can also cool off warm runoff by slowing down runoff as it flows through vegetation. Additional benefits of cooling are that water will hold more oxygen at lower temperatures and more desirable aquatic life thrives in cooler water. Also, a mature forest canopy, along with shrubs and native groundcover, intercepts, diffuses, transpires, and evaporates rainwater, which decreases runoff.

Recommended buffer depth for wildlife habitat varies by species; however, to provide optimal habitat, native vegetation is needed (Wenger 1999). The species of plants generally determine the animals that will live in an area. While the depth of the natural vegetated shoreline buffer is

based primarily on water quality functions, it is important for both water quality and wildlife habitat that buffer management provisions include natural vegetation and habitat structure.

Buffers with natural ground cover, understory plants, and a forest floor duff layer are most effective in removing phosphorus from runoff (Woodard and Rock 1995). Native vegetation, with its deep root systems and natural duff layer, act like a sponge to hold runoff and associated pollutants. If runoff is allowed to "short circuit" a buffer by concentrating and forming channels or rivulets, the chance for filtration of runoff is greatly reduced. The more dense the vegetation is in a buffer and the higher the integrity of the understory, the better it will filter runoff.

In item A, subitem 1, the alternative standards call for a shoreline buffer of native plants within the shore impact zone. Vegetation plays a major role in filtering runoff of such things as organic and inorganic solids and the pollutants that travel with them. Filtration through ground cover, accumulated detritus, mulch, and various exposed parts of the plant or tree occurs as these obstacles get in the way of moving particles. Vegetation also reduces the energy of flow, thus slowing water down, spreading flow out and allowing gravity to settle particles too heavy to move at a reduced energy level. This energy reduction also cuts the erosive potential of runoff.

While shoreline buffers are critical to protect water quality, they do have limits. Shoreline buffers cannot treat concentrated or excessive amounts of rainwater runoff. Therefore, additional standards are included to address stormwater management (see Subp. 11 changes).

In item A, subitem 2, it is necessary to prohibit vegetation clearing within the bluff and shore impact zones and on steep slopes to protect the vegetation and soil resources of these areas. The existence of vegetation in these areas is important to reduce the erosive effects of falling precipitation on the soil. Vegetation can also reduce the velocities or disperse the flow of surface water runoff, which is important since high velocity or concentrated surface water runoff can readily erode soils. Vegetation in these areas will also consume and utilize nutrients that may be in runoff waters or in the soil profile, which could degrade the shoreland water quality if not consumed. Additionally, vegetation root systems in these areas will assist in binding the soil column to prevent or reduce the likelihood of bank and slope failure, which further protects the fish and wildlife habitat values associated with shoreland areas. The existence of vegetation in these areas also acts to screen shoreland development activities, which will protect and preserve the natural values of shoreland areas as directed by the shoreland statute.

Stairways, landings, access paths, view corridors, recreational use areas, and a permitted water-oriented accessory structure may exist in the shore impact zone. In the alternative standards, an access path cannot exceed 6 feet in width and that the recreational use area size restrictions are based on class or district.

In item A, subitem 3, the secondary shoreline buffer zone is treated differently than the shore impact zone. The secondary shoreline buffer zone is defined as the land located between the shore impact zone and the structure setback. In this area traditional urban residential land

management activities are allowed, such as lawn, turf, or flower gardens. The main purpose of this area is to continue to serve as a screen to structures from the water.

In item B, the use of fertilizers is not allowed in the shore impact zone. Garn (2002) found that median dissolved phosphorus concentrations in runoff from fertilized sites was twice that for unfertilized sites.

In item C, the alternative standards put a specific numerical standard on the existing requirement to screen structures, vehicles, and other facilities as viewed from the water, assuming summer, leaf on conditions. The alternative standards call for 50 percent screening. In item D, the alternative standards limit impervious surfaces in the shore impact zone. A relationship between the distance to water of impervious surfaces and the stream and water quality has been found. It is reasonable to have imperviousness placed further from public waters. It is also reasonable to reduce conduits of runoff to the lake or river, and impervious surfaces generate more runoff.

The alternative standards require lawns and other open areas within the shore impact zone that are not allowed be left unmowed or be replanted. Establishing natural vegetation, either directly or through succession, is critical for a functioning shoreline buffer. The vegetative target for the shoreline buffer is mature native forest or other natural vegetation. A natural vegetated shoreline buffer provided by alternative standards generate moderate levels of some important ecological and aesthetic functions. A forested or native vegetated buffer can: provide vegetative screening for structures; maintain physical conditions such as bank or shore stabilization; shade streams and lakes; minimize disturbances to the littoral fringes of lakes; retain and transform sediments, nutrients, and toxicants; improve stream and lake habitat structure by allowing for contribution of woody debris and organic matter to lakes and streams; provide habitat for some shoreline-dependent wildlife such as amphibians that utilize narrow corridors; and provide perching spots for fish-eating birds and ambush sites for other shoreline predators. Restoration or maintenance of the quality of structural diversity of natural shoreline vegetation is as important as buffer depth. Natural vegetation is a critical component in buffer effectiveness, so it is reasonable to require restoration of native vegetation in shore impact zones for all riparian properties.

Provisions in items A through E are reasonable, and comparable rules can be found elsewhere. Maine Department of Environmental Protection sets the minimum standards that local governments must meet for shorelands (State of Maine Guidelines for Municipal Shoreland Zoning Ordinances; http://www.maine.gov/dep/blwq/docstand/szpage.htm). The rules in Maine require that there be no cutting of vegetation within the strip of land extending 75 or 100 feet from shore depending on class, except to remove safety hazards. In addition, openings in the forest canopy cannot exceed 250 square feet; however, a footpath, not to exceed six feet in width as measured between tree trunks and/or shrub stems, is allowed provided that a cleared line of sight to the water through the buffer strip is not created. This area is commonly referred to as the buffer strip. Like the alternative standards, in order to protect water quality and wildlife habitat, Maine requires that existing vegetation under three feet in height and other ground cover, including leaf litter and the forest duff layer, not be cut, covered, or removed. In addition, Maine requires property owners to maintain a buffer strip of native

vegetation. Beyond the buffer strip, Maine does allow cleared openings, provided that such clearings do not exceed 25 percent of the lot area, or 10,000 square feet, whichever is greater.

Appendix A shows an example of residential lot development on a recreational development lake, how the shoreline buffer must be maintained or restored, and what openings are allowed in the buffer zones with the alternative standards.

Sediment delivery from construction site erosion can be a major source of pollution. The shoreline buffer is not usually adequate to prevent serious sediment delivery to lakes and rivers. However, sediment delivery from construction sites can be controlled through proper erosion and sediment control practices. Item F was slightly modified to address these issues.

Land disturbing activities, like grading or filling of even small amounts of material, generally have a serious potential for causing negative impacts to shoreland area natural resources. Some of these impacts are: sedimentation to receiving water bodies; soil deposition on adjacent properties or into wetlands; and significant erosion or soil slumping problems on steeper slopes or on highly erosive soils. It is reasonable to require that the conditions contained in subitems (1) through (13) be considered during the review of the listed uses to further protect and manage shoreland areas. Preserving shoreline and shoreland wetlands is important to protect water quality. Since wetlands filter pollutants, soak flood flows, and provide important wildlife habitat, it is stated in subitem 1 that filling of wetlands in the shore impact and secondary shoreline buffer zones shall be prohibited. Swales and depressions are important land features for reducing runoff to lakes and rivers, and it is stated that they only be altered in conjunction with erosion control and stormwater management plans. For subitem 3, the cutoff of five cubic yards was chosen so that projects involving less than five cubic yards would not need permits, since these activities generally have less potential for causing significant problem (five cubic yards is roughly equivalent to half a standard dump truck load). For subitem 13, to be consistent with other department policies regarding the use of rip rap and retaining walls, natural rip rap can only be used for correction of an established erosion problem that cannot be controlled with vegetation or other best management practices and retaining walls not be used for ornamental purposes or for terracing natural slopes.

Item G clarifies structure setbacks. Setbacks must be measured from the excavation, which become public waters. This is reasonable and consistent with other policy and rule.

Subp. 5. Placement and design of roads, driveways, and parking areas.
The only change is that best management practices must be used for public boat facilities.

Subp. 6. Shoreline recreational facilities for lots.
Standards similar to those for planned unit developments, conservation subdivisions, and resorts were adopted. The only difference to those standards that is not proposed here is a limit on the number of continuous mooring sites. After some preliminary Advisory Committee discussion on docking for residential lots, including the merits of imposing some limits on dockage, it was concluded that any such proposed rules would have to be further discussed within the context of M.R. 6115.0210 (Structures in Public Waters).

Subp. 7. Agricultural use standards.
The only change in this subpart was to make it consistent with M.R. 7020, which does not allow new feedlots in the shoreland and any expansions must meet the standards or rules of the Pollution Control Agency.

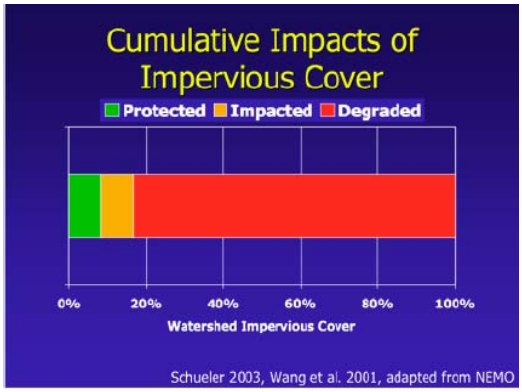
Subp. 8. Forest management standards.
Minor edits were made to modernize this section (e.g., reference to Minnesota Forest Resource Council) and in item B, subitem 1, to require forest land conversions to meet the same requirements as in the shoreline buffer standards (i.e., preserve shoreline and bluff vegetation).

Subp. 11. Stormwater management.
Stormwater runoff is considered a major source of water pollution. Stormwater runoff in the U.S. may be responsible for up to 15 percent of river and lake water impairment (US EPA 1998). Perhaps the single greatest threat to Minnesota lakes from sediment is as a carrier of phosphorus to the lake (Minnesota PCA 2001). The more raindrops that infiltrate where they fall, the better water quality will be for Minnesota lakes.

Rainwater runoff originates from our roads, parking lots, roofs, and lawns. To understand runoff, you need to understand raindrops. So one needs to think small or on a small scale. Runoff is not only occurring when streams are full after a rain, but it is also the small sheets of water that leave our lawns and head down to the lake. It is important to manage our rainwater to reduce pollutants and excessive nutrients entering our lakes. Rainwater that does not infiltrate into the ground or evaporate runs down hill to our lakes or lake inlets. Runoff carries pollutants, such as oil, dissolved metals, pesticides, suspended solids, pet waste, and nutrients. However, if the water infiltrates into the ground, the soil and plants can purify the rainwater and runoff.

Nutrient additions to a lake increase with the intensity of land use. A study in Maine of paired watersheds of similar size and physical characteristics compared an undeveloped, forested watershed to an adjacent watershed with 40 percent forest and a subdivision developed with 1-acre lots (Dennis 1986). The more developed watershed showed an increase of 720 percent in phosphorus export, the main nutrient of concern in lakes because of its role in eutrophication.

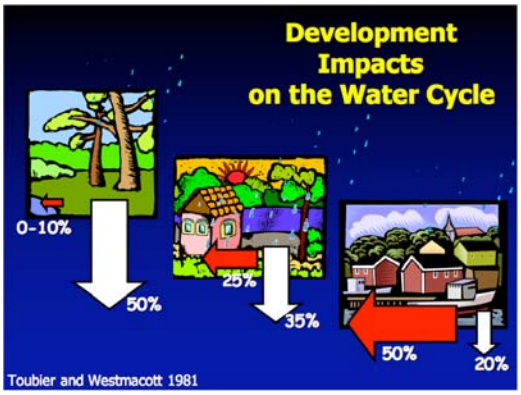
When phosphorus levels increase in a lake, water clarity decreases due to an increase in algae. One predictor of nutrient runoff to our lakes is the amount of impervious surface coverage. Roofs are an impervious surface, as are paved driveways and other constructed hard surfaces that prevent or retard rainwater infiltration. Impervious surfaces inhibit recharge of groundwater, and they provide an express route for pollutants to lakes and rivers.



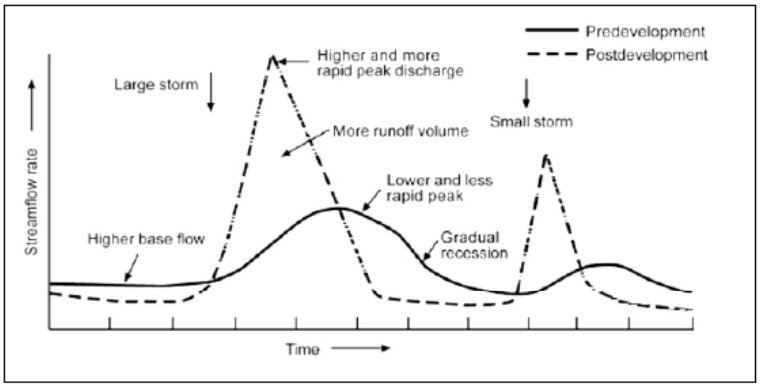
Imperviousness is also an important index in the amount of alteration of the landscape. Scientific evidence relates imperviousness to changes in the hydrology, habitat availability, water quality, and fish and wildlife conditions. Impervious surface is defined as a constructed hard surface that

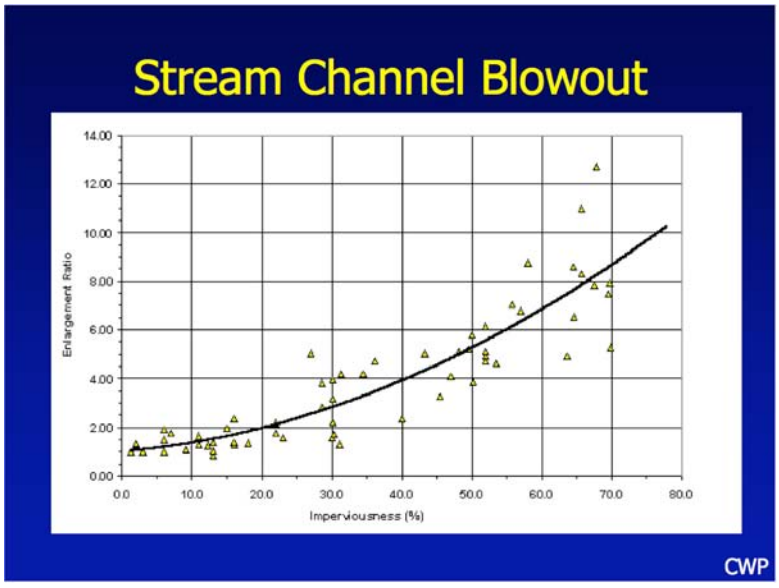
either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, patios, storage areas, and concrete, asphalt or gravel driveways. Even lawns can act as an impervious surface if soils were compacted during construction or with heavy use (Barten 2005).

As impervious surface coverage increases on a lot or in a watershed, the amount of nutrients entering our lakes increases linearly (using traditional stormwater practices; Schueler 1994). Hydrology research consistently shows that when impervious surface coverage exceeds about 10 to 12 percent, water quality is negatively impacted (Schueler 2003). In addition, the proximity of impervious surfaces and development is often as important as the amount with regard to fish, wildlife and habitat effects (Wang et al. 2001; Brabec et al. 2002), which again stresses the importance of large natural vegetated shoreline buffers (DeLuca et al. 2004).



In areas with low amounts of imperviousness, only 10 percent of the rainwater runs off. Around our more developed lakes and rivers, 50 percent of the rainwater becomes runoff. This runoff pollutes receiving waters and changes the character of streams. Higher runoff changes the hydrology of streams. Stream channels change with the increase in energy brought by higher flows. Stream banks blowout and in-stream habitat is degraded with the loss of pool-riffle sequences and bank cover (Schueler 2003).





Stream studies from around the country in a variety of urbanized areas have identified a threshold of 10 percent impervious area in a watershed beyond which stream water quality and habitat begin to degrade (Schueler 1994). The mechanisms of the degradation process are well known. As impervious surface increases,

surface runoff increasingly dominates over infiltration and groundwater recharge. This allows more rapid runoff and higher peak flows in streams, increases stream bank erosion and sediment loading to the streambed. The result is wider, straighter sediment-choked streams, greater temperature fluctuation, loss of streamside habitat, and loss of in-stream habitat. The naturally variable stream substrate is covered over by sand and silt. Nutrient, pathogen, and pollutant loading are increased. Engineering responses to flooding have exacerbated the ecological damage by severely simplifying stream habitat. Research has documented the impact of impervious areas on alterations in stream hydrology (FISRWG 1998). The degradation of wetland water and habitat quality as surrounding development intensifies has also been documented.

There is a definitive link between fish assemblages and impervious surface cover. Sedimentation and toxic pollutant runoff to streams and lakes increases with imperviousness, which reduces fish reproductive success and survival. In addition, increased imperviousness results in increased stream water temperatures and reduced base flows. Increased imperviousness lowers base flow because less precipitation infiltrates into the groundwater, leading to a lowered groundwater table. Increased stream temperatures and high annual temperature fluctuation have a negative impact on fish communities, particularly for fish that thrive at cooler water temperatures. Generally, it has been observed that between 10 to 12 percent imperviousness there is a decline in stream fish communities and above 25 percent fish are usually absent (Paul and Meyer, 2001). Increases in imperviousness also affects species richness. In Wisconsin, fish coldwater index of biotic integrity decreased rapidly at 10 percent urban land cover (Wang et al. 1997) and 8 to 12 percent connected impervious surface coverage resulted in major changes in stream condition (Wang et al. 2001). In Minnesota and Wisconsin, trout streams degraded quickly at 6 to 11 percent connected impervious surface coverage, so even low levels of urban development can damage these streams.

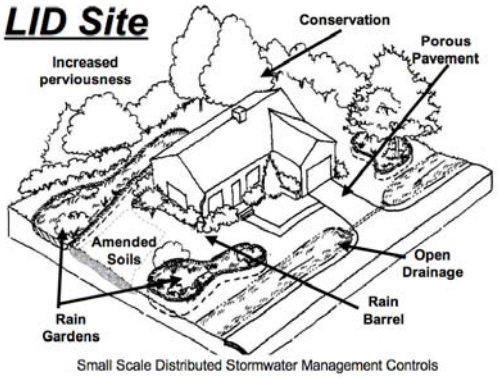
Booth et al. (2004) found no evidence that the impacts of urban development can be fully alleviated. They recommend several reasonable and defensible actions to rehabilitate water resources:
• cluster development to protect most of the natural vegetative cover, especially in headwater areas and around streams and wetlands, so that riparian buffers remain intact;
• limit watershed imperviousness, either through minimal development or by reducing the "effective" impervious area through the widespread infiltration of stormwater;
• mimic natural flow frequencies and durations;
• protect riparian buffers and wetland zones, and minimize road and utility crossings;
• begin landowner stewardship programs that recognize the unique role of adjacent private property owners in rehabilitating, maintaining, or degrading lake and stream health.

The state of the art in managing rainwater is to mimic the natural hydrology. There are two ways to manage rainwater. The traditional way has been to move water off fast. The "five C's" were the predominant rainwater management philosophy: collect, concentrate, convey, centralize and control. This approach uses stormwater sewers, pipes and ponds. Unfortunately, after we used this expensive approach across many areas, civil engineers found that the approach did not work well. Often, the only outcome was the creation of larger problems downstream or downhill. The traditional way is now seen as a failed system. This system does not scale well, and the

treatment of water as a waste product instead of a resource discounts the importance of infiltration into ground water and the value of the pre-development water cycle in the area.

BAD

GOOD



The new way of managing rainwater is to get the water into the ground near where it falls (i.e., treatment of rainwater as a resource). This approach, often called low-impact development (LID), uses infiltration basins, rain gardens, grass overflow parking areas, grass swales, porous or pervious pavers, parking lot infiltration islands, and overall less imperviousness. The key principle of this new way to deal with rainwater is to get back to infiltrating most of the rainwater where it falls, with only 10 percent running off (i.e., the runoff should match pre-development conditions). This approach reduces pollutants and nutrients entering into our lakes, thus protecting the lake water quality, and it mitigates the consequences of increased imperviousness in a watershed.

This new way is small-scale and decentralized, and it mimics the natural hydrologic cycle. In addition to infiltration basins, rain gardens and other practices, the approach also includes protecting natural areas important for water transport and filtering, such as wetlands, streams, and vegetated buffers near water. Every lot is part of a larger watershed. The degree to which water is properly managed at the lot scale is the degree to which downstream flooding, lake and river water quality, and habitat degradation can be avoided.

The U.S EPA (2000) found that bioretention areas could be effective in reducing runoff volume and in treating the first flush (first 1⁄2 inch) of stormwater. These studies were conducted by means of simulated rainfall events. Results from three different case studies indicated that removal efficiencies were quite good for both metals and nutrients. Removal rates for metals were more consistent than for nutrients. Removal rates for metals ranged from 70 to 97 percent for lead, 43 to 97 percent for copper and 64 to 98 percent for zinc. Nutrient removal was more variable and ranged from 0 to 87 percent for phosphorus, 37 to 80 percent for total nitrogen, and 0 to 26 percent for nitrate.

Cheng et al. (2003) compared the stormwater hydrologic and water quality responses between a low impact development (LID) design and the conventional development design within a Maryland subdivision. In the subdivision, two small watersheds are located side-by side: one was developed using a few LID concepts (e.g., grassed swales, bioretention areas, etc.) with drainage area of about 12 acres and another was developed entirely using a conventional

stormwater conveyance system (i.e., a curb, gutter and pipe stormwater conveyance system) with drainage area of about 8 acres. When compared to the conventional site, the LID site had considerably lower event runoff volumes and peak flow rates as well as lower annual flow (20 percent less). In addition, most event runoff hydrographs started later, including peak time, in the LID site. The LID site showed a higher frequency of smaller flow rates while the conventional site showed a higher frequency of larger flow rates. The annual pollutant loads for the LID site were lower for most constituents measured.

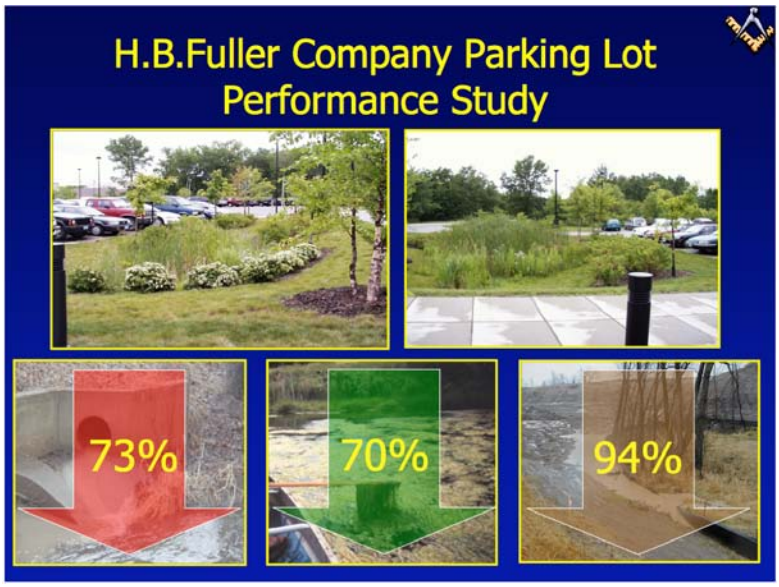
Homeowners can use rain gardens and other techniques to manage rainwater on their property. Rain gardens are landscaped areas planted with wild flowers and other native vegetation that soak up rainwater coming right off the roof and driveway. The rain garden fills with water after a rain and the water slowly infiltrates rather than contributing to the runoff problem. Cumulatively, numerous rain gardens in a neighborhood can have substantial positive environmental benefits. They can reduce drainage problems and pollutants entering lakes and streams, and they can recharge groundwater and create bird and butterfly habitat. In addition, simply disconnecting downspouts from impervious surfaces, reducing imperious surfaces, and using porous pavement can reduce runoff reaching streets and waterways.

The rain gardens and bioretention systems that line some of the streets in the City of Maplewood, Minnesota, have been shown to clean and infiltrate runoff, replenish underground aquifers, and increase property value and beauty (Nassauer 2000). The effectiveness of rain gardens has been confirmed by many studies. For example, Dietz and Clausen (2005) found that rain gardens treated 99 percent of the toxins in runoff captured. Therefore, if the City of Maplewood project is emulated across the state it would be beneficial to lake and river water quality.

A network of rain gardens in a Burnsville neighborhood reduced stormwater runoff by over 90 percent during a 0.75 inch rainfall (Barr Engineering 2004). Monitoring data from 2004 showed that the rain gardens achieved an 80 percent reduction in runoff volume in 49 rain events. Most basins drained dry within 3 to 4 hours.

The H.B. Fuller Company of Vadnais Heights has parking lots that incorporate bioretention strategies to treat stormwater runoff. Landscaped depressions provide stormwater treatment, snow storage, and improved parking lot aesthetics and climate. Low maintenance sedges are

used in place of traditional turf grass to lower maintenance costs and pollution. Most plants are wetland species adapted to fluctuating water levels and can attenuate stormwater and pollutants. The parking lot and swale are engineered so that all the runoff from the parking lot flows into the swale and bioretention basins and is treated by the plants. Water either infiltrates into the ground or is used by the plants. According to the Ramsey-Metro Watershed District, this low impact development significantly reduced runoff (73 percent), phosphorus (70 percent), and sediment (94 percent).



Communities can use low-impact development principles, either for new developments or to retrofit existing neighborhoods and districts. This method of development uses the science of hydrology with the use of infiltration and water storage techniques to mimic the natural water cycle in the area. Instead of the "five C's" of the failed system, this approach relies on conservation at the site and watershed level, minimizing lot disturbance, use of natural features and slopes for drainage, reduced impervious surfaces, disconnection of impervious surfaces, shoreline vegetation, rain gardens and bioretention water storage areas, and pollution prevention.

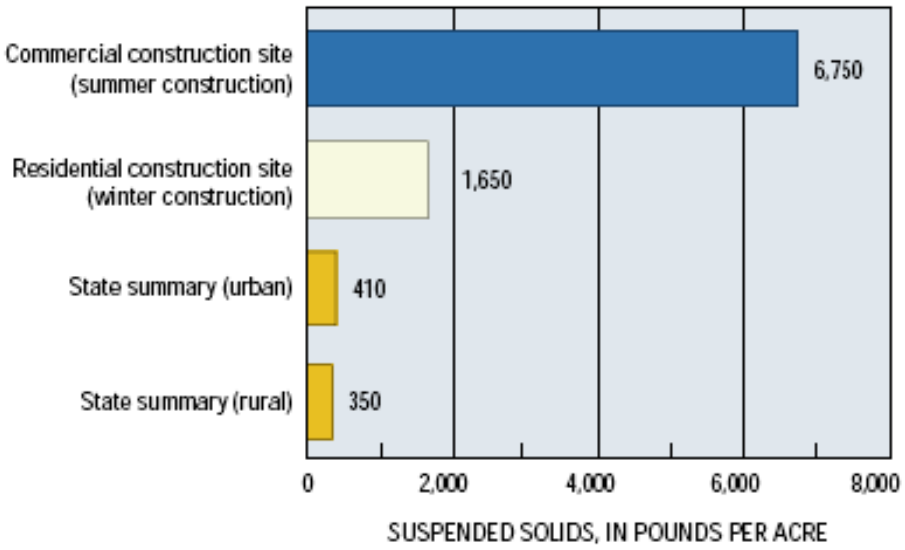
This development technique generally costs less than the traditional methods that rely on curb, gutter, pipe, and stormwater pond. Proper engineering is critical in the design of the bioretention systems and in the overall success of the low-impact development approach. For example, sizing of rain gardens depends on location, soil type, and amount of impervious surface coverage in the area. Developers have found that the advantages of low-impact developments over conventional developments are substantial, due to reduced infrastructure costs, increased lot premiums, higher and faster sales, and reduced debt service.

The stormwater management subpart was formulated by PCA staff. It is based in part on the recently completed Stormwater Management Manual (http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html). This manual focuses in on best management practices, and the alternative standards require the local government to direct property owners, developers, and contractors to incorporate those best management practices by following or actually obtaining the PCA General Stormwater Permit.

Item A provides specific standards.

Subitem 1 is combined with subitem 3 in the alternative standards. Preference is given to use natural features for construction stormwater management, and where and when that is not possible the alternative standards require that constructed facilities be used. Examples of those facilities are provided, with preference given to bioretention and other low impact development tools rather than pipes and ponds.

In subitem 2, specific standards on erosion prevention and sediment control are included. These provisions are needed to minimize soil and sediment reaching public waters, and when quantities do enter public waters or drainage systems, that efforts are conducted to restore those systems.



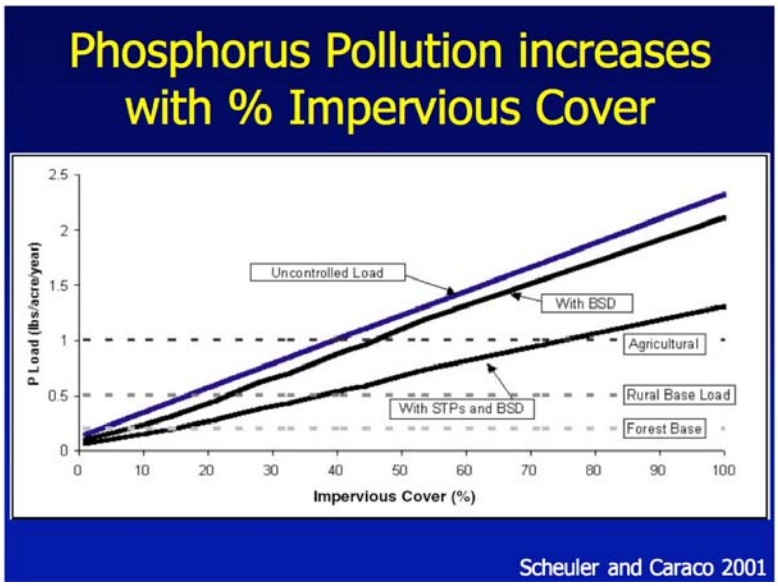
Small construction sites are potential sources of large amounts of sediment erosion. Sediment loads from two monitored construction sites were 10 times larger than typical loads from rural and urban land uses in the area (Owens et al. 2000). Total and suspended solids concentrations data indicate the active construction phase produced concentrations that were orders of magnitude higher than pre- and post-construction periods. Furthermore, these concentrations were dramatically reduced when the site was seeded and mulched. These results support the need to design and implement erosion control plans.

Subitem 3 states that to the maximum extent possible, the vegetated shoreline buffer or the shore impact zone not be disturbed. This provision would result in minimizing pollution reaching public waters.

Subitem 4 has specific limits on impervious surface coverage for an area. Setting limits on the allowable percentage of impervious area per lot or parcel is justifiable due to the negative effects of watershed imperviousness. The alternative standards set specific limits based on development or use rather than the use of a single limit, as with the existing rules, which sets the limit at 25 percent of the lot area. Cappiella and Schueler (2001) recommend a 10 to 15 percent impervious cover limit in shorelands to protect water quality. For existing noncommercial properties, the alternative standards limit imperviousness to 12 percent for natural environment, special protection, sensitive areas, and river classes, and 15 percent (or 20 percent with an approved stormwater management plan and a compliant shoreline buffer) for recreational and general development classes.

Access lots and new conventional subdivision lots must have a 12 percent impervious surface coverage limit in the alternative standards. Commercial developments in commercial districts, besides planned unit developments and resorts, remain at the 25 percent impervious surface coverage limit. Specific standards for planned unit developments, conservation subdivisions, and resorts are also provided in the alternative standards.

Data indicates that better site design (BSD) and stormwater management practices (STP) can reduce phosphorus loads as much as 40 to 60 percent (Scheuler and Caraco 2001). However, even with inclusion of some elements of low-impact development principles, high levels of imperviousness will still result in excessive phosphorus loading to lakes and streams, which will lead to water quality degradation. It is reasonable to have lower amounts of imperviousness in natural environment lakes, sensitive areas, and river class shoreland areas.



Subitem 5 allows credit for porous pavers or other porous material that meets the Minnesota Stormwater Manual best management practices criteria. Only half the area with such material would be counted as impervious surface. Long-term studies on porous materials have yet to be conducted, so the PCA advised such a credit until such time evidence supports a higher credit.

Subitem 6 would allow the local government to require engineered stormwater plans for any permit.

Subitem 7 requires that construction activities that disturb less than one acre but 10,000 square feet or more (5,000 square feet or more on natural environment, special protection, and sensitive area district shorelands) that the property owner meet the PCA General Stormwater Permit for Construction Activity requirements for Erosion Prevention and Sediment Control. A permit is not required but the local government would require the property owner to meet the standards outlined in the permit.

A permit is required for any disturbance of one acre or more (M.R. 7090; see Minnesota PCA 2004 for need and reasonableness). For commercial properties and on residential lots to be covered by structures greater than 5000 square feet, or for any disturbance one acre or more, subitem 8 requires certified personnel in erosion and sediment control be responsible to meet PCA General Stormwater Permit standards, including the permanent stormwater management

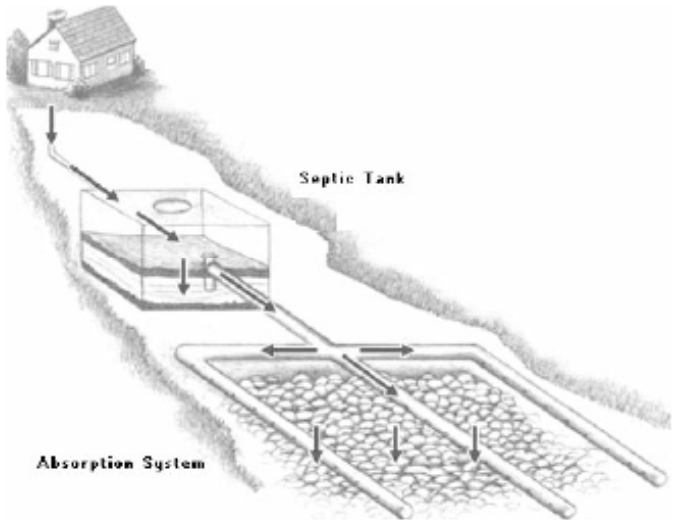
requirements for impervious surfaces located on the project. It is reasonable to require trained people to deal with the complexities of rainwater management with such large projects.

Item B provides provisions, like the existing provisions to identify and upgrade sewage treatment systems, to address nonconforming parcels with regards to impervious surface coverage. Given the significant negative consequences of rainwater runoff from such surfaces, it is reasonable that local governments track and monitor this important variable. Subitems 1 and 2 are mechanisms to accomplish this requirement. Subitem 3 provides local governments flexibility to introduce creative and effective alternatives for meeting the intent of this item. All approaches are needed and reasonable in order to set guidelines for future local programs aimed at correcting existing non-conforming imperviousness.

ALT6120.3400 SANITARY PROVISIONS

Subp. 2. Sewage treatment.
Sewage treatment setbacks from the ordinary high water level are increased to 100 feet for both recreational and general development lake shorelands. For general development lakes, if a soil test demonstrates that the soils present have high phosphorus adsorption or retention capacity, the 100 feet may be reduced to 75 feet. However, sites with coarse soils or calcareous sandy soils must use the 100 feet setback. Two additional approaches are incorporated in item D, which address nonconforming sewage systems. Requiring certificates of compliance are reasonable with convenyance of lot, issuance of any permit, or every 5 years. Such approaches are needed to ensure that nonconforming systems are upgraded and functioning properly. These additions will have long-term positive impacts towards the protection, improvement, and preservation of shoreland area natural resources, specifically surface waters and groundwater. The PCA supports these changes (Appendix B).

Increased sewage treatment system setbacks are reasonable. The state of New Hampshire requires a 125 foot septic system setback for areas with porous soils; the New York City reservoir system requires a 300 foot setback. Other states also have comparable setbacks.



We drain our sinks and flush our toilets without thinking about where the waste goes. For many people living around lakes, sewer systems are not available. They must rely on Individual Sewage Treatment Systems (ISTS), commonly called septic systems, to treat and disperse waste and recycle water.

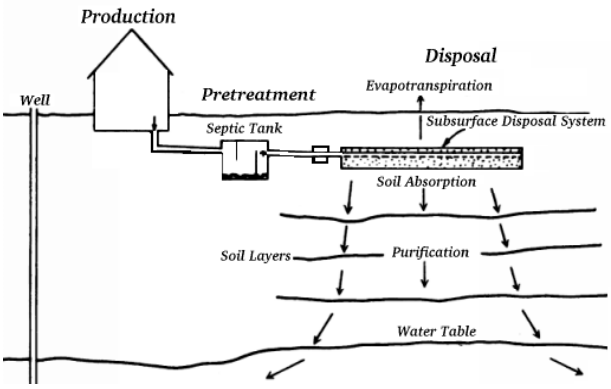
A septic system consists of a septic tank and a drainfield. The septic tank captures solid material and anaerobic bacteria decompose some of the solids. The wastewater that leaves the septic tank, or effluent, contains significant amounts of pathogens, pollutants, and nutrients, such as nitrogen and phosphorus. The drainfield, with a system of perforated pipes, distributes the effluent to a large area so that aerobic bacteria can further break down pathogens and the soil can absorb phosphorus and filter the effluent.

Septic systems that are properly installed and maintained in areas with appropriate soils do meet public health standards. However, septic systems have limited capabilities and have the potential to pollute groundwater and lakes.

Conventional septic systems are relatively ineffective in removing nitrogen, with only a small fraction retained in these systems. Nitrogen (in the form of nitrate) is highly mobile and it can flow with groundwater through the soil and end up in well water or lakes. In the City of Baxter, a PCA study found nitrate down-gradient of septic drainfields exceeded the drinking water criteria at all sites surveyed (Minnesota PCA 1999). Nitrate concentrations in domestic wells from three central Minnesota communities increased with increasing age of the septic systems in the area (Minnesota PCA 2000). Nitrate in drinking water increases the risk to infants of methemaglobinemea, or blue baby syndrome. Nitrate that gets into the lake will increase aquatic plant and algae growth.

Phosphorus is another concern because it is usually the limiting nutrient for lake algae. One pound of phosphorus can produce 500 pounds of algae. A household produces about two pounds of phosphorus per person each year, and it is discharged to septic systems. Conventional septic systems can be effective at removing phosphorus. Drainfield soils usually absorb or mineralize phosphorus; however, certain soil conditions and close proximity of drainfields to lakes can result in phosphorus pollution. In addition, the capacity of the soil to retain phosphorus is finite, and phosphorus movement deeper into the soil profile and down-gradient to water resources can be expected (Barr Engineering 2004).

The PCA has found that elevated phosphorus concentrations in groundwater are usually within 50 feet from functioning septic systems (Minnesota PCA 1999). However, some phosphorus plumes have been found to extend beyond 66 feet from drainfields. Other evidence suggests that drainfields should be at least 100 feet from the lake to minimize the risk of phosphorus reaching the lake.



Robertson (2003) found a distinct phosphate plume that extended about 98 feet down-gradient of the drainfield at a calcareous sand soil site. Long-term monitoring of phosphate of septic system plumes on calcareous sand showed that after 17 years a distinct plume was present and it extended 66 feet down-gradient from the drainfield. Migration velocity was about 3 feet per year, reflecting a retardation by a factor of 20 compared to the groundwater velocity

(Robertson 1995; Robertson et al. 1998). Phosphate sorption was progressively saturated, thereby allowing slow extension of the phosphate plume. In contrast, noncalcareous sand sites had no phosphate plumes or they were more localized with lower concentrations of phosphorus (also at these sites, phosphate concentrations in the shallow water table zones below drainfields did not increase over time, indicating that attenuation reactions were not diminishing at a fast rate; Robertson 2003).

Dillon et al. (1995) found that phosphorus delivery from onsite sewage disposal systems associated with shoreline development may have accounted for a significant portion of the observed total phosphorus level in four Ontario lakes. On two of the lakes with thinner soils, all total phosphorus transported into and out of septic systems apparently reached the lakes. It was estimated that about one-third of the total phosphorus from septic systems reached the third lake, which had a thicker layer of till/soil, while the fourth lake was undeveloped.

Weber (1994) found significantly greater nitrogen and phosphorus concentrations in the seepage water, sediment, and plant tissues in the near-shore waters of Legend Lake, along shorelands with septic systems where groundwater flowed toward the lake, compared to groundwater outflow sites and sites with no septic system. Several studies have found that phosphorus from septic systems could reach surface waters due to impervious layers beneath surface soils, such as bedrock, which could be an issue in northern Minnesota (Woods 1993; Ptacek 1998).

Maintenance of septic systems is critical. Sludge builds up in the septic tank and should be pumped out every two to three years. If sludge accumulates to the level of the outlet pipe, clogging will occur. This will damage the drainfield, reducing the life expectancy of the system. Drainfields can also fail when they are overloaded, either with too much water or with garbage disposal waste in volumes higher than designed for the system.

The average life of a drainfield is 10 to 20 years. Minnesota shoreland development standards require that each residential lot in areas not served by sewer systems have sufficient area for two septic systems. This provides one backup area for system replacement when the drainfield fails. For sensitive lakes or places with poor soils for drainfields, higher standards may be necessary to accommodate permanent and year-round housing.

Lakehome owner management of septic systems is sometimes inadequate. Regular pumping of the septic tank is needed to minimize pollution problems. Some areas have developed comprehensive management programs that track routine maintenance and compliance with public health standards. These programs can save homeowners money, because regular maintenance and inspection costs are much less than replacement of failed systems.

New septic systems are available that provide additional treatment of septic tank effluent. Recirculating sand filters, aerobic treatment systems, and peat filters can prolong the life of drainfields. Information on these systems can be found online at the Water Resources Center at http://septic.umn.edu (ALT6120.3700, Subp. 3, allows use of such systems if they meet M.R. 7080).

ALT6120.3500 SUBDIVISION PROVISIONS

Subp. 1. Purpose.
The reasons for the subdivision provisions are stated.

Subp. 2. Subdivision methods.
The alternative standards make a distinction between minor and major subdivisions. A minor subdivision is defined as the division of a tract of land into two or three lots or the relocation of the boundary line between two abutting metes and bounds parcels of property provided, such relocation shall not cause the creation of an additional parcel or parcels and the resulting parcels comply with all lot dimensional standards. Minor subdivisions are commonly referred to as lot splits and a separate subpart was added to specify the provisions of these kinds of subdivisions. Whereas, a major subdivision is defined as any division of a parcel of land involving the establishment of four or more lots. All major subdivisions must be processed by local governments in accordance with M.S. 462 & 505.

The subdivision process is an important element in the development of shoreland. A well thought out subdivision process and ordinance to govern the same is an essential element in good land use planning. Good subdivision standards should reflect and compliment the community vision for itself and its comprehensive land use plan and support the same. In addition, a good subdivision ordinance should address and encourage good subdivision design.

There are, however, substantial shortcomings with the existing rule, which for major subdivision allows only traditional subdivisions or planned unit developments for residential uses. Traditional lot and block developments, or conventional subdivisions, are not preserving the State's shoreland assets. Conventional subdivisions with their uniform lots and blocks spread development throughout a parcel of land without considering natural or cultural features. This has led to shoreland fragmentation, with homes and docks every 100, 150, or 200 feet regardless of vulnerable or unique natural features or conditions.

Conventional subdivisions essentially produce only lots and streets. Conventional subdivisions provide few green spaces for walking, little habitat for wildlife, and few opportunities for residents to interact with their neighbors. In addition, this development approach comes with a high cost of community services. For every dollar of tax revenue raised from such traditional residential developments, it costs on average $1.15 in public services (American Farmland Trust 2004). Finally, the existing rule creates community deficiencies (no community social places, no neighborhood amenities, no trails, etc.) and prohibits advanced subdivision designs. Better residential development alternatives do exist.

The alternative standards require that all major subdivisions be processed as conservation subdivisions or planned unit developments in accordance with ALT6120.3800 or by issuance of a conditional use permit for a conventional subdivision in accordance with subpart 5. These provisions are needed to address the shortcomings of conventional subdivisions and to promote developments that are less expensive to developers, more desired by potential buyers, and that offer greater protection and conservation of natural resources in the shorelands. Such provisions are reasonable and can be found elsewhere in the United States. The alternative standards

incorporate conservation subdivision concepts. Conservation subdivisions are an important tool used elsewhere to provide better lots for homeowners while protecting water quality, promoting economic development, and creating open space for recreational use, wildlife, and riparian buffers to protect water quality (Arendt 1996).

Conventional

Conservation

Open space has come to be recognized as an important human need and as a necessary element in both comprehensive land use plans and in ordinances. Not only does open space provide social amenities for the human such as a space to play or relax or socialize, they confer economic benefit. For Minnesota shorelands, open space is vital for the survival of native flora and fauna and biodiversity by allowing them to securely move and migrate and giving them areas to grow. And a healthy natural environment is essential for human existence.

A conservation subdivision is a method of subdivision characterized by common open space and clustered compact lots, with the purpose of creating greater community value through open space amenities for homeowners and protection of natural resources, while allowing for the residential densities consistent with prevailing densities. Site designs incorporate standards of low impact development, such as the use of some single-load roadways and narrower rights-of-way, looped road-ways versus cul-de-sacs, maximum road setbacks for structures, and preservation of trees, shoreline, unique resources, and scenic vistas. These developments use stormwater designs that emphasize on-site retention and infiltration through the preservation of native vegetation within the shore impact zone, use of pervious surfaces, rain gardens, and swales. In the alternative standards, conservation subdivisions are essentially density neutral, that is, they are would have densities consistent with the typical residential densities for the class or district.

The alternative standards also prohibit minor subdivisions of any part of an approved planned unit development. Such provisions already exist in local government ordinances in the state, and they are used as a means to reduce administrative burdens and to minimize community conflicts.

Subp. 3. Land suitability and consistency with other controls.
The subpart combines the suitable area requirements of ALT6120.3300, Subps. 2a and 2b, which are viewed as providing more guidance to local governments on lot suitability than the existing rule that does not specify size of area, and the existing provisions related to consistency with other controls.

Subp. 4. Minor subdivision provisions.
There was a need to clarify requirements on minor subdivisions, so provisions were added to address these lot splits. First, to be consistent with other provisions, all lots must meet the lot dimension standards in ALT6120.3300, Subps 2a and 2b. Second, the conditions of use for certificate of survey and platting of minor subdivisions were added. A certificate of survey is defined as a graphic representation of the boundary survey of a parcel of real property along with the description of the land and the signed certification of a Minnesota licensed land surveyor. Whereas, a plat means a map or drawing, conforming to Minnesota Statutes, chapter 505, which graphically delineates the boundaries and dimensions of land parcels for the purpose of identification and record or title. The biggest difference between a certificate of survey and a plat is that a survey cannot be used to dedicate public rights, and certificate of surveys are not signed by the landowner(s). If a road must be created, it is generally recommended that the property be platted and the road dedication be made on the plat. In short, certificate of surveys serve a very useful and needed purpose but they are not plats.

As such, certificate of surveys may be used for minor subdivisions where the tracts are large (greater than 5 acres), splits that result in attachments to neighboring lots, conveyances to a government unit or public utility for specific purposes, and divisions between adjoining owners where such divisions do not create additional building sites or create nonconformity or where such divisions create more conformity.

Subp. 5. Conventional subdivisions provisions.
As noted, conventional subdivisions are a poor choice for development. In the alternative standards, conservation subdivisions are the preferred method of shoreland development. Provisions for conservation subdivisions are found in ALT6120.3800, and these developments would have residential densities similar if not the same as the existing or past conventional subdivisions.

In the alternative standards, conventional subdivisions are not allowed within shorelands of special protection lakes. Conventional subdivisions are not eliminated as a development choice elsewhere, although there was considerable discussion of the merits of such an approach within the Advisory Committee process. With the use of the alternative standards conditions, this approach reasonably guarantees real choices and options for property owners and developers, while simultaneously offering the environmental, social and economic benefits of the ALT6120.3800. The alternative standards eliminate the regulatory and economic barriers to allow property owners and developers the option to use more profitable alternatives of development, such as conservation subdivisions. Costs to obtain rezonings, variances, and permits to allow conservations subdivisions have been prohibitive in other areas where developers wish to use this approach (Wenger and Fowler 2001).

To promote conservation subdivisions over conventional subdivisions, there is a need to place conditions on their use via conditional use permits. The developer should convince the local government that carving up all the resource land into standard lots and no open space is better and more effectively implements the comprehensive plan. Also, the conditions in the alternative standards include density disincentives; which are often used to promote the use of conservation subdivisions elsewhere. Density disincentives are expected to better meet the mission of the

shoreland rules (Wenger and Fowler 2001). Effective density disincentives generally require that conventional subdivision lot sizes be at least two times the lot size used to determine densities for a conservation subdivision (Randall Arendt, personal communication; also see Arendt 1996b and 1999). In addition, lot widths must be at least one and one-half the lot widths allowed in ALT6120.3300, Subps. 2a and 2b. This is needed to provide adequate disincentives for riparian lots and to maintain proportional lot dimensions as the existing rule. Appendix C shows a comparison between an existing and alternative standards conventional subdivision for a recreational development lake.

The reason that conventional subdivisions are not allowed in shorelands of special protection lakes is that large lots (greater than or equal to 10 acre lots) would be created with the density disincentive conditions. Large lot zoning does not save natural resources or open space (Whyte 1968). Large lot zoning eats up more land, and the gains are short-lived. Economic and social pressures break down the benefits of this technique to protect shorelands. The pressures to split large lots are very strong. People who own large lots often request lot splits as property values rise, and the market price for lakeshore will continue to rise. Pressures on local governments to split large lots would be relentless and likely successful; therefore, conservations subdivisions are needed on these more sensitive or vulnerable shorelands and this development option is reasonable.

In item C, impervious surface coverage is limited to 12 percent of lot area. This is needed and reasonable given the runoff produced and the negative consequences of such runoff on water quality. In addition, this item states that, as with other developments, stormwater management must meet the standards in ALT6120.3300, Subp. 11.

Finally, it is stated in item D that lots five acres or less in areas that were created with the conventional subdivision standards may not be further subdivided. It is needed and reasonable to close any potential loopholes that may be used to circumvent the intent and purpose of this part.

Subp. 6. Information requirements.
Minor edits were made on this subpart to include additional information that is needed so that suitability of the subdivision for development is determined.

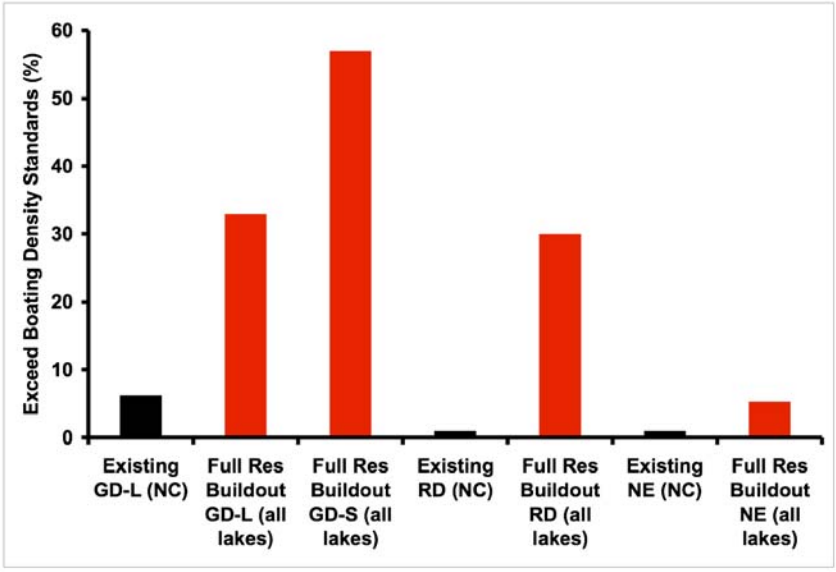
Subp. 7. Dedications.
The alternative standards would allow that a local government may include all wetlands within dedications for management of stormwater.

ALT6120.3600 ACCESS LOTS AND ACCESS EASEMENTS

The question is, how many boats are too many? How many boats should be parked in the productive zone of lakes, and how many boats should be allowed from a recreational boat safety perspective? In the publication "LAKE DEVELOPMENT, How Much Is Too Much?" (Barstad and Karasov 1987) it was shown that lakes have a threshold of recreational and physical carrying capacities up to which they can reasonably sustain development. Safety standards for boat density vary. Minnesota DNR's guideline for access development is 10 acres/boat. For metro lakes, public access sites are developed to reach a 20 acre/boat standard without resident or

commercial additions (e.g., on a 200 acre metro lake, 10 parking spaces in the public access is the design goal).

Other common standards are 20 acres per boat on lakes with high-speed watercraft and 9 acres per boat on small lakes with low-powered watercraft. Most Minnesota lakes currently do not exceed these standards. In 1998, boating intensities at peak times on weekend/holiday afternoons averaged about 90 acres per boat (Minnesota DNR 1999). One can estimate when boat densities may approach or exceed such standards. DNR boat surveys show that 10 percent of the total number of lakehome owners are out boating during high use weekend afternoons.



If every lake in the state had the maximum number of lakehomes (i.e., using existing state shoreland standard lot dimensions to generate full residential buildout conditions) and 10 percent of those lakeshore residents would be boating on nice summer weekends, a large percentage of our lakes would exceed safe boating capacity. Using the same methods for existing densities for northcentral (NC) Minnesota lakes (large general development lakes [GD-L], recreational development [RD], and natural environment lakes [NE]), it was also estimated that a low percentage of the lakes are exceeding safe boating densities, consistent with 1998 estimates.

This analysis simplified the issue, as boats from public accesses and resorts were not included. On average, for northcentral Minnesota, public accesses contributes 28 percent of boats on the water, commercial accesses contributes another 23 percent (e.g., resorts and private campgrounds), and all other sources (mainly riparian residents) contribute nearly half. In addition, boat density guidelines and standards are dynamic or fluid. For example, people can compensate for higher densities by choosing different times and places to recreate on the water. Also, when densities increase, water-surface zoning and boater education can mitigate problems associated with the higher densities. However, the analysis is useful for boat density comparisons and potentials.

Many Midwest lakes already exceed safe boating capacities, and several Minnesota lakes have also reached that point (especially Metro lakes as boating intensities at peak times on weekend/holiday afternoons averaged about 20 acres per boat; Minnesota DNR 1999). For northcentral Minnesota, boaters's perception of congestion and crowding on the water went up between 1985 and 1998 (15 percent of boaters thought lakes were crowded in 1998, up from 5 percent in 1985, likely from the increase in size and horsepower of boats as lengths had

increased an average of two feet and motor sizes had nearly doubled for this time period). Naturally, local governments have responded to overcrowding with regulations for those waterbodies to promote safe enjoyment of these public spaces.

For example, Lake Minnetonka has an ordinance related to boating activity, including size of watercraft, no wake zones, quiet times, speed of watercraft, and docking. In addition, mooring areas and multiple dock areas are regulated on Lake Minnetonka so that boat density criteria and goals are obtained.

White Bear Lake also has a docking ordinance to deal with overcrowding. Recently, Wisconsin DNR discussed the merits of limiting boat docking to two boat slips per the first 50 feet of shoreline and one slip for each additional 50 feet of shoreline owned.

Local governments are also debating the wisdom of controlled access lots. Controlled access lots give access to public waters for owners of non-lakeshore lots. DNR has created many public boat launching facilities across Minnesota so that all of us have good public access to hundreds of fishing lakes. For northcentral Minnesota lakes, the majority of lakes (79 percent) had at least minimal public access in 1998, up from 66 percent with access in 1985. Thus, the often-cited reason for the allowance of these lots appears no longer relevant. Given that future development may result in potential overcrowding, the creation of additional controlled access lots appears inappropriate. In addition, the use of controlled access lots has recently become a serious issue in Minnesota.

The use of public accesses has changed since 1985. Public accesses are becoming more and more an asset that all lake interests take advantage of, including riparian residents and commercial boating-related interests. In 1998, for northcentral Minnesota accesses, riparian residents and resort-campground guests were estimated to account for nearly 40 percent of traffic through the public accesses, up from 17 percent in 1985. The reason for change in the use of public accesses was unknown, but one hypothesis is the increasing size of boats and motors, and the need to launch/land these boats at a well-designed access facility. Boaters give high marks to public access facilities for launching and landing a boat. Positive ratings (‘good’ to ‘excellent’) comprised 84 percent of boater ratings, while few boaters gave negative ratings (3 percent). The majority of all boaters (56 percent), and nearly half of riparian residents (46 percent) use additional lakes near the lake where they were surveyed. Access to these additional lakes is dominated by public access.

As noted in 1989, the use of controlled access lots was a serious issue in nearby states (Minnesota DNR 1989). This change is needed to address concerns that have recently surfaced in the state.

Subp. 1. Purpose.
This subpart was added to explicitly state the reasons for this part.

Subp. 2. Access lots.
The alternative standards simplify the existing control access lot provisions and limit this tool as a means to provide alternative sites for riparian property owners to access public waters when

access in front of their lot is unsuitable. The access lot standards are similar to the existing language, in that, if more than six riparian lots in a subdivision are to be served by an access lot, then the width of the access lot must be increased by 25 percent for each additional riparian lot in excess of six served.

In items B through G, provisions on the use and control of access lots are stated. As with the existing rules with controlled access lots, an access lot must be jointly owned by all of the riparian lots served. The alternative standards require that the site be suitable for its use. Items D and E list the permitted activities allowed at access lots. Finally, items F and G require that access lots follow the same standards related to shoreline buffers and stormwater management as other residential lots.

Subp. 3. Controlled access lots.
The alternative standards prohibit the creation of controlled access lots. This provision is needed to address boat safety concerns, and is reasonable in that several counties have adopted such controls in their ordinances (e.g., Crow Wing County).

Subp. 4. Easement or other access.
To be consistent with subpart 3, easements and other similar means that allow nonriparian lot owners access to public waters are also prohibited.

ALT6120.3700 RESORTS
Minnesota is blessed with hundreds of lake resorts. Families from across the country and abroad spend time at these wonderful places to connect with nature and reaffirm family ties.

Resorts provide us the opportunity to live near a lakeshore, even though it is usually for only a short time. Given the increasing cost of lakehome ownership, resorts represent an affordable way for many of us to explore our lakes. Minnesota resort vacations offer a range of activities, from viewing wildlife, swimming and waterskiing, catching fish, exploring nearby small communities, playing golf, to getting away from the daily routine. Accommodations range from suites to rustic cabins.

Minnesota resorts have adapted to changing vacation styles and demands. In the early 1900s, lake resorts hosted vacationing families and were often retreats for wealthy city dwellers. In the mid part of the last century, the typical up north resort consisted of small lakeside cabins to serve the simple and rustic needs of fishermen. Today, resorts cater both to middle-class and wealthy families seeking recreation in natural environments. Resorts have also adjusted to different lengths of vacation, from several weeks to the current average of four days today.

Resorts are also vital to our north central Minnesota economy. Resort visits annually generate millions of dollars to local economies, and resort guests contribute to the success of other businesses when they explore restaurants, shops, and local entertainment.

While there are several large resorts in the state, many of which are located in the Brainerd lakes area, 90 percent of the resorts in north central Minnesota have less than 20 cabins.

Approximately half the resorts are 10 acres or less in size, and most resorts are seasonal, being fully operational from May to September. Most resorts are also family businesses. Many of these entrepreneurs have gross sales between $25,000 and $100,000. While it is a hard job, there are considerable lifestyle and family benefits of owning a resort.

The increasing value of lakeshore property negatively affects resort properties. For some resorts the land value of the resort exceeds the value of the business. Add this factor to increasing operating costs from higher insurance and the necessity for more amenities for guests, resort owners face issues of sustainability.

Resort owners have told us about the need for flexible shoreland development regulations for Minnesota's resorts. Currently, resorts are classed as planned unit developments within Minnesota's shoreland development standards; thus, they are similarly classed in many local ordinances across Minnesota.

Given the cultural and economic value of resorts to the state, creating standards specific to resorts that give flexibility, while improving rainwater management and promoting natural shorelines, is beneficial. In addition, a review of county comprehensive plans found several references to policies supportive of existing resorts. For example, Crow Wing County's Comprehensive Plan states a strategy to retain existing resorts and to assist them with expansion and improvement to allow them to meet growing needs in a manner that doesn't degrade natural resources.

Alternative standards for resorts were created using an interest-based negotiation process (Fisher et al. 1991). State representatives met regularly with resort owners, resort industry representatives, and tourism officials to express interests and come to a consensus on reasonable standards for resort and campground owners that could be used across the state for a single standard. The State's interest was to craft standards that would provide meaningful measures that would preserve, restore, and enhance the quality of water and habitat; conserve the economic and natural environmental values of shoreland, and provide for wise use of water and shorelands by resort owners and their guests. The resort interests included: simple rules and standards, consistency in such standards across the state, flexibility to replace structures that are damaged by natural events, and to allow resort expansion where appropriate.

It is necessary to have a comprehensive definition of a 'resort' if one is to have specific standards for such developments. Resorts are not defined in the existing shoreland rules. The existing shoreland rules state that resorts are part of commercial PUDs. The existing commercial PUD definition is:

"Commercial planned unit developments" are typically uses that provide transient, short-term lodging spaces, rooms, or parcels and their operations are essentially service-oriented. For example, hotel/motel accommodations, resorts, recreational vehicle and camping parks, and other primarily service-oriented activities are commercial planned unit developments.

This definition was considered too broad for use as a definition for a resort. Therefore, other Minnesota Rules and Statutes were explored to suggest language that might be appropriate and

consistent with the policies declared in Minnesota Statutes for the development and use of shorelands of public waters (M.S. 103F.201).

Under Minnesota Statute (M.S. 157), the Department of Health commissioner adopts rules establishing standards for food and beverage service establishments, hotels, motels, lodging establishments, and resorts. The Department of Health's definition of a resort, thus, is as follows:

"Resort" means a building, structure, enclosure, or any part thereof located on, or on property neighboring, any lake, stream, skiing or hunting area, or any recreational area for purposes of providing convenient access thereto, kept, used, maintained, or advertised as, or held out to the public to be a place where sleeping accommodations are furnished to the public, and primarily to those seeking recreation for periods of one day, one week, or longer, and having for rent five or more cottages, rooms, or enclosures.

It was apparent that this definition was inadequate in regards to length of stay and it does not mention an important benefit of resorts to the state, namely, that resorts provide transient, short-term lodging to the public. Within M.S. 327.70 there is a definition of a hotel that includes resort within the definition, which is:

"Hotel" means a hotel, motel, resort, boarding house, bed and breakfast, furnished apartment house or other building, which is kept, used or advertised as, or held out to the public to be, a place where sleeping or housekeeping accommodations are supplied for pay to guests for transient occupancy.

This definition includes the phrase 'held out to the public'. Such a requirement within a definition is beneficial as one of the greatest assets of resorts is that they provide the public access to public waters, recreational opportunities on lakes and streams, and a base of stay for vacationers such that they may enjoy the natural resources in the shoreland.

The definition of transient, again for the purposes of the Department of Health, from M.S. 327.70 is:

"Transient occupancy" means occupancy when it is the intention of the parties that the occupancy will be temporary. There is a rebuttable presumption that, if the unit occupied is the sole residence of the guest, the occupancy is not transient. There is a rebuttable presumption that, if the unit occupied is not the sole residence of the guest, the occupancy is transient.

There was a need to define a limit to a length of stay for residential use in a resort (except for the resort owners and operators), where residential use is defined in M.S. 515B1-103 as:

"Residential use" means use as a dwelling, whether primary, secondary or seasonal, but not transient use such as hotels or motels.

There were two competing limits on the length of stay for residential use that were discussed and debated. First, U.S. Internal Revenue Service rules and U.S. tax code considers that if you use

your property more than 14 days a year or more than 10 percent of the rental days (whichever is greater), the property is considered a home for tax purposes (and you must pay tax on any rental income). A principled approach would then conclude that such dwelling units should meet the residential use standards of the alternative standards. However, the second limit is in Minnesota Statutes (M.S. 469.190), which allows the imposition of a tax for lodging at a resort for stays less than 30 days. An agreement was reached for a 30-day limit on the length of stay for residential use.

If a resort sold off dwelling units for residential use, there was an agreement reached in negotiation to limit such residential use so that the primary use was still for the public. Therefore, the alternative standards include a definition of a 'share-interest community' (often referred to as shared-capital resorts, but the definition developed for the alternative standards apply when any residential use exceeds 30 days), which would not be defined as a resort but rather as a planned unit development. In the alternative standards, other developments such as cooperatives, condominiums, and common interest communities are also treated as planned unit developments. The definitions for these developments used in the alternative standards come from or are derived from M.S. 515B.1-103.

Based on elements of the above definitions and negotiation, the following definitions were approved by the Advisory Committee:

A. "Resort" means a commercial establishment that includes buildings, campgrounds, lodges, structures, dwelling units/sites, enclosures or any part thereof kept, used, maintained or advertised as, or held out to the public to be a place where sleeping accommodations are furnished to the public and primarily to those seeking recreation, for periods of one day, one week, or longer, and having for rent three or more cabins, rooms, campsites, or enclosures. These establishments must be primarily service-oriented for transient lodging of guests. All cabins, rooms, dwelling units/sites, or enclosures must be included in the resort rental business. Resorts allow no residential use of a dwelling unit/site for more than 30 days within a calendar year, except dwellings used as residences for the service providers or dwelling units/sites for renters. In order to qualify as a resort pursuant to this definition, a resort shall also be fully licensed and permitted under appropriate state and local regulations. The entire parcel of land must be controlled and managed by the licensee.

In the alternative standards, a campground is defined as a development that is used for the purpose of providing sites for non-permanent overnight use by campers using tents, trailers, recreation camping vehicles, or other temporary shelters. However, there can be non-resort campgrounds, that is, campgrounds that are not consistent with resort definition. Such developments are then considered planned unit developments. The same principle applies to youth camps, which are defined in the alternative standards as establishments organized, developed, managed, and operated under supervision for the primary purpose of education, recreation, health, or similar purpose for young persons less than 21 years of age, and these establishments must be primarily service-oriented for transient lodging of youth.

B. "Planned unit development" means a method of land use or development characterized by a unified site design for a number of dwelling units or dwelling sites on a parcel, whether for sale,

rent, or lease, and that incorporates clustering of these units or sites to provide areas of common open space, and a mix of structure types and land uses. These developments may be organized and operated as residential or commercial enterprises such as individual dwelling units, townhouses, condominiums, time-share condominiums, cooperatives, common interest communities, shared-interest communities, apartment buildings, non-resort campgrounds and youth camps, recreational vehicle parks, manufactured home parks, hotels, motels, or any combination of these. Planned unit developments shall also include any conversion of pre-existing structures and land uses in order to utilize this method of development.

C. "Shared-interest community" means real estate that is subject to an instrument which obligates persons owning a separately described parcel of the real estate and occupying a part of the real estate pursuant to a proprietary lease or covenant for residential use for more than 30 days within a year, by reason of their ownership or occupancy, to pay for real estate taxes levied against, insurance premiums payable with respect to, maintenance of, or construction, maintenance, repair or replacement of improvements located on one or more parcels or parts of the real estate other than the parcel or part that the person owns or occupies.

Subp. 1. New resorts.
The alternative standards require that new resorts be permitted only as a conditional use in an appropriate district for their use. Second, new resorts are not allowed on special protection, natural environment land or shorelands, and within sensitive area districts. These areas are vulnerable to heavy use, and it is reasonable to limit such use in these areas.

Items A through G state standards that local governments must use for the creation of new resorts. First, the information requirements must be the same as for planned unit developments, and they must meet most of the planned unit development design criteria. Density evaluation steps must follow those in subpart 5, except for recreational campgrounds where each mobile home, recreational vehicle and camping site must be assessed at least 2000 square feet as the land surface area covered by structures (instead of the minimally assessed value of 400 square feet as in subpart 5). The 2000 square foot value is consistent with M.R. 4630.0400 for recreational camping areas. Structures must meet setbacks of those in the planned unit development section, and no structures can exceed 30 feet in height of building.

Like other developments, new resorts must meet the revised erosion control and stormwater management standards. All resorts, including new resorts, shall not have impervious surface coverage that exceeds 25 percent with the total project or in any tier, except for general development lakes the second and third tiers cannot have impervious surface coverage in excess of 35 percent provided that the total project area imperviousness does not exceed 25 percent.

There is a provision to prohibit garages and other storage structures associated with dwelling units/sites, parking adjoining most dwelling units, and other amenities that would encourage long-term residential use.

Subp. 2. Structure replacement within an existing resort.
This subpart specifies provisions that local governments must include to allow resorts to maintain and replace structures without regard to available density. Replacement structures

cannot be placed closer to the waterbody, and they must meet elevation and maximum height requirements for the shoreland class. For resorts created before the adoption of the alternative standards, their replacement structures that do not meet the structure setbacks in ALT6120.3300, Subp. 3, must only be replaced with structures of the same height or lower. Most importantly, the replacement structure footprint cannot be larger than the original structure, except to minimally meet other building codes or when the original structure was inside the shore impact zone and the replacement structure is to be placed outside the shore impact zone and moved landward to the maximum extent possible in the first tier (however, the increase cannot result in exceeding density as calculated in subpart 5).

To address the runoff associated with replacement structures or within the development, two provisions are stated. First, a portion of the shore impact zone must be restored or maintained in a natural condition with plans approved by the local government. Item B lists the standards for these buffers, which are needed to protect water quality. Second, erosion control and stormwater management plans must be approved by the local government and effectively implemented. Large resorts, those with 20 or more dwelling units, have higher standards. This is reasonable as the consequences of poor rainwater management on larger developments are likely to be greater.

Subp. 3. Resort expansion.
This subpart states the standards for resort expansions. First, they must have available density, as calculated in subpart 5. Second, the impervious surface coverage limits cannot be exceeded. Third, the new structures must meet structure setback and height standards (for existing resorts those standards are in ALT6120.3300, Subp. 3, and for resorts created after the adoption of the alternative standards, those structure setback standards are found in the planned unit development section, ALT6120.3800, Subp. 3). Fourth, no garages or storage structures can be associated with the new dwelling units/sites (or other such amenities that encourage long-term residential use). Fifth, water supply and sewage treatment system must be designed and installed to meet code, and if necessary, a marina permit is obtained. Finally, there are provisions related to erosion control and stormwater management. These provisions vary based on the resulting resort size and amount of impervious surface coverage. Resorts that will have higher percentages of impervious surface covers or higher dwelling unit counts have higher standards. These provisions are found in items G through I.

Subp. 4. Shoreline recreational facilities for resorts.
These standards are similar to the existing planned unit development rules, with a few exceptions. First, instead of mooring space determined by the allowable dwelling units in the first tier, continuous docking space for resorts is limited to use by transient, short-term lodgers. It is assumed that dockage on resorts is self-regulating, that is, a resort owner only puts out as many docks that will be used by the guests. Second, the resort licensee may have one dock for personal use. All shoreline facilities must also comply with M.R. 6115.0210. Finally, non-lodger vehicles that use resort launching ramp facilities must be screened from view by vegetation or topography, as much as practical.

Subp. 5. Resort development density evaluation steps.
This subpart states the standards and methodology for determining how much of the land surface within the resort can be covered by structures (the calculations must include all structures on the

resort; dwelling units, residences, storage buildings, etc.). The methodology has been simplified from the existing rules. For example, there is a maximum of three tiers, and instead of floor area ratios, simple ratios are used. This latter change allows resorts greater flexibility in dwelling size, and it does not punish resorts with smaller dwelling units. Simple ratios are easier to understand and administer. The total land surface area that can be covered by structures is determined by multiplying each tier area (excluding wetlands, bluffs, and land below the ordinary high water level) with its corresponding multiplier, based on shoreland class.

For example, a resort on a recreational development lake may have up to 7.5 percent of the area within the first tier covered by structures (allowance after all wetlands, bluffs, and land below the ordinary high water level subtracted from first tier area). The cumulative area covered is what's important, not the number or size of units. For existing resort campgrounds, each new dwelling site must be minimally assessed 400 square feet as the land surface area to be covered. There is a density bonus for general development and recreational development lakes with more that 50 percent of the lake's shore impact zone permanently protected in natural state or if the resort exceeds the design criteria of ALT6120.3800, Subp. 5, item A.

Subp. 6. Conversions.
Resort conversions have recently been a serious issue with the public. Citizens are concerned about the creation of nonconforming lots that may jeopardize or degrade water quality or the environment. Conversions, as specified in this part, mean that once a resort ceases to be a resort, the property must be converted to a planned unit development or residential lots using the same procedures and standards as if it were a new development (with the only exception being that a deficiency in suitable area for a conversion to residential lots may be mitigated).

Subp. 7. Administration and maintenance requirements.
This subpart provides standards for issues that will likely become increasingly important, especially as other business models are explored and adopted within the resort industry. First, a local government must adopt controls that determine if a resort is operating as a resort as defined. Such provisions include requirements that resorts submit annual reports to the local government, demonstrating residential or personal use within the resort. Such provisions are reasonable, and at least one county has such controls (Crow Wing County). Second, the local government should adopt controls that allow for the determination of covenants or deed restrictions for an establishment as to whether they comply with the definition and standards of a resort. Third, local governments should have controls that require resorts to inform investors of potential risks and that these notices are deed recorded on the parcel specifying that dwelling units may be required to be moved or removed to be in compliance with subpart 6, should the resort cease to exist. Finally, shoreland vegetation must be preserved, restored, and maintained in accordance with a local government approved shoreland vegetation plan.

Subp. 8. Technical review.
This subpart provides provisions for a technical review of new resort and large resort expansion plans via the DNR.

ALT6120.3800 CONSERVATION SUBDIVISION AND PLANNED UNIT DEVELOPMENTS

Minnesota's current planned unit development standards (PUD) are not preserving our shoreland assets. PUDs, which were encouraged under Minnesota's 1970's-era shoreland development standards, allowed greater home densities along the lake with the expectation of preserving open space. Unfortunately, these rules have given us higher densities near the water, with few useful natural features preserved for recreation or wildlife habitat. The existing open space standards for PUDs are ambiguous and weak, such that developers note that if it is not a structure then it is open space.

One good development alternative is conservation subdivisions (Arendt 1996, 1999, 2000). This method of development is characterized by clustering homes adjacent to permanently preserved common open space. Conservation subdivisions are similar to golf course developments. First, critical natural areas and community recreational areas are identified and protected. Then, buildable areas are identified and a majority of the lots and homes are clustered around these protected areas.

Conservation subdivisions have additional benefits. They create a greater sense of community and they allow more interaction with the outdoor environment. People find these developments more attractive than conventional subdivisions (Nassauer 2004). Open spaces provide walking and biking trails, play areas, and community gathering places. Protected natural areas mean lower development costs, preservation of wildlife habitat, and less pollution runoff into lakes and wetlands.

Developers can still build at full residential densities, and they often sell lots at a premium because many of us prefer living next to permanently preserved open space. Development costs are also 12 to 20 percent lower for conservation subdivisions (Caraco et al. 1998). Bielinski Homes, a large Wisconsin developer, has found that total development costs are typically 15 to 25 percent less with conservation subdivisions over conventional subdivisions. The company has also found that the greater site appeal of conservation subdivisions garners premiums 25 to 30 percent per lot. Development costs are lower for conservation subdivisions due to much less mass grading and also due to shorter and narrower street pavements than conventional subdivisions.

Several studies have shown that homes in conservation subdivisions appreciate in value more rapidly than homes in conventional subdivisions. Lacy (1991) compared two subdivisions in Massachusetts that were built at about the same time, with similar houses that originally sold for similar prices; the key differences between the subdivisions were lot sizes and natural amenities. The houses on smaller lots were located in a community with 36 acres of open space, while the houses on larger lots were in a district with little open space. After twenty years, Lacy found that the smaller lots had appreciated to values 13 percent higher than the properties that were twice their size; the price differential was attributed to the neighborhood open space. The National Park Service (1993) found significant positive affects of open space amenities on residential property values (see Appendix E in Arendt 1996).

All this leads to both higher property values and higher community value, which strengthens local economies. In addition, these developments do not require public entities or charities to establish open space areas for our communities. The first conservation subdivision in Minnesota was developed in the mid 1990s in the community of Lake Elmo. There are now about 20 conservation subdivisions in Minnesota, and about 10 are currently being proposed in the Twin Cities area this year.

The major reasons for incorporating conservation subdivision developments in the alternative standards (with promotion over conventional subdivisions) are to protect natural resources. Conservation subdivisions can be a valuable tool for protecting water quality and wildlife habitat. These developments have less impervious surface coverage than conventional subdivisions of the same size, since houses are clustered on only a portion of the land. Also, vulnerable natural features can be incorporated within the open space, instead of being a part of someone's lot, as with conventional subdivisions. Berke et al. (2003) evaluated 50 matched pairs of conservation and conventional developments across the United States and found that the new urban development practices (e.g., conservation subdivisions and communities designed with low impact development practices) were more likely to protect and restore sensitive areas, restore degraded stream environments, and provide a more compact alternative to sprawl than conventional developments. Large conservation subdivisions have the potential to protect some important wildlife habitat in the shoreland. And if planned in unison with neighboring developments or in context of a comprehensive plan, such developments can preserve corridors that facilitate movement of animals between high quality habitat areas (Arendt 1996).

In a study comparing conservation and conventional subdivisions, streams downstream of conservation subdivisions had lower concentrations of total suspended solids, phosphorus, and nitrate than those downstream of conventionally developed catchments (Nassauer et al. 2004). The Center for Watershed Protection (Caraco et al. 1998) estimated that phosphorus runoff and export may be reduced 60 percent and nitrogen export may be reduced 45 percent using conservation subdivisions and better site designs over conventional developments.

Conservation subdivisions also reduce long-term maintenance, since infrastructure is reduced. More compact layouts result in shorter sewer and water connections and arterial roads. Public service costs of compact conservation designed developments are 4 to 8 percent lower than the cost for large lot developments (Center for Watershed Protection 1996). And, depending on how open space is incorporated into the site design and how stormwater is managed, construction and infrastructure cost savings are between 11 and 66 percent (Center for Watershed Protection 1998).

PUDs were envisioned to achieve the same benefits as conservation subdivisions; however, the 1970's-era open space standards were ambiguous and weak. Thus, many of the open space amenity benefits were never realized.

Many people, including the Advisory Committee members, sought higher standards for PUDs. Most significantly, the alternative standards incorporate elements from a new and better approach to residential development. That new approach is conservation subdivisions. Conservation subdivisions are an important tool used elsewhere to provide better lots for

homeowners while protecting water quality, promoting economic development, and creating open space for recreational use, wildlife, and preserving riparian buffers. Second, to address the now realized shortcomings of the existing PUD standards, the alternative standards have new provisions for PUDs that:

- Define 'clustering' or 'clustered';
- Define and specifies the quality of open space standards (Subp. 5);
- Clarify the PUD definition;
- Increase structure setbacks (Subp. 3);
- Set a 15 percent impervious surface coverage limit for the total project area and the first tier;
- Allow only residential densities without any density bonuses.

Conservation subdivisions have the same standards as PUDs, with the following exceptions:
- Where sewer unavailable, must establish dedicated areas for septic systems or establish a system to serve the entire subdivision;
- At least 1 access corridor to the shoreline with a width greater than 50 feet;
- Riparian lots (i.e., lots in first tier) must meet the lot standards in ALT6120.3300, Subps. 2a and 2b;
- For nonriparian lots, the standards in ALT6120.3300, Subps. 2a and 2b become maximum lot size and lot width standards for second and third tier lots;
- Sets a 15 percent impervious surface coverage limit for riparian lots and 35 percent limit for nonriparian lots.

Appendix D shows an example of a conservation subdivision on a recreational development lake, and Appendix E shows a comparison between an existing PUD and a PUD development that uses the alternative standards.

In addition, the alternative standards include density disincentives for conventional subdivisions. Therefore, developers who do not include community open space would need to use significantly larger lots for their developments. These provisions are needed to address the shortcomings of the existing rules for PUDs and to foster the use of conservation subdivision. They are also reasonable, as elements of these changes are found in local ordinances across the state and nation. A summary of changes by subpart follows.

Subp. 1. Scope of provisions.
This subpart was edited to include conservation subdivisions. Subpart 2 of the existing rule (land use district designation) was eliminated as residential densities are required for all PUD developments, although commercial enterprises that are PUDs would still need to be placed in appropriate districts and any conditional use must be identified.

Subp. 2. Information requirements.
To allow developers an opportunity to understand the review process and community interests, the alternative standards encourage local governments and developers to hold discussions prior to addressing the information requirements outlined in this subpart. The added information requirements in the alternative standards are needed and their use can be found in local governments across the state. Arendt (1996) discusses the importance of mapping the features of

the parcel, and he details the four-step design process. Developers, in creating conservation subdivisions in Minnesota shorelands, should use these techniques and local government ordinances should require such techniques.

Subp. 3. Dwelling unit or site density evaluation.
In item A, the number of tiers was reduced, as stated in ALT6120.3700 for resorts. In addition, the sewered area tiers were eliminated, which is consistent with the elimination of sewered residential lot dimension standards in ALT6120.3300, Subp. 2a and 2b.

For item B, suitable area is defined as the area remaining on a lot or parcel of land after bluffs, areas with slopes greater than 25 percent, all easements and rights-of-way, historic sites, wetlands, land below the ordinary high water level of public waters, and all setback requirements, except the ordinary high water level structure setback, are subtracted. Also in item B, clarification is provided to local governments on the issue of overlapping tiers (e.g., shoreland in two different classes, like a parcel that straddles two lakes). Consistent with DNR policy, the alternative standards state that where such conditions exist that topographical divides should be used to determine which shoreland standard would apply, and where this is not possible, the most restrictive rules for the area should be used.

Item C states the standards for minimum structure setbacks. These developments have increased setbacks over existing standards. Such setbacks are currently being used across the state and are reasonable.

Subp. 4. Conservation subdivision and planned unit development density calculation.
The rules for calculation of density were simplified, such that the maximum number of dwelling units/sites is equal to the suitable area in the tier divided by the single residential lot size standard for the shoreland class in part ALT6120.3300, Subps. 2a and 2b. The riparian lot size standard should be used for calculations of maximum dwelling units/sites for the first tier, and the nonriparian lot size standard should be used for the second and third tier calculations.

Subp. 5. Development criteria.
Item A requires the parcel for conservation subdivisions and PUDs be at least 3 contiguous acres of buildable area with a lot width of 400 feet, versus the existing requirement of at least five dwelling units/sites. Such parcels are often subdivided as minor subdivisions, and given the additional standards for conservation subdivisions and PUDs compared to minor subdivisions, it is reasonable to set a minimum size to reduce administrative burdens of such small parcels.

The quality and quantity of common open space is specified. Common open space is defined as a portion of a development site that is permanently set aside for public or private use, is held in common ownership by all individual owners within a development, and will not be developed. Common open space shall include wetlands, upland recreational areas, wildlife areas, historic sites, and areas unsuitable for development in their natural state. The shore impact zone and any bluff impact zones must be included as common open space. For conservation subdivisions, there must be at least one access corridor in an upland area to the shore impact zone common open space for use by all members of the owners' association. The width of access corridor must exceed 50 feet.

The alternative standards state the quantity of open space required. At least 50 percent of the total project area must be permanently preserved as common open space. Common open space must include areas with physical characteristics unsuitable for development in their natural state and areas containing significant historic sites or unplatted cemeteries. At least 75 percent of the common open space must be upland area. At least 33 percent of the common open space must be retained in a contiguous area. Such open space standards are needed to guarantee that this amenity is of value to the community and not fragmented such that the use of that space by community members is inhibited. Open space maintained in a natural condition costs up to five times less to maintain than lawns (Schueler 2000) and provides important wildlife habitat.

The quality of the common open space is determined by specifying what should not be included in the calculation. The land area of all dwelling units/sites and accessory structures, the space between buildings in a cluster, an area of 25 feet around each structure, all road rights-of-way, and all land covered by impervious surfaces, road surfaces, parking areas, or structures, cannot be included in the computation of common open space. Appendix F shows an example of a PUD and areas that cannot be counted as common open space.

As with resorts, conservation subdivisions and PUDs must have a local government approved and effectively implemented shoreland vegetation buffer plan meeting the shoreline buffer standards.

Dwelling units/sites must be clustered. Clustering, or clustered, is defined as a development pattern and technique whereby structures or building sites are arranged in close proximity to one another in non-linear groups, adjacent to permanently preserved common open space, so as to make efficient and visually aesthetic use of the natural features of the landscape, and maximize visualization of permanently preserved open space. Better site design incorporated into these standards reduces imperviousness by promoting use of pervious surfaces, shared driveways, narrower streets, and maximum road setbacks for house-fronts.

Low-density residential street widths should be 22 feet or less. Alternative turn-arounds could be used, as well as looped road-ways, instead of cul-de-sacs. Several national engineering organizations have recommended residential streets as narrow as 22 feet in width (ASCE 2001; ASSHTO 1994). Wide residential streets are created by blanket applications of high volume and high speed design criteria, the perception that on-street parking is needed on both sides of the

street, and the perception that they provide unobstructed access for emergency vehicles. Local governments should use other valid and safe road standards that do exist besides the traditional, yet excessive, standards used today. Communities have a significant opportunity to reduce impervious cover by revising their street standards, where appropriate, to use narrower widths for many residential streets. In addition, narrow residential streets have been shown to be the safest, as they slow traffic and reduce vehicular crashes (Swift 1997).

Streets should not be wider than is necessary to meet projected traffic demands and to provide emergency vehicle access. The use of queuing streets (or single-loading streets) is one technique for reducing street width. Traditional streets are composed of two travel lanes with parking aisles on either side of the road. Queuing streets have one designated travel lane and two queuing lanes that can be used for travel or parking. Wider streets not only create more impervious surface cover, which increases runoff and reduces water quality, but because traffic tends to move faster they can also be less safe for both motorists and pedestrians. In addition, vegetated swales should be encouraged as an alternative to curb and gutter (also to meet the stormwater management standards in ALT6120.3300, Subp. 11).

Local governments should encourage alternatives to cul-de-sacs, such as looped roads and hammerheads, and where not possible, require a pervious island in the center of a cul-de-sac to reduce the amount of impervious surface. With proper grading of the island, this area could also provide stormwater drainage. Many communities require the end of cul-de-sacs to be 50 to 60 feet in radius, creating large circles of needless impervious cover. One option is to reduce the radius of the turnaround bulb, for example, several communities have ordinances that require smaller radii, which range from 33 to 45 feet.

Local governments should set some controls for maximum road setbacks for house-fronts (suggested setbacks may range from 20 to 40 feet). These changes minimize driveway lengths and reduce overall lot imperviousness. Smaller front and side setbacks are also essential for open space designs. These setback requirements allow developers to create attractive, compact lots that are marketable and livable. Porous pavers, narrower driveways, or shared driveways can sharply reduce the typical 400 to 800 square feet of impervious cover created by each driveway.

For conservation subdivisions, riparian lot (i.e., first tier lot) standards shall meet the minimums in part ALT6120.3300, Subps. 2a and 2b, and lots shall not extend into the shore impact zone. For conservation subdivisions, the nonriparian lot (i.e., second and third tier lot) standards that apply are the lot size and lot width standards in part ALT6120.3300, Subps. 2a and 2b; however, these are maximum lot size and lot width standards for these developments, not minimum lot size and lot width standards. Requiring maximum lot sizes for lots in the second and third tiers, instead of minimum lot sizes, allows the developer to use compact lots to meet the open space standards and to protect sensitive area and important natural resource features on the parcel.

Minor edits were made in the shore recreational facilities section. The alternative standards still limit the number of spaces provided for continuous mooring or docking of watercraft to the number of authorized dwelling units/sites in the first tier. Language is clarified to stress the centralized nature that these facilities must have. Temporary docking, or day use docking, should not consist of anything more that a single dock space or area. The intent of day use is something like a public boat access site, that is, a place to dock for a short time to either pick something up or to remove a boat from the water. Individual docks are not allowed, except if a waterbody does not have a public access, then, a launching facility with a small dock is allowed.

All structures, parking areas, and other facilities must meet or exceed structure setbacks in subpart 3, item C, and must be treated to reduce visibility as viewed from public waters and adjacent shorelands. The need is to reduce the possibility of runoff from the surfaces reaching public waters and to maintain scenic quality.

Erosion control and stormwater management for developments must meet the standards in part ALT6120.3300, Subp. 11. For PUDs, the impervious surface coverage cannot exceed 15 percent in either the total project area or the first tier. For conservation subdivisions, the impervious surface coverage for lots must meet the standards in part ALT6120.3300, Subp. 11, which sets a 15 percent impervious surface coverage limit for riparian lots and 35 percent limit for nonriparian lots. The higher limit for nonriparian lots is needed due to the fact that these lots are compact by nature, and this limit gives the property owner the ability to build equivalently sized structures to other property owners in the shoreland. Erosion control and stormwater management must be designed by certified personnel in erosion and sediment control using the best management practices found in the latest Minnesota stormwater best management practices manual, approved by the local government, and effectively implemented.

Additions and edits were made in item B to provide greater guidance on administration, maintenance, and operation of PUDs so that the preservation of open spaces is perpetual by prohibiting changes that will alter vegetation, topography, and water quality.

Item D deals with conversions of existing commercial PUDs, other land uses, and facilities to be converted to residential developments. Conversions as specified in this item mean that the property must be converted to a PUD or residential lots using the same procedures and standards as if a new development.

Subp. 6. Commercial planned unit development density evaluation steps and design criteria. This subpart was eliminated, and all PUDs must use residential densities.

ALT6120.3900 ADMINISTRATION

This subpart includes details on such things as variances and conditional use permits. These concepts are confusing to many people. First, some background is provided to explain these concepts.

What is a variance, when can it be granted, and what conditions may be imposed on a variance to protect adjacent property owner values and the public interest?

A variance is a process that governments use to give citizens the permission to break their own zoning ordinance rules for reasons of exceptional circumstance. Variances can only be granted when they are in harmony with the intent of the ordinance. In Minnesota, granting of variances also depends on determination of undue hardship. Undue hardship, as defined by Minnesota law, requires three conditions.

First, the property can't be put to a reasonable use if used under conditions of the ordinance. For example, if a substandard lot was created, you perhaps would not receive a variance to build a lakehome because you could still reasonable use the lot as a picnic site and a place to access the lake. Alternatively, should a property owner have a 25,000 square foot lot where 30,000 square foot lots are required, a variance to allow a building site might have a good chance of being granted.

Second, undue hardship means that your predicament is due to circumstances unique to the property, not something you created. For example, you built a lake cabin on the lot so that the place you wish to now build your garage or addition would be closer to the lake than the required setback. You created this dilemma, and a variance might not be granted. Whereas, say a small wetland was in the middle of your lot and you requested a variance such that you could build your cabin closer to the lake than the required setback. Here, since your predicament is due to the natural character of your lot, you might receive a variance.

Third, if a variance was granted, it would not alter the essential character of the locality. For example, you wish to build a large, tall home on the lake that would exceed the maximum height of structures allowed of 35 feet. If the character of development in the area is mostly single story homes less than 35 feet, it is possible that a variance might not be given since a large, visually dominating structure might be perceived as altering the character of the area.

The above three conditions must be considered and applied to each variance request. The burden of establishing undue hardship rests with the person requesting the variance. And under law, economic or financial hardship alone does not constitute a hardship.

In addition, no variance can be granted that would allow any use that is prohibited in the zoning district in which the property is located. For example, you could not receive a variance to allow commercial use in a residential district that prohibits commercial uses.

A Board of Adjustment grants or denies variance requests. People who serve on these boards deserve a lot of respect. They must make difficult, impartial decisions that are often subjective. They must determine the facts, apply the criteria in the ordinance, examine alternatives, consider conditions, make a reasoned and objective decision, and document the process. Board decisions have important consequences. Zoning ordinances and their compliance over time define a community, and, when done right, they can increase the economic and natural resource value of an area.

To mitigate water quality impacts of shoreland development and to protect adjacent property values, the Advisory Committee recommended various conditions be attached to variances. Clarifying the use of variances appears to be needed and the additions to this subpart are reasonable.

Subp. 2. Variances.
In item A, the alternative standards prohibit the granting of variances for two additional reasons. First, a variance should not be granted for lots created after the enactment of these standards that do not meet the minimum lot dimension standards in part ALT6120.3300, Subps. 2a and 2b, except variances for lots of record may be granted provided that the standards in part ALT6120.3300, Subp. 2, item D, are met. There is a need to reduce the creation of nonconforming lots. Second, to protect water quality, a variance should not be given to exceed the impervious surface coverage standards on lots that meet the minimum lot dimension standards in part ALT6120.3300, Subps. 2a and 2b without mitigation using best management practices that may include filter strips, infiltration basins, rain gardens, and other conservation designs found in the latest PCA stormwater best management practices manual.

Appendix G has various mitigation systems used by local governments and a model mitigation scoring system that may be used for this subpart and for ALT6120.3300, Subp. 2, item D (variances for structure setbacks on lots of record).

Item B reiterates the allowable reasons for determining of variances requests. Granting of variances is dependent on determination, by reason of exceptional circumstances, of undue hardship. Undue hardship is defined in this item. And it is noted that variances can only be granted when they are in harmony with the intent of the ordinance and they are consistent with the local government's comprehensive plan.

Item C imposes conditions on the issuance of any variance. First, a certificate of compliance for the septic system must be presented. Second, the shore impact zone or restoration of the shore impact zone must meet the shoreline buffer standards in part ALT6120.3300, Subp. 4. Third, where issuance of the variance will likely alter the hydrology of the parcel or where the land surface covered by structures exceeds or will exceed 5,000 square feet, erosion control and stormwater management plans for the parcel must be approved by the local government and effectively implemented. Fourth, the impervious surface coverage shall be brought into compliance, or if not possible, to the maximum extent practicable with the impervious surface coverage requirements of part ALT6120.3300, Subp. 11. For residential properties that will exceed 20 percent impervious surface coverage, a properly designed stormwater pollution prevention plan must be approved by the local government and effectively implemented.

Subp. 3. Conditional uses.
The same conditions for variances are also required for conditional use permits.

Supb. 4. Nonconformities.
What is meant by 'an increase in nonconformity of a structure' is added. An increase in nonconformity of a structure means additional deviation from the standards creating the noncomformity, such as but not limited to, reduction in setbacks, structure additions in the shore

impact or secondary shoreline buffer zones, increased in impervious surface coverage above the limit, or increase in height of a structure above standards. With regard to setback and shoreline buffer standards, an increase in nonconformity means (1) any expansion of structure in the shore impact zone, and (2) any expansion of structure in secondary shoreline buffer zone lakeward or in width as measure parallel to the shoreline.

Subp. 8. Shoreline steward program.
Local governments may establish shoreline protection incentive programs. As the late psychologist B.F. Skinner (1987) noted, we often need contrived reinforcements for good behavior. Good shoreline stewardship criteria are listed that local governments could use. Burnett County, Wisconsin, was the first local government to create and use a property tax incentive program to restore shoreline buffers (see http://www.burnettcounty.com/burnett/lwcd/).

In 1998, prior to comprehensive planning legislation, Burnett County adopted a land use plan with comprehensive planning elements. The county also received a $250,000 Lake Protection Grant from the Department of Natural Resources and began to implement the plan. Through a survey of shoreline property owners, University of Wisconsin-Extension identified interest in voluntary incentive-based preservation of lakes in addition to a regulatory approach, to get individuals and groups to enter a shoreland protection program.

The Burnett County Land and Water Conservation Department administers landowner agreements for the Burnett County Natural Shorelines Program. The county requires that a natural zone of vegetation at least 35 feet wide be left intact next to the water. However, on many shoreline parcels, the protective zone of vegetation has been removed or greatly altered. Under the voluntary restoration program, property owners with lake easements are offered technical and financial assistance to restore their shoreline and reestablish the buffer zone.

If the vegetation along a property owner's shoreline hasn't been altered except for minimal clearing to allow access to the lake, they are urged to maintain it. If the shoreline has been cleared extensively, financial and technical assistance are available to reestablish native vegetation. While shoreline regulations preclude the removal of vegetation and in some instances require replanting the shoreline, the Burnett County Natural Shorelines Program asks for an additional voluntary commitment by owners through placing a covenant on their property stating that the shoreline will remain natural.

This covenant allows a 30-foot wide viewing and access corridor to the lake or river. Following an initial inspection that certifies the property meets program standards, participants in the Natural Shorelines Program receive a $250 property tax credit the first year, with $50 credit each year after. Owners are identified as a natural shoreline supporter with a small sign placed at the shoreline.

The program is a partnership between University of Wisconsin-Extension, the Burnett County Land and Water Conservation Department and the Wisconsin Department of Natural Resources. The Land and Water Conservation Department works with University of Wisconsin-Extension to develop conservation programs in the county, then administers the program and provides technical assistance. Since the Burnett County Natural Shorelines Program began in 2000, there

have been preservation and restoration projects successfully completed on 507 properties. Over five years, a total of $290,000 of grant funds was leveraged, primarily from the state to complete the restorations. To date, the amount of Burnett County shoreline protected can be measured by linear footage, which totals 195,956 feet, or about 37 miles of shoreline. The total square footage of shoreline restored to buffer zones is 91,334, or about 2 acres, which is a significant amount when viewed as a cumulative total of 35 to 75 feet of buffer per lot.

Local governments are encouraged to explore this example.

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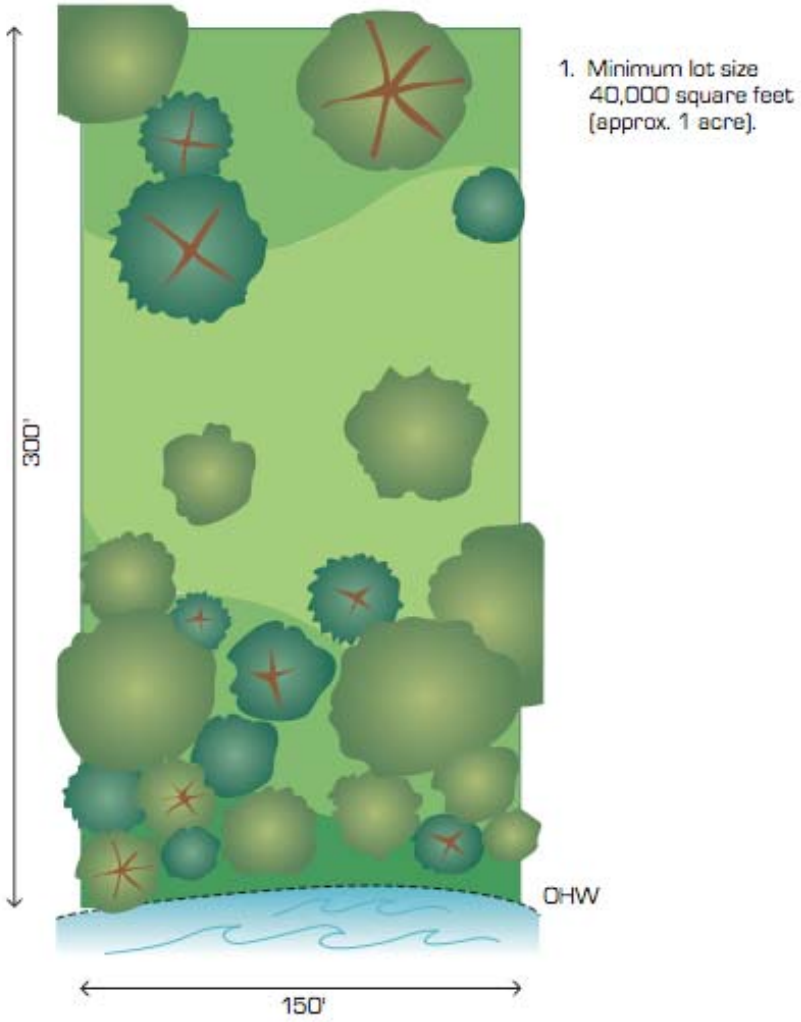
Appendix A. Condition of the shoreline buffer zone for a residential property on a recreational development lake as allowed by the alternative standards.

Shoreline Buffer Standards for Recreational Development Lot

Sample lot: 45,000 square feet, 1+ acre

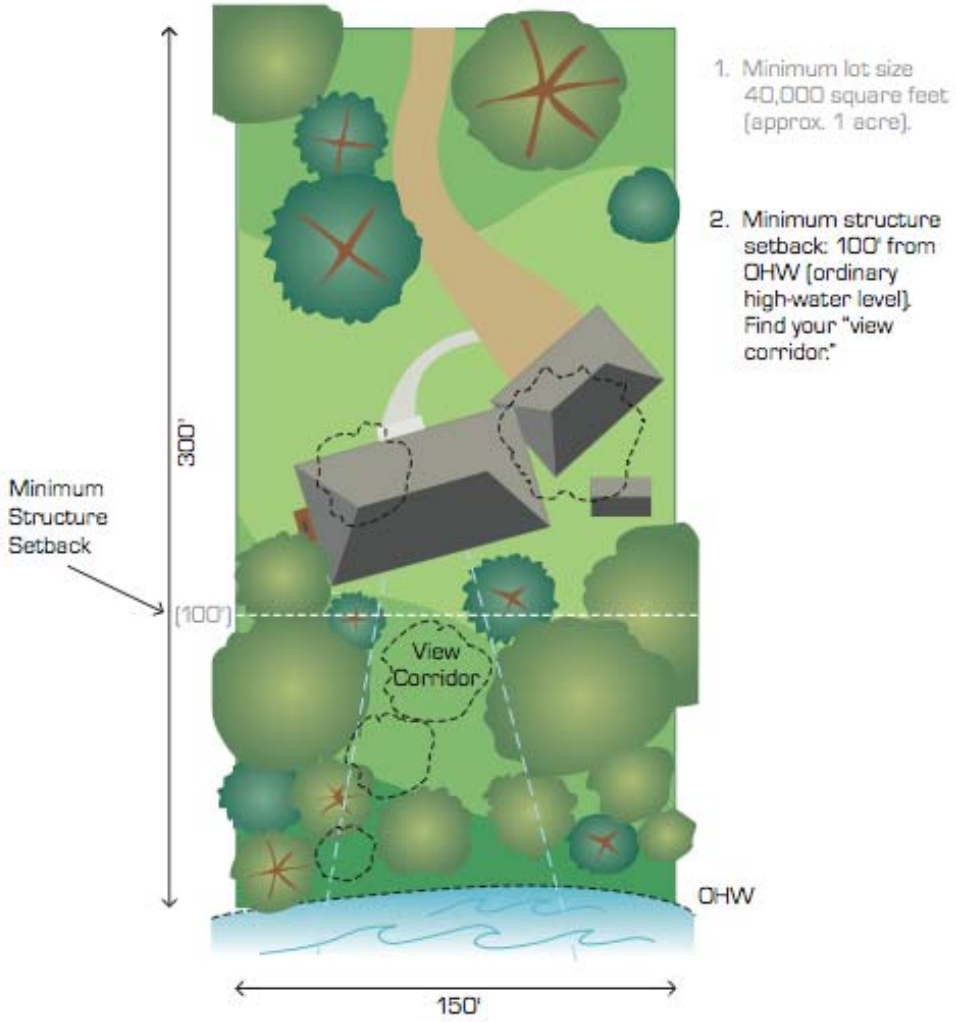
Diagram 1



Shoreline Buffer Standards for Recreational Development Lot

Sample lot: 45,000 square feet, 1+ acre

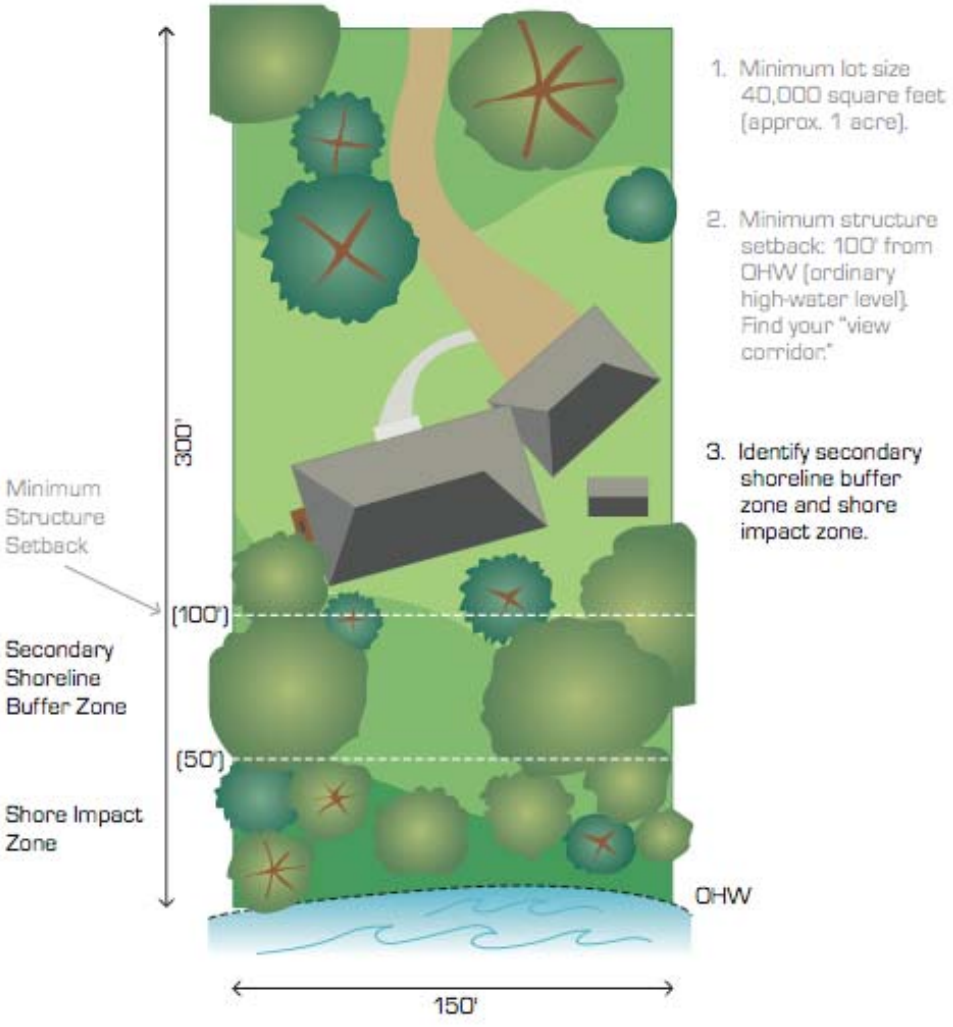
Diagram 2



Shoreline Buffer Standards for Recreational Development Lot

Sample lot: 45,000 square feet, 1+ acre

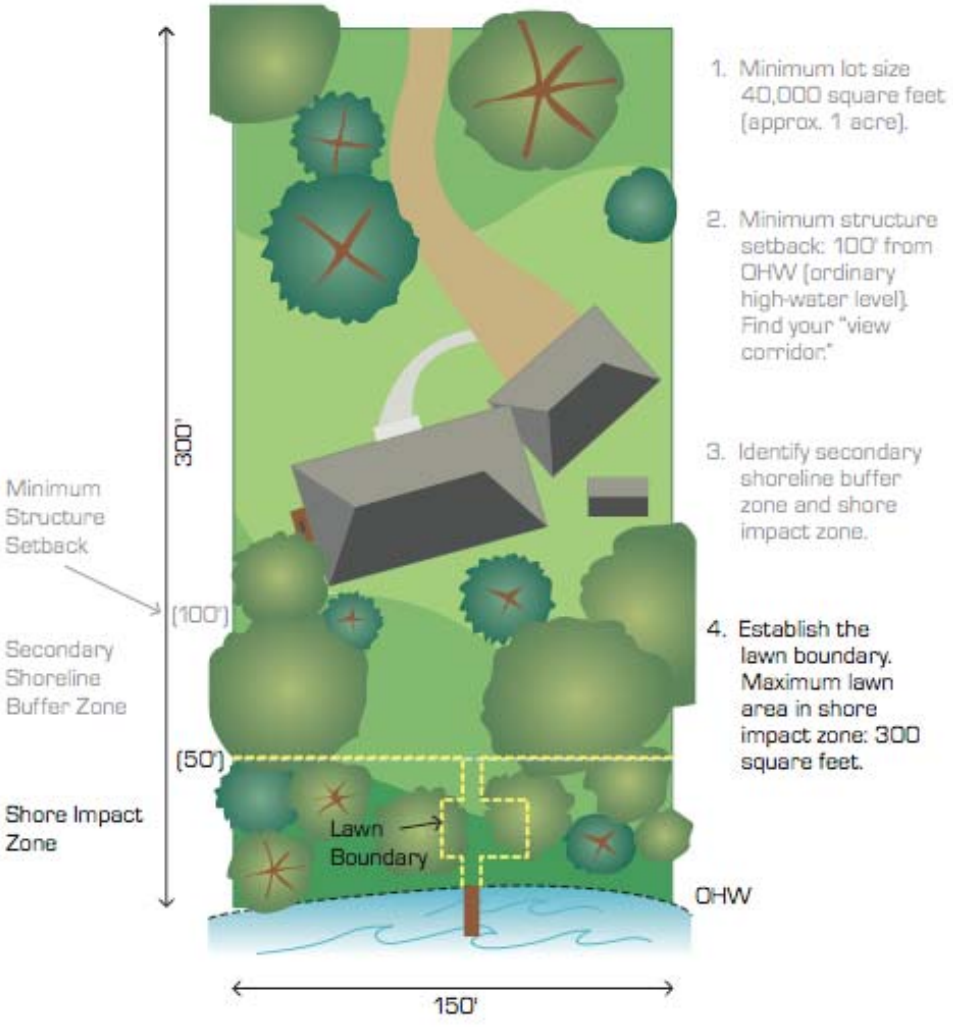
Diagram 3



Shoreline Buffer Standards for Recreational Development Lot

Sample lot: 45,000 square feet, 1+ acre

Diagram 4



Appendix B. Minnesota Pollution Control Agency response to ALT6120.3400, October 26, 2005.

MPCA ISTS Staff Comments on DNR Alternate Shoreland Rule Regarding ISTS Setbacks

The ISTS Rule team has Mark Wespetal, Barb McCarthy, Jade Schulz and Gretchen Sabel have prepared a response to DNR on the proposed setbacks included in the Alternative Shoreland Rules. We recognize all too well the need to be pragmatic in setting policy and to keep rules as simple as possible to facilitate effective implementation. Our answers are based on the science of the topic (ISTS set-backs from surface water bodies), as we now understand it. This is based on the literature review we've been able to conduct since our phone conversation with Paul Radomski in September. If you have additional questions or concerns, we will be glad to meet or hold a conference call to discuss them with you.

Our response is divided into four areas: Consistent setbacks for ISTS and buildings, Groundwater impacts from non-surfacing ISTS, Phosphorus reduction and impact mitigation, and Upgrade triggers.

ISTS Surface Runoff

Considering individual sewage treatment system (ISTS) components consistent with other structures with regard to setbacks appears appropriate. Maintenance activities for septic tanks and grass ground cover maintenance for soil treatment components preclude areas designated for ISTS from being maintained as more natural buffer zones. The USGS, Water Resources Investigations Report 03-4144, Hydrology, Nutrient Concentration, Nutrient Yields in Near Shore Areas of Four Lakes in Northern Wisconsin, 1999 - 2001, indicated that there appeared to be increased phosphorous additions for lawns over woodland due to increased volume of runoff. Keeping all the areas of the lot that need to be maintained (i.e., mowed and not allowed to return to a natural state) together on the lot makes sense.

ISTS Groundwater Impacts *(The following discussion on impacts assumes that the ISTS of concern is one that functions well enough to keep sewage underground (not surfacing) and provides at least minimal separation between the bottom of the distribution media and seasonally saturated soil.)*

Site-specific ISTS and soil properties are likely more important than distance for controlling impacts to surface waters from soluble phosphorous in groundwater with contributions from ISTS. If a situation exists where a soluble phosphorous plume will develop and that plume will migrate into an adjacent surface water body, then increasing the setback will likely only increase the time required for plume to reach the surface water body.

A "worst case" situation from the research literature (Robertson, et al 1995) indicates that the average plume migration for the ISTS monitored is approximately 1 meter per year; at this specific site the difference between a 75 foot setback and a 200 foot setback could result in impacts being delayed from 23 years to 60 years. If the life of the system is 50 years then perhaps impacts would be mitigated by an increased setback. Conversely a system utilizing pre-treatment technology may have a lifespan significantly greater than 50 years and it is unlikely that any realistic, increased setback at a problem site would completely eliminate impacts from soluble phosphorous.

Determining whether any state-wide, standardized setback for Minnesota lakes provides the most reasonable protection may not be possible at this point for phosphorous. Ideally, actual setbacks would be determined using site specific information. Perhaps the best approach with the limited knowledge we have would be to identify those surface waters where soluble phosphorous impacts from ISTS would be significant enough to be a threat to water quality; and evaluate those sites for their ability to adsorb soluble phosphorous and precipitate relatively insoluble phosphorous minerals. Perhaps ISTS to be

installed adjacent to critical area, natural environment, and special protection lakes would warrant a higher degree of design/location attention where phosphorous for ISTS is a concern.

Phosphorous Reduction / Impact Mitigation Strategies

Several methods exist to reduce phosphorus input into an ISTS, or to mitigate the impact on the receiving environment. The first one is the one you've chosen for the draft rule, you may wish to include others as well.

A. Increased horizontal setback, or

B. Increased vertical setback (4' separation distance), or

C. Test the soil for P assimilation and then determine setback, or

D. Do a study on the lake to determine ISTS P impacts (for example, flow-through lakes, ISTS on down gradient side, etc.....), or

E. Reduce P in the effluent (i.e., no P in dishwasher detergent, no garbage disposals, waterless toilets, etc...), or

F. Phosphorous pretreatment technologies.

Further information - the current research appears to indicate that soils with neutral and higher pH, a high buffering capacity and a high hydraulic conductivity are likely to produce the longest soluble phosphorous plumes. This was the situation at the "worst case" site which was located on calcareous sands.

Upgrade Triggers

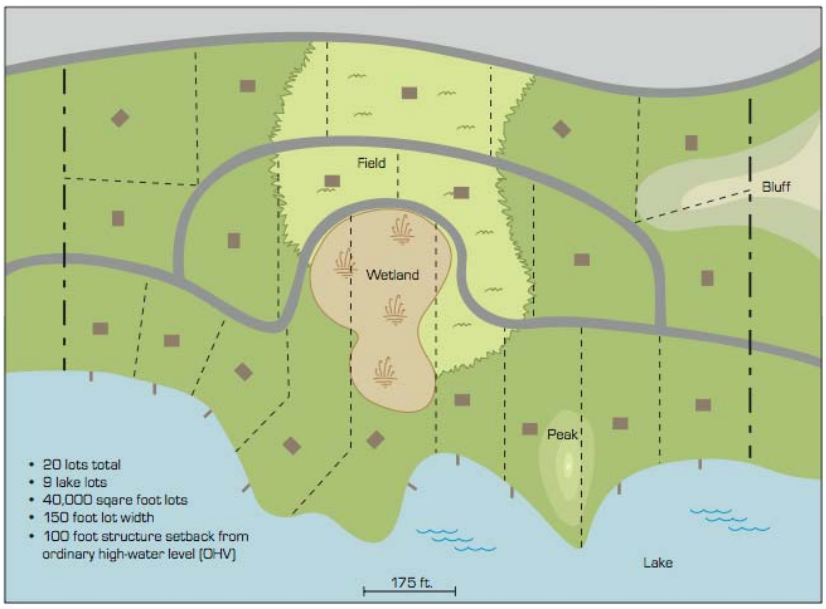
Experience in the ISTS program has shown that the upgrade triggers included in the current shoreland rules have been vitally important in reducing the environmental impacts of noncompliant ISTS in shoreland areas. Adding additional triggers, as the proposed language does, will strengthen this effect, and we support its inclusion.

Thank you for the opportunity to comment.

Appendix C. A comparison between an existing and an alternative standards conventional subdivision for a recreational development lake.

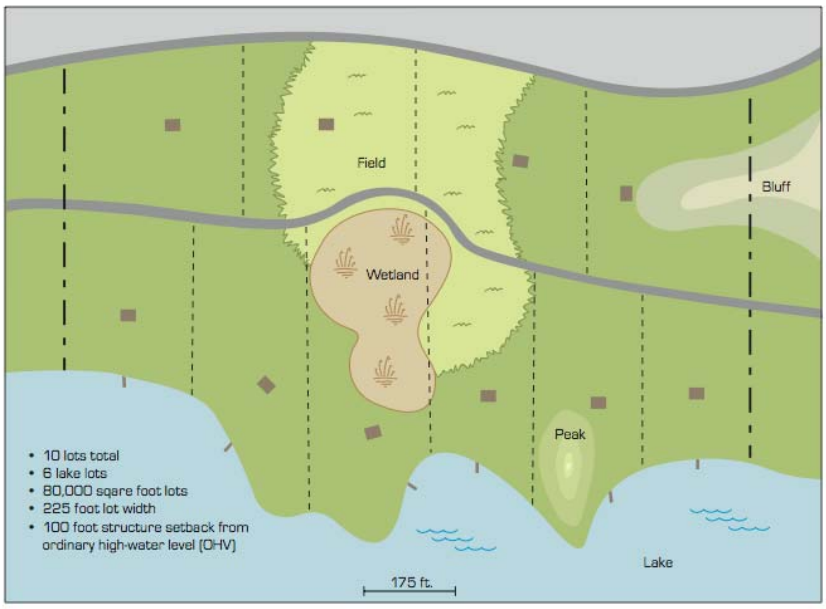
Conventional Subdivision Design Using Existing Rules for a Recreational Development Lake

3. Position house sites and docks



Conventional Subdivision Design Using Alternate Shoreline Standards for a Recreational Development Lake

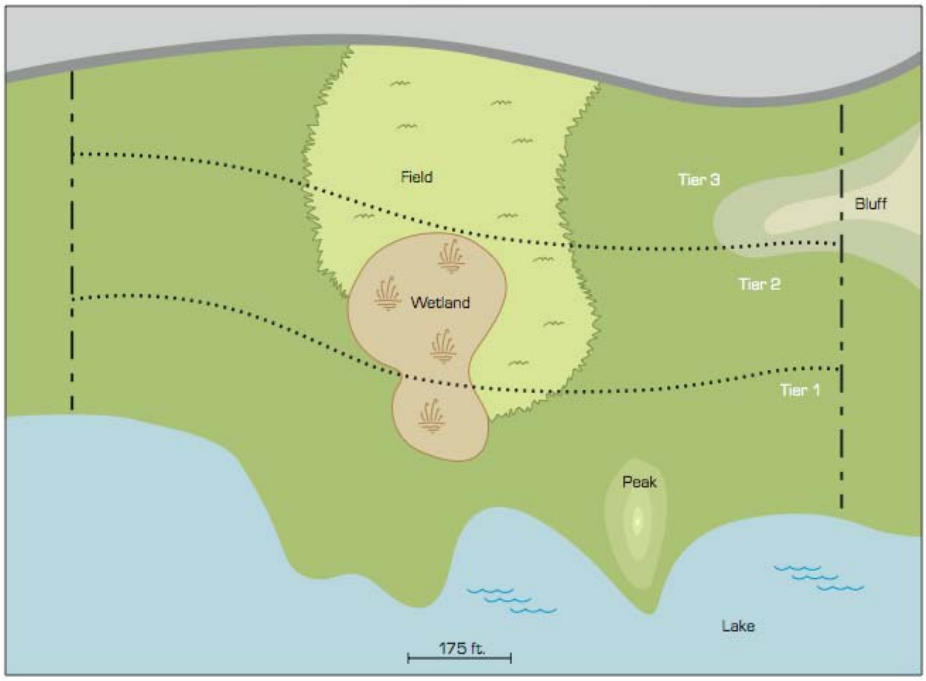
3. Position house sites and docks



Appendix D. Development of a conservation subdivision for a recreational development lake using the alternative standards.

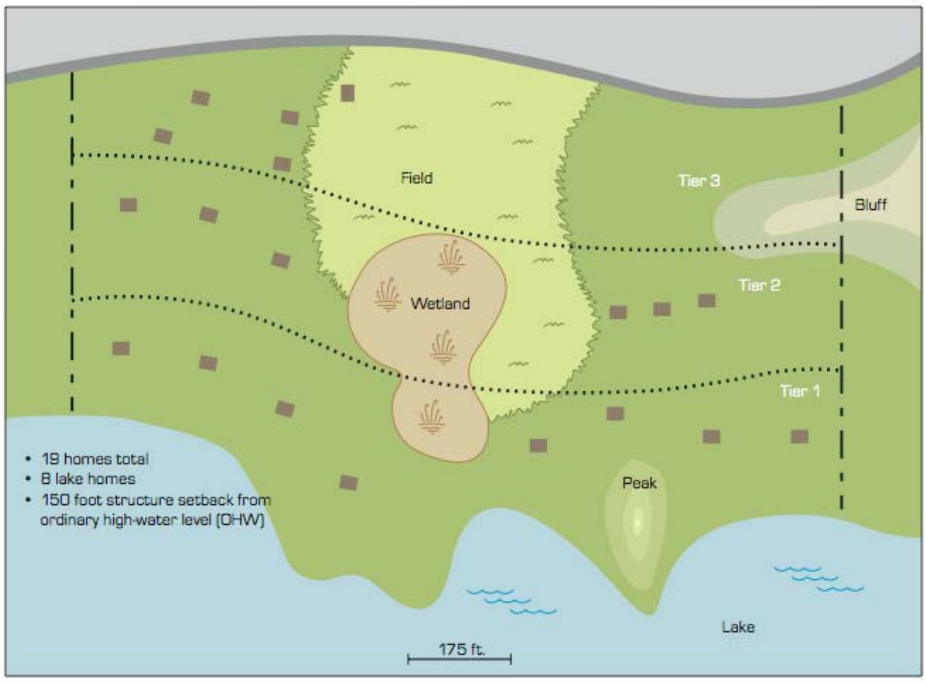
Conservation Subdivision Design Using Alternate Shoreline Standards for a Recreational Development Lake

1. Identify conservation areas and tiers



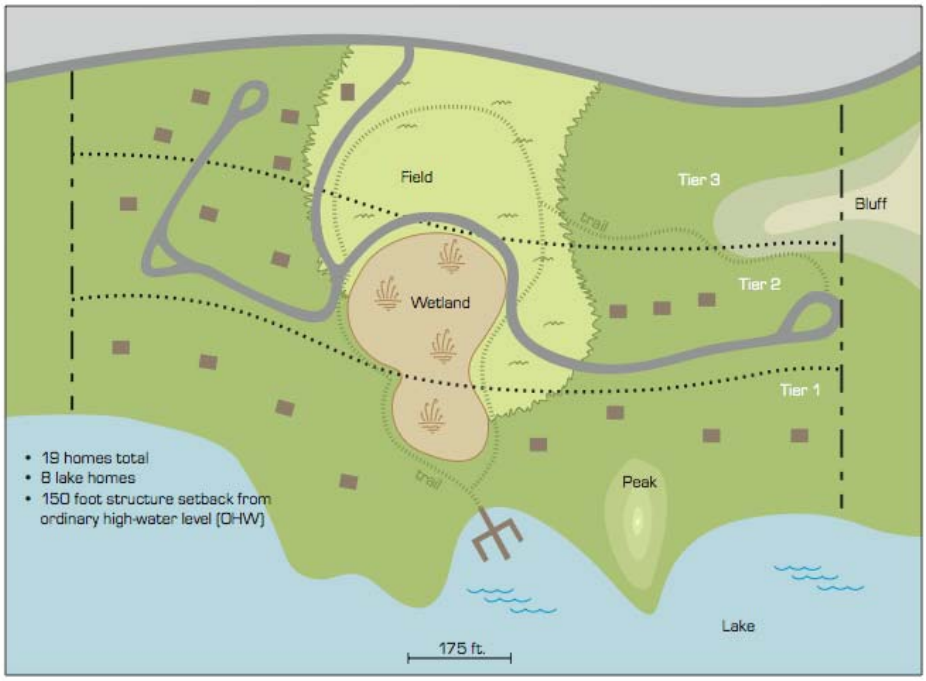
Conservation Subdivision Design Using Alternate Shoreline Standards for a Recreational Development Lake

2. Position house sites



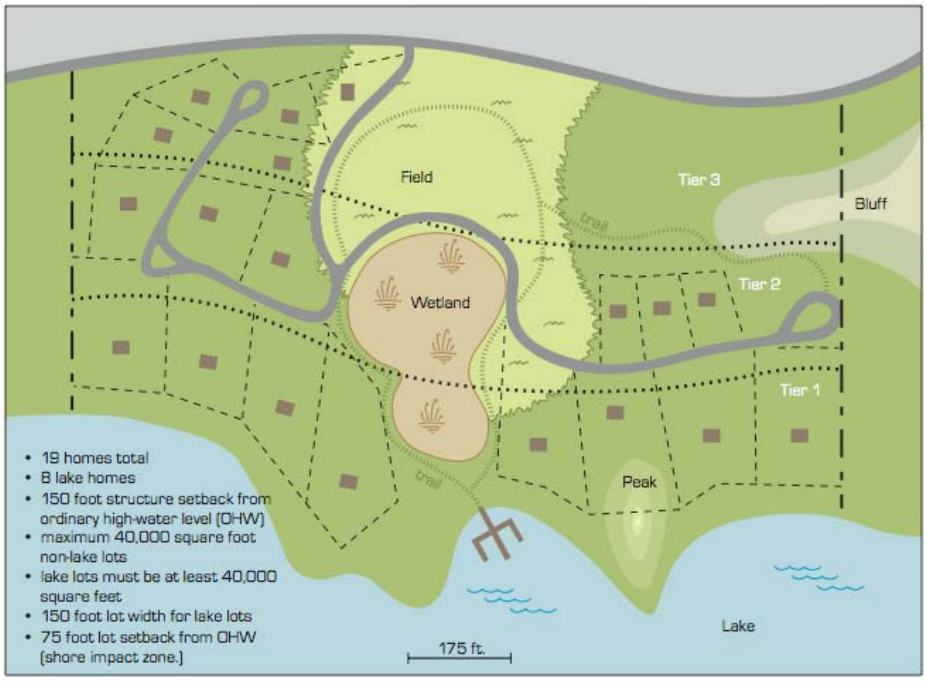
Conservation Subdivision Design Using Alternate Shoreline Standards for a Recreational Development Lake

3. Position roads, trails and access



Conservation Subdivision Design Using Alternate Shoreline Standards for a Recreational Development Lake

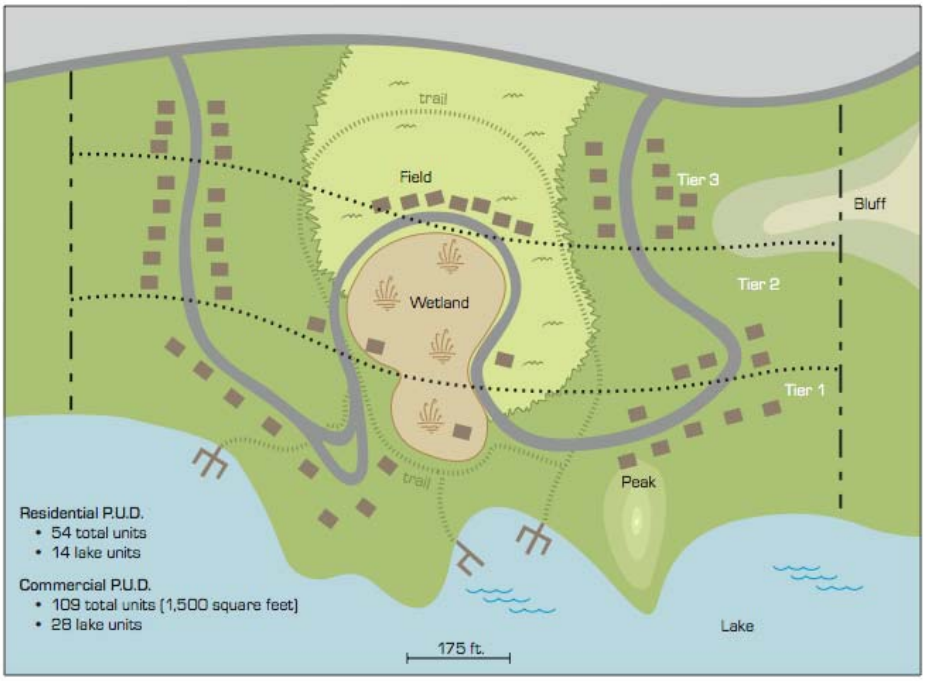
4. Survey land and add lot lines



Appendix E. Comparison between existing and alternative standards planned unit developments for a recreational development lake.

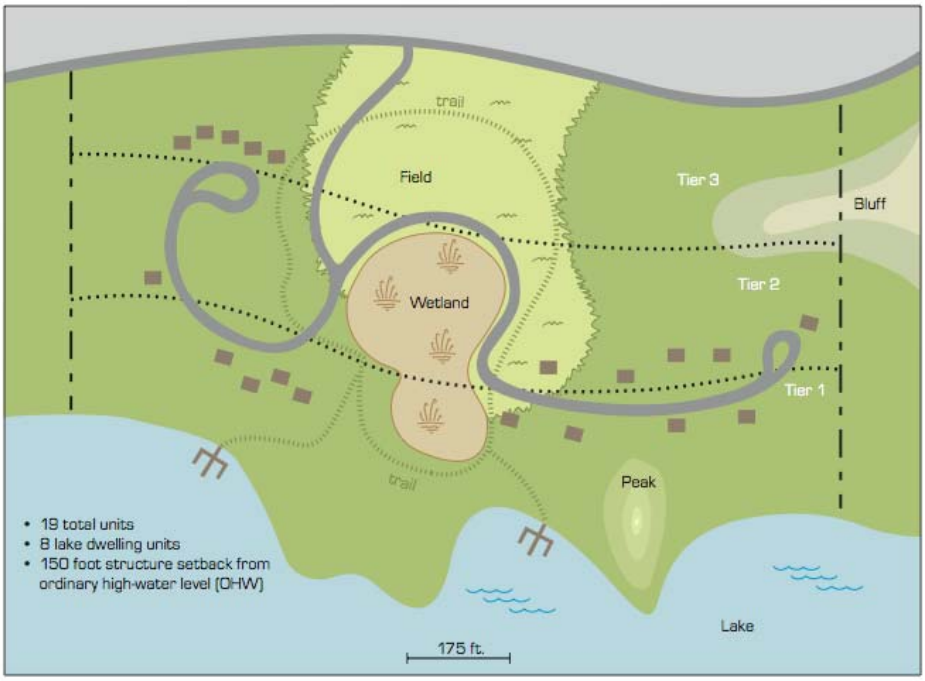
PUD Using Existing Rules for a Recreational Development Lake

2. Position dwelling units, roads, trails and accesses

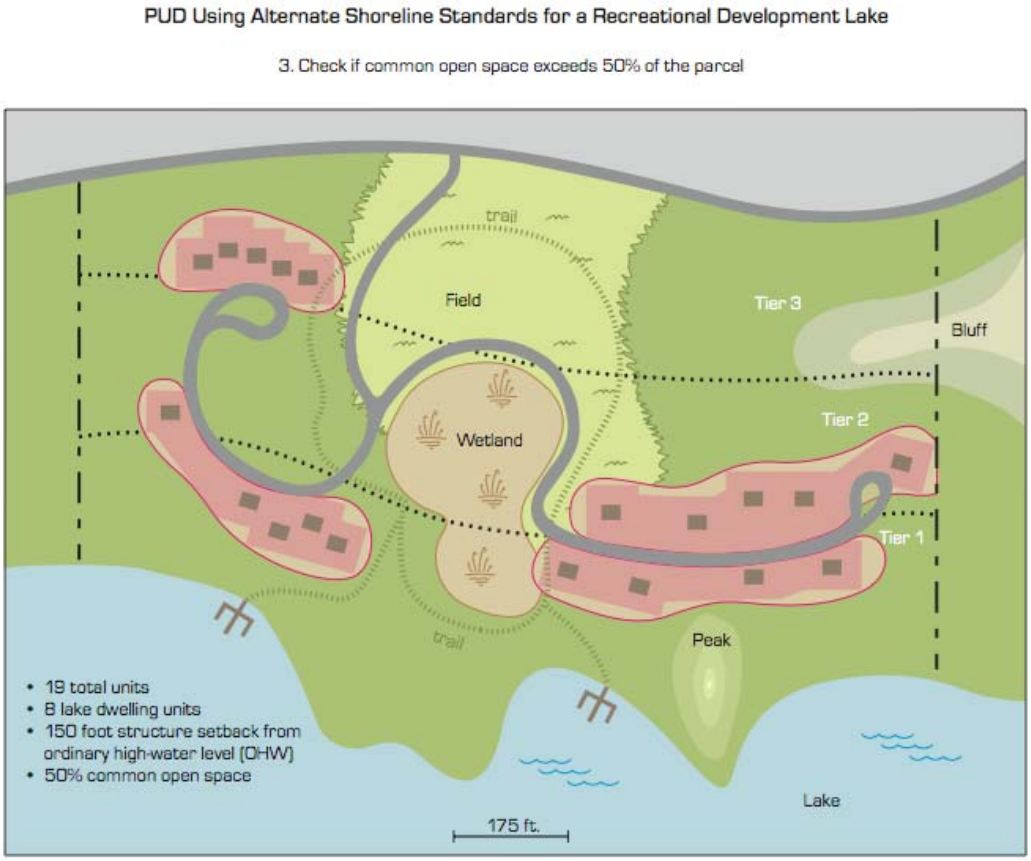


PUD Using Alternate Shoreline Standards for a Recreational Development Lake

2. Position dwelling units, roads, trails and accesses



Appendix F. Areas within a PUD that cannot be counted as common open space (highlighted areas around dwelling units/sites).



Appendix G. Mitigation Scoring Systems (two examples and one model system).

Example 1. Becker County

STATE OF MINNESOTA— COUNTY OF BECKER

NON-CONFORMING SHORELAND PARCELS
Development Worksheet

APPLICANT_____
PROPERTY LEGAL DESCRIPTION_____

Property Dimensions
Width Lakeside_____feet
Roadside_____feet
Depth Side one_____feet
Side Two_____feet
Area_____square feet

Lake Classification_____

LAKE SETBACK
The minimum requirement that must be met is determined by a stringline measurement or the most restrictive adjacent property building setback. The structure setback includes decks, patios, landings, stairs and must be outside the shore impact zone. Setback deficiency is allowed with offsetting mitigation. Each foot deficiency represents one Unit.

Standard Setback_____feet
Proposed Setback_____feet
_____feet Deficiency
MITIGATION REQUIREMENT_____UNITS

IMPERVIOUS SURFACE
Impervious surface; which includes structures, driveways, parking areas, walks, decks, patios; is not allowed to exceed 25 percent coverage. Surface coverage between 15% and 25% is allowed with offsetting mitigation. Each percentage point greater than 15 percent represents five Units.

Threshold Coverage-------15 percent
Proposed Coverage_____percent
_____percent Deficiency
MITIGATION REQUIREMENT_____UNITS

SHORE IMPACT ZONE
Structures and other impervious surfaces are no allowed in the Shore Impact Zone, with exception of landings, stairs and miscellaneous uses which are limited to a total of 32 square feet. Existing structures and existing impervious surfaces must be removed as a precondition to obtaining a site permit. Mitigation credit is allowed for Shore Impact Zone removals.

MITIGATION OPTIONS

LAKE SETBACK DEFICIENCY MUST BE MITIGATED BY:

A. Increasing Structure Setback from the lake. One Unit credit is allowed for each foot closer to the standard setback line.

B. Establishing an approved vegetative buffer adjacent to the Ordinary High Water level and parallel to the shoreline. The minimum requirement is a 20 feet linear by 15 feet deep buffer. Ten Units credit is allowed for meeting the minimum requirements. An additional Ten Units credit is provided for each 10 feet linear by 15 feet deep shoreline increment. An additional Ten Units credit is also provided for each 10 foot linear segment of the buffer that is expanded to 25 feet deep.

MITIGATION SELECTION

Increase Structure Setback _____
Establish Vegetative Buffer _____
TOTAL _____UNITS

IMPERVIOUS SURFACE DEFICIENCY MUST BE MITIGATED BY:

A. Reducing Impervious Surface that exceeds the 15% threshold coverage requirement. Five Units credit is allowed for each percentage point reduction between 25 and 15 percent.

B. Divert structure and/or impervious surface water runoff to an approved on site Stormwater Management System. Ten Units credit is allowed for each 500 square feet of surface area from which runoff will be contained on the property through discharge to the stormwater system.

C. Establish a berm not less than 12 inches above grade and parallel to the shoreline to contain/control stormwater runoff. Ten Units credit is allowed for each 25 feet of protected shoreline. This option is only available to properties of less than 8 percent grade to the lake.

MITIGATION SELECTION

Increase Structure Setback _____
Stormwater Management _____
Establish Vegetative Buffer _____
TOTAL _____UNITS

Removal of structures and/or impervious surfaces from the Shore Impact Zone provided Five Units Credit for each 50 square feet of removal. That credit may be used to reconcile a shortfall in the above mitigation of structure setback and/or impervious surface.

MITIGATION BY SHORE IMPACT ZONE REMOVAL_____UNITS

The mitigations listed above are documented by an approved site and storm water plan filed with this agreement. The mitigations will be installed and maintained as a condition of occupancy and the property is subject to inspection as necessary by the governing authority of Becker County. These mitigations will be deed recorded to remain with the property through subsequent ownerships.

_____OWNER(S)

DATED THIS ____ DAY OF _____, 20 06 .

STATE OF MINNESOTA) BECKER COUNTY OFFICE

) SS OF
COUNTY OF BECKER) PLANNING AND ZONING

I, Patricia L. Johnson, Zoning Administrator for the County of Becker, with and in for said County, do hereby certify that I have compared the foregoing Copy and Development Worksheet with the Original Record. Thereof preserved in my Office, and have found the same to be a correct and true transcript of the whole thereof.

In Testimony whereof, I have hereunto subscribed by hand at Detroit Lakes, Minnesota, in the County of Becker on the __th__ DAY OF _____, 20 __06__.

_____

DRAFTED BY THE BECKER COUNTY ZONING OFFICE

Patricia L. Johnson
Zoning Administrator

Example 2. Aitkin County

AITKIN COUNTY SHORELAND PERFORMANCE

(Structure Placement Guidance)

A property should obtain a score of 100 or more to meet performance standard requirements. A conforming lot is assigned a score of 100. A lot is deemed conforming when the structure meets the required setbacks to the protected water as specified in the Aitkin County Shoreland Management Ordinance (SMO). A structure that fails to meet this definition is considered non-conforming.

To determine the level of non-conformance and score (See Reference Table):

1) Determine the DNR classification of the protected water on the lot (SMO-4.13 & 4.14) ..... 1:_____
2) Determine the required "Structure Setback" to that classification of water (SMO 5.2) ..... 2:_____
3) Determine the "Actual Setback" of the structure by measuring the closest part of the structure to the protected water, bluff, right-of-way, property line, etc. for which a variance is sought ..... 3:_____
4) Enter the corresponding 'Score Multiplier' ..... 4:_____
5) Pre-mitigation 'Lot Score': Determine the percentage of the encroachment as it relates to the standard setback by multiplying the Actual Setback with the 'Score *Multiplier' (Note: round to the nearest whole number*) ..... 5:_____

Reference Table: Performance Multipliers for structures, septics, bluff, and sidelots in Aitkin County.

Protected Waters Type *(DNR Classification; SMO 4.13-4.14)*	Required Structure Setback	Score Multiplier Structures	Required Septic Setback	Score Multiplier Septic	Score Multiplier Bluff	Score Multiplier Sidelot
General Development Lake	75'	1.333	75'	1.333	(30' setback)	(10' setback)
Recreational Development Lake	100'	1.000	75'	1.333		
Natural Environment Lake	150'	0.667	150'	0.667		
Mississippi River	150'	0.667	125'	0.667		
Tributary Stream	100'	1.000	75'	1.333	4.000	12.000
Forested Stream	150'	0.667	100'	1.000		
Remote Stream	200'	0.500	150'	0.667		

Mitigation: *To bring a non-conforming structure to a score of 100 the landowner conducts and maintains one or more of the below listed mitigating activities:*

A) Zone A: Plant and/or maintain a 25' wide natural vegetated buffer zone adjacent to the OHW and record deed restrictions to maintain vegetation in its natural state, prohibit mowing or vegetation removal.* Water access as defined in the Shoreland Management Ordinance is allowed (Section 5.31.B.2.c)..... 30 points
B) Zone B: Plant and/or maintain an <u>additional</u> 12.5' wide natural vegetated buffer zone between Zone A landward. Record deed restrictions to maintain vegetation in its natural state, prohibit mowing or vegetation removal.* A ten-foot (10') access path is allowed. ..... 20 points
C) Zone C: Plant and/or maintain an <u>additional</u> 12.5' wide natural vegetated buffer zone between Zone B landward. Record deed restrictions to maintain vegetation in its natural state, prohibit mowing or vegetation removal.* A ten-foot (10') access path is allowed. ..... 10 points
D) Removal of <u>all</u> other structures that do not meet the standard building setbacks, including water oriented structures. ..... 20 points

E) Removal of impervious surfaces to at least half ordinance limits (SMO 5.52.A) ..... 10 points

F) Removal of fill all placed in historic wetlands and guarantee of no future wetland fill recorded on deed..... 10 points

G) Re-vegetate bluff or steep slopes* and provide screening of structures from the lake. ..... 10 points

H) Diversion of all water runoff from impervious surfaces away from the lake into retention ponds, subsurface drains, wetlands, etc. with no outlet to the lake or tributary ..... 10 points

I) Existing conditions may apply on the property that warrant credit..... *To be determined by P&Z*

Final Score = Pre-mitigation Lot Score (Line 5) _____ + Mitigation Totals (Lines A-I)_____ ___=_____

**Note: Plant materials for vegetative buffers shall be native to northern Minnesota. For every 5,000 square feet of buffer area, there shall be a minimum of four types of trees, six types of shrubs, seven forbs, and three grasses planted to achieve a one plant per square foot minimum coverage. Survival of all plants must be guaranteed for a minimum of 5 year*

Alternative Standards Model Mitigation Scoring System for Variance Request

Property Information

Parcel ID #:_____
Applicants Name:_____
Application is: Owner:_____Agent:_____
Mailing Address:_____
City, State, Zip:_____
Day time phone:_____
E-911 Address:_____
Lake, River, Stream:_____
Shoreland Classification:_____
Depth of Shore Impact Zone for shoreland class:_____feet

Property Dimensions

Lot Width Lake frontage_____feet
Roadside_____feet
Lot Depth Side one_____feet
Side two_____feet
Lot Area _____square feet or _____acres

Variance Request for (check all that apply):

Structure setback from ordinary high water level ☐
Actual Setback of structure*:_____ feet Required Setback:_____feet

Structure setback from bluff ☐
Actual Setback of structure*:_____ feet Required Setback:_____30__feet

Septic system setback from ordinary high water level ☐
Actual Setback of septic system*:_____feet Required Setback:_____feet

Impervious surface cover ☐
Actual coverage:_____percent of lot Required coverage:_____percent

*all distances must be measured horizontally. For structure setback, include deck and platform setbacks.

Condition of shore impact zone (check all that apply):

A. Lawn to the lake condition ☐
B. Mix of lawn and natural vegetation ☐
C. An intact or restored buffer consisting of trees, shrubs, and ground cover of native plants and understory in compliance with shoreline buffer standards ☐
D. Vegetation within the shore impact zone that screen structures so that the structures are at most 50 percent visible from public waters during summer, leaf-on conditions ☐
E. No impervious surfaces are in the shore impact zone, except for stairways, lifts or landings, and, where permitted, one water-oriented accessory structure ☐

Mitigation Measures

Required measures (for all that apply, check when completed; 2 points for each box checked):

1. The septic system is compliant (valid certificate of compliance) or in sewered area; ☐
2. Open areas and lawns within the shore impact zone, except those allowed under ordinance, have been left unmowed and existing noncompliant impervious surfaces and accessory structures have been removed from the shore impact zone; ☐
3. Will the issuance of the variance likely alter the hydrology of the parcel? Yes ○ No ○
If yes, erosion control and stormwater management plans for the parcel have been designed and effectively implemented; ☐
4. Is, or will the land surface covered by structures area exceed 5,000 sq ft? Yes ○ No ○
If yes, certified personnel in erosion and sediment control will be responsible for best management practice design, installation, inspection, and management to meet the PCA General Stormwater Permit requirements; ☐ list personnel:_____
5. The impervious surface coverage has been brought into compliance, or where not possible, to the maximum extent practicable with the impervious surface coverage limits. ☐
6. For residential properties, will impervious surface coverage exceed 20 percent? Yes ○ No ○
If yes, a properly designed stormwater pollution prevention plan has been developed and will be effectively implemented. ☐
(Preference here is given to permanent stormwater management designs that include porous pavement, filter strips, enhanced swales, infiltration basins, disconnected impervious areas, rain gardens and other conservation designs)

Options (1 point each;):

7. Restoration of native vegetation to no less than 50% tree and shrub canopy coverage and establishment of natural ground cover within the shore impact zone ☐
8. Removal of structures that do not meet the required structure setback ☐
9. Removal of all impervious surfaces in shore impact zone ☐
10. Removal of fill in all placed in historic wetlands and guarantee of no future wetland fills ☐
11. Re-vegetate bluff or steep slopes and provide screening of structures from lake ☐
12. Disconnect impervious surfaces (for example, redirect gutter downspouts away from impervious surfaces) ☐
13. Re-establishment of shoreline berm ☐
14. Removal of water oriented accessory structures ☐
15. Establishment of rain garden to treat roof runoff or driveway runoff ☐
16. Replace impervious surface with porous pavers or other porous material ☐
17. Limit waterfront accessory structures (docks, boat stations, etc) to less than 750 sq ft ☐
18. Forgo use of fertilizer between home and the waterbody ☐

Sum of Mitigation Points:_____(10 total points needed plus inclusion of all required measures)
The mitigations will be completed and maintained as a condition of occupancy and the property is subjected to inspection as necessary. These mitigations will be deed recorded to remain with the property through subsequent ownerships.

_____ Signature of Owner(s) _____Date