



Lakes Planning – The Long, Expensive Planning Journey Is Over; Now It's Showtime!

Presentation is motivated by a letter we just sent to Town, DNR and County officials

37 slides



Lake Association Mission Statement:

*The mission of the Minocqua/Kawaguesaga Lakes Protection Association is to **protect** the Minocqua/Kawaguesaga lakes and their surroundings by **enhancing water quality, fishery, and the aesthetic value of** our lakes as public recreational facilities for today and future generations.*

Vision Statement

*The vision of the MKLPA is to **constantly improve** the quality of our lakes.*



The Formal Name: **Comprehensive Lakes Management Plan**

Required by DNR

We have been very pleased with our relationship with
the DNR and we believe they are very pleased with us.
Journey began in 2002

Six studies for a cost of over \$470,000



This presentation will answer some questions that may be on your minds, such as:

Why is the DNR so tough on the topic of wetlands?

Why did the state ban phosphorus in most fertilizers?

Why was Wal-Mart required to build such a large retention pond?

Why is the DNR working through legislation to limit impervious surfaces on a building lot?

Why does the DNR require us to do expensive studies and refuse to give grants until we do?



The Studies:

1. *An Evaluation of the Impacts Septic Systems Have on the Groundwater and Surface Water Quality of Minocqua Lake, Wisconsin –1996* By: Univ. of Wis. Stevens Point, Completed: 1996, Cost: \$15,200
2. USGS Survey Water Quality Study, By: USGS Completed: 2003 Cost: \$34,500
3. *Minocqua – Kawaguesaga Lakes Watershed Management Plan, (Projecting Lake Pollution Levels into the Future)* By: Cedar Corporation, Completed: 2005, Cost: \$40,000
4. *Aquatic Plant Management Plan*, By Steve Schieffer, aquatic plant consultant, Completed: 2008, Cost: \$23,150



The Studies: (cont.)

5. Water Quality Study –more formally, *Hydrology, Water Quality, and Response to Simulated Changes in Phosphorus Loading of Minocqua and Kawaguesaga Lakes, Oneida County, Wisconsin, With Emphasis on Effects of Urbanization.*

By: USGS, Completed: 2010, duration 4 years, Cost: \$330,000

6. *Minocqua/Kawaguesaga Lake Watershed Management Plan*, By: Cedar Corporation

Completed: 2011, Cost: \$30,000



How Were These Studies Funded?

Study	Lake Assn. Cost (\$)	Government Cost (\$)	Total Cost (\$)
1. Watershed	10,000	20,000	30,000
2. USGS Water Qual.	15,000	315,000	330,000
3. Aquatic Plant	5,787	17,383	23,150
4. Lake Pollution Levels	10,000	30,000	40,000
5. USGS Water Quality	4,500	30,000	34,500
6. Septic Systems	5,077	10,144	15,221
Totals	50,364	422,527	472,891

Lake Association: dues, contributions, fund raisers, etc.

Government – Town contributions, WI DNR grants, and Federal Government



We have gone about as far as a lake association can go...

We are now dependent on **governmental bodies** to move forward with much of what needs to be done.

We have been delighted with the support the Town of Minocqua has given us over the years – money, their interest and moral support

We will explain the recommendations for action 🍏 for each group



Four Areas Are Involved:

Storm Water – reduce sediment loading

Reduce phosphorus loading

Manage aquatic invasive species

Improve habitat



Storm Water Management

What are the recommended improvements for:

- Storm Water – **reduce sediment loading; Total Suspended Solids or TSS**

Some background:

Cedar Corporation produced the study: *Minocqua – Kawaguesaga Lakes Watershed Management Plan* (Study 3 above)

Using computer modeling of our watershed they find that*:

1. Total solids moving into the two lakes 1993 = 662,000 lbs./yr
2. Total solids moving into the two lakes 2020 = 1,310,000 lbs./yr.
3. With thorough remediation 2020 could drop to 360,000 lbs./yr

The increases projected are based on the county land-use plan for 2020

Reason, there will be many more acres of **impervious surfaces**

*Source: : *Minocqua – Kawaguesaga Lakes Watershed Management Plan*, Table 5-7, after page 5-34



Storm Water Management

A misconception about a suspended solid.

We usually think about visible grains of sand or small rocks

55% of the particles flowing into the lakes
are not visible to the naked eye - size less than 10 microns



Storm Water Management

The main culprit for storm water management is VELOCITY – we must slow the water down so sediments can filter out before they reach the lake.

Recommendations for improvement:

🍏 End of pipe box treatment systems - plan recommends at least 7 such installations, called stormceptors; cost \$10,000 to \$15,000 each – Town resp. These 7 units should remove about 83,000 lbs. of TSS in total. (see next slide)

🍏 Maintenance of stormseptors - Town responsibility

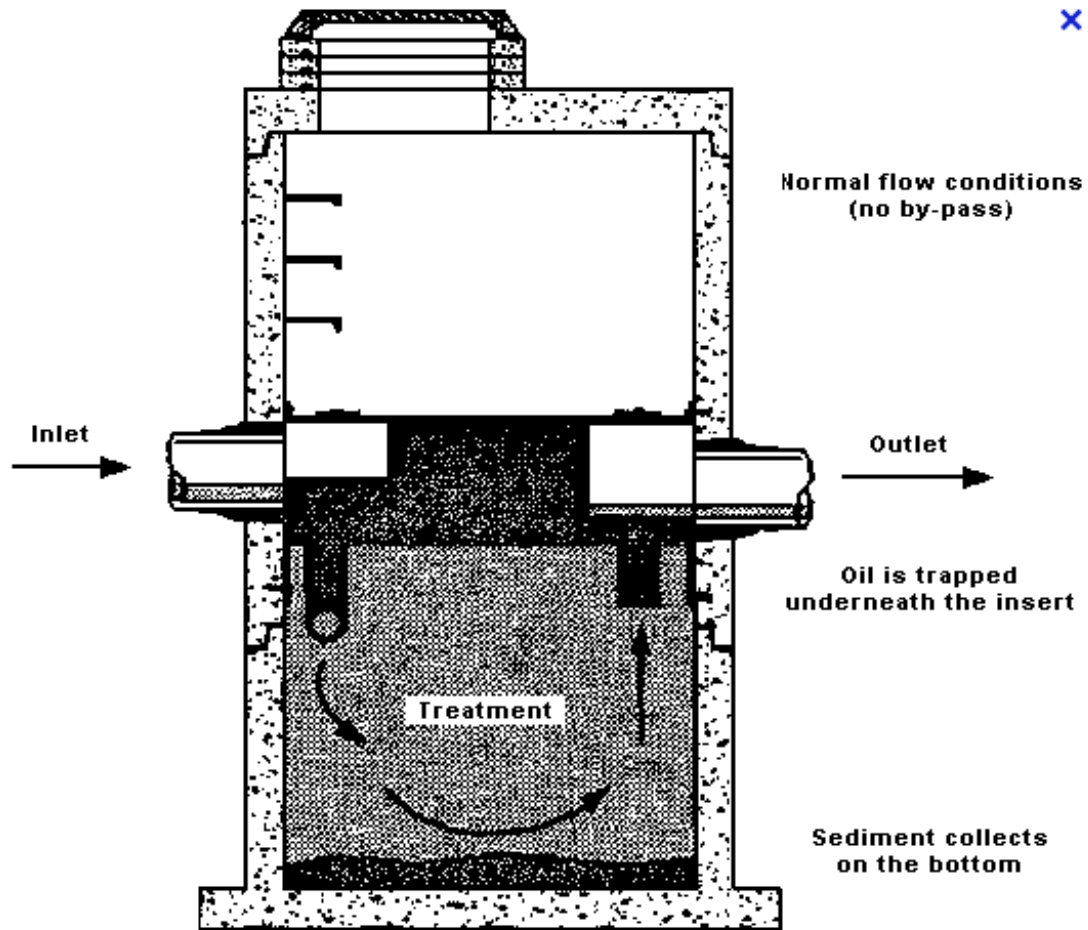
Two are installed in the downtown area:

1. Right hand lane of Chippewa near Milwaukee
2. Fifty feet west on Milwaukee

These are sizeable units about 15-20 feet deep and 10' x 10' at base

🍏 Specifically recommended remedy - in our letter

Storm Water Management





Storm Water Management

How effective is a stormceptor?

Effectiveness from vendor 80% TSS

Research finds a number more in the 60-70% range – it does depend on area drained and stormceptor size so engineering design is important

How effective is a catch basin at base of storm sewer?

Become **ineffective** once 60% of sump volume is filled

Study – Alameda, Cal. effectiveness depends on cleaning frequency
for each inlet cleaned: once/yr. 54 lbs./yr. 4 and 6 mo cleaning 70 lbs./yr.
monthly cleaning 160 lbs./yr. This was in a commercial/industrial area.



Storm Water Management

A brief digression:

In the Early 1990's Minocqua was very energized about improving lake water quality which involves storm water management

Minocqua Area Lakes Improvement Association chartered May, 1994

Minocqua – Woodruff Priority Lakes Project Plan, October 1994

New parking Lot is constructed east of the post office – initially design called for simple filtration system but was expanded to a multi-chambered treatment tank system – plan was upgraded to a very sophisticated system.

New treatment system cost - 1995 dollars \$95,500 this is \$145,000 in 2012 dollars



Storm Water Management

This system has never been maintained! It has probably been running on bypass for years.

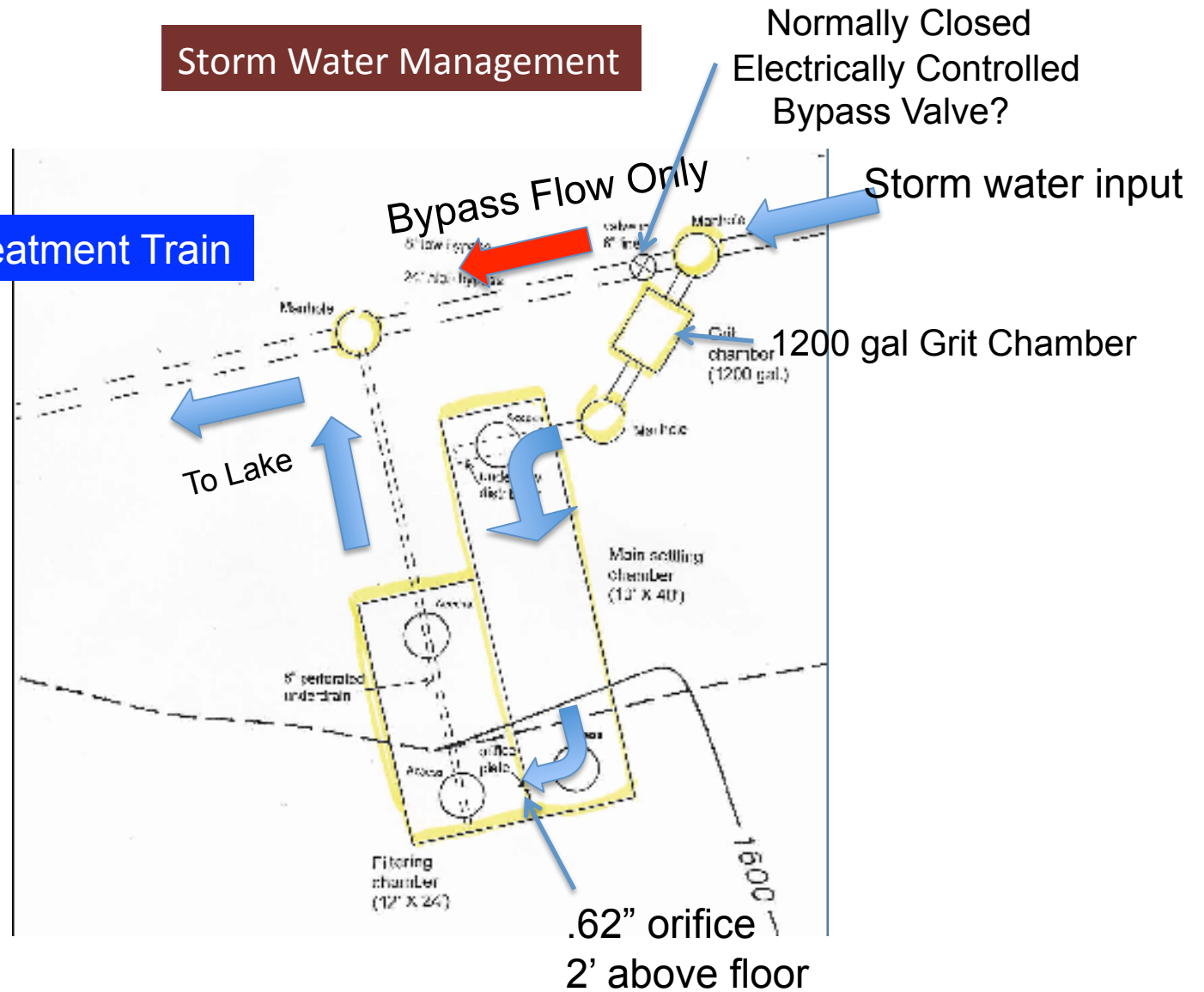
17,000 gallons

25,000 gallons
40 ft. long



Storm Water Management

Multi Chamber Treatment Train





Storm Water Management

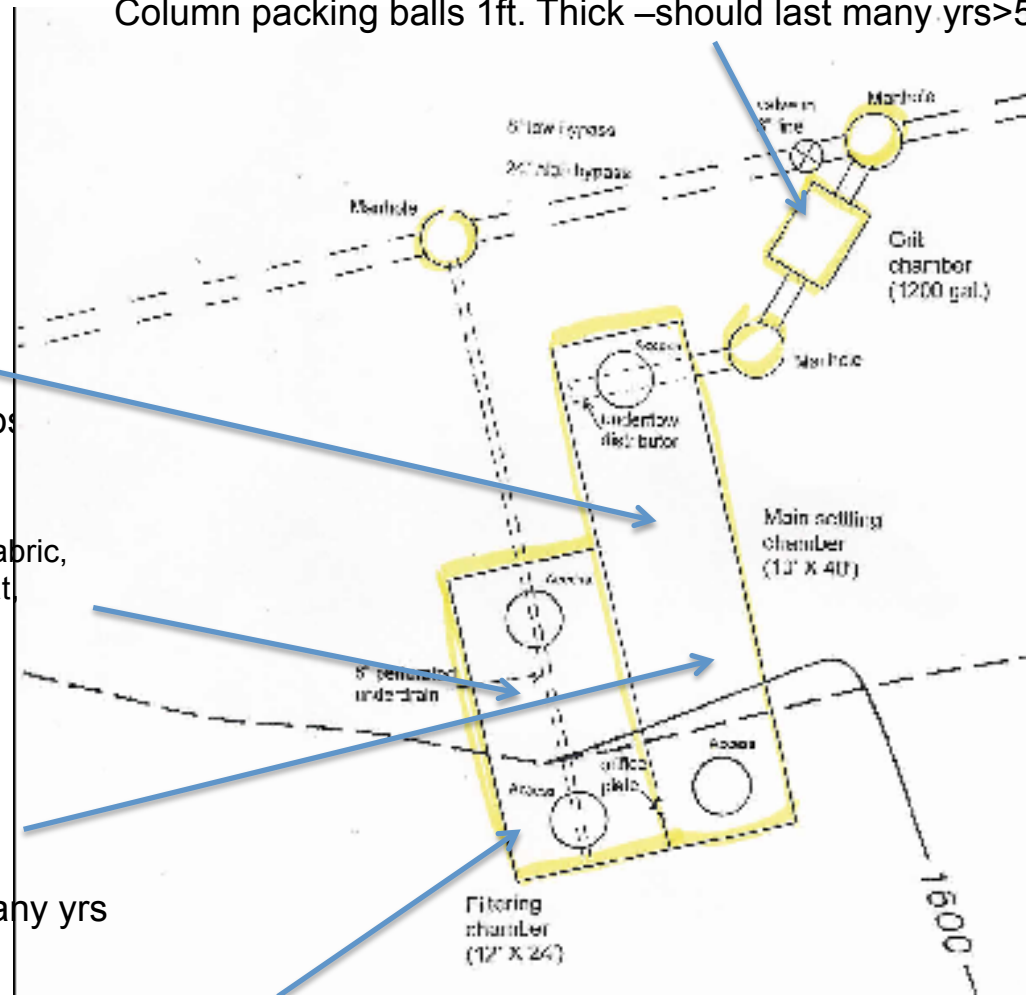
Nylon mesh bag of 1" Jaeger Tri Pack High Performance Column packing balls 1ft. Thick –should last many yrs>5-7

Utilizes 25 floating sorbent pillows to absorb oil -1 to 2 Yr. life Cost \$250 (Pig Corp 104ps)

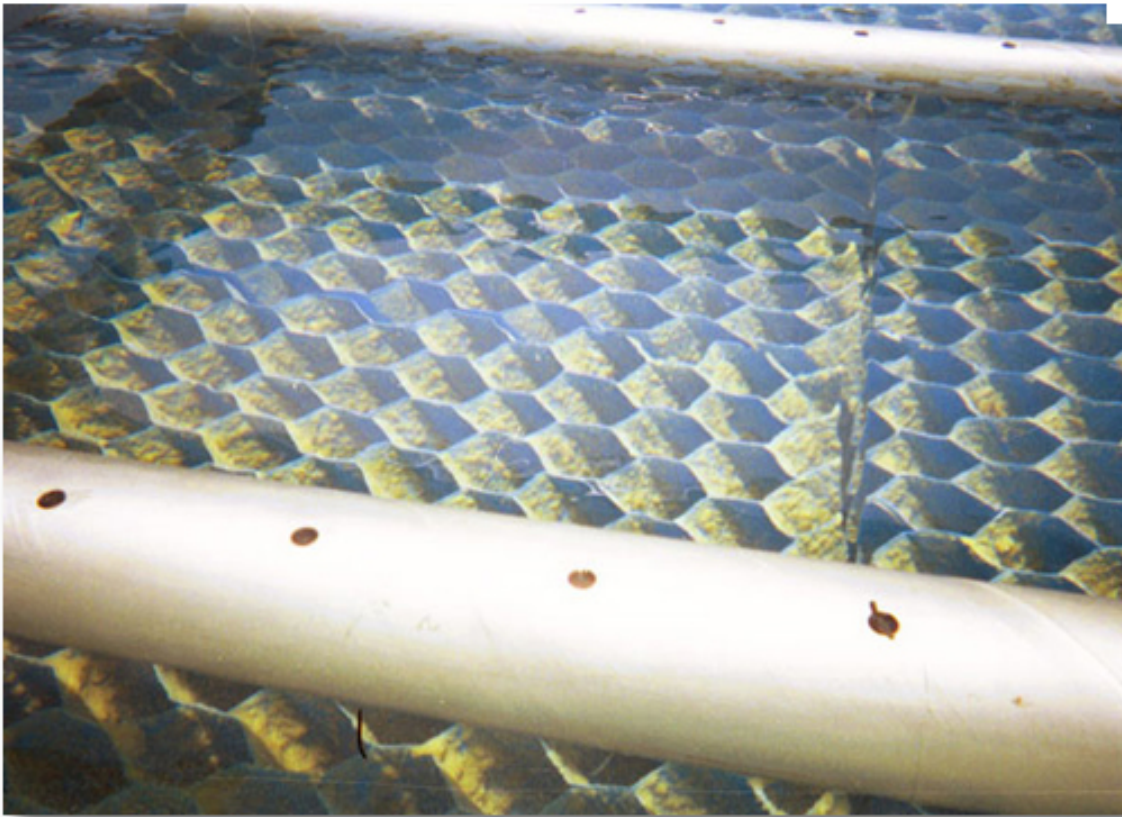
Filter media: 1st layer: Gunderboom fabric,
2nd layer: 1.5' 50-50 mix sand and peat,
3rd layer: .5' sand
4th layer: gravel to allow flow to outlet

Inclined tube settlers, 4" tubes
2' thick Cost \$25/ft sq. Life, many yrs

Tank sloped .5 deg. Towards flow



Inclined Tube Settlers – Sit on Bottom of Tank





Storm Water Management

Why was system maintenance ignored?

The project team was commissioned and did very little to improve storm water management – funding for leader (MarthaCrunk) was not continued - no additional grant money

The system may have been abandoned because of maintenance cost

It may have been abandoned because of no maintenance manual - none exists today

It may have been abandoned because it didn't seem to work



Storm Water Management

UpFlow Filtration for the Treatment of Stormwater

Robert Pitt
Department of Civil, Construction, and Environmental Engineering
University of Alabama,
Tuscaloosa, AL

Uday Khambhammettu
Metcalf & Eddy, Inc.
San Diego, CA

Bob Andoh
Hydro International, Inc.
Portland, ME



Storm Water Management

It does work! Look at these performance nos.

Wisconsin Full-Scale MCTT Test Results

(median % reductions and median effluent quality)	Milwaukee (15 events)	Minocqua (7 events)
Suspended Solids	98 (<5 mg/L)	85 (10 mg/L)
Phosphorus	88 (0.02 mg/L)	>80 (<0.1 mg/L)
Copper	90 (3 µg/L)	65 (15 µg/L)
Lead	96 (1.8 µg/L)	nd (<3 µg/L)
Zinc	91 (<20 µg/L)	90 (15 µg/L)
Benzo (b) fluoranthene	>95 (<0.1 µg/L)	>75 <0.1 µg/L)
Phenanthrene	99 (<0.05 µg/L)	>65 (<0.2 µg/L)
Pyrene	98 (<0.05 µg/L)	>75 (<0.2 µg/L)

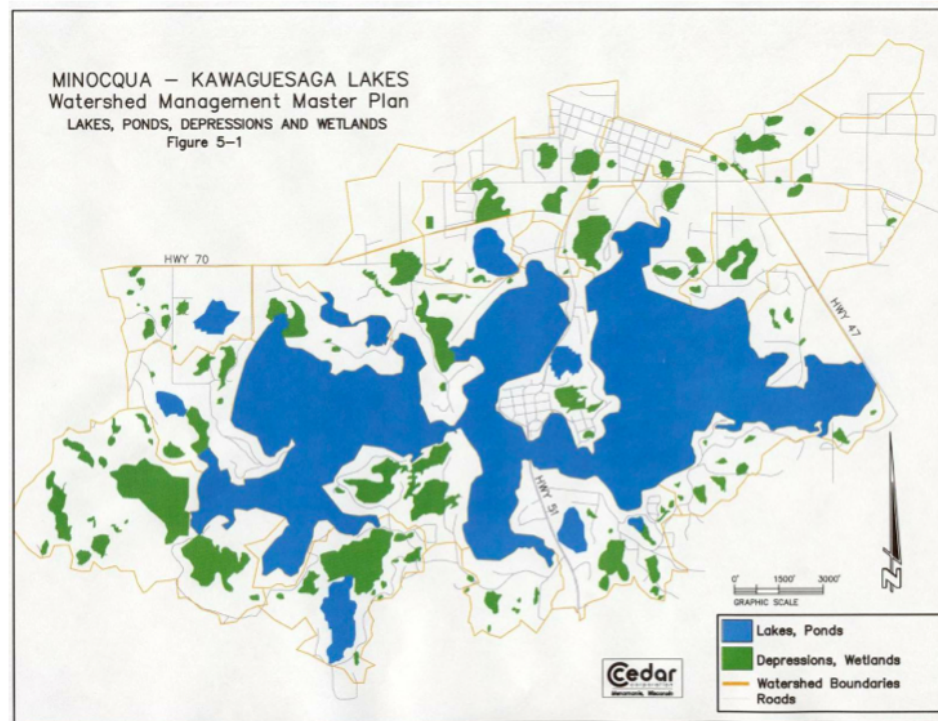


Storm Water Management

Recommendations, (continued)

- 🍏 Highway 51 reconstruction – an ideal time to install the proper systems
Town , county and state – includes 75 storm sewers! - Town, State resp.
- 🍏 Topographical depressions and artificial wetlands - protection of/creation
of wetlands and depressions -Town responsibility

The green areas **MUST**
be protected – a Town/
DNR responsibility.
These areas capture
approx. 140,000 lbs. of
TSS each year.





Storm Water Management

Recommendations cont.

🍏 Stiff enforcement of silt fencing around disturbed land – Town Resp.

🍏 Ordinances: County responsibility
Storm water runoff management
Septic system pumping and inspection



🍏 Encourage shoreline restoration - Town and Lakes Assoc. responsibility





Phosphorus Reduction

Background:

Phosphorus is the root of most lake evils, in Wisconsin, it is the limiting ingredient for algae growth

Rule of thumb, one pound of phosphorus can create up to **500** pounds of algae





Phosphorus Reduction

What did the \$330,000 USGS Study tell us?

How much phosphorus flows into the lake each year?

Source	Pounds/ year	Percent
Rain	332	9
Other Lakes		
Minocqua Thoroughfare	1460	38
Tomahawk Thoroughfare	1220	32
Storm water	370	10
Ground water (under the soil)	124	3
Septic Systems	296	8
Total	3802	100

Cedar gets 1200 lbs



Phosphorus Reduction

What happens to the phosphorus?

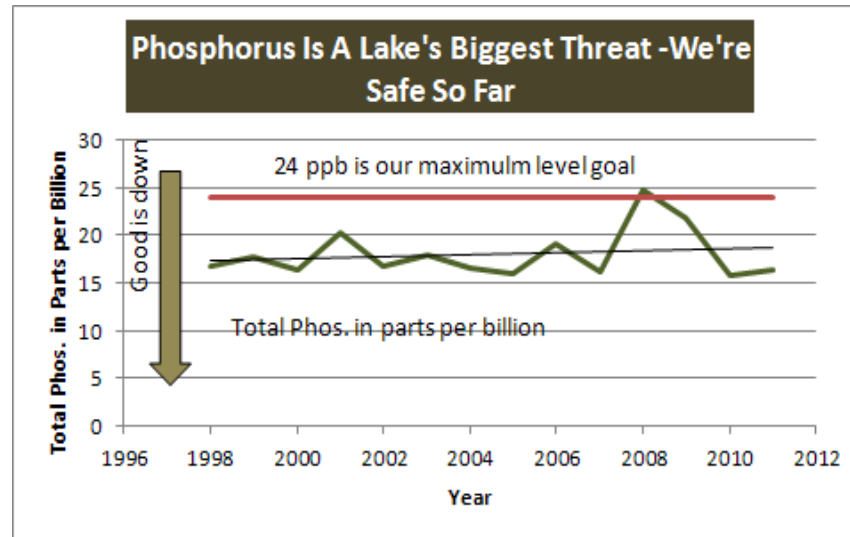
Where does the phos. go?	Pounds/year	Percent
Retained in lake	2179	57.3
Over the dam	1623	42.7
Total	3802	100

Let's look at the 2179 pounds that are retained in the lake, where does it end up?



Phosphorus Reduction

Phosphorus
Is essentially
flat



	Factor lbs./1ppb	Phosphorus concentration In ppb	Total pounds in water of lake
Minocqua	85	16	1360
Kawaguesaga	33	18	594
Total (accumulation since lakes were formed)			1954



Phosphorus Reduction

Pounds in water is tiny compared to the **accumulated** annual deposits and it is essentially constant – conclusion, if 2179 lbs/yr is retained in the lake, it must end up on the bottom

We are in a marvelous, blessed equilibrium – how long will it last?

Other lakes – equilibrium has failed, phosphorus loading too great for the natural processes to keep up

It is our interest to reduce the loading in any way practical and possible



Phosphorus Reduction

What sources are tractable?

Source	Pounds/year	percent
Rain	332	9
Other Lakes		
Minocqua Thoroughfare	1460	38
Tomahawk Thoroughfare	1220	32
Storm water (under the soil)	370	10
Ground water	124	3
Septic Systems	296	8
Total	3802	100



Phosphorus Reduction

Total that is “reasonable” to attack:

Storm water + Septic = **666 lbs./yr or 18% of total**

Less certain – the thoroughfares, 2680 lbs./yr or 70% of total inflow

We will continue to investigate going “upstream”– we’ll be proactive

How to attack the storm water – already discussed

How to attack the septic – find the “bad systems” and get them fixed –
we’re thinking it’s less than 85 homes

Dye pellets may be a simple and inexpensive approach to find failed systems



Phosphorus Reduction

One thing we don't see –

The need to hook lake homes to a sanitary sewer!



Manage aquatic invasive species

Currently there are three known invasives in our lakes

Eurasian watermilfoil – will never be eradicated with known procedures and technology

Curley leaf pondweed – we have ignored it to date, seems to be “in balance”

Purple loosestrife – treat with herbicides and beetles

We have received substantial grant money from DNR
for aquatic invasive control - In process of applying
for another 5 year grant
Project cost at least \$40,00/year

🍏 The Lakes Association will continue to be proactive,
to study and to manage





Purple Loosestrife Running Wild





Improve habitat

Aquatic Plant Management Study says we have a very good aquatic weed culture – 50+ species of weeds

- 🍏 Need to improve shoreline restoration – Home owner, Town, Lake Association, County responsible
- 🍏 Designate as non-developable and protect “lake sensitive area habitats”
- Town, County responsibility
- 🍏 Monitor fishery and conduct stocking as needed – DNR
- 🍏 Continue boat/trailer inspections – Lake Association responsible



What Will Your Lakes Association Do?

We will work with our governmental bodies to push for the recommendations made in our letter

- 🍏 Continue to attack invasive species, Eurasian watermilfoil and purple loosestrife

Move “upstream” to try to reduce phos inflows.

- 🍏 Inform and educate the public

- 🍏 Push to get septic systems fixed

- 🍏 Push to be sure storm water systems are properly maintained

And many other activities to make sure we’re all good stewards



What do we want the public to do?

Support us in motivating the actions outlined in this presentation

Let our governmental officials know that you support these recommendations

Educate yourselves and tell others – understanding leads to support

Be a member of the Lakes Association and make contributions if possible

Thank you for your time and involvement. Any questions?



Lakes in the Minocqua/Kawaguesaga Watershed

Lake	Water Area in Acres	Max Depth (Feet)	Mean Depth (Feet)
Big Arbor Vitae	1090	41	18
Little Arbor Vitae	534	32	11
Carroll Lake	352	27	16
Madeline Lake	159	17	9
Chain	2135		
Little Tomahawk	160	48	28
Tomahawk	3392	84	33
Mid lake	223	12	6
Chain	3775		
Lake Minocqua	1360	60	23
Kawaguesaga Lake	670	44	18
Chain	2030		
Entire Watershed	7940		

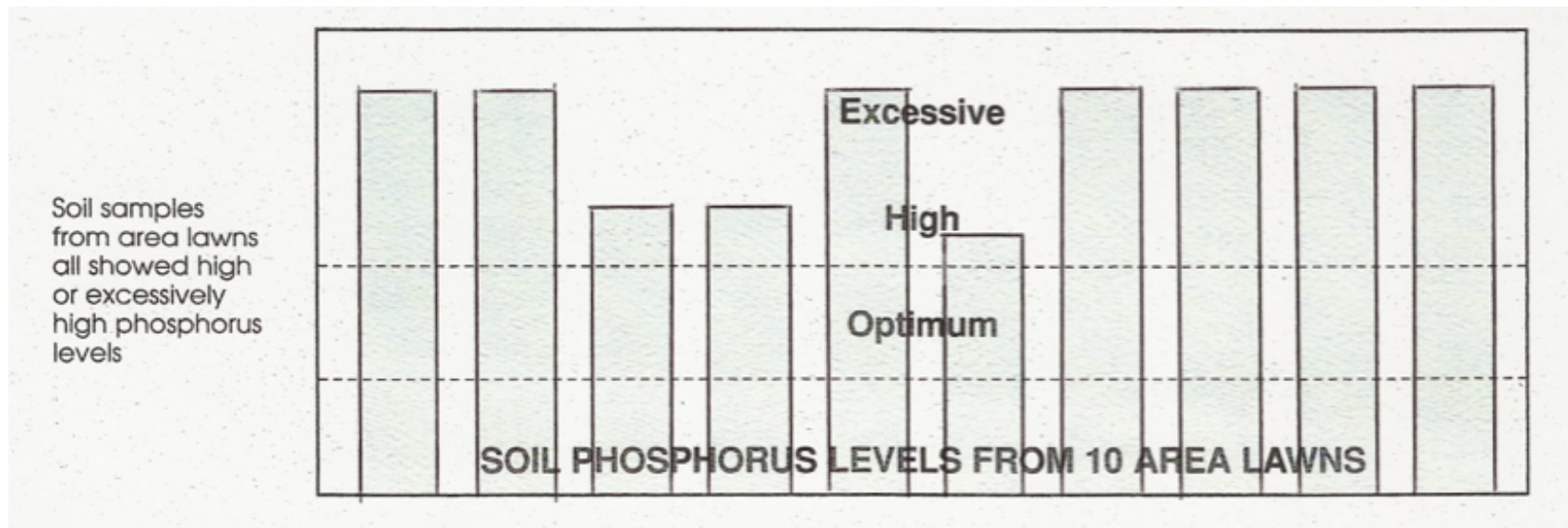


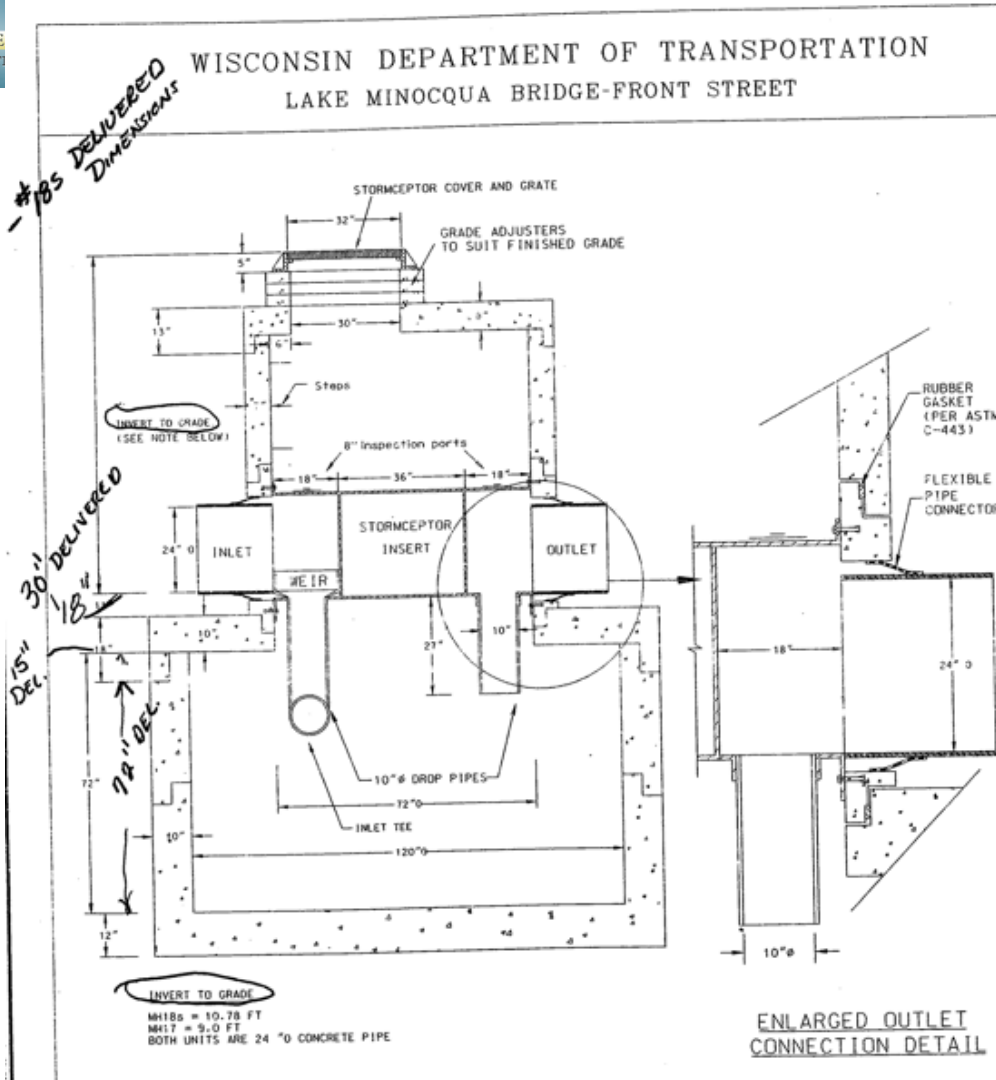
SECTION III. PURPOSE AND INTENT.(1) PURPOSE. The general purpose of this ordinance is to establish long-term, post- construction runoff management requirements that will diminish the threats to public health, safety, welfare and the aquatic environment. Specific purposes are to:(a) Further the maintenance of safe and healthful conditions.(b) Prevent and control the adverse effects of storm water; prevent and control soil erosion; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structures and land uses; preserve ground cover and scenic beauty; and promote sound economic growth.(c) Control exceedance of the safe capacity of existing drainage facilities and receiving water bodies; prevent undue channel erosion; control increases in the scouring and transportation of particulate matter; and prevent conditions that endanger downstream property.(2) **INTENT.** It is the intent of the Town Board that this ordinance regulates post-construction storm water discharges within the Township and to waters of the state. This ordinance may be applied on a site-by-site basis. The Town Board recognizes, however, that the preferred method of achieving the storm water performance standards set forth in this ordinance is through the preparation and implementation of comprehensive, systems-level storm water management plans that cover hydrologic units,Page 2such as watersheds, on a municipal and regional scale. Such plans may prescribe regional storm water devices, practices or systems, any of which may be designed to treat runoff from more than one site prior to discharge to waters of the state. Where such plans are in conformance with the performance standards developed under s. 281.16, Wis. Stats., for regional storm water management measures and have been approved by the Town Board, it is the intent of this ordinance that the approved plan be used to identify post-construction management measures acceptable for the community.



Storm Water Management

Something to remember about our soils







X Marks the location of end of pipe treatment system



