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8-20-80

Dr. 1651

DOE/RA/04934-33
Dist. Category UC-97e

U.S. Department of Energy
Assistant Secretary for Rescource Applications
Industrial and Utility Applications and Operations
Division of Hydroelectric Resources Development
Washington, D.C. 20461

May 1980

A CASE STUDY ANALYSIS OF THE LEGAL AND INSTITUTIONAL OBSTACLES AND INCENTIVES TO THE DEVELOPMENT OF THE HYDROELECTRIC POWER OF THE BOARDMAN RIVER AT TRAVERSE CITY, MICHIGAN

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Price: **Printed Copy:** $11.00
Microfiche: $4.00

ACKNOWLEDGEMENTS

The Energy Law Institute and the case study team would like to acknowledge the contribution of a number of persons whose cooperation contributed greatly to the success of this case study. In particular, we would like to thank:

William P. Strom, Director of Traverse City Light and Power
Ross Childs, Grand Traverse County Coordinator
Donald B. Emery, Emery and Porter, Inc.
William McGarry, Grand Traverse County Commissioner
State Senator John F. Kelley, First District, Michigan

We would also like to acknowledge the assistance provided by:

Emery and Porter, Inc., Snell Environmental Group, Lansing, Michigan
Dr. Otto Kraus, Michigan State University
Members of the Michigan Department of Natural Resources

and other government officials and private individuals too numerous to mention.

The case study team extends special thanks to John Parsons, Traverse City, Michigan, for his generous hospitality during our visit.

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PREFACE

The following is an analytic description of one decision-making process concerning whether or not to develop the hydroelectric potential of a river. The actual study of the case ran from June to July of 1979, and what is presented is limited to that general time period. Much has since changed.

The focus of the analysis is on the factors that the developers considered, or should consider in making a responsible commitment to small-scale hydroelectric development. Though one should always be cautious in generalizing from one instance, many of the factors described are not atypical.

The introduction is a broad overview of the situation as it stood at the time of the study.

Chapter I presents a detailed description of the developers, the river resource, and the contemplated development.

Chapter II is an analysis of the factors that have already affected the developers in their decision-making process and those that should be considered before a final decision is made. The effect of each factor upon future development is identified and critically evaluated. Each factor is considered as either an incentive or barrier to the development. An incentive is a factor whose overall tendency is to encourage or expedite development; a barrier tends to compromise or impede development. The labelling is not made to denote any opinion as to the legitimacy of the factor. Indeed many barriers should be confronted by the developers in order to direct their decision to the best means of development.

Finally, Chapter III summarizes the impact of the more significant barriers and incentives previously noted, and presents recommendations that, if implemented, will favorably affect decisions to develop small-scale hydroelectric generation capability. While the recommendations are based only on the immediate case study, to the extent they treat issues of general concern to hydro development, they may provide insights into legislative opportunites for improving the general climate for hydro development.

INTRODUCTION

The shores of Traverse Bay, streams and lakes, gently rolling hills, and varied woodlands comprise a rural area of unique, quiet and natural beauty in the northwestern portion of Michigan's lower peninsula. In the heart of this region is Traverse City. Located at the base of Grand Traverse Bay, the "Cherry Capitol of the World" is the hub, not only of cherry production, but also of commercial, cultural and governmental activity. The prosperity of this city is primarily attributable to the numerous tourists from southern Michigan and bordering states attracted year-round to the area.

The serene, natural atmosphere of the area is also encouraging retirement and recreational development. Traverse City and surrounding Grand Traverse County are experiencing rapid growth and, consequently, an ever increasing demand for electrical power.

The need for expanded or alternate electrical power sources for Traverse City is urgent. Traverse City's Light and Power Department, the principal producer and distributor of electricity in the area, is currently operating without adequate reserve generating capacity. By 1981, the City's existing generating capacity will be insufficient to meet peak demand. To aid in meeting this demand, the Boardman River is being considered by Traverse City and surrounding Grand Traverse County as a hydroelectric generating resource.

The Boardman River is a particularly outstanding element of the native environs responsible for Traverse City's prosperity and growth. The ecological, aesthetic and recreational assets of the river, perhaps best demonstrated by the excellent cold-water trout fisheries, have long been appreciated. Reliable flows and the existence of five dams sites also yield the Boardman a considerable hydroelectric value.

Development of the Boardman River would occur at the five dam sites. Two existing dams, owned by the County, previously generated hydroelectricity, as did a third before being washed out. One dam has never been utilized to generate electricity. It is owned by the City which also owns the washed-out dam site along with the fifth site that is presently supplying power to the area. A feasibility study of developing the five sites concluded that hydroelectric power is feasible at each.

Grand Traverse County and Traverse City are presently on the threshold of committing themselves to hydroelectric development of the Boardman River.

I. THE CASE

A. The Developers

Traverse City began generating its own electricity in 1912 when it purchased the Queen City Light and Power Company from a local group for $150,000.[1] The acquisition included two hydroelectric sites, Keystone[2] and Brown Bridge,[3] with land and flowage rights.[4] This marked the formation of Traverse City Light and Power (TCL & P). Today TCL & P is the principal producer and distributor of electricity in the Traverse City area.[5]

From its inception, TCL & P was operated as a department of the city government. The city manager was ultimately responsible for overseeing TCL & P's operation[6] but an appointed supervisor managed day-to-day operations. As TCL & P grew and became increasingly complex, it became evident that a more professional management structure was necessary to effectively operate the utility and make sophisticated planning decisions.

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1 Traverse City Light and Power History, Light and Power Department, page 1, May 1, 1979.

2 Keystone Hydroelectric Plant once located on the Boardman River, generated power from 1908 until 1961 when part of the dam washed out. All remnants of the powerhouse and dam were demolished about 1969. Feasibility Study for Boardman River Hydroelectric Power by the Joint Venture of Grant Traverse County and Traverse City, Michigan, Cooperative Agreement No. EW-78-F-07 + 792, (1979).

3 Brown Bridge Hydroelectric Plant, lcoated on the Boardman River, was built in 1921, and has been generating power continuously since. Supra note 1.

4 Id.

5 Cherryland R.E.C.A. and Consumers Power Company also provide service to this general area. Cherryland has no generating facilities and therefore only distributes electricity purchased from Northern Michigan Electric Cooperative. 64,080 MWH or 60% of Cherryland's total load in 1977 was sold within 12 miles of Traverse City. Consumers Power Company generates power in Michigan and distributes throughout the state including a limited area in Traverse City. Supra note 2, at 56.3.1.

6 City of Traverse City Charter, Chapter XII, §110.

As a consequence, Traverse City ammended its charter to establish a seperate Light and Power Department under an independent Light and Power Board appointed by the City Commission.[7] The Board-appointed director has direct responsibility for management and operation of the system.[8] This change became effective June 1, 1979.[9]

Financially, TCL & P is self-contained with authority to set rates, pay operating expenses and retire its indebtedness.[10] The City Commission, however, retains exclusive authority to exercise eminent domain powers and to authorize bond issues.[11]

TCL & P's current generating facilities consist of Bayside Steam Plant and Brown Bridge Hydroelectric Plant. Bayside Steam Plant, located on the shores of Grand Traverse Bay in Traverse City, contains four boilers and four turbine generator units. The plant was originally constructed in 1912, subsequently modified and then expanded in 1968 to accomodate the fourth boiler and generator.[12] Two boilers are coal-fired and, though old (installed in 1948 and 1951) and inefficient, they are realtively reliable. A gas-fired boiler (installed in 1965) is relatively efficient and easy to bring on line quickly.

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7 Id. Chapter XVII, §§ 175, 176.

8 Id. Chapter XVII, §178 (a).

9 Meeting with William Strom, Director of TCL & P, Traverse City, Michigan (June 5, 1979).

10 Supra note 6, at Chapter XVII, § 179 (h)(i)(1).

11 Id. Chapter XVII, § 179 (e), (k).

12 Supra note 1, at pp. 1 and 2.

The newest boiler, coal-fired, serves a 16,000 KW turbine generator which is the base unit for the system.[13]

Nameplate capacity of Bayside is 31,000 KW, but, because of emission problems and boiler limitations, the maximum dependable net output is 28,420 KW.[14] The units are well maintained and in such condition that there is no reason to anticipate forced retirement of any unit before 1993. However, due to the uncertain availability of natural gas, the short-time generating capacity of Bayside Steam Plant should be considered to be 23,000 KW in the near future.[15]

Brown Bridge Hydroelectric Dam, located approximately 13 miles southwest of Traverse City on the Boardman River, was constructed in 1921 expressly for the production of hydroelectric power and has operated continuously since.[16] The facility has a maximum capacity of 830 KW and practical maximum capacity of 250 KW.[17] The powerhouse contains one Leffel 690 BHP Turbine (installed

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13 The three older boilers are connected to a common header serving three turbines of 2,500 KW, 5,000 KW and 7,500 KW capability. The newest boiler is not cross-connected with the others and serves only the 16,000 KW turbo generator.

14 Maximum dependable continuous output is 26,000 KW. Maximum dependable net output is the greatest amount of power that can be generated. Maximum dependable continuous output, is the greatest amount of power that can be generated for a lengthy period of time.

15 Maximum dependable continuous output becomes 20,600 KW.

16 Supra note 1.

17 The amount of power generated is determined by the water flow of the Boardman River. Practical maximun capacity is the generating capability that can be expected when the flow is at its (average seven day) minimum. Maximum capacity is the greatest amount of power that can be generated at high flows.

in 1921) and one Leffel 375 BHP Turbine (installed in 1941). The turbines are operated in a "run-of-the-river" mode. Inspection of the plant in September 1977 concluded that the facility is in safe condition requiring only minor repairs and periodic maintenance.

As the electrical requirements of Traverse City increased over the years, TCL&P also established interconnections with other utilities. These inter-ties ensure reliable service by enabling TCL&P to purchase necessary power. If TCL&P were not interconnected, firm capacity of the system would be the generating capacity available when the largest unit is out of service, or 12,750 KW, which is not adequate to meet present demand. [18]

TCL&P, along with three other utilities, [19] in 1968, formed Michigan Municipals and Cooperatives Power Pool (MMCPP). [20] Membership in the pool

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18
Peak demand in 1970 was 16,540 KW and 23,150 in 1976.

19
Wolverine Electric Cooperative, Northern Michigan Electric Cooperative and Grand Haven Board of Light and Power.

20
The pool system is composed of a number of individually owned generating plants scattered throughout the western and northern portions of Michigan's lower peninsula. The members of the pool operate their systems in parallel under the terms of an agreement to maximize overall economy. Members also cooperate in the planning construction of new facilities. There are not wheeling charges within the pool. However, each member is required to maintain adequate source power capability (generating capacity plus capacity purchases from pool members or third parties) plus a reserve capacity that other members may draw on. TCLP's generating capacity is listed as 33.0 MW (based on nameplate capacity rather than practical capabilities) which just meets the capacity presently required by the pools of TCL&P.

allows TCL&P, through tie lines to Northern Michigan Electric Cooperative [21] and Consumers Power Company, [22] to draw on 25 MW of capacity when needed. [23]

Additionally, in 1978, TCL&P, along with nineteen other municipal utilities, formed the Michigan Public Power Agency (MPPA) under the provisions of the Energy Employment Act of 1976. [24] The MPPA is a corporate entity, distinct from its constituent members, which enables TCL&P and other members to achieve the economies of scale usually associated with large public utilities. [25] The MPPA is currently negotiating for shares in the Midland Nuclear Power Plant under construction by Consumers Power Company. [26]

21
The ties facilities were installed in 1958 and rated at 15 MW.

22
The interconnection substation was constructed in 1977 and is rated at 10 MW.

23
Because of recent equipment failures at Bayside Steam Plant, TCL&P is currently utilizing the pool interconnection to purchase power from the City of Lansing.

24
MICH. COMP. LAWS § 460.801-460.848
[MICH. STAT. ANN. § 22.189 (Callaghan 1979)].

25
MPPA can finance, maintain, improve and acquire projects to supply electric power for the member municipalities on a scale not achievable by the municipalities individually.

26
Consumers Power Company originally did not desire to sell shares in Midland to
Energy Commission licensing proceedings on anti-trust grounds, Consumers Power negotitated a settlement allowing municipal participation.

In the year ending June 30, 1978, TCL&P's net load was 141,761,000 KWH. Of this load, 92.5% was generated at Bayside, 1.7% at Brown Bridge and 5.8% was purchased from MMCPP. Peak demand was 25,980 KW.

It has been apparent for several years that TCL&P does not possess adequate generating facilities to provide reliable electric service to its customers. Membership in a power pool and a joint agency provides TCL&P with the means to purchase additional power to meet demand. However, wholesale purchase of electric power may cost more than generating the power. Thus, when Grand Traverse County approached Traverse City with the notion of jointly developing the hydroelectric capability of the Boardman River, TCL&P was most receptive.

Grand Traverse County which encompasses Traverse City has never engaged in public utility activities. The County, however, does own two dams, Boardman and Sabin, on the Boardman River. Both were used by the former owner, Consumers Power Company, to generate hydroelectricity.

In September 1977, the County engaged a consulting engineering firm to conduct a safety inspection of the two dams. At approximately the same time, Grand Traverse County attempted to get Consumers Power to repurchase the dams. Consumers Power refused to buy the dams but did release the County from a restrictive covenant in the deed prohibiting utilization of the dams for hydroelectric generation. [27] Subsequently, the consultant was additionally charged with exploring the possiblity of developing hydroelectric capability at the dam sites. The consultant was also charged with investigating alternate means to fund any maintenance, renovation, or new construction recommended.

27
Meeting with Ross Childs, County Coordinator, Grand Traverse County, Traverse City, Michigan (June 4, 1979).

The resulting report strongly recommended utilizing both dam sites as hydroelectric power sources either independently or co-dependently with dam sites owned by Traverse City. It was further recommended that the County authorize the consultant, by resolution, to submit a proposal to the U.S. Department of Energy for funding for a feasibility assessment for the hydroelectric development. After a similar resolution was requested of Traverse City by the County, a joint proposal was soon on its way to the Department of Energy.

B. The Resource

The Boardman River rises some 38 miles east of Traverse City in the Mahon Swamp, then flows southwesterly for 40 miles through forested lands. Turning north for nine miles, it flows through Traverse City emptying into Grand Traverse Bay. The Boardman River system drains a surface area of approximately 186,000 acres and includes about 130 linear miles of stream.

Stream flow in the Boardman River is fairly stable, especially during low flow periods, as it is sustained by ground water discharging into the river from permeable glacial outwash soils. [28] Drainage from twelve lakes ranging in size from a few acres to 60 acres and extensive forestation in the watershed also contribute to flow stability. [29]

U.S. Geological Survey records from the Mayfield gauging station for the past 25 years indicate an average discharge of 194 cubic feet per second. [30] Although extemes were recorded during this period (maximum -- 1220 cfs on September 14, 1961, minimum -- cfs on November 2 and 3, 1963), average minimum flow for the summer months is about 130 cubic feet per second. [31] However, it must be taken into account that stream flow is regulated by the Brown Bridge Hydroelectric Plant located 0.9 miles above the gauging station. Spring flows normally raise the stage heights from two to four feet in the upper and lower reaches respectively.

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28 This outwash channel constitute the major ground water aquifier in the basin.

29 Supra note 2 at § 6.2.

30 Id.

31 Id.

The Boardman River has a moderately fast stream gradient, dropping 500 feet in elevation from its sources in a large swamp to its mouth on the west arm of Grand Traverse Bay. Although six dams on the river dissipate about 120 feet of fall, the average drop in elevation over the 50 miles of stream is 8 feet per mile.

Six dams presently impede the natural flow of the Boardman River. Union Street Dam, located in Traverse City, 0.9 miles from the north of the river, was originally erected in 1897 to supply power for a flour mill. Its average head is 9.1 feet with a mean flow of 294 cubic feet per second.[32] The dam is presently owned by Traverse City and used to regulate the level of Boardman Lake, a 350 acre natural lake.

Approximately 5.0 miles upstream from the river mouth is Sabin Dam. Originally constructed in 1906 and rebuilt in 1930 for Boardman River Light and Power Company, it was used by successive owners for hydroelectric generation until 1969.[34] At that time it was sold by Consumers Power

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32 Id.

33 Present facilities at the dam site, consisting of an earth fill dike about 250 feet long with 10 hand wheelgates and a 15 foot long concrete dam spillway at the extreme west end with trash racks and two discharge tubes, are generally in good condition. Id. at § 6.1.1.

34 Present facilities consist of a 20 foot by 60 foot rectangular brick powerhouse and a 110 foot long concrete dam with two concrete spillways (one spillway has an 18 foot long tainter gate; the other has three, 10 foot long wooden lift gates). Turbine flumes are closed off with stop logs. An inspection report issued in January of 1978, indicated that dam stability is good with adequate free board and minimal erosion of the concrete spillways. Id. at § 6.1.2.

Company to Grand Traverse County after removal of turbines and generators. Its average head is 20.5 feet with a mean flow of 286 cubic feet per second. [35] Impounded by the dam is 37 acre Sabin Pond which extends upstream to the base of the Boardman Dam.

The Boardman Dam is located about 5.6 miles upstream from Grand Traverse Bay. The dam was originally constructed in 1894 for Boardman River Light and Power Company and rebuilt in 1940. [36] Successive owners used the dam site to generate power until 1969 when Consumers Power Company sold the site to Grand Traverse County after removing the turbines and generators. The average head is 41.0 feet with a mean flow of 284 cubic feet per second. [37] Boardman Pond (81 acres) is impounded by the dam.

35
Id. at § 6.1.2.

36
Facilities at the site currently include a 700 foot long earth dike across the Boardman River's original channel, an 18 foot wide by 200 foot long concrete bridge-dam structure, an 18 foot wide concrete spillway which includes two stoney spillway gates and energy dissipation blocks at the lower end, and an 18 foot by 60 foot brick and concrete powerhouse. Two exposed steel penstocks feed the turbine bays which includes the scroll case, wicket gates and draft tubes. An adjacent forebay provides gate control for the two penstocks which run beneath the bridge-dam structure. The County road crossing the crest of the structure is in severe disrepair. Inspection of the dam indicated minimal concrete deterioration, an inoperable wicket gate and slight seepage. Id. at § 6.1.3.

37
Id.

The fourth dam, Brown Bridge Dam, is located approximately 19 miles upstream from Traverse City. Constructed in 1921 for the production of hydroelectric power for Traverse City Light and Power, it has generated power continuously since that time. [38] The average head is 30.2 feet with a mean flow of 161 cubic feet per second. [39] Brown Bridge Pond impoundment occupies 191 acres in the approximate center of 1,240 acres of Traverse City-owned property. [40]

In addition to these four major man-made impediments to natural flow, there remain a small dam and millpond on both the North Branch and the South Branch of the Boardman River.

Until 1961, one other dam existed on the Boardman River. Keystone Dam was constructed in 1908 for the Queen City Light and Power Company, approximately 7 miles upstream from the river's mouth. In 1912, the facility was purchased by Traverse City Light and Power and generated hydroelectric power until the intake structure at the powerhouse overtopped and washed out part of the dam in September 1961. The site had had an average head of 20 feet with a mean flow of 282 cubic feet per second. [41]

38
The dam is about 28 feet high consisting of a 425 foot long earth dike on the southside, a concrete superstructure, a brick powerhouse located over a concrete spillway having two 12 foot wide steel tainter gates and 1250 feet of earth dike on the northside. A concrete fishladder, now abandoned, is located north of the powerhouse.

39
Supra note 2, at § 6.1.5.

40
An initial 1,000 acres was acquired in 1912 from the Queen City Electric Light and Power Company. Between then and 1944, additional parcels of land were acquired from private individuals and the State of Michigan. Traverse City is presently considering setting aside this land for a wilderness area.

41
Supra note 2, at § 6.1.4.

The dam had impounded a 20 acre pond. As a result of the washout, an opening was excavated in the west end of the earth dike to permit the river to return to its original course. In 1969, all remnants of the powerhouse were leveled and the spillway demolished to eliminate public hazards at the site. [42]

The Michigan Water Resources Commission has classified the Boardman River as a first-class, cold water stream. [43] Although warm waters from the twelve lakes draining into the river influence water temperatures for a short distance downstream, spring seepage soon cools the water sufficiently to support a variety of cold water fish species. As the Boardman River flows through the three hydroelectric impoundments and Boardman Lake, water temperatures are elevated, especially in the lower eight miles of the river. These impoundments are uniform in temperature, i.e., they do not stratify, mainly due to the short mean hydraulic retention time. [44]

Water quality of the Boardman River meets or exceeds all established standards for the river basin. [45]

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42 Id.

43 Michigan Water Resources Commission, Use Designating Areas for Michigan Interstate Water Quality Standards, Bureau of Water Management, Department of Natural Resources (March 1969).

44 For example, the temperature of Boardman Pond was recently measured by Water Quality Division, Department of Natural Resources, and found to be only 6 or 7° F warmer than the water immediately below the dam. Telephone conversation with E. Evans, Water Quality Division, DNR (June 4, 1979).

45 Michigan Water Resources Commission, Water Quality of Selected Lakes and Streams in the Grand Traverse Bay Region, Bureau of Water Management, DNR (March 1970). The Standards established for the river protect it for swimming; cold water fish species; industrial, agricultural and commercial water supply; and other uses.

Traverse City operates a highly efficient tertiary waste water treatment plant whose discharges into the river at the mouth of Boardman Lake are very clean.[46]

Because of its cool, clean water, the Boardman ranks among Michigan's top ten trout streams. Above Brown Bridge Dam, there is an excellent population of small to moderate size brook trout though brown trout dominate.[47] The relatively swift flow over firm sand and gravel is excellent fish habitat.

Below Brown Bridge Dam, the stream widens but remains rapid over a gravel and sand bottom. Brown trout predominate although their numbers are somewhat less than their food supply will support; natural reproduction is impaired by Brown Bridge Dam. The Boardman River is, however, a fine trout stream all the way downstream to Boardman Pond.

The lower part of the river within the confines of Traverse City suffers from municipal development, but still receives substantial runs of steelhead, lake trout, and salmon seasonally upstream to Union Street Dam.

Boardman Lake and the impoundments on the Boardman River, classified as top quality warm water, support typical warm water fish populations. Brown Bridge Pond, in particular, is considered to provide some of the best inland warm water game fishing in Grand Traverse County.

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46 The phosphorous content of the effluent is less than 0.5 milligrams per litre. Id.
Other communities along the Boardman River are on septic tank-drain field systems or dispose of wastes by land disposal methods.

47 Meeting with members of the Grand Traverse Chapter of Trout Unlimited (June 4, 1979).

Additionally, nearly all of the Boardman's tributaries are top quality cold trout water and important nursery streams, with the more sizeable ones supporting considerable trout fishing of their own.

There are no endangered fish species in the Boardman River, but lake sturgeon undoubtedly used the river for spawning prior to dam construction.[48]

The fisheries potential offered by the river is not used to its maximum by fishermen. This is due in part to the popularity of sport fishing in Grand Traverse Bay which is based primarily on its lake trout resource. Lack of public access also limits fishing activity and other recreational uses of the river.[49]

Only one public access is located on the Boardman River. Access, however is provided at three public campgrounds and several private campgrounds from Brown Bridge Pond upstream, at selected county road bridges and over public lands. Fife Lake State Forest surrounds the Boardman River from approximately 3.5 miles above Boardman Dam to the "Forks" and beyond. The Grand Traverse County Natural Education Reserve, encompassing the Boardman and Sabin ponds, also provides access.

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48 Memo from John A. Scott, Chief, Fisheries Division to Dale W. Granger, Chief, Water Management Division concerning Feasibility Study-Boardman Hydroelectric Generation (October 1978).

49 Supra note 47.

Canoeists make extensive use of the Boardman River from the "Forks" downstream to Boardman Lake.[50] The moderate to fast current makes an enjoyable daylong canoe trip. Portages, of course, are necessary at each of the dams.

The river is neither large nor consistently deep enough for boating. Therefore, boating is restricted to the three hydroelectric impoundments, Boardman Lake and the extreme lower reach of the river at Traverse City.

The Boardman River Valley and surrounding uplands contain a good variety and sizeable populations of deer, small game, fur bearing animals, water fowl and many species of non-game wildlife. The mute swans in Boardman Lake are a particular attraction for bird watchers. The bay area and Boardman River are the only major wintering areas in Michigan for the non-native swan.

The Boardman River is a considerable aesthetic and recreational resource for Traverse City and Grand Traverse County. The river's reliable flow and the existence of five dam sites, also make the Boardman River an attractive resource for hydroelectric development.

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50 The Boardman River Advisory Council, in cooperation with DNR, has recently established voluntary water craft rules in an attempt to limit canoeing on the Boardman which is tending to destroy river banks. Telephone Conversation with Mrs. Kermit French, President, Boardman River Advisory Council (June 4, 1979).

C. The Development

The City of Traverse City and Grand Traverse County, on August 11, 1978, received from the U.S. Department of Energy an $82,000 grant to jointly determine the feasibility of rehabilitating one or more of five existing dam sites located on the Boardman River. An additional $14,000 was provided by the County and the City, and a $96,000 study of the potential for developing the hydroelectric capability of the Boardman River began. [51]

The study focused on installing hydroelectric generating capacity at a non-hydropower dam (Union Street), rehabilitating and installing hydroelectric facilities at two dams (Sabin and Boardman), rebuilding a "washed-out" dam with hydroelectric capability (Keystone), and upgrading an operating hydroelectric facility (Brown Bridge). Seventy percent of the Boardman watershed is above the nineteen mile reach of the mainstream on which these dam sites are located. Sabin and Boardman dam sites and accompanying flowage rights are owned by Grand Traverse County. Brown Bridge damsite and the "washed-out" Keystone damsite are owned by Traverse City along with flowage rights. Union Street Dam is also owned by Traverse City but flowage rights for Boardman Lake behind it are referred to only in a quit claim deed. [52]

From the hydrology of the Boardman River it was determined that the potential annual output available at the five dam sites is about 17,500,000 KWH. [53]

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51 Meeting with Grand Traverse County Commissioners (June 4, 1979).

52 Boardman Lake is a natural lake; the dam operates only as a lake level control. Supra note 2.

53 Approximately 78% of the power potential is base load and 22% is peak load energy. Id. at § 56.4.

The maximum combined generating capacity of the five damsites is approximately 3,000 KW. [54] Brown Bridge Hydroelectric Plant, currently operating, accounts for 830 KW of this generating capacity and produced about 2,400,000 KWH in the year ended June 30, 1978. [55]

If fish passages are installed and used at the lower four damsites (installation of a fish ladder at Brown Bridge Dam is, at present, highly unlikely due to the unique trout fisheries above Brown Bridge Pond), [56] the study estimates that 1,365,700 KWH of power would be lost each year. [57] The water consumption of the fish passages would have to be considered in the selection of hydroelectric equipment. [58] Other environmental constraints considered in recommending the type of turbines and generators to install were maintenance of minimum flows and limitations on pond level fluctuations.

Economic considerations are also significant constraints on the selection of equipment. Costs dictate that the least number of units (within requirements of minimum flow and peaking possibility) be installed, significant changes in existing powerhouse configuration be avoided, and higher turbine speeds or speed increasers be used. [59]

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54 About 45% of the capacity is base load and 55% is peak load. Id.

55 Id. at § 6.3.1.

56 Meeting with Bernhard Ylkanen, District Fisheries Supervisor, State of Michigan Department of Natural Resources (June 4, 1979).

57 Supra note 2, at § 6.4.

58 Fish passages would require a flow of approximately 25 cfs when operating. Id. at § 6.4.3.

59 To avoid the high cost of multiple generators. Id.

The close proximity of Keystone, Boardman and Sabin dam sites places an additional constraint on hydroelectric generation. [60] Flows through any dam must be passed through the others or wasted over the spillway. Thus, each additional KW of capacity at a dam, while costing less per KW, produces fewer KWH per year.

Operating the five dam sites co-dependently, however, also increases the significiance of stored power. The large reservoirs of stored water at Brown Bridge and Boardman can provide peaking capacity not only at those sites but also at Keystone and Sabin, respectively.

The feasibility study, considering these constraints and the Boardman River hydrology, recommended certain hydroelectric generating equipment for the five dam sites. At Keystone and Union Street damsites, variable pitch propeller type turbines are preferred. [61] Fixed blade propeller type

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60
A distance of only about 1.4 miles separates Keystone from Boardman and Boardman's tailwater is Sabin's headwater.

61
Minimum and maximum flows (176 and 344 cfs respectively) at Keystone dam site require the turbine to operate over a range of 241 to 466 KW. A single 1250 mm horizontal, adjustable blade, standard tube unit rated at 445 KW under a 21 foothead and a 287 cfs flow, is most suitable for such a flow range. The Sabin Dam is also suited to the installation of two equivalent fixed vertical propeller type turbines. Installed in the open flumes, each turbines would operate at a speed of 300 rpm and a rating of 335 KW at a flow of 175 cfs and a 20 foot head. Supra note 2, at 6.4.3.

turbines are more suitable for retrofitting Boardman and Sabin Dams.[62] The equipment presently existing at Brown Bridge Hydroelectric Plant is in satisfactory condition and adequate for future generating purposes.[63]

Traverse City Light and Power has an acute need for additional generating capacity. Rapid growth in the Traverse City area has begun to strain TCL&P's ability to adequately serve its customers' electrical power demands. TCL&P is currently operating without adequate reserve generating capacity. By 1981, existing generating capability will be insufficient to meet peak demand.[64] Power supply capability will have to increase by 224% to provide the additional 35,000 KW of capacity necessary

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62
The Boardman Dam is suitable for the installation of two turbines, one to handle the minimum flow and the second, in conjunction with the first, to handle the maximum flow. Each unit would be a fixed, vertical propeller type turbine (installed in the existing concrete pressure flume) which would operate at a speed of 600 rpm and a rating of 610 KW at a flow of 175 cfs and a head of 41 feet. The Sabin Dam is also suited to the installation of two equivalaent fixed vertical propeller type turines. Installed in the open flumes, each turbine would operate at a speed of 300 rpm and a rating of 335 KW at a flow of 175 cfs and a 20 foot head.

63
The two Francis turbines, presently in place, are very efficient despite their age. Originally installed in 1921, the larger turbine, rated at 515 KW at a flow of 252 cfs and a head of 29 feet, is quite suitable for handling peak loads and high flows. The second turbine, installed in 1941 and rated at 280 KW at 135 cfs and a 20 foot head performs satisfactorly at minimum flows.

64
Reserve generating capacity is necessary to provide an alternative source of power in case one or more generating units is forced or scheduled out of service for maintenance. Utilities generally agree that installed capacity reserve should be at least 20%. Maximum dependable net output of TCL&P's generating facilities is 28,670 KW. Peak demand in 1978 was 25,980 KW. Thus, TCL&P, in 1978, had only a 10% reserve margin which is decreasing steadily with increasing demand.

to meet electrical load requirements projected for 1993. [65]

The development of the Boardman River's hydroelectric potential could provide up to 2,150 KW additional maximum capacity and approximately 1,100 KW additional maximum practical capacity. [66] Though small in proportion to the 35,000 KW needed by 1993, the hydroelectric capacity is significant. TCL&P feels that the long useful life and fuel-cost savings of hydropower makes the considerable initial capital cost of development an attractive investment in needed generating capability.

Traverse City and Grand Traverse County possess the necessary property rights and the legal authority to develop hydroelectric generating capability to satisfy their needs. Ownership of the five dam sites considered for hydroelectric development is vested, along with flowage rights, in either Traverse City or Grand Traverse County. [67] Also, the City and County both have legal authority to develop the sites, sell the power and engage in all other public utility activities.

65
Peak demand is the maximum coincidental demand of all consumers in a year. Based on a projected overall growth rate of 4.01% from 1978 to 1993, TCL&P's peak demand in 1981 is estimated to be 29,680 KW (net firm generating capacity is presently 28,670 KW). Id.

66
Based on a projected growth rate of 4.01%, TCL&P's peak demand in 1933 is estimated to be 46,870 KW. Due to the predicted unavailability of natural gas, present generating capacity will be reduced to 20,930 KW. Including a minimal 20% reserve capacity, TCL&P's total power capability in 1933 should be 56,210 KW, or about 35,000 KW more than existing facitlities could provide.

67
Strom had additional reservations about maintaining, operating and interconnecting several small sources in comparison to one large power source, but the fuel-cost savings have made the project attractive to him despite the disadvantages. Supra note 9.

Grand Traverse County, being unchartered, possesses only those powers granted to it by the Michigan Constitution or by statute. The Revenue Bond Act of 1933, as amended, enables counties, as public corporations, to "acquire, construct, and operate and maintain" public improvements, including electrical utility systems. The Revenue Bond Act grants this authority without regard to the issuance of bonds.[68]

The Michigan Constitution specificially authorizes cities to "acquire, own or operate, within or without its corporate limits, public service facilities for supplying . . . light, heat, [and] power . . . to the municipality and the inhabitants thereof." [69] Thus, Traverse City's charter, as authorized by the constitution, expressly provides that TCL&P is empowered to "construct, expand and operate the Light and Power system . . . for the benefit of the City of Traverse."[70]

Traverse City and Grand Traverse County recognize the complementary nature of their respective needs. Presently, each is evaluating the desirability of satisfying those needs through the development of the hydo-electric potential of the Boardman River. A definitive decision to commit themselves either to proceed with or abandon the project must soon be made based upon all the information available.

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68 MICH. COMP. LAWS § 141.104 [Mich. Stat. Ann. & 5.2734 (Callaghan 1976)].

69 MICH. CONST. OF 1963, art. V11, § 24.

70 Supra , note 6.

II. FACTORS AFFECTING DEVELOPMENT DECISION

A. The Developers' Needs

The recognition of needs is a significant stage in the decision to undertake any action that will satisfy that need. Grand Traverse County and Traverse City both see the development of the Boardman River's hydroelectric potential as a means to satisfy their individual needs.

Grand Traverse County's motivation in considering developing hydroelectric production at its two dams, Sabin and Boardman, was to find a means to fund necessary maintenance and repairs of the dams. The County feels that the Boardman River in its natural state would not have the aesthetic quality or recreational advantages equal to the existing impoundments which are an integral asset of the County Natural Educational Reserve. Yet, retaining the dams is a considerable venture.

Sabin Dam (if not rehabilitated for hydroelectric generation) requires reworking of the existing powerhouse area to provide additional spillway. The present conditions of Boardman Dam require construction of a new spillway at the original river channel, removal of the dam, filling the intake channel and realignment of the County Road. The construction costs of such an undertaking are considerable but necessary to avoid potential serious liability due to the severe disrepair of the county road across the top of Boardman Dam, to reduce increasing maintenace costs, and to provide adequate lake level control.

Rehabilitating the dams for hydroelectric generation would incorporate (or eliminate the need for) these structural improvements and as such, would become part of the capital costs of the development to be ultimately paid by revenues from the sale of the generated electricity. Maintenance costs would similarly be paid by revenues.

Development of the hydroelectric capability of the Boardman River at five existing dam sites by Traverse City and Grand Traverse County, jointly, is feasible. The hydrology of the Boardman, the existence of five dam sites, and the availability of suitable hydroelectric generating equipment make development very attractive. However, many other factors come into play in reaching a decision as to the desirability of pursuing hydroelectric development.

B. Lack of Information

A decision as to whether or not to proceed with the hydroelectric development of the project will be made independently by Traverse City and Grand Traverse County. For the City, the decision will be made by the Light and Power Board,[71] but, since bonding authority lies with the City Commission, its approval will also be required.[72] The Director of TCL&P is maintaining close liaison with the City Commisiion to facilitate the making of a decision.[73] The County's decision will be made by a majority vote of the fifteen elected, part-time members of the County Commission.[74]

TCL&P, with experience in the operation of an electrical utility, has had a better information base than the County, which has never engaged in electrical utility activities. However, as to this specific project, neither entity possessed sufficient information concerning hydroelectric development to make a completely informed decision. To acquire the necessary information, the City and County jointly engaged a consultant-engineering firm to conduct a feasibility study.

The study's goals were two: first, to determine the hydroelectric potential of the Boardman River that could be practically realized at five dam sites, individually, and as a series of co-dependent facitlities; and second, to assess the implications of realizing that capability. The attainment of the first goal, essentially an engineering analysis, is straight forward. The second analysis, because it necessarily involved less quantifiable assessments

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71 Id.

72 Id.

73 Id.

74 Id.

of "social" or "external" costs and benefits and a quest for information through myriad regulatory offices, was more difficult to achieve.

Ideally, the decision whether or not to develop a hydroelectric project, as well as what form any elected development should take, should be made with perfect information. That is, the developer should be completely knowledgeable about all factors bearing on the feasibility of the project. Needless to say, perfect information is rarely attainable for any venture, and certainly not available to hydro developers. Nevertheless, there is a certain core of information sufficiently important to a prospective hydroelectric project that it should be readily obtainable by any developer. Unfortuantely, that is frequently not the case, and was not the case here.

The following sections summarize some of the information of value to a hydroelectric developer that had eluded the grasp of the joint venture participants up to the time when this study was conducted. Where possible, the difficulties encountered in obtaining that information are noted, but two cautions are appropriate. The Boardman project was still in an early and controversial development stage when the study visit occurred, so much of the needed information has now undoubtedly been acquired. Also, the blame for the informational deficiencies that are noted should not be attributed to any party, particulary the consultanting engineers. On the contrary, the indications are that the information problem is endemic to the hydro development process and that improvements in the process, and not in individual performances, offer the best prospect of assuring that developers, like the joint venture, acquire information necessary to make good judgments in the early stages of a project.

1. Required Permits And Other Legal Implications

In order to make an informed judgment about the desirability of proceeding with a project that has prima facia economic feasibility, the developers must be, at least, generally familiar with any legal hurdles which must be overcome. That is,they must know at an early point, what licenses and permits will be required and what will be involved in obtaining them. Some of this information is readily available through phamplets and handouts supplied on request by the affected agencies. Supplying other necessary details entails a more difficult search through phone calls and personal interviews. Some information, such as predicted licensing delays, costs of needed experts and probabilities of significant opposition, is particularly elusive. The reasons for failure to obtain such information are discussed below, but at this point, it is sufficient to note that the joint venture will have to acquire a better understanding of the toal legal environoment facing its intended development before proceeding much further with its plans.

The primary legal prerequisite to construction and operation of a hydroelectric generating facility is a license issued by the Federal Energy Regulatory Commission (FERC). At the point when interviews were conducted, the joint venture development decision makers appeared to possess little knowledge of the FERC licensing process and requirements. The fact of FERC jurisdiction was known and it was assumed that a federal short form application could be used. There had apparently been no consideration of the probability that FERC would consider the five sites together as one major project, although Emery and Porter had recently informed TCL&P and the county of the FERC proposed rule-making on major projects at existing dams. The only other federal hurdles apparently considered by the developers as yet are the Water Pollution Control Act, Section 402 requiring a National Pollution Discharge Elimination System (NPDES) permit for discharge of point source

pollutants, and Section 404 requiring a U.S. Army Corps of Engineers' permit to discharge dredge and fill materials into a navigable stream. Among others, the Fish and Wildlife Coordination Act, [75] the National Environmental Policy Act, [76] and the National Historic Preservation Act [77] may also significantly affect hydroelectric development of the Boardman River and thus should be incorpoarated into the County's or TCL&P's thinking at an early point in the process. Additionally, the substantial differences between the time, complexity and probable success of an attempted federal licensing of Keystone Dam, with its need for impoundment restoration, and the remainder of the sites in the five dam study should also be more carefully considered. Information on these legal issues is available, from FERC and DOE for instance, but the need for the information is not readily apparent to new developers. Even where this need is appreciated, many developers just do not know how to initiate the required search. Both county and city officials, for example, were somewhat at a loss to explain where they would turn next to acquire the needed federal licensing requirement information. State and local environmental and energy officials appeared generally aware of this need but it would seem that the transmission of such information to the developers could be improved.

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75 16 U.S.C. § 661 et seq. (1976).

76 42 U.S.C. § 4321 et seq. (1976).

77 16 U.S.C. § 470 et seq. (1976).

The joint venture participants will also need to expand the knowledge of the state requirements facing this project. Michigan legislation directly pertinent to the project is identified by the feasibility study but more information is needed to insure compliance and fully assess the impact of the state licensing scheme on the development. For example, necessary permits are listed in the feasibility study, but the process and requirements for obtaining them are not yet known. The probability that the development will be determined to be a "major action" requiring preparation of an environmental impact statement and review by the Michigan Environmental Review Board has not been considered. The degree of attention alloted to the Michigan Environmental Protection Act and the Natural Rivers Act to date belies their considerable significance to the project.

All of this information, is apparently available in some form, from the relevant agencies. That is, any developer, or the feasibility engineer, could obtain guidance on probable requirements through direct communciation with some division of the Michigan DNR. The quality and completeness of the information obtained would depend heavily on such variables as the experience, cooperativeness and accessibility of the agency contact, as well as the nature of the questions asked. It would seem obvious that a less variable, more reliable procedure for disseminating information on the probable state requirements for the licensing of a hydroelectric project in Michigan should be developed.

2. Evnironmental Implications

A complete environmental impact statement has not yet been prepared for the project. The feasibility study, however, does identify certain environmental effects that hydroelectric development at the five dam sites might precipitate. This information is useful, but a fairly extensive examination of potential environmental difficulties is desirable as soon as possible to avoid subsequent surprise opposition which could retard development. That is, while the preparation of exhaustive environmental assessment seems premature for this stage of the project, a developer should achieve a good understanding of the probable major environmental objections to an intended development, and the reasons underlying such objections, prior to deciding to proceed with licensing. [78] This should not be as much of a burden as it might seem since much of the needed information could be obtained from environmental groups, DNR and private environmental experts, and more experienced developers.

For example, the impoundment level fluctuation problem has a number of subtle implications. The feasibility study indicates that scheduled releases from the impoundments will have to maintain minimum stream flows and cause minimal pond level fluctuation. [79] The environmental reasons given for these restrictions are that they are essential to the assimilation of

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DNR apparently believes that a hydroelectric developer should incorporate environmental impact statement in the feasibility study. This may not be as shocking as it might appear since some DNR conceded that it would have found the Boardman study adequate in this regard, with the exception of few particulars.

79
Supra. note 2.

wastewater discharged at the outlet of Boardman Lake, the maintenance of water-fowl open-water habitat at the inlet to Boardman Lake, the maintenance of trout fisheries located along a three-fourths mile stretch of the Boardman River below Brown Bridge Dam, and the minimization of bank erosion at the impoundments. [80] However, further implications of improper water management on the Boardman should be anticipated by the developers. Fluctuating flows may destroy stream bank vegetation, cause extensive siltation pollution and destroy significant riverine species habitat throughout the Boardman River. [81] Fluctuating impoundment levels may affect spawning of lake fish species, destroy vegetation for fish and wildlife and create biologically impoverished "draw down zones." Alteration of water flow and material transport not only can degrade wetland and terrestrial flood plain habitats near the impoundments, but may also affect estuarine and coastal habitats near the mouth of the Boardman. [82]

Similarly, the effects of stabilized flows on the Boardman merit a more detailed analysis. A properly managed co-dependent hydroelectric system could provide benefits to the established riverine and lacustrine environments on the Boardman River by stabilizing flows and pond levels, as the feasibility study indicates. [83]

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80 Id. at § 6.4.3.

81 Meeting with Leon Coole, Water Resource Management Division, Michigan DNR (June 6, 1979).

82 Meeting with Thomas Doyle, Fisheries Division, Michigan DNR (June 6, 1979).

83 Supra note 2, at § 6.7.2.

Information on how such a system would be accomplished by the project and what improvements over the existing flow regime would be obtained could be quite valuable to the developers, and its early acquisition could even help attract additional public support.

The possible reconstruction of Keystone Dam and the resulting creation of a new impoundment on the Boardman River also raise environmental issues deserving greater attention. The elimination of approximately one mile of riverine and flood plain habitats and the downstream effects that will result are not considered by the study, although the developers have discussed such matters. Without question, additional information concerning, the effects of erosion, alteration of downstream thermal regime, disruption of nutrient and sediment flows and release of soil chemicals is needed to adequately judge the environmental consequences of resurrecting Keystone Dam. A thorough analysis of these factors is particularly important in view of the heavy burden the developers will bear in justifying the restoration of the impoundment to FERC, as well as DNR and probable environmental intervenors.

Finally, even the fishladder issue, which has been the focus of considerable public discussion to date, should be analyzed in greater detail. The dams on the Boardman River do not presently provide passage for anadromous fish species. The environmental implications of providing fish passage along with hydroelectric generating capability at the dams have not yet been considered though the legal and economic implications have received great attention. [84]

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84 Id. at § 6.8.

The effects of introducing anadromous fish species (particulary salmon and steelhead trout) to the Boardman's cold water trout fisheries as discussed below, is an issue deserving of considerable investigation.

The point to be made here is that it is clearly to the developer's advantage to obtain a fairly comprehensive analysis of the evironmental implication of the development during the early stages of the study. Only then can the developer accurately judge the difficulty to be expected in overcoming potential environmental opposition, as well as prepare for or perhaps avert, any future conflicts. Information sufficient to satisfy a developer's initial needs in this area is apparently available in Michigan, and elsewhere. What is not so readily available is an awareness of the value of this information at the planning stage, or a knowledge of the best methods for obtaining it.

3. Recreational Implications

A third factor to be considered in an early stage in the project is the effects of development on the recreational assets of the Boardman River. The feasibility study concludes that effects on recreational uses will be minimal and since the system is projected as an essentially run of the river operation, this conclusion is probably justified.[85] Nevertheless it would seem desirable for the developers to consider information concerning the effects of non-natural flows on boating and swimming in the impoundments, canoeing, and sport fishing to properly weigh recreational implications of hydroelectric generation into the final project decision. The potential benefits of another impoundment and the need for additional recreational

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85 Id. at § 7.2.2.2.

facilities might also be considered. Certainly the Michigan DNR's current inclination to start charging a hydro site owner for the recreational facilities it deems required at that location should be noted. Additionally, it would be useful for the developers to learn about the likely federal recreational facility and reporting requirements to be expected.

The availability of this information is much the same as for the licensing and environmental information discussed above; developer access could be improved.

4. Socio-Institutional Implications

The feasibility study staff participated in meetings with planning commissions, township boards, the Department of Natural Resources, and a vast array of other governmental entities and local organizations to gauge socio-institutional factors that may bear on development. Unfortunately there was no apparent communication with any environmental groups. Contacting these groups at an early stage in the process can lead to the discovery of significant points of concern which if ignored could surface as adverse impacts at a number of points during federal and state licensing. Moreover, the developers' assumption of generally ambivalent to favorable attitudes of organizations and agencies likely to be concerned with the project seems inappropriate in view of the substantial political controversy surrounding the Boardman fish ladder question and the implications of DNR's impending hydro policy formulation. [86] Finally, there is no indication that the developers have fully considered the socio-institutional factors that tend to favor hydroelectric development; factors such as power's utilization of a locally available renewable resource which reduces

86 Meeting with Dennis Tierney, Deputy Director, Michigan DNR, Lansing, Michigan (June 7, 1979).

fossil fuel and nuclear dependency.

Information is available about these issues, but it is not as readily accessible as for the other categories mentioned here. It is certainly not available from any single source, but a significant improvement in the developers' awareness of these factors could be achieved though resort to a few key people in the local area and at the state capital. Methods for access to this information could clearly be enhanced.

5. Reasons for the Lack of Information

There are a number of major reasons for the informational difficulties experienced to date by the joint venture team. Some of these have already been mentioned, but these are all sufficiently important to merit separate treatment. The relative contribution of each problem to the project's total informational deficiency cannot be ascertained with certainty since one is necessarily interrelated to one or more of the others. Nevertheless, each factor, alone, is a significant barrier to the attainment of necessary knowledge.

Before discussing the direct causes of the Boardman informational problems, it is appropriate to address the condition underlying all of these problems. Our society has witnessed substantial increases in regulation and corresponding reductions of property owner autonomy over the last several years. There has been an attendant increase in the institutional and legal complexities entailed in any major development effort. Hydoelectric development, even at existing dams and impoundments, has not been immune from this change. Of course, this general phenomenon is well known but some of its implications are still not completely appreciated by all developers and their consultants. That is, there has been a decided shift

in the relative importance of the technical and legal socio-institutional aspects of developing a hydro project. Engineering factors remain important but the need to determine the institutional feasibility of a project has become equally important. Here, where the developers are not keenly aware of this need, much available development information will not be obtained, or even sought.

Inexperience is a possible reason for the developers' lack of information at this stage. The consultant - engineering firm engaged to conduct the study has never before performed such a hydroelectric development assessment. Neither the study staff nor any of the developers were familiar with the federal and state laws and regulations relating to the project, or the possible enviromental consequences associated with hydroelectric generation. Without the benefit of a practical reference, the relative importance of particular information was difficult to assess. Some relevant information was simply not attainable.

This lack of experience was compounded by deficiencies in the information resources available to the development team. While technical information, such as Boardman River hydrological data and equipment specifications , was accessible, [87] guidance on the numerous non-engineering aspects of hydroelectric development was more elusive.

Several staff members did attend conferences on hydroelectric power,

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87 Hydrological data was obtained from USGS survey Water Data Reports. Information on generation equipment was obtained by correspondence with various manufacturers. Supra note 2; at § 6.4.1.

where they obtained some useful, otherwise inaccessible information.[88] However, access to a thorough analysis of legal and institutional factors bearing on their development was limited as a guide to the staff's own efforts. The same was true of the potential environmental implications of hydroelectric development and operation. Materials requested of the Federal Energy Regulatory Commission concerning its licensing process and requirements were never received.[89] The Michigan Department of Natural Resources, though cooperative, was just beginning to formulate an overall policy assessment of hydroelectric development. Michigan's Energy Administration has no personnel devoted to the hydroelectric field. The relative unavailability of authoritative guidance left developers and the feasibiltiy study staff to their own resources to arrive at a comprehensive assessment of the development project.

A closely related variant of the lack of information resources problem concerns the delicate process involved in dealing with some of the best sources of the needed information. That is, FERC and affected state regulatory agencies such as DNR possess much of the information a developer should acquire to adequately evaluate the merits of the project. However, no matter how cooperative they may be, these same agencies will be passing judgment on the project during the licensing process. There would seem to be

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88 Midwest Regional Conference, May 23-25, 1978, Small Low Head Hydro-Electrical Power, Michigan State University, East Lansing, Michigan. This conference, however, was largely devoted to the engineering aspects of hydropower.

89 Meeting with Don Emery, Emery and Porter, Inc. (June 4, 1979).

communication inhibitions inherent in this arrangement. That is, both developers and the potential regulators would seem to be understandably reluctant to divulge information which might later be used against them. This leads to defensive posturing which severely restricts information transfer. That is not to say information is un-available from these agencies, but the task of obtaining it frequently requires a good bit of tact and diplomacy.

Another major reason for the joint venture study team's lack of completely objective information was their understandable pro development bias. That is, to the extent the developers approach the project with a preconceived commitment to completion, information favorable to proceeding may be highlighted, while obstacles may be de-emphasized. Of course, a healthy belief in the merits of an anticipated hydro development is desirable, perhaps necessary. Care must be taken, however, to insure that this does not engender an inaccurate impression that development will be easy; this can hinder discovery of significant project obstacles.

Also complicating the acquisition of necessary knowledge beyond that contained in the feasibility study is that two separate government entities are involved in the development. Not surprisingly, each is attempting to maximize its own gains from the project. Since the parties are presently bargaining over the responsibilities and benefits each will receive, neither is willing to share information that might weaken their bargaining position and both are inflating the importance of information that strengthens their position. Thus where information is known by one party to the development,

it cannot be considered a part of the decision base unless both TCL&P and the County possess the information.

Finally, there is a category of information of considerable potential value to hydro developments which is essentially unattainable. Reliable advance information about a DNR's internal politics or impending policy shifts, for instance, is practically unavailable, and almost obsolete even when discovered. Moreover, accurate projections about licensing delays and the costs of assembling the resources necessary to survive the licensing process are virtually impossible to make. The developer may be faced with a significant dilemma here since, if the licensing delay or cost is significant, it must be known in advance.

6. Effect on Development

Regardless of the reasons for the lack of information upon which Grand Traverse County and TCL&P can base a decision, this inadequacy presents a significant barrier to hydroelectric development.

To date, lack of information has been partially responsible for the County and TCL&P delaying a final commitment to the development project. Uncertainty exists as to what is the proper next step to take toward proceeding with development, and whether a step should be taken at all.

The lack of legal information tends to raise expectations of an easy permitting process and that the development will be in compliance with the law. The information acquired to date on environmental effects creates the misleading impression that there will be few if any environmental objections. There is also a false sense of security that socio-institutional factors (aside from public sentiment concerning installation of fish ladders) will be of minor consequence to the project. All these potential misconceptions may lead to a less than optimum development scheme.

During development, incomplete prior information may cause unnecessary delays and costs if, for example, the proper timing of permit approval was incorrectly estimated or needless prolonged litigation arises because an environmental implication was not properly considered. Unnecessary modifications of the project may also be made if the information upon which the modification is based is not complete or accurate.

During licensing, prior failures to obtain necessary information may be reflected in unnecessarily strained developer-regulator relations. Thus, if input from all of the appropriate divisions of the state DNR is not obtained and manifested, the Department, or some of its major sections, could become convinced that it was not being taken seriously. This could easily lead to a covertly, or even overtly hostile attitude and harder line on borderline development problems. At a minimum, the permitting process could become considerably more protracted.

C. Legal Relationship Between The Developers

Both Traverse City and Grand Traverse County possess resources of value to the development of the Boardman River's hydroelectric potential. The City owns three of the dam sites being considered for development and existing distribution and marketing facilities that can carry the electricity generated to the consumers. TCL&P also has valuable experience in the electrical utility business. The County owns two dam sites at which development is most feasible. Additionally, each has economic resources available (i.e., bonding authority) to fund the project.

A cooperative arrangement between the County and TCL&P combining these resources would result in a more comprehensive hydroelectric development of the Boardman than each developing alone. Presently, the attorneys for Traverse City and Grand Traverse County are negotiating such an arrangement.

Through the arrangement, TCL&P expects to receive the right to market all the power generated at all the dam sites developed. The County's expectations are to maintain control of its dams so as to ensure the impoundments' values to the county nature reserve, and to obtain a steady flow of revenue from the power sold. [90]

Negotiations between political bodies are usually very trying, and the present situation is not an exception. The major issue is the value of the resources each has to offer. The County and the City are being very coy in bargaining over an appropriate allocation of the costs and profits of development. The County Coordinator is contending that the County does not need TCL&P

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90 Meeting with Peter Doen, Traverse City Attorney, Traverse City, Michigan (June 5, 1979).

that it can wholesale the power to other utilities or use it to meet its own needs. Meanwhile, the City is asserting that the county dams are virtually worthless.

One possible satisfactory agreement would involve sale of the county dams to TCL&P with the County retaining an easement to use the impoundments for recreational purposes. TCL&P could then develop and operate hydroelectric facilities at the dams sites in any amnner so long as it did not interfere with the County's interests (i.e., the impoundments would have to be maintained). No state legal problems arise under such a transfer since no joint activity is involved. TCL&P and the County are empowered by state law to acquire and convey property. Payment could be by installment to yield the County its desired flow of income. The second option is essentially the reverse of the first. The County would grant an easement to TCL&P to use the county dams for developing and operating hydroelectric facilities. The County would maintain the dams subject to TCL&P's interest.

The most attractive option available is an agreement between TCL&P and Grand Traverse County to pool their resources and cooperatively develop the hydroelectric potential of the Boardman River. The Michigan Energy Employment Act of 1976 provides the necessary state statutory authority for such a joint activity. By authority of this act, TCL&P and the County would contractually agree to form a joint venture. Each would obtain an undivided interest as a tenant-in-common in any development undertaken by the venture. The share of ownership is proportional to the amount of resources contributed to the project. TCL&P would contribute its dam sites, necessary transmission facilities, utility expertise, and development monies. To this, the County would add its dams and monetary assistance. Neither the County nor TCL&P would be liable for the acts or debts of the other, and the

assets contributed by one could not be credited to the other.

The County would then be entitled to a percentage of the revenue generated by the project in proportion to its ownership share in the project. TCL&P would market the power and likewise receive a percentage of the revenue. Additionally, the county would retain control of its dams through membership in the venture.

The joint venture itself would be the licensee of the development project as it would have the property interests required by FERC. [91]

By pooling their resources, Grand Traverse County and Traverse City can realize a more economical development of the Boardman. How much development is economical is considered in the following section.

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The contract between the City and the County would have to stipulate that the property rights would remain with the venture regardless of either party leaving the venture.

D. ECONOMIC VIABILITY

1. INTRODUCTION

Before the four Boardman River hydroelectric sites can be developed, a full financial analysis of the project is needed. Each of the four proposed redevelopments should be proven independently feasible, before development should continue. While certain conditions may make it appropriate to analyze the financial feasibility of a group of sites as one unit, that is not the case here. For instance, each site will be fitted with completely different turbines and generators which make purchase from a single source unlikely. Additionally, the project costs for sites are so disparate that their combination for analytical purposes is likely to be misleading. As a municipality, Traverse City enjoys several financial advantages. It does not pay income or real estate taxes. It can issue tax free bonds which make its financing costs lower. In addition, the city obtained partial federal financing of the Boardman feasibility study, a direct subsidy for the development of the project. Despite these advantages, the project must still be proven financially feasible.

One method of demonstrating the feasibility of this project is to compare the payments required to operate each of the four generating facilities with the revenues required to operate the same amount of capacity in an equivalent alternative facility. An example of this analysis is provided below, where the cash payments required to operate each of the four sites and to operate equivalent alternative facilities are discussed. Profits and losses, as defined in accrual accounting, are not examined in this feasibility analysis. Only the actual cash flows resulting from the development of a

hydroelectric facility are evaluated.

In order to project these cash flows, the capital investment in the proposed development is estimated. From the total investment figure, annual debt service and required return on this investment are derived. Annual payments to a decomissioning sinking fund are estimated. Finally, annual operating expenses are projected for the next 40 years. All these represent the negative cash flows incurred in the operation of the project.

The capital committed to a hydroelectric project at one time are compared with funds required to operate another power facility of equal capacity. These cash flows from a project represent the real flows of resources to TCL&P. Because resources can be used in alternative ways, the timings as well as the magnitude of these payments is evaluated. A time value is attached to money. A dollar used in one of the Boardman projects cannot be invested in another generating facility. The cost of the debt borrowed is the time value of money. Using present worth analysis, as explained below, both the magnitude and timing of cash flows from the Boardman projects are evaluated. To undertake a financial analysis, projections about the future must be made. The final capital cost of each hydroelectric development has been estimated, along with debt service payments and future operating expenses. The cash flows required to produce energy in other ways have been researched. The positive cash flows resulting from the revenues from energy sales have also been projected. Each of these projections represents an informed judgment about the future. Inevitably, some of these judgments will be proven incorrect. The assumptions used in this analysis are listed in the footnotes that accompany this text.

2. SPECIAL ASPECTS OF HYDROELECTRIC PROJECTS

For the purposes of financial analysis, a hydroelectric facility warrants special consideration for at least two of its characteristics. First, hydroelectric generating stations have an unusually long life. Second, the initial capital investment in a hydroelectric facility is large relative to its annual operating expenses. A third factor, inflation, may substantially affect the feasibility of proposed projects, and hence must also be examined.

Water powered generating stations may continue to produce electricity for over one hundred years. The generators at Brown Bridge Dam have been operating for fifty-eight (58) years.[92] In contrast, the useful life of a nuclear plant is 30 years and the life of manufacturing equipment can be as short as two or three years. Because the life of hydroelectric plants is long, debt service payments on the initial investment may be spread over a long period of time. Revenues may be received over an even longer period.

Second, the initial capital investment in a hydroelectric plant is large relative to other generating facilities. The hydroelectric generating stations proposed at Boardman River Dams may cost from $1,500. to over $6,500 per KW to construct.[93] In contrast, baseload generating facilities' costs range from less than $1000 to $2000 per KW, and combined cycle facilities under $1000 per KW. The larger capital cost per KW of hydroelectric capacity results in larger annual debt service payments for these facilities.

On the other hand, variable operating expenses for a hydroelectric facility may be quite small compared to the operating expenses for a fossil

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92 Supra note 2 at 6.1.5.

93 Id. Appendix F.

fueled or nuclear facility. The variable operating costs of a recently proposed mix of nuclear and coal plants available to TCL&P are estimated to be sixteen mills/KWH. [94]

Those of Traverse City Power and Light's Bayside Plant are currently twenty-nine mills/KWH. In contrast, the variable operating expenses at the proposed Boardman Lake Dam are less than one mill per KWH. [95]

In times of inflation, the mix of debt service and operating expense will strongly affect the total payments required to operate a generating station in the future. Debt service payments are fixed for the life of the plant. On the other hand, operating expenses can be expected to increase with inflation and price changes. Operating expenses, exclusive of fuel costs, may increase at a rate close to the rate of inflation. Fuel prices, a larger portion of the variable costs for a fossil fueled or nuclear facility, may in the future, increase much faster than the rate of inflation. Because operating expense constitute a smaller portion of annual cash flows for a hydroelectric facility, the total payments will increase at a slower rate over time.

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94 Supra note 64, at Chapter 6, Exhibit C.

95 Id. at Chapter 7, Exhibit P.

3. CAPITOL INVESTMENT

In the following section, investment costs involved in the Boardman projects are discussed below.

For those hydroelectric generation stations, investment costs include: generator and turbine equipment costs, engineering fees, the cost of land purchased for a powerhouse, payments for modification and structural repair of a dam, interest during construction, the cost of a canoe portage, remote operating equipment, and the possible cost of fish ladders.

Below, the capital investment costs of the proposed Boardman projects, both with and without fish ladders, are listed:

PROJECT	CAPACITY	COST WITHOUT LADDER * [96]	COST WITH LADDER *
Boardman Lake	963 KW	$1,505,400 ($1,563)	$2,776,400 ($2,883)
Sabin	484 KW	$ 708,640 (1,464)	$1,328,640 ($2,745)
Union Street	221 KW	$1,160,540 ($5,251)	$1,439,540 ($6,514)
Keystone	466 KW	$2,527,350 ($5,423)	$3,147,350 ($6,753)

*Figures in parentheses are cost/KW

There are two capital investments that are more or less unique to hydroelectric facilities. First, a developer may purchase water rights on the stream he is developing. In doing so, the developer purchases the fuel for the hydroelectric facility. Because this fuel is used throughout the life

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96 Supra note 2, at Figure 7.16 and Appendix F.

of the facility, this purchase may be capitalized.

Two of the four Boardman River sites, Union Street and Keystone Dams, are currently owned by Traverse City. The other two dams, Boardman and Sabin, are owned by Grand Traverse County. Apparently, Grand Traverse County would prefer to lease two dams to TCL&P. While an easement for the use of these sites may be sold to TCL&P, the County would prefer an annual return from its dams to a lump sum payment. For the purpose of this feasibility analysis, it is assumed that annual rental fees will be paid on any proposed sites. A hydroelectric project incurs relatively unique regulatory costs to obtain the privilege of producing energy at the site. These may be capitalized also. At a minimum, regulatory costs for the developer include any direct license fees paid to government agencies to obtain approval of the project. Of greater magnitude are the costs incurred to prepare and present license applications and studies required by governmental agencies.

These indirect licensing costs are substantial, but cannot easily be quantified. They include: labor costs in preparing applications, legal fees, consultants' fees, engineers' fees, and printing costs. In addition, when regulations delay the completion of a project, the interest on funds borrowed to build the project and incurred during the period of regulatory delay can be categorized as a regulatory cost. Project modifications made at the behest of regulators are also costs attributable to regulation. Finally, any price increase for equipment or construction that occurs during a period of regulatory delay may be attributed to that delay and hence regarded as regulatory costs. Needless to say, regulatory costs may substantially increase investment costs. It is, however, virtually impossible to accurately estimate the regulatory costs incurred on a specific project. Both standard accounting practices and federally mandated accounting practices for utilities tend to obscure these costs. They are recorded in

in numerous accounts. (At this point, only direct and indirect costs are considered. Changes in the risk associated with a project that result from regulatory delay are considered later in this section.) Nevertheless, some of the regulatory costs affecting the TCL&P sites may be estimated. Below is a table of some of the regulatory costs that could be incurred to develop these projects:[97]

ITEM	SABIN	BOARDMAN	UNION STREET	KEYSTONE
	(Dollars of total investment)			
1. Fish Ladder	620,000	1,271,000	279,000	620,000
2. Canoe Portage	2,000	2,000		
3. Cost Savings lost from a two year regulatory delay assuming no fish ladder requirements	46,708*	88,367*	0*	0*

*(Present value of two years of cost savings when compared to the purchased power alternative.)

For the purposes of this table, it is assumed that: first, without regulations, fish ladders and canoe portages would not be needed. In addition, it is conservatively assumed that the cost of constructing these projects escalates five precent per annum during a two year regulatory delay. A two year regulatory delay for these projects is not unreasonable. As discussed elsewhere in this report, considerable controversy surrounds the redevelopment of these sites. No other regulatory costs were included in the chart. Undoubtedly, there are others. In particular, the regulatory costs of rebuilding Keystone Dam may be prohibitive.

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97 Id. Appendix F in 1978 dollars.

As regulatory costs for a project mount, the capital investment in the project increases. These regulatory costs eventually increase required debt service payments. As these payments increase, other utility plant investments may become more attractive to a developer. If the regulatory costs for hydroelectric generation on the Boardman escalate enough, the project may become unfeasible.

Thus, the capital investment includes: construction costs, the costs of licensing, and any increases in these costs attributable to regulation. This investment will be financed with debt raised by the developer. To determine the cash flows required for a particular project, debt service requirements must be estimated. Before they can be done, a project life must first be defined.

4. PROJECT LIFE

There are at least four possible definitions of project life. These are: physical life, useful life, debt life, and financial life. Each must be defined to calculate the cash flow required for a project. The analysis of these four definitions of project life follows as they apply to TCL&P's proposed development.

The physical life of a hydroelectric generating plant is the expected life of major turbine or generator equipment or the life of licenses issued or leases held on a site. If properly maintained, any hydroelectric equipment installed on the Boardman may last over one hundred years. As noted above, the turbines and generators at Brown Bridge Dam have been operating for fifty-eight years and are expected to continue generating electricity for at least another forty years. The FERC is currently issuing licenses for hydroelectric development for periods ranging from thirty to fifty years. For the purposes of the analysis which follows, a physical life of fifty years is assumed.

The useful life of a hydroelectric development is the period over which sales of the energy output of the project will be made. In many cases, the useful life equals the physical life as defined above. However, the useful life is further constrained. A project is no longer useful when a developer ceases to recover the variable costs of producing energy. Were a photovoltaic cell developed which could produce electricity for less than 1 mill per KWH, it is possible that a hydroelectric operator could no longer recover operation and maintenance expenses on the plant. If the developer sold energy to a utility at one mill, he would be unlikely to recover any of these costs. If variable costs are not recovered, a developer would not have any funds available to cover fixed costs. When a developer is not meeting any fixed costs, it will close the plant.

The debt life is the period during which any funds borrowed or equity used must be repaid. Typically, the debt life for a hydroelectric project would extend from fifteen to thirty-five years. Traverse City Light, with its Aa bond rating, should be able to float twenty-five year bonds. The twenty-five year term is isued to calculate the annual bond sinking fund payment required in order to repay bond principal. The annual bond sinking fund payments for each of the Boardman River dams follow. The bonds are assumed to be floated in 1982 for a twenty-five year term. The capital costs are inflated into 1982 terms. A twenty-five year, seven percent interest sinking fund is used for sinking fund payments. It is also assumed that no fish ladders are required.

ANNUAL SINKING FUND PAYMENTS
IN DOLLARS

Sabin	Boardman	Union Street	Keystone
12,969	27,552	21,240	46,257

In addition, interest would have to be paid each year on these bonds. The annual interest payments on the four Boardman projects at a rate of seven percent per annum follows:

ANNUAL INTEREST PAYMENTS
IN DOLLARS

Sabin	Boardman	Union Street	Keystone
57,423	121,988	94,042	204,801

These combined principal and interest payments are fixed for the developer over the period of borrowing.

The financial life of a project is the time period used to analyze cash flows. It is always shorter than the useful life of the development. The financial life for this project is assumed to be forty years. Using present worth analysis, as described below, the cash flows of the project are compared with those from alternative projects. To be deemed financially feasible, a project must have either a lower present worth of required revenue, or a higher net present value than alternative projects during its financial life.

The project life for feasibility purposes must always be shorter than the useful life of the project. In order to develop cash flows used in the feasibility analysis, a debt life must also be determined. Both of these lives are shorter than the useful life of the project.

5. DECOMMISSIONING COSTS

When evaluating TCL&P's proposed development, all cash flows that occur during the life of the project must be estimated. Capital costs are incurred at the beginning of the project. At the end, TCL&P must decommission the plant. To prevent misallocation of charges to the municipality's customers, cash should be set aside throughout the life of a plant in anticipation of decommissioning. If TCL&P did not set aside revenues from customers to cover decommissioning, later customers, who had not received the benefits of the electricity produced, would be burdened with payments for decommissioning.

Emery and Porter estimated the 1978 decommissioning costs of dams at $90,000 without fish ladders and at $100,000 with fish ladders. Assuming five percent annual price change for decommissioning costs, it would cost $770,144 to decommission these plants without ladders in 2022. The annual sinking fund payments, required to accumulate $770,144 by 2022, assuming a constant seven percent interest rate would be $3,858. Similarly, for developments with fish ladders, the annual decommissioning payment would be $4,501. as all decommissioning payments can be attributed to regulation. Decommissioning payments must be made each year to fund a sinking fund.

Operating costs are incurred by the developer each year to produce electricity. These are the annual cash flows required to produce the electric energy from the turbines and generators. Periodic maintenance of dams, turbines, and generators are considered operating costs. So are the labor and annual property tax payments associated with the plant. Any dam user fee or water tax is also an operating expense. Such payments are similar to fuel expenses in conventional plants.

The estimated annual operating payments required for the four proposed Boardman River sites are as follows:

[98]

OPERATING EXPENSES
(1978 DOLLARS)

ITEM	SABIN	BOARDMAN	UNION STREET	KEYSTONE
Operation	1,635	1,635	4,235	4,235
Administrative	294	294	430	430
Insurance	3,000	3,000	3,000	6,750
Taxes	____	____	____	____
Maintenance and Repair	3,980	3,980	3,980	3,980
User Fee	*	*	____	____
	____	____	____	____
	8,909	8,909	11,645	15,395

[98] Id. Appendix F.

User fees at Sabin and Boardman dams are not specified for the following reasons: Grand Traverse County, the current owner of the dams, has not yet decided on the rent it plans to ask for Boardman and Sabin dams. The County can be expected to attempt to maximize the revenues it receives from the rental of these dams. However, if TCL&P rents the dams the burden of annual maintenance and any liability for dam failure might be removed from the County. Thus, the County could receive a real benefit from rental of the dams beyond any cash rental received.

TCL&P can be expected to negotiate for the minimum possible dam rental. Grand Traverse County may attempt to extract the maximum possible rental from their dams. However, if Grand Traverse County asks a large enough rental fee, the dams will not be found feasible and Grand Traverse County will receive no rental fee. Therefore, the maximum annual rental fee for Boardman and Sabin dams is dependant upon the difference between the revenues required for alternative generating facilities, and the revenue required to produce energy at those two dams. Any such rental fee can be determined only after a feasibility analysis is completed.

Operating expenses for fish ladders were not included in the above chart. Substantial operating expenses are expected for fish ladders.[99] In the analysis of feasibility which follows, operating expenses are arbitrarily increased twenty-five percent for dams with ladders.

Annual regulatory payments must be made by a developer. These include: annual fees, the costs of preparing annual reports, the annual maintenance and operating expenses on any facility or equipment built as a result of regulatory requirements, and any power generation foregone due to government regulation. From materials available to this study team, the exact magnitude

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99 Id.

of annual operating expenses attributable to regulation cannot be determined. As stated above, the operating expenses of a fossil fuel plant having similar capacity are much larger than operating expenses are for a hydro plant. Unlike debt service and decommissioning payments, the dollar amount of operating expenses can be expected to increase as a result of both inflation and price changes.

Inflation is a change in the general level of prices. It is measured by several indices including: the Consumer Price Index, the Wholesale Price Index, and the GNP Price Deflator. The rate of inflation indicates a general increase in the level of prices; it does not provide any information about changes in the prices of specific products. General operating expenses, with the exception, at this time, of fuel costs, incurred in the production of energy can be expected to parallel the rate of inflation. The annual increase in operating expenses will never exactly equal the rate of inflation, but the rates are normally similar. If the costs of operating a hydroelectric plant increase five percent annually, the annual cost of operating a facility can be expected to increase 2.65 times over a twenty year period. Thus, using these assumptions, the operating costs for the Boardman River Dams would be the following in 2002 after 20 years operation.

OPERATING COSTS
(2002)

Sabin	Boardman	Union Street	Keystone
28,732	28,732	37,556	49,650

Fuel costs, however, are increasing much faster than the rate of inflation. While the Wholesale Price Index increased 9.5 percent per year from 1973 to 1978, the price of coal increased 15.2% annually. Were this rate of price change for coal to continue over twenty years, the price would

increase to over seventeen times its previous price. At present, when inflation is rapid and large upward price changes in fossil fuel and fossil generation are occuring each year, hydroelectric development has become substantially more attractive.

As discussed above, fixed debt service cash flows are large relative to annual operating cash flows at hydroelectric facilities. In contrast, operating cash flows, including fuel payments, are large relative to debt service payments for a fossil fueled facility. Over the life of a fossil fuel facility, operating cash flows, exclusive of fuel payments, can be expected to increase at a rate similar to inflation. Fuel costs, if recent history is any guide, can be expected to increase even faster. Thus, the negative cash flows of a fossil fuel facility will increase rapidly each year.

The total payments required to operate the Boardman River hydroelectric plant in 1982 follow:

TOTAL ANNUAL PAYMENTS
(1982 DOLLARS)

Sabin	Boardman	Union Street	Keystone
82,650	170,198	122,640	263,116

Comparison with Alternative Plants
The Required Revenue Approach

TCL&P must build some sort of facility to meet its projected load growth. The managers of this municipal must decide what type of facility will result in the least cost to its customers. TCL&P must ask: "If I don't build this plant, what will I build in its place?" The hydroelectric generation facility is compared with an alternative generation facility that has the same generation characteristics (base or peak).

It is assumed that the developer will build some sort of facility. The developer attempts to ascertain which facility will require the smallest present worth of required revenues.

The alternative to a hydroelectric plant for TCL&P is a fossil or nuclear fueled plant. For a hydroelectric plant, debt service is fixed at a relatively high level. There are relatively low operating costs that escalate with inflation. The debt service for a fossil fueled facility is lower relative to operating payments. Thus in the early years, the hydroelectric facilities will require more revenues to provide new generation; in later years they may require less revenues.

6. PRESENT VALUE ANALYSIS

Cash flows that occur at different times must be compared. Present worth analysis is the method used to compare such cash flows.

Money is a good that is useful to an individual. It can be invested in alternative ways to produce a return. A dollar spent next year is less valuable to the utility than a dollar that must be spent today. In the interval of a year,TCL&P could have invested that dollar in another facility to serve customers.

To compare dollars spent in the future (exclusive of the effects of inflation), these dollars are discounted to their present worth. The discount rate used is the expected return on an investment for the developer. For one hundred percent bond financed investments, the expected return on investment is equal to the bond or loan interest rate. As mentioned earlier, TCL&P could probably float twenty-five year bonds for its hydroelectric development at a seven percent interest rate. Thus, seven percent is its discount rate.

To summarize, by choosing an appropriate discount rate, the developer is able to compare cash flows incurred at different times. For example, if

TCL&P feels that it needs to achieve a rate of return of seven percent per year, the discount rate would be seven percent. TCL&P would discount future cash flows by seven percent per annum. Thus, the net present worth of a dollar received in one year is 0.935. The present worth of a dollar received in two years is 0.873. A table for the present worth of one dollar received in future periods (discounted at seven percent) follows:

1.	$0.935
2.	0.873
3.	0.816
4.	0.763
5.	0.713
6.	0.666
7.	0.623
8.	0.582
9.	0.543
10.	0.508
20.	0.258
30.	0.131
40.	0.067

Discounting to present value allows the comparison of the required revenues described above. The revenue required in each period is discounted to present worth. The present worth of all cash flows is then summed. This sum of the present worths of the cash flows is the present worth of the required revenues (PWRR) for the project. The project with the smallest PWRR is the one the developer should find most feasible.

This analysis has been completed for each of the four Boardman River hydroelectric projects. In addition, a present worth of required revenue analysis of a group of alternative facilities has been completed. The least costly alternative to hydroelectric development would be the purchase of shares in coal and nuclear plants currently under construction by Consumer Electric Power Co. (CEPCO) and by Detroit Edison (DECO). A present worth of required revenue analysis was made of these plants in order to compare them with hydroelectric development on the Boardman. The underlying cost data from which the present value calculations were derived is given in the Appendix. To make the figures more comprehensible, all figures have been

converted to levelized cost per kilowatt hour. The levelized costs follow :

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LEVELIZED COSTS/KWH
(1982 Dollars)

PLANT	COST WITHOUT LADDERS	mills/KWH	COST WITH LADDERS
Boardman	28.4		56.2
Sabin	29.6		57.6
Union Street	94.8		____
Keystone	91.0		____
CEPCO/DECO	60.3		____

Clearly, development of Boardman and Sabin dams without fish ladders is feasible. With the addition of fish ladders, these dams become only marginally feasible. If fish ladders are required, the addition of user fees for Boardman or Sabin, or the operating costs of fish ladders might make either of these sites unfeasible. Needless to say, development at Union Street and Keystone dams would not be wise.

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Assumptions for levelized cost analysis:

a) inflation at five percent per year for all operating expenses and decommissioning;

b) interest on bonds and sinking funds at seven percent per year and a discount rate of 7.2% including financing transactions costs;

c) twenty five year sinking fund bonds;

d) forty year sinking fund for decommissioning;

e) comparison of required revenues over twelve years;

f) capital, operating, and decommissioning costs for fish ladders spread over Boardman and Sabin dams using a weighted average of energy production from the two sites;

g) the following formula was used to develop levelized cost per kilowatt-hour

Total Present Worth of Required Revenue: divided by KWH per year all divided by Discount multiplier (7.86);

h) information on CEPCO and DECO units adusted from power study information.

The feasibility of each of the five potential Boardman sites was not independently analyzed in the feasibility study. Instead, the group was analyzed cumulatively in the following manner. First, the sites were ordered by levelized cost per KWH, least cost first. Next, the net present value of the Brown Bridge was calculated. The net present value of the Brown Bridge and Boardman (the second least expensive) sites was then calculated. After this the net present value of the combination of Brown Bridge, Boardman, and Sabin sites was determined. In a similar fashion the Union Street site and then the Keystone site were incorporated into the cumulative net present value calculation.

There are currently operating generators at Brown Bridge. Little new construction or equipment is needed for the continued operation of this facility. Some periodic maintenance must be performed. The maintenance required at Brown Bridge does not constitute a new generation project. It should not be analyzed as a new hydroelectric facility.

When Boardman is added to Brown Bridge (assuming 5% energy price inflation), the two projects yield a net present value increase of $1.3 million. With the addition of Union Street to the above three, the present value is decreased over $400,000. Thus, Union Street must have a negative net present value. If analyzed alone, Union Street would be found financially infeasible. Similarly, when Keystone is added to the above four, net present value is further decreased. Thus, neither Keystone nor Union Street is independently feasible. All five groupings of projects show positive net present values. Because the projects are grouped from most feasible to least feasible, the grouping with the largest positive net present worth must be chosen. The correct financial choice might not, however, be obvious to one who is not familiar with present value analysis. Such a person might choose the grouping

with the most generation capacity that also has a positive net present value. If such a choice were made, two infeasible projects, Union Street and Keystone, would be developed.

Financial feasibility need not be the only criterion used in deciding to develop the Boardman River. There are many aspects of hydroelectric development which cannot be quantified easily in dollar terms. The hydroelectric development's environmental and other problems and benefits represent real economic costs and benefits to society. For example, society may reap significant benefits from the reduction in the utilization of less environmentally benign sources of energy, such as oil, coal and nuclear fired plants, that the development of a hydroelectric facility makes possible. Through its utilization of a renewable resource, a hydro facility also provides general societal benefits by reducing the amount of scarce fossil fuels necessary to produce a given quantity of electricity. Where a hydro facility is used to replace oil fired generation, the further societal benefits of reduced foreign energy source dependence and preservation of petroleum for less flexible applications are particularly noteworthy. Additionally, employment created during construction and operation of the dam, and water flow stablilization also represent benefits to society. These benefits accrue to society, not the developer. Thus, they are excluded from the feasibility analysis. Nevertheless, these are true benefits to society and should at least receive attention by policy makers and regulators equivalent to the way in which environmental costs are now quite appropriately considered.

E. FINANCING

1. BONDING

The City and the County will need to raise approximately $9,000,000[101] (including fishladders) to undertake the complete development of the Boardman system. Thus, a bond issue or series of issues will be necessary to provide the required financing.

While a number of bonding options are theoretically available to the venturers, it seems most likely that project financing will be obtained through the issuance of revenue bonds. Both the City and the County have authority to issue revenue bonds under the Revenue Bond Act of 1933.[102] Revenue bonds give the purchaser a lien on the revenues of the project,[103] but not on the project itself or on general tax revenues.

In the unlikely event the venture participants found revenue bonds undesirable, they could turn to general obligation bonds. The city has the authority under its charter to issue general obligation bonds[104] to cover such projects. The County would appear to have a comparable ability, although its authority to issue general obligation bonds to fund such a development is not nearly as express. Since Grand Traverse County is not a charter county, it derives its powers from the state constitution and state statutes. There are no state statutes that specifically grant counties authority to issue general obligation bonds for the organization or development of utilities, but counties may issue them for any permanent improvements, authorized by law, relating to

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101 Supra note 2.

102 MICH. COMP. LAWS§ 141.101 et seq. (MICH. STAT. ANN. § 5.2731 et seq. (Callaghan 1976)).

103 Id. § 141.101 (§5.2738).

104 Supra note 6.

county property or to public property under the control or management of county authorities.[105] Rehabilitation of the Sabin and Boardman dams would seem to fit this definition.

General obligation bonds are secured by the full faith and credit of the municipality. That is, the municipality pledges its tax revenues to pay the bond debt and is under a duty to impose sufficient taxes to retire them. This method of financing would generate significant problems for the City and the County. The Michigan Constitution imposes a limit on ad valorem taxes of 15 mills per dollar.[106] Bond issues are exempt from this limitation only if approved by the voters.[107] Any referendum on a bond issue for this project would likely run into difficulties on two grounds. First, the local opposition to fishladders would make it difficult to impose taxes for a project that involves their installation. Secondly, it is reasonable to expect opposition to taxes imposed to benefit the municipal utility providing service to only a portion of the county population, particularly since the municipality enjoys its own ability to generate tax revenues, as well as operating revenues from its utility. The combination of these probable objections would seem to make a county general obligation bond issue here somewhat unlikely.

In Michigan, revenue bonds have their own form of referendum problem. Although not subject to the constitutional requirement, revenue bonds may face a referendum by petition of 10% of the voters or 15,000 voters whichever is less.[108] Consequently, the opponents to the project, could by petition, force a referendum that would defeat financing the project.

The actual decision on what type of bonding issue will be floated will be made by Grand Traverse County Commissioners, and the Traverse City

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105 MICH. COMP. LAWS § 141.61 (MICH. STAT. ANN. § 5.2251 (Callaghan 1976)).

106 MICH. CONST. of 1963, art. IX, § 6.

107 Id.

108 MICH. COMP. LAWS § 141.133 (MICH. STAT. ANN. § 5.2763 (Callaghan 1979)).

Commissioners based on the recommendation of the Traverse City Light and Power Board.[109] Before this decision is made, Traverse City and Grand Traverse County must, of course, resolve the question of their legal relationship in this project and develop a structure to implement that relationship. Before this can occur, the two parties must reach an agreement on what benefit each is to derive from the development.

At this point, Traverse City and Grant Traverse County perceive several options for financing, although those perceptions are somewhat colored by the ongoing negotiations process to establish the proper valuation of the County contribution to the project. That is, it is to the County's advantage to maximize the benefit it can bring to the project at this point, while it is to the city's advange to minimize them. Thus, the County has suggested that it could benefit project financing by making use of its superior bond rating. The current county rating is Aa, the city's A. To take advantage of its rating, the County would sell the bonds for the project, providing the City with the capital it needs in its role as developer, then sell an easment to the City to operate its dams. The easement would be paid in installments from revenues derived from the project's electricity sales.

The ability of this arrangement to reduce project financing costs is questionable. When queried on this subject, a number of financing institutions observed that the bond rating for the project will be determined by assessing the development as a whole, and hence the actual rating assigned would depend as much, if not more so, on the County's most recent bond rating. In fact, when revenue bonds are placed on the market, the investors look to the source of the revenue.[110] Thus, the bond rating most relevant to a projection of project

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109 Supra note 6.

110 Telephone conversation with Chuck Moon, Bond Counsel with Dickinson, Wright and Moon, Detroit, Mich. (August 3, 1979).

financing costs would be that of the Traverse City Light and Power Department which was most recently Aa. However, it should be noted that a public entity's previous general obligation or revenue bond ratings provide little insight into the probable rating for its future general obligation or revenue bonds.

Given that the County cannot provide a rating advantage in a revenue bond issue, this arrangement appears unnecessarily cumbersome. It would seem that the most direct and obvious answer would be to have the Traverse City Light and Power Development sell the electrical utility revenue bonds needed for the project.

Another possible option is some kind of split with the City and the County each selling some share of the bonds. This poses marketing problems. The bond market will look more favorably on a single large issue than two smaller ones because of the transaction costs.[111]

Before the bond issue is offered, Traverse City and Grand Traverse County will have to conclude their negotiations and establish a final legal and financial relationship. The Revenue Bond Act requires that the rate for services be set before the bonds are offered for sale and the issue must be approved by the Municipal Finance Commission.[112] The Commission will consider whether the bonds conform to provisions of the Revenue Bond Act, whether the probable revenues are sufficient or excessive for the purpose for which they are to be issued.[113] The level of revenue in relation to the debt service is critical to the sale of the bond and currently the market requires a net

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111 Id.

112 MICH. COMP. LAWS §§ 141.121, 141.127 (MICH. STAT. ANN. §§ 5.2751, 5.2757 (Callaghan 1979)).

113 Id.

revenue to debt service ratio of 1.25 to 1.4. Net revenues are revenues minus operating expenses and costs.[114] Thus, if the County wishes to issue the bonds, it will have to know what it will be receiving as a return from the City, and if the City is to issue the bonds, it will have to know what it is required to pay for use of the County dams.

2. MICHIGAN ENERGY EMPLOYMENT ACT

The Michigan Energy Employment Act of 1976[115] is evidence of a desire to promote municipal electrical utility systems. Essentially, it allows municipalities, which might not otherwise have sufficient resources to undertake large projects, the economies of scale that can be realized by a single large entity, in negotiating with a large utility for generation shares or wheeling services, obtaining financing and financial counseling, as well as in construction and operation of electric generation systems; these economies are particularly helpful to hydro development.

The Act authorizes two types of joint relationships. In one, two or more municipalities, engaged in electrical utility operation as of the effective date of the Act (1/13/77), may by resolution of either governing bodies form a joint agency. The joint agency is a public body politic and corporate, which may sue and be sued, issue bonds, exercise eminent domain power, and set rates and charges for electricity and service it provides.[116] The Act also authorizes a contractual relationship or joint venture between a municipality or a joint agency and one or more municipalities, joint agencies or power utilities.[117] Each member maintains an individual interest as a tenant in

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114 Supra note 110.

115 MICH. COMP. LAWS § 460.801 - 460.848 (MICH. STAT. ANN. § 22.189 et seq. (Callaghan 1979)).

116 Id. § 460.837 (§ 22.189(37)).

117 Id. §460.821 (§ 22.189(21)).

common in any project under the agreement and shares in the property, capacity and output proportionally to their contributions contributed to the project. No governmental entity in the agreement can be liable for acts or debts of another governmental entity nor may any contribution to the venture by a governmental entity be credited to another governmental entity.

Unlike the joint agency, membership in a joint venture is not restricted to municipalities owning utilities at the time when the Act was passed, and many even include private utilities. This makes the joint agency membership restriction relatively unimportant since unqualified municipalities may enter into a joint venture relationship with the joint agency, and vicariously share the economies it enjoys. For example, it would seem that a joint agency might develop a large generating facility or a transmission system and sell shares to a nonmember municipality in a joint venture relationship.

Neither Traverse City nor Grand Traverse County officials evidenced any interest in applying the Act to their impending relationship. Nevertheless, it does offer great potential for cooperative municipal development of hydroelectric projects. That is, the Act would be particularly useful to municipalities with some property interests in a potential hydroelectric site or without a current municipal electric system. It would also be useful to municipal efforts to develop a hydro generation river system, or in any other municipal hydro development situation where financing economies or bargaining leverage were desired.

F. FEDERAL REVIEW OF THE PROJECT

1. FEDERAL ENERGY REGULATORY COMMISSION

Despite Grand Traverse County and Traverse City's sentiment that development of small scale hydroelectric capability is only of local concern, the federal government does exercise pervasive control over such projects. Federal jurisdiction of the hydroelectric development of the Boardman River arises from the Commerce Clause of the Constitution empowering Congress "to regulate Commerce with foreign nations, and among the several states . . . "[118] Since the landmark case of Gibbons v. Ogden,[119] navigation has been held synonymous with commerce.[120] The Federal Power Act incorporates this relationship between commerce and navigation in granting the Federal Energy Regulatory Commission (FERC) the primary authority to regulate the construction and operation of hydroelectric dams obstructing navigable streams.[121] Any hydroelectric development of the Boardman River - a navigable stream -[122] must therefore comply with FERC regulations.

Aside from navigability, FERC is concerned with achieving the optimum hydroelectric development of the Boardman River compatible with the other

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118
U.S. CONST. art. I, § 8. cl. 3.

119
22 U.S. (9 Wheat.) 1 (1924).

120
See U.S. v. Appalachian Electric Power Co., 311 U.S. 377 (1940); Economy Light and Power Co. v. U.S., 256 U.S. 113 (1921); The Steamer Daniel Ball v. U.S., 77 U.S. 557 (1870).

121
16 U.S.C. § 791 et seq. (1976).

122
A finding of navigability may be promised upon use of the stream for transportation of goods or persons, or the flotation of logs to mill at any time past or present.
See Connecticut Light and Power Co., 9 FPS 606 (1976), aff'd, Connecticut Light and Power Co. v. FPC, 557 F.2d 349 (1st Gr. 1977).
The Boardman River was once used in lumbering operations.

resource values of the river. To this end, FERC considers the dependable generating capacity and annual power production that a specific development project can realize, and the implications associated with development and operation of the hydroelectric facilities. The economic, environmental, historic, safety, recreational and aesthetic costs are weighed against the same resource benefits of the project before any development is authorized.

FERC administers its regulatory authority by issuing preliminary permits and licensing projects.[123]

A preliminary permit is not required for any hydroelectric development,[124] but it does offer one significant advantage. Receipt of a preliminary permit would yield the County-City venture a three year priority for developing the Boardman. The venture then would be able to invest the funds necessary to file a complete and adequate license application without risk of loss of the dam site(s) to another developer.[125] This is the only privilege a preliminary permit grants.

The venture could easily obtain the permit. A preliminary permit application requires only the name, location, and description of the project; the applicant's legal authority to construct and operate the facility; an explanation of the proposed use of the power; and any other information the applicant or FERC may consider relevant to justify awarding the permit to the applicant, rather than a competing developer. The venture already possesses

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123
16 U.S.C. § 797 (e) (f) (1976).

124
18 CFR § 4.80 (1978).

125
See 16 U.S.C. § 800 (a) (1976). Mere ownership of the dam sites is not adequate protection from another developer. The Federal Power Act vests a licensee with the power of eminent domain to acquire unimproved dam sites necessary for a development project. 16 U.S.C. § 803 (i) (1976). Even municipal or state lands are subject to this power.

this information. Since FERC is required to give preference to municipalities over equally qualified private developers,[126] and TCL&P is experienced in operating hydroelectric facilities, the County-City venture should have no difficulty in securing a preliminary permit.

Prior to beginning any hydroelectric development of the Boardman River, a FERC license must be obtained for the specific project. The FERC licensing process constitutes a complete evaluation of all the implications - both the benefits and detriments - associated with the development. Depending upon which dam sites are co-developed, compliance with one of three FERC licensing procedures will be required of the Boardman River project.

FERC's objective in establishing three licensing processes is to require a project to meet only those requirements necessary to adequately secure the maximum public benefit from the development. The only significant substantive requirement that varies between the licensing procedures is the scope and depth of the "environmental report." An environmental report is not confined to the environmental implications of the development but must also address the implications to recreational, historic and aesthetic values.

The three licensing processes also vary the procedure for consulting with interested local, state and federal agencies. The developer is required to consult with the agencies prior to filing an application by two of the processes. FERC corresponds with the agencies after receipt of the application in the third licensing procedure.

If total development of the Boardman River results in a maximum installed generating capacity of less than 1,500 KW, then a minor project (short-form)

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[126] 16 U.S.C. § 800 (a) (1976).

application must be filed with FERC.[127] Prior to filing this application, FERC requires the County-City venture to consult with local, state and federal resources agencies during the preparation of the application and the accompanying environmental report, and to provide interested agencies with the opportunity to comment on the proposed project. Comments from these agencies can bear on any aspect of the project and will be used by FERC in evaluating the planned development.

By definition, licensing of a development of less than 1,500 KW of generation capability, is not a "major Federal action significantly affecting the quality of the human environment."[128] Thus, the environmental report required by a minor project license application need not be of the detail of an environmental impact statement. Nevertheless, the report is required to be consistent with the scope of the project and the environmental impacts of the proposed action.[129] Specifically, the environmental report must describe the present resources and the proposed measures to mitigate the effects, or to protect and enhance the resources.[130] Alternative sources of the power must also be described.

If the development of the Boardman will result in a maximum generating capacity greater than 1,500 KW and include only the physically existing dams (i.e., Keystone dam site is not developed), then the County-City venture will be

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127 See 43 Fed. Reg. 40217 (1978).

128 18 CFR § 2.80 (1977).

129 See 42 U.S.C. § 4321 et seq. (1976).

130 43 Fed. Reg. 40215 (1978).

required to file a major project - existing dam license application.[131] As with a minor project license application, evidence of consultation with interested local, state and federal agencies is required before the application is processed by FERC.[132]

An environmental report of the same scope and detail as that submitted for a minor project license must accompany the major project - existing dam license application.[133] The significant environmental, recreational and aesthetic implications accompanying the construction of dams and impoundments are believed to have already occured at existing dam sites and, therefore, development of hydroelectric capability at such sites is subject to the less stringent requirements of an environmental report.

Although the washed-out Keystone Dam site is by law considered an existing dam, if resurrection of the dam is an element of a major development project (greater than 1,500 KW), then the County-City venture will have to comply with the strict requirements of a major project license application. Reconstruction of Keystone Dam would result in the destruction of approximately one mile of existing riverine and wetland habitats: a significant environmental impact. The FERC definition of a "major project-existing dam" excludes any project where reconstruction "would result in a significant environmental impact."[134]

A major project license application will require the County-City venture to submit information concerning the environmental implications of the development sufficient to enable FERC to prepare a full environmental impact

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131 See Id.

132 See 44 Fed. Reg. 24095 (1979).

133 Id.

134 Section 408(b) of PURPA, 92 Stat. 3157 defines "existing dam" as any dam, the construction of which was completed on or before April 20, 1977, and which does not require any construction or enlargement of impoundment structures (other than repairs or reconstruction) in connection with the installation of hydroelectric capacity.

statement (or to determine that the environmental effects are minimal and an EIS is unncessary).[135] The environmental assessment of the development is to be prepared in consultation with state and federal agencies having environmental expertise. The scope of the assessment is the same as that required for an environmental report by the minor project and the major project - existing dam license applications, but more detailed information and thorough analysis is required.

Once a major project application is received by FERC, it notifies interested local, state and federal agencies, and solicits their comments on the development project.

The effect of these three licensing procedures on the development of the Boardman River is that Grand Traverse County and Traverse City may design their development scheme to take the best advantage of the differences. Since there is no significant difference in the requirements for a minor project and a major project - existing dam license, consideration will focus upon whether or not to develop the washed-out Keystone Dam site.

Resurrection of Keystone Dam will increase the maximum generating capacity of the Boardman development by 470 KW. A much more detailed and expansive environmental assessment will be necessary. Consultation with interested government agencies will be performed, in main, by FERC, which may delay the licensing procedure,[136] and the project will be out of the control of the venture during this consultation period.

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44 Fed. Reg. 24098 (1979); 18 CFR § 4.50 (1978).

136
FERC processes a considerable number of applications and therefore would not be as assertive as the County-City venture in getting comments from local, state and federal agencies.

Alternatively, the County-City venture might first seek a license for developing all the dam sites, except Keystone, and then later, seek a minor project license for developing Keystone. This scheme may avoid preparing a detailed environmental assessment, but would result in significant redundancy of efforts, added costs and delay.

The added expense and delay in licensing a development including the reconstruction of Keystone Dam must be weighed against the benefit of an additional 470 KW of hydroelectric generation capacity. Given the negative economic and environmental implications of developing the Keystone Dam site, this licensing factor may be just enough to make the development infeasible.

Regardless of which development plan the County-City venture decides to pursue, the "non-environmental" information required of the applicable FERC license application will be the same. The basic information required of the preliminary permit application is likewise required of a license application. Evidence must be provided to establish that the venture possesses the land and water rights necessary under Michigan property law to build and operate the hydroelectric facilities.[137]

Information to assist FERC in determining whether the proposed development and operation plan comports with the optimum development of the Boardman River must be supplied. This includes a description of the available resource (an estimate of dependable generating capacity and annual energy production that the hydraulogical characteristics of the river can provide) and the manner of utilizing the resource (the type of generating equipment and the mode of operation). A description of the physical structures and features of the

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137 These rights include ownership of both banks of the stream at the dam site, the right to use the water, and flowage rights to create an impoundment. The City or the County presently possess these necessary rights.

project along with general design drawings is required to ensure that the structures are safe and adequate for the stated purposes. To aid FERC in understanding the scope of the project and in establishing a construction time table in the license, a construction schedule is to be submitted. Also required is information necessary to assess the economic and financial viability of the development including estimates of construction and annual costs and the value of the power to the County-City venture. Finally, a detailed map showing the location of the project works and all land involved must accompany the license application submitted to FERC.

The above information either already exists in the feasibility study or would be acquired from working drawings, precise plans and specifications, and stress and stability analyses normally prepared for purposes of construction. Thus, preparing this part of an application would not be a burden to the County-City venture. However, the venture presently does not have sufficient information concerning the "non-engineering" aspects of the project to prepare the even less rigorous environmental report required of a minor project license. Further study will have to be performed before submitting a license application.

Consultation with interested agencies is time consuming, regardless of whether FERC or the venture is required to perform it, and may result in significant compromises in the extent and type of development ultimately licensed. Consultation, though, will also aid the County-City venture in thoroughly understanding the implications associated with hydroelectric development of the Boardman.

Processing of the application by FERC will necessarily result in a delay in beginning the construction of the project. It is estimated that for a small scale hydroelectric project not requiring an environmental impact statement, the elapsed time for FERC decision making varies from twelve to fifteen months.

When an environmental impact statement is required, the processing time increases to twenty to thirty months.[138]

Thus, the necessity of a FERC license for any hydroelectric development of the Boardman River results in a significant obstacle for the County-City venture. The need for additional information, consultation and application processing results in costs and delays that should be considered in reaching a development decision.

2. THE U.S. ARMY CORPS OF ENGINEERS

The authority for the U.S. Army Corps of Engineers (the Corps) over the hydroelectric development of the Boardman River arises from section 10 (e) of the Federal Power Act. This section provides that no license for a hydroelectric facility "affecting the navigable capacity of any navigable waters of the United States shall be issued [by FERC] until the plans . . . have been approved by [the Corps] . . . ."[139] The Corps does not require a separate permit pursuant to its authority under the Federal Power Act. Rather, the Corps comments on FERC license applications to satisfy its statutory responsibility.[140] Review by the Corps of the development plans for the Boardman will focus on dam safety and flood control measures.

Accordingly, the County-City venture will be required to assess the adverse and beneficial impacts of the hydroelectric impoundments on the potential flood levels and to develop an impoundment management schedule

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138 This estimate was made prior to the implementation of the minor project licensing procedure.
Coraso, Ronald A., "Small Scale Hydro; Legal and Institutional Problems," Low Head Hydro; Idaho Water Resources Research Institute (1978).

139 16 U.S.C. § 797 (e) (1976).

140 Regulatory Program of the Corps of Engineers, 42 Fed. Reg. 37122, 37135 (1977).

that is beneficial to flood control.[141]

The Federal Water Pollution Control Act also invests the Corps with authority to regulate the construction and operation of hydroelectric facilities on the Boardman River. Section 404 of the Act provides that the Corps is to regulate the discharge of dredge and fill materials into navigable streams through the issuance of permits. Mere construction or rehabilitation of a dam, without the discharge of dredge or fill materials, does not require a permit.[142]

At present, the County-City venture does not anticipate that it will be removing silt from the impoundments or be engaged in any other activity that would require a Section 404 permit in the development of the Boardman River's hydroelectric potential.

3. THE ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) is charged by the Federal Water Pollution Control Act with the protection and enhancement of the quality of all surface waters of the United States.[143] Under section 401 of the Act, the County-City venture must provide FERC with certification of compliance with Michigan's water quality standards.[144] A permit establishing that operation

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141 Letter from P. McCallister, Chief, Engineering Division, Detroit District, Corps of Engineers, Department of the Army to Emery and Porter Inc. Supra note 2, at Appendix E.

142 Minnehaha Creek Watershed District v. Hoffman, 449 F. Supp. 876 (December 15, 1978), the U.S. District Court for Minnesota ruled that the Corps lacks jurisdiction to require a Section 404 permit for the construction of dams unless such construction includes the discharge of dredged or fill materials. The Court rejected the contention that the Corps had jurisdiction because such projects are constructed of rock and sand in navigable waters, and rock and sand are among those substances defined by the Federal Pollution Control Act as pollutants.

143 33 U.S.C. § 1251 (1979).

144 Id. § 131.

of the hydroelectric facilities will be in compliance must be obtained from the Michigan Department of Natural Resources and accompany the license application to FERC.[145]

The specific water quality standards established for the Boardman River which may affect hydroelectric operations, as well as the effect compliance will have on the venture's method of generating electricity, is explored below in Section G(2) of this Chapter.

If the hydroelectric facilities will discharge sump water, bearing cooling water, floor drains or any other low volume wastes the County-City venture will be required to obtain a National Pollution Discharge Elimination System (NPDES) permit from the Michigan Water Resources Commission pursuant to section 402 of the Federal Water Pollution Control Act.[146] This should not present much of a legal obstacle to the development but will necessitate that proper maintenance controls be established to limit wastes discharged into the Boardman River.

4. THE U.S. FISH AND WILDLIFE SERVICE

Generally, the Fish and Wildlife Service has been involved in the FERC licensing of hydroelectric projects under the provisions of the Fish and Wildlife Coordination Act.[147] The Act requires FERC consult with the federal and state wildlife agencies prior to licensing a project impounding more than ten acres of water.[148] Under current conditions, this may pose no significant additional burden for the Boardman project. However, the new proposed regulations under the Fish and Wildlife Coordination Act[149] appear

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145 18 CFR § 4.41 (1978).

146 Memorandum from Robert E. Basch, Biology Section, Water Quality Division, DNR. Supra note 2 at Appendix E.

147 16 U.S.C. § 661 (1976).

148 Id. §622.

149 44 Fed. Reg. 29300 (1979).

to some to require federal permitting agencies to reconcile differences with state or federal wildlife agencies before issuing a permit. Of course, this suggests the possibility of increased licensing delays or license conditions, but the rules have not been finalized and FERC has questioned their applicability to FERC activities.

5. ADVISORY COUNCIL ON HISTORIC PRESERVATION

The National Historic Preservation Act establishes a National Register of Historic Sites,[150] which list places of local, state, regional or federal significance. All projects involving listed sites must be reviewed for comment by the Council on Historic Preservation.[151]

At present, it is not known whether any of the proposed Boardman developments would involve a listed or eligible historic site. If any such sites are affected, the FERC project manager for the Boardman project will have to screen the development for adverse impact. If an adverse impact is found, the project manager must initiate consultation with the Advisory Council and state historic agency to consider alternatives and mitigation.

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150 16 U.S.C. § 470 et seq. (1976).

151 Id. §§ 470f - 470m.

G. REVIEW OF THE PROJECT BY THE STATE OF MICHIGAN

1. OVERVIEW

By the Supremacy Clause of the Constitution, the federal right to regulate hydroelectric facilities obstructing navigable streams (and thereby commerce) is superior to the right the State of Michigan has to regulate activities within its borders. Thus, hydroelectric development of the Boardman River, licensed by FERC, is not subject to Michigan law which may interfere with FERC's objectives in regulating hydroelectric facilities.[152]

Though not constitutionally obligated, FERC does notify interested state agencies of receipt of a license application and invites their comments concerning the proposed project. Additionally, FERC requires that the environmental report accompanying all applications be prepared in consultation with local and state agencies having environmental expertise. A considerable amount of deference is given to these comments in evaluating whether the project is best suited to the comprehensive development of the stream. Usually, compliance with state laws is required by FERC to evidence that legitimate state concerns have been satisfied by the development. Thus, in making a totally informed decision, the County-City venture must consider the implications Michigan law holds for development.

Michigan's Constitution states unequivocally that "the conservation and development of the natural resources of the state are . . . of paramount public concern . . . [and that] the legislature shall provide for the protection of the . . . water and other natural resources of the state from pollution, impairment and destruction."[153] Pursuant to this mandate, the legislature

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152 See the Introduction to Legal Obstacles and Incentives to the Development of Small Scale Hydroelectric Power in Michigan, Energy Law Institute of Franklin Pierce Law Center (1979), for a comprehensive analysis of the federal preemption issue.

153 MICH. CONST. of 1963, art. IV, § 52.

enacted the Michigan Environmental Protection Act of 1970 (MEPA), which imposes a duty on individuals and organizations in the public and private sectors to prevent or minimize degradation of the environment, which may result from their activities.[154] No conduct is permissible that pollutes, impairs or destroys the environment as long as a feasible alternative exists which is consistent with public safety.[155] MEPA's environmental standard has been judicially held to be incorporated into every regulatory statute and must be affirmatively applied by the administrators of such laws in their decisions.[156]

This pervasive conservationist attitude pervades the requirements Michigan law imposes on hydroelectric development and the comments FERC reviews from interested Michigan agencies. The County-City venture will be continually required to justify that development of the Boardman River is consistent with conservation and that no other reasonable alternative is as environmentally feasible.

2. MICHIGAN DEPARTMENT OF NATURAL RESOURCES

The Michigan Department of Natural Resources (DNR) is the principal agency concerned with protecting and conserving the natural resources of Michigan.[157] As such, it will have an extensive impact on the development through comments provided as part of the FERC licensing process and by requiring that hydroelectric development of the Boardman River comply with Michigan law.

DNR is particularly concerned with having input into any proposed hydroelectric development at the very earliest opportunity possible. With

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154 MICH. COMP. LAWS § 691.1201 et seq. (MICH. STAT. ANN. § 14.528 (201) et seq. (1976)).

155 Id.

156 Ray v. Mason County Drain Com'r., 224 NW 2d 883 (1975).

157 See Act 17 of 1921, MICH. COMP. LAWS § 299.3 (note: all authority of the Department of Conservation was vested in the Department of Natural Resources by the Executive Organization Act of 1965), MICH. COMP. LAWS § 251.

the Boardman River project, DNR was particularly concerned that the Department of Energy's grant for the feasibility study did not proceed through an A95 review, thus denying DNR the opportunity to raise objections to the funding of a study exploring a possible assault on the environment.[158] DNR would also have enjoyed the opportunity to comment on a draft of the feasibility study prepared so as to assure that its concerns were adequately expressed.[159] DNR has since acquired a copy of the study and is in the process of preparing a thorough review of the study to be submitted to the County-City venture and possibly the Department of Energy.[160]

Early input is desired by DNR so that both it and the developer are aware of the legal and environmental implications of the proposed project prior to any commitment being made toward development.[161] Though this causes an initial

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158 An A95 review is a procedure whereby certain designated federal funding programs are reviewed by the state in which the funds are proposed to be spent. The state, after reviewing the potential impact of the expenditure, can either approve or reject the expenditure. A federal funding program is designated for A95 review by two means. Either the program is nationally designated by the federal funding agency (DOE in this case) for all states or an individual state may designate the program for A95 review by only that state. Presently the PURDA program of DOE which funded the Boardman River feasibility study has not been designated for A95 review by either DOE or Michigan.

DNR is currently contemplating whether it should request DOE to so designate the program or merely have the program designated for Michigan review.

Telephone conversation with Gary Gettel, Environmental Enforcement Division, Michigan DNR.

159 Id.

160 Id.

161 Supra note 81.

impediment to development, DNR review would otherwise impede the development at a later stage. DNR feels that early review prevents controversial surprises to the developer after substantial expenses and momentum toward development have built up and it is more difficult to stop an unsound project.[162]

Review of the hydroelectric development plan for the Boardman River, whether requested by FERC or the County-City venture, will proceed via a "lead-agency approach." Under this approach, the County-City venture (or FERC) contacts DNR's Environmental Enforcement Division (EED) which is the central DNR contact (lead-agency) for communications concerning the project, including coordination of environmental reports, environmental studies, permits, public hearings, and DNR approval of the project as one package.[163] The EED coordinates the proposal and routes it to all divisions of DNR having an interest in the project for their comments and recommendations relating to their own expertise. Comments from townships surrounding the Boardman River, Grand Traverse Soil Conservation District, the Boardman River Basin Council and the general public will also be solicited. If any governmental unit, the County-City venture, or any person requests it, a public hearing will be held.[164] EED also injects its own expertise.

162
Supra note 158.

163
State Federal Review of Hydro-Electric Power Generating Facilities Regulated by Federal Energy Regulatory Commission, a working paper drafted by Michigan DNR, EED (April 1979).

164
Meeting with David Bastian, Lakes and Stream Protection Unit, Division of Land Resource Programs, Michigan DNR.

All comments and legitimate objections are compiled by EED in an environmental report.[165] Any additional environmental assessment necessary is performed and then permit applications are prepared.

Rehabilitation of any of the five dam sites will require a permit under the Inland Lakes and Streams Act for any reconstruction, change in impoundment, or addition to existing dams such as generating equipment.[166] Resurrection of Keystone will also require a permit under the Dam Construction Act.[167]

One uniform position will be taken by DNR concerning the development plan. Differences among DNR divisions, if any, will be resolved internally.[168] EED next prepares an acceptable project description (if any plan is acceptable). This document is then given to the County-City venture, if it sought the review, or directly to FERC.[169]

The lead-agency procedure of DNR for review of hydroelectric development projects is an efficient process. The County-City venture, by contacting only one division of DNR, will be informed of what constitutes compliance with the laws that DNR administers. The information required of each division to make a decision, will be requested at one point so that needless redundant assessment should not occur. Such a procedure avoids confusion and delay in understanding and complying with Michigan law.

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165 Supra note 158.

166 Supra note 164.

167 Id.

168 Supra note 86

169 Supra note 158.

A complicating aspect of the Boardman River development review is the fact that DNR is just now developing policy concerning hydroelectric development in Michigan. Previously, DNR gave only cursory review of FERC license applications, which led to difficulties whenever DNR desired to require more of a developer after FERC had granted a license. In 1968, FERC was notified that DNR would require more from a development than it had previously.[170] A policy concerning hydroelectric projects licensed by FERC was finally adopted in July of 1979.[171] Other policy positions are presently being prepared.

DNR's relationship with FERC has been generally good. Recommendations of DNR concerning dam safety, water quality, water management, and fish passage have usually been incorporated into the FERC license. The County-City venture should take special cognizance of the concerns of DNR since they will significantly affect the extent and type of development that can be realized.

DNR's particular concerns with hydroelectric development of the Boardman River focus on its duty to protect the public trust in the natural resources of Michigan. Specifically, DNR will be interested in minimizing the environmental stress on the river's existing ecology that derive from water management schedules altering stream flow regimes and impoundment levels, and the creation of a new impoundment by the resurrection of Keystone Dam. Additionally, DNR will balance the value of the hydroelectric generating capacity against the value of the resources lost.

DNR prefers that the water management schedule be run-of-the-river.[172]

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170 Supra note 86.

171 Fisheries and Wildlife Resource Policy - Hydro-electric Power Projects Licensed by the Federal Energy Regulatory Commission, Approved by NRC (July 13, 1979).

172 Supra note 81.

However, flow releases are open to negotiation within the parameters necessary to maintain fish and other aquatic life habitat, water quality, wildlife habitat, recreational resources, stream bank stability, and the rights of downstream riparians.

A minimum flow will be required at all times so as not to expose areas of the stream bed necessary for food production and fish spawning. Sufficient flow must be maintained to allow fish species to migrate and, if fish passage is provided, releases must be adequate to attract anadromous fish.[173]

Large daily fluctuations in flowage must also be controlled to prevent scouring and flushing of sand and gravel which destroys bottom fauna, larvae and fish eggs, and covers up spawning gravel. Fluctuations in impoundment levels will be limited to minimize the impact on the spawning of the resident fish species within the impoundments. Additionally, flow releases will have to be such as to maintain the requisite water quality for resident fisheries.[174]

The Michigan Water Quality Standards (WQS) for the Boardman River establish that the river is to be protected for swimming and coldwater-trout fisheries, while the impoundments are to be protected for warm water fish species.[175] The most important WQS affecting hydroelectric operation concern temperature and dissolved oxygen. Sufficient water exchange in the impoundments will have to be maintained so that the dissolved oxygen concentration in the impoundments

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173 Meeting with Bernie Ylkanen, District Fisheries Supervisor, Michigan DNR (June 4, 1979).

174 Supra note 82.

175 Use Designated Areas for Michigan Interstate Water Quality Standards, Michigan Water Resources Commission, Bureau of Water Management, DNR (March 1969).

does not go below the WQS,[176] and such that the water released from the impoundments does not significantly raise the temperature of the downstream water at the base of the dams above that naturally occurring.[177] The dissolved oxygen concentration in the downstream water is not of concern since the spillways on the dams are of sufficient height that oxygen is put back into the water during its fall.[178] Unlike other state permits, the Federal Water Pollution Control Act mandates that any project licensed by FERC must be in compliance with state WQS.[179]

The discharges from the Traverse City waste water treatment plant into the Boardman River below Union Street Dam will also affect the water management schedule. A minimum flow will be required at all times to assure proper assimilation of the effluent and downstream water quality.

Ducks, geese and swans are the important wildlife species associated with the Boardman River Basin. Minimal fluctuation in impoundment levels, therefore, will be required so as not to significantly affect the water fowl habitat.

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176 The WQS for warm water lakes with a high rate of exchange is that dissolved oxygen concentrations must be maintained throughout the upper levels of the lake at greater than 5 milligrams per litre throughout the year including the summer stagnation period. Rule 323.1065.

177 The WQS do not permit cold downstream (receiving) water temperature to increase more than two degrees Fahrenheit above that natually occurring. Rule 323.1075. Additionally, dams are not treated as industries and therefore it is unlikely that they would be given a mixing zone to reestablish the WQS, and thus the WQS would apply at the base of the dams.

Supra note 146

178 Telephone conversation with Elvin Evans, Ph.D., Aquatic Biologist, Water Quality Division, Michigan DNR (June 4, 1979).

179 33 U.S.C. § 1341 (1976).

The Wildlife Division of DNR does not feel that fluctuations in the upper four impoundments will have any more than minimal impact. However, the upper portion of Boardman Lake is used by a large flock of muted swans as wintering habitat and during their molt. Considerable numbers of other waterfowl also use this area. Daily fluctuations in the level of the Boardman Lake will be limited in order to protect the abundant food resources present in the shallows of the immediate area. In the winter, minimum flow will also be required throughout the river so as to insure that inflow into Boardman Lake is sufficient to prevent freeze-over of wintering waterfowl habitat.[180]

During the summer, recreational use of the impoundments will dictate that fluctuations in water level be as little as possible. Also, sufficient flow will be required to permit canoe passage and utilization of the stream by anglers.[181]

Fluctuating flows are significantly different from natural stream variations due to snow melt and rainfall. Large fluctuations will be limited to prevent serious stream bank erosion and siltation. Stability of the impoundment banks will also be protected from erosion or slumping my minimizing draw down of the impoundments.[182]

Finally, the operation of hydroelectric facilities will have to comport with the rights of other riparians along the Boardman River. The use of the water must be a reasonable one.[183]

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180 Memo from Edward Mikula, Senior Wildlife Executive, Wildlife Division, Michigan DNR (October 1978).

181 Supra note 81.

182 Memo from Dennis J. Hall, In Charge, Special Land Programs Section, Division of Land Resource Programs, Michigan DNR (October 1978).

183 Dumont v. Kellog, 29 Mich. 420, 18 Am. Rep 102 (1874).

The net effect of these flow requirements is that water management will to a large extent be dictated by the needs of the existing ecology, rather than by the needs of Traverse City, for power. As a result, use of the dams for peaking power will be limited, especially during low flow periods, thereby reducing the optimal value of the hydroelectric development.[184]

DNR is even more concerned with the impacts on the Boardman River associated with resurrecting Keystone Dam. Creation of an impoundment will result in the elimination of approximately one mile of stream and flood plain habitat. The Fisheries Division of DNR is definitely opposed to the loss of this trout stream resource.[185]

The effects on the newly created lacustrine environment due to erosion of the flooded areas, decay of flooded organic matter and the release of soil chemicals into solution are of concern to DNR.[186] Also, DNR is concerned with the impact on downstream ecology due to an increase in nutrients transported and the increase in water temperature.

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By not operating the hydroelectric facilities during non-peak demand periods, water can be stored in the impoundments. This water is then released through the turbines to generate power when it is in the most demand. Hydroelectric generation can be started-up quickly and shut-down with little loss of water power. Additionally, the rate of the flow of water through the turbines can be incrementally controlled so that just as much power as needed is generated.

The ability to store power, use it quickly and use only as much as is necessary makes the peaking mode of hydroelectric operation very valuable to a generating system. Any constraint that limits the ability of a hydroelectric development to realize its full potential as a peak power source reduces its optimal value to the overall generating system.

185
Supra note 92.

186
Supra note 178.

While DNR is not strictly anti-dam, the result of DNR's concern will be that the County-City venture will be required to justify that the 470 KW of additional generating capacity and the other benefits (recreational, stabilization of flows, etc.) realized by rebuilding Keystone Dam will outweigh the loss of the riverine environment and the detriment downstream.

To adequately protect the public trust in Michigan's natural resources, DNR is interested in the benefit-cost ratio of the hydroelectric development of the Boardman River. Information dealing with the economic and other benefits of the project must be supplied by the County-City venture, along with the expenses of constructing and maintaining the facilities. DNR also desires that decommissioning costs also be accounted so that the structures do not become a state-reverted eyesore. This occurred in the past when hydroelectric dams had outlived their useful lives or when new technology replaced their utility.[187]

This information supplied by the County-City venture would then be analyzed and compared with the overall cost of the project. DNR, not the County-City venture, will determine what is the best management of the Boardman River Resource.

DNR, however, may not be the ultimate decision maker. Since the hydroelectric development of the Boardman possesses significant environmental consequences and is becoming quite controversial, it is more than likely that DNR's decision will be reviewed by the Michigan Environmental Review Board.

3. MICHIGAN ENVIRONMENTAL REVIEW BOARD

Based on the premise that environmental protection is best served when all decisions are made from an environmental perspective , Executive Order 1974-4,

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[187] Supra note 86.

issued by Governor Milliken in May 1974, mandated that all major activities of each department of state government having a significant potential impact on the environment or human life are subject to a formal environmental assessment by the department involved.[188] The Executive Order further established the Michigan Environmental Review Board (MERB), which, with the aid of the Inter-Departmental Environmental Review Committee (INTERCOM), is required to evaluate such assessments. It is the responsibility of MERB to recommend to the Governor those actions of state agencies that should be suspended or modified because of significant implication for the quality of Michigan's environment or human life.

A major state activity, by definition, includes any administrative action proposed by a department that could reasonably result in significant degradation of Michigan's natural resources or in a significant acquisition of energy resources. An environmental impact statement (EIS) is required to be prepared for such activities whenever requested by the Governor or MERB, the director of a department determines that a proposed action is a major state activity, or the activity raises general public concern or controversy.[189]

The approval by DNR of any hydroelectric development of the Boardman River would meet the criteria of a major action. Though DNR has been reluctant in the past to declare its activities major actions, public controversy has apparently prompted DNR to require the preparation of an EIS for the project.[190]

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188 State of Michigan, Executive Order 1974-4 (May 3, 1974).

189 Michigan Environmental Review Board. "Guidelines for the Preparation and Review of Environmental Impact Statements under Executive Order 1974-4" Lansing, Michigan, Department of Management and Budget (1975).

190 Supra note 81.

The requisite EIS for the Boardman project will be prepared by DNR since it is DNR's approval that is subject to environmental assessment. However, DNR will rely on an environmental report prepared by the County-City venture to assist in the preparation of the EIS.

In theory an EIS is a very exhaustive document analyzing the probable impacts of the project on the environment and human life, evaluating the alternatives to the project, and considering modifications to the project which would eliminate or minimize adverse effects. Since an EIS must be completed by the department within the constraints of statutory deadlines for issuing permits, while providing for adequate review of the EIS, considerable latitude is allowed in what is submitted to meet the requirements of an EIS.[191] Informal memorandums, sections of reports and personal statements have been accepted, but in view of DNR's reacton to the Boardman study, it is likely that a more formal presentation will be required of the venture.

Upon completion of the EIS it will be submitted to MERB where it is made available to public inspection. Interested citizens and organizations will be notified that an EIS concerning development of the Boardman River has been filed. The EIS is then forwarded to INTERCOM.

INTERCOM is composed of members in high level positions from each of the nineteen state departments.[192] Because of its interdisciplinary breadth and depth of experience, INTERCOM will provide the major review of the project. However, since DNR has the expertise in the matters concerning hydroelectric development, and it is, at this stage, pushing for approval of its decision to approve the project, the EIS will more than likely slide through INTERCOM's

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191 Meeting with Terry Yonker and Boyd Kinzley, Executive Secretaries, MERB.

192 Supra note 188.

review. After evaluating the technical adequacy of the EIS, INTERCOM will relay its opinions, appraisals and recommendations to MERB.[193]

MERB is composed of ten unpaid members of the general public and the heads of seven state departments who are appointed by and serve at the pleasure of the Governor. MERB is not restrained to consider only the legal requisites of developing the Boardman. A decision will be made with regard to the project's impact on the health, safety and welfare of Michigan's citizens as well as the impact on the environment.[194] However, due to time constraints, an in depth analysis will probably not occur.

Additionally, the public is invited to participate in the review of the EIS either through written or verbal comments to both INTERCOM and MERB. The total MERB review process will take at minimum 60 days and more likely 75 to 90 days.[195]

Beside delaying final DNR approval of the project, further restrictions may be placed on the hydroelectric development of the Boardman River. Though MERB does not have legal authority to impose modifications on or totally deny the development, DNR will be morally obligated to follow MERB's suggestions.[196] Since it is DNR's specific approval that is being reviewed, the environmental requirements of DNR will not be reduced.[197]

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193 Supra note 191.

194 Id.

195 Id.

196 Supra note 164. Since recommendations of modifications or suspension are forwarded to the Governor there is additional pressure to follow MERB's requests.

197 This may not be the case if a resource enhancement policy (such as requiring fish passage) accompanies the DNR approval of the project which poses significant implications for the quality of the environment or human life.

Proceeding through the MERB review does offer one advantage to the County-City venture. By inviting public participation, much of the public controversy surrounding the hydroelectric development may be diffused. The public will have the feeling that they have at least been heard by some impartial authoritative body. If the public perceives that its concerns have been adequately addressed through the MERB review, there is less likelihood that the venture (or DNR) will be subjected to lengthy and costly legal actions.

Another voice in the hydroelectric development of the Boardman River through the MERB review process will be that of the Michigan Energy Administration.

4. MICHIGAN ENERGY ADMINISTRATION

The Michigan Enery Administration (MEA) was established as an agency within the Department of Commerce by Executive Order, to advise the Governor on energy policy and to enable Michigan to receive federal funds for dealing with energy problems.[198] Currently its 16 million dollar budget consists of 8 percent federal funds.[199]

MEA's immediate duty is to develop a long range energy policy for Michigan. Presently, only bits and pieces of an overall energy policy exist. There is no policy specifically concerning hydroelectric development, though general statements favoring all renewable energy resources have been issued. Additionally, no individual is primarily responsible for considering hydroelectric development's role in meeting Michigan's energy needs. Development of the hydroelectric potential of the Boardman River is viewed favorably by MEA. Lacking

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198 Meeting with Randy Harmson, Program Director, Business and Renewable Resources, Energy Administration, Michigan Department of Commerce (June 7, 1979).

199 Id.

a legislative mandate, however, MEA can express its view only in an advisory capacity.[200]

Through a personal friendship, MEA's interest in the Boardman project has been related to DNR. As any interested citizen or organization, MEA may participate in any public hearings concerning the development held by DNR or MERB. Additionally, MEA may also be able to voice its concerns in the MERB review process by using the Department of Commerce's position on INTERCOM and MERB.[201]

The effect MEA might have on the County-City venture's development plans will be minimal at best. MEA has no funds available to provide financial assistance.[202] Advising DNR and MERB of the project's energy potential will be of marginal assistance.

MEA's advice may enlighten DNR of the energy aspects of developing the Boardman, but without a legal requisite, DNR will only be morally obligated to consider MEA's view point. Though MERB is to consider the impact of state actions on human life as well as on the environment, it is the project as shaped by DNR's legal requirements that will be reviewed. MERB cannot demand less of a project than the law (as interpreted by DNR) requires.[203] MERB can

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200 Randy Harmson, because of a personal interest in hydroelectric production has, on his own initiative, kept himself abreast of hydroelectric development in Michigan. Id.

201 Id.

202 Id.

203 MERB's authority was established by Executive Order which cannot override a legislative mandate such as DNR's duty to protect Michigan's natural resources.

only go beyond the law to require more. MEA's influence may lessen the likelihood of MERB imposing further constraints on the development beyond those required by DNR.

While there is no legislative mandate to consider the development of the hydroelectric asset of a river resource, there is legislative support to consider the development of the recreational, aesthetic and fisheries assets of a river resource. Legislative policy concerning the enhancement of these river potentials is in direct conflict with realizing the hydroelectric potential of the Boardman River.

II. MICHIGAN POLICIES COMPETING WITH HYDROELECTRIC DEVELOPMENT

1. RECREATIONAL DEVELOPMENT

The Michigan Legislature, by Public Act 17 of 1921, mandated that, in addition to being responsible for the protection of Michigan's natural resources, the Michigan Department of Natural Resources is to be responsible for the provision and development of outdoor recreational facilities.[204] The creation of an impoundment by a hydroelectric dam provides expansive open water recreational uses. Special sport fisheries and wildlife values developed within the impoundment and shoreline areas provide excellent potential for various forms of recreational use.

In the past, DNR has provided and maintained most of the recreational facilities at hydroelectric projects. Land surrounding the dams was obtained, or leased, so as to provide public access to the recreational values established by the dams. Presently, liability and management costs of the land and recreational facilities are impinging upon DNR's budget.[205]

Since the Federal Power Act and regulations of the Federal Energy Regulatory Commission (FERC) require that licensed hydroelectric development include construction, maintenance and operation of reasonable facilities to provide for recreational use of the project, DNR now intends that optimum recreational development be achieved by the developer. DNR no longer will, itself, go the extra mile in enhancing the recreational value of a hydroelectric project.[206]

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204 Public Act No. 17 of 1921, MICH. COMP. LAWS § 299.3 (1976).

205 Supra note 158.

206 Id.

Pursuant to this feeling that the burden of recreational development at hydroelectric facilities should no longer be that of DNR, the Natural Resources Commission, the policymaker for DNR, recently adopted a general policy concerning this issue.[207] The policy establishes that DNR will seek all reasonable accommodations for recreational uses at FERC licensed projects and will negotiate with the licensee and, when necessary, with FERC to achieve that end. FERC license applications are to be diligently reviewed by DNR to ensure that they include adequate provisions for reasonable present and future recreational uses. Though DNR may provide assistance in the planning, construction and operation of such facilities, the costs associated with recreational enhancement will be the responsibility of the hydroelectric developer.

FERC, in reviewing the license application of the County-City venture, will decide, probably for the first time, whether DNR's new policy of shifting responsibility for recreational development to the licensee is appropriate. The licensing of the Boardman development, therefore, may be viewed by both FERC and DNR as an opportunity to establish precedent. DNR may be unusually adamant in its request that optimum recreational facilities be provided by the venture. Regardless of the extent that FERC agrees with DNR's request, the County-City venture may be significantly affected.

If FERC decides that DNR is unreasonable in its requirements, the licensing of any development of the Boardman River could be delayed for a considerable period while DNR negotiates with the venture and FERC. The possibility of DNR intervening in FERC licensing deliberations, presenting testimony in an administrative hearing or even requesting judicial review of

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207 Fisheries and Wildlife Resource Policy - Hydroelectric Power Projects Licensed by the Federal Energy Regulatory Commission, Mich. National Resources Commission (1979).

FERC's decision will have to be considered by both FERC and the County-City venture in their negotiations over recreational development.

It's inevitable that the County-City venture will be required to assume a large share of the expense of developing the recreational potential of the dam sites at which it seeks to generate hydroelectricity. The negotiations will only resolve the magnitude of recreational development required and the proportion that will be the venture's responsibility. If FERC totally agrees with DNR's present policy, the County-City venture will be required to bear the full burden of optimal recreational enhancement.

Public access, including the needs of the handicapped, boat launching ramps, canoe portages, litter control, and other services will have to be provided.[208] Recreational enhancement will increase both the construction and operating expenses of the hydroelectric facilities developed.

It should be noted that the land surrounding the County owned dams, Boardman and Sabin, and the City's washed-out Keystone Dam site is the property of the Grand Traverse County Natural Education Reserve. Likewise, Union Street Dam is part of a city park. Brown Bridge Dam and Pond, along with the City property around them are presently being considered by Traverse City to be set aside as wilderness area. A FERC license for developing the hydroelectric potential at these dam sites may require the County and the City to give up their autonomy in managing the recreational development of lands. County and City plans would of course be considered by FERC in determining the extent and type of recreational development to be required.

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208 State - Federal Review of Hydroelectric Power Generating Facilities Regulated by Federal Energy Regulatory Commission - A Working Paper, Environmental Enforcement Division, DNR, pages 5-6 (April 1979).

DNR's recreational policy will also restrict the mode of operating the hydroelectric facilities so as not to interfere with the recreational uses associated with the dams. For example, the water level fluctuation of the impoundments would have to be minimal so as not to create a muddy drawdown zone imcompatible with swimming and canoeing.

Imposing even greater restrictions on the water management schedule for operating the hydroelectric facilities developed on the Boardman River will be the Michigan Natural River Program.

2. PRESERVING NATURAL VALUES

In 1970, the Michigan Legislature, with intent to perserve and enhance numerous values of a river resource for present and future generations to enjoy, enacted the Natural River Act.[209] Major values to be protected include the scenic, aesthetic, ecologic and the free-flowing character of a designated river system.[210] The responsibility for guiding the protection of rivers is given to DNR.[211]

Due to recreational and retirement development occurring at a rapid rate in the Boardman River watershed and threatening the natural values of the river, residents of the Traverse City area actively sought DNR designation of the Boardman River as a natural river.[212] Utilizing a citizens planning

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209
MICH. COMP. LAWS § 281.761 et seq. (1976).

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Id.

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The act states that the Natural Resources Commission may designate a river as a natural river area and prepare, adopt and enforce a long range comprehensive plan for such designated rivers. MICH. COMP. LAWS § 281.761 (1976).

The Natural Resources Commission is the head of DNR
MICH. COMP. LAWS §251 (1976).

212
Telephone conversation with Mrs. Kermit French, President, Boardman River Advisory Council (June 4, 1979).

approach, the Boardman River Management Plan Committee, under the auspices of the Boardman River Advisory Council and the DNR, and sponsored by the Grand Traverse Bay Regional Planning Commission, drafted a plan to regulate future development and use of the basin for the protection of the natural character of the Boardman River. The plan calls for the maintenance or improvement of water quality, discouragement of development and activity which may damage the ecological, aesthetic or historic values of the river, orderly development consistent with the natural environs, and the maintenance or improvement of the existing free-flowing conditions for the purpose of preserving the natural environment.[213] On February 13, 1976, the Natural Resources Commission, by authority of the Natural River Act, designated the Boardman River a natural river. The Boardman was the first river owing its designation to local initiative.

All the dam sites under consideration for hydroelectric development by the County-City venture, except Union Street Dam, are within the designated reaches of the river. Any rehabilitation of the dam sites therefore must be in compliance with the Natural River Plan for the Boardman River.

The Boardman River Natural River District includes an area four hundred feet on each side and parallel to the river and its tributaries. This district establishes the definable area within which zoning may regulate future development and use to be in compliance with the goals of the Natural River Act. Within the district, neither industrial and commercial buildings

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213 Natural River Plan for the Boardman River (1976), pp. 16-17.

and uses nor electrical transmission lines are permitted.[214] However, nonconforming uses lawfully existing at the time the plan was adopted may be continued and are permitted reasonable reconstruction and extension.[215]

Brown Bridge, Boardman and Sabin dams, along with their powerhouses, existed at the time the Boardman River Plan was implemented, and are therefore exempted from complying with the zoning. Though in conflict with the long range goal of the Natural River Act to reclaim the free-flowing character of natural rivers by prolonging impediment, rehabilitating these sites would be permitted as reasonable renovation of an existing nonconforming use.[216] Additionally, an electric transmission line already exists connecting the dam sites to Traverse City.

Keystone Dam, however, did not exist at the time the Boardman Natural River Plan became effective. A zoning variance from the Garfield Township Zoning Appeals Board will be necessary to resurrect the dam. Also, rebuilding Keystone Dam will require approval by DNR.[217]

Though a zoning variance may be obtained, it is highly unlikely that DNR would sanction the resurrection of Keystone Dam. While Keystone once impounded water, the dam has not existed since 1961 and the ecology of this reach has reverted to a riverine environment. The Land Resource Programs Division of DNR, administrators of the Natural River Act, will strongly oppose the resurrection of Keystone Dam on the grounds that the resulting innundation would violate the intent of both the Boardman Natural River Plan and the

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214 Meeting with Doug Carter, Chief, Natural River Program, Land Resource Programs Division, DNR (June 6, 1979.)

215 MICH. COMP. LAWS § 281.773 (3) (1976).

216 Supra note 214.

217 Supra note 213 at p. 20.

Natural River Act by destroying existing ecology and free-flow characteristics.[218]

The free-flowing characteristics of the Boardman River are perceived by DNR to be major values of the resource to be protected. The Natural River Act specifically identifies the free-flowing condition of a designated river system as a value to be preserved and enhanced.[219] This natural value is also highlighted in the Boardman Natural River Plan as a major objective.[220]

The staff of DNR is highly concerned with the environmental effects fluctuating flows may cause. The Land Resource Programs Division is therefore unwilling to take a definite position on the proposed hydroelectric development of the four existing dams until an environmental impact statement is completed and reviewed by DNR and the Michigan Environmental Review Board.

The Natural River Program will most likely dictate that the operation of any hydroelectric facilities on the Boardman River be such as to maintain the existing flow regime (i.e., the mode of operation would be run of the river) or to enhance the flow characteristics by stabilizing flows and minimizing natural fluctuations. Such a restriction greatly minimizes the opportunity for optimal power generation via a "peaking" mode of operation, which, of course, offers the highest valued use of a hydro facility.[221]

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218 Memorandum from Karl R. Hosford, Chief, Land Resources Programs Division, DNR. Meeting with Doug Carter, Chief, Natural River Program, Land Resource Programs Division, DNR (June 6, 1979).

219 MICH. COMP. LAWS § 281.763 (1976).

220 The Boardman River Plan states that its fourth objective is to "[m]aintain the existing free-flowing conditions and to seek to stabilize or improve the water flow characteristics for the purpose of preserving the environment." Supra note 213.

221 This provision is a compromise between the residents of the Traverse City area and the Fisheries Division of DNR. Fisheries has been for sometime considering utilizing the Boardman River's potential as a nursery stream for anadromous fish species in the Great Lakes. Local residents have been eaully desirous of preventing anadromous species in the Boardman. In order to get the Boardman Natural River Plan approved by the Natural Resources Commission, the local planners had to allow Fisheries the opportunity to introduce new fish species that are compatible with the existing ecology of the river. Supra note 214.

The Boardman Natural River Plan also includes a provision that may aid the County-City venture by preventing a requirement that fish passage be provided at the dams along with developing the hydroelectric potential of the Boardman River. The provision states that the river "should be managed for existing fish species" and that

> [t]he introduction of any new species should first be documented by reports of the implications and compatibility of such a program with other native species, recreational uses and the control techniques necessary to protect private property rights and the natural quality along the river.[222]

The Fisheries Division of DNR will have to perform the required assessment before it can proceed with its intended plan to develop the Boardman River as a spawning stream for anadromous fish species.[223] If the assessment concludes that the introduction of anadromous species will be detrimental to the Boardman as a natural river, DNR will be precluded from requiring fish passage necessary to enhance the anadromous fisheries potential of the Boardman River.[224]

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222 Supra note 213 at p. 26.

223 The Natural River Act, itself, specifically requires that . . . "state management of fisheries . . . take . . . cognizance of the plan."

MICH. COMP. LAWS § 281.763 (1976).

Additionally, the Michigan Environmental Protection Act could be utilized to enjoin DNR from requiring fish passage. The provision in the plan does, however, provide the advantage that DNR will have the initial burden of proof that its introduction of anadromous species is not environmentally detrimental, rather than the initial burden being on the County-City venture to demonstrate that it is environmentally detrimental as would be the case under the Michigan Environmental Protection Act.

See Id. § 691.1203.

224 Id. § 299.3.

3. FISHERIES ENHANCEMENT

DNR is additionally mandated by Michigan legislation to "foster and encourage the protecting and propagation of . . . fish." Today, sport fishing in Michigan is a multi-million dollar business. The Fisheries Division of DNR (Fisheries) takes great pride in this accomplishment.

The Boardman River is viewed by Fisheries as a particularly valuable resource to the Sports Fishing Program. Interest in the river focuses on its potential as a spawning stream for natural reproduction of anadromous fish species. Offspring would contribute to the fisheries of Traverse Bay and the Great Lakes, as well as providing fishing opportunities within the Boardman during the migratory runs. Though Fisheries considers the river as having the potential of being one of Michigan's finest steelhead trout and salmon streams, the immediate goal of Fisheries is only to develop steelhead fisheries. Only the existence of dams on the Boardman River has so far prevented it from being utilized as a nursery stream providing fisheries for the Great Lakes.[225]

Fisheries' optimum plan for developing the fisheries potential of the Boardman involves breaching Boardman and Sabin dams and replacing Union Street Dam with a lamprey barrier that allows passage of anadromous fish. The lower stretches of the river and tributaries are considered sufficient for necessary anadromous fish spawning and therefore Brown Bridge Dam would be maintained. This would preserve the excellent coldwater trout fisheries above Brown Bridge in keeping with Fisheries long range goal for the Boardman River.[226]

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225 Supra note 82.

226 Id.

Breach of the dams would of course cause some environmental impacts; however, DNR believes that breach can be conducted with minimal downstream impact.[227] DNR has breached three dams within the last ten years, with the latter two considered successful. Fisheries is not concerned with the destruction of established lacustrine environments, since the impoundments are not of benefit to trout, which are the species being promoted.[228]

Fisheries previously attempted to implement the plan to breach the dams, but it was met with considerable local opposition. DNR decided to wait until the County and the City would themselves decide to breach the dams without pressure from DNR, rather than bear the expense of repairs necessitated by natural deterioration.

However, the development of the hydroelectric potential of the Boardman River places Fisheries' plan for the river in new light. Rehabilitating the dams to generate electricity guarantees their existence for at least another fifty years.[229] Fisheries' present position is to require fish passages at all the dams, along with hydroelectric development at any of the dams, at the expense of the County-City venture.[230]

DNR's authority to require fish passage arises from the Free Passage of Fish Act of 1929.[231] By this act, DNR has discretion to require at anytime

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227 Supra note 81.

228 Supra note 82.

229 Id.

230 Supra note 48.

231 MICH. COMP. LAWS § 307.0 et seq. (1976). This statute has existed in one form or another since 1820 when Michigan was still a territory. Thus requiring fish passage at the dams is in compliance with due process.

that a dam owner, at his own expense, "erect and maintain . . . permanent means to admit of the free and uninterrupted passage of fish . . ."[232] DNR is also authorized to abrogate the requirement whenever "the height of the dam or the condition of the river . . . makes the installation of such ladders impracticable or unnecessary."[233]

Presently, Fisheries is developing a policy concerning fish passage which will be implemented by rulemaking. This policy establishes that DNR will never abrogate the requirement. With modern construction techniques, the height of a dam is no longer a technical constraint, and the condition of a stream rarely makes installation forever impracticable. Further, DNR does not desire to impose constraints on future management of a river resource.[234]

The policy, however, does enable DNR to grant a waiver if one of three stream conditions presently exist: (1) there remains little or no habitat necessary to support anadromous fish, (2) fish would merely pass from public to private control with no public access, or (3) the public benefit gained is clearly minute compared to the cost. There is little utility in requiring fish passage if the public does not benefit. Approval of the Natural Resources Commission, DNR's overseer, is necessary for a waiver to be granted.[235]

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232 Id. § 307.3 (1976).

233 Id. § 307.1.

234 All the divisions of DNR have concurred with the proposed policy and it will soon be considered by the Natural Resources Commission for approval.

Supra note 82.

235 Letter from Howard Tanner, Director DNR.

One reason for the new policy is to ensure uniform administration of the Free Passage of Fish Act. The intent of the policy is also to link the Free Passage of Fish Act and Fisheries overall Sport Fishing Program with FERC's licensing of hydroelectric projects. Fisheries will have sole discretion in determining when fish passage will be required.[236]

Fisheries does not consider any of the provisions for a waiver to be applicable to the Boardman River. Nor does Fisheries consider the provision of the Boardman River Plan restricting the introduction of new fish species to those compatible with the existing environment as preventing development of the Boardman River's potential as an anadromous fish spawning stream.[237]

It must be reiterated that the immediate objective of Fisheries is to utilize the Boardman River only as a spawning stream to enhance the trout fisheries of the Great Lakes. Fisheries believes that the introduction of salmon to the river can be prevented by discriminating against them in the operation of the fishladders. Flows in the ladders would be maintained only during those periods when steelhead trout spawn. These are the months of March and April, and November and December. Brown trout, native to the Boardman, also spawn in September and October and during this time the fishladders would not operate thereby preventing salmon from passing into the river. Since spawning seasons vary somewhat each year, there is a potential that the runs of the steelhead and salmon may overlap and hand sorting would be necessary at these times to keep salmon out of the Boardman River.

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236 Supra note 82.

237 Supra note 173.

Though Fisheries' present intention is to develop the Boardman's trout fishery potential, management attitudes are subject to change and Fisheries is therefore unwilling to state unequivocally that the Boardman River will never be utilized as a salmon spawning stream. Fisheries is also presently conducting an experimental program to determine the feasibility of introducing Atlantic salmon to Michigan's waters.[238] Due to the experimental nature of the program, Fisheries is unwilling to speculate as to whether the Boardman may be used to promote Atlantic salmon.[239]

Sea lamprey might be prevented from entering the Boardman River by designing a lamprey barrier at Union Street Dam. DNR stated that an effective lamprey barrier presently exists on the Betsy River and Fisheries is confident that the same effectiveness can be achieved on the Boardman by use of a vertical-slot fishladder. The number of lamprey that would pass is considered insignificant by Fisheries.[240]

There would be some species competition between the existing brown and brook trout and the steelhead introduced. However, Fisheries feels that the effect will be minimal. Steelhead trout live in spawning streams for only two years before migrating to mature in the Great Lakes. Similarly, coho

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238 Id. Coho and shanook (pacific) salmon were introduced in 1966 to the Great Lakes to feed on ale wife, a fish too small for sport but which polluted the streams and beaches of Michigan through massive die-offs. Salmon effectively control the ale wife, but also play a large role in the success of Michigan's sport fishing industry. Michigan was the only state bordering the Great Lakes to take such a bold initiative. Today, Michigan's DNR remains the sole promoter of salmon in the Great Lakes. Supra note 173.

239 Ohio and Pennsylvania are presently considering launching a program to introduce stripe bass to the Great Lakes. Michigan will not be participating in the program.

240 Supra note 82.

salmon leave the streams within two years and shanook salmon remain only one year. Thus, competition between these fingerlings and the existing species is viewed by Fisheries as insignificant.[241]

Many of the fish in the Great Lakes are contaminated with PCB's, PBB's and other toxic industrial pollutants. Spawning of such fish in streams can lead to contamination of the stream. This, however, is not considered by Fisheries to be a legitimate concern associated with introducing anadromous species to the Boardman. Contaminated fish are generally found only in the vicinity of industrial waste discharges. Therefore, any contamination of fish using the Boardman River to spawn would result from Traverse City's own pollution of Traverse Bay. This occurred in the past due to runoffs of DDT used in cherry production. This is a condition of the past. Additionally, DNR is doing everything it can to clean-up the Great Lakes.[242]

Water quality of the Boardman River would not be adversely affected by the introduction of anadromous species. Steelhead trout do not die in appreciable numbers after spawning. The death of salmon after spawning is a natural process which would only affect water quality by creating a stench and by increasing the nutrients in the stream.[243]

The Boardman Natural River Plan also states that the rights of riparians are to be considered in the introduction of any new species. When salmon were introduced to Michigan, a considerable detriment to riparian property rights resulted as large crowds of unruly fisherman descended to snag the

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241 Supra note 173.

242 Supra note 82.

243 Supra note 178.

spawning fish. Fisheries maintains that this is a situation of the past and points to areas where salmon fishing is in harmony with riparian rights. Providing public access will further minimize any interference with riparian rights that the introduction of steelhead trout or salmon might precipitate.[244]

Though there may be minimal implications for the existing environment from developing the Boardman River's potential as an anadromous fish spawning stream, the requirement of providing fishladders does significantly affect the hydorelectric development of the river.

The Fisheries and Wildlife Policy concerning FERC licensed hydroelectric projects recently adopted by the Natural Resources Commission established that DNR intends that the County-City venture bear the full cost of providing and maintaining fish passages at the dams licensed by FERC for hydroelectric development. The Free Passage of Fish Act requires that the City and/or the County pay for fish passage at those dams not developed. Even if state and federal anadromous fish funds are acquired to pay 50 percent of the cost, installation of fishladders will significantly increase the expense of developing and operating hydroelectric facilities on the Boardman River.

Providing fish passage will also precipitate several soci-institutional implications that may significantly delay or totally prevent the realization of the Boardman River's hydroelectric potential.

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244 Supra note 173.

I. LOCAL REVIEW OF THE PROJECT

Residents of the Traverse City area view the Boardman River as one of the more outstanding features of their attractive region. They are very interested in maintaining the natural character of the river and thus are concerned with the proposed hydroelectric development of the river. The single issue that permeates and dominates all local discussion about the project is the requirement to install fishladders at the dams.

The Boardman River Advisory Council, the Grand Traverse Soil Conservation District, the local Audubon Club, and the Grand Traverse Chapter of Trout Unlimited, along with the City of Traverse City Commission and the Grand Traverse County Commission, have all passed resolutions opposing the installation of fishladders. The local consensus is clearly against the introduction of exotic anadromous fisheries to the native trout waters of the Boardman River.[245]

Local officials, groups and citizens consider the impact of developing the Boardman's potential as an anadromous fish spawning stream to be environmentally detrimental. Additionally, the residents predict that considerable damage to this prime recreational area will be caused by the anadromous fishermen attracted to the Boardman River during the spawning runs.

The Boardman River is considered to be one of Michigan's finest trout streams. The dominant species in the Boardman below Brown Bridge Dam is brown trout, which average eight to twelve inches in size with a few reaching eighteen to twenty-four inches. The larger, non-native steelhead trout are viewed by local fishermen as being incompatible with the existing species.

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[245] Meeting with William McGarry, Grand Traverse County Commissioner (June 4, 1979).

They foresee the introduction of steelhead displacing the brown as the dominant species by driving the brown trout into the less favorable parts of the stream for which they are not adapted, thus causing the gradual extinction of brown trout in the Boardman.[246]

The local populace also fears that steelhead trout will not be the only anadromous species admitted to the river. It is felt that neither DNR nor the County-City venture will bear the expense of the manual sorting necessary to eliminate salmon when the spawning seasons of trout and salmon overlap. Salmon, like steelhead, are considered incompatible with the native brown and brook trout and would further destroy the Boardman River as a quality trout stream. Additionally, residents maintain that sea lamprey, attached to steelhead trout, will enter the Boardman along with carp, ale wife, and other undesirable species.[247]

The introduction of anadromous species from the Great Lakes is also seen as leading to the contamination of the river. Citizens are concerned that PCB's, PBB's and other toxics in the spawning fish would eventually permeate the food chain of the Boardman River. The death of the non-native salmon after spawning is also considered a pollutant.[248]

Local fishermen are concerned that DNR will lengthen the fishing season for the Boardman so as to accomodate fishing during the early spring spawning of steelhead trout. Destruction of the shoreline is foreseen as a consequence of fishermen plunging into the muddy banks typical of spring.[249]

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[246] Meeting with Members of Grand Traverse Chapter of Trout Unlimited (June 4, 1979).

[247] Id.

[248] Supra note 212.

[249] Supra note 249.

The people who fish for the large anadromous species have been rowdy and destructive in other areas of Michigan. Riparians fear that large crowds of fishermen will be attracted to the Boardman River who will be similarly insensitive to the landowner rights.[250]

Trout fishermen fear that the anadromous fishermen attracted will ruin the existing good relationship between them and riparians along the Boardman River. They are concerned that their access to the river will be limited, as riparians erect fences and take other measures to prevent the anadromous fishermen from trespassing as has happened along other streams. There is presently inadequate public access and this situation is not likely to improve, since most of the land along the reaches of the Boardman below Brown Bridge Dam is privately owned.[251]

Citizens of the Traverse City area believe that there are already enough rivers open to anadromous species. However, the Fisheries Division desires to further enhance the Great Lakes fisheries. They feel that raising fish in hatcheries would cost considerably less than the detriment that would result from utilizing the Boardman River as a natural hatchery. Few good trout streams remain in Michigan, and therefore the local residents want the Boardman to remain in its present natural condition without fishladders.

Local interest in the natural character of the Boardman River also raises concern with the operation of the hydroelectric facilities developed. Residents are concerned that wide fluctuations in stream flow may occur, adversely affecting the riverine environment. Local fishermen also fear that hydro-

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[250] Supra note 212.

[251] Supra note 249.

electric facilities will be used for peaking and point to the extreme exposure of the streambed that resulted from previous hydroelectric generation on the Boardman.

The need for electricity, however, is also recognized by the citizenry. Therefore, if a water management schedule sufficient to protect the environment is strictly maintained, residents of Traverse City would accept the operation of hydroelectric facilities on the Boardman River.[252]

However, resurrection of Keystone Dam is likely to be confronted with opposition. Already the local Audubon Club and the Grand Traverse Chapter of Trout Unlimited have expressed opposition to re-creation of an impoundment on the Boardman River. The trout fishermen believe that the power produced at the site would be minimal, and at best provide only temporary relief from electrical demand and, hence, it is simply not worth sacrificing the river.[253]

The fishermen are quick to point out that they are not only concerned with the negative impact rebuilding Keystone Dam would have on fishing. They view the river as a unique ecosystem: a priceless oasis of tranquility and scenic beauty which provides a necessary psychological relief from today's tensions. It just happens that good fishing goes hand in hand with the values associated with the present character of the Boardman River.

In addition to intervening in administrative proceedings at DNR or FERC and instigating litigation in the Michigan or federal courts, the local citizenry may also affect the County-City venture's decision concerning hydroelectric development by acting through local institutions. By exercising their franchise to vote, politicking, and refusing to issue permits, local citizens,

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[252] Supra note 212.

[253] Supra note 249.

groups and officials can force modifications in the development scheme or totally prevent any hydroelectric development of the Boardman River by the County-City venture. Four local institutions offer forums for expressing concerns and influencing the development decision.

1. REFERENDUMS

If the legal relationship established between the City and the County is a joint venture under authority of the Energy Employment Act, the Grand Traverse County will be acquiring an interest in a utility. The Revenue Bond Act mandates that acquisition of a utility must be approved by three-fifths (3/5) of the electorate, whether or not bonds are issued.[254]

Naturally, the concerns of the electorate will be reflected in such a referendum. Thus, if forty percent or more of those voting in the referendum find fault with any of the aspects of the project discussed above, the County will be prevented from participating in the hydroelectric development of the Boardman River.

The referendum can of course be avoided if Grand Traverse County chooses to allow the City to develop, limiting County participation to receiving payment for the use of its dams. Traverse City will not be subjected to such a referendum since it already owns a utility and the hydroelectric development would merely be an expansion of the existing utility system.

However, since bonding will be the principal means of financing the project, local citizens can prevent the implementation of a decision by the city officials to develop via a bonding referendum. A petition signed by ten percent of the electorate can force a decision to issue revenue bonds to be the subject

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254 MICH. COMP. LAWS § 141.104 (1976).

of a referendum. A simple majority can prevent the bond issue.[255]

Similarly, the issue of revenue bonds by Grand Traverse County, regardless of the degree of its participation in the project, can be defeated by a majority of its voters.

Additionally, if the full faith and credit of either the City or the County is pledged against their respective bond issues, then the issue must be approved by the respective electorates. This is a constitutional mandate and no petition is necessary to require the referendum.[256]

The ability of the local citizenry to prevent the funding necessary to implement hydroelectric development of the Boardman River is a significant hurdle confronting the County-City venture. The venture must allay the majority of fears associated with any development plan. The project will have to be designed with the electorates' concerns in mind. Significant modifications may have to be made in order to ensure initial local approval of the project. Some degree of campaigning may be necessary to acquire votes sufficient to pass a bonding referendum.

2. ELECTIONS

The City and the County Commissioners, who will make the ultimate commitment to a hydroelectric development plan for the Boardman River, are elected. Given the intense citizen interest in the future of the Boardman, the popularity of their decision may be the determining issue in subsequent elections. Hence, the political futures of the Commissioners may significantly depend on the electorates' continuing support of the project as it proceeds through

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255 Id. § 141.104.

256 MICH. CONST. of 1963, art. 9, § 6.

licensing, review, possible litigation and other events that tend to lessen initial support. Operation of the hydroelectric facilities will also probably be scrutinized each time the Commissioners are up for re-election.

Sensitivity to the political consequences of a particular development decision will ensure that the electorates' majority concerns are reflected in the development and operation of hydroelectric facilities. The Grand Traverse County Commissioners already consider it politically wise to avoid proceeding with any project requiring the installation of fishladders. Needless to say, the most politically viable development plan is not necessarily the best plan.

3. ZONING BOARDS

As previously mentioned, the resurrection of Keystone Dam will require a zoning variance from the Garfield Township Board of Zoning Appeals. The County-City venture must consider the likelihood of receiving that variance in light of local opposition to rebuilding the dam.

4. GRAND TRAVERSE SOIL CONSERVATION DISTRICT BOARD

The Soil Erosion and Sedimentation Control Act of 1972 and rules promulgated thereunder will require that the County-City venture develop a soil erosion and sedimentation plan for any man-made alteration in the natural cover or topography of land connected with water impoundments and waterway construction.[257] The plan must be approved by the Grand Traverse Soil Conservation Board before any development can commence. Such a plan would not be limited to providing temporary facilities to limit soil erosion and sedimentation during any construction. The plan will also have to provide means

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257 See MICH. COMP. LAWS §§ 282.101 (1976) et seq. and Michigan Administrative Rules 323.1701 et seq.

to limit erosion caused by the operation of the hydroelectric facilities.

Practically, this will require the venture to conduct assessments and studies to determine the impact of fluctuating flows on impoundment and river banks, and the streambed. Permanent erosion control and protection devices may be necessary. Restriction on fluctuations may be imposed to protect the Boardman River from sedimentation.[258]

The required local approval of a soil erosion and sedimentation control plan gives local concerns legal authority to regulate the method of operating the hydroelectric facilities. The effect on hydroelectric generation will be to constrain utilization of the facilities as peak power generating sources, and thereby lessen their value to Traverse City Light and Power's overall generating system.

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[258] Memorandum from Dennis J. Hall, In Charge, Special Land Programs Section, Division of Land Resource Programs, DNR, supra note 2, at Appendix E.

J. REVIEW OF THE PROJECT BY CONSERVATION GROUPS

There are at least two formidable conservation groups in Michigan presently interested in the proposed hydroelectric development of the Boardman River. At this point the project is still somewhat in the planning stage and the County-City venture has not solicited formal input from any outside interests. As a result, neither of the groups has yet formulated any specific concerns.

The Michigan United Conservation Clubs (MUCC) is a strong sportsman organization that is very active in representing conservation concerns. MUCC forsees that it will be interested in any hydroelectric development of the Boardman River. The focus of MUCC's concerns will be on the project's impact on wetland and riverine habitat, and on swans and other wildlife of the area. MUCC would probably oppose the introduction of salmon to the river but would not object to steelhead trout.[259]

Michigan Trout Unlimited will be less favorably disposed to the hydroelectric development than the local chapter has been. Trout Unlimited is generally anti-dam. Providing exposure and editorial support of this view is the North Woods Call, a small but influential conservation newspaper that is a strong proponent of the free flowing conditions of streams. Trout Unlimited and the North Woods Call can be expected to oppose any hydroelectric development on the Boardman River since it would prolong the life of the dams currently in place.[260]

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[259]Telephone conversation with Ray Rustem, Field Representative, MUCC (June 7, 1979).

[260]Telephone conversation with Glenn Shephard, Editor, "North Woods Call" (June 1, 1979).

As the development plan begins to take firmer shape, greater interest in the project by more conservation groups in inevitable. Once an environmental impact statement is prepared for the project the groups will be better able to pinpoint their concerns and develop preferred modes of expressing them.[261]

Early consultation and negotiation with conservation groups can avoid significant obstacles to the development of the Boardman River's hydroelectric potential. If the groups feel that the public interest, as they perceive it, has not been adequately considered by the County-City venture, FERC, DNR or other entities exercising control over the development, it is assured that they will seize each opportunity available, including public hearings, intervention and litigation, to insure that the conservation interests are thoroughly treated. Such activities can lead to delay, additional costs, modification of the development plan or total prevention of any hydroelectric development. Thus it would seem that the County-City venture should actively solicit and consider conservation groups' viewpoints before making any decision to develop.

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[261] Supra note 259.

III. CONCLUSIONS AND RECOMMENDATIONS

This section attempts to distill the information presented above and isolate the factors of major significance to the development of hydroelectric power on the Boardman River. These factors are categorized as incentives or barriers, depending on whether, in their current form, they tend to encourage or discourage hydroelectric development. Recommendations to enhance or minimize their impact, as necessary to foster a pro-hydro development climate, are included where appropriate.

A. BARRIERS

1. LACK OF PUBLIC AWARENESS OF HYDROELECTRIC POTENTIAL

Educating the public as to the value of hydroelectric generation would seem to be the primary prerequisite to the promotion of hydroelectric development. Recognition of hydropower's value has not yet been universally achieved. Many existing dams that could be used to generate hydroelectricity are presently being utilized only to provide recreational opportunity and flood control. Hydroelectric potential can be utilized without disturbing existing uses. Awareness of hydroelectricity's value should be actively fostered.

Presently, an assessment of the hydroelectric potential at existing dam sites throughout Michigan is being conducted by Ferris State College. The results of this study should be widely publicized. Dam owners should be made aware that they possess valuable assets. Recognition of the value that can be realized is the first step in considereing whether that value should be realized.

2. LACK OF HYDRO DEVELOPMENT INFORMATION

As noted above, developers, particularly new developers such as the joint venture participants here, have a vital need for complete and reliable information about any intended hydroelectric development. At a minimum this

information should be sufficient to enable the developer to comprehend the difficulties likely to be encountered in completing the project, and to identify the courses of action best suited to achieving that development, if feasible. The legal and institutional aspects of the development are clearly necessary considerations and should not be slighted. When, as here, the developers experience substantial difficulty in becoming informed about what data is needed or desired, as well as how to go about obtaining it, the project may incur substantial unnecessary delay, opposition, and cost. Quite obviously then, increasing hydro developers' access to such information is an effective means of encouraging hydro electric development.

Information concerning the hydroelectric potential of existing dams should be made available to all who may be interested in developing the sites. The present owner may not have the capital to invest or the willingness to exert the effort necessary to develop the site. Others may be more willing and able.

Once the value of hydroelectric generation is made known to potential developers, the developers should be educated as to the proper means of realizing it. Information concerning the engineering, environmental and legal implications of pursuing development should be made generally available to interested parties. The information should be in layman's language and should be geared to inform developers of what should be done and what needs to be considered. It is also essential that the developer understand why certain information is required and why certain factors need to be considered. Without such understanding, the requirements appear arbitrary and bewildering. The developer naturally becomes apprehensive of undertaking a course of action he does not comprehend.

Since hydro projects are very site specific, such information would necessarily be general in nature. Yet is would serve as a touchstone in evaluating a specific project. That is, the potential implications associated with development could be presented in an exhaustive check list format. The developer would proceed in a logical order to determine whether a particular law, environmental effect, economic factor or engineering consideration is applicable to his particular development. This would help ensure that a factor deserving consideration is not overlooked.

Information on funding sources should also be well publicized.

Additionally, a bibliography of more thorough resource materials should be provided so that a developer can educate himself on matters of particular concern to his project. However, providing personalized information concerning a specific development would be a more effective means of promoting hydroelectric development.

An agency, with expertise in hydroelectric development, could be established to aid the developer in understanding the peculiarities of his project. Personal contact should be encouraged. The agency need not (and perhaps should not) do the actual assessments, but should give specific guidance. Such activities as on-site visits to point out areas of concern that the developer should assess should be conducted. The legal requirements for a particular project should be discussed.

Environmental assessments should be made in cooperation with the Michigan Department of Natural Resources (DNR) since it has the expertise. However, an experienced ecologist could be employed by the agency to at least review DNR's concerns,so as to determine their actual impact on the hydroelectric development. An environmental concern which may seem an insurmountable

obstacle to a novice developer may be satisfied through a minor modification in the development scheme or restrictions on the water management schedule that will still allow profitable operation of hydroelectric facilities.

The agency could also be available to review any feasibility studies or preliminary plans for hydroelectric development. Such a review would reveal any additional factors requiring consideration or more thorough assessment. This early review could also be made by DNR.

Early review would lessen the likelihood of surprises to the developer after he has made a substantial commitment towards the project. It would assure that the developer's decision to develop is a responsible one, based on an adequate information base.

A variant of the informational deficiency problem is demonstrated by the Boardman development team's failure to contact the environmental groups likely to be interested in their project. This is frequently a costly oversight. Early communication with potentially interested environmentalists can help developers anticipate environmental difficulties and assess, and perhaps diffuse, much potential environmental opposition. Combating this tendency is primarily an educational task. The advantages of early environmental group contact should clearly be incorporated into the informational materials and guidance provided developers.

3. FISH PASSAGES

The fish ladder issue is certainly the most controversial and potentially threatening obstacle confronting the joint venture development effort. If ladders are required for the dams in the system, as indicated by DNR, the cost of the project will be increased appreciably (between 35 percent and 100 percent, including the water loss, depending on the dam). Moreover, in view of the perceived intensity of the local public opposition to installation of the.

ladders, it is unlikely that the elected political representatives of Traverse City and Grand Traverse County will decide to pursue development if ladders are required. Hence, the fish passage question must be recognized as a substantial impediment at hydroelectric development at existing dams in Michigan, and in other states sharing Michigan's strong environmental orientation. While the ladder issue is sufficiently complex and controversial to resist simple solutions, some opportunities for redress may be illuminated through an examination of some of its underlying policy facets.

Initially, the fact that the technical and policy aspects of the ladder question are highly controversial should be thoroughly appreicated. For example, an investigation of the Boardman ladder debate failed to reveal any consensus on the respective damages and benefits that could be reasonably expected from installing the ladders or not installing them, as well as on the fish passage objectives that should be pursued. As noted above, the ladder requirement raises what are in part technical and in part policy quandaries regarding proper fish management techniques and priorities.

While it is beyond our scope to attempt to resolve the technical debate, the existence of the controversy suggests that a legislative commandment (such as the Michigan Fish Passage Act) to require ladder installation should be reexamined. If the relative environmental merits and detriments of ladders, as well as their effectiveness for their intended purpose, are in question, it would seem unwise to permit their requirment to exert its potentially stifling influence over hydroelectric development.

Similarly, it is not our function to suggest the specific fish management or fish passage policies appropriate for Michigan, or any other states. Nevertheless, it is worth noting that the fish ladder question raises sub-

stantial issues of public policy that the legislature, and not any special interest administrative agency, should address. That is, the state legislature should formulate some specific guidelines for dealing with the fish passage question for hydroelectric developments at existing dams. In developing these guidelines, the legislature should consider at a minimum the probability of deriving the expected benefit from the ladders, the desirability of pursuing that benefit, the impact of a ladder requirement on hydroelectric projects, and alternative methods for achieving equivalent environmental objectives. The appropriate balance between statewide goals and local concerns, as well as how to most fairly allocate the substantial cost of the ladders where required, should also be addressed.

In Michigan, for example, the legislature might find that the questionable performance of ladders, coupled with the substantial cost of the models currently suggested by DNR, the likelihood that their requirement will inhibit much hydro development at existing dams, and the availability of undammed streams and alternative fish management techniques, such as stocking to serve state fishery goals, dictates the need for a legislative directive not to require ladders unless there are no reasonable alternatives. It might also determine that ladders should not be required at all as a condition to developing the hydro power at an existing dam. Where ladders are considered necessary, the legislature might determine that requiring the developer (and, of course, ultimately the local electric ratepayers) to pay for their costs is inferior to allocating the costs more generally among those who benefit, such as fishermen and state citizens.

The Michigan legislature might also question the wisdom of a DNR ladder orientation that apparently defers requiring installation until the dam is targeted for hydro development.

Of course, the legislature might conclude that some other balance between the need for ladders and the need for energy alternatives should be struck, but the important point is that legislatures in states, such as Michigan, should not blindly accept the status quo of their fish ladder requirements. Rather, legislatures should be sure that their DNR's or fisheries departments receive sufficient specific guidance on the ladder question to insure that the state's alternative energy or hydroelectric power objectives, as well as its fisheries' objectives, are intelligently pursued.

4. INADEQUATE LEGISLATIVE GUIDELINES FOR REVIEW OF HYDROELECTRIC PROJECTS

Currently, the Michigan DNR's evaluation of hydroelectric projects is directed by the broad language in the Michigan Constitution and the departments' enabling legislation, and the special purpose statutes covering areas affected by hydroelectric development (such as the Fish Passage Act and Natural Rivers Act). Policy guidance is supposedly available from the Natural Resources Commission. Since there is presently no legislative expression of commitment to any particular hydroelectric policy, it may be expected that hydroelectric generation may be undervalued relative to the other priorities that DNR is specifically charged with promoting.

In many cases, this may produce permitting delays, licensing conditions and other hydro development impediments based on priorities which are contrary to legislative desires. For example, DNR's current posture on the appropriateness of environmental mitigation as an alternative to a DNR requirement, which would prevent a hydro project or the need for optimum recreational facilities at a hydro site, would seem to require precise policy guidance on the relative importance of hydroelectric power to the

state. Similarly, DNR's apparent preference for dam breaching seems precipitous absent some clear legislative hydro policy reference. Thus, it would seem that determining appropriate relative value of hydroelectric generation involves fundamental public policy issues that the legislature should directly confront. Hence, the Michigan legislature should formulate a hydroelectric development program, complete with specific guidelines for balancing hydroelectric development against other state resource objectives.

In developing these guidelines the legislature should reconsider the relative worth of the values associated with a river resource. At present, the maintenance and enhancement of a river's ecological, fishery, wildlife, aesthetic and recreational values are considered paramount to its hydroelectric value. Certainly these values are important, but they cannot continue to completely overshadow the energy potential of a river.

Additionally, the relative value of hydroelectric power should be established through a comparison with other available power sources in the state. Extensive development of hydroelectric power in Michigan may reduce construction or use of nuclear, coal-fired and other electric generators which have significant associated environmental implications. A comparison of the detriments associated with each power source is critical to an accurate valuation of the state's hydroelectric potential.

Determining the relative value of hydroelectric generation will not be easy. There is no ready method of determining how many KW's of generating capacity equals the loss of important fishery habitat, for instance. Nor is it easy to compare the environmental damage caused by acid rain resulting from coal-fired generators with the soil bank erosion resulting from hydroelectric peaking operations. However, such qualitative evaluations are necessary and should not be delegated or resolved by default.

5. DEFICIENCIES IN FEDERAL-STATE LICENSING COORDINATION

In view of the dual licensing process confronting each eligible hydro project, an optimal degree of federal-state coordination is necessary to avoid saddling hydro developers with costly redundancies and contradictions. As noted, FERC and the Michigan DNR have worked well together in the past. Nevertheless, there are some inconsistancies between their licensing schemes which should be recognized.

For example, the apparent likelihood that a hydroelectric development like the Boardman project will be considered a major state action necessitating a state environmental impact statement seems to undermine FERC's recent rulemaking efforts to simplify licensing for existing dams. This contradiction is amplified by DNR's expressed reluctance to differentiate between existing and new dams when formulating permit conditions or application content. The legislature could resolve this dichotomy by exempting hydro projects at existing dams from state environmental impact requirements and directing DNR to promulgate permit standards in conformity with FERC requirements. In addition, the legislature could take general steps, either through appointing a hydro watchdog committee or statutory mandate requiring hydro permitting agencies to minimize federal-state differences, to insure the optimum compatibility between the two systems.

B. INCENTIVES

1. FEASIBILITY STUDY GRANT PROGRAM

Among the more significant factors stimulating the initial consideration of the Boardman River's hydropower potential was the availability of a hydro feasibility grant from the U. S. Department of Energy. Even preliminary hydro feasibility assessments are expensive (this one cost nearly $82,000),

and unexperienced developers are understandably reticent to risk such amounts without some inducements. The feasibility grant program seems to have been valuable in this regard, since the Boardman potential would have gone unnoticed without it. The new feasibility loan and licensing loan programs would appear to be a desirable follow up. While they do not provide outright grants, they offer low interest seed money to a much wider group and forgive loans on projects that would prove infeasible or fail to secure a license. Retention or expansion of this federal program, as well as the adoption of analogous state programs, would clearly offer a substantial stimulus to hydro development.

2. THE MICHIGAN ENERGY EMPLOYMENT ACT

Until 1976, Michigan Municipalities were not permitted to pool their resources to mutually develop an electric generating system. The Energy Employment Act now authorizes municipalities to form joint agencies and joint ventures to engage in such activities. This ability to pool resources enables municipalities to more effectively compete with the larger independently owned utilities, particularly where the project has a relatively high capital cost. The act provides municipalities with the opportunity to achieve the economies of scale in financing, legal and financial counseling, and construction and operation that are extremely useful in fully developing the hydroelectric potential of a river. That is, two or more municipalities can reap substantial hydro development cost savings by pooling their efforts to develop a river system, float a larger bond issue, attract valuable licensing and financial expertise and enhance their bargaining position with nearby investor owned utilities to secure power exchange and wheeling services at reasonable rates.

Other states have similar legislation, but the language of the Michigan

statute should be regarded as a model for states desiring to encourage potential municipal hydro developers. However, general awareness of its existence and implications should be improved in Michigan to increase the hydro development options of the municipalities in the state.

3. MUNICIPAL DEVELOPER ADVANTAGES

The Boardman joint venture enjoys certain cost advantages over private hydro developers as a result of certain financing advantages available to public bodies. The project can be funded through a revenue bond issue. Since the bonds offer tax exempt income, the joint venture can obtain development money more easily and at lower interest rates than private developers. Additionally, the municipal bonding market is so well developed that public hydro developers have superior access to multiple sources of expert financial and general development guidance.

An additional incentive to hydroelectric development of the Boardman River stems from the fact that the developers are municipalities. A private developer, before engaging in or expanding public utility activities, must demonstrate to the Michigan Public Service Commission that there is a public need for his development. In Michigan, a municipality is the sole determiner of whether there is a need for it to construct or expand a public utility system. The autonomy of deciding when and how to provide for the public need is a considerable advantage that Grand Traverse County and Traverse City enjoy over private developers and regulated utilities.

4. ADVANTAGES OF EXISTING DAMS

As noted earlier, preferential federal and, in some states, state licensing treatment substantially improves the prospects for development at existing dams. Moreover, environmental groups and property owner resistance to hydro projects utilizing existing impoundments is more likely to be limited than

for projects requiring new dams. In view of the substantially reduced environmental impacts of existing dam projects, noted briefly above, these advantages seem warranted. Furthermore, the Boardman project reveals a number of capital cost advantages attributable to the existing conditions of the sites considered.

For example, the property and flowage rights necessary to development at the five sites are already possessed by either the city or the county. Considering the high cost of real estate, especially along scenic streams, prior ownership offers significant development savings.

At four of the sites dams presently exist. Avoidance of the cost of building a dam is a significant incentive to developing hydroelectric capability at existing dams. The significance is clearly illustrated by the fact that rebuilding the washed-out dam along the Boardman River makes hydroelectric development financially infeasible at the site.

A further financial incentive is that two of the existing dams were previously used to generate hydroelectricity and the power structures are still useable. The cost of installing a powerhouse substructure (penstocks, flumes, etc.) and erecting a powerhouse superstructure (housing for the generators) at the dam never before used to generate hydroelectricity renders development at the site an unsound investment in light of alternative generating sources available. Thus, the existence of a retired hydroelectric facility may substantially encourage development at that site.

Of course, legislative action cannot create existing dam sites. It can, however, insure that existing sites with hydroelectric potential are identified, catalogued, publicized and preserved. It can also devise specific guidelines for determining the appropriateness of dam breaching

and require that the energy value of the dam be considered in any dispositions. Whatever the reason for their initial construction, existing dams represent recreational, environmental, capital and energy investments which should not be casually destroyed.

APPENDIX A

HYDRAULIC AND COST DATA

TABLE I

SUMMARY OF HYDROELECTRIC CHARACTERISTICS[A-1]

	Unit	Union Street Dam	Sabin Dam	Board-man Dam	Key-stone Dam	Brown Bridge Dam	Total
Drainage Area	Sq. Mile	276	269	267	265	151	
Max. Flow (4)	Cfs	359	350	347	345	403	
Min. Flow	Cfs	183	180	177	176	100	
Max. Head Water	Elev.	590.0	613.8	654.8	678.0	797.5	---
Max. Tail Water	Elev.	581.4	593.8	613.8	658.5	768.2	---
Min. Tail Water	Elev.	580.4	592.8	613.8	657.5	766.5	
Max. Head (at Base Load)(1)	ft. (1)	9.6	21.0	41.0	20.5	31.0	123.1
Min. Head (at Peak Load)(2)	ft. (2)	8.6	20.0	41.0	19.5	29.3	118.4
Pond Area	Acres	350	37	81	20	191	679
Power Potential	(At 80% eff.)						
Min. Capacity	KW	120	255	490	240	210	1,315
Max. Capacity (5)	KW	220	490	970	470	830	2,980
Base Power	KWH/yr.	1,330,000	2,680,000	5,322,000	2,577,000	1,875,000	13,674,000
Peak Power	KWH/yr.	289,000	635,000	1,260,000	610,000	1,012,000	3,806,000
Annual Power	KWH/yr	1,509,000	3,315,000	6,582,000	3,187,000	2,887,000	17,480,000
Stored Power (3)	KWH/ft(3)	2,610	620	2,720	330	4,720	8,550
Fish Passage	KW	16	36	69	35	---	156
Losses	KWH/yr.	142,350	311,400	607,950	304,000	---	1,365,700

(1) Max. H.W. El - Min. T.W.El.
(2) Max. H.W. El - Max. T.W.El.
(3) Pond Area x Aver. Head x 0.8193.
(4) At 15% of Time Exceeded except Brown Bridge which is existing acpacity.
(5) At average Head & Max. Flow

A-1 Feasibility Study for Boardman River Hydro Electric Power by Traverse City, Michigan, and Emery and Porter, Inc., Contract No. EW-78-F-07-1792, DOE Cooperative (1978).

TABLE II[A-2]

UNION STREET DAM

Earliest possible service date: Fall, 1981

Construction Cost

Preliminary Expenses	$ 11,600
Clearing	9,000
Powerhouse Substructure	365,000
Powerhouse Superstructure	90,500
Turbine-Generator	448,000
Other Electrical	55,000
Crane and Motor	20,000
Total	$999,100

Capacity: 221 kw

Transmission Losses 6 kw

Capacity for System Load		Without Fish Ladder	With Fish Ladder
Base Load	118 kw	1220 MWH/yr	1086 MWH/yr
Peak Load	103 kw	289 MWH/yr	289 MWH/yr
Total	221 kw	1509 MWH/yr	1375 MWH/yr

Capital Costs

Plant and Equipment	$965,540	$965,540
Interfacing	35,000	35,000
Fish Passage	0	279,000
Int. During Construction	10,000	10,000
Engineering and Conting.	150,000	150,000
Total Capital	$1,160,540	$1,439,540

Annual Cost

Annual Expense		
Maintenance	$ 4,900 ea. 5 yrs	$ 4,900 ea. 5 yrs
Repair	30,000 ea. 10 yrs	30,000 ea. 10 yrs
Operation	4,235	4,235
Admin. and general	430	430
Insurance	3,000	3,000
Total Annual Expense	11,645	11,645
Depreciation	29,014	35,989
Dept. Retirement	107,431	133,258
Total Annual Cost	$148,090	$180,892
Cost per kwh (mils)	98.1	131.6

A-2 Id.

TABLE III [A-3]

SABIN DAM

Earliest possible service date: September, 1980

Construction Cost

Canoe Portage	$ 2,000
Reservoir Bank Protection	2,000
Powerhouse Superstructure	25,000
Hydraulic Equipment	537,000
Electrical Equipment	41,500
Total	$607,500

Capacity 484 kw

Transmission Losses 15 kw

Capacity for System Load		Without Fish Ladder	With Fish Ladder
Base Load	253 kw	2680 MWH/yr	2386 MWH/yr
Peak Load	231 kw	635 MWH/yr	635 MWH/yr
Total	484 kw	3315 MWH/yr	3021 MWH/yr

Capital Costs

Plant and Equipment	$589,440	$589,440
Interfacing	21,500	21,500
Fish Passage	0	620,000
Int. During Construction	6,100	6,100
Engineering and Contig.	91,600	91,600
Total Capital	$708,640	$1,328,640

Annual Cost

Annual Expense		
Maintenance	4,900 ea. 5 yrs	4,900 ea. 5 yrs
Repair	30,000 ea. 10 yrs	30,000 ea. 10 yrs
Operation	1,635	1.635
Admin. and general	294	294
Insurance	3,000	3,000
Total Annual Expense	8,909	8,909
Depreciation	17,716	33,216
Dept. Retirement	65,599	122,992
Total Annual Cost	$ 92,224	$165,117
Cost per kwh (mils)	27.8	54.7

[A-3] Id.

TABLE IV [A-4]

BOARDMAN DAM

Earliest possible service date: September, 1980

Construction Cost			
Highways and Bridges		$503,460	
Reservoir Bank Protection		2,000	
Conduits		2,000	
Powerhouse Superstructure		28,000	
Hydraulic Equipment		707,000	
Electrical Equipment		48,000	
		$1,290,460	
Capacity	963 kw		
Transmission Losses	25 kw		
Capacity for System Load		Without Fish Ladder	With Fish Ladder
Base Load	489 kw	5,322 MWH/yr	4,738
Peak Load	474 kw	1,260 MWH/yr	1,260
Total	963 kw	6,582 MWH/yr	5,998
Capital Costs			
Plant and Equipment		$1,269,700	$ 1,269,700
Interfacing		28,000	28,000
Fish Passage		0	1,271,000
Int. During Construction		13,000	13,000
Engineering and Conting.		194,700	194,700
Total Capital		$1,505,400	$ 2,776,400
Annual Cost			
Annual Expense			
Maintenance		$ 4,900 ea. 5 yrs.	$ 4,900 ea. 5 yrs.
Repair		30,000 ea. 10 yrs.	30,000 ea. 10 yrs.
Operation		1,635	1,635
Admin. and General		294	295
Insurance		3,000	3,000
Total Annual Expense		$ 8,909	$ 8,909
Depreciation		37,636	69,410
Dept. Retirement		139,355	257,011
Total Annual Cost		$ 185,899	$ 335,330
Cost per kwh (mils)		28.2	55.9

[A-4] Id.

TABLE V[A-5]

KEYSTONE DAM

Earliest possible service date: Fall, 1982

Construction Cost	
Preliminary Expenses	$ 17,000
Clearing	15,000
Highways and Bridges	25,000
Dams	1,285,000
Conduits	70,000
Powerhouse Substructure	222,000
Powerhouse Superstructure	102,500
Hydraulic Equipment	378,000
Electrical Equipment	16,000
Other Electrical	20,250
Crane and Motor	20,000
Total	$ 2,170,750

		Without Fish Ladder	With Fish Ladder
Capacity	466 kw		
Transmission Losses	14 kw		
Capacity for System Load			
Base Load	241 kw	2,577 MWH/yr	2,294
Peak Load	225 kw	610 MWH/yr	610
Total	466 kw	3,187 MWH/yr	2,904

Capital Costs		
Plant and Equipment	$ 2,153,400	$ 2,153,400
Interfacing	20,250	20,250
Fish Passage	0	620,000
Int. During Construction	27,700	27,700
Engineering and Conting.	326,000	326,000
Total Capital	$ 2,527,350	$ 3,147,350
Annual Cost		
Annual Expense		
Maintenance	4,900 ea. 5 yrs.	4,900 ea. 5 yrs.
Repair	30,000 ea. 10 yrs.	30,000 ea. 10 yrs.
Operation	4,235	4,235
Admin. and General	430	430
Insurance	6,750	6,750
Total Annual Expense	$ 15,395	$ 15,395
Depreciation	65,013	80,513
Dept. Retirement	233,957	291,350
Total Annual Cost	$ 314,365	$ 387,258
Cost per kwh (mils)	98.6	133.4

A-5 Id.

TABLE VI[A-6]

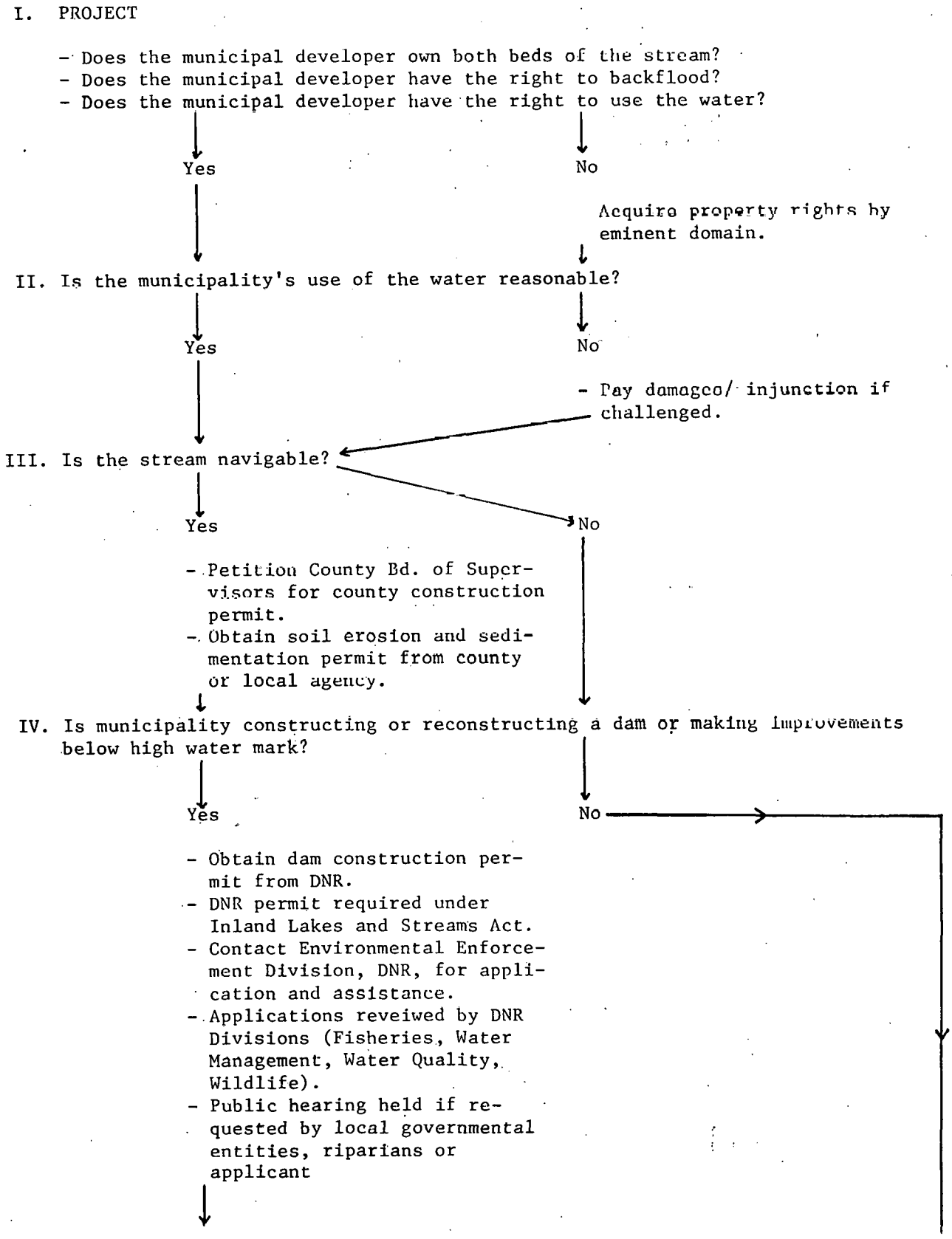
BROWN BRIDGE DAM - WITHOUT FISH LADDERS

Construction Cost			
Highway and Bridges		$ 2,000	
Reservoir Bank Protection		10,000	
Powerhouse Superstructure		1,500	
Electrical Equipment		12,000	
Nameplate Rating	800 kw		
Capacity	823 kw		
Transmission Losses	25 kw		
Capacity for System Load			
Base Load	210 kw	1,875	MWH/yr
Peak Load	613 kw	1,012	MWH/yr
Total	823 kw	2,887	MWH/yr
Capital Costs			
Plant and Equipment		$30,000	
Interfacing		2,000	
Int. During Construction		270	
Engineering and Conting.		4,000	
Total Capital		$36,270	
Annual Cost			
Annual Expense			
Maintenance		$12,900	every 5 years
Repair		30,000	every 10 years
Operation		4,235	
Admin. and General		515	
Total Annual Expense		$10,330	
Depreciation		1,741	
Dept. Retirement		3,358	
Total Annual Cost		$15,428	
Cost per kwh (mils)		5.3	

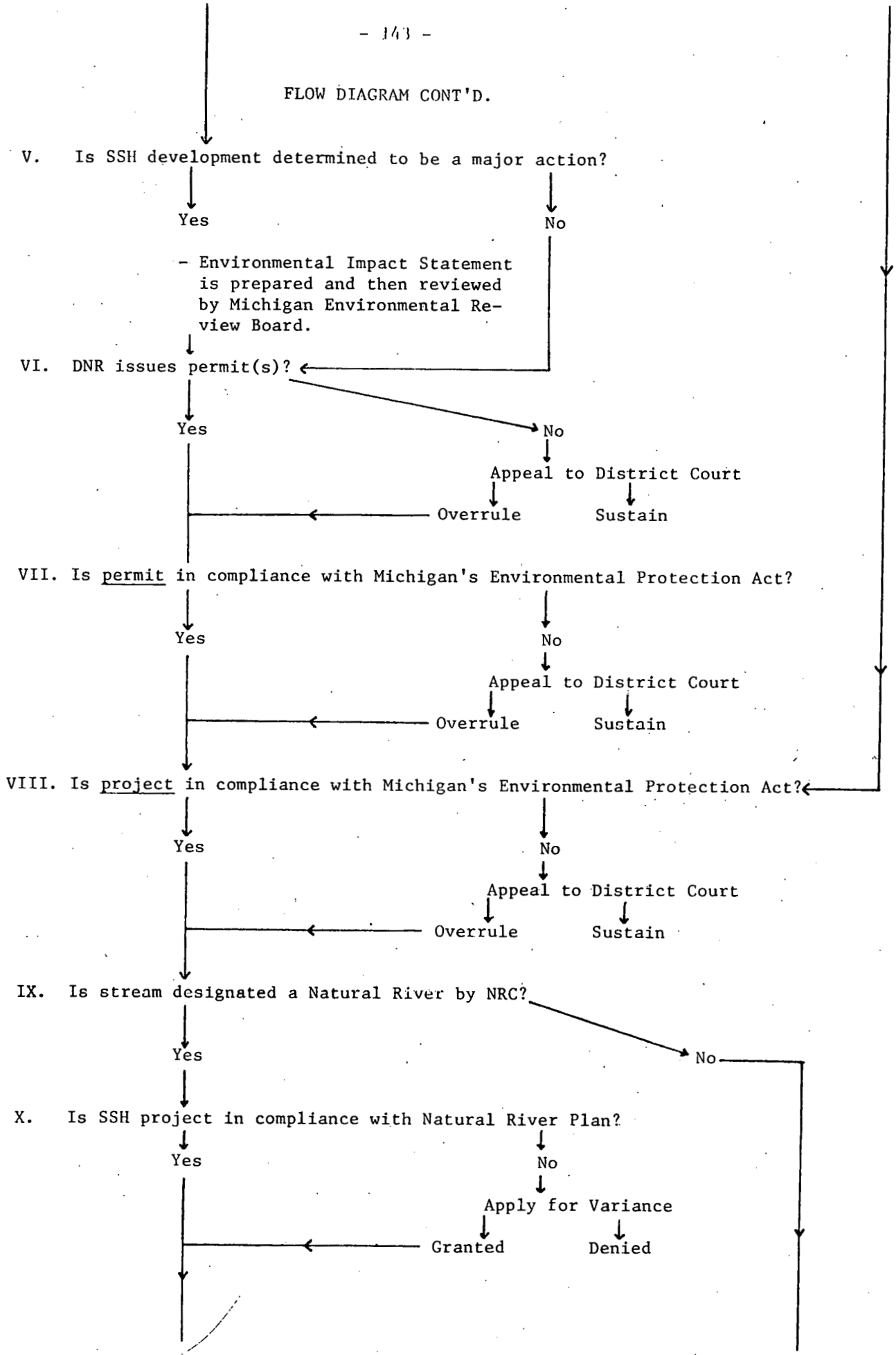
A-6 Id.

APPENDIX B

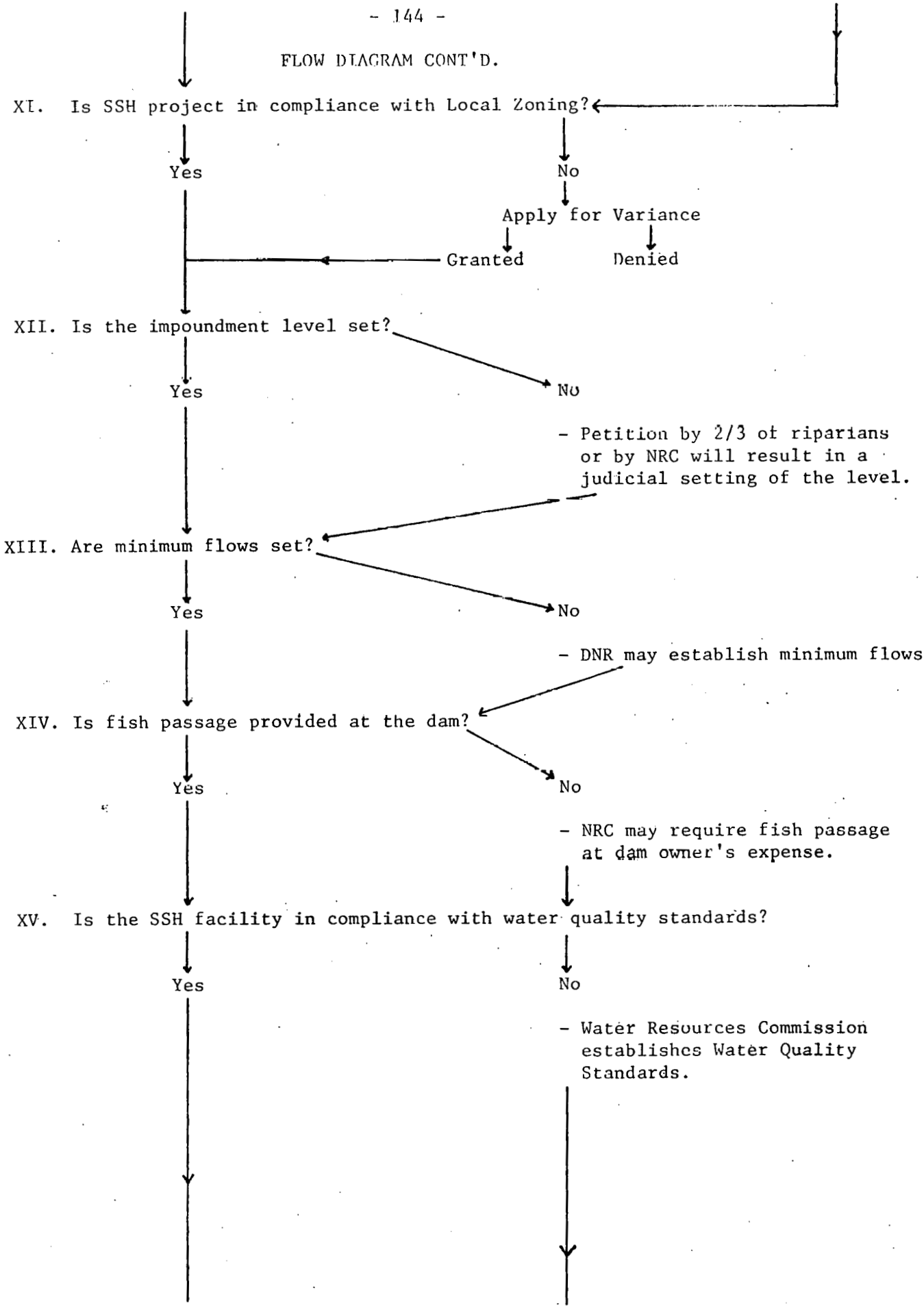
FLOW DIAGRAM FOR THE TRAVERSE CITY-TRAVERSE COUNTY JOINT VENTURE PROJECT



FLOW DIAGRAM CONT'D.



FLOW DIAGRAM CONT'D.



FLOW DIAGRAM CONT'D.

XVI. Will construction, rehabilitation or operation of the facility interfere with an historic site?

Yes

- Apply for permit from local historic preservation district.

granted — denied

No

XVII. Is development in compliance with zoning enacted pursuant to Shorelands Protection and Management Act?

Yes

No

Apply for Variance

granted — denied

XVIII. Is project within a State Wilderness Area?

Yes

- Only construction of structures for emergency purposes is permissible.
- Rights vested before 7/1/72 not affected.

No

XIX. Is the project within a federally designated Wild and Scenic River Area?

Yes

-Dams may not be constructed.

No

XX. Construction, Operation and Maintenance of SSH Dam

- Comply with conditions of all permits and licenses.
- Obtain insurance for dam breach.
- In terms of insurance, costs, is project worth risk?

APPENDIX C

SOME KEY DECISION MAKERS FOR THE BOARDMAN PROJECT

Traverse City, Michigan

Peter C. Dendrinos, Mayor
The City Commission
William P. Strom, Director of Traverse City Light and Power Department
Peter Doren, City Attorney

Grand Traverse County, Michigan

Rooo Childs, County Coordinator
The Board of Commissioners

Michigan Department of Natural Resources

Dr. Howard A. Tanner, Director	
Dale W. Granger	Chief, Water Management Division
John A. Scott	Chief, Fisheries Division
Edward Mikula	Senior Wildlife Executive, Wildlife Division
Henry H. Webster	Chief, Forest Management Division
Dennis J. Hall	In Charge of Special Land Programs Section, Division of Land Resources Programs

*U.S. GOVERNMENT PRINTING OFFICE : 1980 O-311-125/137