

**PRELIMINARY ASSESSMENT
OF
STORM WATER
MANAGEMENT OPTIONS**

**FOR LAND LIKELY TO DEVELOP
IN THE
VILLAGE OF HORTONVILLE
WITH DRAINAGE TO
BLACK OTTER LAKE**

**OUTAGAMIE COUNTY
WISCONSIN**

MARCH 1996

FOR

BLACK OTTER LAKE PROTECTION AND REHABILITATION DISTRICT

Hortonville, Wisconsin

BY

COASTAL PLANNING AND DESIGN, INC.
641 Baeten Road
Green Bay, WI 54304

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SUMMARY

The Black Otter Lake Protection and Rehabilitation District was created in 1976 to provide a focused and unified effort to restore and maintain Black Otter Lake. In 1982 it completed the Black Otter Lake Rehabilitation Plan and has since been implementing lake protection and rehabilitation strategies as resources allow. Since 1982 the lake has been aerated each winter to maintain adequate dissolved oxygen for the fishery. In 1989 the lake was drained and 120,000 cubic yards of sediment were removed. The lake was refilled in 1990. In 1992 the rehabilitation plan was updated.

Coastal Planning and Design, Inc. was retained by the lake district in October, 1995, to assess where development areas with drainage to the lake in the Village of Hortonville are anticipated, and how the lake district can best insure proper protection of the lake as such development occurs. Seven key growth areas were identified within one-half mile of the lake and delineated on an air photograph. One area is presently outside the village but is adjacent to the village and close to the lake. Recommended storm water management options including erosion and sediment control measures are included.

Although the delineation of the anticipated growth areas and control measure recommendations will provide a more comprehensive and unified lake protection plan for developing areas around the lake, the most important impact the lake district can make to protect the lake is public education. Lake protection must have broad public support. A better educated and informed public which includes developers, contractors, inspectors and neighbors, will help insure that land development is done in a sensitive manner. The lake district is encouraged to promote education whenever and wherever possible; at its meetings, at the village level, and to children in the schools. To facilitate the educational process, the lake district has received as part of this assessment some of the most recent information and instructional videos, one including a training course, the Wisconsin Construction Site Best Management Practice Handbook, the Wisconsin Stormwater Manual, the Water Action Volunteers packet, and several other resource materials for use. Control measure recommendations also include the construction of dry and wet sediment and storm water management basins by the Hortonville schools for educational use beyond a classroom setting.

The Black Otter Lake Protection and Rehabilitation District has provided twenty years of leadership in the protection and rehabilitation of Black Otter Lake. This storm water management assessment will help the lake district continue to plan and manage factors that affect the lake.

Introduction

Coastal Planning and Design, Inc. was retained by the Black Otter Lake Protection and Rehabilitation District (lake district) in October, 1995, to do an assessment of storm water management options for potential development areas with drainage to Black Otter Lake. Black Otter Lake is a 75 acre impoundment on Black Otter Creek in Outagamie County, Wisconsin. The watershed covers 10,043 acres with agriculture being the major land use. As a result of the continuing effort by the lake district to protect and rehabilitate the lake, the assessment was initiated to help identify probable future development areas near the lake and recommend storm water management options including erosion and sediment control measures.

All the areas except one are within the village boundary with drainage to the lake. The area outside the village is adjacent to the village and the lake. All areas are within one-half mile of the lake.

Areas of future development shown on the assessment plan were identified by members of the lake district and officials of the Village of Hortonville. The Village of Hortonville corporate boundary does not fully surround the lake but much of the future development is expected in the village.

The base map for the assessment plan is a 1990 grayscale aerial photograph obtained from Aero-Metric Inc. of Sheboygan, Wisconsin. Contours, hydrologic soil groups, the Hortonville corporate boundary, and development locations were added by the consultant.

Soils

Soil types are identified on the assessment plan by their hydrologic soil group, A, B, C, or D. Generally soils in group A yield very little runoff under saturated conditions due to the permeable nature of the soil. Group D soils yield large amounts of runoff because of the impermeable nature of the soils or a high water table. Soils in groups B or C are located between the A and D soil groups. The dominant soil types in the anticipated growth areas have a hydrologic soil group listing of B. These soils have medium infiltration rates when saturated. Runoff rates from these areas will be affected mainly by the amount of impervious surfaces and slopes. A description of the individual soil groups is included in Appendix B.

Village of Hortonville Construction Site Erosion Control Plan

The Village of Hortonville has a construction site erosion control plan in effect since September 6, 1990, for development within its corporate boundaries.

Some of the areas which the plan covers are: site dewaterings, waste and material disposal, tracking, drain inlet protection, and site erosion control. The village ordinance is patterned after the "model construction site erosion control ordinance" developed by the State of Wisconsin in 1987 with some exceptions. It is good the village adopted such an ordinance as it is a very important first step in minimizing construction site erosion and the transport of sediment and pollution to the lake. If the village ordinance were to continue to be the sole requirement for development within the village, we would encourage clarification of some of the "gray" areas regarding plan submittal requirements, plan review time, and the building inspector's site inspection schedule. A copy of the existing village ordinance is included in Appendix C with our review comments in the margins.

Today the State of Wisconsin has new development requirements as part of the Construction Site Storm Water Discharge Permit Program in effect since November 29, 1994. The permit program applies statewide to any land disturbing area of five acres or more and includes construction site erosion control and storm water management. The townships around Black Otter Lake, Village of Hortonville, and Outagamie County are all affected by this program. Information about the program and requirements are included in Appendix D.

Enforcement of the program is done by the Department of Natural Resources and generally occurs when there is a complaint. We recommend the lake district encourage the Village of Hortonville to include provisions of the state storm water program as part of its development ordinance. The same is true for the townships surrounding the lake unless it is more effective to do this at the county level.

Generally a 25-year storm event is used for pre and post storm water design comparisons but it can vary based on the size of development and local conditions. The Town of Bellevue in Brown County for instance requires all developments covered by its policy to provide "on-site storm water retention/detention storage designed to restrict surface drainage and/or discharge into public storm sewers to that which would occur from a five-year storm event over an equivalent residential development". A copy of the Bellevue storm water management policy is included in Appendix E. If the village is willing to include a storm water ordinance for new development, we would also recommend it apply to any development greater than one acre rather than the five acres criteria in the state program because of the proximity of village development to the lake.

If the lake district is not successful in getting the village to adopt a storm water ordinance, the district can still be proactive in protecting the lake by making sure the village and state enforce the existing village construction site erosion control ordinance and existing state Construction Site Storm Water Discharge Permit Program.

Whatever requirements the village, townships, or county adopt, or are required to follow, a far more important concern for the lake district is to insure that what is enforceable, is enforced. On February 22, 1996, we made a site inspection of the seven areas around the lake where development is anticipated. Photographs were taken of all seven areas and are included in Appendix F. In Area D residential development has already started but erosion and sediment control measures are seriously lacking. The lake district should talk to the building inspector or village immediately about this. Hopefully barriers and fencing can be installed before the spring thaw. Mulch on the disturbed areas would also reduce the impact of raindrops on the bare soil. Enforcement is crucial both in this situation and for any other development around the lake. Without enforcement, construction site erosion control and storm water management plans are meaningless. The lake district should also check to see what control plans the developer submitted to the village for the present development in Area D and why implementation of those plans is not being enforced.

Recommendations for Anticipated Growth Areas

As mentioned earlier, growth areas were determined based on input from the lake district and village. One area includes the construction of a new grade school. Commercial and/or residential development is anticipated in the other six areas by the year 2000. One of the areas is presently outside the village but all are within one-half mile of the lake and drain to the lake. Some areas will have village storm sewers, others will have surface drainage to the lake.

The preliminary recommendations on the assessment plan include erosion and sediment control and storm water management measures. At this time the exact layout and density of each development area is not known.

Erosion and Sediment Control

Whether indicated on the assessment plan for a particular area or not, there are common practices that apply to all land development situations. The Waukesha County Land Conservation Committee developed ten basic principles to erosion and sediment control that should be common vocabulary for any development and are worth repeating. They are also included in the Wisconsin Construction Site Best Management Practice Handbook.

Ten Basic Principles to Erosion and Sediment Control

1. Fit development to the terrain.
2. Time grading and construction to minimize soil exposure.
3. Retain existing vegetation whenever feasible.
4. Vegetate and mulch denuded area.

5. Divert runoff away from denuded area.
6. Minimize length and steepness of slopes.
7. Keep runoff velocities low.
8. Prepare drainageways and outlets to handle concentrated or increased runoff.
9. Trap sediment on site.
10. Inspect and maintain control measures.

Storm Water Management

As shown on the assessment plan, we recommend the construction of sediment and storm water management basins in several of the development areas. Not all areas are well suited for basins in our opinion. Generally the size of a basin should be at least 1% of the area draining to the basin. Final sizing is determined after the proposed development and existing site conditions are better known.

The purpose of storm water management practices is to control peak flow, pollutants and runoff volume that will occur after construction operations have been completed. They are installed during the construction of the development if specific to that development, or sometimes prior to development in anticipation of future development of an area. To the extent feasible, the purpose of such practices should be to increase on-site infiltration through conveyance, depression storage and reduction of impervious area. For permanent structures like basins, provisions must be made for long-term maintenance.

An existing basin was designed and installed in 1992 in a drainage ditch leading to the northeast corner of the lake. This basin was designed to reduce the sediment load from a runoff area of approximately 735 acres. The basin is 285 feet long by 68 feet wide with 4:1 side slopes.

A - Area "A" is an 83 acre area containing the existing middle school and high school. A new grade school is planned in the area as shown on the assessment plan. A school, driveways and parking lots will produce large impervious areas with increased runoff. Also, because of the large area of disturbance during construction, erosion of the exposed soil is highly likely. Fortunately the location where the new school is proposed has generally gentle slopes of 2 to 3%. Elsewhere in the area slopes range from 0.5 to 15%.

At least one basin is recommended near the new grade school. The basin would serve initially as a construction sediment basin until construction of the school, driveways and parking lots is complete and vegetation re-established. The basin can then be converted to a storm water detention/absorption basin. Since the

location is near all three schools, particularly the grade school and middle school, it would be best to make the basin a shallow, dry detention basin for child safety. The outlet should be constructed so the basin slowly but completely drains. Most of the time the basin will be dry and can serve as a playground. To educate children about the multi-purpose value of the basin, informational signage can be placed near the basin to explain how it works and why it is important.

We further recommend a vegetation buffer be established at the outlet of the existing dry detention basin by the middle school. This will help trap sediment in the basin before leaving the outlet. Letting the vegetation grow in the drainage ditch from the schools to the lake would also help trap sediment in runoff going to the lake.

The area also offers the potential for one additional storm water basin southeast of the middle school. At this location it would receive drainage from Area C to the east and not school property drainage. However it would improve storm water drainage to the lake and has the potential, being in a more secluded location on the school property, to function as an educational resource for the school for environmental, habitat and wildlife classes. A wet basin could be constructed with various shallow/open water, marsh and meadow plants similar to the Ogie-Michels retention facility in Fond du Lac. A controlled access fence could be added for safety.

- B - Area "B" is a 39 acre area immediately east of Black Otter Lake. A 38 lot commercial/residential development area is planned for the area. Slopes on the site are moderate to gentle at approximately 5%. A sediment basin currently exists just south of the site but only about a third of the area is able to or should be allowed to drain to that basin. Several large quarry pits are in the southeast corner of the area and would function very well as sediment and storm water management basins for the easterly one-third to one-half of the area. The balance of the surface drainage is toward the southwest corner of the area and a wet basin in that corner is recommended. The basin should be constructed before any land disturbance in the area is started if property ownership will permit this. Since this area is right next to the lake, a basin is important for this area and there is adequate room to construct one at the location shown.

It is particularly important as development occurs in this area to minimize the disturbance of existing drainageways passing through the area from the north along Hwy. 45. Ditch checks are effective in keeping channelized runoff velocities low. Parking lot and open

ditch detention for the commercial lots and backyard swales in the residential lots are recommended.

- C - Area "C" is a 71 acre area located northeast of the lake. There is a small wooded area on the site but most of the area is currently being used for agriculture. Most of the area has steep slopes with high erosion potential. Mr. Mike Schiedermeyer, Village Administrator of Hortonville, said the village does not expect it will be able to provide municipal water to most of the area because of area is higher than the city water supply system. Therefore development in these areas will probably require individual wells on larger lots.

Since soils in the area have a hydrologic soil group of B, water transmission into the soils will be relatively high. Disturbed areas should be kept small and stabilized quickly. Terracing would help reduce runoff velocities. Drainageways and outlets should be prepared before any road or lot construction in the area so they become vegetated and stabilized before land is disturbed for roads and homes. Ditch checks in the channels will slow down the water and allow some of the sediment to settle out. Sediment basins on the westerly side of the area draining the steep slopes are recommended during construction.

The northern part of the parcel has flatter slopes. Water and sewer service is expected to be extended to this area in the near future so development here is anticipated soon. Because the area is relatively small, a basin for the northern portion of Area C is not considered necessary.

- D - Area "D" is a 76 acre parcel west of Black Otter Lake. Agricultural crops currently cover the area but development already began last fall with gravel roads, sanitary, storm and water now in place. Construction site erosion and sedimentation control is especially critical here since storm sewer catch basins are now in place on the site. Slopes are generally moderate and range from 0.5 to 10%.

The area was inspected on February 22, 1996, and there are no sediment barriers around the catch basins, fencing on the downslope ends of disturbed areas, or mulch on bare soil. Such measures are critical and should be installed at once before the spring thaw. Storm sewer routing is direct to the lake. The village should be enforcing its construction site erosion control ordinance. Significant erosion could also impair or plug the village storm sewer system and require cleaning if control measures are not installed.

Because of the moderate slopes, disturbed areas should be kept small and isolated if possible and stabilized quickly. Silt fencing should be installed on the downslope side of each disturbed lot to keep sediment from entering the street and storm sewer system.

The wetland bordering the southern side of the area should be protected with fencing. Channelized runoff should be avoided as much as possible.

A sediment and storm water management basin in our opinion is not suitable for this area. The other measures mentioned should be adequate as long as they are installed and maintained.

- E - Area "E" is a 46 acre site located immediately west of Black Otter Lake. Except for a small corner on the north side, the area is not presently in the village but it is adjacent to a fully developed residential area in the village. Slopes are moderate ranging from 1 to 17% with an average of about 5%. The majority of the soils are in the hydrologic soil group A, although there are a few areas of B and D soils. Runoff flows east to the lake. Except for the northern corner of the parcel, the site is located outside of the Village of Hortonville limits.

A sediment and storm water management basin is recommended in the southeastern corner of the area as shown on the assessment plan. Disturbed areas should be kept small and stabilized quickly. Lot terracing and backyard detention/infiltration swales are recommended.

The wetland adjacent to the southeast corner of the area should be protected with a silt fence. The drainage ditch along the west side of the railroad tracks should also not be disturbed so the existing vegetation in the ditch effectively traps channelized sediment.

- F - Area "F" is an 7 acre parcel located on the north side of Hwy. 45. Commercial development along the highway is expected. Presently the area is used for agriculture. Most of the area except for the extreme northeast corner has gentle slopes.

Since this area will likely have large impervious areas from buildings and parking lots runoff could significantly increase unless measures are constructed to control the runoff. The size and existing drainage patterns do not favor a permanent basin but temporary sediment traps during construction would be possible. Permanent runoff detention and absorption could be accomplished by keeping and using the open ditches along the highway and also

constructing a detention/absorption swale along the backside of the area. Some detention on the parking lots is also possible. Rooftop drainage should be routed through the detention areas, and parking lots grades should be only 1 to 2% to keep runoff velocities low.

- G - Area "G" is an 11 acre lot located on the north side of Hwy. 45 along the east boundary line of the village and northeast of the lake. The site has moderate to gentle slopes and hydrologic soil types of B and C. Runoff from the site travels to an existing drainage swale west of the site and eventually flows to the existing sediment basin just south of Area B. Commercial and residential development is anticipated for the area.

Because of the shape and size of the area a temporary or permanent basin does not seem practical and is not recommended. Since runoff drainage now does not concentrate in the area but instead leaves as sheetflow to the west, a similar strategy should be used to control erosion and sedimentation during construction, and storm water management afterward. Minimize channelization and maintain a vegetation buffer between the disturbed areas and the existing drainage swale are recommended measures. A modest berm and swale could be constructed near the buffer to further detain flows before leaving the area and promote absorption.

Implementation Costs

How much will erosion and storm water management control measures cost?

The costs will be mainly a function of the existing site terrain and the type and density of development proposed. For residential development on gentle slopes with adequate room for backyard detention and absorption the cost should be nearly negligible or possibly 2% of the entire site development cost. Residential development on steep slopes generally requires the use of additional stabilization measures like erosion control matting in addition to the normal seed, mulch and sod. Drainageways and outlets will also need additional fabric and armor, and more inspections and maintenance will be necessary. For development on steep slopes, control measures are expected to be 2 to 5% of the total development costs.

Commercial and industrial development may present additional unique features that need to be controlled based on their particular business activity. The State of Wisconsin has a specific storm water discharge permit for three tiers of industrial activity. If properly addressed at the onset of such development

however, control measures should still only range from 2 to 5% of the total development costs.

Conversations with Other Agency Personnel

During the course of preparing the assessment, we contacted service and regulatory agencies for input. The following comments are noted:

1. Wisconsin Department of Natural Resources (DNR)

Rob McLennan, Tim Razman and Cheryl Bougie were contacted. The Wolf River Basin Water Quality Management Plan "public review draft", January 1996, discusses Black Otter Lake since it is in the Wolf River Basin. The lake has been given a "medium" priority ranking for potential selection under the Wisconsin Nonpoint Source Pollution Abatement Program. This means the lake and its watershed do not have a high priority for state cost-share money so such money, although not impossible to get, will be more difficult to obtain from the state. The full report is available from the DNR.

On the positive side, the DNR is pleased with the continual efforts by the lake district to improve the quality of Black Otter Lake and has an application from the lake district for purchase of a parcel of land along the lake as part of the Wisconsin Lake Management Protection Grant Program which it will again consider in 1996. The storm water management assessment, which includes this report, was partially funded by the DNR through the Wisconsin Lake Management Planning Grant Program.

2. Outagamie County Land Conservation Department

Contacted Roy Burton - conservationist with the department. He mentioned the department has very limited manpower resources and therefore focuses most of its efforts on the quickly urbanizing areas near Appleton. The new county zoning administrator however is interested in more aggressively dealing with storm water management issues throughout the county and that may benefit Black Otter Lake. Dave Muench with UW-Extension in Outagamie County may also be a helpful resource contact for the lake district.

3. U.S. Natural Resources Conservation Service

Contacted Gary Stanke. He mentioned the service may be able to help survey areas for wetland restoration. Manpower and resources are limited but it provides similar help to the U.S. Fish and Wildlife Service.

Other Information and Educational Materials Provided the Lake District Under Separate Cover As Part of the Assessment

1. Base Map -- 1990 Development Around Black Otter Lake. Affixed to 32"x40" Rigid Gatorboard.
2. Base Map -- Anticipated Growth Areas By Year 2000 Around Black Otter Lake. Affixed to 32"x40" Rigid Gatorboard.
3. An Ounce of Detention, A New Look at Stormwater Detention Ponds, Video (Copy), University of Wisconsin-Green Bay, Green Bay, Wisconsin, 1993.
4. Erosion Control for Home Builders, Pamphlet, University of Wisconsin-Extension and Wisconsin Department of Natural Resources, Publication Number GWQ001, Madison, Wisconsin, 1992.
5. From Curb to Stream: Cleaning Up Our Urban Waters, It All Adds Up Series, Video (Copy), University of Wisconsin-Extension, Madison, Wisconsin, 1990.
6. Keeping Soil On Construction Sites: Best Management Practices, Video Training Course, Ohio Federation of Soil and Water Conservation Districts, Columbus, Ohio, March, 1991.

Also includes: (1) Instructor's Manual.
(10) Training Manuals.

7. Protecting Water Quality: Best Management Practices, Video (Copy), Ciba-Geigy Agricultural Division, 1989.
8. Stormwater Ponds, An Effective Way to Control Urban Runoff, Pamphlet, University of Wisconsin-Extension and Wisconsin Department of Natural Resources, Publication Number GWQ 017, Madison, Wisconsin, 1995.
9. Urban Runoff: How Polluted Is It?, Pamphlet, University of Wisconsin-Extension and Wisconsin Department of Natural Resources, Madison, Wisconsin, December, 1992.
10. Water Action Volunteers, *Introductory, hands-on stream and river action projects for Wisconsin*, University of Wisconsin-Extension and Wisconsin Department of Natural Resources, Publication Number: GWQ018, WR-388-95, Madison, Wisconsin, 1995.

11. Wisconsin Construction Site Best Management Practice Handbook, Wisconsin Department of Natural Resources, Publication Number: WR-222 93 Rev., Sixth Printing, Madison, Wisconsin, November, 1993.
12. Wisconsin Stormwater Manual, Wisconsin Department of Natural Resources, Publication Number: WR-349-94, Madison, Wisconsin, 1994.

Review Comments About Ohio Video Training Course (Item 6)

In our opinion the Ohio video training course is one of the best educational resources we have found explaining the value and methods of properly installing erosion and sediment controls to keep soil on construction sites. The complete training course has been purchased as part of this project and presented to the lake district for its use in developing an educational outreach program. Since the course was prepared for Ohio construction, the following review comments are worth noting for Wisconsin construction. Most of the review input was provided by Carolyn Johnson, UWEX Southeast Area Urban Water Quality Educator, and is based on her involvement with erosion control and storm water management issues throughout Wisconsin for several years. We are grateful for her input.

Clarification:

1. Stabilize disturbed areas within seven days if they will be left disturbed for over 30 days.
2. Use NRSC #342 for seeding.
3. Liming is not necessary in most of Wisconsin.
4. Tackifiers should be biodegradable.
5. Silt fence should have draw strings or stakes at least every three feet.
6. Silt fence should be overlapped one full stake spacing width or the two end stakes should be wrapped around each other several times.
7. Remove accumulated material behind silt fence whenever one-half the height of fence.
8. Check fence every night and restaple fabric to stakes when necessary.
9. Straw bales can generally be used effectively if properly installed and maintained.
10. Maintain sediment barriers.

Omission:

1. Construction access drives should have stone cover.
2. Sediment should be cleaned when tracked off site.
3. Use guidelines in Wisconsin Construction Site Handbook (bluebook) for site dewatering.
4. Stabilization roadside ditches and other channelized runoff areas. Use NRSC guidelines.

5. Maintain sediment basins.
6. Use runoff diversions and maintain them.
7. Winter installation of control measures is possible.

End of Report

REFERENCES

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