

# BOARDMAN RIVER FEASIBILITY STUDY SCOPE OF WORK- APPROVED

September 26, 2006

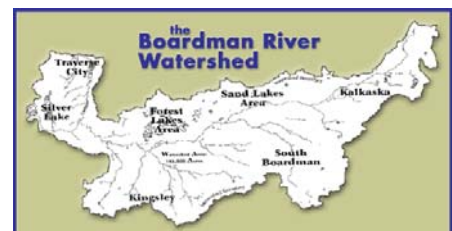


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SCOPE OF WORK

APPROVED  
26 SEPTEMBER 2006

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ECT proposes to accomplish the following work items in the evaluation of possible alternative futures for the Boardman River. The general approach to this study is envisioned as a collaborative effort between ECT and the Boardman River Dams Committee wherein close communication between the parties is used to ensure the study meets the desired objectives. The approach will employ both qualitative and quantitative analyses of primary and secondary data and utilize widely accepted methods in engineering, hydrology, environmental sciences, economics, law, and sociology. The information presented below, in addition to identifying specific studies and evaluations, also presents a general workflow and demonstrates how initial study efforts will be expanded to provide an evaluation of identified alternatives. The issues and concerns expressed by the Boardman River Dams Committee in the Request for Qualifications are addressed, but at different points in the study process. Further, it is recognized that funding for this study will likely come from a variety of sources, all with potentially different requirements, constraints, and focus areas. ECT will work closely with the Boardman River Dams Committee to match current and potential future funding sources with appropriate line items of the Scope of Work; to identify remaining funding gaps; and support and assist, as appropriate, as additional sources of funding are pursued. In accordance with the Qualifications Based Selection process, it is envisioned that approval of the Scope of Work will be followed by the contracting phase that will assign priorities, costs, and funding sources to work items.

**1. Communications and Public Education.**

The Communications and Public Education component has been designed, and will be carried out, to achieve four basic objectives: (1) identify all entities that could be potentially impacted and that should be included in the process; (2) actively seek public input for the feasibility study; (3) provide a ready source of information on study status and data availability; and, (4) seek comments on the communication process for the purpose of continual process improvement. All aspects of the Communications and Public Education component will be closely coordinated with the Boardman River Dams Committee to assure compatibility with, and support to, ongoing activities. The communications and public education efforts will continue for the duration of the feasibility study.

- a. Stakeholder survey to gauge public opinion and knowledge of the issues surrounding the Boardman River Study.
  - i. One-on-one interviews with government officials, community leaders and residents.
  - ii. Individual focus groups comprised of river/dam property owners, recreational users and other specific groups as appropriate.
  - iii. A survey with questions developed after the one-on-one interviews and focus group sessions that gauge public knowledge and opinions of Boardman River Dams issues and concerns. This survey would be a combination Internet-based survey and a mail survey to ensure that all sectors of the public are accessed. This could include a possible incentive to respondents to ensure participation.
  - iv. A limited phone survey to provide a statistically valid sample of opinion on the various proposed options.

- b. Web-based communication support, including access to:
  - i. Easy-to-understand written reports on the four disciplines (economic, environmental, engineering and societal) as they become available. The Communications Committee will review these reports in advance of being placed on the web page. The website will be an extension of the existing BRDC Webpage, and will allow for public comment and reaction;
  - ii. Interactive maps;
  - iii. A calendar of events;
  - iv. On-line survey which could feature a question of the day and short response polling questions;
  - v. Up-to-the-minute news bulletins;
  - vi. Attractive graphical displays of alternatives discussed, and their impacts, that provide for public comment;
  - vii. An intranet for the ECT Team and the Boardman River Dams Committee to communicate; and,
  - viii. A comment/questions (community forum) area, for visitors to communicate with staff.
  
- c. General Communications:
  - i. A Speakers' Bureau will be created and an accompanying presentation and materials will be created that incorporate attractive, graphical designs.
  - ii. The ECT Team will actively solicit Traverse City area civic, business, river/dam property owner, and governmental organizations for opportunities to make presentations about the Boardman River Study.
  - iii. Workshops or community open houses will be developed, if necessary, highlighting specific discipline areas through the standing subcommittees of the Boardman River Dams Committee.
  - iv. Media updates will be provided regularly through fact sheets and press releases to area media, as well as to local websites.
  - v. Semi-regular columns highlighting specific topics will be generated for use on local media opinion pages.
  - vi. Staff will attend the monthly Boardman River Dams Committee Communications Subcommittee.

## 2. Determination and Documentation of Existing Conditions.

In this early phase of the study, an inventory will be developed of historic and existing conditions within the study area, as well as a forecast of future conditions that can be expected assuming no significant changes are implemented. The information presented under these baseline conditions will be used to formulate, evaluate and compare alternative measures that address study problems and opportunities. This information will be developed through the Communications and Public Education Phase outlined above, literature searches, data collection, and mathematical modeling tools to best facilitate the evaluation of project alternatives. This study phase, the establishment of a baseline conditions, is also commonly referred to as determining the "without-project" conditions. The baseline conditions that will be developed for the Boardman River Study will include:

- a. Environmental

- i. Fish and wildlife surveys to determine:
  1. Current and historic habitat types and quality.
  2. Distribution of resident and migratory species, both terrestrial and aquatic.
  3. Threatened and endangered (T&E) species within or impacted by the watershed.
  4. Environmental threats, including aquatic invasives.

Historic habitat and fisheries information will generally be obtained through investigation and evaluation of existing studies done on the Boardman River including, but not limited to, the MDNR Boardman River Fisheries Assessment.

An in field evaluation will be performed, if necessary, to determine current distribution and abundance of fishes and how their distribution and abundance is related to habitat conditions. Sample site will be determined in a manner to augment the current MDNR sampling sites.

Aquatic invertebrates will be sampled throughout the river, if necessary, utilizing MDEQ's Procedure 51 for wadeable stream areas. The project team will work through the MDNR Fisheries to request that the MDEQ conduct these studies in support of the Boardman River project.

The information gained will be used to develop a composition list, to identify species of special concern, and to provide an index of water quality and ecosystem health. This will determine where there is a need and potential for habitat enhancement measures within the natural or altered channel and riparian zone.

Terrestrial habitat and species abundance and distribution will be evaluated within the riparian corridor of the river. The corridor utilized will be 500 feet on each side of the river. Current available data from the MDNR and similar organizations will be evaluated. On-site examination will be conducted within the corridor for indications of animals residing in the corridor and/or utilizing the corridor to transit the area. Sample sites within the corridor will be established on a grid system that will provide a statistically valid population analysis within the corridor.

- ii. Vegetative surveys to determine:
  1. Natural processes - to determine the condition of native plant communities in the study area and their resistance to change. We will collect data on the resistance to change by determining the dominant plant species in the plant communities in the river corridor.
  2. Location and distribution of native species – using existing land use maps, vegetative cover maps and interpretation of existing aerial photography. This analysis will include preparation of a wetland map for the Boardman River corridor. All wetlands within the impoundment will be mapped and surveyed. Plant communities will be identified by major plant species and recorded on maps of the study area.
  3. Threatened and endangered (T&E) species within the watershed will be mapped.
  4. Environmental threats, including invasives – an assessment of environmental threats, such as invasive plants, in the study area with special emphasis on threats that could be important.

- iii. Water Quality - existing water quality data will be reviewed and evaluated. Additional data will be collected, as necessary, to validate the existing information and to fill critical data gaps.
  - 1. Organic – Surface water samples will be collected and evaluated for potential contamination due to a variety of organic constituents. The analytical parameters of interest are aggregate constituents such as biochemical oxygen demand (BOD) and total organic carbon (TOC) as well as specific chemicals such as volatile and semivolatile organic compounds.
  - 2. Inorganic – The primary inorganic constituents of interest will be the nutrients (ammonia-N, nitrate-N, total phosphorus), dissolved oxygen, and trace metals.
  - 3. Bacteria – Primary concern will be various indicators of sewage or other fecal contamination. The bacterial indicators will include fecal coliform and *Escherichia coli*
  - 4. Temperature – Temperature measurements will be made at each sampling location to evaluate the stream's status as a cold water stream. Additionally, temperature recorders will be installed upstream and downstream of each dam and at an upstream reference location to provide constant temperature monitoring for trend analysis.
  - 5. Turbidity – Turbidity readings, using the Secchi disc method, will be collected, as necessary, and used, along with nutrient status, for evaluating the level of eutrophication at each location within the impoundments. We will also collect samples above and below each of the impoundments for analysis of total suspended solids.
- iv. Sediment contamination
  - 1. Nature and extent – Existing sediment data assembled by MDEQ, EPA and other entities, as well as environmental data for all contaminated sites adjacent to the Boardman River, including each of the four (4) impoundments and Boardman Lake, will be collected and reviewed. Identified contaminant sediment areas within the River and potential contaminant sites adjacent to the River will be mapped and potential exposure pathways identified.
  - 2. Biological risk– Sediment biological risk will be evaluated by comparison of the chemical data collected above to established EPA sediment criteria. Based on our review of existing data, we will determine the need to conduct sediment toxicity evaluations and make appropriate recommendations to the Boardman River Dams Committee for their completion.
- b. Engineering
  - i. Groundwater Supply and Use - existing information will be evaluated and used to develop a database to identify existing wells that may potentially be impacted by changes in Boardman River hydrology.
  - ii. Structural Evaluations (dams and other diversion structures)
    - 1. Structural Dam Safety Evaluations – existing inspection records will be reviewed and evaluated. Onsite inspections will be made and preliminary structural/stability analysis will be performed to validate the existing reports. If it is determined that critical information is missing, or if there are any apparent deficiencies that could impact the decision making process, then a recommendation will be made to the Boardman River Dams Committee to conduct more extensive structural/stability testing. The results of this evaluation will be used to determine the minimum operation, maintenance and repair requirements for the existing system.

2. Operational Safety Evaluations – An evaluation of the existing operating procedures, and a determination of any changes thereto, to insure system safety.
- iii. Topographic (Surface) and bathymetric surveys (underwater) as needed to support other critical baseline evaluations and to form a basis for other mapping requirements (habitat types, etc.).
- iv. Hydrologic, Hydraulic and Sediment Transport Studies
  1. Hydrologic Studies to determine the sources and amount of water flow into the Boardman River system, their rates, and seasonal variability.
  2. Hydraulic Studies (modeling), including flood hazard mapping. A HEC-RAS model will be developed. This mathematical model will define the physics of water flow through the system and will be used to determine river flow characteristics (water surface elevations and velocities) under current conditions and as a result of any future proposed changes to the system. Ice processes including freezeup, breakup, and jamming, will also be evaluated and results used in the evaluation of alternatives
  3. Geomorphology/ stream stability – to determine areas where the stream may be unstable using various classification systems such as Rosgen and BEHI.
- v. Geotechnical Investigations of sediments - Soil borings will be use to determine the depth of sediment and type of material contained up stream of each dam.
- vi. Sediment studies:
  1. Existing erosion hot spots – existing data will be reviewed and evaluated to identify areas subject to higher erosion rates.
  2. Sediment budgets – A preliminary estimate will be made of the sources of sediment from the watershed to determine the amount of sediment that will have to be naturally transported through the system if existing impoundments are modified (removed, drawn down, or bypass channels constructed). Past historical data, if available, will also be reviewed to assess the rate of accumulation of sediment behind impoundments, and migration of aggradational front, if any.
  3. Quantity and distribution behind each impoundment  
These studies will determine the amount of sediment in the ponds that will have to be managed in the event that any existing dams are removed or modified as well as determining how sediment currently travels through the system. Also included will be the identification and evaluation of best management practices for sediment management that may be applicable for inclusion in various identified alternatives.
- vii. Road and other infrastructure crossings - A level of service and link analysis will be performed to understand the existing and anticipated future flow of traffic within the study area assuming no changes to the roadway network.

c. Economic

- i. Costs of maintaining existing structures at a baseline level to include operation, maintenance, and major repair when necessary – this estimate will be based upon historic records as well as the results of the engineering studies.
- ii. Economic impact on local economy (jobs, payroll, tax base)
  1. Commercial and Industrial
  2. Tourism

3. Recreation—Consideration of current levels and types of recreation based on key informant interviews and assessment of relevant existing data, including fishing licenses and pressure data.
  4. Households
  5. Public finances
  6. Energy costs
  - iii. Property valuation
    1. Current values
    2. Major determinants of value - A statistical model will be developed to link property value to property characteristics (i.e., riparian access)
  - iv. Tax revenue
- d. Societal
- i. Historic and current land use
  - ii. Property ownership both riparian and bottomland
  - iii. Cultural Resources
  - iv. Recreational
    1. Opportunities - Survey-based evaluation of trade-offs between types of fishery (cool, cold) and recreational opportunities (i.e., boating vs. canoeing)
    2. Impacts on property owners—Survey application eliciting preferences for various property characteristics (i.e., riparian vs. not riparian)
  - v. Population and land use characteristics - Survey-based elicitation of public and private land use
  - vi. Water rights - Evaluation of current access to water
  - vii. Community infrastructure including the County's Natural Education Reserve, trails, and transportation - Baseline valuation understanding and use of current community infrastructure from survey as well as public data
  - viii. Community identity - Develop understanding of nearby residents' sense of current community identity (i.e., tourist beach, etc.)
- e. NEPA Process

The data collected during the initial phase of the study, the documentation of existing conditions, will also form the baseline for the evaluation of environmental impacts as a result of any recommended changes to the system. The baseline information will be summarized and used as a scoping document for transmittal to relevant reviewing agencies. This information will be a critical component of the NEPA documentation that may be required for implementation of a recommended project. At this phase, a preliminary determination will be made as to whether an Environmental Assessment (EA) or an Environmental Impact Assessment (EIS) may be required to satisfy NEPA requirements; project implementation schedules will be established accordingly.

### 3. Identification of Alternatives

This phase of the study will build upon all available data; including the information generated from the Communication and Public Education effort and the detailed evaluation of existing baseline conditions, both as discussed above. Therefore the specific alternatives and the number of



alternatives cannot be determined at this time. Some of the specific concerns itemized in the RFQ will be addressed in the judicious selection of alternatives for evaluation. The process for the identification of alternatives will necessarily involve community / public input to:

- a. Identify problems and opportunities that could be addressed by modifications to the river system. This will be a major determinant in the formal selection of alternatives.
- b. Determine system constraints that could limit the choice of specific alternatives.
- c. Develop a multi-objective decision-making methodology to reflect local values as well as being consistent with Federal principles and guidelines. One such tool is IWR – Plan, a multi-objective decision making software program, developed jointly by The U. S. Army Corps of Engineers and the Department of Agriculture. The software was specifically designed as a planning tool for environmental restoration projects. However, it can be helpful in any study with multiple output measurement criteria.
- d. Formulation of alternatives to address the above. It is anticipated that the mix of alternatives selected for evaluation will include, but not necessarily be limited to the following:
  - i. No Action alternative – existing dams assumed to remain in place with only minimum investment for operation, maintenance, and repair. Dams would be monitored for safety purposes
  - ii. Dam removal
  - iii. Full rehabilitation of dam(s) for future beneficial uses, including hydropower generation
  - iv. Partial removal
  - v. Modifications to Boardman River
    1. Alternate channel alignments if an impoundment is removed or if a bypass channel is proposed
    2. Changes to existing natural river (white water recreation; habitat enhancement, etc.)
  - vi. Fisheries management options
- e. For each alternative, a determination will be made of the expected end state as well as the transition processes that can be expected.
- f. NEPA Process – The identification of alternatives is critical to the NEPA process, particularly to demonstrate that consideration has been given to avoid/mitigate adverse environmental impacts. During this study phase, we will summarize the alternatives developed by the team in a format that is consistent with NEPA requirements. The original determination as to whether to prepare an EA or EIS will be revised as necessary.

#### **4. Evaluation of Alternative Plans**

Each alternative will have an impact on the future of the watershed and the community as a whole. The futures resulting from each alternative identified above will be defined and evaluated. The number of alternatives requiring detailed evaluations will impact the effort required for this study phase. Evaluations will be from the base line conditions, and will be measured in both monetary and nonmonetary measures. This evaluation process will become a focus area of the public education process. Impacts will be evaluated in each of the main focus areas:

a. Environmental

- i. Distribution of resident and migratory species, both terrestrial and aquatic – Data collected during the establishment of baseline conditions will be manipulated utilizing models and professional judgment to reflect the options associated with the river management options. The outputs from these data processes will be compared to provide a ranked evaluation of potential impacts for each of the evaluated management options.
- ii. Habitat impacts, including those critical for T&E species – ECT will prepare an assessment of the impact of proposed alternatives on T&E plant species. These impacts will be evaluated using metrics to quantify habitat values and quantity.
- iii. Protection from environmental threats
- iv. Vegetative changes - ECT will prepare an assessment describing the impact of the proposed alternatives on vegetation changes in the river corridor, including wetlands. The assessment will include an assessment of new plant communities that may develop given a particular alternative. The assessment will include short term (5 years) and long-term (5+ years) changes in plant community development.
- v. Water quality – Scientifically developed and defensible models will be utilized to generate potential water quality impacts associated with each of the management options developed for the river system. The model outputs will be ranked and the potential impacts evaluated to provide a relative ranking among the various options.
- vi. Potential impacts to Ground water supplies, or caused by changes to ground water quantity and or flow characteristics – data collected during the engineering evaluation will be utilized to develop plume models to evaluate the potential for impacts to ground water supplies including the potential for ground water degradation by the river and the potential for river impacts from contaminated ground water.
- vii. Contaminated sediment management - Based on the data, contaminated sediment quantities will be calculated and costs associated with removal/disposal or removal/reuse derived. If necessary, a risk analysis can be completed for contaminated sediments that will remain in place or if natural erosion associated with a dam removal is a viable alternative.
- viii. Impact of changes in sediment loading on aquatic environment.

b. Engineering

- i. Structural and operational safety of dams and other diversion structures
- ii. Groundwater supply, use, and impacts
- iii. Impacts to other water users
- iv. Hydraulic characteristics including changes to the flood plain, and flood characteristics
- v. Sediment management and erosion control
- vi. Stream stability, migration, and control
- vii. Cost evaluations
  1. Implementation costs, including real estate costs
  2. Annual Operation, maintenance, and rehabilitation costs including the costs of sediment management if the impoundments are maintained for future beneficial uses.
  3. Mitigation costs, if any including any changes to flood hazard insurance rates.

c. Economic

- i. Property valuation
  1. Proximity to water
  2. Changes in water and riparian uses
- ii. Recreational benefits - Evaluation of expected changes in property values through a simulated change in housing characteristics in the previously developed statistical model. Changes in recreational benefits will be calculated using previously developed models and simulations of changes associated with various scenarios: for example, dam removal leads to different numbers and types of recreation trips.
- iii. Regional and local economic changes both during transition and at end state - Changes to dams will potentially lead to temporary transition effects and longer run (steady state) effects. These effects will be evaluated. For example, dam removal will lead to a temporary increase in demand for certain types of capital and labor. Longer run local economic impacts might include a loss or adaptation of existing local businesses and development of new ones (i.e., local fly fishing guides and outfitters). Areas to be considered include the following:
  1. Job creation / payroll
  2. Income
  3. Energy costs
  4. Tax base/revenues
- iv. Financing options will be determined for possible implementation of each alternative. This will include, but will not be limited to, an identification of potential beneficiaries (public and private), and potential sources of implementation funding from Federal, state, and other sources.

d. Societal

- i. Cultural resources
  - ii. Community risks and liabilities
  - iii. Property ownership
  - iv. Water rights
  - v. Cultural infrastructure
    1. Trails – ECT will prepare an assessment of the opportunity for trail systems along the river for each alternative.
    2. Natural Education Reserve
      - a. Transportation - The same locations that were studied in the existing and future conditions will be assessed for the impacts for up to three alternatives. One final recommended alternative will be assessed as well.
  - vi. Social impacts - The evaluation will consider how impacts are distributed across various subpopulations. This will allow understanding of how various groups (i.e., land owners vs. recreators) are affected in general, within the watershed.
  - vii. Recreational opportunities, including necessary support facilities.
  - viii. Community identity
- e. NEPA process - At this point in the study process, with the full evaluation of alternatives and with public comments obtained through the ongoing Communications and Public Education

Process, the impact of alternatives will be summarized in a format consistent with NEPA requirements. The original determination to prepare an EA or EIS will be revised as necessary.

#### **5. Selection of Preferred Alternative**

Once all alternatives are identified and the respective alternative futures are described, a detailed evaluation will lead to a local determination of the preferred alternative for the Boardman River. ECT will support the evaluation and selection process, which will be a phased process:

a. Evaluation of all alternatives.

The ECT team will fully evaluate all alternatives and present performance metrics, both monetary and nonmonetary. This information will be used to determine a ranking of alternatives based upon the community-determined, multi-objective, decision-making methodology. The results of this ranking will be presented to the Boardman River Dams Committee for its review and action.

b. Choice of preferred alternative.

Based upon the alternative evaluation, it is envisioned that the Boardman River Dams Committee will select a locally preferred alternative and this determination will be documented in the final feasibility report and NEPA documentation.

#### **6. NEPA Documentation**

NEPA documentation will be required for implementation of the preferred alternative plan to address all environmental impacts, including cumulative impacts. This process will begin during the establishment of existing conditions and will be completed, with the exception of formal agency and public review, after the preferred alternative is selected. Should an Environmental Impact Statement (EIS) be required, ECT will work with the USACE to complete all necessary documentation.