



# **Preparation of a Diagnostic Study and Implementation Plan for Clean Water Partnership Projects**

A Guidance Document

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# I. Introduction

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Projects receiving resource investigation (phase I) funding through the Clean Water Partnership (CWP) Program are required to complete a final report, which consists of a Diagnostic Study and Implementation Plan. To apply for implementation (Phase II) funding through the CWP Program (including both grant and loan funding), the Diagnostic Study and Implementation Plan must receive Minnesota Pollution Control Agency (MPCA) approval prior to the submission of the Phase II application.

The purpose of this document is to provide guidance and a general framework that can be used to develop a Diagnostic Study and Implementation Plan. This is a very important step in developing strategies for water quality improvement and in obtaining funding to implement those strategies. This document contains suggested outlines for the Diagnostic Study and Implementation Plan that can be used to organize the reports, updates, and information you already have into a cohesive final report. The outlines are intended to supplement the project activities and monitoring and modeling plan identified in the project Work Plan. The outlines are not intended to be all-inclusive or to provide a section to handle all the aspects of resource investigation. However, they do provide a general framework which, along with the project Work Plan, can be used to develop a project-specific outline. The goal of the MPCA in developing and distributing this guidance is to provide both flexibility to handle project-specific reporting needs as well as some standardization of final reports for review and program considerations.

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**Note:** *This guidance was developed to supplement the existing CWP rules and regulations; it does not replace them. As you proceed with final report preparation, you should consult applicable rules, regulations, and grant agreement obligations. For CWP projects, this includes Minn. R. ch. 7076 and the current grant agreement.*

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## II. Getting Started

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Although both the Diagnostic Study and Implementation Plan are very important documents, the writing of these documents should not be a daunting task. This is because much of the information to be included in the final report has already been generated during the course of the project. Therefore, before you begin writing the final report, take some time to survey the written materials you already have for the project. Most likely, by combining the text from the Work Plan, Annual Reports, and even the initial Application, you will have generated much of the content of the Diagnostic Study, and parts of the Implementation Plan as well.

As a first step in developing the final report, Section V of this document and the project Work Plan should be used by the project team to develop a project-specific outline. Section V contains a generic outline for use in developing a project-specific Diagnostic Study and Implementation Plan outline. Appendix A contains the same outline, but with added descriptions, recommended formats, and examples. The development of a project-specific outline will help organize the project's final reporting activities and any assignments that need to be made. Your MPCA project manager will work with you throughout the final reporting phase. This involvement will include assistance in developing the project-specific outline, assistance with data analysis and interpretation, assistance with watershed evaluation, assistance with best management practice (BMP) evaluation and selection, review of rough drafts, and final review of the Diagnostic Study and Implementation Plan.

Another important initial step in the development of the final report is the solicitation of public input. Public involvement is crucial to the success of a CWP project. The MPCA recommends that the project sponsor begin building public support for a project at the start of the resource investigation phase. In fact, the CWP rule requires that a public participation plan be included in the project Work Plan. During the final reporting activities of Phase I, a local Steering Committee (or, in the absence of a Steering Committee, local citizens in general) should be involved in making resource management recommendations to the project sponsor, developing consensus, gaining political acceptance of selected implementation measures, and coordinating local actions. The importance of involving diverse members of the local public cannot be stressed enough. Often the success of a project hinges on the development of broad-based community support, especially when it comes time for individuals and groups to adopt the implementation measures identified in the final report.

Finally, before work begins on the final report, a schedule should be developed for the reporting activities. This is especially important if you intend to apply for CWP Phase II financial assistance, since the final report must be approved by the MPCA prior to application (see note below).

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**Note - Timing of Final Report Preparation:** If you intend to apply for Phase II financial assistance through the CWP program, it is important to consider the timing of the drafting and completion of the final report. The CWP rule requires that the final report be approved prior to application for Phase II financial assistance. The MPCA has 60 days to approve or disapprove a final report. To ensure that there is ample time for comments and revisions, the final report should be submitted for approval well in advance of an application period (three to four months prior is suggested). Your MPCA project manager can help develop a schedule for the reporting activities and help ensure that the final report is completed in time to submit a Phase II application.

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### III. Diagnostic Study

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A Diagnostic Study is a comprehensive document that provides the data and information collected by a CWP project and the documentation of the methods employed for the data collection and information management. The purpose of a Diagnostic Study is to describe why a resource investigation project was undertaken, how it was conducted, and what was learned. The Diagnostic Study must be an organized and illustrated analysis and assessment of the data, and include a set of conclusions upon which the Implementation Plan will be based. A solid and scientifically-based Diagnostic Study is a major step in preparing for implementation practices that will provide water quality improvement and protection.

The general format to be followed for a Diagnostic Study is that of a scientific paper. This means that the report should be organized into the following sections: introduction/background, methods, results, discussion, and conclusions. Your MPCA project manager can help you organize your report and provide examples of well-organized Diagnostic Studies.

The Diagnostic Study should report the results of the activities outlined in the Work Plan, including monitoring and modeling results, and contain both an analysis and assessment of the results and conclusions based on the results. Appendix B contains checklists that are meant to help you identify the different monitoring, modeling, and analysis/assessment components that make up a Phase I project. Please note that these checklists are inclusive lists of elements that could be contained in a Diagnostic Study. It is important to compare these checklists to the activities identified in your Work Plan to determine which elements pertain to your specific study. Your MPCA project manager is available to help identify which items of the checklists apply to your project. The checklists are provided merely as a reference point and should not be used in place of a project-specific outline.

The Diagnostic Study must be completed and analyzed by the project team before the Implementation Plan is developed. Your MPCA project manager will be available throughout the final reporting process to help with developing the final report.

## IV. Implementation Plan

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An Implementation Plan is the second component of the final report necessary for the completion of a CWP Phase I project, and it (along with the Diagnostic Study) must be approved by the MPCA prior to application for Phase II financial assistance. Your MPCA project manager will be available to assist you throughout the development of the Implementation Plan. The Implementation Plan should contain the following elements:

- an identification of project objectives
- a summary of the pollutant loads identified in the Diagnostic Study
- an identification of target pollutant reductions, priority management areas, and BMP systems and other measures needed to attain the project's water quality goals
- a description of the agency/organization roles and responsibilities, a schedule, an information and education program, and a budget for completing the project implementation and monitoring activities

The purpose of the Implementation Plan is to provide rationale, goals, objectives, and a plan for project implementation.

In addition to containing the above elements, the Implementation Plan should provide an appraisal of potential project implementation activities, including the feasibility of each option. The evaluation must cover the entire project area. In some cases, the predicted water quality improvement gained by all or some of the implementation measures will not be sufficient to attain project goals, but it is still important to include these cases in the evaluation of the project area. By including these cases, determinations of potential BMP effectiveness can be made in the context of the entire project area.

It is important that the components of the Diagnostic Study are well-integrated in the Implementation Plan, and that assumptions and methods are documented clearly and data is used to support the decisions made. Therefore, the Diagnostic Study must be completed and analyzed by the project team before the Implementation Plan is developed. The Implementation Plan should be written so that pertinent background information is developed and presented, comparisons are made, and conclusions/recommendations are clearly defined. The CWP Rule contains a list of items that should be included in the plan; these items are attached as Appendix C.



## V. Diagnostic Study and Implementation Plan (Final Report) Outline

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The following outline is provided for use in developing a project-specific outline, which is the first step in developing the final report. Appendix A contains the same outline, but with added descriptions, recommended formats, and examples. Your MPCA project manager can provide you with additional descriptions and examples for each section of the Diagnostic Study and Implementation Plan.

### A. Overall Information

1. Title Page
2. Table of Contents
3. List of Tables, Figures, and Maps
4. Executive Summary
  - a. Diagnostic Study
  - b. Implementation Plan
5. Introduction and Project Background
  - a. History of the water(s) of concern and project area
  - b. Why the project took place
  - c. Who was involved in carrying out the project
  - d. Project costs by program element
6. Project Milestones

### B. Diagnostic Study

1. Methods
  - a. Water quality monitoring
  - b. Watershed assessment
  - c. Data management and statistics
  - d. Quality control/quality assurance (field, laboratory, and office)
  - e. Water modeling techniques
  - f. Watershed modeling techniques
2. Results
  - a. Description of project area
  - b. Description of the water(s) of concern
3. Discussion
  - a. Assessment of the project's resource water quality
  - b. Assessment of pollutant loads
  - c. Resource water quality goals
  - d. Target reductions of pollutants needed to meet water quality goals
4. Conclusions

## C. Implementation Plan

1. Implementation Plan Objectives
2. Identification of Priority Management Areas
3. Best Management Practice (BMP) Alternatives and Analysis
  - a. Evaluation of BMPs
  - b. Cost estimates for each alternative
4. BMP Selection and Justification
  - a. Selected BMP package and justification
  - b. Rationale and justification of the BMPs in the package
  - c. Pollution control effectiveness analysis
5. Implementation Monitoring and Evaluation
  - a. Phase II monitoring plan
  - b. BMP evaluation procedures
6. Roles and Responsibilities of Project Participants
7. BMP Operation and Maintenance Plan
8. Information and Education Program
9. Permits Required for Completion of Project
10. Identification and Summary of Program Elements
11. Milestone Schedule
12. Implementation Project Budget
13. Conclusions

## D. References

## E. Appendices

## F. Distribution List

## VI. References

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1. Houp, Kenneth W. and Thomas E. Pearsally. 1977. Reporting Technical Information. Glencoe Publishing Company, Inc. 472 pp.
2. Andrews, Deborah C. and Margaret D. Blickle. 1978. Technical Writing: Principles and Forms. Macmillian Publishing Company, Inc. 429 pp.
3. Halbach, Thomas. 1989. Community Information and Outreach for the Clean Water Partnership: A Guidance Document. Minnesota Pollution Control Agency, Water Quality Division. 48 pp.
4. Minnesota Pollution Control Agency. 1989. Water Quality Monitoring for the Clean Water Partnership: A Guidance Document. 62 pp.
5. Minnesota Pollution Control Agency. 2006. Development of a Project Work Plan for Clean Water Partnership Projects: A Guidance Document. 18 pp.

# Appendix A

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## Recommended Diagnostic Study/ Implementation Plan: Outline with Descriptions

Listed below is the same outline as presented in Section V but with short descriptions and formatting ideas included. By using this outline, as well as relevant background information and the project work plan, you can define how the different sections of the final report will be formatted and completed.

### A. Overall Information

1. Title page (project name, sponsor, preparation date)
2. Table of contents (all significant sections listed by title and page number)
3. List of tables, figures, and maps (by title and page number)
4. Executive summary. The executive summary should be an extended abstract, two to three pages in length or as needed to concisely state the final report's contents. Since many casual readers may not read past this section, care should be taken to make this summary readable and understandable to a broad target audience.
5. Introduction and project background
  - a. History of the water(s) of concern. List pertinent historical milestones for the water resource and watershed in this section (i.e., developmental history, water quality degradation, population changes, etc.).
  - b. Why the project took place?
  - c. Who was involved in carrying out the project?
  - d. Project costs by program element. Project costs should be updated to actual costs from the work plan budget.
6. Project Milestones (reference the milestone schedule of the work plan and include all major Phase I milestones for future reference).

### B. Diagnostic Study

#### 1. Methods

Reference and summarize work plan methodology, including all areas where the method ultimately used differed from the method listed in the work plan. In the case of changed methods, explain why a different method was used. If a detailed description of methods is not given in the work plan, it should be included here in complete detail. You should include methods for:

- a. Water quality monitoring
- b. Watershed assessment
- c. Data management and statistics
- d. Quality assurance (field, laboratory, and office)
- e. Water modeling techniques
- f. Watershed modeling techniques
- g. The predictive and diagnostic computer or statistically-based models with a description and definition of predictive and diagnostic uncertainties

## 2. Results

### a. Description of project area (see checklist in Appendix BI).

- 1) General background information on the project area. Include here the general background information on the project area that is needed to put the detailed project information in context. Much of this information is available in previously published reports and documents (local water plans, watershed or county inventories, etc.). General background information includes information on:
  - Existing land use
  - Soils
  - Geology
  - Precipitation
  - Population characteristics
  - Land ownership
  - Community water supplies
  - Point Sources of pollution (landfills, dumps, wastewater treatment plants, tanks, etc.)
- 2) Detailed project data and information. Include in this section all the project specific results that have been obtained for the project area. The items included here should reflect those identified in the work plan. The format for this information should emphasize the use of maps, graphs, and tables along with text. Possible types of data and information include more detailed assessments of the items in 1) above and:
  - Agricultural watershed assessment
    - pesticide and fertilizer use estimates
    - tiling and drainage patterns
    - feedlots
  - Urban watershed assessment
    - storm and sanitary sewers
    - pesticide and fertilizer use estimates
  - Regional runoff and precipitation
  - Rating curves for streams (water stage versus stream discharge in cubic feet per second)
  - Flow characteristics: base, spring, runoff, and storms
  - Hydrographs (stage vs. time for project period for each tributary station)
  - Aquifer assessment
    - Stratigraphy (cross sections)
    - Structure contour maps
    - Potentiometric maps
    - Thickness of cover (glacial materials) map

b. Description of the water(s) of concern (see checklists in Appendix B2).

This section is where all water quality monitoring results are presented. All data should be attached in an appendix. Graphical presentation of the data using line plots, diagrams, pie charts, bar graphs and maps is critical to a quality presentation. Statistical summaries should be included (i.e., sample size, means, medians, standard deviations, confidence limits, etc.) as appropriate. Other analytical methods should also be presented in this section.

For lake projects, the following formatting is recommended:

- Table with morphometric data
- Table(s) with monitoring stations and sample inventory by tributary, storm event, and in-lake samplings
- Table with average summer water quality and trophic status indicators (epilimnetic data)
- Dissolved oxygen and temperature plots or diagrams
- Bar graphs showing the dominant plankton by-sampling date
- Secchi transparency plots
- Map of monitoring network
- Water balances for the study period
- Flows and loadings at monitoring sites
- Flow-weighted mean concentrations of measured parameters by tributary
- Nutrient balances
- Plots of nutrient and suspended solids export from subwatershed
- Aquatic plant distribution maps

For ground water projects, the following formatting may be useful:

- Map of monitoring well network
- Geologic cross sections
- Surficial geology map
- Map of ground water flow directions (head isopleth map)
- Contaminant concentration maps
- Ground water level vs. time (in conjunction with precipitation departure from normal graphs)
- Summary tables of chemical data for various well categories
- Change balance tables and other QA/QC tables (split or duplicate sampling results)
- X- Y plots (e.g., N03 vs. Cl, Mg vs. Ca, S04 vs. Ca, N03 vs. well depth, Concentration vs. time, etc.)/Regression analysis
- Box plots
- Trilinear diagrams for cations and anions (e.g., Piper Diagram)
- Schoeller plots

For stream projects, the following formatting is recommended:

- Tables with stream morphometry characteristics
- Tables and figures for hydrology (base, spring runoff, storm)
- Tables and plots for chemical data
- Map of monitoring network
- Summary of benthic and fishery assessments
- Riparian survey results by reach and stream mile
- Storm event hydrology, land use, and water quality comparisons

Your MPCA project manager or technical assistance representative will provide examples of these items and will assist in selecting appropriate methods of data presentation.

### 3. Discussion

Minn. R. 7076.0240, subp. 4 requires an analysis and assessment of the data and information. This should include an assessment of data for existing and potential water quality problems. Historical data that is available for the water of concern should also be utilized in this section.

This section is critical to the formulation of a good Implementation Plan. Your MPCA project manager will help you complete this section. It is a good idea to have several key people in your project brainstorm on this section after reviewing the previous sections of the diagnostic study. The discussion section involves the synthesis and coordination of explanations concerning water quality data and its relationship to watershed assessment information. It is important to consider the range of environmental factors affecting the water quality data you are interpreting (factors such as soils, geology, precipitation patterns, ground water recharge, and many others). Completed statistical analyses will help provide rankings of significance between factors.

For a good discussion section, Houpp and Pearsall (1977) suggest that you define the questions that need to be answered and the details that should be included in the answers. These authors note that too little detail will result in missing links in the chain of discussion, while too much detail which does not have significance to the problem will detract from a coherent explanation. As in the previous section, the use of tables and figures is recommended for the presentation of the target pollutant reductions identified for the project.

#### a. Assessment of the project's water quality

Assess the current water quality of the water of concern through a discussion of the results.

#### b. Summary of pollutant loads from subwatersheds

This section should include the pollutant loads measured and/or estimated in the diagnostic study. Pollutant loadings from each subwatershed are especially important for lake projects. Other information, such as pollutant concentrations, flow characteristics, biological monitoring information, and aquifer characteristics, may better define the pollution problems in stream and ground water projects. Use of tables and figures for presenting this information is recommended to enable easier evaluation and comparison with the water quality goals established for the project.

c. Resource water quality goals

Based on desired uses of the waters of concern, establish and justify the selection of water quality goals in terms of specific numerical criteria, biological habitat criteria, and/or biological indicators. For lake projects, this should include an in-lake phosphorus concentration goal defined relative to the ecoregion phosphorus criteria. Your MPCA project manager can help you establish and justify realistic water quality goals.

d. Target reductions of pollutants needed to meet water quality goals

This section should build on the previous two sections by describing the evaluation of current pollution levels, current water quality conditions, desired water quality conditions (specific water quality goals), and pollutant reductions necessary to meet project water quality goals. In most cases, computer modeling will be used in estimating impacts of pollutant load reductions on water quality and, in reverse, estimating the amount of pollutant load reduction necessary to achieve desired water quality levels. Descriptions of the evaluations made and modeling completed must be included in this section. As in the previous section, the use of tables and figures is recommended for the presentation of the target pollutant reductions identified for the project.

4. Conclusions

Conclusions are statements that are derived from an appraisal of the information presented in the discussion section. Summary statements contained in the various sections of the diagnostic study may be useful in forming the conclusion statements. They should be presented as clear statements that are derived from an examination of the data and from reasoning (Andrews and Blickle, 1978).

## C. Implementation Plan

1. Implementation plan objectives

This section should describe the general project objectives, the specific water quality goals and objectives, and the implementation goals for the project. A discussion of how the project goals and objectives relate to state water quality management plans should also be included. Check with your project manager for assistance in making this comparison.

2. Identification of priority management areas

The next step in preparing and presenting the implementation plan is to identify areas in the project area that are impacting the project's water quality the most. Delineation of priority management areas is important given that: 1) some project areas will not contribute appreciable amounts of pollutants to the water(s) of concern; and 2) implementation of BMPs in all areas of the project might be cost prohibitive. Priority management areas can be used to make the most effective use of limited resources in improving and protecting water quality.

3. BMP alternatives and analysis

This section involves the identification, description, and evaluation of all BMPs or categories of BMPs available for controlling the pollution sources and impacts of the pollution on the water(s) of concern. The use of ordinances, individual housekeeping activities, and other regulatory or incentive programs should also be identified, described, and evaluated as alternative management activities in the project. Each BMP or category of BMP is to be evaluated for its ability to achieve pollutant load reductions in the priority management areas. The evaluations will involve a continuation of the watershed modeling begun for the Diagnostic Study.



Advantages and disadvantages of each practice should be presented so that their impact can be evaluated against each other and as a package. Please remember that BMPs are not meant to be used alone, rather they are meant to be incorporated as a comprehensive system of implementation measures. The costs associated with the implementation of the alternative BMPs also are to be estimated in this section. Costs for all tasks and materials, including design, installation, operation and maintenance, should be included. In addition, the likelihood of adoption of the BMPs should be evaluated.

Combining the effectiveness of the BMPs in reducing pollutant loads, BMP costs, likelihood of adoption, and other factors associated with implementation of the BMPs, an evaluation of the alternatives can then be completed to select the BMP package best suited to obtain the project goals.

#### 4. BMP selection and justification

This section is to describe the package of BMPs or categories of BMPs and other measures selected for implementation in the previous section. The section should include information describing the BMPs and other measures, and the rationale for their inclusion in the package, justification for the package selected, and an analysis of the pollution control effectiveness expected when the package is implemented. This section should summarize the results of the previous section.

If the results of the BMP evaluations indicate that the pollutant load reductions will not be sufficient to meet project water quality goals or implementation costs are too high, this section may need to identify that no BMPs can be implemented to obtain the water quality goals for the project. If this is the case, the implementation plan should be completed by describing these decisions in a Conclusions section. Please note that it is likely that some CWP projects will not be able to attain their water quality goals with available and feasible implementation measures. As such, it is important, though difficult, to present this as an honest appraisal in the final report.

#### 5. Implementation monitoring and evaluation

An implementation evaluation and monitoring program is required in an implementation project to document and evaluate the implementation of BMPs and resulting changes in water quality. This section should describe the evaluation procedures that will be used in the project to identify, record, and compile the pertinent information for each implementation activity. This information will include number, size, and location of BMPs implemented; number and descriptions of information/education activities and ordinances implemented; and tracking of any other implementation activity in the project. The use of a geographic information system (GIS), if available, offers features that would assist in the management and evaluation of the implementation activities.

This section should also describe a water quality monitoring program that will be used to provide information regarding the project's water quality during and following the completion of implementation activities in the project. The intent of this monitoring is to document improvement in water quality in the project's water(s) of concern; however, given the environmental constraints and variability present, implementation project monitoring information may not provide conclusive evidence of water quality changes. For this reason, the monitoring program should be developed based on the information desires for the project. As with the Phase I monitoring program, this monitoring program should be developed using the information protocol emphasized in the CWP monitoring guidance (MPCA 1990) to obtain a workable monitoring program. Your project manager will help you develop this portion of your implementation plan.

## 6. Roles and responsibilities of project participants

This section is intended to provide a distinct section for the description of the roles and responsibilities of the various individuals, agencies, and organizations to be involved in the implementation project. The roles and responsibilities should be summarized in enough detail to provide the foundation for accomplishing the implementation project. Delineation of the roles and responsibilities is important to ensure that everyone targeted for involvement is aware of the tasks expected of them in completing the project. The success of a project is largely dependent on the cooperation generated between each individual and group during the development of the implementation plan. Specific tasks for completing the implementation project should be covered in the milestone schedule section that follows.

If other programs are present within the scope of the implementation project, this section should reference and describe their interaction with this project. The programs may involve the Natural Resources Conservation Service, Soil and Water Conservation Districts (SWCD), watershed districts, other units of government, or other organizations. It is important for the implementation activities to be well integrated.

- a. Delineate the general responsibilities of all groups involved.

Example: The SWCD will provide staff and equipment to make farmer contacts for BMP implementation, design and layout of BMPs, and assist with the information and education program.

- b. Reference the milestone schedule section for specific responsibilities.
- c. Include a project organization chart that displays how the project will be organized. The organization chart should include the relationships between the project sponsor and all contributing sponsors, the project representative, consultants, and technical and citizen advisory committees, as applicable.
- d. Include a complete staff and governing board directory within this section or as an appendix to the implementation plan.

## 7. BMP operation and maintenance plan

The long-term effectiveness of implementation projects is dependent on the ongoing functioning of BMPs installed in the project area. Depending on the BMP, the amount of operation and maintenance activities necessary to keep them functioning may be small to large. Lack of adequate operation and maintenance procedures in past projects has demonstrated the need for a BMP operation and maintenance plan. A detailed plan is necessary when a Phase II grant is awarded for project implementation. A plan containing less detail is adequate for the final report, as long as each item requiring operation and maintenance is identified and an outline of procedures is presented. The more detailed the plan, the more likely it is that the extent and costs of operation and maintenance will be fully recognized. Continuing operation and maintenance is necessary to fulfill the requirements of the CWP Program.

## 8. Information and education program

An information and education program is an integral part of an implementation project. Due to its importance, a separate section of the implementation plan is recommended to describe the activities that will be used in the project to obtain and maintain broad-based local support for the project. This is especially important for projects that expect to implement BMPs on individual property owners' land.

An information and education program, as with the other components of the final report, should be detailed so that it is clear as to what, when, and how the activities will be completed. Many options that have been used successfully in past watershed projects are available for CWP projects. Individual projects are likely to identify new activities in which to further promote the project and its goals. Guidance for developing, implementing, and evaluating an information and education program is present in the guidance document titled, "Community Information and Outreach for the Clean Water Partnership" (Halbach, 1989). Each project should have a copy of this document in their project handbook. If additional copies are needed, please contact your project manager.

#### 9. Permits required for completion of project

This section should list the permits that may be required to complete the implementation project. It is important to check local, state, and federal laws to determine if permits are needed for the particular BMPs and other management activities planned for the project. By laying out these needs ahead of time, the projects can hopefully avoid delays in being completed. This also provides an avenue to determine if implementation activities are not feasible due to permit constraints.

#### 10. Identification and summary of program elements

This section should organize the activities proposed in this implementation plan into a set of program elements. The program elements, as in Phase I projects, are to serve as broad project work categories for the implementation plan, as well as for budgeting and reimbursement of project expenses. Use of program elements should make project administration easier.

To select your program elements, define the significant activities that will take place in the project and group similar tasks into the same program element. Although program elements should be project specific, you may want to consider using some of the ones listed below. It is recommended that no more than ten program elements be used in the implementation plan. The amount of consolidation of tasks into the program elements you select should be discussed with your project manager during the program element selection process.

Examples of implementation plan program elements include:

- fiscal management and administration
- information and education program
- implementation of agricultural BMPs
- implementation of urban BMPs
- implementation of resource management measures (in-lake, in-stream work)
- water quality monitoring and evaluation
- BMP record keeping and tracking

Much of the information to be contained in each program element will have been discussed in previous sections of this report, such that this section should only contain a brief summary for each program element.

#### 11. Milestone schedule

A proposed schedule segmented into three-year periods is to be included in this section as required in Minn. R. 7076.0250. The schedule should either be developed on a relative basis (January-December) or an assumed funding period (January 2009 - December 2011) given the uncertainty of the actual starting date of a project at this time. The schedule should list the tasks that will be completed within each program element in sufficient detail to provide a road map to completion of the project. To

ensure that the sequence of the project's activities is adequate, please include a critical pathway analysis for the project. A critical pathway analysis can be completed by developing a Gantt chart (a bar graph time line) of the primary tasks in each program element. Examples of a milestone schedule and a Gantt chart can be found in the guidance document, "Development of a Project Work Plan for Clean Water Partnership Projects" (MPCA, 2006).

#### 12. Implementation project budget

An estimated budget for project implementation segmented into three-year periods is to be included in this section as required in Minn. R. 7076.0250. Guidelines for developing a budget are included in the guidance document, "Development of a Project Work Plan for Clean Water Partnership Projects" (MPCA, 2006). Please note that the examples used in the guidance are oriented to Phase I project monitoring and watershed assessment rather than implementation activities; however, the budgeting format and specifics remain the same. Using this information as a guide, budgets that adequately describe the implementation needs by program element should be prepared.

In addition to project costs, an implementation support budget is needed. This budget specifies cash and in-kind contribution by the project sponsor and contributing sponsors. Refer to the work plan guidance document for more information. Identify plans for applying for CWP Phase II funds or other sources of funds. Also, indicate funding alternatives if CWP funding is not available.

#### 13. Conclusions

The conclusions section should highlight the activities selected for implementation, the procedures to be followed in attaining BMP implementation, and the expected changes in pollutant loadings and water quality improvements. This section may also be used to outline the options available to the project sponsor for beginning and completing the project. If a decision was made that implementation activities would be ineffective in protecting or improving water quality in Section 4 of this report (BMP Selection and Justification), the conclusions should state this and lay a framework for future action without pursuing additional funding for an implementation project.

### **D. References**

This part of the final report should contain a list of all references used in the report including scientific papers, technical reports, previous studies, etc.

### **E. Appendices**

Report appendices should contain information that supplements the information in the main text of the diagnostic study and implementation plan. Supplementary information may include biological, chemical and physical water quality data; hydrology data; modeling inputs, outputs and assumptions; operation and maintenance plan; and project directory. The use of microfiche for large appendices may be appropriate, if available.

### **F. Distribution List**

The distribution list should list all individuals or agencies that will receive copies of the final report.

## Appendix B

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### B1 -- Clean Water Partnership - Diagnostic Study: Description of Project Area Checklist

Minn. R. 7076.0240, subp. 3 requires that a diagnostic study contain a detailed description of the project area that includes:

- A physical description of the project area.
- A description of existing and predicted future land uses, land cover, sources of pollution that may impact the water of concern, and resource uses including public, private, recreational and other water uses.
- Hydrologic monitoring data that provides a thorough characterization of the surface and ground water conditions in the project area that affect the quality of the water of concern.
- Other data as defined in the work plan that provides an understanding of the dynamics and interactions between the project area and the quality of the water of concern.

The following is a list of potential items to include in the Diagnostic Study. While this list is fairly comprehensive, it may not contain items that you should include in your Diagnostic Study, and it may include items that are irrelevant to your study. Consult with your MPCA project manager and refer to your work plan to determine which elements of this list (or elements not on this list) pertain to your project.

- ☐ Map of project area
- ☐ Aerial photo of project area
- ☐ USGS topographic maps
- ☐ Hydrologic mapping with boundaries and flow directions
- ☐ Aquifer systems, confining layers, flow characteristics
- ☐ Ground water - surface water interconnections (recharge and discharge areas)
- ☐ Geologic conditions that may pose concerns relating to water quality
- ☐ A description of the waters of concern
- ☐ Soils:
  - ☐ general soils map
  - ☐ map of erosion-prone soils
  - ☐ description of soil infiltration characteristics
- ☐ Land use
  - ☐ existing land use
  - ☐ existing management practices
  - ☐ future land use
  - ☐ areas served by storm and sanitary sewers, public water systems
  - ☐ location of community water supply, intakes, and wells
  - ☐ irrigated acreage
  - ☐ domestic animal density, feedlots
  - ☐ on-site wastewater treatment systems
  - ☐ known tiling and drainage systems
  - ☐ pesticide use estimates
  - ☐ fertilizer use estimates

Land use (continued):

- ☐ sanitary landfills (open or closed)
- ☐ dumps (operating or closed)
- ☐ hazardous waste sites
- ☐ improperly abandoned wells
- ☐ underground storage tank sites
- ☐ wastewater disposal systems and discharges permitted
- ☐ wetlands under the National Wetland Inventory
- ☐ floodplain areas
- ☐ areas with known flooding problems
- ☐ state ecological classifications
- ☐ state management classifications
- ☐ fish and wildlife management plans
- ☐ unique features relating to the water of concern
- ☐ land ownership (federal, state, Indian tribal lands)
- ☐ population characteristics
- ☐ recreational land use summary

☐ Precipitation

- ☐ map and list of precipitation gauging stations in the project area
- ☐ map of normal precipitation isolines (May-September)
- ☐ summary of precipitation for project area

☐ Hydrology

- ☐ maximum high flow for 24 hours (25-year recurrence interval)
- ☐ annual minimum flow (for seven consecutive days, ten-year recurrence interval)
- ☐ permitted withdrawals (source, use, and amounts)
- ☐ protected levels or flows
- ☐ known water use conflicts
- ☐ wells with state appropriation permits
- ☐ well interference problems
- ☐ list of observation wells

## Appendix B2 -- Description of the Water of Concern Checklist

Minn. R. 7076.0240, subp. 2 requires that a Diagnostic Study contain a detailed description of the project area that includes:

- A summary of historical uses and changes resulting from water quality degradation.
- A discussion of previous studies and other historical physical, chemical, and biological data.
- Biological, physical, and chemical monitoring data that provides a thorough characterization of the current water quality of the water of concern.
- Water quality data that describes the sources and magnitude of pollutants impacting the water of concern.
- Other data as defined in the work plan that provides an understanding of the dynamics and interactions of the physical, chemical, and biological processes of the project area and the water of concern.

The following lists delineate **potential** items to include in the Diagnostic Study. The lists are separated by type of water (lake, stream, and ground water). For wetland projects, please consult with your MPCA project manager. While the lists are fairly comprehensive, they may not contain items that you should include in your Diagnostic Study, and they may include items that are irrelevant to your study. Consult with your MPCA project manager and refer to your work plan to determine which elements of the lists (or elements not on the lists) pertain to your project.

### Lakes

- ☐ Summary of historical uses and changes resulting from water quality degradation
- ☐ Discussion of previous studies and other historic baseline data
- ☐ Current data or information on -  
Lake surface area:
  - ☐ Maximum depth
  - ☐ Average Depth
  - ☐ Hydraulic residence times (1 in 10 years):
    - ☐ low ☐ high ☐ average
- ☐ Temperature profiles
- ☐ Secchi transparencies
- ☐ Watershed area draining to lake
- ☐ Tributaries
  - ☐ estimated inflow contribution
- ☐ Hydrologic budget
  - ☐ including ground water flow

### Biological parameters

- ☐ Chlorophyll a (average summer epilimnetic)
- ☐ Predominant phytoplankton
- ☐ Predominant zooplankton
- ☐ Predominant floating plant community

- ☐ Predominant emergent plant community
- ☐ Fecal strep and fecal coliform
- ☐ Available fisheries info. summary

### In-lake chemistry

- ☐ Dissolved oxygen
- ☐ Total phosphorus
- ☐ Dissolved inorganic phosphorus
- ☐ Total Kjeldahl nitrogen
- ☐ Nitrate plus nitrite nitrogen
- ☐ Total suspended solids
- ☐ Total alkalinity
- ☐ Chloride
- ☐ Color
- ☐ pH
- ☐ Conductivity
- ☐ Mass loadings (for major tributaries) of:
  - ☐ Total phosphorus
  - ☐ Total Kjeldahl nitrogen
  - ☐ Total suspended solids
  - ☐ Nutrient budget
  - ☐ Sediment budget

## Streams

### Stream characterization/morphometry/hydrology

- ☐ Stream length
- ☐ Sinuosity
- ☐ Order
- ☐ Substrate
- ☐ High flow (24 hour, 25 year)
- ☐ Mean flow
- ☐ Annual minimum flow

### Chemical parameters

- ☐ Biochemical oxygen demand
- ☐ Total phosphorus
- ☐ Nitrate and nitrite nitrogen
- ☐ Ammonia nitrogen
- ☐ Organic nitrogen
- ☐ Total dissolved solids
- ☐ Total suspended solids
- ☐ Diurnal dissolved oxygen
- ☐ Turbidity
- ☐ pH
- ☐ Conductivity

### Biological

- ☐ Fecal strep
- ☐ Fecal coliform
- ☐ Benthic survey
- ☐ Fishery assessments
- ☐ Habitats
- ☐ Riparian vegetation

## Ground water

### Aquifer characterization

- ☐ Identification or measurement of aquifer physical type and size
- ☐ Temperature

- ☐ Saturated thickness
- ☐ Recharge sources
- ☐ Discharge sources
- ☐ Transmissivity
- ☐ Hydraulic residence time
- ☐ Hydraulic gradients
- ☐ Underlying lithology and stratigraphy

### Chemical parameters

- ☐ Chemical oxygen demand
- ☐ Total organic carbon
- ☐ Total Kjeldahl nitrogen
- ☐ Total phosphorus
- ☐ Total phosphorus
- ☐ Chloride
- ☐ Sulfate
- ☐ Calcium
- ☐ Magnesium
- ☐ Iron
- ☐ Manganese
- ☐ Potassium
- ☐ Sodium
- ☐ Carbonate
- ☐ Alkalinity
- ☐ Oxidation potential
- ☐ pH
- ☐ Specific conductance

### Contaminants

- ☐ Organic compounds
- ☐ Pesticides
- ☐ Metals

### Bacteria

- ☐ Fecal strep
- ☐ Fecal coliform



## B3 - Clean Water Partnership - Diagnostic Study Analysis and Assessment Checklist

Minn. R. 7076.0240, subp. 4 requires that a Clean Water Partnership diagnostic study contain an analysis and assessment section for data collected to fulfill the requirements of subpart 2 (description of water of concern) and subpart 3 (description of project area) of this rule.

The analysis and assessment section should include the following:

- ☐ Identification of existing water quality problems
- ☐ Identification of potential water quality problems
- ☐ Watershed or aquifer recharge area assessment:
  - ☐ Identification of the project area and its subunits defined on a hydrologic basis
  - ☐ Analysis of the current and predicted future land uses and management practices in the project area and the impact on the quality of the water of concern
  - ☐ An estimate of pollutant loads from subunits of project area
  - ☐ Target levels of pollutant reductions needed to meet project objectives and water quality goals
  - ☐ Ranking of project area subunits into priority management areas on which to focus BMP implementation
- ☐ Identification of water goals for the water(s) of concern
- ☐ Identification of project objectives in terms of:
  - ☐ specific water chemical measurements
  - ☐ specific biological measurements
  - ☐ specific physical measurements
  - ☐ economic, recreational and health factors
  - ☐ project area characteristics and priority management areas

## Appendix C

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### Clean Water Partnership Implementation Plan Checklist

A list of the rule requirements for a CWP implementation plan is presented below. The list is abstracted from Minn. R. 7076.0250. The rules specify what an implementation plan should include and address.

- A. BMPs analysis. Consider if BMPs or categories of BMPs will aid in the achievement of target levels of pollutant reduction in areas identified as priority management areas.
  - ☐ Identification of BMPs or categories of BMPs
  - ☐ Cost estimate for BMPs installation
  - ☐ Implementation schedule
  - ☐ Engineering/assistance needs (consider design, inspection, operation, and maintenance)
  - ☐ Estimate for pollutant reduction standards and criteria for BMPs
  - ☐ Likelihood of adoption of the BMPs
- B. A discussion of how the implementation plan will advance the water quality goals and objectives identified in the Diagnostic Study.
- C. Implementation Monitoring and Evaluation.
  - ☐ Monitoring:
    - ☐ chemical ☐ physical ☐ biological
  - ☐ Will these parameters allow comparison with the goals and objectives established in the Diagnostic Study?
  - ☐ Procedure to document and evaluate the implementation of BMPs.
  - ☐ Procedure to identify BMP effectiveness on water quality and their impact on water resources in the project area.
- D. Information and Education Program
  - ☐ Plan
  - ☐ Schedule
- E. Roles and Responsibilities
  - ☐ Roles of sponsor
  - ☐ Roles of participating agencies
  - ☐ Responsibilities of sponsor
  - ☐ Responsibilities of participating agencies
- F. Project Implementation Schedule
  - ☐ Schedule segmented into three-year periods
- G. Budget
  - ☐ Budget segmented into three-year periods
- H. Maintenance Plan
  - ☐ Is there a plan to maintain project goals and accomplishments and thereby prevent further NPS pollution?
- I. Required Permits - Consider what permits are required to complete the project:
  - ☐ Federal permits
  - ☐ State permits
  - ☐ Local permits