

Beaver Dam Lake Shoreline Protection Guide

JUNE 2016

Homeowners guide to Shoreline Erosion Control

* Shore line erosion is caused by a number of physical factors;

- 1) Lake-surface water
- 2) Groundwater
- 3) Wind generated wave impact
- 4) Soil and ground condition

* Shore line erosion control is a valuable tool to improve your property and water quality. When the shoreline is properly protected, sedimentation inflow into the lake is reduced. With the addition of vegetative cover the phosphorus and nitrate nutrient levels are also significantly reduced which has a direct impact on water quality.

* In order to identify the best approach for your shoreline a few basic questions need to be answered to present specifics for your property. A selection of applicable forms and practices are attached to help you get started, however, once you are familiar with the process, early contact with Dodge County and WDNR should be made to determine your best approach.

Step 1: If a property survey is available, check for the extent of erosion over time.

Step 2: If rip-rap cover is currently in place what is the condition and how well does it protect the shore line? If repair of existing stone is needed it is normally required to obtain a permit if no new stone will be added. If more extensive repair is required see exemption # 9 regarding how to proceed.

Step 3: Prepare a basic sketch of the shore line with areas of concern identified.

Step 4: Prepare a shore line 'Erosion Intensity' worksheet or 'Energy Along Shoreline',

This will calculate a relative factor for the forces that affect the shore line. If the fetch is less than 1.5 miles with depth of 3 ft. the intensity is LOW. If fetch is greater than 1.5 miles with depth of 3 ft. intensity is typically MODERATE.

Step 5A: If low energy level WDNR Best Practice would be for vegetative cover.

5B: If moderate energy level WDNR Best Practice would be for Rip-Rap protection.

Step 6: Prior to submitting the required permit application, the homeowner should consider if a contractor will be required. If the homeowner performs the work or a contractor is used a WDNR permit will be required. This will insure that the work performed will provide the best protection with a good useful life.

If a contractor is your choice a list of local contractors is provided to help you get started. (Note that BDLIA is not offering a recommendation for any contractor but rather a list for your consideration.)

Step 7A: Work performed on the shore line of Beaver Dam Lake is under Dodge County Zoning. A Dodge County permit may be required; Contact Terry Ochs at 920 – 386-3270 to determine if one will be required.

Step 7B: The WDNR will require a permit for replacement (Exemption #8) or new installation of work performed the shore line or in the water. The basic permit application has a submission cost of \$303 and will include the information that was collected in steps 2 through 5. Review the WDNR web site at; www.dnr.wi.gov/permits/water/ for additional details.

Step 8: With the scope of your project identified and the required permits received you are now ready to start the shore line erosion control and enjoy your lake shore. Remember to take before and after photographs to document your progress.

Certain activities in navigable waters are exempt from needing a permit under chapter 30, Wisconsin Statutes. Using this checklist, you can determine if your project qualifies for an exemption.
Your proposed **riprap repair** is eligible for an exemption if your project will meet all the following conditions:

- The riprap may not be located in an area of special natural resource interest (ASNRI) – see the Designated Waters Search on DNR's website to determine if your waterway is an ASNRI or has another special designation.
- Riprap repair may not exceed 300 linear feet of shoreline, and must be located on an inland lake or flowage.
- If the riprap was previously permitted, the riprap repair shall meet the conditions of the original permit.
- Where riprap was not previously permitted, the riprap repair shall meet the following additional conditions:
 - Repair shall be located along moderate or high energy shorelines.
 - Riprap may not be placed at an elevation higher than the ordinary high water mark plus the storm-wave height. For certain flowages greater than 2500 acres, specified in NR 328-subchapter II, riprap may not be placed at an elevation higher than the ordinary high water mark plus 1.5 times the storm-wave height (see the rule or contact DNR for a list of applicable waters.)

Note: You can calculate the energy category and storm-wave height for your shoreline using the following web site: <http://dnr.wi.gov/org/water/fhp/waterway/erosioncalculator.shtml>. If you don't have Internet access, contact your county Land Conservation Department or a contractor for assistance.

- The toe of the riprap may not extend more than 6 feet waterward of the ordinary high water mark.
- Riprap shall be clean fieldstone or quarry stone 6 to 24 inches in diameter.
- The final riprap may not exceed (be steeper than) 2 foot horizontal: 1 foot vertical.
- Filter cloth or clean-washed gravel shall be used as a filter layer under the riprap to extend the life of the structure, improve effectiveness and prevent soil erosion behind the riprap.
- Riprap or other vegetated armoring along moderate energy sites shall be re-vegetated above the ordinary high water mark by using native plantings which may include native non-woody plants, native shrub plantings, native live stakes or native jointed plantings.
- The riprap may be placed and maintained only by a riparian (an authorized agent or contractor may do the work on behalf of the riparian).
- The project shall not result in removal of greater than 20% of the aerial coverage of natural bank, vegetation, emergent vegetation or floating vegetation, not including the area covered by the footprint of the riprap, or any access corridors necessary for the placement of the riprap.
- Any grading, excavation and land disturbance shall be confined to the minimum area necessary for the construction and may not exceed 10,000 square feet.
- Erosion control measures shall meet or exceed the technical standards for erosion control approved by the department under subch. V of ch. NR 151. Any area where topsoil is exposed during construction shall be immediately sodded, seeded and mulched, covered with an erosion mat or riprapped to stabilize disturbed areas and prevent soils from being eroded and washed into the waterway.

Note: These standards can be found at the following website: <https://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm>

- Unless part of a permanent stormwater management plan, all temporary erosion and sediment control practices shall be removed upon final site stabilization. Areas disturbed during construction or installation shall be restored.
- All equipment used for the project shall be designed and properly sized to minimize the amount of sediment that can escape into the water.
- No waterward extension of the property is permitted other than what is reasonably necessary to conduct the project and protect the existing bank. No soil or similar fill material may be placed in a wetland or below the ordinary high water mark of any navigable waterway.
- Dredging is not allowed for the placement or maintenance of any shore erosion control structure.

If your project does not meet all of these conditions, submit a permit application to the Department.

If you have any questions about whether you meet these conditions, you may request an Exemption Determination from DNR. Obtain Form 3500-107, "Chapter 30 Exemption Determination Request" from a DNR service center or visit the website <https://dnr.wi.gov/org/water/fhp/waterway/permits/exemptionrequest.pdf> or search for it on our website at www.dnr.wi.gov under the topic "Waterway and Wetland Permits." Complete the form and submit it to the DNR office identified on the form.

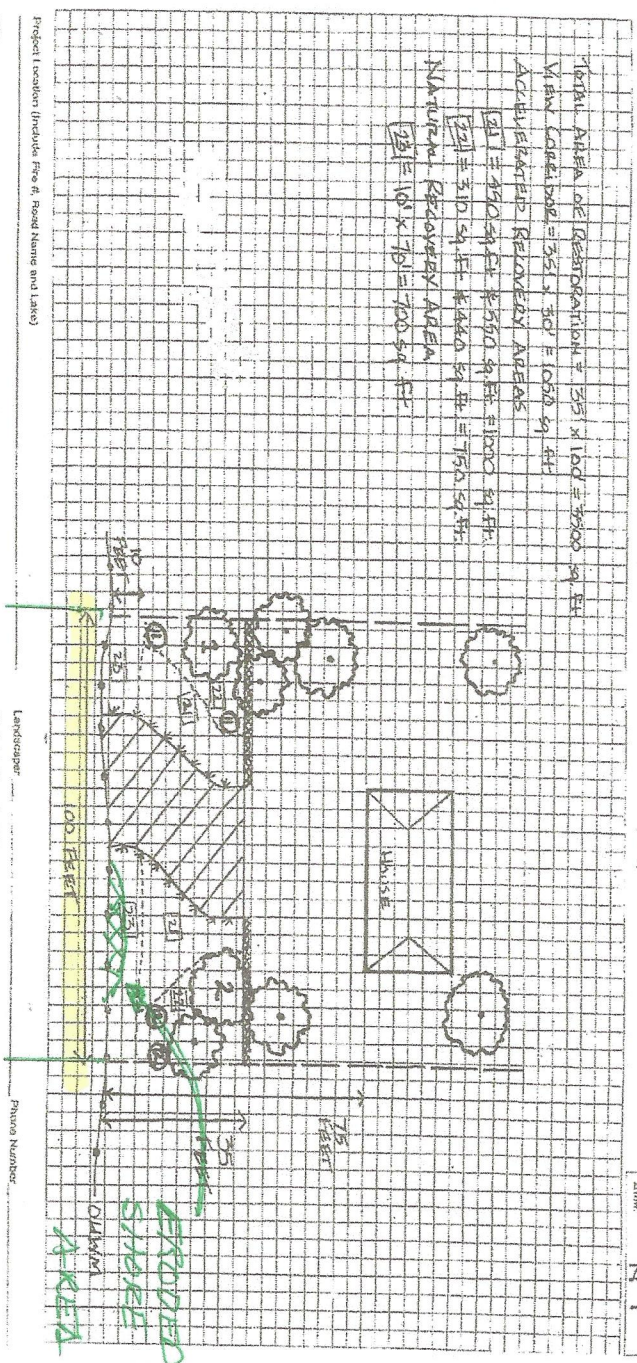
Note: If you submit an Exemption Determination Request for any shoreline erosion control project, you must calculate the energy category and storm-wave height for your shoreline using the following website: <http://dnr.wi.gov/org/water/fhp/waterway/erosioncalculator.shtml>, and must include with your request the energy calculation result page and the lake map used for the calculation.

Use the dimensions and symbols found on the work of this project to complete the diagram.

Scale: 1 INCH = 20 FEET

Please indicate north
N
↑

TOTAL AREA OF RESTORATION = 255' x 100' = 25,500 SQ. FT.
 VEGN CORRIDOR = 35' x 30' = 1,050 SQ. FT.
 ACCUMULATED BUFFERED AREAS
 21 = 450 SQ. FT. x 500 SQ. FT. = 1,000 SQ. FT.
 22 = 510 SQ. FT. x 440 SQ. FT. = 750 SQ. FT.
 NATURAL RECOVERY AREA
 23 = 100' x 70' = 7,000 SQ. FT.



Project Location (Include Fire #, Road Name and Lane) _____
 Owner _____
 Phone Number _____
 Landscape _____
 Worksheet Completed By _____
 Date _____
 Plan Number _____
 Plan Approved By _____
 Date _____

NOT TO SCALE

Waterway and wetland permits: calculating energy along a shoreline

STEP 4

NOTE: For best results, use Microsoft Internet Explorer browser version 7 or higher

Follow these steps to obtain an accurate calculation of energy along your shoreline:

- Print out the http://dnr.wi.gov/topic/Waterways/face/sheets/Erosion_Intensity_Worksheet.pdf (include the scale)
- Figure out the correct feet-per-inch value using the map scale and your ruler, and enter the number below:
1 inch = feet
- Mark your shoreline site on the lake map.
- Draw the longest unobstructed straight line originating from your site across the water to any other point on the shore; this is the fetch at your site. Use the [example \[PDF: 239KB\]](http://dnr.wi.gov/topic/Waterways/face/sheets/Erosion_Intensity_Worksheet.pdf) for reference.
- Using a ruler, measure the length of the fetch line and record this value:
 inches
- To convert the ruler measurement of fetch to actual distance, multiply feet per inch (found in step 2) by the measured fetch line (found in step 5):
Lake Fetch = feet/inch x inches = 0 feet
- Use the value (in feet) obtained from step 6 and divide by 5280 to convert Lake Fetch in feet to miles.
For example Lake Fetch (ft)/5280
- Measure the mean depth along your fetch line
 - Locate and mark at least 3 equally-spaced points along your fetch line.
 - Estimate and record the depths at these equally spaced points (for example: 45 ft, 105 ft, 75 ft, 55 ft and 25 ft).
 - Add these depth values together and then divide by the number of sample points taken, and record the result. For example, (45 ft + 105 ft + 75 ft + 55 ft + 25 ft)/5 = 61 feet.) Use the [example \[PDF: 273KB\]](http://dnr.wi.gov/topic/Waterways/face/sheets/Erosion_Intensity_Worksheet.pdf) for reference.
- Using the two values obtained in steps seven and eight, fetch from your site and mean depth on your fetch line, use the wind wave model below to calculate the storm wave height at your site. The storm wave height is used to determine the energy category at your site.

Mean Water Depth Along My Fetch feet

Lake Fetch From My Site miles

Storm Wind Speed ft/sec

Storm Wave Height

Energy Category

Calculate

-Low Energy/Moderate Energy/High Energy

NOTE: 3ft DEPTH w/ <1.5 FETCH = LOW ENERGY

Last revised: Monday November 11 2013

Erosion Intensity Worksheet

STEP 4

Section V: Erosion Intensity (EI) Score Worksheet

Applicants and department staff shall use this worksheet to calculate erosion intensity pursuant to s. NS 328.02(2). Where an applicant or the department determines that the erosion intensity score is not representative of the site, the applicant shall provide a written explanation of the reasons for the determination. The applicant shall apply methods outlined in the manual to determine the erosion intensity (EI) at the shore profile. The applicant shall also provide a written explanation of the methods used to determine the erosion intensity in different energy categories. The site shall be placed in the category as determined by EI.

SHORELINE VARIABLES	EROSION INTENSITY VALUE IS LOCATED IN PARENTHESIS ON LEFT SIDE OF EACH CATEGORY BOX						ASSIGNED EI
	(0) <1/10	(2) 1/10 - 1/3	(4) 1/3 - 1	(7) 1 - 3	(10) 3 - 10	(13) 10 - 30	
AVERAGE FETCH ¹ , average distance from shore to the opposite shore	(1) <1	(2) 1-3	(3) 3-6	(4) 6-12	(5) >12		
DEPTH AT 20 FEET , ² value of depth at 20 feet from shore	(1) <1	(2) 1-3	(3) 3-6	(4) 6-12	(5) >12		
DEPTH AT 100 FEET , ² value of depth at 100 feet from shore	(1) <1	(2) 1-5	(3) 5-10	(4) 10-20	(5) >20		
BANK HEIGHT ³ , highest bank along shoreline	(0) rock, man, light clay, well developed (40' or more)	(1) soft clay, clayey sand, sand with a silt (20' or more)	(2) hard, stony, gravelly sand (10' or more)	(3) hard, stony, gravelly sand (5' or more)	(4) hard, stony, gravelly sand (2' or more)	(5) unarmament stands (1' or more)	(6) unarmament stands (less than 1')
BANK COMPOSITION ⁴ , ⁵ soil type and degree of exposure to wind	(0) no hard armor on either adjacent property	(1) hard armor on one adjacent property	(2) hard armor on both adjacent properties	(3) hard armor on one adjacent property with measurable recession	(4) hard armor on both adjacent properties with measurable recession	(5) unarmament stands (1' or more)	(6) unarmament stands (less than 1')
INFLUENCE OF ADJACENT STRUCTURES , ⁶ substantial reduction in wave energy	(0) rocky substrates unable to support vegetation	(1) dense or abundant vegetation	(2) scattered or patchy vegetation	(3) emergent, floating or submerged vegetation	(4) emergent, floating or submerged vegetation	(5) lack of vegetation (cleared), crop or agricultural land	(6) lack of vegetation
AQUATIC VEGETATION ⁷ , ⁸ presence and abundance of vegetation in the water	(0) bank composed of rocky outcropping vegetation	(1) dense vegetation, upland trees, shrubs and grasses, including those having	(2) moderate to dense natural ground vegetation and canopy trees with shrub layer	(3) lack of vegetation (cleared), crop or agricultural land	(4) moderate to dense canopy trees with moderate to dense natural shrub layer, or other natural features	(5) moderate to dense canopy trees with moderate to dense natural shrub layer, or other natural features	(6) moderate to dense canopy trees with moderate to dense natural shrub layer, or other natural features
BANK STABILITY , ⁹ presence and abundance of vegetation in the water	(0) established lawn with moderate to dense canopy trees	(1) established lawn with moderate to dense canopy trees	(2) moderate to dense natural ground vegetation and canopy trees with shrub layer	(3) lack of vegetation (cleared), crop or agricultural land	(4) moderate to dense canopy trees with moderate to dense natural shrub layer, or other natural features	(5) moderate to dense canopy trees with moderate to dense natural shrub layer, or other natural features	(6) moderate to dense canopy trees with moderate to dense natural shrub layer, or other natural features
SHORELINE GEOMETRY , ¹⁰ presence and abundance of vegetation in the water	(0) < 1/3 mile fetch	(1) 1/3 to 1/2 mile fetch	(2) 1/2 to 1 mile fetch	(3) 1 to 3 miles fetch	(4) 3 to 10 miles fetch	(5) > 10 miles fetch	(6) > 10 miles fetch
SHORE ORIENTATION ¹¹ , ¹² presence and abundance of vegetation in the water	(0) < 1/3 mile fetch	(1) 1/3 to 1/2 mile fetch	(2) 1/2 to 1 mile fetch	(3) 1 to 3 miles fetch	(4) 3 to 10 miles fetch	(5) > 10 miles fetch	(6) > 10 miles fetch
BOAT WAKES ¹³ , ¹⁴ presence and abundance of vegetation in the water	(0) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels	(1) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels	(2) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels	(3) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels	(4) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels	(5) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels	(6) no channels within 100 yards, broad open water body, or consisted shallow water body, or channels
EROSION INTENSITY SCORE (EI)							

STEP 5A

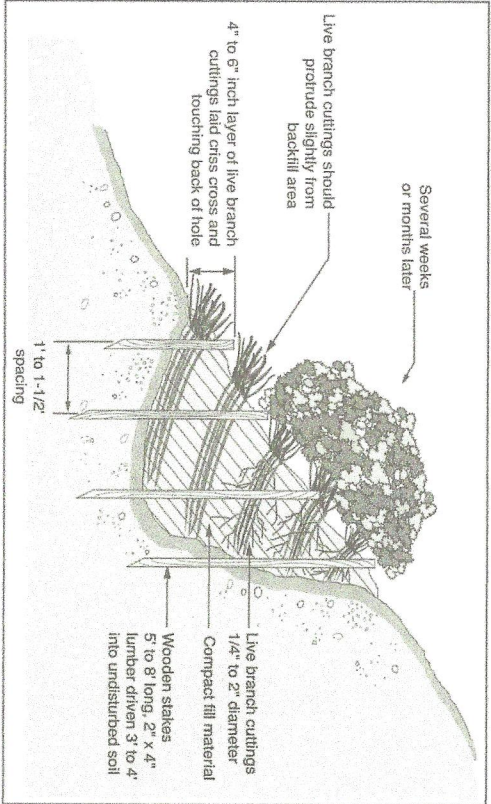
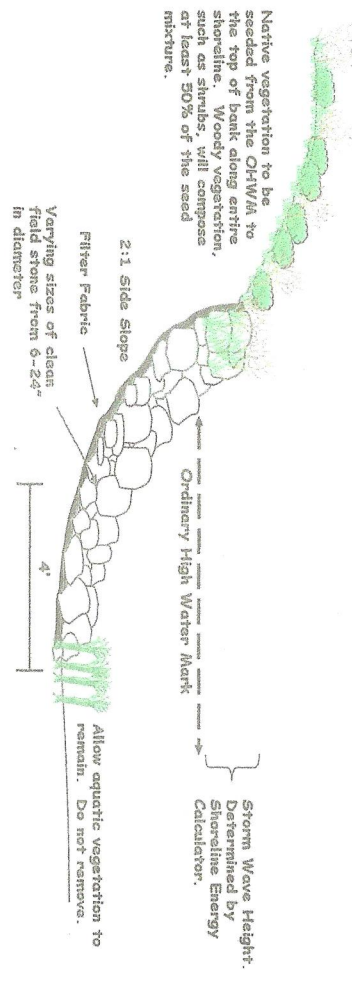


Figure 17—Typical branchpacking. (Lewie 2000)

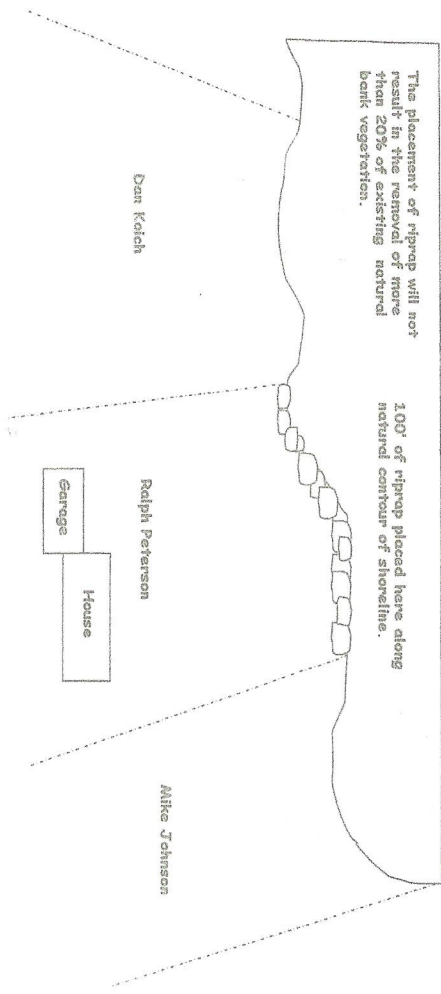
LOW ENERGY SHORELINE

STEP 5B



The placement of riprap will not result in the removal of more than 20% of existing natural bank vegetation.

100' of riprap placed here along natural contour of shoreline.



Step 6:

Listing of Contractors:

Design – Manage LJ Reas 920-291-7787

Stone Link Aggregate 920-885-5621

Installation:

Kinas Excavating Green Lake 920-294-3879

Roedl Excavating Beaver Dam 920-885-4753

K& B Landscape Beaver Dam 920-885-6982

Outdoor Impact Green Lake 920-294-6162

Washkovick Landscape Princeton 920-295-9480

STEP 7 Waterway protection Lake shore erosion



Lake Erosion Control

Natural shoreline features provide erosion control in various ways. Every shoreline is exposed to different natural events and human activities that can cause erosion.

A small amount of soil erosion may not be a cause for any concern, but intervention may be needed on some shorelines. A permit may be required.

Determine permit required

Question 1 :

Are you a municipality or similar public entity (e.g. state or federal government, inland lake protection and rehabilitation district or similar special purpose unit of government, public utility, etc.) wanting to put in a permanent breakwater structure?

Yes No

[Print text version](#)

Exemptions

- **Exemptions** for this and other activities - choose riprap repair or replacement.

Laws

Applicable statutes and codes include [Section 30.13, Wis. Stats. \(PDF, 541 DNR\)](#) and [Chapter NK 323, Subchapter I, Wis. Admin. Code \(PDF, 541 DNR\)](#).

Local permits and U.S. Army Corps of Engineers regulations may also apply. We advise you to contact your [LOCAL AGING OFFICE](#) and your [REGIONAL U.S. ARMY CORPS OF ENGINEERS OFFICE \(541 DNR\)](#).

Last revised: Wednesday, December 03 2014

State of Wisconsin
Department of Natural Resources
dnr.wis.gov

STEP 7 LAKESHORE EROSION CONTROL - BIOLOGICAL
General Permit Application Checklist
(06/2013)

GENERAL PERMIT APPLICATION INSTRUCTIONS

To apply for this General Permit, submit all of the required information listed below. A complete submittal with detailed plans will allow us to make a decision about your permit application. Permit processing review times begin when the application is received by the Department and is determined to be complete.

Please note that you are responsible for obtaining all necessary local (e.g. city, town, village or county) and U.S. Army Corps of Engineer permits or approvals in addition to any applicable state permits prior to commencing any work at the project site.

The Department offers the opportunity to apply electronically for all waterway and wetland permits. The Water Permits portal page can be found at <http://dnr.wis.gov/Permits/Water/>

Informational Requirements:

1. Application form. A complete, signed application form "Water Resources Application for Project Permits (WRAPP)" (form# 3500-53) <http://dnr.wis.gov/files/PDF/forms/3500-53.pdf>.
2. Application fee. Checks should be made payable to "Wisconsin DNR." A list of fees can be found at <http://dnr.wis.gov/topic/Waterways/Permits/PermitProcess.html>.
3. Site maps which clearly illustrate the location and perimeter of the project site, and its relationship to nearby water resources (e.g. lakes, rivers, streams, wetlands), major landmarks and roads.
4. Photographs that clearly show the existing project area. Remember that too much snow cover or vegetation may obscure important details. If possible, have another person stand near the project area for size reference.
5. Project plans and specifications reflecting the General Permit Eligibility Standards as listed in the project-specific checklist below. If your project does not meet all of the eligibility standards, you will need to apply for an Individual Permit.
6. Vegetation Plan to meet the requirement of the general permit that native vegetation must be seeded above the ordinary high water mark (OHWM). Please refer to the Shoreland Habitat: Wisconsin Biology Technical Note 1 or the NRCS Conservation Practice Standard 643A, Shoreland Habitat to see the recommended practice standards establishing native vegetation.
7. Wave Energy Calculation or Erosion Intensity (EI) Worksheet to meet the requirements of the general permit which directs the type of shoreline erosion control structure needed based on the erosion energy at your site. Please refer to Wave Energy Calculator or the EI Worksheet. Remember if the Erosion Calculator and the EI Worksheet result in different energy levels, you must use the EI worksheet energy level.
8. Electronic documents. If you are applying on paper, all documents listed above must also be submitted in an electronic format, either by enclosing a disk with your application materials, providing a link to an ftp site, or by other electronic methods. If possible, please create a separate file for each component of the application (i.e., forms, photos, maps, plans, etc.). Each file must be less than 15 megabytes in size, and the total size of the files combined must be less than 30 megabytes.

If you are applying electronically, you may be prompted for some of these items separately during the electronic submittal process.

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2. **Application fee.** Checks should be made payable to "Wisconsin DNR." A list of fees can be found at <http://dnr.wi.gov/topic/waterways/Permits/PermitProcess.html>.
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