Office Use Only:

CASE #_____

PLANNER:

_____

CITY OF MAPLE GROVE

12800 ARBOR LAKES PARKWAY
P. O. Box 1180
MAPLE GROVE MN 55311-6180
763-494-6040

WETLAND SYSTEMS CONDITIONAL USE PERMIT APPLICATION

PROJECT NAME:_____

Application is hereby made for a Conditional Use Permit in a WETLAND SYSTEMS zone district for the purpose of:

_____

OWNER: _____

CONTACT NAME (PRINT): _____ **PHONE:**_____

ADDRESS: _____ **FAX:**_____

CITY/ZIP: _____ **E-MAIL:**_____

APPLICANT: _____

CONTACT NAME (PRINT): _____ **PHONE:**_____

ADDRESS: _____ **FAX:**_____

CITY/ZIP: _____ **E-MAIL:**_____

The following info is submitted in support of the application as described on the attached "Conditional Use Permit Procedures:"

_____1) Completed Application for Conditional Use Permit
_____2) Fee schedule:

Application	$75.00	
Review	200.00	for small wetland impacts*
	1,000.00	for large wetland impacts

***small wetland impacts - all projects which will fill less than 0.1 acres of wetland or 0.25 acres of wetland from construction or expansion of a single-family dwelling unit when the project cannot be modified to avoid the fill)**

Permit Monitoring	
5,000.00	for each replacement basin

Cash escrow for yearly monitoring for five (5) years (due before grading of the site can begin.)

_____3) Legal description of property
_____4) Acknowledgement of Responsibility form completed
_____5) Affirmation of Sufficient Interest form completed
_____6) Names and addresses of property owners within 500' of property, certified by the County Auditor of Hennepin County (<u>Mail attached letter to John Smith - Hennepin County</u>)
_____7) Dependent on the proposed use of the property, the following are required:
- **_____a) Narrative describing the proposed use, operational information, purpose and justification of the request and any other pertinent information explaining the request to allow a comprehensive City review**
- **_____b) 15 FOLDED copies of separate scaled drawings indicating:**
  1. **existing conditions on the site**
  2. **any improvements proposed including but not limited to grading, access, structure dimension, fencing and landscaping**
  3. **wetland boundaries with supporting data (routine on-site determination method or similar)**
  4. **wetland impacts**
- **_____c) Project notification form**
- **____ d) MN Rapid Assessment of Wetland Functions form**

_____e) Sequencing analysis
_____f) Additional information as required by Staff

_____8) One set (8½" X 11") paper copies of all documents listed in #7b above)

I fully understand that all of the above required information must be submitted at least 28 days prior to a Planning Commission meeting to ensure review by the Planning Commission on that date.

Applicant's Signature	**Printed Name**	**Date**

G:\PLANNING\Applications\@ WETLAND CUP.doc

ACKNOWLEDGEMENT OF RESPONSIBILITY

This is to certify that I am making application for the described action by the City and that I am responsible for complying with all City requirements with regard to this request. This application should be processed in my name and I am the party whom the City should contact regarding any matter pertaining to this application.

I have read and understand the instructions supplied for processing this application. The documents and/or information I have submitted are true and correct to the best of my knowledge. I will keep myself informed of the deadlines for submission of material and of the progress of this application.

I understand that this application may be reviewed by City staff and consultants. I further understand that additional information, including, but not limited to, traffic analysis and expert testimony may be required for review of this application. I agree to pay to the City upon demand, expenses, determined by the City, that the City incurs in reviewing this application and shall provide an escrow deposit to the City in an amount to be determined by the City. Said expenses shall include, but are not limited to, staff time, engineering, legal expenses and other consultant expenses.

I agree to allow access by City personnel to the property for purposed of review of my application and to erect a temporary sign indicating the application proposed.

Signature of applicant _____ Date_____

Name of applicant _____ Phone_____
(Please Print)

Name and address of Contact (if other than applicant) _____

_____

_____

_____

_____

_____ _____
Phone Number **Date**

AFFIRMATION OF SUFFICIENT INTEREST

I hereby affirm that **I am the fee title owner** of the below described property or that I have written authorization from the owner to pursue the described action.

Name of applicant _____
(Please Print)

Street address/legal description of subject property _____

_____

_____

_____

_____

_____ _____
Signature **Date**

If you are not the fee owner, attach another copy of this form which has been completed by the fee owner or a copy of your authorization to pursue this action.

If a corporation is fee title holder, attach a copy of the resolution of the Board of Directors authorizing this action.

If a joint venture or partnership is the fee owner, attach a copy of agreement authorizing this action on behalf of the joint venture or partnership.

APPLICANT - To receive names & addresses of property owners within 500' of the applicant address, please <u>mail a copy of this letter to the Hennepin County Government Center or you may order by phone by calling 612-348-5910</u>.

Date: _____

Property Id and Platting Unit
A-500 Government Center
300 South 6th Street
Minneapolis, MN 55478-0055

Dear Property ID/Platting:

Please prepare a certified list of the names and addresses of the owners of all properties located within **<u>500 feet</u>** of the following property:

Street Address _____

_____

Legal Description_____

_____

I understand the fee will be $1.25 per parcel/<u>$25.00 minimum/$250.00 maximum</u>. Please notify me when the list is complete and what the total fee is at:

_____

(Applicant's Name & Daytime Phone Number)

Hennepin County: After receiving payment for the list, please mail labels to:

_____

_____

_____

Sincerely,

_____

(Name of Applicant)

CITY OF MAPLE GROVE
12800 ARBOR LAKES PARKWAY, P. O. BOX 1180
MAPLE GROVE MN 55311-6180
763-494-6040

CONDITIONAL USE PERMIT PROCEDURES

By Applicant

- Submit all filing requirements to the Community Development Department **28 days prior** to the regular Planning Commission meeting at which the public hearing is to be held.

All required information must be received before the application will be placed on a Planning Commission meeting agenda. Conditional Use Permits are valid for one year from date of City Council approval.

General Filing Requirements

1. Completed Conditional Use Permit application
2. Cash fee of $300.00
3. Legal description of the property
4. Acknowledgement of Responsibility form completed
5. Affirmation of Sufficient Interest form completed
6. Names and addresses of property owners within 500 feet of the property, certified by the County Auditor of Hennepin County
7. Dependent on the proposed use of the property, the following are required:
   a. Narrative describing the proposed use, operational information, purpose and justification of the request, any other pertinent information explaining the request to allow comprehensive City review
   b. 15 **folded** copies of all scaled drawings and other pertinent documents indicating:
      1. Existing conditions on the site
      2. Any improvements proposed including but not limited to gradings, access, structure dimension, fencing, landscaping
8. One set (8½" X 11") of paper copies of all documents listed in #7b above.

By City Staff

- Public hearing notice published at least 10 days before the Planning Commission meeting at which time the item will be heard. Notice sent to area owners within a radius of 500 feet.

- Conditional Use Permit request placed on Planning Commission agenda for a public hearing. Either approval or denial is recommended by the Community Development department.

- Review and report by the Community Development department forwarded to the Planning Commission at least 3 days prior to the hearing; copy sent to applicant.

- Planning Commission holds public hearing and recommends approval **OR** denial to City Council.

- Conditional Use Permit request placed on City Council agenda with staff report and recommendations and Planning Commission recommendations noted.

- Council acts on request, approving, denying **OR** referring back to Planning Commission.

MNRAM UPDATE ASSESSMENT METHOD FOR EVALUATING WETLAND FUNCTIONS (Revised 08/20/02)

Wetland Ranking

Before assigning numerical rankings to each wetland within the Wetland Comparison Domain, it is necessary to either establish Reference Standard Wetland sites for each wetland type within the domain or to rank wetlands based on assumed pre-settlement wetland type conditions until assessment of domain area wetlands has been completed and reference wetlands established. Each wetland function will be ranked with a numeric index according to the formulas or decision trees accompanying this methodology. The scoring system is from 0.1 to1 signifying low to high (Ammann and Stone, 1991), respectively, and in the instances where an exceptional rating applies, a score of 2 will be given to accentuate the rarity. For yes-no questions, yes will receive a score of 1 and no will receive a score of 0.1. Each wetland function would then receive an index score with rankings as follows:

Ranking	Question Score	Functional Index Score
• **Exceptional:**	**2.0**	**1- 2**
• **High:**	**1.0**	**0.66 - 1**
• **Medium:**	**0.5**	**0.33 - 0.65**
• **Low:**	**0.1**	**0.1 - 0.32**

Wetland functions/characteristics

1. Maintenance of Characteristic Vegetative Diversity/Integrity
2. Maintenance of Hydrologic Regime
3. Flood/Stormwater Attenuation
4. Downstream Water Quality
5. Maintenance of Wetland Water Quality
6. Shoreline Protection
7. Ground Water Interaction
8. Maintenance of Characteristic Wildlife Habitat Structure
9. Maintenance of Characteristic Fishery Habitat
10. ***Maintenance of Characteristic Amphibian Habitat***
11. Aesthetics/Recreation/Education/Cultural
12. Commercial Uses

Optional Evaluation Information

13. Additional Stormwater Treatment Needs
14. Wetland Restoration Potential
15. Wetland Sensitivity to Stormwater and Urban Development
16. ***Index of biological integrity (IBI) scores and assessments of wetland's condition***

References

Adamus, P.R., L.T. Stockwell, E.J. Clairain, Jr., M. E. Morrow, L.P. Rozas, R.D. Smith, 1991. *Wetland Evaluation Technique: Volume I , Literature Review and Evaluation Rationale*. US Army Corps of Engineers Waterways Experiment Station.

Adamus, P.R., ARA, Inc, E.J. Clairain, Jr., R.D. Smith, and R.E. Young, 1987. *Wetland Evaluation Technique (WET) Volume II , Methodology, Operational Draft.* Department of the Army, Vicksburg, MS.

Ammann, A. P. and A. Lindley Stone, 1991. *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire*. Published by the New Hampshire Department of Environmental Services. NHDES-WRD-1991-3.

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Cowardin, L.M., V. Carter, F.C. Golet, R.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Fish and Wildlife Service, FWS/OBS079/31, 103 pp.

Fetter, C.W. 1980. *Applied Hydrogeology.* MacMillan Publishing Company, New York, NY. 592 pp.

Flores, A.C., P.B. Bedient and L.W. Mays, 1981. *Method for Optimizing Size and Location of Urban Detention Storage.* Proc. Of the Internatl. Symp. On Urban Hydrology, Hydraulics and Sediment Control, ASCE, New York, pp 357-365.

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Seaberg, J.K. and Douglas D. Hansen, 2000. *Metropolitan Area Groundwater Model Project Summary: Northwest Province, Layers 1, 2, and 3 Model, Version 1.00*. Minnesota Pollution Control Agency.

State of Minnesota Storm-Water Advisory Group, *Storm-Water and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Storm-Water and Snow-Melt Runoff on Wetlands.* June, 1997.

U.S. Fish and Wildlife Service. 1956. *Wetlands of the United States Circular 39.* U.S. Government Printing Office, Washington, D.C.

Wells, J., Mike Mueller, John Parker, Bruce Gerbig, S. Jatnieks-Straumanis, Bruce Wilson, John Kittelson, Paul Richert, Teri Sardinas, Scott LaChance, and Larry Smith, 1988. *The Minnesota Wetland Evaluation Methodology for the North Central United States*. Corps of Engineers in conjunction with the Minnesota Environmental Quality Board Wetland Evaluation Methodology Task Force, John R. Wells, Chairman.

GENERAL INFORMATION:

Project Number or Name:		Wetland Number:	
Location: County;	Section; ,	Township	Range
Major Watershed:	Subwatershed:		City:
Evaluator(s):			Date of Site Visit:

SCOPE AND LIMITATIONS:

1. Note unusual climatic conditions experienced during this assessment due to seasonal considerations and/or unusual existing hydrologic and climatologic conditions:
2. Describe the **purpose** of this assessment: inventory**/planning/classification**_____

SUMMARY TABLE

ACTUAL CONDITIONS	FUNCTIONAL INDEX*		
FUNCTIONS (and Related Values)	N/A	Functional Index Score	Comments
Vegetative Diversity/Integrity Plant Comm. #1			
Plant Comm. #2			
Plant Comm. #3			
Maintenance of Hydrologic Regime			
Flood/Stormwater/Attenuation			
Downstream Water Quality			
Maintenance of Wetland Water Quality			
Shoreline Protection			
Ground-water Interaction			
Maintenance of Characteristic Wildlife Habitat Structure			
Maintenance of Characteristic Fishery Habitat			
Aesthetics/Recreation/Education./Cultural			
Commercial Uses			
Additional Stormwater Treatment Needs.			
Wetland Sensitivity to Stormwater and Urban Development			
Wetland Restoration Potential			

FUNCTIONAL ASSESSMENT

Special Features

Is the wetland part of, or directly adjacent to, an area of special natural resource interest? Check those that apply:

a. ____ Designated trout streams or trout lakes (see MNDNR Commissioners Order 2450 Part 6262.0400 subparts 3 and 5);
b. ____ Calcareous fen (Special Status see MN Rule Chapter 7050) *(If yes, Vegetative Diversity/Integrity functional rating is Exceptional) Consult MN DNR for regulatory purposes.*
c. ____Designated scientific and natural area.
d. _____ Rare natural community *(If yes, Vegetative Diversity/Integrity is Exceptional, also if question #35 is yes and Wildlife Habitat functional rating is Exceptional);*
e. ____ A high priority wetland, environmentally sensitive area or environmental corridor identified in a local water management plan,
f. _____Public park, forest, trail or recreation area.
g. ____ State or Federal fish and wildlife refuges and fish and wildlife management areas; *(If yes, then Wildlife and/or Fishery Habitat functional rating is Exceptional)*
h. ____ An archeological or historic site as designated by the State Historic Preservation Office; *(If yes, then Aesthetics/Recreation/Education/Cultural functional rating is Exceptional)*
i. ____ Federal or state listed endangered or threatened plant species or species of concern in the wetland or known adjacent lands. If yes, list the species of concern: *(If yes, then Vegetative Diversity functional rating is Exceptional)*
j. ____ Federal or state listed endangered or threatened wildlife species or species of concern in or using the wetland or known adjacent lands. If yes, list the species of concern: *(If yes, then question #36 is yes, and Wildlife Habitat functional rating is Exceptional)*
k. ____ A Shoreland Management Plan area.
l. ____ A shoreland area identified in a zoning ordinance (generally within 1000 feet from a water basin and 300 feet from a watercourse).
m.____ A floodplain area identified in a zoning ordinance or map.
n. ____ A wetland restored or preserved under a conservation easement.
o. ____ A wetland restored or created for mitigation purposes;
p. ____ A Wellhead Protection Area; *(If yes, and Ground Water Interaction is Recharge, then Ground Water functional index is Exceptional)*
q. ____ A sensitive ground-water area; *(If yes, and Ground Water Interaction is Recharge, then Ground Water functional index is High)*
r. ____State or Federal designated wild and scenic river (see MN Rule Chapter 7050);
s. ____Federally identified special area management plan, special wetland inventory study, or an advanced delineation and identification study;
t. ____State or Federal designated wilderness area;
u. ____A State Coastal Zone or Shoreland Management Plan area.

Vegetative Diversity and Integrity

VEGETATION

Identify the type and amount of vegetation species present by dominant species in each stratum.
Use species list already in place and drop-down list of 3 cover classes (see below for definition) for dominants (>20% cover within the wetland).

Cover Class	Class Range %
1	0-20
2	20-50
3	50-100

Invasive/Exotic Species and Cover: (e.g. Common buckthorn, amur maple, Siberian elm, reed canary grass, giant reed grass, garlic mustard, leafy spurge, purple loosestrife, quack grass, Canada thistle, tartarian honeysuckle, Eurasian watermilfoil, etc…)

Estimated size of existing wetland in acres: _____ (Note this size will be used for question 42 and 61) Guidance will be added for this question on method for determining the existing size of the wetland.

1. **Key out wetland plant community(-ities) within the evaluation area where each contiguous type comprises at least 10% of the vegetated wetland area (with the exception of shallow, open water communities in which fringe emergent communities must be evaluated) using the following key and enter in table located on Page 13:** ***Refer to Pages 19 - 22 of "Wetland Plants and Plant Communities of MN and WI"; (USACOE - St. Paul District; Eggers and Reed).***

Wetland Community Classification Key

1A. Mature trees (dbh of 6 inches or more) are present and form closed stands (more than 17 trees per acre; more than a 50 percent canopy cover) on wet, lowland soils (usually floodplains and ancient lake basins) .

2A. Hardwood trees are dominant; usually alluvial, peaty/mucky, or poorly drained mineral soils.

3A. Silver maple, American elm, river birch, green ash, black willow and/or eastern cottonwood are dominant; growing on alluvial soils associated with riverine systems. ..... **FLOODPLAIN FOREST** (Type 1; PFOA)

3B. Black ash, yellow birch, silver maple and/or red maple are dominant; northern white cedar may be subdominant; growing on poorly-drained mineral or peat/muck soils, often associated with ancient lake basins. ..... **HARDWOOD SWAMP** (Type 7; PFO1, 5, 6; B, C, F)

2B. Coniferous trees are dominant (>50% areal coverage); soils usually peaty.

4A. Tamarack and/or black spruce are dominant; growing on a continuous sphagnum moss mat and acid, peat soils. ..... **CONIFEROUS BOG** (Type 8; PFO2, 4, 7; B)

4B. Northern white cedar and/or tamarack are dominant; continuous sphagnum moss mat absent; usually growing on neutral to alkaline peat/muck soils. ..... **CONIFEROUS SWAMP** (Type 7; PFO;1, 5, 6; B, C, F)

1B. Mature trees are absent or, if present, form open, sparse stands; other woody plants, if present, are shrubs or saplings and pole-size trees (dbh less than 6 inches) less than 20 feet high and growing on wet, lowland, or poorly-drained soils, or in ground-water seepage areas.

5A. Community dominated (>30% areal coverage) by woody shrubs.

6A. Low, woody shrubs usually less than 3 feet high; sphagnum moss mat layer may or may not be present.

7A. Shrubs are ericaceous and evergreen growing on a sphagnum moss mat layer; peat soils are acidic. ..... **OPEN BOG** (Type 8; PSS, 2, 3, 4, 7; B)

7B. Shrubs are deciduous, mostly shrubby cinquefoil, often growing on sloping sites with a spring-fed supply of internally flowing, calcareous waters; other calciphiles are also dominant; sphagnum moss mat layer absent; muck/poorly-drained mineral soils are alkaline. .....**CALCAREOUS FEN** (Type 2, PEMB)

6B. Tall, woody deciduous shrubs usually greater than 3 feet high; sphagnum moss mat layer absent. ..... SHRUB SWAMPS

8A. Speckled alder is dominant; usually on acidic soils in and north of the vegetation tension zone. ..... **ALDER THICKET** (Type 6; PSS; 5, 6; C, F; PSSH)

8B. Willows, red-osier dogwood, silky dogwood, meadowsweet and/or steeplebush are dominant on neutral to alkaline poorly-drained muck/mineral soils; found north and south of the vegetation tension zone. ..... **SHRUB-CARR** (Type 6; PSS; 5, 6; C, F; PSSH)
NOTE: Buckthorns (*Rhamnus* spp.) may occur as dominant shrubs or small trees in disturbed shrub-carrs.

5B. Community dominated (>50% areal coverage) by herbaceous plants.

9A. Essentially closed communities, usually with more than 50 percent cover.

10A. Sphagnum moss mat on acid peat soils; leatherleaf, pitcher plants, certain sedges, and other herbaceous species tolerant of low nutrient conditions may be present. ..... **OPEN BOG** (Type 8; PSS; 2, 3, 4, 7; B)

10B. Sphagnum moss mat absent; dominant vegetation consists of sedges (Cyperaceae), grasses (Gramineae), cattails, giant bur-reed, arrowheads, forbs and/or calciphiles. Soils are usually neutral to alkaline poorly drained mineral soils and mucks.

11A. Over 50 percent of the cover dominance contributed by the sedge family, cattails, giant bur-reed, arrowheads, wild rice, and/or giant reed grass (*Phragmites*).

12A. Herbaceous emergent plants growing on saturated soils to areas covered by standing water up to 6 inches in depth throughout most of the growing season.

13A. Major cover dominance by the sedges (primarily genus *Carex*). .... **SEDGE MEADOW** (Type 2, PEMB)

13B. Major cover dominance by cattails, bulrushes, water plantain, *Phragmites*, arrowheads, and/or lake sedges. ..... **SHALLOW MARSH** (Type 3; PEM; C, F)

12B. Herbaceous submergent, floating and emergent plants growing in areas covered by standing water greater than 6 inches in depth throughout most of the growing season. ..... **DEEP MARSH** (Type 4; PEM; G, H; PAB; F, G; PUB; B, F; L2EM2; F, G; L2AB; F)

11B. Over 50 percent of the cover dominance contributed by grasses (except wild rice and *Phragmites*), forbs and/or calciphiles.

14A. Spring-fed supply of internally flowing, calcareous waters, often sloping sites; calciphiles such as sterile sedge, wild timothy, Grass-of-Parnassus and lesser fringed gentian are dominant. ..... **CALCAREOUS FEN** (Type 2; PEM; B)

14B. Water source(s) variable; calciphiles not dominant.

15A. Soils saturated to inundated during the growing season; prairie grasses such as big bluestem, prairie cordgrass and/or Canada bluejoint grass are usually dominant, and various species of lowland prairie forbs are present. ..... **WET TO WET-MESIC PRAIRIE** (Type 2; PEMB)

15B. Site rarely inundated, but soils are saturated for all or part of the growing season; dominated by forbs such as giant goldenrod and/or grasses such as redtop and reed canary grass. ..... **FRESH (WET) MEADOW** (Type 2; PEMB)

9B. Essentially open communities, either flats or basins usually with less than 50 percent vegetative cover during the early portion of the growing season, or shallow open water with submergent, floating and/or floating-leaved aquatic vegetation.

16A. Areas of shallow, open water (< 6.6 feet in depth) dominated by submergent, floating and/or floating-leaved aquatic vegetation. ..... **SHALLOW, OPEN WATER COMMUNITIES** (Type 5; PAB; H; PUB; G, H; L2EM; A, B, H; L2AB; G, H; LRS; L1; all)

16B. Shallow depressions or flats; standing water may be present for a few weeks each year, but are dry for much of the growing season; often cultivated or dominated by annuals such as smartweeds and wild millet. ..... **SEASONALLY FLOODED BASIN** (Type 1; PEMA)

2. Characterize the current vegetative quality of each wetland community comprising at least 10% of the wetland using the following key and enter in table located on Page 13. Assign a Functional Rating For Each Plant Community

Additional Guidance: The plant community rating incorporates two principal components: integrity and diversity. **Diversity** refers to species richness, e.g., number of plant species. Generally, the more floristically diverse a community is, the higher its ranking. **Integrity** refers to the condition of the plant community in comparison to the reference standard for that community. The highest ranking is given to those communities that represent the characteristic condition of that particular community. The degree (e.g., minor versus substantial) and type of disturbances typically play an important role in the diversity/integrity of plant communities. Some native plant communities are maintained by periodic, natural disturbances (e.g., fire, annual floods). For purposes of this functional assessment, disturbances are more in reference to man-induced disturbances (e.g., filling, dredging, drainage) that are typically detrimental to vegetative diversity/integrity.

It is important to note that some native wetland plants naturally form large colonies or clones creating communities that are low in diversity, but high in integrity. Examples are stands of wild rice, arrowhead, lake sedge, river bulrush, pickerelweed, wire-grass sedge and tussock sedge. *Plant communities with low diversity but high integrity can have a high vegetative diversity/integrity ranking if they represent the characteristic condition of that plant community (i.e., compared to the reference standard community).*

Size of the area sampled for the rating can also be a factor. If the area sampled is small, the evaluator must be aware that it may not support the diversity of species a larger area of the same plant community supports.

User Notes: Consult the high, moderate and low quality descriptions for each community before making a decision on which is most appropriate. Also, read the description of "exceptional" quality communities applicable to all communities.

Exceptional Quality:

Plant communities' undisturbed, or sufficiently recovered from past disturbances, such that they represent pre-European settlement conditions. Non-native plant species are absent, or if present, constitute a minor percent cover of the community. Unique features (e.g., old growth forest, never plowed wet prairie, T/E species) may also be present.

I. SHALLOW, OPEN WATER COMMUNITIES (page 28, Eggers and Reed)

High Quality: Diverse aquatic bed communities dominated by 3 or more species of native aquatic plants such as pondweeds, water lilies, bladderworts, wild celery, duckweed, water crowfoots, native milfoils, etc… or monotypic communities with low diversity but high integrity as given in additional guidance.

Medium Quality: Dominated by 1 or 2 species of native aquatic plants.

Low Quality: Dominated by Eurasian water milfoil; or no aquatic vegetation present.

II.A. and B. DEEP AND SHALLOW MARSHES (page 51-53, Eggers and Reed)

High Quality: Dominated by a diverse assemblage (3 or more species) of native aquatic plants (e.g., bur-reeds, bulrushes, arrowheads, cattails, sweet flag, pondweeds) or monotypic communities with low diversity but high integrity as given in additional guidance. Cattails comprise less than 40 percent cover. Purple loosestrife absent or comprises less than 5 percent cover.

Medium Quality: Dominants include at least 2 species of native aquatic plants, often arranged in a band or interspersed as patches. Purple loosestrife, if present, comprises less than 25 percent cover. Cattail, if present, comprises 40 to 85 percent cover.

Low Quality: Purple loosestrife comprises more than 25 percent cover; or cattail comprises more than 85 percent cover.

III. A. SEDGE MEADOWS (page 86, Eggers and Reed)

High Quality: Stands of sedges with 5 or more species of native forbs or monotypic communities dominated by wiregrass sedge and/or tussock sedge as discussed in additional guidance. Grazing, haying, artificial drainage, stormwater input, excavation and/or impoundment absent or minimal. Reed canary grass, purple loosestrife and/or stinging nettle absent or cumulatively comprise less than 5 percent cover. Buckthorn absent or comprises less than 10 percent cover.

Medium Quality: Stands of sedges subjected to moderate degree of the disturbances listed above. Two to 4 species of native forbs present. Reed canary grass, purple loosestrife and/or stinging nettle cumulatively comprise less than 40 percent cover. Buckthorn absent or comprises less than 30 percent cover.

Low Quality: Stands of sedges highly impacted by grazing, haying, artificial drainage, stormwater input and/or cropping. Reed canary grass, purple loosestrife and/or stinging nettle cumulatively comprise more than 40 percent cover; and/or buckthorn, if present, comprises greater than 30 percent cover.

III.B. WET MEADOWS (page 105, Eggers and Reed)

High Quality: Composed of a diverse assemblage (10 or more species) of native grasses, sedges, rushes and/or forbs. Reed canary grass, if present, comprises less than 20 percent cover. Purple loosestrife absent or comprises less than 5 percent cover. Buckthorn absent or comprises less than 10 percent cover.

Medium Quality: Community moderately impacted by disturbances (e.g., haying, grazing) and composed of 5 to 9 species of native grasses, sedges, rushes and/or forbs. Reed canary grass comprises less than 40 percent cover. Purple loosestrife, if present, comprises less than 20 percent cover. Buckthorn, if present, comprises less than 30 percent cover.

Low Quality: Community highly impacted such that reed canary grass comprises more than 40 percent cover; and/or purple loosestrife comprises greater than 20 percent cover; and/or buckthorn, if present, comprises greater than 30 percent cover; and/or vegetation is frequently removed by cropping.

III.C. WET to WET-MESIC PRAIRIES (page 125, Eggers and Reed)

High Quality: Community composed of native grasses (e.g., prairie cord-grass, Canada bluejoint grass), sedges, and forbs characteristic of wet to wet-mesic prairies. Site is undisturbed or minimally disturbed by cropping, grazing, haying, and/or artificial drainage. Reed canary grass, purple loosestrife, quack grass and/or Canada thistle absent or cumulatively comprise less than 5 percent cover. Buckthorn absent or comprises less than 10 percent cover.

Medium Quality: Community subjected to moderate degree of disturbances listed above. Reed canary grass, purple loosestrife, quack grass and/or Canada thistle cumulatively comprise less than 40 percent cover. Buckthorn absent or comprises less than 30 percent cover.

Low Quality: Community highly disturbed by activities listed above and reed canary grass, purple loosestrife, quack grass, Canada thistle and/or other undesirable species cumulatively comprise more than 40 percent cover; and/or buckthorn, if present, comprises greater than 30 percent cover; and any frequently cropped wet to wet-mesic prairie.

III.D. CALCAREOUS FENS (page 141, Eggers and Reed)

High Quality: Composed of the characteristic assemblage of calcium tolerant or opportunistic species. Community undisturbed or with minimal disturbances such as artificial drainage, ground-water pumping, grazing, filling, excavation, etc. Rare, threatened or endangered species often present. Reed canary grass, *Phragmites*, purple loosestrife and/or stinging nettle absent or cumulatively comprise less than 5 percent cover. Buckthorn absent or comprises less than 10 percent cover.

Medium Quality: Community moderately impacted by disturbances listed above. Reed canary grass, *Phragmites*, purple loosestrife, stinging nettle and/or cattail cumulatively comprise less than 40 percent cover. Buckthorn absent or comprises less than 30 percent cover.

Low Quality: Community highly impacted by the disturbances listed above. Reed canary grass, *Phragmites*, purple loosestrife, stinging nettle and/or cattail cumulatively comprise more than 40 percent cover; and buckthorn, if present, comprises greater than 30 percent cover.

IV.A. OPEN BOGS (page 161, Eggers and Reed)

High Quality: Composed of the characteristic assemblage of sphagnum mosses, sedges and heath family shrubs, often with carnivorous plants and various orchid species. Community undisturbed or with minimal disturbances such as artificial drainage, peat mining, filling, impoundment, stormwater input (esp. salt), etc.

Medium Quality: Community moderately impacted by the disturbances listed above.

Low Quality: Community highly impacted by the disturbances listed above. Indicators could include die-out of sphagnum mosses and/or invasion by buckthorn, aspen, stinging nettle, dewberry, cattail, etc.

IV.B. CONIFEROUS BOGS (page 175, Eggers and Reed)

High Quality: Stands of tamarack and/or black spruce undisturbed or minimally disturbed by artificial drainage, peat mining, logging, filling, impoundment, stormwater input, etc.

Medium Quality: Stands of tamarack and/or black spruce moderately impacted by disturbances listed above.

Low Quality: Majority of stands of tamarack and/or black spruce dead or dying due to highly disturbed condition. Substantial invasion by buckthorn, aspen, stinging nettle, dewberry, cattail, etc.

V.A. SHRUB-CARRS (page 180, Eggers and Reed)

High Quality: Community undisturbed or minimally disturbed by artificial drainage, grazing, filling or impoundment. Dominated by native shrubs (e.g., dogwoods, willows) with a groundlayer stratum composed of five or more species of native grasses, sedges, rushes and/or forbs. Buckthorn, honeysuckle and/or box elder, if present, cumulatively comprise less than 10 percent cover. Reed canary grass, if present, comprises less than 10 percent cover.

Medium Quality: Community moderately impacted by the disturbances listed above. One of two types: (1) shrub canopy composed of native species with a nearly monotypic reed canary grass groundlayer; or (2) shrub canopy composed of up to 50 percent non-native or disturbance indicator species (e.g., buckthorn, honeysuckle, box elder) with a groundlayer stratum composed of less than 5 species of native grasses, sedges, rushes and forbs; reed canary grass may be present but comprises less than 50 percent cover.

Low Quality: Community highly impacted by the disturbances listed above. Buckthorn, honeysuckle and/or box elder comprise more than 50 percent canopy cover and the groundlayer stratum is composed of greater than 50 percent cover of reed canary grass or non-native grasses/forbs.

V.B. ALDER THICKETS (page 192, Eggers and Reed)

High Quality: Community undisturbed or minimally disturbed by artificial drainage, grazing, filling, impoundment, etc. Non-native shrubs (e.g., buckthorn), if present, comprise less than 10 percent cover. Groundlayer stratum may be depauperate or composed of native grasses, sedges, rushes, ferns and/or forbs. Reed canary grass, if present, comprises less than 10 percent cover.

Medium Quality: Community moderately impacted by the disturbances listed above. Non-native and/or disturbance indicator shrubs (e.g., buckthorn, box elder, honeysuckle) cumulatively comprise less than 40 percent cover. The groundlayer stratum, if present, has less than 50 percent cover of reed canary grass.

Low Quality: Community highly impacted by the disturbances listed above with greater than 40 percent cover contributed by buckthorn, box elder and/or honeysuckle; and/or reed canary grass comprises more than 50 percent cover of the groundlayer stratum.

VI.A. HARDWOOD SWAMPS and VI.B. **CONIFEROUS SWAMPS** (pages 197 to 213, Eggers and Reed)

High Quality: Stands undisturbed or minimally disturbed by artificial drainage, grazing, logging, impoundment, filling, etc. Seedlings and/or saplings of native tree species evident, indicating regeneration. Groundlayer stratum composed of native grasses, sedges, rushes, ferns and/or forbs. Box elder, buckthorn and/or reed canary grass, if present, each comprise less than 10 percent cover.

Medium Quality: Stands moderately impacted by the above disturbances. Disturbance indicator species such as box elder, quaking aspen and/or eastern cottonwood comprise up to 50 percent cover of tree and sapling strata. Shrub stratum has less than 40 percent cover of buckthorn. Groundlayer stratum has less than 50 percent cover of reed canary grass.

Low Quality: Stands highly impacted by the disturbances listed above. Box elder, quaking aspen, eastern cottonwood, buckthorn and/or reed canary grass comprise more than 50 percent cover in 2 or more strata (e.g., tree, sapling, shrub, groundlayer). Few to no indications of regeneration of native tree species.

VII. FLOODPLAIN FORESTS (page 214, Eggers and Reed)

High Quality: Stands undisturbed or minimally disturbed by artificial drainage, grazing, logging, diking, impoundment, filling, catastrophic flood events, etc. Groundlayer stratum, if present, composed of native forbs/graminoids characteristic of floodplain forests: wood nettle, jewelweed, Virginia rye, cut-leaf coneflower, etc.

Medium Quality: Stands moderately impacted by the disturbances listed above.

Low Quality: Stands highly impacted by the disturbances listed above. Indicators include high proportion of dead and/or dying native tree species.

VIII. SEASONALLY FLOODED BASINS (page 227, Eggers and Reed)

High Quality: Located within an area of permanent vegetative cover (e.g., forest, prairie, non-agricultural settings) undisturbed or minimally disturbed by artificial drainage, haying, grazing, plowing, stormwater input, or other disturbances.

Medium Quality: Moderately impacted by the above disturbances -- e.g., partially drained, infrequently cropped, subject to some stormwater input, etc.

Low Quality: Located in frequently cropped agricultural fields or subjected to substantial inputs of stormwater, or other disturbances.

3. **Y N Are rare plant species or species that are state or federally listed found in the wetland or known to be found in the wetland recently? (If Special Features, questions c or g [rare natural community] are answered yes, then this question is yes and Vegetative Diversity function is Exceptional, otherwise go to question #2.)**

4. **Y N Is the wetland plant community scarce or rare within the watershed, imperiled, or critically imperiled (state rankings S1 and S2)? [Answer yes if Special Features question b is answered yes. If the wetland community identified in Question #1 is 3A (not dominated by silver maple), 4A, 4B, 7A, 7B, 10A, 13A, 13B (mixed emergent marsh not dominated by cattails), 14A, 15A, AND has a High quality rating from Question #2, then this question is yes and Vegetation function is Exceptional, otherwise continue with following questions.]**

5. **Y N Are non-native plant species absent, or if present, constitute less than 5 percent cover of the community or does the plant community represent pre-European settlement conditions? If yes, then Vegetation function is Exceptional (continue to answer subsequent questions).**

Vegetative Diversity/Integrity Summary Table 1:

	Community (Question 1)	Cowardin/ Circular 39	Dominant Species/Cover Class	Vegetative Quality Index (Question 2)	Invasive and Exotic Species*/Cover Class
Community #1					
Community #2					
Community #3					
Community #4					
Community #5					
Entire Wetland (average)					
	Dominant community	Dominant community		Average of all communities	

Compute the functional index for vegetative diversity and integrity for each plant community by doing the following:

If any of questions #3-5 are answered yes and/or if any of the Special Features b, d, or I have been selected, enter Exceptional for the functional index, if not, use the answer in the Vegetative Quality Index from the table for each community (Question 2). The functional index for the wetland is the calculated

four ways and should be utilized according to the scope of the project:

1. **Maintain Individual Community Scores: preserves data to the highest level by maintaining the quality ratings of each community within the wetland. While it may be cumbersome to maintain this data for a large number of wetlands, this data should always be maintained and reported when the MNRAM is utilized for inventory or regulatory purposes.**
2. **Present Highest Quality Community: This method of presenting the Vegetative Diversity/Integrity can be utilized for determining sensitivity to impacts such as stormwater/hydrologic alterations. Typically, communities with the highest quality are also those that are most sensitive to alteration.** *(This method would be preferable in regulatory situations in which a wetland basin may be impacted).*
3. **Present Non-Weighted Average Quality of all Communities: This method of data presentation results in the greatest dilution of the individual community data. However, it may be the only reasonable method for comparing large numbers of wetlands such as for an inventory and/or planning project. In some instances, it may not be possible, given budget and scope constraints, to collect community dominance data. In that case, one way to get a single measure of overall wetland vegetative diversity/integrity quality is to utilize the non-weighted average. It is important to maintain and report the individual community quality data, even if it cannot be readily used to develop management classifications.** *(This method is not recommended for regulatory purposes).*
4. **Present Weighted Average Quality Based on Percentage of Each Community: This data presentation method provides the best average Vegetative Diversity/Integrity measure for the entire wetland. Here the quality rating is computed by summing the product of each community rating and the proportion of the wetland that community comprises. Whenever possible, the community proportion data should be collected to preserve the highest possible value for a single Vegetative Diversity/Integrity rating. Again, the individual community ratings should be preserved and reported to provide a complete data set.** *(This method is not recommended for regulatory purposes).*

Vegetative Diversity/Integrity Summary Table 2:

	Proportion of Wetland	Individual Community Scores	Highest Quality	Non-Weighted Average	Weighted Average
Community #1	T	A		A	A
Community #2	U	B		B	B
Community #3	V	C		C	C
Community #4	W	D		D	D
Community #5	X	E		E	E
Community #6	Y	F		F	F
Community #7	Z	G		G	G
Wetland Rating Value	1.0		Highest Value	(A+B+C+D+E+F+G)/7 = Ave.	(A*T)+(B*U)+(C*V)+(D*W)+(E*X)+(F*Y)+(G*Z) = Wt. Ave.

HYDROLOGIC SETTING

A. Describe the hydrogeomorphology of the wetland and associated topography(check those that apply):

___ Depressional/Isolated (no discernable inlets or outlets)
___ Depressional/Flow-through (apparent inlet and outlet)
___ Riverine (within the river/stream banks)
___ Lacustrine Fringe (edge of deepwater areas) / Shoreland
___ Extensive Peatland
___ Slope
___ Floodplain (outside waterbody banks)
___ Other _____

B. Approximate maximum depth of standing water in the wetland (inches): _____ % inundated:_____

C. What is the estimated area of the wetland's local watershed in acres? _____

D. General Description of Soil(s) from Soil Survey and on Site:

	Adjacent UPLAND Area within 500 feet	**WETLAND Area**
Soil Survey Classification(s):		
Soil texture and drainage characteristics		

6. **Describe the wetland surface and subsurface outlet characteristics as it relates to the wetlands ability to detain runoff and/or store flood water.**

Exceptional = No surface or subsurface outlet, or outlet >2 feet higher than wetland boundary (overflows less than once every 100 years)

High = Restricted outlet (pipe or structure with opening less than 18 inches or natural restricted outlet) with outflow elevation 0-2 feet above the wetland boundary.

Medium = Swale, channel, weir, or other large, surface outlet (>18 inch pipe) with outflow elevation 0-2 feet above the wetland boundary.

Low = Swale, channel, weir, or other large, surface outlet (>18 inch pipe) or subsurface outlet (drain tile) with outflow elevation below the wetland boundary.

7. **Describe the wetland surface and subsurface outlet characteristics as it relates to the wetland hydrologic regime: (Lee et al., 1997)**

Exceptional = No outlet or natural outlet condition with no evidence of subsurface drainage

High = Natural outflow elevation lowered or raised to upper temporary wetland (wet meadow) zone; minimal evidence of subsurface drainage.

Medium = Constructed, reduced capacity outlet below the top of the temporary wet meadow zone; moderate indications of subsurface drainage; outlet raised above the wet meadow zone if managed to mimic natural conditions; watercourse has been recently ditched/channelized.

Low = Excavated or enlarged outlet constructed below the bottom of the wet meadow zone; strong indications of subsurface drainage; outlet removes most/all long-term and temporary storage; or outlet changes hydrologic regime drastically.

7. Guidance Outlet Characteristics. The ability of a wetland to maintain a hydrologic regime characteristic of the wetland type is somewhat dependent upon whether a natural outlet is present, or whether an outlet has been constructed by humans. Constructed outlets can significantly diminish the ability of a wetland to provide temporary and long-term water retention, and thus its ability to maintain its characteristic hydrologic regime. Wetlands with natural outlets are functioning at the highest level possible for the type within the wetland comparison domain, and should be rated **high**. Constructed outlets above the temporary wetland (wet meadow) zone are rated **medium** if managed to mimic natural conditions. Constructed outlets, either surface or subsurface, below the top of the temporary wet meadow zone reduce the ability of the wetland to provide temporary and long-term water retention; if a constructed outlet is present below the top of the temporary wetland zone, but is such that the wetland is able to provide some temporary and long-term water retention (i.e. the wetland is only partially drained), the rating should be **medium**. Constructed outlets, either surface or subsurface, which remove most or all temporary and long-term retention capabilities, significantly reduce the ability of the wetland to maintain its characteristic hydrologic regime; the rating should be **low**.
Constructed outlets that keep open water wetlands open water or keep saturated wetlands saturated are rated **medium**. If the constructed outlet changes the wetland to non-wetland or to deepwater habitat or from saturated conditions to open water or from open water to saturated then it is rated **low**.

8. Describe the dominant land use and condition of the upland subwatershed (Lee et al., 1997) or within 500 feet of the wetland if the subwatershed area is not known:

High = Watershed conditions essentially unaltered; < 10% impervious (i.e. low density residential, >1 acre lots); land use development minimal, idle lands, lands in hay or forests or low intensity grazing.

Medium = Watershed conditions somewhat modified; e.g., 11–30 % impervious (i.e. medium density residential, 1/3 to 1 acre lots); moderate intensity grazing or haying with some bare ground; conventional till with residue management on moderate slopes, no-till on steep slopes.

Low = Watershed conditions highly modified; e.g., >30 % impervious surfaces (i.e. high density residential, smaller than 1/3acre lots, industrial, commercial, high impervious institutional) maximizing overland flow to the wetland; intensive agriculture or grazing with a high amount of bare ground, no residue management on moderate or steep slopes, intensive mining activities.

8. Guidance: Dominant upland land use. Upland land use within the watershed contributing to the wetland has a significant influence on the flow of runoff and sediments to the wetland, and thus the ability of the wetland to maintain its characteristic hydrologic regime. The more developed and intensively the watershed is used, the greater the delivery of runoff and sediments to the wetland is likely to be. With increased runoff and sediment delivery, the wetland will be less likely to maintain its characteristic hydrologic regime. As the proportion of the impervious watershed area increases, runoff volume and rate increases along with sediment concentrations. The range of impervious proportions for various land uses is borrowed from Chow, Maidment and Mays, (1988)

9. Describe the conditions of the wetland soils:

High = There are no signs or only minor evidence of disturbance or alteration to the wetland soils (i.e. recent tillage); temporary wetland wet meadow zone intact; idle land, hayed or lightly to moderately grazed or logged. Minimal compaction, rutting, trampling, or excavation damage to wetland.

Medium = Moderate evidence of disturbance or alteration to the wetland soils. Temporary wet meadow zone tilled or heavily grazed most years. Zones wetter than temporary receive tillage occasionally. Some compaction, rutting, trampling, or excavation in wetland is evident.

Low = Evidence of significant disturbance or alteration to the wetland soils. Wetland receives conventional tillage most (>75%) years; or otherwise significantly impacted (e.g., fill, sediment deposits, cleared, excavated). Severe compaction, rutting, trampling, or excavation damage to wetland.

9. Guidance: Condition of Wetland Soils. The condition of the soils in the wetland affects the vegetation within the wetland, and thus the relationships affecting ground-water discharge, recharge, and evapotranspiration. The more developed and intensively the wetland is used (i.e. tillage, excavation, vehicle traffic, pedestrian or livestock usage), the more likely these relationships are to be impacted, and the more likely the ability of the wetland to maintain its characteristic hydrologic regime will be reduced.

10. Describe the functional level of the wetland in retarding surface water in relation to primary rooted wetland vegetation cover type and interspersion: *(Insert percentage and formula will determine ranking for the downstream water quality function)*

_____% High = Dense vegetation. Vegetative cover >75%.

_____% Medium = Combination of vegetation and unvegetated open water. Vegetative cover 25 – 75%.

_____% Low = Primarily unvegetated open water. Vegetative cover <25%.

_____% N/A = Not applicable if wetland is isolated.

10. Guidance: Water/Vegetation Proportions and Interspersion. Flow-through wetlands with relatively low proportions of open water to rooted vegetation and low interspersion of water and rooted vegetation are more capable of altering floodflows. Rooted vegetation slows floodwaters by creating frictional drag in proportion to stem density. Flow-through wetlands with dense stands of rooted vegetation, including trees, shrubs, herbaceous, emergent, submergent, and little open water are more capable of slowing floodwater than open water alone.

11. For flow-through wetlands, describe the roughness coefficient of the wetland in regard to surface floodwater flow in relation to wetland vegetation biomass, numeric density and plant morphology (Adamus et al., 1991):

High = Dense bushy willow, heavy stand of timber with down trees, or mature field crops with flow at half or less of crop height

Medium = Dense grass with rigid stems, weeds, tree seedlings, or brushy vegetation where flows can be 2-3 times the height of the vegetation.

Low = Primarily flexible turf grass or other supple vegetative cover or unvegetated

N/A = Not applicable; either open water wetland or not a flow-through type.

For the formulas questions 10 and 11 would be added for weighting.

11. Guidance: Floodwater detention of flow through wetlands. Forest cover and other woody stems increase surface roughness resulting in an increased detention of high flows. The cumulative effect is reduced peak flows down stream. A forest (i.e. ash, boxelder, red maple, conifers) with a dense understory is best for detaining high flows. Without a forest present, woody shrubs (i.e. alder, willow, red osier dogwood) can be extremely effective but lose effectiveness once high flows approach and exceed the woody shrub height. Dense, non-woody vegetation (i.e.; cattails, reed canarygrass) are effective at detaining minor flood flows but lay down to higher flows and the surface roughness greatly diminishes. Turf grass and other supple vegetation has minimal effects on flood flows. Open water wetlands with submergent and scattered emergent vegetation are part of the channel characteristics and have minimal effect on detaining flood flows.
The Manning's roughness coefficient decreases as water depth increases above the macorphytes and other surface roughness characteristics**.** The rate of detention of high flows decreases. Dense, robust, tall vegetation is best for floodplains.

12. Describe the extent of observable/historical sediment delivery to the wetland from anthropogenic sources including agriculture:

High = No evidence of sediment delivery to wetland.

Medium = Minor evidence of accelerated sediment delivery in the form of stabilized deltas, sediment fans

Low = Major sediment delivery evidenced by buried detritus and/or vegetation along outer edge of temporary wetland (wet meadow) zone. Recent deltas, sediment plumes, etc. in areas of concentrated flow or sedimentation raising bottom elevation of wetland.

12. Guidance: Sediment Delivery. Wetlands filled by sediment from anthropogenic sources will have reduced capacity to store stormwater. Land use, ground slope, and erodibility characteristics of the soils affect the potential for sediment delivery to the wetland.

13. Overland flow affects wetland flood storage capabilities and overland flow is affected by changes in upstream vegetative communities. Describe the dominant land use and condition of the upland subwatershed or within 500 feet that contributes to the wetland: (Lee et al., 1997)

High = Watershed conditions highly modified; e.g., >30% impervious surfaces (i.e. high density residential, <1/4 acre lots, industrial, commercial, high impervious institutional) maximizing overland flow to the wetland; intensive agriculture or grazing with a high amount of bare ground, no residue management on moderate or steep slopes, intensive mining activities, very large watershed area.

Medium = Watershed conditions somewhat modified; e.g., 11 – 30 % impervious (i.e. medium density residential, ¼ to 1 acre lots); moderate intensity grazing or haying with some bare ground; conventional till with residue management on moderate slopes, no-till on steep slopes.

Low = Watershed conditions essentially unaltered; 10% or less impervious (i.e. low density residential, >1 acre lots); land use development minimal; idle lands, lands in hay or forests or low intensity grazing; or small watershed area.

13. Guidance: Upland Land Use/Overland Flow. Upland land use within the watershed contributing to the wetland and the watershed size have a significant influence on the flow of runoff to the wetland, and thus the ability of the wetland to desynchronize flood flows. The more developed and intensively the watershed is used, the greater the delivery of runoff to the wetland is likely to be, and the more likely the wetland will have the opportunity to minimize flooding downstream.

14. Describe the predominant upland soils within the subwatershed which affect the overland flow characteristics to the wetland:

High = Clays or shallow to bedrock (Hydrologic soil groups C, D, A/D, B/D, C/D)

Medium = Silts or loams (Hydrologic soil group B)

Low = Sands (Hydrologic soil group A)

14. Guidance: Watershed Soils. Greater runoff and higher flood peaks occur in watersheds having primarily impermeable soils. These types of soils impede infiltration of water and therefore produce increased runoff. Wetlands located downslope in watersheds supporting these conditions are more likely to provide flood attenuation.

15. Describe the characteristics of stormwater, *wastewater or* concentrated agricultural runoff detention/water quality treatment prior to discharging into the wetland: *(Check off one of the following and formula will use appropiately. Reverse ranking in electronic fromat for question 21.)*

_____High = Receives significant volumes of untreated/undetained stormwater *, wastewater or concentrated agricultural runoff* directly, in relation to the wetland size.

_____Medium = Receives moderate volumes of directed stormwater*, wastewater or concentrated agricultural runoff* in relation to wetland size, which has received some treatment (sediment removal) and runoff detention.

_____Low = Does not receive directed stormwater, *wastewater or concentrated agricultural runoff or receives directed low volumes of one or more of these sources* in relation to wetland size, or stormwater is treated to approximately the standards of the National Urban Runoff Program (NURP); runoff rates controlled to nearly predevelopment conditions.

15. Guidance: Stormwater Runoff Pretreatment and Detention. Wetlands receiving undetained, directed stormwater from developed areas, or by increasing the drainage area -- generally provide a higher functional level for flood/stormwater storage than do similar wetlands receiving stormwater at rates equivalent to those prior to development. A NURP pond is most easily identified by having a 10-foot wide, nearly flat shelf just below the normal water level and will be 4 to 10 feet deep. Ponds that remove sediment only are typically smaller with a depth of 4 feet or less.

16. Describe density of wetlands within the subwatershed (the 5,600 DNR minor watersheds as defined in Minnesota Rules 8420.0110, Subp. 31) and the opportunity for contributing to floodwater detention: (Wells et al., 1988; Flores et al., 1981; and Ogawa and Male 1983/MA:P).

High = Wetlands make up less than 10% of the subwatershed area.

Medium = Wetlands make up 10-15% of the subwatershed.

Low = Wetlands make up more than 15% wetlands of the subwatershed.

16. Guidance: Subwatershed Wetland Density. The density of wetlands in the subwatershed will determine the benefit each provides downstream. When wetland densities in the subwatershed exceed 10% total cover, the flood storage benefits of additional wetlands begin to decrease rapidly.

17. Describe the functional level of the wetland in retarding or altering flows based on the surface flow characteristics through the wetland:

High = No channels present

Medium = Channels present, but not connected, or meandering channels

Low = Channels connecting inlet to outlet

17. Guidance: Channels/Sheet Flow. Sheet flow, rather than channel flow, offers greater frictional resistance. The potential for floodflow desynchronization is greater when water flows through the wetland as sheet flow. Connecting channels will carry water directly from the inlet to the outlet preferentially in the channel. Channels not connected indicate that some channelized flow may occur within the wetland but not all the way through the wetland via a single channel; some sheet flow will occur. No channels present represents wetlands in which water from the inlet will spread out over the wetland to the outlet (e.g. unchannelized meadows, shallow marshes, deep marshes, ponds, etc…).

18. Upland Buffer width (Utilize in Habitat and Water Quality Formulas)

Average width of the buffer:_____feet [Default maximum = 500'] *(Formula will deal with ranking based on width)*

To score the next three questions, enter the percent in each category of a 50 foot ring around the wetland. This is the condition of the buffer immediately contiguous to the wetland. Total should equal 100%.

19. Upland Buffer Management, condition of vegetative cover for water quality)[Utilize in Water Quality Formula]

_____% Exceptional: Unmanicured, full vegetative cover (trees, shrubs, or well established herbaceous perennials)

_____% High: Full vegetative cover receiving minor maintenance

_____% Medium: Manicured, primarily vegetated (i.e. short-grass lawn, clippings left in place)

_____% Low: Lack of vegetation: bare soil or cropped, unfenced pasture, rip-rap.

19. Guidance: Upland Buffer Management. This question refers to the upland vegetation surrounding the wetland unlike the shoreland wetland vegetation question, which refers to the vegetation within the wetland. Maintenance may include mowing, haying, spraying or burning.

20. Upland Buffer diversity & structure (composition of characteristics for habitat)

_____% High: Full coverage of native non-invasive vegetation

_____% Medium: Mixed native/non-native vegetation, moderate density coverage.

_____% Low: Sparse vegetation with a predominance of non-native vegetation and/or impervious surfaces.

21. Upland Buffer Slope

_____% High: 0-6% (gentle slopes)

_____% Medium: >6-12% (moderate slopes)

_____% Low: >12% (steep slopes)

Guidance: Upland Buffer. Vegetated buffers around wetlands provide multiple benefits including wildlife habitat, erosion protection, and a reduction in surface water runoff. A buffer is the area immediately adjacent to the wetland boundary and is composed of primarily native vegetation, which is not manicured.

22. Describe the ability of the wetland to uptake metabolize, sequester and/or remove nutrients and other imported elements from the water via microbial processing and bioaccumulation associated with plant cover including floating, emergent or submergent vegetation(*Magee et al.,* Lee et al., 1997):

High = Vegetative cover >75% or isolated wetlands with outlet above wetland boundary.

Medium =Vegetative cover 25%-75%.

Low = Vegetative cover <25%.

22. Guidance: Nutrient Uptake. A wetland's ability to uptake, metabolize, sequester and/or remove nutrients and imported elements is primarily dependent on the vegetative conditions of the wetland. Vegetative density can serve as an index of primary production, which is an indicator of nutrient assimilation. Forested wetlands retain ammonia during seasonal flooding and wetland environments are effective at denitrification. Wetlands take up metals both by adsorption in the soils and by plant uptake via the roots. They also allow metabolism of oxygen demanding materials and can reduce fecal coliform populations. These pollutants are often buried by deposition of newer plant material, isolating them in the sediments.

23. Rate the sensitivity to water quality degradation of the first recreational lake, watercourse, spawning area or significant fishery, or water supply source within 5 miles down gradient of the wetland (Wells et al., 1988):

Exceptional = One or more resource within 0.5 mile downstream via any form of channel, pipe, or isolated wetlands.

High = One or more resource within 0.5 to 2 miles downstream.

Medium = One or more resource within 2 to 5 miles downstream.

Low = No significant resources are located within 5 miles downstream.

23. Guidance: Downstream Sensitivity. The water quality function wetlands provide help disperse the physical, chemical and biological impacts of pollution in downstream waters. Sensitive water resources located within 0.5 miles downstream of the wetland will realize the greatest benefit to water quality from the wetland. As discharges from the wetland move farther downstream, the benefits to water quality provided by the wetland will continue to diminish.

24. Describe stormwater, *concentrated agricultural or wastewater* runoff detention/water quality treatment prior to discharging into the wetland:

High = Does not receive directed *runoff*, or receives low volumes of directed *runoff* in relation to wetland size, which is treated to approximately the standards of the National Urban Runoff Program (NURP); runoff rates controlled to nearly predevelopment conditions.

Medium = Receives moderate volumes of directed *runoff* in relation to wetland size, which has received some treatment (sediment removal) and runoff detention.

Low = Receives significant volumes of untreated/undetained *runoff* directly, in relation to the wetland size.

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24. Guidance: Stormwater Runoff. Ponds that treat storm water runoff to NURP standards will have a permanent pool of water with an average depth greater than 4 feet and a maximum depth of less than 10 feet. Typically, these ponds will have a wet surface area (at the normal level) approximately equal to 1% of the watershed area (when the impervious percentage is less than 50), or 2% of the watershed impervious area (when the impervious percentage is >50). For example, a 0.5 acre pond will serve 50 acres of drainage area with 15% impervious surfaces or a 35 acre watershed containing 25 acres of impervious surfaces). Ponds which just provide sediment removal are small ponds, dry ponds, or shallow ponds. The low rating equates with direct pipe discharge into the wetland and runoff rates which will likely increase the water level in the wetland significantly (i.e. a pipe discharge from a short length of road or from several residential back yards to a 100 acre wetland complex does not constitute a significant impact).

25. Does the wetland *water quality and/or* plant community exhibit signs of excess nutrient loading:

High = No evidence of excess nutrient loading (e.g. evidence of diverse, native vegetative community, no pipes, etc.).

Medium = Some evidence of excess nutrient loading such as dense stands of reed canary grass *or narrow* leave *and/or blue* cattail.

Low = Strong evidence of excess nutrient loading such as algal mats present or evidence of excessive emergent, submergent and/or floating macrophyte growth. *(e.g. evidence of concentrated flow such as pipes, etc.)*

25. Guidance: Nutrient Loading. Excessive nutrient loading to a wetland can cause nuisance algal blooms and the production of monotypic stands of invasive or weed species. *Observed point source or nonpoint source of nutrients may include but is not limited to: fertilized lawns, agricultural runoff, manure storage or spreading, concentrated stormwater runoff, or pet wastes inputs..*

26. Y N Is the wetland fringing deepwater habitat, a lake, or adjacent to a watercourse? If NO, enter "not applicable" for this function in the Summary Table and skip to Question 28 and remove from computation of Shoreline Protection function. If YES, answer the following questions.

26. Guidance: Shoreline Wetlands. The Shoreline Protection function only applies to wetlands which lie at the fringe of lakes, deepwater habitats, and along creeks, streams, rivers, and other watercourses. Typically, these include lacustrine wetlands i.e. fringing lakes which are defined as being situated in a topographic depression; lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage; and greater than 20 acres in size or fringing deepwater habitats which are defined as less than 20 acres in size, but either greater than 6.6 feet deep at the deepest, or has a wave-formed shoreline (Cowardin, 1979). The wetland portion is typically the area which is less than 6.6 feet deep. Also included as shoreline wetlands area floodplain/riverine systems (i.e. wetlands present between the active river channel and river banks that may experience frequent water level fluctuations and/or erosive forces).

27. Describe the rooted shoreline wetland vegetation (Wells et al., 1988). ***(In the electronic version plug in percentages for formulas to assign rank.)***

_____% High = Macrophyte cover in the wetland >50%

_____% Medium = Macrophyte cover in the wetland is 10% - 50%

_____% Low = Macrophyte cover in the wetland <10%

27. Guidance: Rooted Shoreline Vegetation. The erosive strength of waves and currents can be greatly dissipated by a dense vegetation cover including submerged macrophytes. The greater the vegetation density, the greater the shoreline protection.

28. Describe the wetland width between the shoreline/streambank and deep water/stream (Adamus et al., 1991). ***(For the electronic version insert the width in feet and the formula will assign rank.***

_____*feet*; High = Wetland width >30 feet

_____*feet*; Medium = Wetland width 10-30 feet

_____*feet*; Low = Wetland width <10 feet

28. Guidance: Wetland Width. Wetlands with wide stands of vegetation are more likely to stabilize sediments than those with narrow stands. Knutson et al. (1981) found that wetlands wider than 30 feet reduced wave energy by 88% while emergent wetlands less than 6 feet wide were relatively ineffective in wave buffering.

29. Describe the emergent vegetation type and resistance (Wells, et al., 1988):

High = Dominance of emergent species with strong stems present all year and/or dense root mats in the wash zone (e.g. cattails, shrubs) that are resistant to erosive forces.

Medium = Presence of some emergent species with strong stems or dominance of weak-stemmed emergent species persisting most of the year and/or moderately dense root mats in the wash zone (e.g. bulrushes, grasses) that are resistant to erosive forces.

Low = Presence of some weak-stemmed emergent species and/or no dense root mats in the wash zone (e.g. rushes).

29. Guidance: Emergent Vegetation. The erosive strength of waves and currents can be greatly dissipated by a dense, emergent vegetation cover. In addition, species with stronger stems will provide greater protection than weak-stemmed species. The greater the vegetation density, the greater the shoreline protection. Some of the more common species with potentially high value for shoreline anchoring include: sweetflag (*Acorus calamus*), speckled alder (*Alnus rugosa*), blue joint grass (*Calamagrostis canadensis*), sedges (*Carex spp.*), red-osier dogwood (*Cornus stolonifera*), spike rush (*Eleocharis palustris*), scouring rush (*Equisetum fluviatile*), rice cutgrass (*Leersia oryzoides*), switchgrass (*Panicum virgatum*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites communis*), smartweeds (*Polygonum spp.*), pickerelweed (*Pontederia cordata*), cottonwood (*Populus deltoides*), arrowhead (*Sagittaria spp.*), willow (*Salix spp.*), bulrushes (*Scirpus spp.*), cordgrass (*Spartina spp.*), and cattail (*Typha spp.*).

30. Describe the erosion potential at the site (Wells et al., 1988):

High = Strong wave action or water current (greatest wind fetch on a lake or outside river bend); frequent boat traffic and restrictions that funnel boats into narrow passages; sandy soils or evidence of erosion or slope failure.

Medium = Moderate wave action or water current (small lakes or large ponds); moderate boat traffic with some evidence or potential for erosion or slope failure.

Low = Negligible erosive forces (little open water or wave action or slow-moving, straight river); minimal to no boat traffic or no-wake zone; no evidence of past erosion or slope failure.

30. Guidance: Shoreline Erosion Potential. Wetlands located in areas with strong currents and wave action have the greatest potential for protecting shoreline. Shorelines composed of sandy or erodible soils will benefit the most from shoreline wetland protection.

31. Describe the shoreline/streambank vegetation conditions in relation to the ability to protect the bank from erosion or slope failure:

High = Lack of vegetation; regularly manicured, short-grass lawn.

Medium = Full vegetative cover composed of shrubs receiving only moderate maintenance or grasses/understory vegetation that is not manicured.

Low = Deep-rooted vegetation which is not actively manicured (e.g. trees, native shrubs and native grasses), or rip-rap.

31. Guidance: Bank Protection Ability. The potential for erosion and/or slope failure of shoreline or streambank areas is also dependent on the land use and condition on the slope and on top of the bank. Bare soils or those with shallow rooted grasses that are manicured on a regular basis provide less protection than deep-rooted native grasses allowed to grow naturally.

32. Describe the soils within the wetland: (R.P. Novitzki, 1998 personal communication in MNRAM; Magee and Garrett, 1998)

Recharge = Mineral soils with a high organic content (all soils not included in discharge system).

Discharge = Organic/peat soils, formed due to more continuous wetness associated with a ground water discharge system

32. Guidance: Wetland Soils. Wetlands with mineral hydric soils typically represent drier hydrologic regimes where groundwater recharge is more likely (i.e. saturated, seasonally flooded, and temporarily flooded) where the wetness does not significantly limit oxidation of organic materials. Groundwater discharge wetlands represent more stable and permanent hydrologic regimes where excessive wetness limits the oxidation of organic matter resulting in the accumulation of peat and/or muck. In addition, coarser-grained mineral hydric soils may have higher permeability's allowing groundwater recharge, while histosols generally have low permeability's, reducing groundwater discharge.

33. Describe the land use/runoff characteristics in the subwatershed upstream of the wetland (Adamus et al., 1991):

Recharge = Land is primarily developed to high-density residential, commercial, industrial and road land uses indicating impervious surfaces (>38%), which result in more runoff to wetlands and lowered water tables creating a gradient for recharge under wetlands.

Discharge = Upland watershed primarily undeveloped or with low to moderate density residential development (i.e. lots larger than ¼ acre) with low percentage of impervious surfaces (<38%) so upland recharge (to groundwater) and higher water table will be more likely to contribute discharge to wetlands.

33. Guidance: Land Use/Runoff. Watersheds with extensive paved surfaces, topographic disruptions, and the presence of wells are associated with human development that lowers the potentiometric contours. Lowered or diversified potentiometric contours enhance the likelihood of recharge, not discharge (Fetter, 1980). Wetlands with unpaved watersheds are more likely to allow groundwater discharge to occur.

34. Indicate conditions that best fit the wetland based on wetland size and the hydrologic properties of the soils within 500 feet of the wetland (Adamus et al., 1991; Magee and Garrett, 1998).

Recharge = Wetland is <200 acres and surrounding soils (within 500 feet) are primarily in the C or D hydrologic groups.

Discharge = Wetland is >200 acres in size or wetland is <200 acres and the surrounding soils (within 500 feet) are primarily in the A or B hydrologic groups.

34. Guidance: Wetland Size and Surrounding Soils. The size or area of the watershed and the soil texture are two factors controlling the wetland's water budget; the larger the surface area of the watershed which flows to a wetland and the more fine-grained the soil texture, the more water will flow to the wetland. The wetland size also controls the amount of recharge potential. A large wetland with a proportionately small watershed may indicate subsidization of its water budget by groundwater discharge. The probability of groundwater discharge occurring may thus increase as the wetland/watershed ratio increases. Williams (1968) observed that a small wetland situated in a large watershed favored groundwater recharge, because surface water inflow from a large watershed was sufficient to create a water mound conducive to recharge. Sandy and loamy upland soils allow more infiltration of precipitation than clayey soils. The infiltrated water will percolate downward vertically and/or flow laterally becoming groundwater discharge where wetlands intersect the water table.

35. Indicate the hydroperiod of the wetland (Adamus et al., 1991; Lee et al., 1997):

Steve is going to reword this question to more accurately describe saturated, sloping peatland/fen complexes.

Recharge = Cowardin et al. water regimes: A, B, C (i.e. temporarily flooded, saturated, seasonally flooded).

Discharge = Cowardin et al. water regimes: F, G, H, and calcareous fens (i.e. semi-permanently flooded, intermittently exposed, permanently flooded, and saturated calcareous fens).

35. Guidance: Hydrologic Regime. Permanent surface water, especially in regions having high evaporation rates, often indicates groundwater discharge into a wetland. Wetlands that are not permanently or semi-permanently flooded are more likely to recharge groundwater. Calcareous fens are an anomaly since they have a saturated hydrologic regime, but by definition are supported by groundwater discharge.

36. Describe the inlet/outlet configuration that best fits the wetland (Adamus et al., 1991; Lee et al., 1997):

Recharge = No outlet or restricted outlet in natural wetlands and lacustrine wetlands.

Discharge = Perennial outlet but no perennial or intermittent stream inlet; or perennial stream riverine wetland.

36. Guidance: Inlet/Outlet for Groundwater. A wetland with a permanent stream inlet but no permanent outlet is more likely to recharge groundwater than one with an outlet. Several factors support this ranking. First, a higher hydraulic gradient will likely be present in an area with no outlet, especially if an inlet is present. Second, the longer water is retained in an area, the greater the opportunity for it to percolate through the substrate. Third, wetlands without outlets generally experience more water-level fluctuations, resulting in inundation of unsaturated soils. Finally, lack of an outlet suggests that water is being lost either through recharge or evapotranspiration, especially if an inlet is present. A wetland with a permanent outlet and no inlet is more likely to discharge groundwater than one with other combinations of inlets and outlets. Continuous discharge of water (i.e. permanent outlet) without surface water feeding the wetland through an inlet suggests an internal source of groundwater (e.g. springs or seeps).

37. Characterize the topographic relief surrounding the wetland (Adamus et al., 1991):

Recharge = Land slopes away from (below) the wetland (wetland is elevated in the subwatershed).

Discharge = Topography characterized by a downslope toward the wetland around the majority of the wetland (wetland is found lower on the landscape).

37. Guidance: Topographic Relief. Groundwater discharge is more likely to occur in areas where the topographic relief is characterized by a sharp downslope toward the wetland (i.e. wetland is located at the toe of a slope) and groundwater recharge is more likely in wetlands where the topographic relief is characterized by a sharp downslope away from most of the wetland. The hydraulic gradient for groundwater movement is influenced by the slope of the water table with respect to the wetland. The slope of the water table usually roughly parallels with the topography of the land surface. Thus, when local topography slopes sharply toward the wetland, the result is typically a hydraulic gradient favorable for groundwater discharge.

38. Y N Is the wetland known to be used recently by rare wildlife species or wildlife species that are state or federally listed? If yes, wildlife habitat functional level rating = exceptional. (If Special Features, question J is answered yes, the functional level will also be exceptional)

38. Guidance: Rare Wildlife. Rare wildlife species include any of those listed in the Minnesota Natural Heritage Database or County Biological Survey or are federally listed.

39. Y N Is the wetland or a portion of the wetland a rare natural community or habitat based on the Minnesota Natural Heritage Database or the County Biological Survey? If yes, wildlife habitat functional level rating = exceptional. (If Special Features, question d is answered yes, this question will also be affirmative.)

39. Guidance: Rare Community. Rare natural communities include those identified in the Minnesota Natural Heritage Database or the County Biological Survey or are known to be rare in the ecoregion.

40. **For *deep and shallow marshes or shallow open water* wetland types select the cover category that illustrates the interspersion of open water and emergent vegetation within the wetland (Figure 1 attached, from Wells et al., 1988; Adamus et al., 1991). *(Interspersion is based on the WEM Page 180 Interspersion Diagram in the appendix or the electronic version drop down.)***

High = Cover category 3, 5, or 6.

Med. = Cover category 2 or 4.

Low = Cover category 1 or 7.

N/A = Wetland types 1, 2, 6, 7, 8 are not applicable.

40. Guidance: Vegetation Interspersion. Wetlands that contain vegetation interspersed with open water are more likely to support notably greater on site diversity and/or abundance of fish and wildlife species. Those with very dense vegetation and no channels or open water areas are less likely to support this function. Vegetation interspersion is a measure of the amount of edge between vegetation and open water, which is valuable to wildlife.

41. For wetlands having more than one vegetative community (see Question 1), indicate the interspersion category (*Interspersion is based on the WEM Page 67 Interspersion Diagram in the appendix or the electronic version drop down, Golet et al., 1976*):

High = Category 3

Medium = Category 2

Low = Category 1

N/A = Only one vegetative community is present.

41. Guidance: Vegetative Interspersion. For wetlands that are characterized by multiple vegetative communities, the increased structural diversity and amount of edge associated with greater interspersion is generally positively correlated with wildlife habitat quality.

42. A healthy wetland will have litter in several stages of decomposition present. Describe the litter condition in the wetland: (Lee et al., 1997)

High = The presence of litter layer in various stages of decomposition.

Medium = The presence of some litter with apparent bare spots, or dense litter mat (e.g. reed canary grass mat).

Low = No litter layer.

N/A = *Deep marshes, shallow open water and bogs communities.*

42. Guidance: Wetland Detritus. Detritus or vegetative litter in various stages of decomposition is a sign of a healthy wetland. Detrital biomass impacts nutrient cycling processes and disturbance regime and thereby influences plant assemblages. Detritus maintains thermal regulation of rhizomes and propagules, and is essential to nutrient cycling. The integrity of the system's vegetation components supplies the bulk of the faunal habitat requirements.

43. Describe the relative interspersion of various wetlands *in the vicinity of the assessment wetland* (Wells et al., 1988; Adamus et al., 1991):

High = *The wetland occurs in a complex of wetlands of various types (general guideline: at least 3 wetlands within 0.5 miles of assessment wetland, at least one of which has a different plant community than the assessment wetland); or the assessment wetland is the only wetland within a 2 mile radius and exhibits at least a moderate or greater plant community quality rating (see question 2).*

Medium = *Other wetlands of the same plant community as the assessment wetland are present within 0.5miles.*

Low = *No other wetlands are present within 0.5 miles of the assessment wetland but are present within 2 miles.*

43. Guidance: Wetland Interspersion. This question is best determined using GIS (except in forested areas where wetlands smaller than one to three acres may not appear). This question uses a 0.5-mile radius and rates wetlands higher for having more wetland neighbors. However, research indicates that the critical radius varies by species. Whited, D.; Galatowitsch, S.; Tester, J.R. Schik, K.; Lehtinen, R.; Husveth, J. Landscape and Urban Planning 2000, 49 (1-2): 49-65.)
Wetlands that are isolated in the landscape may provide the last refuge for wetland dependent plant and animal species in an otherwise upland or developed area.

44. Habitat value diminishes when fragmented by barriers which restrict wildlife migration and movement. Describe barriers present between the wetland and other habitats: (Rheinhardt et al., 1997)

High =No barriers or minimal barriers present; i.e. low traffic; uncurbed roads, low density housing (> 1 acre lots), golf courses, utility easements, or railroads.

Medium =Moderate barriers present; i.e. moderately traveled; curbed roads, moderate density housing (1/2 to 1 acre lots), residential golf courses, low dikes.

Low =Large barriers present; i.e. 4-lane or wider, paved roads, parking lots, high density residential (<1/3 acres), industrial and commercial development.

44. Guidance: Wildlife Barriers. This variable is defined as a measure of habitat fragmentation of the wetland relative to other wetlands and native plant communities to indicate the ecosystem connectivity. It identifies barriers to wildlife migration ranging from very small barriers such as unpaved roads and low-density housing to large hydrologic barriers such as regional canals and levied roads.

45. Y N There is evidence that the wetland provides habitat for reproduction or habitat for overwintering by amphibians (frogs and salamanders).

45. Guidance: Amphibian reproduction evidence*. Frogs reproduce at different times from late March to June, depending on the species. Early breeders (such as spring peepers, wood frogs, chorus frogs, salamanders) need to reproduce in shallow, seasonal wetlands that are lacking in predatory fish. Other frogs, green frogs and mink frogs, reproduce in larger more permanent wetlands. Evidence of frog reproduction would be observations of frogs calling at the wetland, egg masses in the water, presence of tadpoles or presence of young, newly metamorphosed frogs or salamanders at the wetland. Wetlands that are deep and oxygenated provide over-wintering habitat for leopard, green and mink frogs. Evidence of over-wintering would be*

observations of migrations of frogs to the wetland in fall and away from the wetland in spring. Observations could come from local citizens.

46. The wetland has potential for providing habitat for reproduction or over-wintering by amphibians.

High = The wetland is isolated, temporary or seasonal, lacking in predatory fish; or, the wetland, if more permanent, is isolated and has vegetated littoral areas. For over-wintering habitat, the wetland is deep and well oxygenated, it is not known to winter-kill. Fish may be present in overwintering habitat. There is debris on landscape for overwintering tree frogs and wood frogs. There is woodland within 100 meters for tree frogs..

Medium = The wetland is seasonal or more permanent. It may have some fish, but has significant vegetated littoral habitat for amphibian reproduction. For over-wintering habitat, the wetland only winter-kills rarely. There is some debris on the near landscape for over-wintering tree frogs.

Low = The wetland is connected with a lake or river such that predatory fish are able to get into the wetland; or, the wetland is used for rearing of game fish; or, the wetland receives significant runoff of polluted water and it lacks emergent vegetated areas. The wetland receives severe fluctuations during spring and early summer (>20cm) following storm events.

46. Guidance: Potential Amphibian Reproduction Habitat. *Many amphibians reproduce in habitats that lack predatory fish (M. Lannoo, 1998). These habitats are wetlands that winter kill, dry periodically, are periodically anoxic, and are not connected to waters bearing predatory fish. The wetland should not be used to rear bait or game fish. Unnatural fluctuations in water depth in wetlands from conducted storm water runoff can impair reproductive success in amphibians which often attach their eggs to stems of wetland vegetation, e.g., salamanders, tree frogs, green frogs, wood frogs (Watermolen, 1995; Richter, 1997; Richter and Azous, 1996). A developed littoral vegetation is important for amphibians to use for attachment of eggs and for calling perches. A wooded area near the wetland is needed for tree frogs for feeding and calling. A deeper wetland that serves as over-wintering habitat for some amphibians like leopard frogs must have oxygen in it for them to survive (Oldfield and Moriarty, 1994). See also Semlitsch, 2002. The wetlands used for reporduction must have sufficient hydroperiod to allow successful development to the young adult stage (Snodgrass et al. 2000) A site with very low road traffic will allow more successful migration of amphibians (Link, 2000).*

47. Y N *The wetland provides feeding habitat for juvenile and or adult turtles and overwintering habitat for turtles.*

47. Guidance: Turtle Habitat. *Turtles use wetlands extensively for feeding. Juveniles use shallow heavily vegetated habitats and adults use deeper more open habitats. Wetlands should have good populations of prey (invertebrates, tadpoles, small fish). Presence of turtles may be difficult to assess, with the exception of Painted Turtles. Over-wintering wetlands need to be deep enough not to freeze to the bottom. Turtles can survive low dissolved oxygen, but not freezing (Oldfield and Moriarty, 1994).*

48. List any noteworthy wildlife species observed or in evidence (e.g., tracks, scat, nest/burrow, calls, viewer reports), including birds, mammals, reptiles, and amphibians: ***(Note: This list is for documentation only and is not necessarily an indication of habitat quality.)***

49. Y N Is the wetland a known spawning habitat for native fish of high importance/interest or is the wetland part of or adjacent to a trout fishery as identified by the DNR? (If the answer to Special Features question a is yes, this question is also affirmative)

49. Guidance: Spawning Habitat. In the north central region, spawning habitat for warm water species can be an important function of a wetland, and northern pike are among the most valuable warm water species spawning in wetlands (Adamus et al., 1991). Cold water species are relatively rare and wetlands (according to traditional definition) do not provide habitat for spawning trout, but have an indirect effect through improving water quality (Adamus et al., 1991). Northern pike wetland spawning habitat will have several characteristics including: 1) A semi-permanent or permanent connection to a lake or stream that has a population of northern pike; 2) The wetland is vegetated primarily with reeds, grasses, or sedges; or secondarily with cattails, rushes, arrowhead, water lilies, submerged plants, and shrubs or lowland hardwoods with grass and low emergents; 3) The wetland is flooded during the early spring at least once every 3 years for at least 20 days and remains connected to the lake or stream during that time; 4) Lacustrine areas should have 4 to 8 acres of actual spawning area for each 100 littoral acres of lake (MIDNR, 1981; Adamus et al., 1991); and 5) Shallow or deep marsh wetland spawning areas are typically located on the upstream side of the lake or stream (Personal communication, D. Ellison, MNDNR).

50. Is the wetland contiguous or intermittently contiguous with a permanent waterbody or watercourse such that it may provide spawning/nursery habitat for native fish species? Choose the condition from the following list that best describes the wetland in relation to fishery habitat:

High = The wetland is lacustrine/riverine or is contiguous with a permanent waterbody or watercourse and may provide spawning/nursery habitat, or refuge for native fish species in adjacent lakes, rivers or streams.

Medium = The wetland is intermittently connected to a permanent waterbody or watercourse that may support native fish populations as a result of colonization during flood events?

Low = The wetland is isolated from a permanent waterbody or watercourse or has exclusive, high carp populations which cause degradation to the wetland.

50. Guidance: Fishery Quality. Generally, the value of a wetland for fish habitat is related to it's connection with deepwater habitats. A wetland should be rated as having high value for fish if it provides spawning/nursery habitat, or refuge for *native* fish species in adjacent lakes, rivers or streams. Some isolated deep marshes may intermittently support populations of sunfish and northern pike as a result of colonization during flood events. Permanently flooded isolated wetlands that support native populations of minnows provide moderate value. Wetlands with exclusive, high carp populations provide low value for fish habitat because carp cause extreme degradation of the wetland. Isolated wetlands that are not permanently flooded do not generally support fish populations.

51. List any fish species observed or evidenced: *(Note: This list is for documentation only and is not* necessarily *an indication of habitat quality.)* (Drop down list: northern pike, perch, sunfish, bass, minnows, carp)

52. Y N Does the wetland provide a unique or rare educational, cultural, or recreational opportunity (e.g. located in an outdoor learning park focused on wetland study)? If yes, Aesthetics/Recreation/Education/Cultural/Science Index is Exceptional.

52. Guidance: Unique Opportunity. The wetland must provide a rare or unique opportunity within the ecoregion, wetland comparison domain, or study area.

53. Is the wetland visible from vantage points such as: roads, waterways, trails, public lands, houses, and/or businesses?

High = The wetland is highly visible and can be seen from several vantage points

Medium = The wetland in somewhat visible and can be seen from a few vantage points.

Low = Very limited visibility.

53. Guidance: Visibility. While dependent on accessibility, a wetland's functional level could be evaluated by the view it provides observers. Distinct contrast between the wetland and surrounding upland may increase its perceived importance. Multiple vantage points increases the likelihood and number of people that may view the wetland.

54. Y N Is the wetland in/near any population centers so as to generate aesthetic/recreation/educational/cultural use?

54. Guidance: Population Centers. Accessibility of the wetland is key to its aesthetic or educational appreciation. Thus, proximity to population centers may increase its perceived importance. However, proximity to population centers and locations in public areas may have associated noise and/or pollution factors that could degrade the aesthetic and educational functional level.

55. Is any part of the wetland in public or conservation ownership?

High = Completely contained within publicly owned land or entirely within a conservation easement.

Medium = Partially within publicly owned land or partially within a conservation easement.

Low = Privately owned or not within a conservation easement.

55. Guidance: Public Ownership. Wetlands located on lands in public ownership inherently will provide open accessibility. Wetlands on lands within a conservation easement provides some certainty that the wetlands will not be subject to impact pressures.

56. Does the public have access to the wetland from public roads or waterways?

High = Direct access through a public facility with an established parking area or boat access.

Medium = Cumbersome access from a public facility (i.e. no established trails to or near wetland) or no public parking or boat access available.

Low = No public access available.

56. Guidance: Public Access. Accessibility of the wetland is key to its aesthetic or educational appreciation. Wetlands located on private lands are not likely to provide aesthetic or educational opportunities to the general public.

57. Is the wetland itself relatively free of obvious human influences, such as:

High = No structures, pollution, invasive vegetation or other alteration present in the wetland.

Medium = Wetland only moderately disturbed by structures, pollution, invasive vegetation or alteration.

Low = Wetland has signs of extensive pollution/trash or multiple structures present.

57. Guidance: Human Disturbances in Wetland. Wetlands subject to direct human disturbances/impacts are not likely to provide aesthetically pleasing natural environments.

58. Is the viewshed from the wetland relatively free of obvious human influences, such as:

High = No or minimal buildings, roads, or altered land uses surrounding the wetland.

Medium = Surrounding area composed of mostly open space with few buildings or roads, low intensity agriculture.

Low = Wetland surrounded by residential, other intensively developed land uses, or intensive agriculture.

59. Does the wetland and buffer area provide a spatial buffer between developed areas?

High = Spatial buffer more than 500 feet wide.

Medium = Spatial buffer between developed areas less than 500 feet wide.

Low = Does not provide a spatial buffer.

59. Guidance: Spatial Buffer. Distinct contrast between the wetland and surrounding upland may increase its perceived importance. Expansive wetlands and associated buffer areas provide open space and a feeling of a natural environment while reducing the visibility of adjacent human development. If the wetland is surrounded by undeveloped land within its immediate viewshed, the wetland will not act as a spatial buffer. Developed lands across any portion of the wetland will benefit from the spatial buffering of the wetland. Further guidance is needed here to measure the spatial width.

60. Is the wetland and immediately adjacent area assumed to be currently used for (or does it have the potential to be used for) recreational activities such as the following: education, cultural, scientific study, hiking, biking, skiing, hunting, fishing, trapping, boating, canoeing, wildlife observation, exploration, play, photography, or food harvest.

High = Evidence or a high probability for multiple recreational uses.

Medium = Evidence of or a high probability for a few recreational uses.

Low = Low probability or potential for recreational use

60. Guidance: Activities. Wetlands can provide recreational and educational opportunities which enhances their value.

61. Y N Is, or has, the wetland used to provide a commercial crop or product oran agricultural commodity,? If NO, enter "not applicable" for this function in the summary table and proceed to question #56. If YES, list the products the wetland provides:

61. Guidance: Commercial Uses. Wetland dependent crops include wild rice and cranberries. Other agricultural uses of wetlands may include hay, pasture/grazing, or row crops such as soybeans or corn. Some row crops can be planted in wetlands after spring flooding has ceased and still have adequate time to grow to maturity.

62. Is the vegetation or hydrology controlled or modified to sustain the commercial crop or other commercial products that may include …….or agricultural commodity?

High = Commercial use of the wetland that does not permanently alter the wetland characteristics such as timber products, wild rice, hay, pasture, wet native grass seed production, etc.

Medium = Wetland characteristics have been altered to produce rice, cranberries, hay, pasture/grazing. Vegetation is still hydrophytic.

Low = Hydrology dramatically altered to produce non-hydrophytic row crops such as; soybeans or corn.

62. Guidance: Commercial Quality. Wetland dependent crops rely on the wetland hydrology for some part of their life cycle, and thus, are a more natural fit for wetland use. Haying and grazing are less intrusive agricultural activities than planting and harvesting row crops and can be utilized more casually when hydrologic conditions permit.

Optional Evaluation Information

63. Describe the sustainability of the wetland with regard to stormwater treatment prior to discharge into the wetland: (Use the Wetland Water Quality Protection Functional Index rating of H, M, or L and apply to the list below)

High = No additional stormwater treatment needed.

Medium = Additional stormwater nutrient removal needed.

Low = Additional sedimentation and nutrient removal needed.

63. Guidance: Nutrient Loading. Wetlands which receive untreated, directed stormwater containing sediment and nutrients will not be as sustainable as in a native landscape. Typically, wetlands receiving stormwater treated to approximately NURP standards will have a higher likelihood of sustainability. Wetlands receiving stormwater with just sediment removal will be subject to nutrient loading and excessive plant growth.

64. Y N Does the wetland have the potential for hydrologic restoration without flooding: roads, houses, septic systems, golf courses or other permanent infrastructure (active agricultural fields are acceptable uses within potential restoration areas) within the restoration area? If yes, answer the following questions, otherwise this section is not applicable and continue with the next section. If no, skip to question 64.

64. Guidance: Hydrologic Restoration Potential. The purpose of this question is to identify opportunities for restoration of drained or partially drained wetlands. Generally, this question applies to wetlands which have been ditched or tiled for agricultural or other purposes. Some drained or partially drained wetlands will not have the potential for restoration because of altered land uses which rely on continued drainage of surface and/or subsurface water. It is important to look at land uses upstream of the drained wetland to determine if any of the features mentioned could be flooded by plugging a ditch, breaking drain tiles or creating an impoundment.

65. Indicate the number of landowners that would be affected by the wetland restoration project:

Exceptional = Completely within public ownership

High = 1

Medium = 2

Low = 3 or more

65. Guidance: Landowners. The number of landowners of the drained or partially drained wetland and any obvious upstream areas, which would be flooded by hydrologic restoration of the wetland directly affects the feasibility of a restoration project. Typically as the number of private owners of a potential restoration site goes up the project becomes financially complex and the probability of success is reduced due to conflicting desires among the landowners.

66. Describe the estimated size of the potential wetland restoration area, not including the buffer area.

This question will have a place to enter the acreage and the programming will assign the rank based on size.

A. Size of existing wetland _____(The answer for this question will come from question 1)

B. Restoration size of wetland_____

Calculated new wetland area_____

Ranking is based on computation of percentage of new versus existing.

66. Guidance: Wetland Restoration Area. The size of the potential wetland restoration will be determined partially by the extent of historic hydric soils mapped on the site, but must also take into consideration upstream land uses, methods of hydrologic alteration that have occurred, and the current topography of the site.

67. Is there the potential to restore the natural hydrologic regime and vegetation of wetlands that have been degraded by prior drainage, diversion of the natural watershed, or filling? If yes, indicate the proportion of the restoration area that would likely receive new wetland credit Possibly combine questions 58 and 59 to get size and credit based on % effectively drained and % partially drained. Need to think about this one.

High = Between 25% and 50% of the potential wetland restoration area.

Medium = Between 10% and 25% of the potential wetland restoration area.

Low = Less than 10% of the potential wetland restoration area.

N/A = Not applicable

67. Guidance: Restoring the natural hydrology to partially drained wetlands, thus restoring the historic wetland type. This provision will typically apply to existing wetlands which have some ditching or tiling that did not effectively drain the entire wetland. The potential restoration area can most accurately be approximated by the extent of hydric soils mapped on the soil survey.

68. Indicate the potential for upland buffer establishment. Enter the average width.

High = More than 75’ around the potential wetland restoration area.

Medium = Between 20’ and 75’ around the potential wetland restoration area.

Low = Less than 20’ around the potential wetland restoration area.

68. Guidance: ***<u>Natasha and Mark working on guidance</u>***

69. Rate the potential ease of wetland restoration:

High = Break tile line and/or plug ditch, discontinue pumping.

Medium = Break multiple tile lines and/or ditch plugs.

Low = Diking, berming, excavation or grading.

69. Guidance: Restoration Ease. The easiest wetlands to restore are those that were drained by a single ditch or drain tile. Restoration of those wetlands will typically involve simply plugging the ditch or breaking the tile line. The most difficult situation for creating wetlands is by impoundment or excavation in uplands. This involves much more uncertainty and greater cost.

70. Indicate the type of hydrologic alteration:

___ Ditching

___ Drain Tiles

___ Ground Water Pumping

____ Lowered Outlet Elevation

____ Watershed Diversion

____ Filling

70. Guidance: Hydrologic Alteration. Alterations may include ditching or tiling which is typical in agricultural settings. Also important are ground water pumping activities that can lower local ground water levels and drain wetlands (i.e. dewatering for quarries, underground construction, or utility construction; ground water pumping for residential, commercial or municipal water use). In metro areas, the natural wetland outlet elevation may be lowered by the construction of an outlet structure (i.e. weir, culvert, lowered overland outflow elevation). Development activities occasionally result in the diversion of drainage away from a wetland, which can change the natural hydrology. (This information will be used for informational purposes only.)

71. Indicate the potential restoration wetland classification according to Circular 39 (USFWS, 1956) and Cowardin et al., 1979: Type 1, 2, 3, 4, 5, 6, 7, or 8. (Informational purposes only)

72. Describe the susceptibility of the wetland to degradation from stormwater input: wetland type classification (Question #1 and quality (Question #5) will be utilized to determine the best fit to the following categories based on the most sensitive, dominant wetland community:

Exceptional = Sedge meadows, open and coniferous bogs, calcareous fens, low prairies, coniferous swamps, lowland hardwood swamps, or seasonally flooded basins.

High = Shrub-carrs, alder thickets, diverse fresh wet meadows dominated by native species, diverse shallow and deep marshes

Medium = Floodplain forests, fresh wet meadows dominated by reed canary grass, shallow and deep marshes dominated by cattail, reed canary grass, giant reed or purple loosestrife.

Low = Gravel pits, cultivated hydric soils, or dredge/fill disposal sites.

72. Guidance: Stormwater Sensitivity. Guidelines are taken from State of Minnesota, 1997, Section IV, Wetland Susceptibility.

FUNCTIONAL RATING FORMULAS (THIS SECTION NO LONGER COMPATIBLE WITH ASSESSMENT)

Vegetative Diversity/Integrity

Compute the functional index for vegetative diversity and integrity for each plant community by doing the following:
If any questions #3-5 are answered yes and/or if any of the Special Features b, d, or i have been selected, enter Exceptional for the functional index, if not, use the data in the Vegetative Diversity/Integrity Summary Table 2 on page 14 depending on the use.

Maintenance of Characteristic Hydrologic Regime

Compute Functional Index for Maintenance of Characteristic Hydrologic Regime
(This formula utilizes the same characteristics as used in MNRAM, however, the questions have been modified slightly and the score computation has been clarified. Each parameter is weighted equally.)
Index of Function:

Use the following equation if Flow-through Emergent Vegetation Density(9) is applicable.

- **{Outlet Characteristics(6)+Upland Land Use(7)+Wetland Land Use (8) +Flow-through Emergent Vegetation Density (9)}/4**

If Flow-through Emergent Vegetation Density (9) is not applicable use:

- **{Outlet Characteristics(6)+Upland Land Use(7)+Wetland Land Use(8)}/3**

Flood and Stormwater Storage/Attenuation

Compute Functional Index for Flood/Stormwater Attenuation (Lee et al., 1997).
This formula is based on the Surface Water Storage Functional Capacity Index scoring concept and equation utilized by Lee et al., 1997 in the *Revised Operational Draft Guidebook for the Hydrogeomorphic Assessment of Temporary and Seasonal Prairie Pothole Wetlands* (HGM). The HGM formula was altered slightly with the addition of two surface flow characteristics (questions 9 and 15), substituting Subwatershed Wetland Density (14) for Soil Porosity, and substituting Stormwater Runoff Quality/Quantity (13) for characterization of a Subsurface Outlet. The Flood and Stormwater Storage Functional Index is comprised of 4 primary processes which are weighed equally:

1. **Outlet Characteristics**: Outlet characteristics
2. **Upland Watershed/Runoff Characteristics**: Upland land use, Upland soils, Stormwater runoff quality/quantity
3. **Wetland Condition/Land Use**: Wetland land use, sediment delivery, subwatershed wetland density
4. **Surface Flow Characteristics**: Flow-through emergent vegetation density, surface flow characteristics

Within each of these major processes are 1 to 4 characteristics which equally contribute to the rating of the

process.

Index of Flood and Stormwater Storage/Attenuation Function:

If Outlet Characteristics (5.5) =Low, then Index of Function = Low

If Outlet Characteristics (5.5) is not Low and Flow-through Emergent Vegetation Density (9) is applicable, use the following formula:

- **{Outlet Characteristics (5.5) +[Upland Land Use(11)+Upland Soils (12)+Stormwater Runoff Quality/Volume (13)]/3+[Wetland Land Use (8)+Sediment Delivery (10)+Subwatershed Wetland Density(14)]/3+[Flow-through Emergent Vegetation Density (9)+Surface Flow Characteristics (15)]/2}/4**
- **{#5.5+[#11+#12+#13]/3+[#8+#10+#14]/3+[#9+#15]/2}/4**

If Outlet Characteristics (5.5) is not Low and Flow-through Emergent Vegetation Density (9) is not applicable, use the following formula:

- **{Outlet Characteristics (5.5)+[Upland Land Use(11)+Upland Soils (12)+Stormwater Runoff Quality/Volume (13)]/3+{[Wetland Land Use (8)+Sediment Delivery (10)+Subwatershed Wetland Density(14)]/3+Surface Flow Characteristics (15)}/4**
- **{#5.5+[#11+#12+#13]/3+[#8+#10+#14]/3+#15}/4**

Downstream Water Quality Protection

Compute Functional Index for Downstream Water Quality Protection

This functional index computation was derived from a combination of Nutrient Cycling and Retention of Particulates functions in the HGM Prairie Pothole draft guidebook (Lee et al, 1997) with the downstream sensitivity concept from *The Minnesota Wetland Evaluation Methodology.* Again, 3 major processes make up an equal portions of the Downstream Water Quality Protection function with a measure of opportunity to protect downstream resources. Each of the 3 processes is comprised of two to four observable parameters.

1. **Rate, Quantity, and Quality of Runoff to the Wetland**: this is characterized by the conditions in the upstream watershed; both land use and soils, that affect the sediment and nutrient loads to the wetland, and by the existing stormwater delivery system to the wetland (Upland watershed conditions, storm water runoff, evidence of sediment delivery, and upland buffer each comprise 1/16 of the entire downstream water quality functional index based on their contribution to sediment removal).
2. **Sedimentation**: this is characterized by the presence of flow-through emergent vegetation density and by the overland flow characteristics within the wetland. A wetland with primarily sheet flow through the wetland and dense emergent vegetation density will allow sediment to drop out more effectively than a wetland with channel flow and no vegetation (When all parameters are applicable; emergent vegetative density and overland flow characteristics each make up 1/8 of the total downstream water quality functional index based on their contribution to sediment removal).
3. **Nutrient Uptake**: this is characterized by the outlet configuration and vegetative characteristics. A wetland with long water retention times has more capacity to remove nutrients from the water column via physical and biological processes. Vegetation slows floodwaters by creating frictional drag in proportion to stem density which allows sediment particles to settle out, thereby improving the water quality for downstream uses (Outlet characteristics and vegetative density each make up 1/8 of the total downstream water quality functional index based on their contribution to nutrient uptake).

4. **Downstream Sensitivity**: if the wetland contributes to the maintenance of water quality within one-half mile of a recreational water body or potable water supply source downstream, it operates at a higher functioning level than a similar wetland farther from or without significant downstream water resources (This factor accounts for ¼ of the total downstream water quality functional index).

Functional Index for Downstream Water Quality Protection:

If question Flow-through Emergent Vegetation Density (9) is applicable, then use the following formula:

- **{[Upland Land Use(11)+Stormwater Runoff Quality(13)+Sediment Delivery (10)+Upland Buffer(16)]/4+[Flow-through Emergent Vegetation Density (9)+Surface Flow Characteristics (15)]/2+[Outlet Characteristics (6)+Vegetative Density(17)]/2+Downstream Waterbody Sensitivity(18)}/4**
- **{[#11+#13+#10+#16]/4+[#9+#15]/2+[#6+#17]/2+#18}/4**

If question Flow-through Emergent Vegetation Density (9) is not applicable, then use the following formula:

- **{[Upland Land Use(11)+Stormwater Runoff Quality(13)+Sediment Delivery (10)+Upland Buffer(16)]/4+Surface Flow Characteristics (15)+[Outlet Characteristics(6)+Vegetative Density(17)]/2+Downstream Waterbody Sensitivity(18)}/4**
- **{[(#11+#13+#10+#16]/4+#15+[#6+#17]/2+#18}/4**

Maintenance of Wetland Water Quality

Compute Functional Index for Maintenance of Wetland Water Quality

This functional index was derived from a combination of sources including MNRAM, HGM, WEM, WET, and experiences of the project team. The sustainability of a wetland is partially driven by the quality and quantity of stormwater runoff entering the wetland. The ability of the wetland to sustain its characteristics is evaluated based on characteristics of the contributing subwatershed and indicators within the wetland. Subwatershed conditions which affect the wetland's sustainability in relation to water quality impacts include: upland land use; sediment delivery characteristics to the wetland; stormwater runoff volumes and rates; and the extent, condition, and width of upland buffer. Indicators of nutrient loading to the wetland indicate that a diverse wetland may not be sustainable. Indicators that a wetland has been affected by nutrient loading include the presence of monotypic vegetation and/or algal blooms.

Index of Function (each of the following 6 parameters make up equal parts of the overall wetland water quality functional index):

- **{Vegetative Quality/Integrity (2)+Upland Land Use(7)+Stormwater Runoff Quality(19)+Upland Buffer(16)+Sediment Delivery (10)+Nutrient Loading(20)}/6**
- **{#2+#7+#19+#16+#10+#20}/6**

Additional Stormwater Needs

(21) Use functional rating for Maintenance of Wetland Water Quality (MWWQ) as follows (this index is rated strictly from the measure of the water quality in the wetland and the sustainability, i.e. if the water quality in the wetland is low, additional stormwater treatment is needed to protect the wetland and the rating is low):

- **High = MWWQ Index >0.65 (no additional treatment needed)**
- **Medium = 0.33 < MWWQ Index ✂ < 0.65 (sediment removal needed)**
- **Low = MWWQ < 0.33 (sediment and nutrient removal needed)**

Shoreline Protection

Compute the functional index for Shoreline Protection:

The index of function is based primarily on the characteristics presented in WEM with a simple, straightforward computation of the index assuming all characteristics contribute equally.

Index of Function: If Lacustrine/Riverine Wetland (22) is yes, then compute index with following equation, otherwise Not Applicable (each of the following 5 parameters contribute equally to the Shoreline Protection index).

- **{Shoreline Vegetation(23)+Wetland Width(24)+Emergent Vegetation Stem Strength(25)+Shoreline Erosion Potential(26)+Upland Vegetation Type/Density(27)}/5**
- **{#23+#24+#25+#26+#27}/5**

Ground-Water Interaction

Compute the Likely Ground Water Interaction: the purpose of this function is strictly to determine the likelihood of the appropriate ground-water interaction based on observable characteristics of the wetland and watershed. The significance of ground-water as a component of the wetland water budget is the most difficult functional characteristic to determine without large quantities of detailed hydrologic and geologic information. The following methodology takes the most easily observable and distinct measures of recharge/discharge relationships from the *Wetland Evaluation Technique* (Adamus, et al., 1987) and the *Hydrogeomorphic Assessment Methodology* (Magee and Hollands, 1998). In many wetlands, surface water and ground water both make significant contributions to the water budget, but occasionally recharge or discharge is dominant. The goal here is to identify the dominant ground-water interaction (if there is one) to help guide future management and provide an indication when additional information may be warranted.

- **If 5 or 6 of questions 28-33 are answered the same, this indicates a strong likelihood that the most frequently stated interaction exerts the primary influence on the wetland.**
- **If 3-4 questions are answered the same, then the wetland is likely influenced by a combination of both recharge and discharge interactions (i.e. both types of ground water interaction are likely to be present at some point during most years).**

28. Wetland Soils – from Hydrogeomorphic Classification system functional assessments and Novitzki
29. Subwatershed Land Use/Imperviousness – taken from WET Volume I
30. Wetland Size and Upland Soils – taken from WET Volume I and HGM
31. Wetland Hydrologic Regime– taken from WET Volume I and HGM
32. Inlet/Outlet Configuration – taken from WET Volume I and HGM
33. Upland Topographic Relief – taken from WET Volume I

Special Concerns for Recharge Wetlands

Wherever ground water recharge is indicated as the **primary** interaction and the wetland lies within a sensitive ground water area (**Special Feature Question m**), a contribution area to a public water supply, or a wellhead protection area (**Special Feature Question n**), it should be recorded as Exceptional for the ground water/wetland function.

Maintenance of Characteristic Wildlife Habitat Structure

Compute the functional index for Maintenance of Characteristic Wildlife Habitat Structure

Index of Function (10 parameters are weighed equally, as described below and the vegetative quality is weighted double the other factors). The questions comprising the Wildlife Structure index are borrowed or modified from MNRAM, WET, WEM, and HGM methodologies. The overall index is derived from a combination of those methodologies to provide a measure of wildlife habitat in general and not focusing on any particular species.

If Rare Wildlife (34) or Rare Natural Community (35) are true, then Maintenance of Characteristic Wildlife Habitat Structure Index is Exceptional. If Vegetation Interspersion (36) is not applicable use Equation #1:

Equation #1

- **{[2*Vegetative Quality/Integrity (2)]+Wetland Detritus (37)+Upland Land Use (7) +Wetland Land Use (8) +Sediment Delivery (10)+Outlet Characteristics(6)+Wetland Interspersion (38) +Habitat Barriers (39) +Wetland Size (40)+Upland Buffer(16)}/11**
- **{[2*#5]+#37+#7+#8+#10+#6+#38+#39+#40+#16}/11**

otherwise, use Equation #2:

- **{[2*Vegetative Quality/Integrity (2)]+ Vegetation Interspersion (36) +Wetland Detritus (37) + Upland Land Use (7) + Wetland Land Use (8) + Sediment Delivery (10) + Outlet Characteristics (6) +Wetland Interspersion (38)+Habitat Barriers (39)+Wetland Size (40) + Upland Buffer (16)}/12**
- **{[2*#2]+#36+#37+#7+#8+#10+#6+#38+#39+#40+#16}/12**

Maintenance of Characteristic Fishery Habitat

Compute the functional index for Maintenance of Characteristic Fishery Habitat

Index of Function: If Spawning Habitat (42) is yes, then Maintenance of Characteristic Fishery Habitat Index is Exceptional, otherwise use value from Fishery Quality (43). The fishery function has been simplified by integrating the 3 questions that were included in MNRAM into one question.

Aesthetics/Recreation/Education/Cultural/Science

Compute Functional Index for Aesthetics/Recreation/Education/Cultural/Science

The primary structure and content has been maintained from MNRAM with some minor clarification of guidance and one minor addition. All questions contribute equally to the overall index.

Index of Function: If Rare Educational Opportunity (45) is yes, then Aesthetics/Recreation/Education/Cultural/Science Index is Exceptional, otherwise us following equation:

- **{Wetland Visibility (46)+Proximity to Population (47)+ Public Ownership (48)+ Public Access (49)+ Human Influence on Wetland (50)+ Human Influence on Upland (51)+ Spatial Buffer (52)+ Activities in a Wetland (53)}/8**
- **{#46+#47+#48+#49+#50+#51+#52+#53}/8**

Commercial Uses

Compute Functional Index for Commercial Uses

Index of Function (the commercial uses function has been simplified to one question which has factored in the likely hydrologic implications within each ranking. The ratings classify wetland dependent crops such as wild rice and cranberries as high due to need for maintaining some wetland hydrology to produce the crops with lower ratings for crops which typically cannot be sustained in conjunction with sustained wetland hydrology.)

- **If Commercial Uses applicability (54) is no, question not applicable, otherwise use value from Commercial Quality (55).**

Wetland Restoration Potential

Compute Functional Index for Wetland Restoration Potential

Index of Function: If Wetland Restoration Potential (56) is no, then the index is 0, otherwise compute index with following equation [either Hydrologic Restoration Credit (59) will apply or not]:

If Hydrologic Restoration Credit (59) is N/A, then use formula:

- **{Landowners Affected by Restoration (57)+Subwatershed Wetland Density (14)+ Wetland Restoration Size (58)+ Likelihood of Restoration Success (60)+ Public Value Potential (61)}/5**

If Hydrologic Restoration Credit (59) is not N/A, then use formula:

- **{Landowners Affected by Restoration (57) +Subwatershed Wetland Density (14)+ Wetland Restoration Size (58) + Hydrologic Restoration Credit (59) +# Likelihood of Restoration Success (60)+ Public Value Potential (61)}/6**

Wetland Sensitivity to Stormwater Input and Urban Development

Use habitat proportions from Vegetative Integrity section and enter into a formula to compute answer according to the following criteria which are taken directly from State of Minnesota Storm-Water Advisory Group, 1997.

Exceptional = Sedge meadows, open and coniferous bogs, calcareous fens, low prairies, coniferous swamps, lowland hardwood swamps, or seasonally flooded basins.

High = Shrub-carrs, alder thickets, diverse fresh wet meadows dominated by native species, diverse shallow and deep marshes

Medium = Floodplain forests, fresh wet meadows dominated by reed canary grass, shallow and deep marshes dominated by cattail, reed canary grass, giant reed or purple loosestrife.

Low = Gravel pits, cultivated hydric soils, or dredge/fill disposal sites.

CITY OF MAPLE GROVE 2016 PLANNING COMMISSION SUBMISSION DATES

Submission Deadline (DATE is FIRM)	Planning Commission Meeting Dates	City Council Meeting Dates	Osseo-MG Press PH Notice Deadline	Residential Mailing Deadline
December 14, 2015 December 28, 2015	January 11, 2016 January 25, 2016	*Tues., January 19, 2016 February 1, 2016	December 24, 2015 January 7, 2016	December 31, 2015 January 15, 2016
January 11, 2016 February 1, 2016	February 8, 2016 February 29, 2016	*****Tues., February 16, 2016 March 7, 2016	January 21, 2016 February 11, 2016	January 29, 2016 February 19, 2016
*Tues., February 16, 2016 February 29, 2016	March 14, 2016 March 28, 2016	March 21, 2016 April 4, 2016	February 25, 2016 March 10, 2016	March 4, 2016 March 18, 2016
March 14, 2016 March 28, 2016	April 11, 2016 April 25, 2016	April 18, 2016 May 2, 2016	March 24, 2016 April 7, 2016	April 1, 2016 April 15, 2016
April 11, 2016 May 2, 2016	May 9, 2016 *****Tues., May 31, 2016	May 16, 2016 June 6, 2016	April 21, 2016 May 12, 2016	April 29, 2016 May 20, 2016
May 16, 2016 *Tues., May 31, 2016	June 13, 2016 June 27, 2016	June 20, 2016 *Tues., July 5, 2016	May 26, 2016 June 9, 2016	June 3, 2016 June 17, 2016
June 13, 2016 June 27, 2016	July 11, 2016 July 25, 2016	July 18, 2016 August 1, 2016	June 23, 2016 July 7, 2016	July 1, 2016 July 15, 2016
July 11, 2016 August 1, 2016	August 8, 2016 August 29, 2016	August 15, 2016 *****Tues., Sept. 6, 2016	July 21, 2016 August 11, 2016	July 29, 2016 August 19, 2016
August 15, 2016 August 29, 2016	September 12, 2016 September 26, 2016	September 19, 2016 October 3, 2016	August 25, 2016 September 8, 2016	September 2, 2016 September 16, 2016
September 12, 2016 October 3, 2016	October 10, 2016 October 31, 2016	October 17, 2016 November 7, 2016	September 22, 2016 October 13, 2016	September 30, 2016 October 21, 2016
October 17, 2016 October 31, 2016	November 14, 2016 November 28, 2016	November 21, 2016 December 5, 2016	October 27, 2016 November 10, 2016	November 4, 2016 November 18, 2016
November 14, 2016	December 12, 2016	December 19, 2016	November 23, 2016	December 2, 2016

Planning Commission meetings are held on the 2nd and last Mondays of the month at **7:00 p.m.** unless a holiday falls on a Monday, then it would be held on the following Tuesday. After the Planning Commission makes its recommendation, (unless it is tabled) the item will be scheduled on the next available City Council meeting for their action.