FDM 24-5-1 Introduction
December 8, 1995

The purpose of this section is to discuss potential impacts on aquatic systems from highway projects. This section is divided into two subjects: FDM 24-5-5, Rivers, Streams and Lakes and FDM 24-5-10, Wetlands.

Highway projects can present specific problems to each of these types of aquatic systems.

FDM 24-5-5 Rivers, Streams and Lakes
December 8, 1995

5.1 Evaluating Existing Conditions

5.1.1 Hydrology-Physical

Rivers or streams are defined as either naturally occurring or human-made watercourses that have distinguishable beds and banks and a flow gradient. They are components of a drainage basin in a watershed and usually serve as habitat for aquatic species.

Where appropriate, physical descriptions of rivers and streams should include geologic and topographic features; geometric characteristics such as depth, width, slope, and velocity; soils and substratum type; and discharge and drainage area data.

Water quality and sediment transport are usually intimately related to the watershed feeding the stream. Consequently, it is important to evaluate the land use and soil characteristics of the project area. Nearby upstream dischargers and downstream receivers should also be noted. They include wastewater treatment plants, industrial dischargers, and water intake systems for municipalities. Information on surface water resources is available by county through the Department of Natural Resources (DNR) District Offices.

Rivers and streams should be characterized based on continuity of flow. Three situations are possible:

1. Permanent (Year-Round) Flow: Rivers and streams that receive water mostly through seepage, subsurface springs, lakes or impoundments. In the immediate drainage area, the water table usually stands at a higher level than the stream bottom.
2. Temporary Flow: Rivers and streams that receive water primarily from surface runoff. Because runoff is seasonal, these streams are dry during part of the year.
3. Intermittent Flow: Rivers and streams that flow alternately on and below the ground's surface. Subsurface flow is usually through coarse sand, gravel, or limestone.

Lakes are bodies of water formed in depressions of the earth's surface. A lake with a surface outlet represents a holding and mixing basin for stream flow. Zonation and stratification are characteristics of lakes. The littoral zone is one containing rooted vegetation along the shore. The limnetic zone is one of open water dominated by plankton, microscopic plants and animals that float or drift in water. The deep-water profundal zone is an area of poor light with no rooted vegetation and is inhabited by heterotrophic organisms - those organisms that are dependent on organic matter for food (see Attachment 5.1).

Physical descriptions of lakes should include inlets or outlets, approximate size and depth, substratum and vegetation.

The amount of dissolved oxygen in a lake varies according to depth (or zone) as well as according to season. In summer, the surface waters are warmer than the bottom waters and circulate, not mixing with the colder more viscous bottom waters. The epilimnion is the zone in which sunlight penetrates causing more phytoplankton, activity which in turn produces more dissolved oxygen. The photosynthetic activity, as well as surface motion is lacking in the hypolimnion causing a lack of dissolved oxygen, possibly even a depletion. A depletion would result in stagnation.

In the onset of winter, the oxygen in a lake circulates freely due to the drop-in temperature of the surface waters to equal the bottom waters. This is when the waters are said to turn over. Cold water holds more oxygen. This fact, along with the reduced activity of aquatic organisms usually assures an adequate amount of dissolved oxygen in a lake in the winter unless a lake is too shallow and is ice covered for a long period.

For purposes of impact evaluation, lake trophic state may be an important consideration. The trophic state of a lake describes the nutrient content and productivity (Weller 1981). A lake can change from an oligotrophic state (low productivity) to a eutrophic state (high productivity) as nutrients are added through surface water flow. The trophic state of a waterbody is influenced by water temperature, water depth, and season and is associated with certain fish and wildlife species.

A highly eutrophic lake will exhibit stagnation, algae bloom, excessive vegetation, and contain fish such as bullhead and carp. These conditions are associated with low dissolved oxygen levels.

5.1.2 Water Quality

A good indication of water quality can be gained by observation in the field. Qualitative information to be noted includes type of substratum; water clarity; sources of agricultural, residential, or industrial runoff; odor or other signs of stagnation (e.g., algae blooms, dead fish, excessive weeds); and habitat diversity.

Aquatic insects and fish are good indicators of water quality. Many species can tolerate only clean, well oxygenated water, while others are able to survive low oxygen or polluted conditions. In general, waterbodies with a high diversity of insect or fish species are considered healthier and more stable than those with only a few species.

Quantitative water quality data are available through the Department of Natural Resources (DNR), U.S. Geological Survey (USGS), or private industry for many rivers and lakes; or, if it is necessary, these data can be obtained by individual water quality testing procedures.

Quantitative values of factors such as turbidity, nitrates, phosphates, dissolved oxygen, biological oxygen demand, and conductivity are useful indicators of the existing quality. Standards are available to which the data can be compared. The Region Offices should contact the Office of Environmental Analysis (OEA) for technical assistance if it is determined that such data are necessary.

5.1.3 Aquatic Species

If it is desirable to do so, many sampling techniques are available to determine the species of fish, aquatic insects, and bottom dwelling organisms that are present. Generally, the DNR District Office can provide adequate information. In most cases, it is sufficient to know whether a particular waterbody supports a critical resource, such as trout, forage species, or spawning habitat. The presence or absence of vegetation should also be noted. Include the submergent, emergent, and bank or shoreland vegetation that might serve as a source of food or cover, or function to control water temperature.

5.1.4 Waterbody Uses

Impact significance is generally based on waterbody use. A description of present use, such as recreational, sport fishery, irrigation, wildlife production, rare plant habitat, etc., should be provided. The DNR can provide information on whether a river is classified as a trout stream or a scenic or wild river. Any upstream or downstream uses that might contribute to, or receive effects from, the project area should also be included. This information can be obtained from DNR watershed basin studies.

Contributors of pollution along large, commercially navigable waterways generally include point sources such as industrial and storm sewers. Nonpoint sources along other waterbodies include urban and agricultural runoff.

The area over which these observations should be made depends upon the waterbody. The idea is to describe those existing situations that could reasonably be expected to either influence the water quality at the project site or that could be receivers of siltation due to construction.

5.2 Evaluating Impacts on the Aquatic System

The proposed project activity should be explained in terms of how it will change the existing waterbody. Discuss whether a new or replacement structure is proposed and if there will be a channel change or instream dredging or filling. Document whether a temporary crossing will be provided during construction and if there will be any changes in drainage to and from wetlands. Any other work that could alter the waterbody should also be evaluated.

5.2.1 Primary Impacts

Primary impacts are those that would be expected to occur as a result of initial construction. These include:

1. Removal of Bank or Shoreland Vegetation: Can eliminate a source of food input to the water body and can cause a temperature change due to loss of cover that can be lethal to species with narrow temperature tolerances. An increase in temperature would cause a reduction in dissolved oxygen and may result in a reduction in the number of cold water fish species. This activity can also eliminate habitat for wildlife and accelerate bank erosion.

2. Removal or Simplification of Substratum: Can eliminate spawning habitat and benthic food source.

3. Increase in Suspended Particulate Matter: Can affect aquatic insects and fish directly by covering spawning areas, smothering, and gill abrasion and can decrease productivity by limiting sunlight availability.

4. Alteration of Stream Hydrology: Can eliminate diverse bottom gradient, meanders, and pool and riffle areas resulting in scour around piers and erosion. Velocity changes can also occur.

5. Alteration of Adjacent Wetland Habitat: Can disrupt or eliminate wildlife habitat and reduce flood storage capacity. See FDM 24-5-10 for further wetland information.

5.2.2 Secondary Impacts

Secondary impacts occur as a result of primary impacts. These occur over a period of time and although not immediately observable are usually predictable. Secondary impacts may include the following:

1. The introduction of chemical pollutants such as road salt or automobile by-products can adversely affect the quality of the water.

2. Aesthetics and recreational use can be affected.

3. Water quality, vegetational and structural alterations may lead to changes in wildlife and/or human populations and use.

Common knowledge and past experience should allow a reasonable prediction of secondary impacts. Previous, comparable situations can be cited in discussions of secondary impacts. The point is to predict changes that could reasonably be expected to be long-term consequences of the initial action.

5.3 Determination of Significance

Impact significance can be estimated based on a thorough knowledge of the local ecology or land use of the project area. Coordination with the DNR, local units of government, and private property owners is the best way to gain information about the uses and importance of the waterbody. Once this has been done, a basis is available for determining significance. Both context and intensity should be addressed.

This type of analysis should be made for all alternatives, comparing each in terms of adverse and beneficial effects. Differences among alternatives should be pointed out. For example, all alternatives might involve a stream crossing, but the crossing site for one alternative might avoid a spawning bed or food source (e.g., a riffle area) considered important to the stream's productivity.

5.4 Measures to Minimize Harm

Techniques to reduce adverse impacts should consider the critical nature of the resource being affected. For many projects, the standard specifications outlined in the Standard Specifications for Road and Bridge Construction are adequate procedures to minimize harm. Specifically, the reader is referred to the following sections of the Standard Specifications:

standard spec 107.18	Environmental Protection
standard spec 107.20	Erosion Control
standard spec 203	Removing Old Culverts and Bridges
standard spec 205.3.11	Disposal of Surplus or Unsuitable Material

Information on standard erosion control measures is also found in Chapter 10.

For certain projects, specific mitigation measures are usually requested by the DNR, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Environmental Protection Agency, or local units of government. Requests to select alignments that would affect the least critical part of the waterbody, to design crossings that minimize work in the waterbody and to keep clearing and grubbing operations to a minimum are common recommendations. Timing of construction activities ("construction windows") to avoid adverse impacts on animal life can also be a type of mitigation. Mitigation by habitat replacement or enhancement for habitat lost to the project may be requested under special circumstances by the DNR or other government agencies.

Where stream channel changes are unavoidable, efforts should be made to reconstruct the channelized segment to hydrologic characteristics similar to the original stream. Thought should also be given to reestablishment of natural bank or shoreland vegetation and to placing clean aggregate on the new stream bottom in order to speed recolonization of food crop species. Basic goals in project planning are:

1. Change existing conditions as little as possible.

2. Where adverse changes are unavoidable, try to implement techniques that could minimize primary

and secondary impacts.

3. Look into possibilities for enhancing remaining undisturbed features of the project site (e.g., adding spawning gravel or creating riffle areas by the addition of riprap).
4. Be aware that mitigation techniques can also cause secondary impacts that can be more undesirable than no mitigation.

Mitigation must have a goal and must be decided upon relative to the current uses of the waterbody. Coordination with the DNR and the U.S. Fish and Wildlife Service will generally provide an acceptable mitigation plan.

5.5 Permits

A federal permit may be required. Section 404 of the Clean Water Act requires permit authorization from the U.S. Army Corps of Engineers for the discharge of fill material into waters of the United States. These waters include rivers, streams, lakes, embayments and wetlands. In addition, a Section 401 Water Quality Certification (from the Clean Water Act) must be waived, denied or granted by the DNR before a Section 404 Permit is issued or denied by the Corps. Chapters 30 and 31 in the State Statutes pertain to alterations to or impacts on a waterbody from channel changes, rip-rap, bridges, or other structures. WisDOT is exempt from obtaining Chapter 30 permits for certain activities, according to a Cooperative Agreement between the WisDOT and the DNR for wetland mitigation. This cooperative agreement applies only to highway and bridge projects, and only if the activity is accomplished in accordance with the interdepartmental procedures established in this cooperative agreement.

FDM 21-50 discuss federal and state permits.

5.6 Factor Sheets

Factor Sheets F1 through G pertain to aquatic system evaluation and need to be completed when preparing an environmental document if the project affects rivers and their floodplains (F1 and F2) or lakes (G).

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

5.7 Reference

"Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act", Council on Environmental Quality, Executive Office of the President, November 29, 1978.

Ruttner, F. 1973. Fundamentals of Limnology. University of Toronto Press. Toronto, Canada.

Weller, M. W., 1981. Freshwater Marshes. Univeristy of Minnesota Press. Minneapolis, MN.

LIST OF ATTACHMENTS

Attachment 5.1	Zonation of Lakes

FDM 24-5-10 Wetlands

December 8, 1995

10.1 Evaluating Existing Conditions

Wetlands should be described in terms of hydrology, relationship to other waterways, vegetation and soils, and ecology. Following is an outline that defines wetlands and provides several criteria for describing different types. As with other environmental factors, understanding the existing wetland complex is necessary before impacts can be predicted and assessed.

10.1.1 Definition and Characteristics

1. Wetlands are "those areas that are saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." [1] The Wisconsin Statutes define a wetland as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions".[2]
2. Saturation ranges from waterlogged soils to permanent, standing water. The degree of saturation

[1] Code of Federal Regulations, 33CFR 323.2(c). Regulatory definition accepted by the FHWA, CORPS, U.S. Fish & Wildlife, U.S. EPA, etc.

[2] Wisconsin Statutes, 23.32(1). Definition used by Wisconsin Wetlands Inventory.

changes with seasonal or annual changes in water levels. Associated plant and animal communities adjust as water levels fluctuate.

3. Wetlands have some of the characteristics of both the aquatic and upland communities.
4. Wetlands are part of the hydrologic cycle (Attachment 10.1):
    - Water enters the groundwater system through recharge areas by precipitation. Water runs off to streams, is transpired through plants, evaporates or seeps into the groundwater.
    - Water that enters the groundwater moves to discharge areas such as springs, lakes, streams, and wetlands.
5. Wetlands can occur in any part of the hydrologic cycle. Characteristics of categories of wetlands, according to Novitzki's (1981) hydrologic classification system, are as follows:
    - Perched wetlands:
        - Occur at the highest point of ground surface in the area's hydrologic cycle.
        - Are usually small in size.
        - Have an impermeable bottom separating them from the groundwater.
        - Serve very little recharge function.
    - Flow-through wetlands (upland slope):
        - Created where a dip in the land surface intersects the water table.
        - Groundwater discharges to the wetland on the upper side and recharges to the zone of saturation on the lower side.
        - May also have relatively impermeable bottom layer.
    - Spring-fed wetlands:
        - Similar to flow-through wetlands with water emerging from groundwater system on upper side.
        - Water usually does not re-enter groundwater on lower side, but leaves the wetland as a stream headwater.
    - River floodplain wetlands:
        - Most common wetlands.
        - Occur along river floodplains and lake margins.
        - Groundwater is discharged through these into streams or lakes.
        - These wetlands may become recharge areas when their water levels are higher than the water table due to heavy precipitation, saturated soils, and low evaporation rates.
6. Wetland soils may be mineral (sand, silt, clay) or organic (peat, muck):
    - Wet mineral soils occur where the water table is slightly below the land surface most of the year. Anoxic conditions are produced and the soils exhibit mottling or gleying.
    - Organic soils occur where the water table is at or above the surface most of the time. These soils are formed by incomplete decay of vegetation that builds layers as it dies. Saturated soils do not contain the necessary oxygen to complete decomposition.

    A list of hydric soils by series and subgroup for Wisconsin (Wis. Bulletin No. 430-5-9) can be obtained from the Natural Resource Conservation Service or through the Office of Environmental Analysis (OEA).
7. Vegetation:
    - Vegetation is indicative of soil type, saturation, soil, water chemistry, and climate.
    - Knowledge of local ecology is important in knowing what types of wetlands occur in various areas of the state.

10.1.2 Wetland Classification

The most current wetland classification system is "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin, et al., 1979). Table 4 and Figures 1, 4, 5, and 6 in this publication summarize wetland types in use and adopted by the FHWA and all federal regulatory and resource agencies.

A new federally accepted classification system based on the hydrogeomorphic functions of wetlands may be used in functional wetland assessment. In this case a regional model rather than a national model of wetlands has been proposed by Brinson (1992).

The classification is based on the three basic properties that are incorporated into determination of wetland function:

1. Geomorphic setting (depressional, riverain, fringe or extensive peatlands)
2. Water source (precipitation, lateral flow from upstream/upslope, or ground water)
3. Hydrodynamics (primarily vertical, primarily unidirectional and horizontal or primarily bidirectional and horizontal)

From the three basic properties describing wetlands a particular wetland is given a profile from which the functions it performs are deduced.

For the purpose of the WisDOT wetland mitigation banking program, a classification for wetland type was derived. A correspondence table of this classification with other classifications is given in Attachment 10.2. These wetland types should be used on the factor sheets (E) for environmental documents. The "Wisconsin Wetlands Inventory User Manual" summarizes wetland types for the purpose of wetland inventory mapping.

The DNR has mapped and described the wetlands in Wisconsin based on the Department of the Interior's publication, but with a few simplifications. These maps are printed by township and are available for internal WisDOT use at the WisDOT district offices.

All Wisconsin Wetland Inventory Map Products are now sold by the Department of Natural Resources. Please send Map Order Form and Payment to:

Wisconsin Department of Natural Resources
Bureau of Water Regulation & Zoning, WZ/6
101 S. Webster St., P.O. Box 7921
Madison, WI 53707
(608) 266-8852

Attachment 10.3 is a copy of the DNR map order form.

10.1.3 Wildlife

Wildlife use is most easily determined by observation. Ideally, observations should be made during each season because many species use wetlands only seasonally. Migratory birds can be observed best during spring and fall. Information may be obtained through the DNR and the U.S. Fish and Wildlife Service. Wildlife use may also be estimated through knowledge of the area, associated vegetation, and open water conditions.

An approach to discussing wetland wildlife is to list species observed or expected to be present, what parts of the wetlands are being used, and what the observations and assumptions are based on (e.g., actual inventories, vegetation, water conditions, or other criteria). This method provides document reviewers with a better understanding of the habitat value and productivity of the wetland. It also allows a thorough evaluation of impacts, particularly in situations where only a fringe taking is involved.

10.1.4 Wetland Functions and Value

Wetland systems serve many functions and provide many benefits. Their potential for supporting large plant and animal populations of diverse species is high. Wetlands act as nutrient traps and thus usually have considerable vegetation. The vegetation provides the base for many aquatic and terrestrial food chains. The reproduction of deep water species may also occur in marsh areas adjacent to a water body.

Wetlands can improve water quality. This is done through the filtering capacity of dense stands of wetland vegetation, which provide an effective means of removing suspended solids from polluted waters.

Wetlands provide important resting, breeding, feeding, and rearing habitat for many species of waterfowl, fur bearing mammals, and fish.

Wetlands contribute to the biodiversity of an area. Primary environmental corridors are areas consisting of a concentration of a variety of natural resource features, such as wetlands, floodplains and woodlands. These areas have been identified by some regional planning agencies in Wisconsin under Section 208 of the Clean Water Act.

Wetlands can serve as effective flood control and erosion buffers. Wetland areas of shallow water and associated vegetation can slow the velocity and desynchronize the peaks of flood water and thus reduce shoreline and river bank erosion. They can also act as groundwater discharge areas and, under some circumstances, as groundwater recharge areas.

Wetlands have recreational value. Activities may include observing birds and other wildlife, fishing, hunting, and canoeing. Wetlands are also important for their aesthetic value.

10.2 Evaluating Impacts on the Wetland

Describe the proposed project in terms of the anticipated work in the wetland. Provide enough engineering detail to explain how wide a strip will be involved, including shoulders, medians, and ditches. Also include land acquired for auxiliary lanes, frontage and access roads, intersections and interchanges, rest areas, waysides, and weigh stations. Explain whether excavation or fill are necessary, whether a structure across the wetland is proposed, what the marsh disposal method will be and where it will be located, and any other activity that will affect the wetland. Encroachments on separated wetlands along the project should be described separately. Determine the number of acres lost or modified at each wetland site.

10.2.1 Primary Impacts

Marsh Disposal: Primary impacts are usually associated with construction. Removal of loose, compactable organic soils for the roadbed core presents a disposal problem. Casting aside this material creates a berm that probably will not settle to the original marsh elevation. This causes a loss of additional wetland acreage or a change to a drier and disturbed wetland. If the material is removed to an upland disposal site, the upland habitat is disturbed.

Hydrology: The relationship of a wetland to the surrounding watershed should also be evaluated. Impacts of highway construction will differ depending upon the water source of a wetland. If the wetland is adjacent to a stream, lake, or other waterbody, a determination should be made as to whether the wetland depends on periodic flooding of the waterway. If the wetland is supported by stream flooding or overland flow, road fill can interrupt flow patterns and reduce flood storage capacity. Drying of portions of a wetland can occur or, conversely, the road fill can act as a dam, creating wetter conditions. Either has the potential for changing the characteristics of the wetland.

If the wetland is not adjacent to a stream, lake or other waterbody, discuss whether the wetland is groundwater dependent or whether it is a perched, water-filled depression in the land surface. This information will help in determining whether a structure or fill will have an impact on the wetland's source of water.

Roadfill can also interrupt groundwater movement which may be an important source of water for the wetland. Depending upon soil types, the weight of the road fill can cause a mudwave effect, where adjacent soil is pushed above its original elevation, causing it to dry out and convert to upland habitat.

Habitat: Since many wetlands are islands of a unique habitat surrounded by upland communities, the loss of this habitat reduces its ability to support wildlife associated with wetlands. Wetland species correspondingly have unique requirements and adaptations that can only be met by the special characteristics of wetlands.

The roadbed can also act as a barrier to the movement of amphibians and reptiles to near-shore breeding areas, and the movement of furbearers among feeding, breeding, and resting areas.

Construction noise has a potential for interrupting courtship, breeding, nesting, and prey/predator location behavior for species that depend upon audio cues for these activities.

10.2.2 Secondary Impacts

These impacts are generally associated with the operation and maintenance of the facility or are those that occur over time as a result of initial construction.

Traffic noise could eliminate use of wetland habitat adjacent to the roadway for breeding purposes by some species. Road kills will occur, particularly during dispersal periods when wildlife are actively moving in response to seasonal water level changes or other breeding and feeding requirements.

Because destruction of vegetation and contamination of open water areas is possible from road salt and automobile by-products, it should be discussed as a potential impact.

10.3 Determination of Significance

The significance of impacts should be viewed in terms of the functions of a particular wetland and how these might be affected. Perched wetlands isolated from waterways would best be discussed in terms of aquatic wildlife, waterfowl, and loss of habitat. Those wetlands associated with and dependent upon other waterways require additional discussions on elimination of flood storage and water quality functions, such as sediment and nutrient trapping, as well as wildlife habitat and food chain support.

Fringe encroachments on wetlands tend to be less significant than severances. The fringe of a wetland, however, can provide critical resources, such as food, shelter, or nesting. Size and location of wetlands are also important considerations.

Wetlands with open water are also subject to water quality impacts similar to those discussed for other water bodies. This should be considered when estimating impact significance.

In most cases, impact significance can be estimated based on a thorough knowledge of the local ecology or land use of the project area. Coordination with the U.S. Fish and Wildlife Service, the DNR, and local units of government is a way to gain information about the uses and importance of the wetland. Once this has been done, a basis is available for stating whether the changes proposed will be significant. This type of analysis should be made for all alternatives, comparing each in terms of adverse and beneficial effects. Differences among alternatives should be pointed out. For example, all alternatives might involve wetland loss, but the site for one alternative might be away from a wildlife nesting area or food source.

There are several methods available for assessing wetland significance. All of them are equally acceptable.

A Method for Wetland Functional Assessment (Adamus 1983) has been updated (Adamus 1989) and is referred to as WET 2.0. The WET 2.0 manuals contain information on the functions and values associated with wetlands and provides a method of assessing these values for individual wetlands. Functions covered include groundwater recharge and discharge, flood storage and desynchronization, shoreline anchoring and dissipation of erosive forces, sediment trapping, nutrient retention and removal, food chain support, habitat for fish and wildlife, water quality and active and passive recreation.

The Corps of Engineers, St. Paul district, and the Minnesota Environmental Quality Board, have developed a wetland evaluation methodology (WEM) for the north central states (Minnesota and Wisconsin). This method was derived from Adamus (1983). The method allows the user to select functions to be included in the analysis. This document also provides an overview of unique wetland qualities and qualities of potential legal significance. Functions covered in this manual are flood flow characteristics, water quality, wildlife, fish, shoreline anchoring and visual values.

The Hollands and Magee (1986) evaluation methodology assigns weighted values to the functions evaluated for each wetland. Each wetland is given a total value to be compared with other wetland's total values. Functions covered by this method include hydrologic support, water quality, ground water recharge, biological, shoreline protection, stormwater and flood and aesthetic values.

10.4 Measures to Minimize Harm

Because wetlands are recognized and protected by legislation and executive order as critical resources, they should be avoided, where possible, during alignment location studies.

When upgrading a roadway on existing alignment by widening, it is nearly impossible to avoid encroachment into adjacent wetlands. A dilemma is created because, from an overall standpoint, existing alignment reconstruction causes the least impacts; and, yet, where wetlands are involved their preservation is often considered paramount to other land uses. It becomes necessary to justify the use of wetlands on the basis of no practicable alternatives rather than on the basis of reasonable land use trade-offs.

Coordination with the DNR and the U.S. Fish and Wildlife Service can provide recommendations on impact mitigation.

Compensatory mitigation policy is outlined in detail in the DOT/DNR Cooperative Agreement amendment on compensatory migitation. Restoration of former or degraded wetlands or creation of new wetlands can be recommended as compensatory wetland mitigation. If unavailable wetland loss cannot be replaced on or near the project, a wetland mitigation bank site may be available for wetland compensation.

Compensation for wetland loss is based on evaluation of primary and secondary impacts. The replacement of wetland acreage lost is based on ratios of replacement acreage to acreage lost as determined by the probability of restoration or creation success. Any type of compensation should be conducted prior to or in concert with construction of the transportation project. Compensation is for unavoidable wetland losses after all effects to avoid and minimize the impact to wetlands have been taken.

Techniques for increasing open water are beneficial primarily for waterfowl production and might not be the best solution for a particular wetland. For example, in parts of the state where open water is already abundant it could be more beneficial to create upland islands or berms to provide habitat diversity, such as waterfowl resting and nesting sites. Mitigation proposals should be evaluated on a case-by-case basis.

Consideration can be given to utilizing longer structures to minimize fill into wetlands, particularly those that are dependent upon surface water. Techniques to maintain existing flow patterns under the roadway can assist in the maintenance of water levels in portions of the wetland. Passive maintenance of normal flow can be accomplished with pipe culverts, valved pipe, and the use of permeable fills. Water level control structures would be needed to actively manage water levels.

Where possible, roadway severances of wetlands should be avoided. Fringe takings are less likely to cause significant impacts. Marsh disposal into wetlands should be minimized or avoided. Special disposal methods for excavated material are also recommended. Where practicable, slopes can be steepened to minimize the amount of wetland fill. The use of permeable, granular-fill material will help maintain the natural surface water movement.

Construction should be restricted during critical nesting, breeding, or spawning periods, if these have been identified for a project site. Construction windows, if needed, are usually recommended by the DNR or the U.S. Fish and Wildlife Service on an individual project basis. After construction, the disturbed areas will need to be revegetated. On site soil conditions, land contours, and surrounding vegetation are some of the factors to consider when selecting a suitable roadside cover.

Techniques for reducing adverse impacts should consider the critical nature of the resource being affected. For many projects, the standard specifications outlined in the Standard Specifications for Road and Bridge Construction define adequate procedures for minimizing harm. Specifically, the reader is referred to the following sections of the Standard Specifications:

standard spec 107.18	Environmental Protection
standard spec 107.20	Erosion Control
standard spec 203	Removing Old Culverts and Bridges
standard spec 205.3.11	Disposal of Surplus or Unsuitable Material

10.4.1 Wetland Finding

When there is no practicable alternative to an action which involves new construction located in a wetland, the final environmental document should contain the finding required by Executive Order 11990 and by DOT Order 5660.1A, entitled Preservation of the Nation's Wetlands, August 24, 1978.[3] The finding should summarize the following points which should be detailed elsewhere in the environmental document:

- A reference to Executive Order 11990.
- A discussion of the basis for the determination that there are no practicable alternatives to the proposed action.
- A discussion of the basis for the determination that the proposed action includes all practicable measures to minimize harm to wetlands.
- A concluding statement as follows: "Based upon the above considerations, it is determined that there is no practicable alternative to the proposed new construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use."

The environmental document should also contain information on the wetland type, acres lost, and a map of the area, such as a wetland inventory map, showing the wetland basin where the project is located.

10.4.2 Permits

Federal and state permits are required to discharge fill into wetlands. Section 404 of the Clean Water Act requires permit authorization from the U.S. Army Corps of Engineers of the United States. These waters include rivers, streams, lakes, embayments and wetlands. In addition, a Section 401 Water Quality Certification (from the Clean Water Act) must be waived, denied, or granted by the DNR before a Section 404 Permit is issued or denied by the Corps.

Chapters 30 and 31 in the State Statutes pertain to alterations to or impacts on a waterbody from channel changes, rip-rap, bridges or other structures. WisDOT is exempt from obtaining Chapter 30 permits for certain activities, according to a Cooperative Agreement between the WisDOT and the DNR. This cooperative agreement applies only to highway and bridge projects and does so only if the activity is accomplished in accordance with the interdepartment procedures established in this cooperative agreement.

FDM 21-50 discusses federal and state permits.

10.4.3 Factor Sheets

Factor Sheets E1 and E2 pertain to wetland evaluations and need to be completed when preparing an environmental document if the project affects wetland areas.

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

[3] FHWA Technical Adversary, T6640.8, February 24, 1982.

10.5 References

[1] Committee on Characterization of Wetlands. 1995. Wetlands: Characteristics and Boundaries. National Research Council. National Academy Press. Washington D.C.

[2] DOT Order 5660.1A, "Preservation of the Nation's Wetlands." August 24, 1978.

[3] Executive Order 11990, Protection of Wetlands. May 24, 1977.

[4] FHWA Technical Advisory, T6640.8. February 24, 1982.

[5] Mitsch, W. J. and J.G. Gosselink. 1993. Wetlands. 2d ed. Van Nostrand Reinhold. New York.

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LIST OF ATTACHMENTS