DOE/EIS-0079 Final

Environmental Impact Statement

300-KV International Submarine Transmission Line-Erie, Pennsylvania to Nanticoke, Ontario, Canada General Public Utilities Corporation

May 1982

U.S. Department of Energy
Assistant Secretary for Environmental Protection,
Safety, and Emergency Preparedness
Office of Emergency Operations

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Office of Emergency Operations
Washington, D.C. 20585

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U.S. DEPARTMENT OF ENERGY

memorandum

DATE: APR 27 1982

REPLY TO ATTN OF: EP-1

SUBJECT: Final Environmental Impact Statement, DOE/EIS-0079, 300 kV International Submarine Transmission Line - Erie, Pennsylvania, to Nanticoke, Ontario, Canada by General Public Utilities Corporation

TO:

Ronald L. Winkler, EP-40
Deputy Assistant Secretary for Energy Emergencies

The Office of Environmental Protection, Safety and Emergency Preparedness has reviewed the subject final environmental impact statement. Our review indicates that our previous comments have been satisfactorily accommodated.

In accordance with DOE Order 5440.1A, it is our determination, after consultation with the Office of the General Counsel, that the final environmental impact statement is adequate for publication.

Your staff should call Linda Desell on 252-6374 to obtain guidance and assistance on filing and distributing the final EIS.

William A. Vaughan
Assistant Secretary
Environmental Protection, Safety,
and Emergency Preparedness

Office of the General Counsel

Concur _____ Date 4.21.82

Nonconcur _____ Date _____

Responsible Agency: U.S. Department of Energy
Office of Energy Emergency Operations

Title of Proposed Action: The Issuance of a Presidential Permit to Jersey Central Power & Light Company

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Designation: Final Environmental Impact Statement

Abstract: This final environmental impact statement (FEIS) was prepared by the Office of Energy Emergency Operations. The proposed action by the Department of Energy is the granting of a Presidential Permit for the construction, connection, operation, and maintenance of 69.6 kilometers (44 miles) of a +250 to +325 and -250 to -325 kilovolt (250-325 kV) transmission facility from the Erie West Substation to the international border. The proposed project will connect the General Public Utilities Corporation System with the Ontario Hydro System for the purpose of economic exchanges of power and increased reliability. Environmental impacts expected from construction and operation of the proposed Lake Erie Interconnection appear to be mainly transitory effects on aquatic life due to construction.

SUMMARY

Jersey Central Power and Light Company (JCP&L), a subsidiary of General Public Utilities Corporation (GPU), has applied for permits to construct, connect, operate, and maintain the U.S. portion of high-voltage direct-current (dc) transmission circuits extending from the Nanticoke Generating Station in Ontario, Canada, by cables under Lake Erie to the Pennsylvania shore, a distance of about 100 kilometers (62 miles). Overhead dc transmission would then continue for 9.6 kilometers (6 miles) to a dc/ac conversion station to be located adjacent to the existing Erie West substation of Pennsylvania Electric Company, also a GPU subsidiary. The major purpose of the proposed Lake Erie Interconnection is to provide reliable transmission for a planned firm purchase of 1000 MW by GPU from Ontario Hydro (OH) during the period 1985 through 1994. The Canadian portion of the interconnection would be constructed by OH.

An electric utility or other entity proposing to build a transmission line crossing a U.S. international border must obtain a Presidential Permit authorizing the project (see Executive Orders 10485 and 12038). The U.S. Department of Energy (DOE) evaluates, processes, and issues each Presidential Permit. Regulatory decision-making at both the state and federal levels must comply with environmental review laws. This environmental impact document on the proposed project has been designed to meet the federal requirements of the National Environmental Policy Act (NEPA).

Possible alternatives to the proposed transmission line interconnection include enhancement of conservation and use of decentralized energy sources, purchase of additional power from U.S. sources, and construction of additional generating capacity. GPU already has implemented a Conservation and Load Management Plan. It appears unlikely that enhancement of this plan would remove the need for the firm purchase from OH. "No action" by DOE would be equivalent to denial of the Permit.

GPU considered four alternative routes in determining the most desirable location for the interconnection between Ontario Hydro and the Pennsylvania-Jersey-Maryland Interconnection (PJM): the proposed Lake Erie Interconnection, a combined overland and submarine cable route, a route through the New York Power Pool (NYPP), and another via Michigan and Ohio. The combined overland-submarine, NYPP and Michigan-Ohio routes are not preferable for GPU's 1985-1994 energy needs.

The environmental impacts expected from construction and operation of the proposed Lake Erie Interconnection appear to be mainly transitory effects on aquatic life due to construction, provided that possible impacts are mitigated by appropriate practices.

The environmental impacts expected from the enhanced conservation and decentralized source alternative would be mainly those due to the increased

mining, manufacturing, and transportation required to supply the materials and equipment necessary to implement this alternative. These impacts would be national in extent but imperceptible (or nearly so) at any specific locality. This alternative would not provide the enhancement of reliability which would be a benefit from the proposed interconnection.

The alternative of purchase of additional power from other U.S. sources could have a wide variety of impacts, depending upon how and where the power is generated. Since these impacts would be spread over many locations, they would be nearly imperceptible in any specific locality.

Construction impacts would result from the alternative of construction and operation of additional generating capacity. The impacts of operation would be roughly comparable to those associated with additional power purchases, but mainly confined to a single, small region in which they would be perceptible.

The enhanced conservation and additional power purchased from U.S. sources alternatives would probably result in the least adverse environmental consequences. However, it is doubtful that enhanced conservation and use of decentralized sources could meet the need of GPU's customers within the 1985-1994 time frame. Additional U.S. purchases would not enhance reliability nor reduce U.S. oil imports. Construction and operation of new generating capacity would impose greater adverse environmental consequences than would construction and operation of the proposed interconnection.

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1. PURPOSE AND NEED

1.1 INTRODUCTION

Under Executive Order 10485 as amended by Executive Order 12038, a Presidential Permit is required for the construction, connection, operation, and maintenance of electrical transmission facilities that cross an international border of the United States. Under the latter Order, authority to grant or deny a Presidential Permit is delegated to the Secretary of Energy, subject to concurrence by the Secretary of Defense and the Secretary of State.

Jersey Central Power & Light Company (JCP&L), a subsidiary of General Public Utilities Corporation (GPU), applied to DOE on June 25, 1980, for a Permit for the Lake Erie Interconnection. GPU owns the entire common stock of JCP&L and of two Pennsylvania electric utilities, Metropolitan Edison Company (ME) and Pennsylvania Electric Company (PN). The three companies are operated as an integrated GPU system, although each is separately regulated by the Public Utility Commission of its state. JCP&L, the actual Applicant, would be the major customer (650 MW) for the proposed firm sale of power (1000 MW total) from Ontario Hydro (OH), but the entire GPU system would be affected. Indeed, the U.S. portion of the interchange would be constructed in PN territory but not necessarily by PN. For these reasons and for simplicity, GPU will generally be considered as "the Applicant" throughout this environmental impact statement.

1.2 PROJECT SUMMARY AND PURPOSE

GPU, a U.S. electric utility holding company, and OH, a crown corporation of Canada, propose in cooperation to construct and operate the Lake Erie Interconnection, a facility for transmission of dc electric power between existing substations near Erie, Pennsylvania, and Nanticoke, Ontario. The proposed transmission route is shown in Figures 1.1 and 1.2. Over most of its length, 100 kilometers (km) [62 miles (mi)], the facility would be composed of five cables on or under the bottom of Lake Erie. New equipment to convert ac power to dc and vice versa would be required at the Nanticoke and Erie West substations. About 9.6 km (6 mi) of new overhead transmission line would be constructed to connect Erie West to a terminal near the Lake Erie shore. GPU would construct and own the U.S. portion of the facility while OH would construct and own the Canadian portion. After completion of the interconnection in late 1984, GPU would buy 1000 MW of electrical power from OH through 1994. The interconnection would subsequently serve as a non-dedicated transmission facility providing a means for exchange of emergency, seasonal-diversity, and economy energy between OH and U.S. utilities. The proposed project is described in greater detail in Section 2.1.

GPU's main purpose in constructing the proposed Lake Erie Interconnection is to provide an adequate transmission path for a proposed firm purchase of

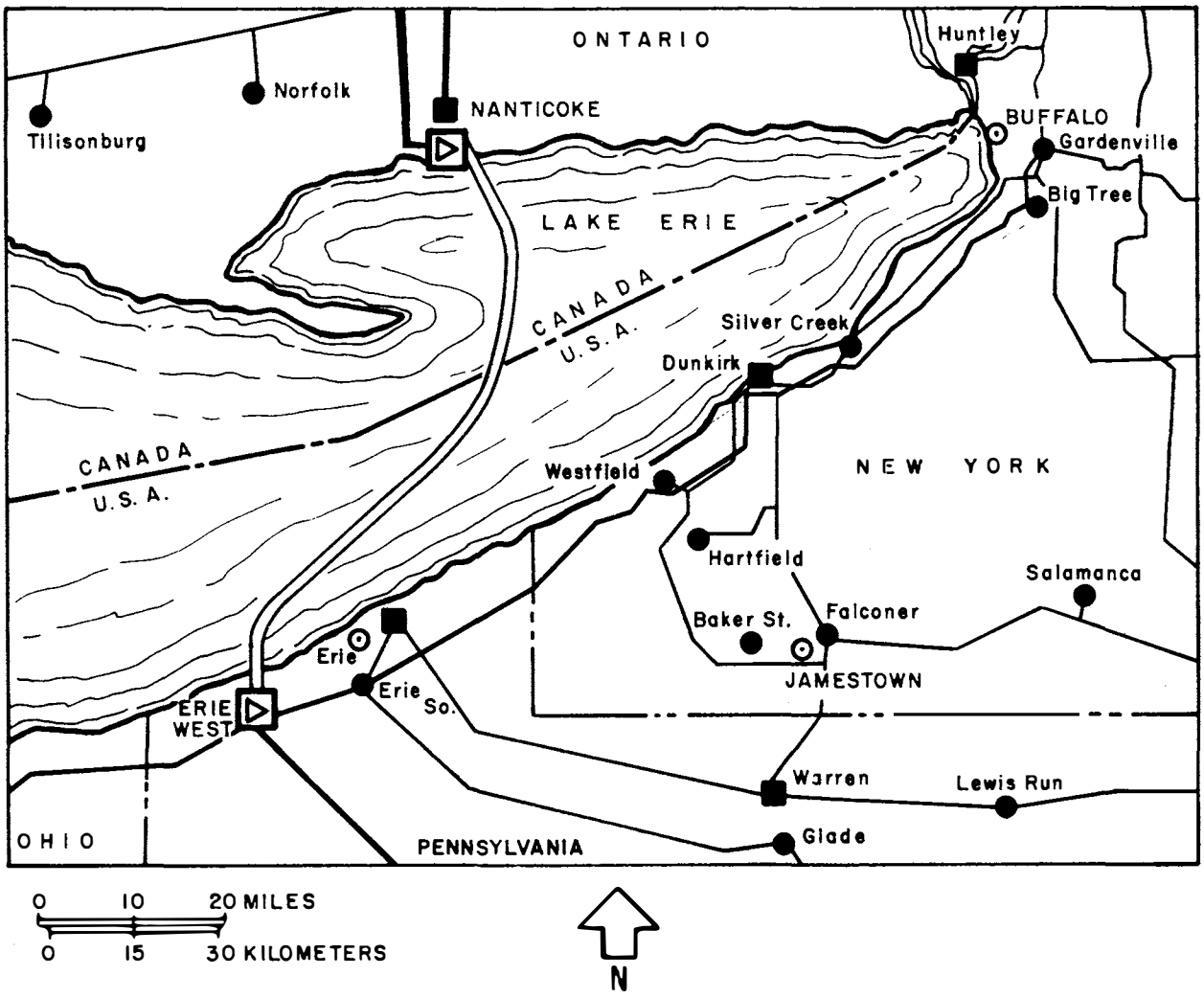


Fig. 1.1. Proposed Lake Erie Transmission Route. From GPU 1981a, Figure 2.0-1.

1000 MW from OH during the years 1985 through 1994. The firm purchase would relieve the capacity deficit due to the loss of Three Mile Island Unit 2 and to the deferment of one new generating plant and the cancellation of another which had been planned for operation during the 1980's. It would also provide GPU and its customers with lower cost electrical energy than would be available by purchase from GPU's neighboring utilities in the Pennsylvania-Jersey-Maryland Interconnection (PJM). PJM baseload energy is provided by coal-fired and nuclear plants, but peak power is provided by the more expensive oil-fired units. On the other hand, OH baseload energy is provided by hydro and nuclear plants, normal peak power is provided by coal-fired units, and emergency power is provided by oil-fired plants. Peak power purchased from OH would be less expensive than the peak power purchased from PJM due to the cost of the fuel used.

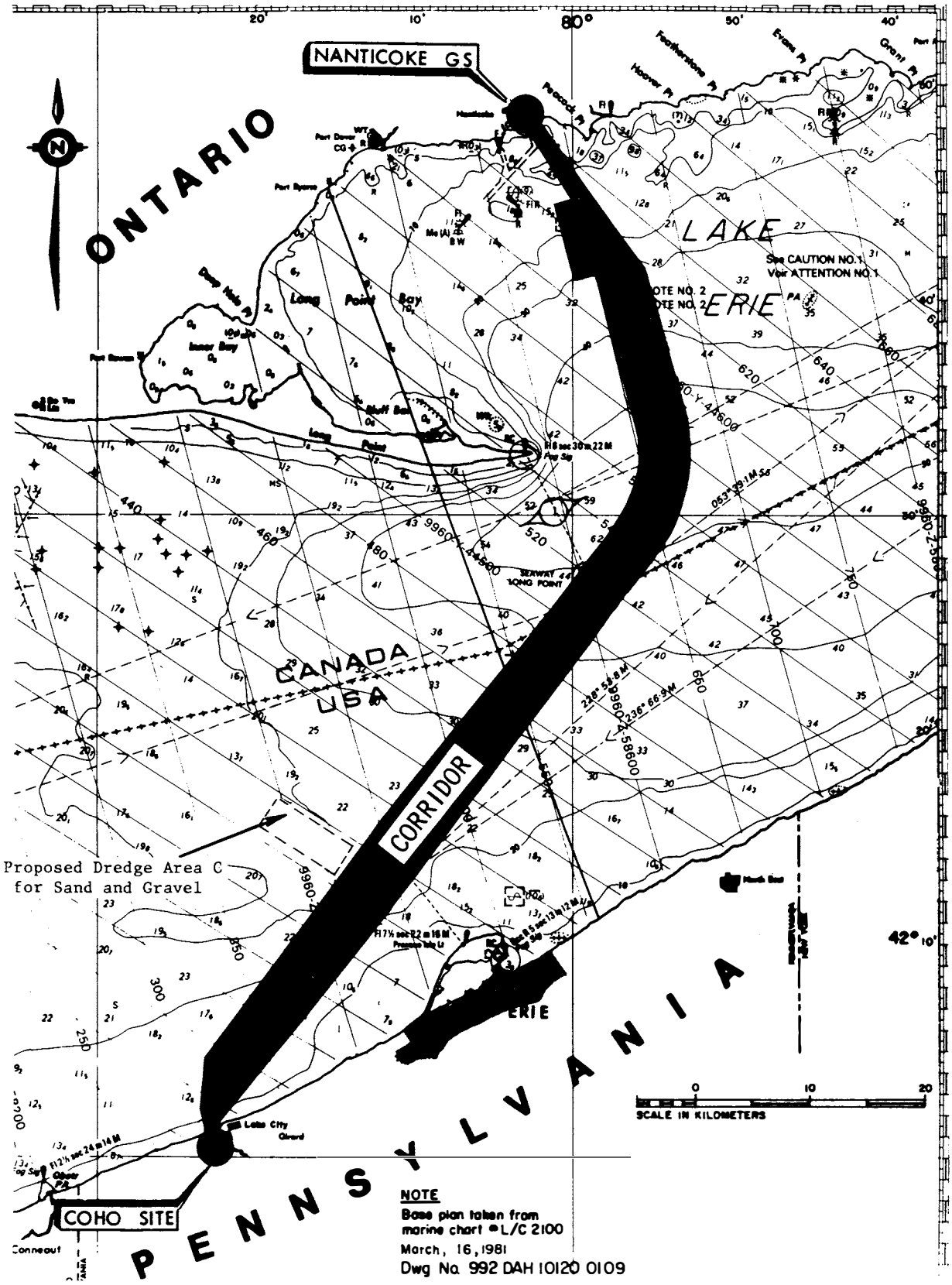


Figure 1.2. Proposed Lake Erie Submarine Cable Corridor. From GPU 1981c.

1.3 RESOURCE PLAN AND SUPPLY REQUIREMENTS

GPU's electric load and resources (generating and purchase capability) are shown in Table 1.1 for the years 1982 through 1995. The peak load is based on GPU's Energy Plan of November 1981 (Load and Capacity Forecast Tables).

The average annual rate of growth (AARG) of peak load indicated by GPU for the years shown in Table 1.1 (1982-1995) is 2.2%. Independent forecasts of AARG made by Joiner and Platt (1981; Table IV-6) for the region of the United States in which GPU is a major supplier indicate that the AARG will be 2.5%. This is unusually good agreement for forecasts of this kind made by two independent sources.

The entries in Table 1.1 that allow comparison of percent reserves (columns 8 through 11) with and without the OH capacity reflect the assumption that the firm purchase of 1000 MV from OH via the interconnection will begin in 1984 and continue through 1994. All of the 1000 MW are assumed to be available for the summer peak in 1986. Normally, GPU would seek to maintain a system reserve margin (% reserve) of about 25% in order to meet interconnection obligations (GPU 1980a).

As indicated in Table 1.1, that level (% reserve) will be achieved in only one year (1991) and then only if (a) the OH firm purchase is in place, (b) Three Mile Island Unit 1 comes on line in 1983, (c) Three Mile Island Unit 2 comes on line in 1990, and (d) a 625-MW coal plant is completed for 1991 operation.

1.4 TECHNICAL STUDIES

The Department of Energy (DOE) staff will determine if the Applicant's proposed international interconnection will impair the sufficiency of electric power supply within the United States. The DOE will also determine if the interconnection will impede or tend to impede the coordination of electric utility planning or operation within the Applicant's service area. To meet this requirement, the DOE staff is conducting a technical review in the following areas: (1) system load flow studies to review the expected performance of the pertinent parts of the two systems and to determine line loadings during normal operation and during the outage of certain key facilities; (2) voltage-level evaluations with and without the proposed facility; (3) system stability studies immediately following a major outage or disturbance; and (4) production-cost studies and loss-of-load probability studies to ascertain the economic and reliability factors associated with the proposed line.

A computer analysis will be used to assess potential benefits in production cost, fuel use, and reliability resulting from incorporation of the proposed interconnection into the applicant's system. The computer simulation model will be for several different periods from January 1985 through December 1994. The GPU system will be modeled separately and combined with the OH system. For reliability evaluation, an additional analysis will be performed for the GPU system with the addition of the available interconnection capacity modeled as a generating plant.

Table 1.1. General Public Utilities Electric Load and Resources

Year	Peak Load (MW)[a]	Annual Operable Resources (MW)[b]	Capability Added and Operable (Annual, 1982-1995) TMI-1 (MW)	TMI-2 (MW)	Coal Steam (MW)	Changes in Capability due to Retirements and Purchases (MW)	Total Resources Without Ontario Hydro Purchase (MW)	Reserve Without Ontario Hydro Purchase (%)[c]	Total Resources With Ontario Hydro Purchase (MW)	Reserve With Ontario Hydro Purchase (%)[c]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1982	6155	6406				117	6523	6	6523	6
1983	6365	6523	776			-25	7274	14	7274	14
1984	6478	6499	776			-279	6995	8	6995	8
1985	6609	6219	776			27	7022	6	7622[d]	15
1986	6730	6246	776			15	7037	4	8037	19
1987	6857	6261	776				7037	3	8037	17
1988	7031	6261	776				7037	<1	8037	14
1989	7201	6261	776				7037	Negative	8037	12
1990	7360	6261	776	880			7917	8	8917	21
1991	7537	6261	776	880	625		8542	13	9542	27
1992	7685	6261	776	880	625	-385	8157	6	9157	19
1993	7839	5876	776	880	625	-768	7389	Negative	8389	7
1994	7986	5108	776	880	1250	-250	7744	Negative	8744	9
1995	8138	4838	776	880	1250	-312	7432	Negative	8432	4

Based on "GPU Energy Plan, Load and Capacity Forecast Tables" (GPU 1981).

[a] Summer peak (GPU is a summer peaking utility).

[b] Summer capability. The numbers in this column (3) have been adjusted to show how the 1982 capability decreases due to retirements and reduced purchases over the 10-year period. Capability is also affected by variable diversity interchange agreements. These capability figures, with and without Ontario Hydro (OH) purchase, are directly from Table 1 (summer) of the GPU Energy Plan.

[c] The percent reserves are calculated using the equation: $$\% \text{ Reserve} = \left[\frac{\text{Total Resources (column 8 or 10)}}{\text{Peak Load (column 2)}} - 1\right] \times 100$$

[d] GPU indicates that their first use of OH-purchased power (300 MW) will be in December 1984, the second increment (300 MW) will be used in May 1985, and the third (400 MW) in December 1985. Thus, the entire amount will be available for the summer peak of 1986.

2. THE PROPOSED PROJECT AND ITS ALTERNATIVES

The proposed Lake Erie Interconnection, consisting of three optional transmission routes, and three alternatives to the route preferred by the Applicant are described below. The alternatives considered are a) enhanced levels of conservation and use of decentralized energy sources within the General Public Utilities Corporation (GPU) service area, b) purchase of additional power from U.S. sources, and c) construction and operation of a new generating plant. These alternatives were selected because each might conceivably replace the firm power purchase from Ontario Hydro (OH), the end purpose of the proposed project. The environmental consequences of the proposed interconnection and of the three alternatives are also summarized.

The "no action" alternative is not considered as a distinct alternative because no action by DOE is merely equivalent to denial of the Presidential Permit. Denial of the Permit could result in one or more actions by the Applicant: continued purchase of U.S. power, conservation and use of decentralized energy sources, and construction of a new generating facility.

2.1 INTERCONNECTION WITH ONTARIO HYDRO

2.1.1 Proposed Lake Erie Interconnection

Over most of its length, 97-113 km (60-70 mi), the interconnection would be composed of five cables on or under the bottom of Lake Erie (Fig. 2.1).

The new line would originate at the Nanticoke Generating Station on the Canadian shore of Lake Erie and terminate at the existing Erie West Substation located six miles inland on the U.S. side. The transition from submarine cable to overhead line would occur near the shore immediately west of the mouth of Elk Creek in Girard Township, approximately 23 km (14 mi) west of the City of Erie (Fig. 2.2). The transmission line is planned to have a capacity of 1000 MW and to operate at +250 to +325 and -250 to -325 kilovolts (250-325 kV) dc. GPU would construct and own the U.S. portion of the facility while OH would construct and own the Canadian portion. The concern of this EIS is the portion within the U.S. jurisdiction as specified in Executive Order 12114.

Major permits, licenses, and approvals that the Applicant will be required to obtain in order to commence construction activities for the U.S. portion of the interconnection project are listed in Table 2.1. The DOE permitting action will be consistent with other permitting and licensing by local, State, and Federal agencies.

2.1.1.1 Cable

The proposed cable is a mass-impregnated paper-insulated cable operating at voltages of about 300 kV (250 to 325 kV) (GPU 1980a). This type of cable

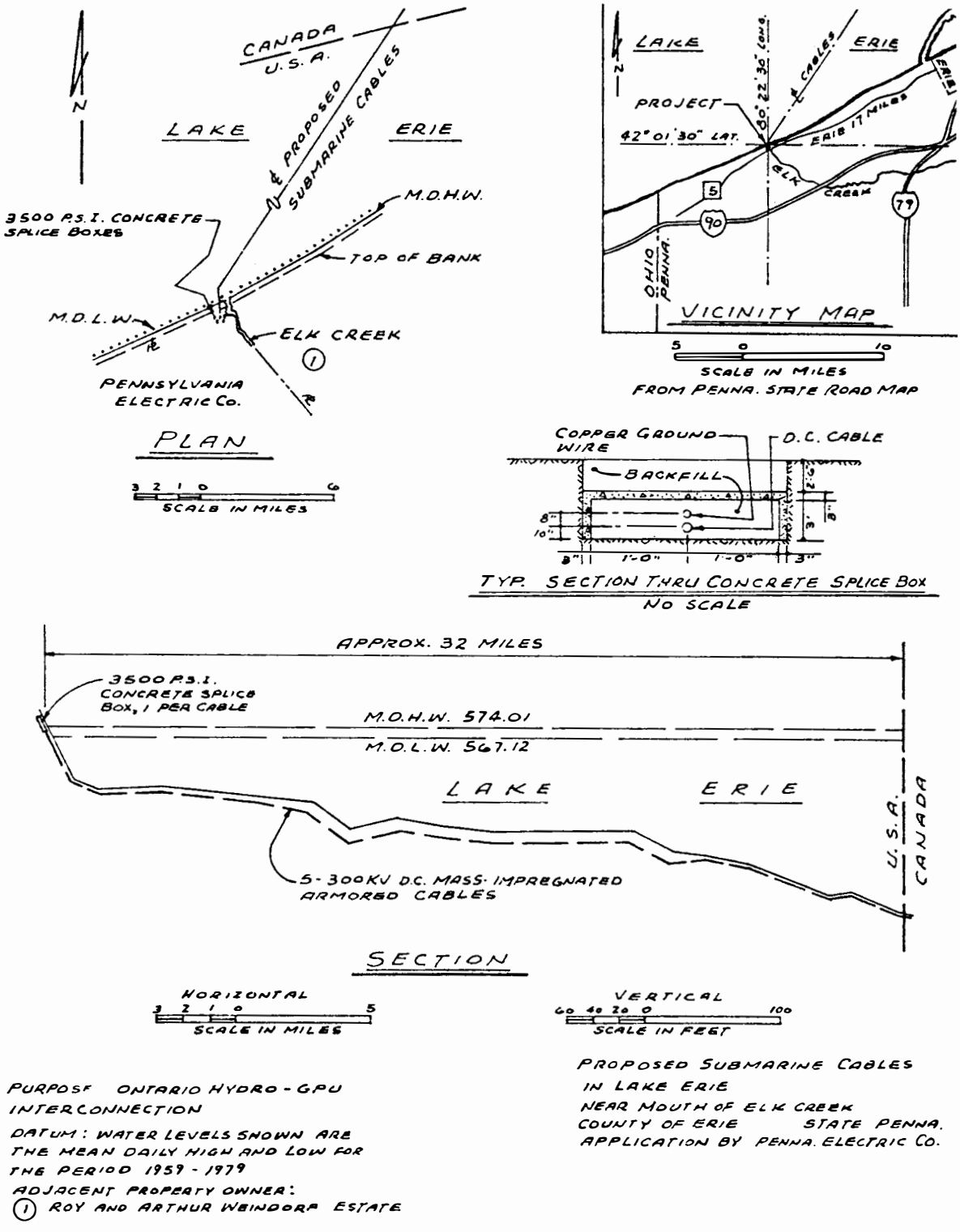


Figure 2.1. Plan and Profile of Submarine Cables in Lake Erie. From GPU 1981b.

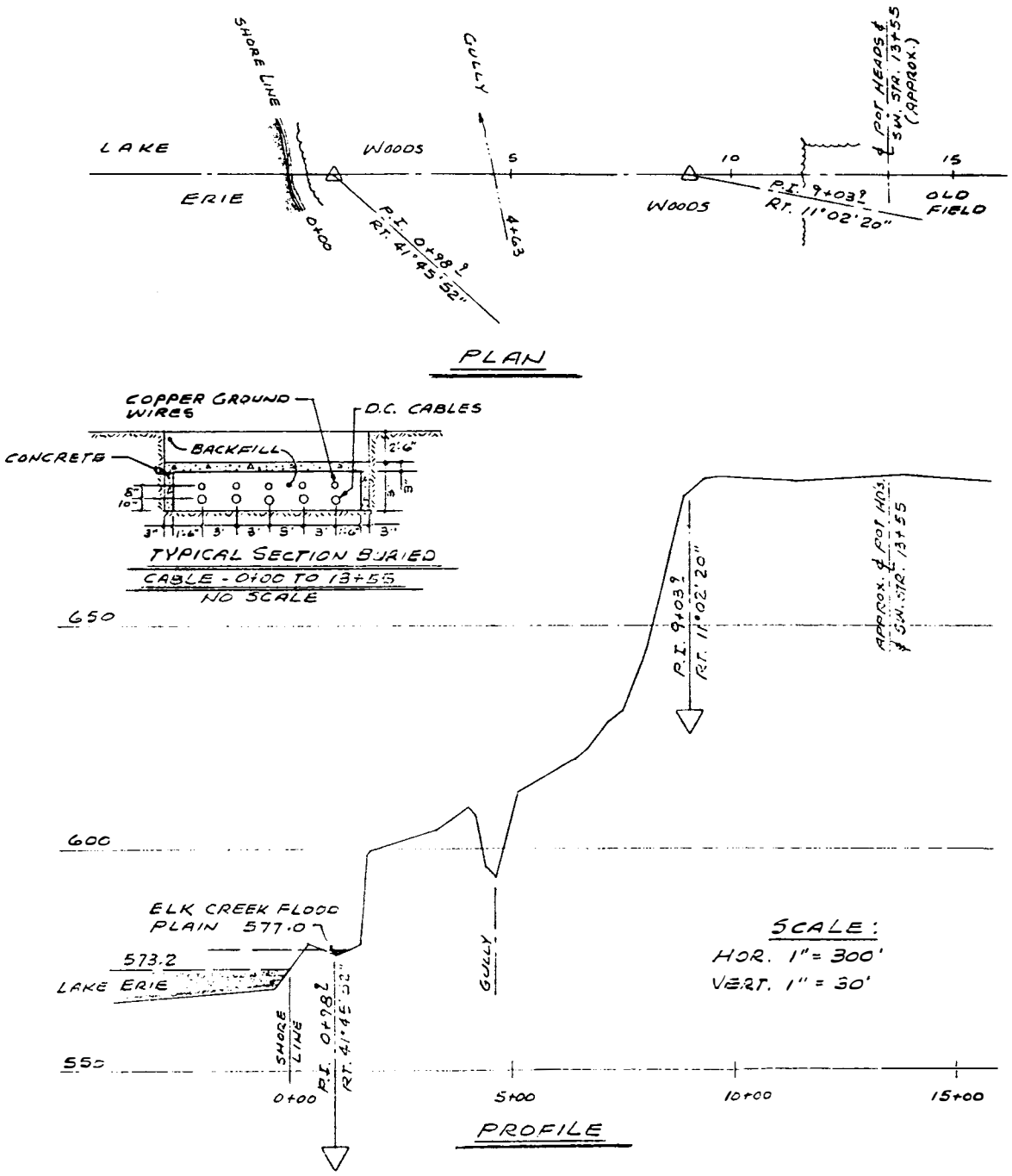


Figure 2.2. Plan and Profile of Underground Cable Route from Lake Erie Shore to Coho Switching Station. From GPU 1981b.

Table 2.1. List of Major Permits, Licenses, and Approvals Required of the Applicant

Permit	Agency
1. Presidential Permit: cross international boundary	Department of Energy
2. Environmental Report	Department of Energy
3. Encroachment Permits: cross, enter, or work in waterway	Pennsylvania Department of Environmental Resources
4. Water Quality Certification	Pennsylvania Department of Environmental Resources
5. Work in Navigable Waters: cross, enter, or work in waterway	U.S. Army Corps of Engineers
6. Disposal of Spoil: disposal of materials from trenching activity	U.S. Army Crops of Engineers
7. Agencies to be contacted prior to commencement of work on project	Dept. of Defense; U.S. Coast Guard; Great Lakes Basin Commission; Great Lakes Commission; International Joint Comm.; U.S. State Dept.; Pennsylvania Coastal Zone Management Commission; U.S. Dept. of Treasury (Customs); U.S. Dept. of Justice (Immigration)

Source: GPU 1980a.

has been used successfully in several projects, including a line between Norway and Denmark [129 km (80 mi)] and a line from the British Columbia mainland to Vancouver Island [at depths of 550 m (1815 ft) and operating at 260 kV dc] Three manufacturers of such cable are confident that this type of cable can be used for this project. The capacity per cable is about 300 MW. Four cables operating in a bipolar mode (two at +300 kV, two at -300 kV) relative to ground could be used to achieve a circuit capacity of 1000 MW. A fifth cable would also be laid; during normal operation this cable would serve as a neutral return to minimize ground currents. Since this function is not

essential, the fifth cable would be available to replace a failed cable until repair could be accomplished.

2.1.1.2 Route

The route has the following salient characteristics (GPU 1980a):

1. The route leaves Nanticoke Generating Station, following a southeasterly direction to avoid the shipping channel, and follows a path through a network of gas pipelines near the Ontario shore (Canadian jurisdiction).

2. The route maintains a distance of about 10 km (6.2 mi) to the east of Long Point Lighthouse to utilize deep water and avoid possible danger from anchors or ships rounding Long Point to seek shelter in storms. This distance is also adequate to avoid the continuous deposition of sand and mud which occurs east of Long Point (Canadian jurisdiction).

3. After clearing Long Point, the cable route follows a southwesterly direction towards Penelec's Coho site and finally turns south on a direct approach from deep water to the shoreline terminal (U.S. jurisdiction).

4. The transition from submarine cable to overhead line will be located at the Coho site with a single-circuit 300-kV overhead dc line paralleling an existing right-of-way (ROW) to a dc/ac converter station at Erie West Substation.

The precise location of the Lake Erie cable corridor will be selected from a wider corridor (Fig. 1.2) after extensive investigation by the Applicant.

The plan and profile of the cables in Lake Erie is presented in Figure 2.1. The distance between the cables embedded in the splice boxes will be approximately 3 m (10 ft). Approximately 100 m (330 ft) from shore the cables will be placed in three or five separate trenches, spaced 10 m (33 ft) apart, to protect them from damage from ice scour and ships' anchors. In the deeper central basin of the lake, the cables will be laid on the bottom, spaced a minimum of 250 m (820 ft) apart with a buffer zone of 125 m (410 ft) on either side of the outside cables. Thus, the anticipated corridor width will be 1250 m (4100 ft). The cables will be allowed to sink into the bottom sediments. It is estimated that the submarine cables will be buried for their entire length to the following depths: 2 m (7 ft) in rock, 3 m (10 ft) in sand and clay, 1 m (3 ft) in mud and silt (GPU 1981b).

2.1.1.3 Cable Laying

The cable laying will begin on either the U.S. or Canadian shore. The laying vessel will approach the shore as closely as possible and the end of the cable will be paid out from the vessel and floated to the shore on small floats. Once the cable end has been located at the place where it will be joined to the shore-end cable, the submarine cable will be allowed to sink to the bottom into a trench which has been prepared for it. The vessel will then proceed along its course toward the other side of the lake, paying out the cable as it goes. The cable will drop to the bottom of the lake where it must be guided into the trench. This guiding will likely be done by a self-propelled sled, which will move along the lake bottom just behind the cable-laying

vessel. In certain sections, notably in mid-lake, the guiding sled may actually prepare the trench as it places the cable, using a combination of plow and hydraulic jets (GPU 1980a; GPU 1981b).

The course of the vessel must be accurately controlled to within a few meters. Its position will be pinpointed at all times by precise radio survey equipment installed on the ship and at locations in Ontario and Pennsylvania. Accurate control of the vessel's position and heading will be maintained by one or a combination of the following three methods, depending on the ship chosen for the job:

--the ship may be self-propelled and equipped with special propellers and control equipment;

--the ship may be maneuvered by tugs;

--the ship may be held in position by four anchors and its position and heading controlled by tightening and loosening anchor chains appropriately. The anchors would be repositioned periodically by tugs.

The vessel will proceed to the near shore area at the other terminal, where the end of the cable will be taken ashore on floats and sunk into a precut trench. Total time for laying an individual cable after trenching is expected to be only a few days.

As the cable laying must proceed expeditiously over the whole 100 km (62 mi) once it has started, some preparation of the lake bottom such as dredging or trenching will be necessary as a separate operation before laying starts. The alternatives available for this preparatory work are: dredging, trenching, and plowing and jetting.

The conventional method of installing a buried pipeline or cable is to dredge out a trench, lay the cable in it, and backfill. This method works in rock, where blasting is necessary, and in reasonably firm soil. In Lake Erie, it has been used for construction of water intake and discharge structures. At the shoreline portion of the route, as well as in very shallow water, dredging is likely to be the only feasible method, although further investigation is required on disposal of spoil and possible requirement of backfill. Dredging progresses at less than 1 km (0.6 mi) per week in rock and produces a wide trench. The dredging would be done as a preparatory operation, and the cable would be laid at a later time. Some cleaning out of the trench may be required if sediment has drifted into it.

A second procedure which may be available for certain kinds of rock and hard soils is the use of a self-propelled trenching machine, which crawls along the bottom and cuts a narrow trench. The machine uses a rotary cutting device to cut the bottom material into small pieces, and a hydraulic jet system to force the material out of the trench. The material then settles back loosely in the trench and on both sides. This procedure is faster [about ½ km (0.3 mi) per day in rock] than dredging, but is a relatively new technology. Several manufacturers have prototype machines which are being investigated. Some machines dig the trench and lay the cable in one operation, and others require laying to be a second operation.

Plowing and jetting is a third procedure, useful in sand and soft mud where a wide trench would backfill itself too quickly to be practical. A machine would be used to plow a narrow trench, hold the trench open briefly with hydraulic jets, drop the cable in the trench, and allow the trench to backfill itself. It is likely this method would be used in the deep part of the route, where the substrate is soft.

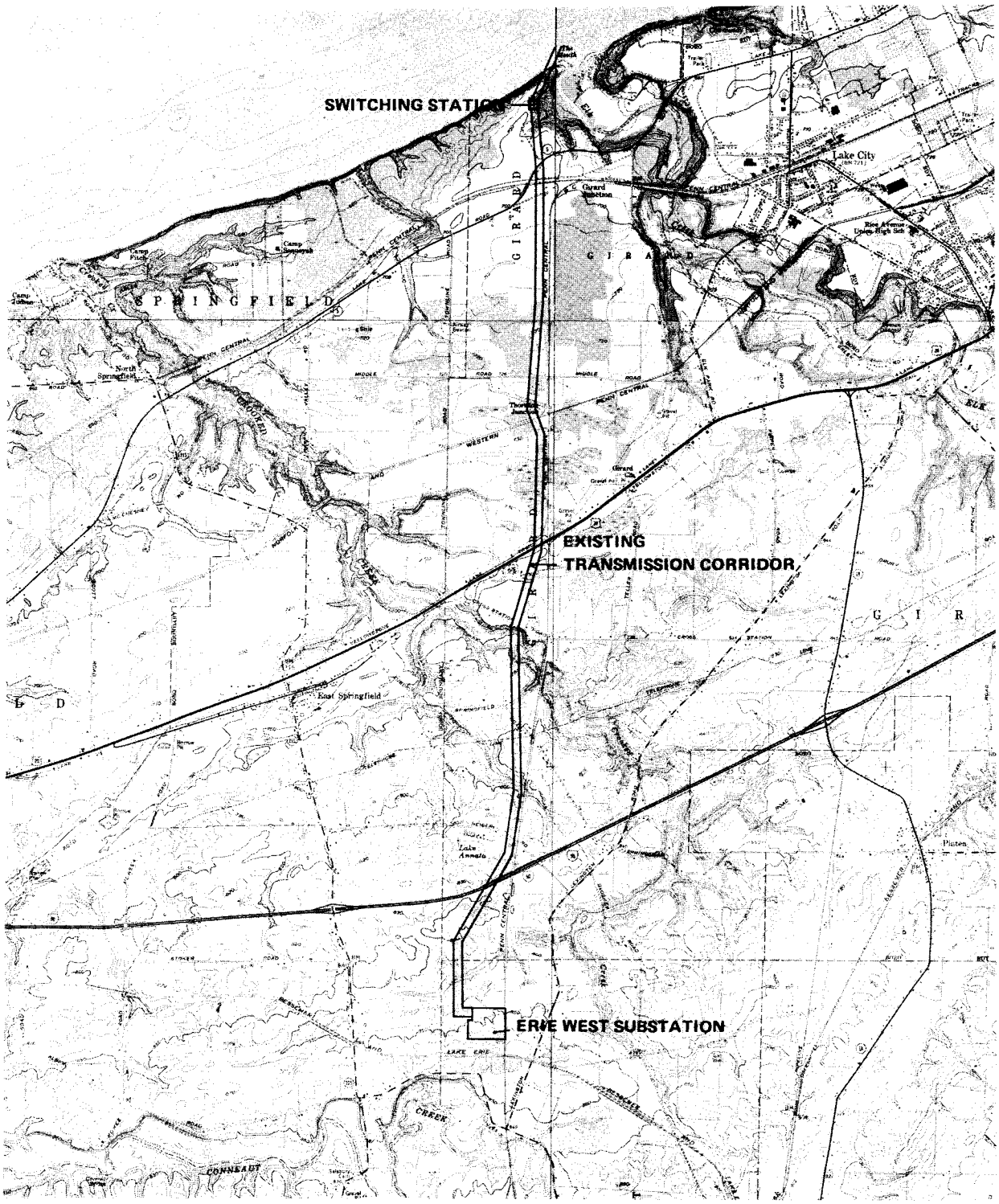
From the shore terminal point of the submarine cables (submarine-underground cable junction in the concrete splice boxes) to the switching structure [0.4 km (0.24 mi)], it will be necessary to embed the cables in the soil. Plans are to excavate a single trench for the cables with a backhoe, allowing spacings of about 1 m (3 ft) between each cable. Thermal backfill (sand) would surround the cables and a 7.6-centimeter (3-inch) concrete cover would be placed over the backfill. The concrete cover would be covered over with 0.8 m (2.5 ft) of soil and seeded with erosion-retarding grasses. Erosion- and sedimentation-control practices as well as reseeding will be implemented to control the impacts of construction and land clearing for the underground cable and the switching station (GPU 1980a; GPU 1981b). The route to the switching station and the depth of cable imbedment are shown in Figures 2.2 and 2.3. The switching station will occupy less than one-quarter acre. The station will be fenced and similar to a substation in appearance. The switching station will be located in an old-field area.

2.1.1.4 Overhead Line

From the switching area, the line will continue southward about 9.6 km (6 mi) to the Erie West Substation (Fig. 2.3). A typical tower design for a dc transmission line is shown in Figure 2.4. The location and number of tower structures are presented in Figure B.1. Wherever possible, the positions of individual towers will be chosen to allow use of existing access roads or otherwise to provide access with minimal disturbance to the existing terrain. The overhead line will be constructed using two 1590 45/7 ACSR conductors with 45.7-centimeter (18-inch) spacing per pole and with a minimum ground clearance of 11 m (35 ft).

The chosen ROW will parallel an existing transmission line and will occupy 79 ha (195 ac). Portions of this corridor are forest which will be cleared for the ROW. Some agricultural land will be displaced. Floodplains and wetlands are present in the proposed corridor, and construction activities will occur in them; however, the Applicant will be prohibited from constructing any structures in the floodplains and wetlands (GPU 1980a) (see Appendix B). Access roads will be routed so as not to cross wetlands.

The sequence of operations will be access road grading, foundation installation, pole erection, and wire stringing. The overhead line is expected to be completed at a rate of one mile per month. No additional clearing or grading will be required at the structure foundations. Foundations for the tubular pole structures will be auger type, typically 2.4 m (8 ft) in diameter and 6 m (20 ft) deep. Earth removed from the augered hole will be spread over the adjacent area. Poles will be trucked to the site in one or more sections



Base Map Source: U.S.G.S. 7.5' Quadrangles, 1969

Figure 2.3. Route from Lake Erie to the Erie West Substation. From GPU 1980a, Fig. 2.0-2.

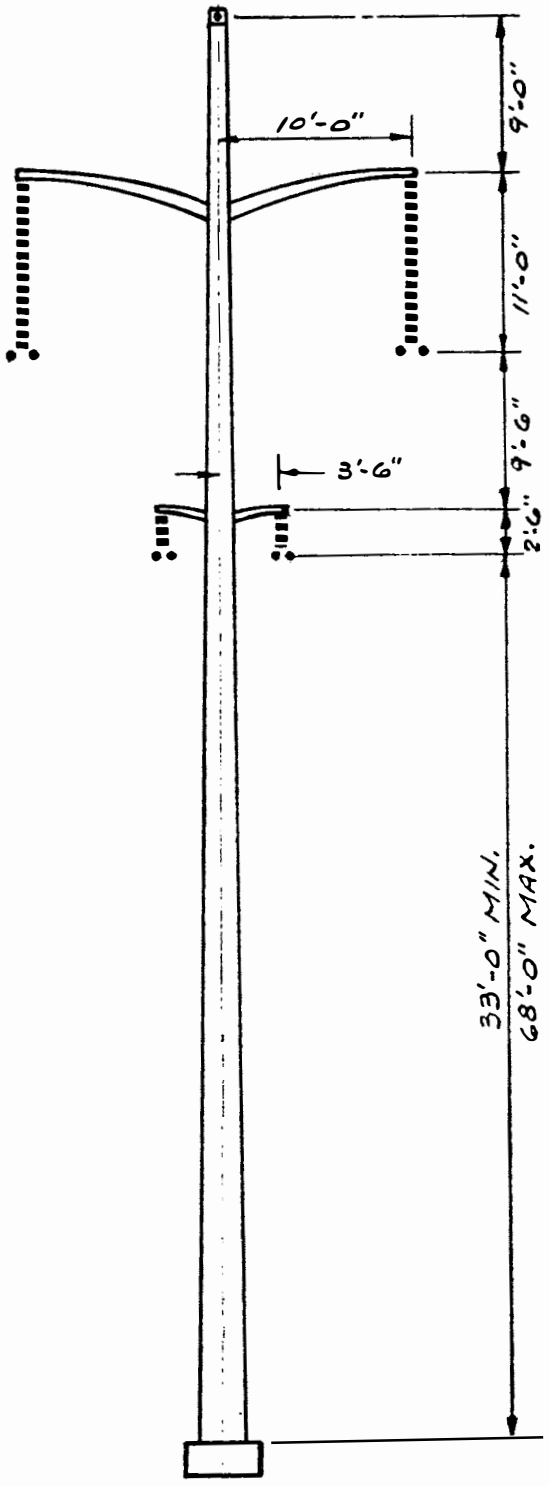


Figure 2.4. Typical 300-kV Direct Current Suspension Structure. From GPU 1981b.

and then assembled and erected on the foundations using a crane. All construction will take place during daylight hours from 8 a.m. to 5 p.m. Fugitive dust is not normally a problem in transmission line construction, but a sprinkler truck will be used to wet down the access roads when required (GPU 1981b).

2.1.1.5 Substation and Converter

The U.S. terminal of the proposed transmission facility will be an extension of the existing Erie West Substation. The converter needed to change the dc power to ac compatible with the existing transmission system would be constructed on GPU-owned land, adjacent to the substation, and would occupy approximately 5 ha (12.7 ac).

Operation of the dc converter station will require both a primary and a secondary closed-cycle cooling system. The secondary cooling system, which will remove heat from the primary system and act as the final heat dissipation point, will use one of three alternative cooling methods. For two of the alternatives, groundwater would be drawn from a well and then directed to either a wet cooling tower or to another well for discharge into an aquifer. The anticipated flow rate for these alternatives would be 0.013 and 0.003 cubic meters per second (0.45 and 0.12 cubic feet per second), respectively. The third alternative would be a dry cooling tower utilizing air as the coolant.

2.1.2 Alternative Interconnection Options

There are two major existing transmission overland routes between Ontario and the Pennsylvania-Jersey-Maryland Interconnection (PJM). One path is through the New York Power Pool (NYPP) and the other through the East Central Area Reliability Coordination Agreement (ECAR) region companies via Michigan and Ohio. Without substantial reinforcement, these transmission paths would be incapable of accommodating the additional 1000 MW of purchased power imported from OH.

The exports of Canadian energy to Michigan and the NYPP were limited by transfer capability in 1979 and 1980. Capacity purchases by GPU from OH (200 MW) have been subject to interruption and limited by transmission restrictions, especially in New York State. Joint Ontario-New York studies indicated that the existing transmission capability from upstate New York to southeastern New York is fully required to provide the economic dispatch necessary for New York utilities. Transfers from Michigan to the PJM Interconnection require the transmission of energy across Ohio to Pennsylvania and then to JCP&L. Very little spare transmission capability exists for economy and capacity transfers from OH to PJM through these three states.

Thus, to achieve a transfer capability of 1000 MW from OH to GPU, major reinforcement of the interconnecting transmission systems in ECAR and NYPP would be required. These would be in the form of reconstructed or new overhead transmission lines in New York State, Pennsylvania, and possibly in Michigan and Ohio.

If an OH-NYPP overland route were to be selected, the most likely route would be around the eastern end of Lake Erie, crossing the international border near the Sir Adam Beck Generating Station, and then paralleling the

lake shore through New York State and into Pennsylvania. Aside from economic considerations, this route would require about 177 km (110 mi) of new double-circuit 345-kV transmission lines in New York State. Since existing circuitry is fully committed at present and is unable to accommodate additional load, it would be difficult or impossible to replace the conductors with heavier ones. If the existing ROW cannot be expanded, substantial new ROW would have to be acquired. The time required for certification of the lines would largely depend on regulatory requirements within New York and Pennsylvania and on problems encountered along the proposed route. The latter might include condemnation procedures, which could be rather lengthy since the transmission would be of benefit mainly to New Jersey and hence could lack public and political support in Pennsylvania and New York.

Because of the necessity for joint studies, a Presidential Permit, certification in two states, regulatory approval from the states and federal authorities, and environmental considerations, the route through New York and ECAR is not preferred by the Applicant. These complications indicate that these routes could not be implemented in a timely manner, and thus could not meet GPU's 1985-1994 energy needs.

An alternative combined overland and submarine cable route option which would utilize the minimum submarine cable length is an interconnection between Ontario Hydro's Nanticoke Generating Station and a point east of the city of Erie. This alternative would require additional transmission line from the landing point east of Erie to the Erie West Substation. This option is not preferred by the Applicant because it would involve the acquistion of land for new overhead line routes in Pennsylvania. Thus, complications similar to those outlined for the overland options would be encountered and the route could not be implemented in a timely manner and could not meet GPU's 1985-1994 energy needs.

2.2 THE ALTERNATIVE OF ENHANCED CONSERVATION AND THE DEVELOPMENT OF DECENTRALIZED ENERGY SOURCES

2.2.1 Enhanced Conservation

GPU has developed a two-pronged energy management strategy to meet future energy and capacity needs during the 1980's (GPU 1980a). One facet of this strategy is the proposed interconnection and firm purchase of 1000 MW of power from OH. The other facet is the "Conservation and Load Management Master Plan" (Master Plan) (GPU 1980d). The goal of the master plan is to reduce capacity needs by about 1000 MW by 1990.

The master plan has two major segments: a residential program and a commercial and industrial program. The residential program is based on the implementation of time-of-day (off-peak) rates. To enhance customer understanding and incentive, the customers will be provided an energy audit prior to being placed on the rate. In addition, the residential program includes weatherization, energy storage, space and water heating, solar water heating, and direct load controls. The GPU companies will offer to make the appropriate investment in space heating, water heating, or weatherization equipment.

The commerical and industrial program integrates time-of-day rates with the energy-load-management activities of individual customers. Again, GPU will make investments in the appropriate equipment if this would be cost-effective. Because detailed end-use information usually is insufficient to determine the specifics of programs suitable for wide-scale deployment, the commercial and industrial efforts will include a number of demonstration activities to identify and verify opportunities. These demonstration efforts will provide a sound basis for the implementation of full-scale programs. Currently attractive candidate programs are heating/cooling storage, heat-recovery systems, direct load controls, improved building design, energy-efficient lighting, energy-efficient motors, and energy-management systems.

Full success of the master plan would reduce the electrical power consumption of GPU's 1.5 million customers by about 14% (12.3-16.9%) by 1990. If the Presidential Permit is denied and GPU must rely on enhanced conservation and increased load management for an additional 1000 MW, GPU's customers would have to reduce their power use by another 14% by 1985. A reduction of this magnitude within this time frame appears unlikely.

The environmental impacts expected from substantially enhanced conservation and load management would be those associated with the mining, manufacturing, and transportation of the materials and equipment required. These impacts would be national in extent but would represent only a very small fractional increase over existing industrial and commercial impacts.

2.2.2 Decentralized Energy Sources

Technically feasible decentralized energy sources include solar space- and water-heating systems, solar photovoltaic generation of electricity, and wind-energy generation.

Only solar water heating, which is already considered to some degree in the master plan, is likely to achieve any significant degree of use during the next decade within the GPU service area. No significant level of backfitting of solar space-heating systems has been achieved anywhere in the U.S. because of the large capital investment required, and economic considerations are much less favorable in the Northeastern states than in the South and Southwest. Economic feasibility for solar photovoltaic generation would require much lower production costs for the photovoltaic cells than has been achieved thus far. Wind-energy generation appears to be approaching marginal economic feasibility in selected locations, but any significant contribution during the 1980s appears unlikely within the GPU service area.

As with conservation and load management, the expected environmental impacts from decentralized energy sources would be associated with the mining, mananufacturing, and transportation of the materials and equipment. Wind-energy systems also produce local noise and visual impacts. Impacts associated with conservation and load management would be dispersed over a wide geographical area.

2.3 THE ALTERNATIVE OF PURCHASE OF ADDITIONAL POWER FROM U.S. UTILITIES DURING THE PERIOD FROM 1985 THROUGH 1994

An alternative available to GPU would be substantial purchases of power from utilities in the PJM power pool, and from other U.S. utilities. Reliability within the PJM service area would be decreased by GPU's inability to meet PJM capacity obligations, particularly if generation from new plants planned by other PJM utilities is delayed. Energy purchased from PJM utilities would be generated primarily by coal-, oil- or gas-fired plants. GPU has estimated the annual increase in oil consumption for 1985 as 76,000 and 74,000 barrels of No. 6 and No. 2 oil, respectively, 3.58 million cubic feet of natural gas, and 126,000 tons of coal, if the OH purchase is not possible. The increased oil and gas use would result in markedly higher electrical energy cost to GPU and its customers. A preliminary estimate of the cost increase for 1985 is $170 million (GPU 1981a -- not corrected for the cost of the interconnection).

It is not possible to quantify the adverse environmental impacts associated with the purchase of power from other U.S. utilities without knowing the generation type and location. However, certain generalizations can be made.

Since the alternative would involve the purchase of power generated at existing plants, there would be no impacts from construction nor changes in land use. Operational impacts would be related to the fuel used, (e.g., oil or coal). Oil is virtually ash-free (0.1-0.2%) but coal (eastern) has an ash content of about 10%. Oil and coal often have high sulfur contents (2.8-3.5%); removal of this sulfur from the flue gas with scrubbers results in the accumulation of sludge. Disposal of this ash and sludge causes several types of impacts (land use, land clearing, loss of vegetation, loss of habitat, possible erosion, possible water pollution, and visual impacts). Air quality impacts would also result from the increased plant operation. Concentrations of primary and secondary pollutants are generally highest in the industrial and population centers of the northeastern, middle Atlantic, and east-central U.S., and any incremental increase in the air emissions from a generating plant in these areas would likely result in a commensurate incremental decrease in air quality.

2.4 THE ALTERNATIVE OF CONSTRUCTION AND OPERATION OF COHO-1

An alternative to the implementation of the proposed transmission line would be the construction and operation of a new generating facility. Many processes (siting, permitting, construction, operation) are involved in bringing a project of this size on-line, including numerous variables which are plant-specific. The following discussion is based on Coho-1, a coal-fired power plant which had been planned by GPU for 1989 operation. After the TMI-2 accident, the planned construction was deferred.

PN, an operating subsidiary of GPU, proposed a coal-fired facility, known as Coho-1, for a site located immediately west of Elk Creek in Erie County (GPU 1979) (Fig. 2.5). The site would encompass approximately 411 ha (1,105 ac), of which the station would occupy 111 ha (275 ac). The solid waste disposal area would occupy 221 ha (545 ac), and the transmission corridor would occupy the same area proposed for the Erie Interconnection [79 ha (195 ac)]. These areas are shown in Figure 2.6. A more detailed discussion can be found in GPU (1979).

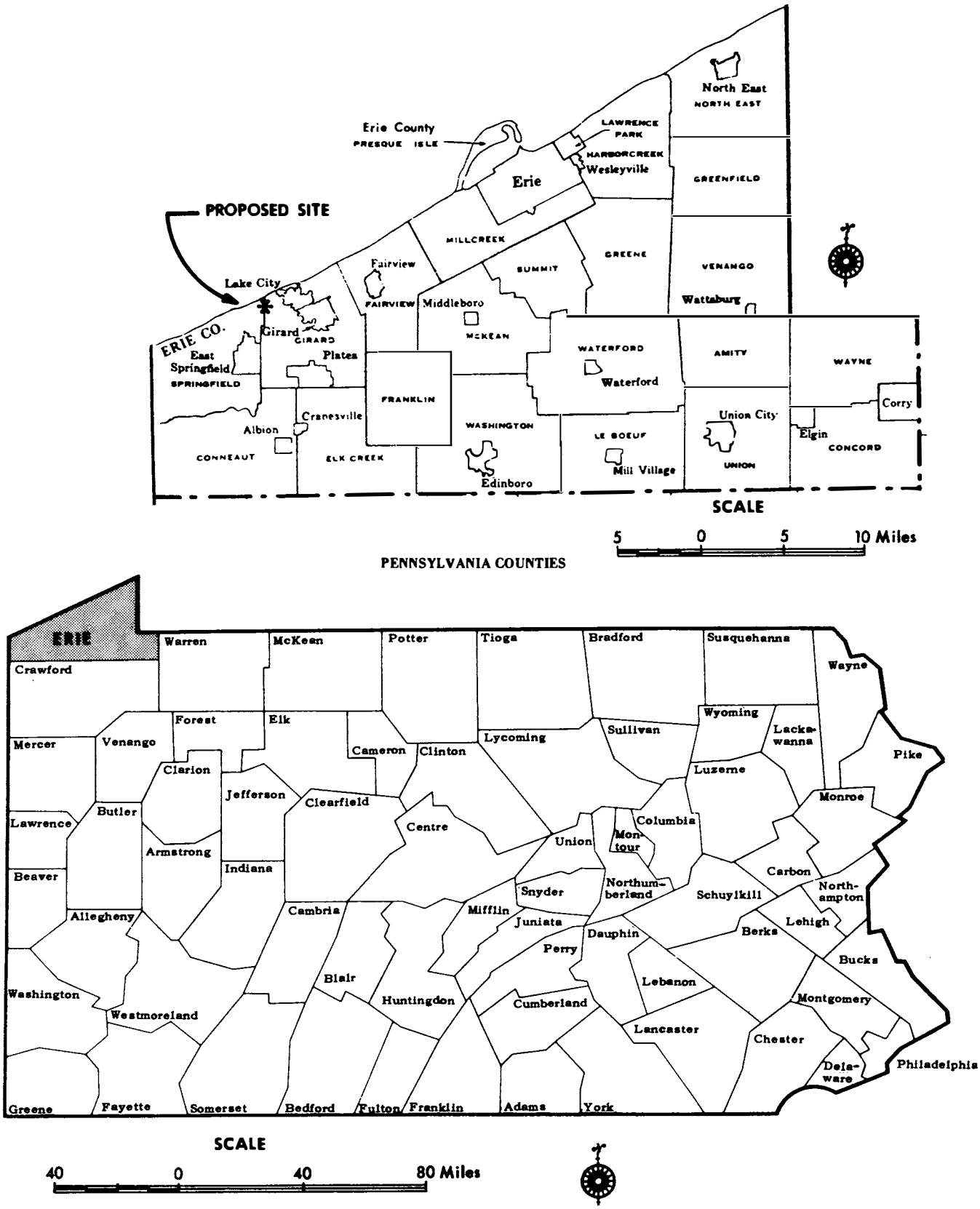


Figure 2.5. Location of the Proposed Coho Site. From GPU 1979, Fig. 1.2-1.

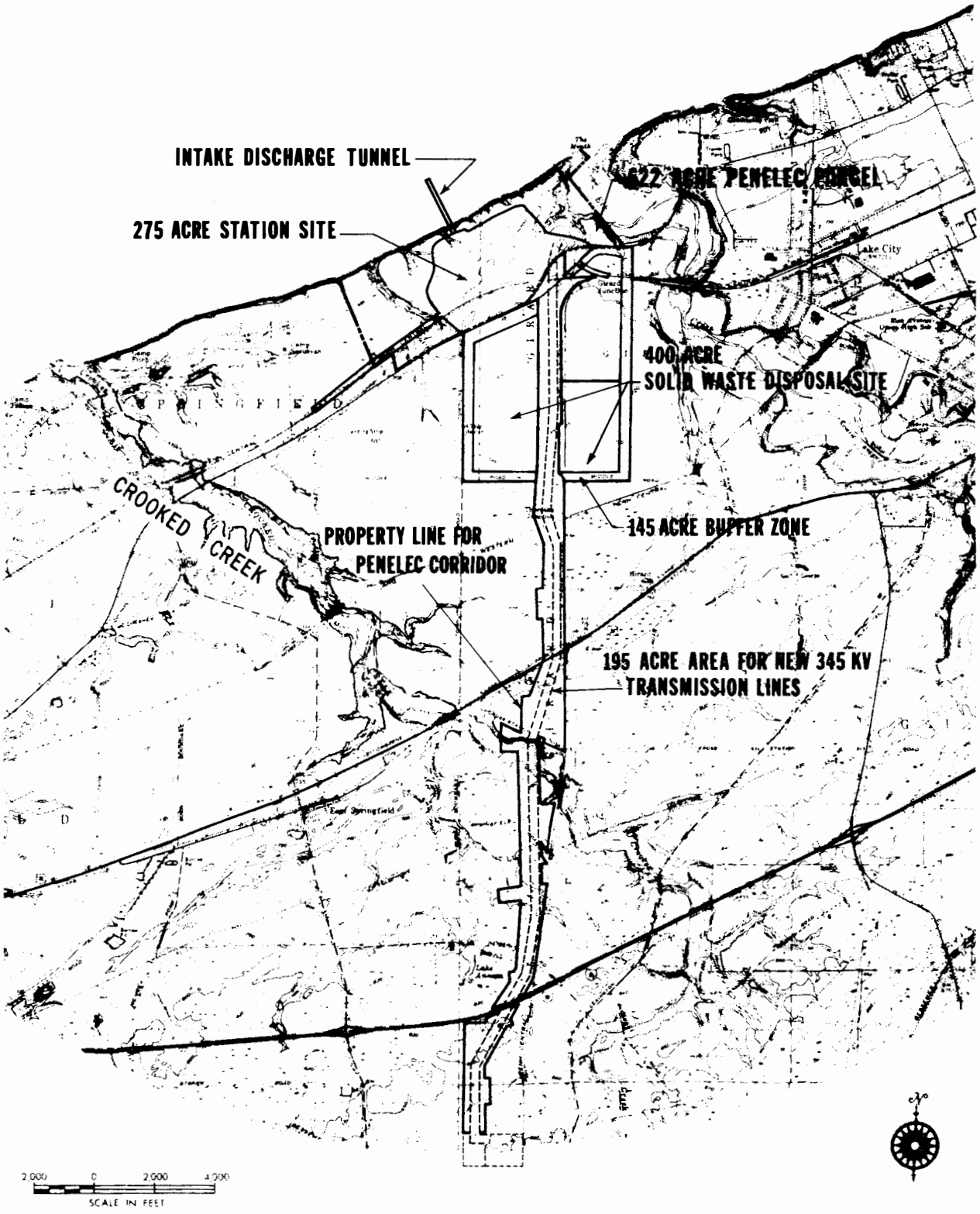


Figure 2.6. Map of Coho Site and Transmission Line. From GPU 1979, Fig. 1.2-2.

The construction phase of this project had been planned to begin in June 1983 and to continue until May 1988. Operation was expected to begin in June 1988 and to continue for about 40 years.

Construction of Coho-1 would involve not only the generating unit itself, but also several other major components such as intake and discharge structures, cooling tower, air pollution controls [precipitator, flue gas desulfurization (FGD)], coal and waste handling systems, water treatment systems (raw water, waste water, sewage, coal pile runoff, storm water, and industrial waste), access roads, and new substations.

Preparation of the solid waste disposal site, which would be used for storage of fly and bottom ash, FGD scrubber sludge, waste treatment sludge, construction wastes and silt, would have to begin early in the construction phase. Two new 345-kV transmission circuits connecting Coho-1 to the Erie West Substation would also have to be constructed but at a later date. The new lines would parallel an existing 115-kV transmission line, and the associated corridor would be 82 m (270 ft) wide and 10 km (6.2 mi) long.

Operation of the station would require that bituminous coal be delivered in unit trains at the rate of three trains per week. This coal would then be used to fuel the boiler. Make-up water would be drawn from Lake Erie at the rate of approximately 38 million liters per day (10 million gallons per day). Blowdown discharge, containing cooling water and effluents from various water treatment systems, would be discharged into Lake Erie. Solid waste (fly and bottom ash, scrubber sludge) from the unit would be mixed together and transported by truck to the solid waste disposal area adjacent to the site.

Construction and operation of a new generating facility would produce both short-term and long-term impacts. Short-term construction impacts would include noise, dust, erosion, increased runoff, sedimentation, socioeconomic impacts, and traffic congestion. Most of these impacts would be minimized through appropriate mitigation procedures. Long-term construction impacts would result from site clearing and changes in the land use. Major operational impacts on the environment would include those associated with fuel handling and storage, fuel combustion, solid waste disposal, water intake and discharge, cooling towers and visual intrusions.

2.5 COMBINATION OF ALTERNATIVES

GPU has indicated the deferment of Coho-1 was due to financial limitations. However, if this situation improves GPU may undertake the construction of Coho-1 even if the Presidential Permit were granted. Such an undertaking would be feasible since GPU faces a substantial projected deficiency of base-load capacity after 1994. Any extra coal-fired energy available prior to 1995 could be used to displace oil-fired generation. Moreover, if the Master Plan does not curtail demand as effectively as now projected, GPU would be deficient in capacity prior to 1994.

Since the capacity of Coho-1 would be 625 MW, purchase of the remaining 375 MW from other utilities would still be necessary.

The impacts for the combination of alternatives considered above would be linear combinations of the impacts predicted for the separate alternatives.

3. AFFECTED ENVIRONMENT

3.1 ECOLOGY

3.1.1 Aquatic

Lake Erie, the shallowest lake among the Great Lakes has an area of 25,766 sq km (9950 sq mi) and an average outflow rate of 5920 cm/s (209,000 cfs) (Upchurch 1976). The mean detention time of water in the lake is about 2.5 years. This mean detention time is an important determinant of overall lake water quality, whereas other factors (such as the amount, rate, and method of release of contaminants, as well as current patterns and removal mechanisms) determine local constituent concentrations.

Offshore water-current patterns in Lake Erie are highly variable in speed and direction and depend strongly on wind patterns (Hamblin 1971). Current speeds are generally greatest near the lake surface, and decline with depth in the water column to low values near the bottom. Speeds greater than 54 cm/s (106 ft/min) have been observed in the open lake, but such high values are rare (Hamblin 1971).

Close to shore, the net current is parallel to the shoreline, with the direction of movement depending upon recent wind direction. If the wind is strong, current speed may vary markedly with depth--maximum speed being near the water surface and lowest speed near the bottom (Liu et al. 1976). During periods of onshore or offshore winds, surface currents tend to be in the direction of the wind stress. Currents near mid-depth are nearly parallel to the shoreline and return flow occurs near the bottom to maintain continuity (Saylor 1966); net flow remains parallel to the shore.

The width of the zone of shore-parallel currents in the Great Lakes is variable, depending upon numerous factors, including wind conditions (Liu et al. 1976) and upwelling (Mortimer 1975). Mortimer (1975) cited a study indicating that water-current patterns characteristic of the nearshore zone extend 3-16 km (2-10 mi) from the shoreline of Lake Michigan, and Boyce (1974) presented data indicating that the transition between shore-parallel current patterns and those of the main body of Lake Ontario occur at 8-16 km (5-10 mi) from shore in the summer, with similar, though less well-defined trends in spring and fall.

Although the direction of nearshore currents near the shoreline may reverse in response to wind stress, the predominant direction of flow along the U.S. shoreline of the central and eastern basins of Lake Erie is northeastward. This might be expected from the approximately southwest-northeastward orientation of the lake's long axis, "essentially parallel to the prevailing southwest wind" (Hamblin 1971).

Natural shoreline erosion and turbulent resuspension are the dominant sources of suspended sediments in Lake Erie (Sly 1976). Anthropogenic sources, however, have resulted in increased sediment input from tributary streams. These tributary flows and their water quality--including loading with suspended solids--varies with seasonal rainfall. There is no clear evidence that any increased concentration of suspended solids in Lake Erie is related to these anthropogenic sources (Sly 1976).

Increasingly high inputs of nutrients (phosphorus and nitrogen) to Lake Erie since the 1800s have resulted in its highly eutrophic state and associated extensive anoxic hypolimnetic conditions reported during the early 1970s. It is this aspect of Lake Erie's water quality that has received the most widespread attention (Sly 1976). Recognition of the deteriorating condition of the lake prompted signing of Canada/U.S. water quality agreements in 1972 and 1978, and initiation of massive remedial action. A literature survey of Lake Erie limnology and critical contaminant loadings and concentrations is presented in COE/EPA (1980).

Though steps have been taken to reverse eutrophication in Lake Erie, the U.S. EPA (1980) reported that the effectiveness of nutrient controls in reversing eutrophication of Lake Erie cannot be demonstrated. The same report stated that halting of further degradation of the Lake is important and that placement into operation of new treatment facilities and modifications in agricultural practices will reduce the loadings of nutrients into Lake Erie and its tributaries. However, these changes will not be reflected in water quality improvements for several years due to the slow migration of sediment within and to the Lake.

Elk Creek, a Lake Erie tributary, has had a history of high coliform bacteria counts, and other water-quality problems, as a result of discharges from the Lake City and Girard Borough sewage treatment plants and from the Grennison Brothers Tannery (GPU 1980a).

The water quality of Elk Creek near Pennsylvania Route 5 has been monitored by the Erie County Department of Health. Several parameters (namely pH, fecal coliforms, and ammonia nitrogen) occasionally exceeded maximum concentrations given in Pennsylvania's Water Quality Criteria. Some of the high concentrations, plus some observations of Sphaerotilus-like (sewage bacteria) growth and sewage odors, may be due to the Lake City sewage treatment plant located upstream of the sampling site (GPU 1980a).

Crooked Creek water quality is good to excellent. Crooked Creek is one of the few Pennsylvania tributaries to Lake Erie that meets state water quality standards (GPU 1980a).

Duck Run appears to have good to excellent water quality, as inferred from the composition of macroinvertebrate populations (GPU 1980a).

The bottom topography of the Lake Erie nearshore area changes constantly. During late winter the shelf-ice stacks up along the shore and scours the bottom, picking up sand, gravel, and large boulders. As the ice melts, materials are redeposited, thus changing the bottom topography. Sand bars are deposited yearly offshore and are eroded away during the summer. High lake levels

during the spring increase erosion along the escarpment. During the open-water season, the beach and nearshore portions of the lake bottom are influenced by the prevailing lake currents (GPU 1980a).

Bottom sediments in the nearshore area consist of sandy-silty-clay materials mixed with cobble- and boulder-sized pieces of sandstone and shale. Beyond the zone of sand and gravel, the bottom sediments become scarce, giving way to bedrock outcropping. As the bedrock slopes toward the central depression of the eastern basin, it again becomes covered with a thick layer of sediments. Most of the cable crossing will be in this depression. Bottom sediments in the depression are mainly soft muds. The typical sequence of the sedimentary strata is: muds, a combination of muds and reworked glacio-lacustrine clays, undisturbed glacio-lacustrine clays, and till. Sediments above the glacio-lacustrine clays become thicker with increasing water depth. The composition of deep-water sediment is regularly modified by the influx of silt-size material originating from shoreline erosion west of Long Point (GPU 1980a).

A sampling and analysis program was conducted during the summer of 1980 to obtain specific data on sediment chemistry along the cable corridor. Sampling was concentrated in the approach zone where the most potential for construction impact exists. Concentrations for the primary EPA sediment criteria are generally within prescribed limits and compatible with representative values for the area. Zinc exceeds the nonpolluted criteria; however, zinc levels in the approach area are not significantly higher than background levels. Concentrations of several secondary parameters--in particular total phosphorous, chromium, manganese, arsenic, and iron--exceed the prescribed nonpolluted criteria (see Table 4.1) (GPU 1980a).

The bottom sediment at the mouth of Elk Creek is composed of muck and sand. The eastern portion of the floodplain toward the creek mouth has been dredged for docks and boat liveries. A sand-and-gravel barrier builds up yearly at the stream mouth, and remains until rains increase the stream flow enough to wash it out. Upstream, the bottom is gravel and rubble (GPU 1980a).

Crooked Creek, at the point of the transmission line crossing [3.3 km (2.1 mi) south of the switching station] flows through a densely wooded, steep-sided valley. At this point, the stream [about 6 m (20 ft) wide] forms a series of runs, riffles, and pools with a maximum depth of about 0.6 m (2 ft). The stream bottom is rubble, pebble, and muck (GPU 1980a).

Two small tributaries of Duck Creek are crossed by the transmission line. Duck Run is a minor tributary to Lake Erie with a total drainage area of 8 sq km (3 sq mi). Only the extreme headwaters will be affected. Riffle habitat (pebbles, rocks and gravel) is very limited (GPU 1980a).

Benthic invertebrate sampling along the entire proposed cable corridor was conducted by the Applicant (GPU 1979; Ontario Hydro 1980) in 1980. Macroinvertebrate populations were dominated by four major groups: Oligochaeta, Diptera, Amphipoda, and Mollusca. These groups represented 99 percent of the individuals collected.

Aquatic earthworms (Oligochaeta) dominated numerically (78%) and were represented by the families tubificid (Tubificidae), lumbriculid (Lumbriculidae),

and naidid (Naididae). The Midge family (Chironomidae) was the major dipteran family, of which 33% belonged to the genus Chironomus. Gammarus fasciatus and Pontoporeia affinis represented 98% of the amphipods collected. The fingernail clam (Sphaerium rhomboideum) and the snail (Amnicola limosa) dominated the 26 taxa of Mollusca found.

Results of the macroinvertebrate survey are summarized in Table 3.1. Stations H-M are located within the approach zone of the proposed route. Station G is in the "deep basin" portion of the lake. Diversity (an indication of the variety of species) tended to increase from the shallow nearshore region out to a depth of 16 m (53 ft) but to decrease as the depth increased beyond this. Shannon-Weiner diversity values can range from 0 to >4. These diversity values are indicative of poor to moderate species variety, but are not necessarily indicative of poor habitat quality.

Table 3.1. Summary of Macroinvertebrate Survey†[1]

Station	Depth (m)	Number of Sample Points	Dominant Substrate Component	Av. Macroinvertebrate Index†[2]
G	>16	4	Clay/bedrock	1.0
H	>16	3	Sand	2.2
I	>16	4	Sand	2.0
J	12-16	7	Sand	2.6
K	10-12	4	Sand	2.0
L	10-12	4	Sand/clay/bedrock	1.8
M	6-10	4	Sand/gravel	1.5

†[1] Compiled from Ontario Hydro (1980).

†[2] Calculated on the basis of Shannon-Weiner Diversity Index values presented in Ontario Hydro (1980). Lower numbers indicate lower species diversity.

The Erie County Department of Health sampled macrobenthos from Elk Creek and Crooked Creek near Pennsylvania Route 5. A species list and relative abundances are presented in Appendix C of the Applicant's Environmental Report (ER) (GPU 1980a). Equal numbers of pollution-sensitive and pollution-tolerant groups were found in Elk Creek during all seasons sampled. The macroinvertebrates of Crooked Creek are generally characteristic of fast-flowing streams. Abundant macroinvertebrate species included mayflies (Baetidae and Heptagenidae) and caddisflies (Hydropsychidae).

The two tributaries of Duck Run were sampled between February and August 1974. A species list is included in Appendix C of the Applicant's ER (GPU 1980a). Several invertebrate genera indicative of high water quality [e.g., a caddisfly (Potamiya), a midge (Microspectra), and a stonefly (Isoperla)] were collected.

A species list of fish collected in Lake Erie and Elk Creek is included as Appendix B of the Applicant's ER (GPU 1980a). A total of 1251 fish representing 27 species were collected by gill net. Yellow perch (Perca flavescens) and gizzard shad (Dorosoma cepedianum) constituted a majority of the fish collected. Other abundant species included walleye (Stizostedion vitreum), white sucker (Catostomus commersoni), alewife (Alosa pseudoharengus), and freshwater drum (Aplodinotus grunniens). White bass (Roccus chrysops), smallmouth bass (Micropterus dolomieui), golden redhorse (Moxostoma erythrurum), coho (Oncorhynchus kisutch), chinook salmon (O. tschawytscha), and channel catfish (Ictalurus punctatus) were present in moderate numbers. The remaining 15 species were represented in the collection by 15 or fewer individuals.

Results of the adult-fish sampling program suggest that the spatial and temporal distributions of Lake Erie fishes in the project area are influenced by seasonal in-lake movements and by the proximity of Elk Creek. It is assumed that fish populations in Lake Erie are similar "upstream" and "downstream" of Elk Creek due to habitat similarity (ANL, 1981). Gill-net collections nearest the mouth of Elk Creek contained higher numbers of gizzard shad, alewife, coho and chinook salmon, carp (Cyprinus carpio), and smallmouth bass than did other stations (GPU 1980a).

Differences in spatial distribution were also noted in seine collections. Relatively high numbers of alewife and mimic shiner (Notropis volucellus) were found at sample station L3(s) (Fig. 3.1).

The 1978 fish-larvae survey collected 16 species of fish [including gizzard shad, rainbow smelt, carp, minnows, darters (Etheostoma spp.), yellow perch, logperch (Percina caprodes), and freshwater drum] at all three transects [1.0 m (3.3 ft), 6.0 m (20 ft), and 9.1 m (30 ft)]. Alewife and bass were collected nearshore. Larvae of trout-perch (Percopsis omiscomaycus), rockbass (Ambloplites rupestris), Johnny darter (Etheostoma nigrum), and sculpin (Cottus spp.) were collected offshore at the 6.0 m (20 ft) and 9.1 m (30 ft) depth stations but not nearshore.

A total of 113 individuals and 22 species of fish were collected from the Elk Creek pool habitat (GPU 1980a). The golden redhorse was the most numerous and consistently collected species in the pool. The only other notably abundant species in this habitat were the coho salmon and smallmouth bass.

The Elk Creek riffle habitat was found to support a highly productive and diverse fish fauna. Thirty-eight species and 3173 individuals were collected in the riffle during the study period. In general, typical stream species such as the common shiner (Notropis cornutus), bluntnose minnow (Pimephales notatus), stoneroller (Campostoma anomalum), and golden redhorse exhibited consistently high abundances throughout most of the study period. The highest diversity was observed in the riffle habitat in May, when the collection contained mostly stream fishes, but also included species which could be classified as probable migrants from Lake Erie. These migrant species include

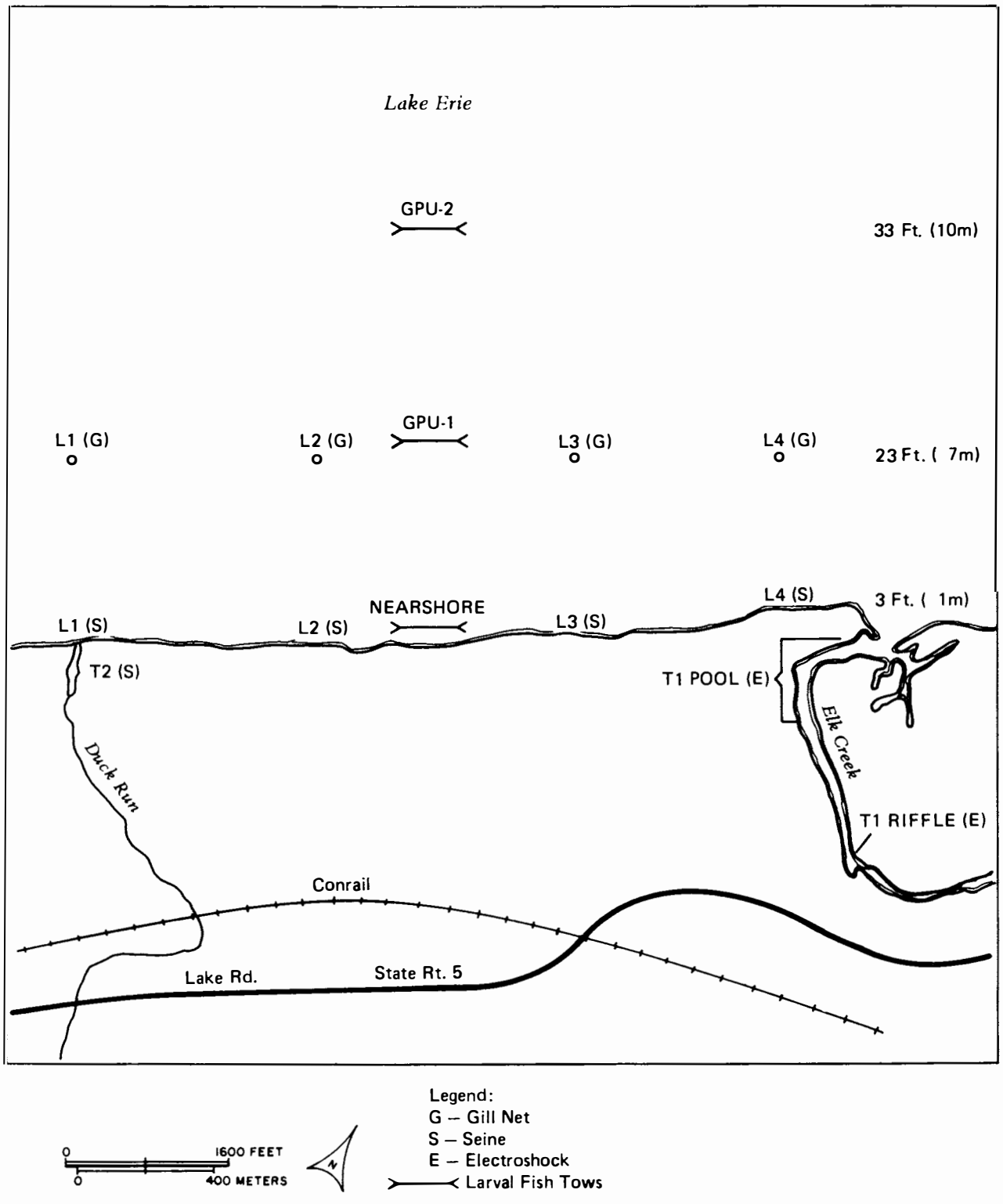


Figure 3.1. Aquatic Sampling Stations at the Proposed Coho Station (1974-1978). From GPU 1980a.

silver redhorse (Moxostoma anisurum), carp, emerald shiner (Notropis atherinoides), smallmouth bass, and logperch. Many of the white suckers were also probably migrants. Most of the suckers and carp were juveniles, although adult white sucker, silver redhorse, and smallmouth bass were also found. All of the adult fish in the latter group were in spawning condition.

The May pool collection consisted predominantly of adult female smallmouth bass in spawning condition. Other species which were collected and found to be in spawning condition were goldfish (Carassius auratus), carp, golden redhorse, and freshwater drum.

A logperch spawning migration from Lake Erie into Elk Creek apparently occurred between the May and June collections. Logperch increased in number in the Elk Creek riffle between early May and early June. As was observed with yellow perch and walleye in Lake Erie, logperch abundance decreased rapidly in Elk Creek after the June peak.

3.1.2 Terrestrial

The shoreline of Lake Erie near the project area is characterized by steep, rapidly-eroding, clay cliffs. A narrow beach of clay, rubble, and boulders appears at the cliff bottom during the times when the lake-water level is lowest (summer and fall). The beach is littered with rocks and small-to-large trees that have eroded from the top of the cliff, and with other debris that has been carried onshore by waves and movements of the ice pack (GPU 1980a).

In the area west of the mouth of Elk Creek, where the submarine cables will come ashore, the slopes are less steep and covered with vegetation. Alternating layers of gray shale and fine-grained gray sandstone of the Canadaway Formation Outcrop occur along portions of the lake shore and Elk Creek. Bedrock in the general area of the transmission route consists of 1830-2280 m (6000-7500 ft) of horizontal layers of sedimentary rock above crystalline igneous rock of pre-Cambrian Age (GPU 1980a).

Soils of the Elk Creek bottom area consist of silty loams with high water tables, except for small beach sand areas and riverwash areas of sand and gravel. The higher areas, above the steep bluffs that parallel Lake Erie and slope into the Elk Creek bottomland, consist of sandy and gravelly loams with fairly flat slopes. Beach ridges are a prominent feature of the lake plain that formed the shoreline when the lake was at higher levels. The gravelly and sandy soils of the beach ridge are quite porous (GPU 1980a).

Behind the beach ridge are located deep silty and clayey soils of the gently or moderately sloping glaciated upland. This general soil type lies on upland areas that are mantled with glacial till. These soils are underlain by compact subsoils, so after rains, water remains ponded in level spots. The soils warm slowly in spring and become wet in the fall, so planting and harvesting of crops frequently are delayed (GPU 1980a).

Plant communities in the project area are 1) mixed forest (deciduous and coniferous), and 2) disturbed areas (Fig. 3.2). The mixed forest is modified by various human activities. The disturbed areas range from actively farmed fields, through an old-field succession of shrubs and young trees, to stands

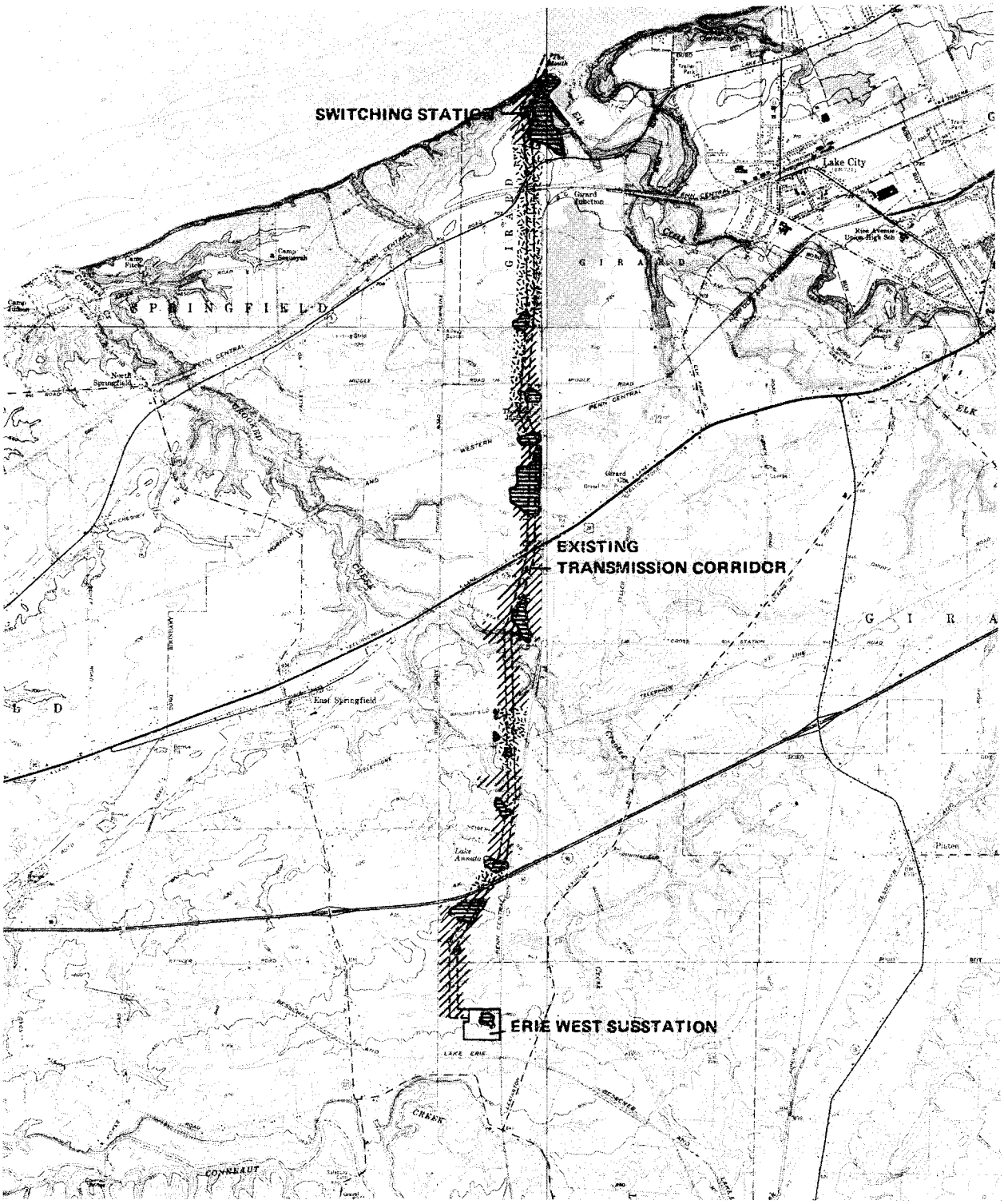


Figure 3.2. General Vegetation Map. From GPU 1980a.

of more or less mature forest. There are several overgrown orchards. Secondary ecological succession in disturbed communities of the project area follows generally well-known and predictable series (GPU 1980a).

Because of slow water drainage through the soil, vegetation on farm fields usually follows a hydrarch succession (change from aquatic habitat toward terrestrial habitat) upon cessation of agriculture. Brambles (Rhus spp) and composites give way to willow-maple-aspen (Salix-Acer-Populus) communities, in which sassafras (Sassafras albidum), sour gum (Nyssa sylvatica), and staghorn sumac (Rhus typhina) are often represented (GPU 1980a).

A mixed mesophytic hemlock-hardwood community is situated on the east-facing slope to the west of Elk Creek. This community has many large hemlocks (Tsuga canadensis), white oak (Quercus alba), yellow birch (Betula alleghaniensis), tulip trees (Liriodendron tulipifera), sugar maple (Acer saccharum), and American beech (Fagus grandifolia). Some areas show a closed canopy of hemlocks. The rich alluvium floodplain on the west side of Elk Creek supports a white oak-black willow (Quercus alba-Salix niger) community. Sycamore (Platanus occidentalis), bitternut hickory (Carya cordiformis), red maple (Acer rubra), sugar maple and basswood (Tilia americana) are also present. Many large black willow and sycamore trees are found on the floodplain. Although ostrich fern (Pteretis sp) is the most abundant groundcover plant in the summer, other ferns and some forbs are also common (GPU 1980a).

Information on the wildlife resources along the transmission corridor is provided from studies conducted at the Coho site (GPU 1979). Of the 23 species of mammals observed on the Coho site, the white-footed mouse (Peromyscus leucopus) was the most abundant and prevalent. The short-tailed shrew (Blarina brevicauda) was a distant second. Eastern cottontails (Sylvilagus floridanus), woodchucks (Marmota monax), and white-tailed deer (Odocoileus virginianus) were the most apparent larger herbivores. Red foxes (Vulpes fulva) and weasels (Mustella spp) are the most common carnivores. Small colonies of muskrat (Ondatra zibethicus) were apparent in the Elk Creek vicinity.

The most important single feature of the project corridor is its location in a major migratory flight path. Data from the Coho studies show that the density and frequency of migrating birds is highest in spring and somewhat reduced in autumn. A major east-west flight path parallels the shore of Lake Erie while north-south flights also pass over the site. The east-west flight path in spring carried raptors, blue jays, and blackbirds. Other species doubtless move along the lake shore but their passage was not as spectacular and thus not so easily observed. The north-south flight path was noted to carry mostly waterfowl flying at high altitudes (GPU 1980a).

Autumn migration is virtually devoid of raptors, and other groups utilizing the site pass through in more leisurely fashion. With the exception of waterfowl, autumn migration was not characterized by concentrated flights, but the area was intensively used (GPU 1980a).

3.1.3 Wetlands

Two principal categories of wetlands are found in the transmission corridor, namely forested and unforested wetlands (Fig. B.1). The latter category includes naturally occurring openings supporting herbaceous growth and areas kept "clean" by various cultural practices. The forested wetlands are "shrub" and "wooded swamps"; some are abandoned cropland or timberland areas which are influenced by succession (GPU 1980a).

The entire floodplain of Elk Creek can be categorized as a wooded swamp. Canadice soils occupy most of the floodplain. This is a deep, poorly drained silty soil that has a subsoil of silty clay loam on silty clay (Taylor 1960). The dominant trees are white ash and black willow. Several additional wetlands are located along the transmission route in low lying areas that form the headwaters of tributaries to Duck Run and Crooked Creek. Wetland types represented include nonforested (naturally and culturally influenced) shrub and wooded swamp.

3.1.4 Threatened and Endangered Species

None of the fish or macroinvertebrate species collected in Lake Erie during the 1974 study program are listed as threatened or endangered by the U.S. Fish and Wildlife Service (1980) or the Pennsylvania Fish Commission (1979). Four fish species whose ranges include Lake Erie are listed by one or both of these agencies. The longjaw cisco (Coregonus alpenae) and blue pike (Stizostedeon vitreum glaucum) are on the federal endangered list, although the latter species is believed by the Pennsylvania Fish Commission (1979) to be extirpated from state waters. The lake sturgeon (Acipenser fulvescens) is listed as endangered, and the eastern sand darter (Ammocrypta pellucida) is listed as threatened by the Pennsylvania Fish Commission (1979).

None of the fish species collected in Elk Creek are currently listed as "threatened" or "endangered" by the federal government (U.S. Fish and Wildlife Service 1980) or by the Pennsylvania Fish Commission (1979). However, the black bullhead (Ictalurus melas), found in May and June riffle collections in Elk Creek, has an "undetermined" status because of insufficient information to make a determination (Pennsylvania Fish Commission 1979).

No federally listed species of plants and terrestrial vertebrates or critical habitats (U.S. Fish and Wildlife Service 1980) were observed at or near the project area in investigations from 1974 through 1978 (GPU 1980a); however, some of these species--e.g., Indiana bat (Myotis sodalis) and peregrine falcon (Falco peregrinus)--range into and are occasionally observed in the region.

Except for occasional transient species, no federally listed or proposed endangered or threatened species under the jurisdiction of the U.S. Fish and Wildlife Service are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the U.S. Fish and Wildlife Service (see Comment DOI-3).

3.2 SOCIOECONOMICS

The project area consists of three townships (Girard, Springfield, and Conneaut) and three boroughs (Girard, Lake City, and Platea).

3.2.1 Employment

Erie County's economy is closely tied to the general economic trends of industry, the biggest employers in the county being manufacturing and wholesale and retail trade. Employment in Erie County is summarized by sector in Table 3.2. Most of the industrial and commercial trade growth has occurred in the City of Erie, and in adjacent Millcreek, Lawrence Park, and Harbor Creek Townships.

Industrial enterprises in Erie County have provided between 40 and 50 percent of the available jobs for the past 25 years. These numbers can be contrasted to the national average of 24%. The City of Erie typically has 10% more manufacturing employment than the county. Distribution of employment within the industrial sector is presented in Table 3.3. This pattern of employment, with its emphasis on the durable goods sector, has greatly hurt

Table 3.2. Employment by Economic Sector in Erie County (1975)

Industry	Employment
Manufacturing	44,200
Wholesale and retail trade	20,800
Services	17,900
Financial services	4,400
Government	13,700
Transportation and utilities†[1]	5,000
Contract construction	3,200
Agriculture†[2]	1,800
Tourism	8,054

Source: Erie County Metropolitan Planning Commission (1977).

†[1] For 1976, but the figure for 1975 is believed to be approximately equal.

†[2] 1971 value. A generally declining trend has occurred since 1950 when 4100 people were employed in agriculture.

Table 3.3. Industries in Erie County and Percent of Total Employment

Industry	% of Total Employment
Durable Goods	
Furniture and fixtures	1.1
Primary metals	4.4
Fabricated metal products	4.7
Nonelectrical machinery and transportation equipment	13.3
Electrical machinery	4.5
Instruments and related products	2.8
All other durable goods	1.5
	32.3
Nondurable Goods	
Food products	1.7
Paper products and printing	2.6
Rubber and misc. plastics	3.1
All other nondurable goods	0.5
	7.9

Source: Erie County Metropolitan Planning Commission (1977).

the county and city economies, because investment in machinery, raw material inventories, heavy equipment, and furnishings typically declines during recessionary times.

Tourism is the county's second largest source of revenue. The general attractions for tourists are: hunting in the state game lands and major rural areas of the escarpment and upland plateau areas; fishing on the numerous local streams, stream mouths, and lakes, as well as on Lake Erie; and general recreation in public and private parks, camping/recreation areas, and private homes along the lake shore. The primary mainstay of the county tourist industry is the Presque Isle State Park, which has an area of 1200 ha (3000 ac) and which received approximately 4.6 million visitors in 1980. The area has many natural features and over seven miles of shoreline.

Employment in agriculture is higher--and employment in services, wholesale trade, and retail trade is lower--than county or municipal averages in the immediate vicinity of the transmission line corridor (GPU 1980a).

3.2.2 Population

The project area lies within Erie County, which is the 12th most populous county in the State of Pennsylvania. Since 1900 Erie County has been growing at a rate of 13% each decade. Erie City is the major population center. Erie City's growth relative to the county has been diminishing. Mill Creek Township and Fairview Township to the west of the city and Harbor Creek to the east have been experiencing more rapid growth (Erie County Metropolitan Planning Commission 1977). Population data for municipalities in the proposed project area are presented in Table 3.4. The area has been growing in population at a rate exceeding that of the County. Population densities of the municipalities are low to medium (Table 3.5).

Table 3.4. 1980 and Forecasted Populations by Municipality

Municipality	1980 Population†[1]	Forecasted 2000 Population†[2]	% Change
Springfield Township	3310	3533	6.7
Girard Township	4216	5287	25.4
Lake City Borough	2451	3331	35.9
Girard Borough	2579	3366	30.5

†[1] Phone conversation, E. Cherizio, Girard-Lake City-Springfield Zoning Officer, Girard Township, with ANL Staff, April 2, 1981.

†[2] Erie County Land Use Plan Update. 1978. Erie County Department of Planning, Erie County Metropolitan Planning Commission.

3.2.3 Housing

The predominant form of housing in the municipalities and in the immediate vicinity of the proposed transmission corridor is single-family dwellings.

3.2.4 Transportation

Major arterial routes include Interstate 90, U.S. 20, and Pennsylvania Route 5, all of which are east-west highways. Railroad service is provided by Conrail and by the Bessemer and Lake Erie and the Norfolk and Western railroads. The major airport for the project area is the Erie International Airport, located in northwest Millcreek Township.

Table 3.5. Population Density by Municipality

Municipality	Population Density (persons/residential acre)
Girard Township	4.3
Girard Borough	8.9
Lake City Borough	9.1
Springfield Township	5.0
County average	9.3

Source: Phone conversation, E. Cherizio, Girard-Lake City-Springfield Zoning Officer, Girard Township, with ANL Staff, April, 1981.

3.3 CULTURAL RESOURCES

3.3.1 Historical Sites

Three historic properties that are located within the project area (Girard, Springfield, and Conneaut Townships, and Girard, Lake City, and Platea Boroughs) are listed in The National Register of Historic Places. All three properties are covered bridges (Table 3.6).

The Pennsylvania Historic and Museum Commission lists two privately owned state historic sites that are located within the project area. They are: (1) the John Dickson House (1842); and (2) the Hutchinson House (1830). Both houses are located in Girard Borough. In addition, the Commission has erected a historical marker for the "Erie Extension Canal" on Pennsylvania Route 18 in Platea Borough (GPU 1979).

There are several structures of local historical significance located within the project area, as identified by the Erie County Metropolitan Planning Commission (Table 3.7) (GPU 1979). The closest site to the proposed transmission line is the C. Smith House, which is located approximately 0.8 km (0.5 mi) to the west along Middle Road in Springfield Township.

3.3.2 Archeological Sites

Salient archeological features of the project area are the presence of Warren beaches, which are remnants of glacial Lake Erie, on and adjacent to the area, and the high density of prehistoric sites in the general vicinity. Warren beaches are frequently associated with Paleo-Indian occupations. Paleo-Indian sites are of importance to archeological history since they are believed to represent the earliest human occupants of North America (GPU 1979).

Table 3.6. National Register Sites Located within the Project Area

Bridge Name	Location	Stream	Truss Type	Year Built
Gudgeonville	Girard Township	Elk Creek	Multiple kingpost	1868
Carman	Springfield & Conneaut Townships	Conneaut Creek	Multiple kingpost	1870
Harrington	Conneaut Township	Conneaut Creek, west branch	Multiple kingpost	1870

Source: Letter from Mr. Claridge, Erie County Historical Society, to ANL staff, March 6, 1981.

Table 3.7. Structures of Local Historical Significance

Springfield Township	Girard Township	Girard Borough	Platea Borough
Holliday-Miles House, North Springfield; 1832	Landwehr House Restaurant, E. Main Street; 1834	Asa & Elizabeth Battles House, Girard; no date	Erie Extension Canal, Platea; 1844-1871
Samuel Holliday House, North Springfield; 1806	Daniel Sayre House, Pa. Route 20; 1845	Rush S. Battles House, Girard, circa 1850	
North Springfield Academy, North Springfield; 1866		Myron Hutchinson House, Girard; 1830	
C. Smith House Middle Road; circa 1865		Pfeiffer House, Girard; 1868	
A.T. Davison House, Sanford Road; 1876		Universalist Church, Girard; 1852	
Joseph M. Strong House, E. Springfield; 1834		James & Mary Webster House, Girard; 1830	
		Dan Rice Soldier's Monument, Girard Public Square 1865	

Source: GPU 1979.

While much has been researched and reported on the larger geographic area that encompasses Erie County, little professional archeological work has been conducted in Erie County itself. The first systematic survey was conducted by D.A. Johnson and Associates (as cited in GPU 1980a). A records search and initial reconnaissance of selected areas was performed by Commonwealth Associates in 1979. No less than 23 archeological sites were found and reported to the state archeologist. A brief pedestrian survey along the abandoned Penn Central tracks, also conducted in 1979, did not reveal any additional sites (GPU 1980a). The Applicant has completed a cultural resources survey for the onland portion of the corridor (Lantz 1981), which identified archeological sites in the project vicinity. This work is being coordinated with the Pennsylvania State Historic Preservation Officer.

Because several archeological sites have been found in the project area and because their association with geological formations indicates a high potential for prehistoric sites, the project area is considered archeologically sensitive. There are no archeological sites listed in the National Register of Historic Places. However, a site near Presque Isle State Park has been recommended for inclusion by the state archeologist, Region IV (Johnson 1981).

3.4 LAND USE

Land uses within the proposed project area are presented in Table 3.8. Agricultural land and open space (land and water use areas) constitute 43% and 41.3% of the area, respectively (Fig. 3.3). Future land-use patterns are presented in Figure 3.4.

3.4.1 Agriculture

Agricultural activities within the county can be divided into three sections on the basis of topography and soils: namely lake plain, escarpment slope, and upland plateau, (Erie County Metropolitan Planning Commission, 1977). The lake plain area extending along the Lake Erie shore is used for specialized crops, such as nursery stock, fruit crops, and early maturing vegetables. Nearly all the grapes grown in the state come from this area. Lake Erie moderates the fall climate and provides an extended growing season such that grapes and other sensitive orchard crops can be raised. The escarpment slope is also used to grow fruits; however, hardier crops such as apples and cherries tend to replace the more sensitive peaches and grapes. The upland plateau is evenly divided between well drained soils (where late maturing vegetables, cabbage, cauliflower, root crops, and potatoes predominate) and poorly drained soils where dairy farming and timber production predominate. Much of the farmland in the project area is designated as either "prime farmland" or as "additional farmland of statewide importance" by the U.S. Department of Agriculture.

3.4.2 Recreation

Several areas near the proposed overhead portion of the transmission facility have been recognized as having significant recreational value (Table 3.9). Racoon Creek County Park [78.5 ha (194 ac)] is located along the Lake Erie shoreline at the mouth of Racoon Creek. The park serves as a greenbelt where visitors can go swimming, boating, and fishing. Additionally,

Table 3.8. Land Uses in Proposed Project Area (Percentage) in 1975-76

Area	Residential	Commercial	Industrial	Public & Institutional	Recreation	Agricultural	Open & Water	Airport & Railroad	Roads	State Game Lands
Girard Twp.	4.6	0.5	1.3	0.1	1.3	46.2	41.3	1.1	3.5	--
Springfield Twp.	4.2	0.2	0.0	0.2	5.0	42.5	43.4	1.3	3.3	--
Girard Borough	19.6	2.9	1.9	18.1	3.8	20.3	21.3	5.8	6.4	--
E. Springfield Borough	7.1	0.1	--	1.3	0.1	45.7	41.7	0.7	3.3	--
Lake City Borough	24.4	2.2	10.4	4.3	0.2	7.5	40.1	2.4	8.5	--
Platea Borough	6.3	0.4	--	1.1	--	52.8	34.7	1.1	3.5	--
Study Area Total	5.5	0.5	0.8	0.9	2.9	43.0	41.3	1.4	3.6	--
Erie County	5.9	0.8	0.6	1.3	1.5	44.6	39.0	0.8	3.5	2.1

Source: Erie County Metropolitan Planning Commission, 1977.

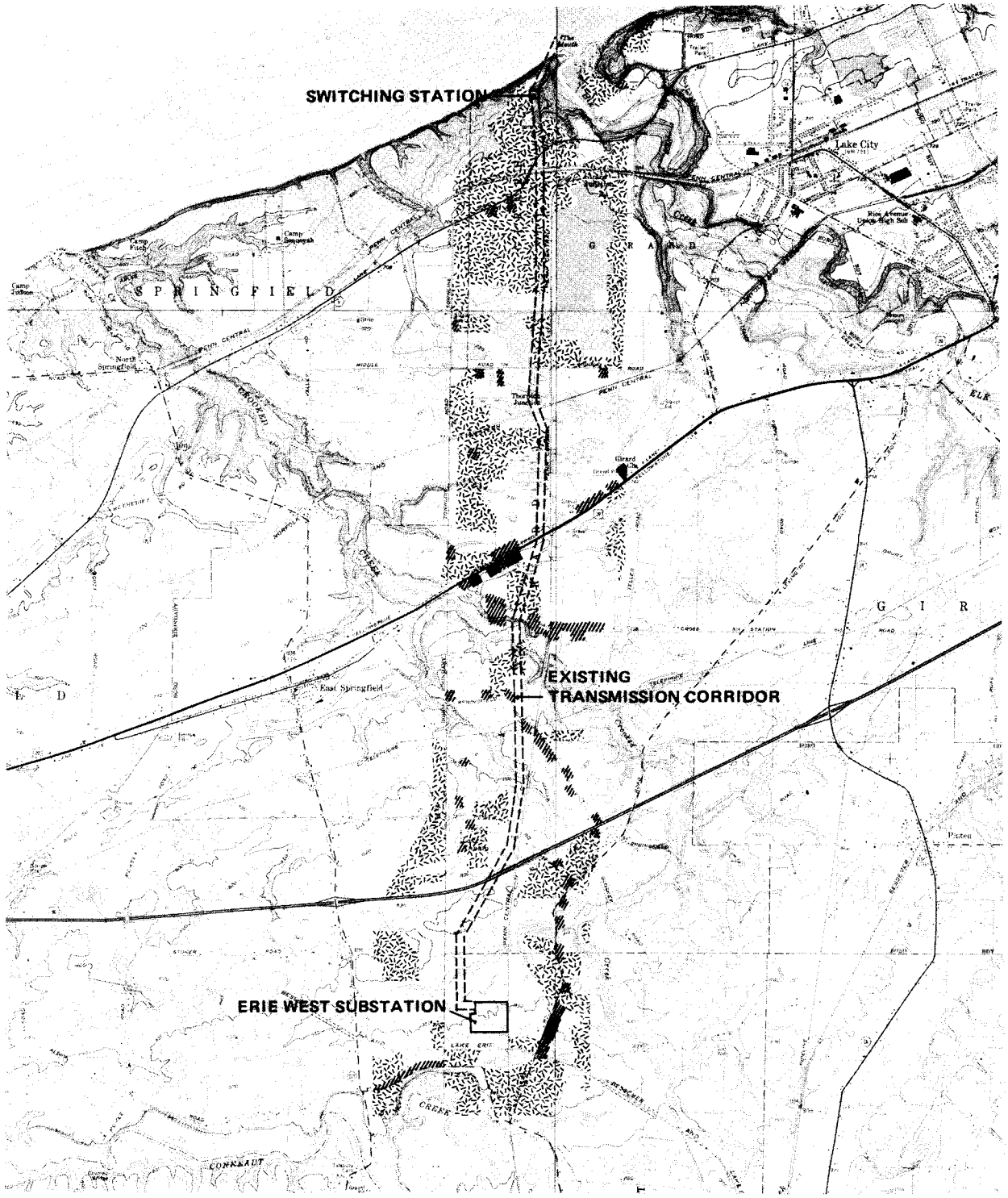


Figure 3.3. Existing Land Use. From GPU 1980a.

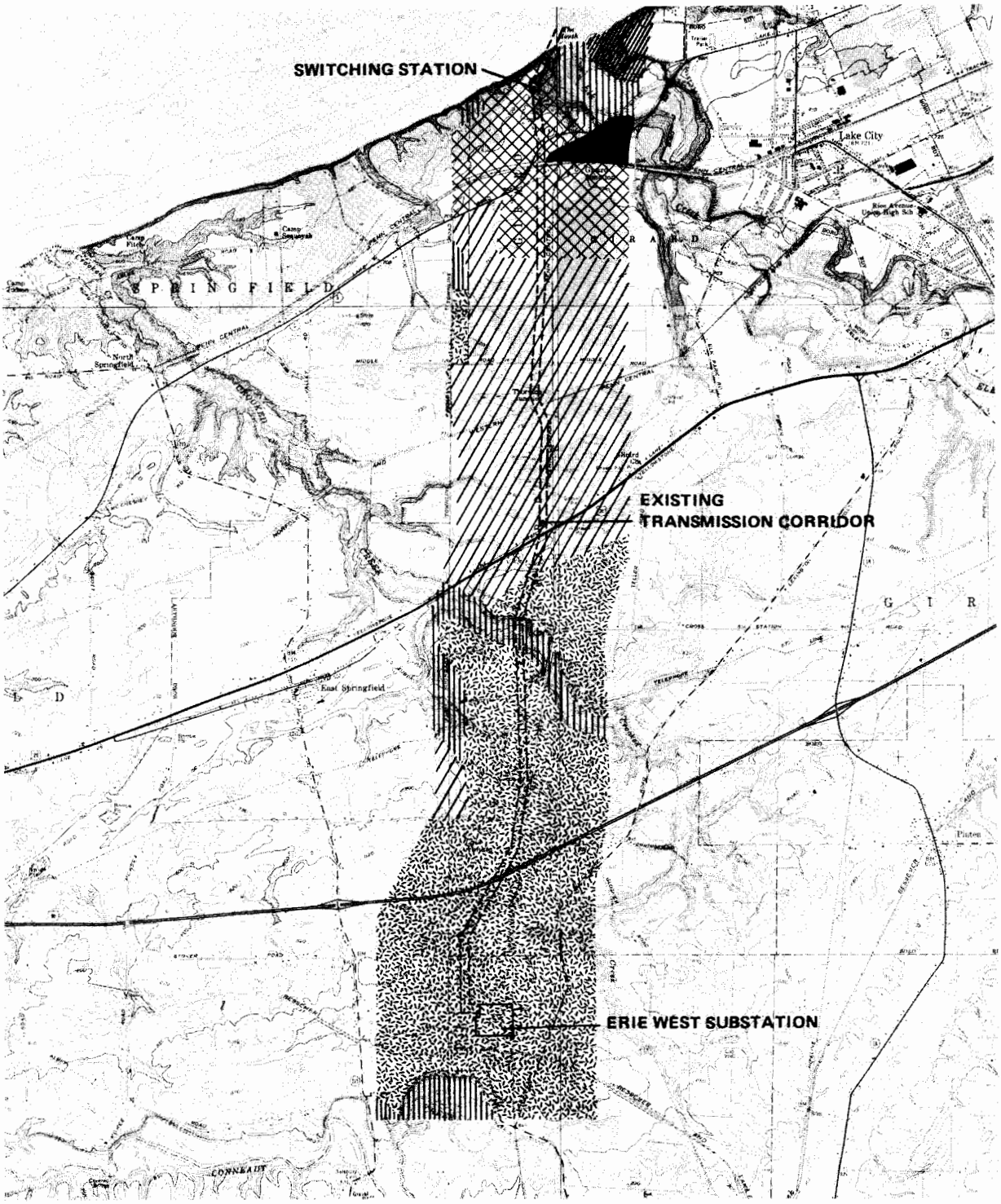


Figure 3.4. Future Land Use. From GPU 1980a.

Table 3.9. Recreational Areas in Surrounding Townships

Site	Municipality	Ownership	Activities†[1]
Raccoon Creek County Park	Springfield Twp.	Public	S, BA, F, O, NSA
Eagley Twp. Park	Springfield Twp.	Public	S, BA
Crooked Creek	Springfield Twp.	Private	S, NSA
Elk Creek	Girard Twp.	Private	S, BA, M, F, NSA
Lake Erie Community Park	Girard Twp.	Public	S, O
Trout Run	Fairview Twp.	Private	S, NSA
Walnut Creek (Manchester Beach)	Fairview Twp.	Public	BA, M, F
Presque Isle	Millcreek Twp.	Public	S, BA, M, O, NSA
Scott County Park	Millcreek Twp.	Public	O
Commodore Perry Yacht Club	Millcreek Twp.	Private	BA, M
Erie Yacht Club	Millcreek Twp.	Private	BA, M
East Side Marina	Millcreek Twp.	Public	BA, M

Sources: Pennsylvania Coastal Zone Management Program Technical Report--Draft, 1978, Commonwealth of Pa., Dept. of Environmental Resources, Office of Resources Management, Harrisburg, Pa.
Environmental Report, Lake Erie Interconnection Project, 1980, Docket No. PP-72, General Public Utilities Corporation, Reading, Pa.

†[1] Activities: S - Swimming; F - Sport Fishing; BA - Boat Access; M - Marina; O -Other (picnicking, hiking); NSA - Natural Scenic Area

picnic shelters, a playground, and a ballfield are available. Lake Erie Community Park [44.5 ha (110 ac)] is located approximately one mile northeast of the proposed switching station. The park is located along the shore of Lake Erie and has facilities for swimming, camping, and picnicking. Scott County Park is located at the mouth of the Presque Isle Peninsula. The park was acquired only recently and is undeveloped at present. Walnut Creek [16 ha (40 ac)] is the most significant recreational development in the project area, and offers fishing, boating access to both Walnut Creek and Lake Erie, and a marina.

Many of the creeks in the project area (i.e., Elk Creek, Crooked Creek, Racoon Creek, and Trout Run) provide natural scenic areas in addition to their recreational amenities. Elk Creek, Crooked Creek, and Racoon Creek are further discussed in Section 3.4.3. Trout Run is used primarily for swimming and fishing. There are also several marinas and yacht clubs in the project area which provide boat access to Lake Erie.

Additionally, the proposed Elk Creek Recreation Area, adjacent to the Coho site on the west side of Elk Creek, is currently under construction. In March 1981, PN finalized an agreement with Girard Township, leasing 18.9 ha (46.6 ac) on a 25-year renewable term. In August 1981, the area was dedicated and construction was begun by the Township with matching funds from the Coastal Zone Management Program.

3.4.3 Natural Areas

The Lake Erie Bluffs running along the Lake Erie shore of Springfield, Girard, and Fairview Townships, and Lake City Borough, are of significant value (Department of Environmental Resources 1978; Erdman and Wiegman 1974). The Bluffs stretch for 24 km (15 mi), reaching heights of 36 m (120 ft) above water level, and are largely undeveloped. The Lake Erie Bluffs provide significant habitat areas for wildlife and vegetation and serve as esthetic open space. Erosion is a severe problem in this area, and clearing of vegetation in some areas has increased the rate of erosion (Great Lakes Research Institute 1975). For this reason the Lake Erie Bluffs are listed as a critical hazard area (Great Lakes Research Institute 1975).

Several rivers and streams (e.g., Elk Creek, Crooked Creek, Racoon Creek, and Duck Run) occur in the proposed project area. None of these waterways is designated as a National Wild and Scenic River by the U.S. Department of Interior, but Elk Creek is listed in the Pennsylvania Scenic Rivers Inventory. Elk Creek is a scenic river of first priority (of statewide importance), Group B (of less than immediate concern), and Water Quality Group 2 (does not presently meet state water quality standards but is expected to within ten years) (GPU 1980a). The Crooked Creek corridor in Springfield Township covers approximately 110 ha (275 ac). Crooked Creek has been cited as probably the most unique natural area in the entire Erie County Coastal Zone (Department of Environmental Resources, 1978). Raccoon Creek has been designated of particular concern as a recreational area (Great Lakes Research Institute, 1975). Raccoon Creek corridor contains approximately 120 ha (300 ac), of which 8 ha (20 ac) near the lake has been developed, while the remainder is primarily undeveloped and utilized for primitive hiking and camping.

The Elk Creek bay area consists of approximately 130 ha (320 ac) of which all but 5.5 ha (13.5 ac) is privately owned. The publicly owned parcel is occupied by the Lake City Borough sewage treatment plant, which is located immediately south of Route 5. Elk Creek bay is considered by the Commonwealth's Coastal Zone Management Program to be an area of significant natural, cultural, and recreational value. It is used for fishing, boating, and other recreational activities, as well as for vacationing. This area has also been identified by the Western Pennsylvania Conservancy as having significant natural value (Erdman and Wiegman 1974).

3.5 WATER USE

3.5.1 Municipal/Industrial Supplies

Two water intake pipelines (municipal/industrial) at Erie, Pennsylvania--approximately 24 km (15 mi) northeast of the proposed project corridor--are the only known functioning down-current intakes near the proposed submarine cable route (GPU 1980a). Erie Water Company's two intake pipelines cross Presque Isle Bay and the neck of Presque Isle and then continue northwest into Lake Erie. One of these pipelines is a 152-cm (60-in.) diameter line that extends 1600 m (5200 ft) into the lake, with the intake crib in 8.5 m (28 ft) of water. The second pipeline is a 183-cm (72-in.) diameter line that extends 1950 m (6400 ft) into the lake, and the intake crib is in 8 m (28 ft) of water. Both pipelines are recessed 2 to 2.5 m (6 to 8 ft) into the sediments.

3.5.2 Fisheries

Fishing grounds immediately adjacent to the proposed project corridor are heavily fished by commercial fishing operations licensed in the State of Pennsylvania. Most commercial fishing occurs from Erie, Pennsylvania west to the Ohio state line. Commercial boats are restricted to waters outside a 1.2 km (0.75 mi) contour from September 30th through June 30th and outside a 2.4 km (1.5 mi) contour the rest of the year. This boundary separates sport fishing traffic from commercial operations and protects fish brood stocks. Commercial fishing gear consists almost entirely of bottom-set gill nets. Setlines are set in the area for channel catfish. Commercial fishing operators have not set trap nets for five years in the areas off Elk Creek. The rocky bottom prevents trawling in the area (GPU 1980a).

The salmonid stocking program for Elk Creek results in heavy sport fishing pressure in the project vicinity in spring and fall. The most intense fishing pressure occurs for several weeks immediately following release of yearling salmonids in late April and early May, and during the period from September to mid-November when salmon are returning from Lake Erie (GPU 1980a).

Hand dipping for smelt occurs at the mouth of Elk Creek during late April and early May, when rainbow smelt are entering the creek mouth to spawn (D.A. Johnson and Associates, as cited in GPU 1980a). Yellow perch, walleye, and smallmouth bass are the primary recreational species sought from May through July.

3.5.3 Ports/Shipping/Navigation

The harbor in Erie, Pennsylvania is the closest large harbor to the proposed cable route. The Erie harbor is completely surrounded by the Presque Isle Peninsula except for the channel entrance. The harbor is currently not used to capacity. The principal shipping and docking facility in the port is the Erie International Marine Terminal. Shipbuilding and repair services are a major activity of the Erie harbor.

Inbound ship traffic to Lake Erie harbors increased during the early 1970s, but has declined since 1973. Ship traffic is composed primarily of passenger and dry cargo vessels (COE/EPA 1980). The lake usually opens for boating traffic in late March or early April and closes in mid-December when

ice becomes a navigational problem. Shipping may continue through the winter months if the ice is thin and the shipping lanes can be kept open.

The large commercial lake ships or ocean-going ships ordinarily remain offshore in deep water within shipping lanes to ensure safe speedy travel. Large vessels rarely enter the nearshore waters [within 8 km (5 mi) of shore] except when entering port. When entering port, these ships are restricted to shipping channels, usually artifically maintained at a depth to ensure passage of deep-draft vessels.

3.5.4 Recreation

A major recreational activity occurring near the transmission route is sport fishing along the Lake Erie shore and in Elk Creek. Heavy sport fishing occurs in the fall at the mouth of Elk Creek during the period of salmon migration, and in spring along Elk Creek during the first few weeks of trout season.

Recreational demand along the Pennsylvania Lake Erie coastline, including the need for lake access, is expected to increase significantly within the next decade (GPU 1980a). Provision of adequate recreation sites having lake access along the coastline is important and the location of Elk Creek and its numerous site amenities makes it a candidate for recreational development. See Section 3.4.2 for additional information.

3.5.5 Sand and Gravel Extraction

Potential commercial sand and gravel production areas exist in the nearshore zone of U.S. Lake Erie in the proposed project corridor (U.S. COE/EPA 1980). Dredge Area C, which is shown in Figure 1.2, has been permitted by the U.S. Army Corps of Engineers.

3.5.6 Lake Erie Natural Gas Development

A programmatic environmental impact statement on the development of natural gas in Lake Erie is being prepared by the U.S. Army Corps of Engineers and the Environmental Protection Agency (COE/EPA 1980). At this time there has been no drilling for oil or natural gas in U.S. waters of Lake Erie.

3.6 SEISMIC ACTIVITY

The Lake Erie area lies in the central stable region of the continent. A map of earthquake epicenters is presented in Figure 3.5.

3.7 METEOROLOGY AND CLIMATOLOGY

The onland portion of the project area is situated within a narrow plain climatically characterized as the Lake Erie Plain Region. Lake Erie has a climatic effect on the continental type climate of the area. A detailed discussion of the meteorology and climatology can be found in GPU (1979).

The prevailing winds are from the south and occur in excess of 20 percent of the year. During greater than 50 percent of the year, winds prevail from the west through south quadrants. Year round wind speeds average about

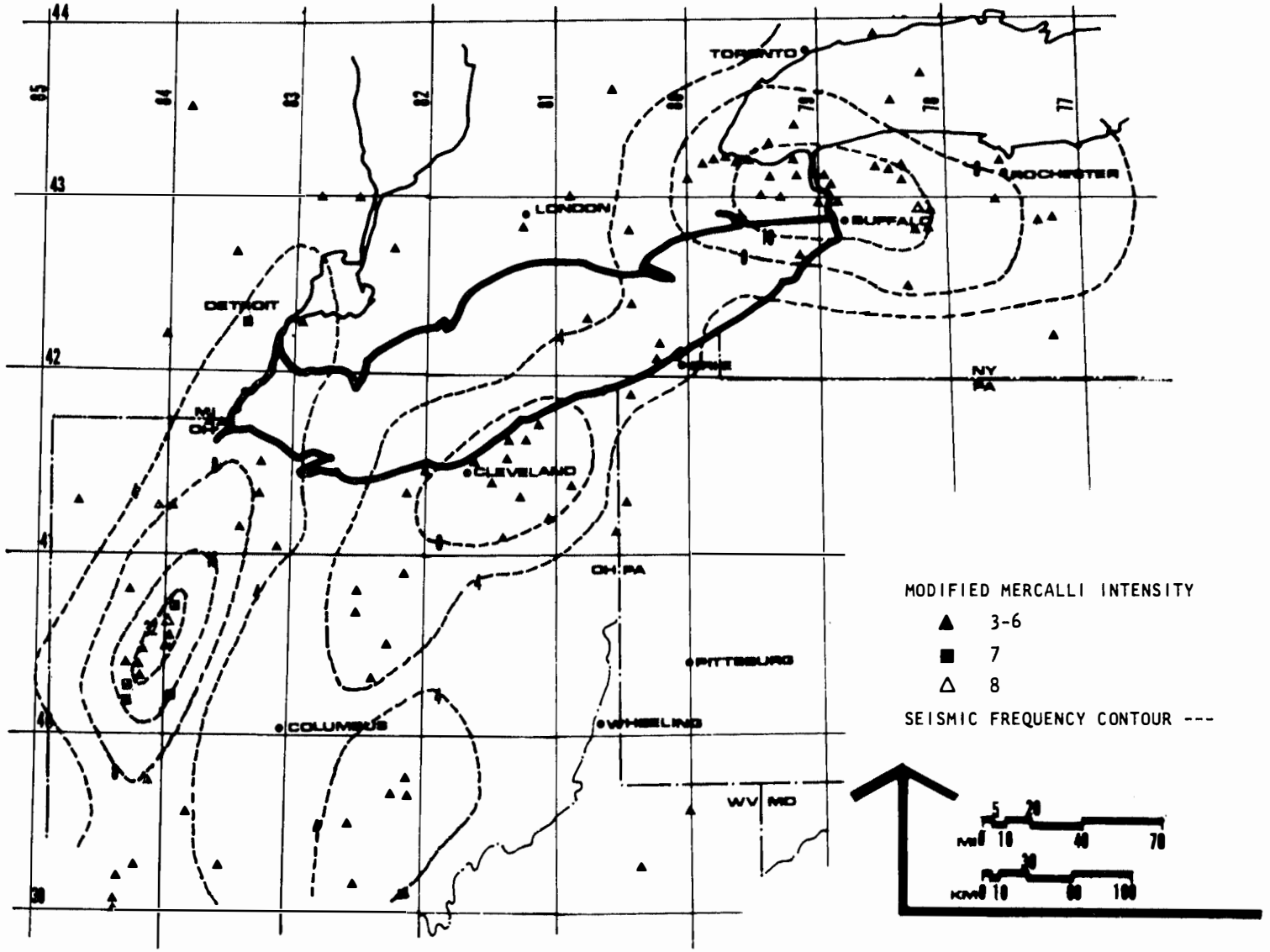


Figure 3.5. Map of Earthquake Epicenters in the Lake Erie Region. Locations of epicenters of earthquakes recorded during 1800-1972 are shown; only earthquakes with intensities equal to or greater than MM III (Modified Marcelli scale of earthquake intensity) are mapped. The seismic frequency contour (generalized) designates epicentral concentrations (number of epicenters per 10,000 sq km). Adapted from Hadley and Devine (1974).

11.4 miles per hour (9.9 knots) with slightly stronger winds occurring during winter. Neutral atmospheric conditions are most common for the area occurring with a relative frequency in excess of 67 percent of the time (GPU 1979).

The project area is in the Northwest Pennsylvania-Youngstown Interstate Air Quality Control Region (AQCR). AQCR were established under provisions of the Clean Air Act Amendments of 1970, as a means of implementing air quality standards. The ambient air in the counties and townships within the AQCR have been monitored or modeled by the U.S. EPA, the Pennsylvania DER, and the Ohio EPA to determine if they are in compliance with the National Ambient Air Quality Standards. The results of these analyses determine the "attainment" or "non-attainment" status of areas in the ACQR, and consequently determine which regulations must be complied with if a new pollutant emitting facility is proposed. Results of these analyses are compiled in GPU (1979).

4. ENVIRONMENTAL CONSEQUENCES

4.1 CONSEQUENCES OF THE PROPOSED LAKE ERIE INTERCONNECTION

4.1.1 Ecology

The ecological consequences of the proposed Lake Erie Interconnection will be discussed under the headings of aquatic ecology, terrestrial ecology, wetlands ecology, rare and endangered species, and atmospheric emissions from Ontario Hydro.

4.1.1.1 Aquatic

4.1.1.1.1 Construction

(a) Cable Laying in Lake Erie. A map of the proposed cable corridor is shown in Figure 1.2. The appropriate COE permit will be acquired prior to trenching activities associated with cable laying. A discussion of trenching prior to cable laying is presented in Section 2.1.1.3. Construction impacts associated with substrate disturbance due to cable laying include: 1) sediment resuspension and subsequent deposition 2) disruption of existing benthic habitat, and 3) increased turbidity.

Impacts to water quality will depend on the quantity and quality of the substrate disturbed during trenching activities in the approach zone [approximately 0.8 km (0.5 mi)], and on current dispersion of resuspended solids. Project-specific data are unavailable. Thus, a set of conservative dispersion analyses for pipeline corridor trenching in the nearshore (approach) zone of Lake Erie, described in COE/EPA (1980), is here assumed to be conservative also for cable corridor trenching in the approach zone (ANL 1981). COE/EPA (1980) estimated resuspended sediment concentrations of 2×10^5 milligrams per liter (mg/L) in the immediate trenching area and 10 mg/L at 0.8 km (0.5 mi) on the assumption of no losses of resuspended sediment. The suspended solids should have only a temporary and localized impact on water quality. Natural shoreline erosion and turbulent resuspension are the dominant sources of suspended sediments in Lake Erie (Sly 1976).

Conservative estimates of concentrations of dissolved, potentially toxic trace elements (arsenic, barium, chromium, manganese, and zinc) from resuspended sediment are presented in Table 4.1. Concentrations of dissolved elements are derived from the COE/EPA (1980) data and GPU (1980c) data by assuming the COE/EPA dilution ratio and a conservative 10% solubility of resuspended sediments. Studies by the Applicant indicate that trace-element solubility should be less than 10% (GPU 1980c). Concentrations of dissolved elements in the immediate trenching area exceed estimated permissible concentrations based on ecological and health effects (EPCE and EPCH), but are

Table 4.1. Potential Impacts to Lake Erie Water Quality as a Result of Trenching for Cable Laying in the Approach Zone

Element	Nonpolluted Criteria for Sediments (ppm)†[1]	Average Sediment Concentration†[2] (ppm)	Average Dissolved Concentration†[3] at Release (mg/L)	Dissolved Concentration at 0.5 miles†[4] (mg/L)	EPCH†[5] (mg/L)	EPCE†[6] (mg/L)
Arsenic	<3	13.3	0.27	0.01×10^{-3}	0.05	0.02
Barium	NA†[7]	347.0	6.9	0.35×10^{-3}	1.00	0.05
Chromium	<25	55.0	1.1	0.05×10^{-3}	0.05	NA
Manganese	<300	540.0	10.8	0.54×10^{-3}	0.05	0.02
Zinc	<90	138.0	2.8	0.14×10^{-3}	0.02	NA

†[1] Source: GPU (1980a).

†[2] Source: GPU (1980c).

†[3] Determined from information in COE/EPA 1980 on the assumption of 10% solubility.

†[4] Derived by dividing the average dissolved concentrations at release by 2×10^4, a dilution factor based on COE/EPA, 1980.

†[5] EPCH = Estimated Permissible Concentration based on Health Effects. Source: Cleland and Kingsbury (1977).

†[6] EPCE = Estimated Permissible Concentration based on Ecological Effects. Source: Cleland and Kingsbury (1977).

†[7] NA = not applicable or not available.

dispersed rapidly and do not exceed EPCE or EPCH at 0.8 km (0.5 mi). Potential impacts of dissolved trace elements should be temporary and localized. During sediment resuspension, most compounds (including nutrients) will be retained or resorbed by particulates and redeposited on the lake bottom. Minor dissolved phosphorus loadings to Lake Erie will be associated with trenching activities in the approach zone. There should be little potential for natural gas release from Devonian shale and subsequent degradation of water quality during the trenching activities.

Substantial gas pockets would not be found at the shallow trenching depths. Water-quality impacts associated with cable laying without trenching will be substantially less than with trenching.

Cable-laying trenching activities will increase concentrations of suspended solids and will disturb benthic and open-water habitat. Disturbance impacts, however, will be localized and temporary. Benthic communities have recovered quickly after similar disturbances (Stickney 1972; McCauley et al. 1976). Impacts to benthic communities and to open-water communities (e.g., fish and plankton) due to suspended solids should be minor because suspended solids will be rapidly dispersed from the immediate trenching area. Increased turbidity could result in temporary avoidance of the immediate trenching area and possibly Elk Creek Bay. Impacts of fish spawning in the immediate trenching area could be severe; however, there will be minimal effect lake-wide.

Conservative estimates indicate that EPCE for selected trace elements could be exceeded in the immediate trenching area (Table 4.1). However, potential for increased bioaccumulation and toxicity of trace elements to aquatic biota is minimal. Sediment resuspension will be localized and temporary, thus, relatively small amounts of resuspended contaminants will be available to aquatic biota.

(b) Cable Laying on Land. Increased turbidity and sedimentation effects on the aquatic environment of nearshore Lake Erie, similar to those described above for cable laying in Lake Erie, could occur as a result of cable installation from the shore to the switching station. The potential severity and duration of these impacts will depend on the effectiveness of erosion- and sedimentation-control measures on the slopes. Control measures will be implemented in accordance with the Bluff Recession and Setback Act of 1980 and thus consistent with the Pennsylvania Coastal Zone Management Program (GPU 1980a; GPU 1981b).

(c) Clearing in the Transmission Corridor. Construction of the proposed overhead transmission facilities will involve widening an existing right-of-way (ROW). The existing ROW originates on relatively flat terrain immediately west of the slopes bordering Elk Creek north of Pennsylvania Route 5. Transmission facilities will cross two small tributaries of Duck Run, the Crooked Creek mainstream, and two small tributaries of Crooked Creek enroute to the converter station at the Erie West Substation (Fig. 2.3). Potential impacts to the aquatic resources of these streams are expected to be limited to a slight decrease in stream shading due to the selective removal of riparian vegetation, and temporarily increased silt loads from erosion until vegetation is re-established on disturbed areas.

Aquatic biota should be little impacted by construction of the closed-cycle cooling system at the dc converter station located at the Erie West Substation. Suspended solids loadings to aquatic systems should be minimal.

4.1.1.1.2 Operation/Maintenance

Impacts to water quality during cable operation will be minimal. A polyethylene jacket will protect the lead sheathing of the cable from direct contact with the environment. In addition, an outer armour shielding of galvanized steel will provide cathodic protection of the lead sheath if any break should occur in the polyethylene jacket. Additionally, the cable will be of the solid, mass impregnated variety and damage to the cable will not release lubricants into the water (GPU 1980a; GPU 1981b).

The operation of the cable will produce electrical and magnetic fields in the vicinity of the cable. Due to the insulation and shielding surrounding the conductor, the electrical fields produced will be minimal during normal operation. The magnetic field produced will be detectable at the water surface. Field strength will depend on conductor current and distance from the cable. It will be greatest at the cable surface and decay quickly as one moves away from the cable route. Given a current of 1000 A the expected field flux density (strength) for the Lake Erie cable would be about 3.33×10^{-3} tesla at the cable surface, 2.00×10^{-4} tesla at one m (3 ft) and 1.00×10^{-5} tesla at 20 m (66 ft) away. These values can be compared with the existing background magnetic field of 6.20×10^{-5} tesla exerted by the earth (GPU 1981b). Impacts to aquatic biota are expected to be minimal.

It is possible that transient electrical fields may appear around the cable for brief periods during fault conditions. However, a cable fault will cause an immediate disconnection and no electrical shock will be introduced to the water column (GPU, 1981b). If cable repair is required, some re-excavation of the bottom to remove overburden material deposited by natural sedimentation processes and/or backfilling is likely. Maintenance impacts to aquatic biota due to repairing transmission line breaks will be similar to those discussed under construction impacts but of lesser magnitude and duration.

4.1.1.2 Terrestrial Ecology

4.1.1.2.1 Construction

Clearing in the Transmission Corridor. Routing of underground cables to the upland switching station will require the clearing of a corridor through hemlock-hardwood woodlands on slopes west of Elk Creek. Clear-cutting a corridor through this woodlot to allow trenching for cable placement will require that some mature white oak (Quercus alba), yellow birch (Betula alleghaniensis) hemlock (Tsuga canadensis), sugar maple (Acer saccharum), and American beech (Fagus grandifolia) be removed. Loss of these trees will not have a significant effect on the terrestrial ecology of the area. Additional information is presented in Section 4.1.4.

The impact to vegetation will vary from one plant community to another in any segment of the ROW and will depend on the position of each community relative to nearby towers. A short section of ROW will have to be cleared to connect with the existing transmission corridor. At the present time this

small section of ROW is located in an agricultural field on relatively flat terrain immediately west of the slopes bordering Elk Creek (tentative location of the switching station). In addition to removal of vegetation where towers will be erected and along selected ROW sections to provide access, trees too close to the ROW will be removed. Generally, a 200-foot ROW will be kept clear of woody vegetation. In wooded areas, this selective clearing will result in a community shift to herbaceous species and some small shrubs. Much of the vegetation along the existing transmission corridor is classified as mixed mesophytic forest. Another alteration in the vegetation as a result of transmission-line construction in wooded areas will be a change in species composition near the ROW edge. Generally, shade-intolerant species will become established at the interface between forest and ROW. Additional information is presented in Section 4.1.4.

Construction of the proposed transmission line should have minimal effect on existing mammalian and avian populations. Some individual small mammals may be unavoidably lost during the construction phase; but larger, more mobile species will relocate during construction, and most will return after construction activities cease.

Game and song birds will generally relocate to avoid construction activities. If construction occurs during the nesting season, some loss of song bird nests will result from ROW clearing. This unavoidable loss should have little impact on regional populations. Selected removal of trees will result in the loss of perching, cover, and nesting habitats, but this will be of minor consequence.

Reptiles and amphibians should undergo minimal impact due to construction and maintenance. Indirect impacts may occur to reptiles, particularly snakes, due to increased human contact during the construction phase.

Approximately 5 ha (12.7 ac) of land will be developed for the dc converter at the Erie West Substation. These 5 ha (12.7 ac) do not represent unique habitat; therefore, impacts to terrestrial biota should be minor.

4.1.1.2.2 Operation/Maintenance

The proposed transmission line conductors and towers should not pose a serious threat to waterbirds approaching or leaving the Elk Creek bay because of the distance of transmission facilities from the creek and the tree screen between the creek and transmission route. Mortality and injury could result from collisions with shield wires, guy wires, conductors, or tower structures. These collisions are more likely to occur during inclement weather and/or during spring and fall migration. The conductors will be spread far enough apart to prevent electrocution of birds landing on the structures or shield wires.

Terrestrial biota are expected to adapt to noise associated with operation of the converter station and should be impacted little by its operation.

Operation of the overhead portion of the Lake Erie Interconnection could produce various electrical field effects. These effects result from "corona loss," which is the amount of unrecoverable power emanating from the conductors. Corona-generated ions from a dc transmission line form a "space charge"

which alters the electric field near the line. Distribution of ground-level electric field strengths for the dc line is usually asymmetrical and varies widely as a result of the pronounced effect of wind on the space-charge distribution (Bracken et al. 1977).

The effects of dc electric fields are less than those of ac electric fields of comparable intensity (Hill et al. 1977). Because the corona effects from dc fields have been little studied, a uniform corona distribution similar to that from an ac line (and thus a worst-case situation) has been assumed for purposes of assessment (ANL 1981). Corona loss is highest during inclement weather, such as in periods of heavy rain. The maximum loss is on the order of 100 kW per km of circuit (EPRI 1976). For the 9.6-km (6-mi) overhead portion of the proposed transmission line, the maximum total corona loss will thus be on the order of 1 MW--a 0.1% power loss. In view of the mobility of animals, the dc electric field associated with this 0.1% power loss is expected to have no adverse impact on animals. This conclusion is further supported if one keeps in mind that the dc corona is asymmetrical and varies widely.

The magnetic field of a dc line is roughly equal to the 0.6-Gauss magnetic field of the earth (Lee and Griffith 1978). Comparisons of magnetic fields associated with various household appliances and the 0.6-Gauss magnetic field of dc lines led the Minnesota Environmental Quality Board (1977) to conclude that long-term deleterious biological effects are unlikely in view of the relatively low magnetic flux densities associated with high-voltage dc transmission lines.

With respect to audible noise associated with high-voltage dc lines, preliminary results of Lee and Griffith (1977) indicated no significant difference between the total number of birds detected on a high-voltage dc ROW and the number detected on control transects. Audible noise is usually higher for ac lines. Ellis et al. (1978) observed that a variety of wildlife species were undisturbed by audible noise from a 500-kV line in Idaho; however, the authors pointed out that wildlife react differently to constant noise or hum than they do to a sudden noise such as a twig snapping. On the basis of this information, transmission-line noise is unlikely to have significant impacts on wildlife. Because of the variation in the location and magnitude of the corona, wildlife may temporarily avoid a given location.

4.1.1.3 Wetlands

Approximately 1700 linear m (5500 ft) of wetlands exist along the transmission corridor, mostly in association with tributaries to Duck Run and Crooked Creek (Fig. B.1). Construction activity will avoid these areas when possible. It is unlikely, however, that all such areas can be avoided. The placement of tower structures will be specifically designed to avoid wetland areas (GPU, 1981b). Adverse impacts to these wet areas, though temporary, will occur during construction and stringing operations. Additional information is presented in Appendix B.

4.1.1.4 Threatened and Endangered Species

Except for occasional transient species, no federally listed or proposed endangered or threatened species under the jurisdiction of the U.S. Fish and Wildlife Service are known to exist in the project impact area. Therefore, no

Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the U.S. Fish and Wildlife Service (see Comment DOI-3). Additionally, the Pennsylvania Game Commission has not identified any species as being of special concern (see Comment PGC-2).

4.1.1.5 Air Quality

Of the 1000 MW of power associated with the interconnection, approximately 50% is expected to come from the OH system grid and the other 50% from the Nanticoke Generating Station (Feldman 1982). However, for purposes of presenting a worst-case analysis of air quality impacts in the United States from the interconnection, 100% of the power is assumed to come from the Nanticoke station. The results of the analysis are, therefore, conservative. That is, the results indicate higher levels of pollutant emissions than would probably occur if the interconnection is implemented.

Due to the fact the Nanticoke Generating Station is located about 60 km (40 mi) from the nearest point of land in the United States, the concentration of most pollutants from Nanticoke will be reduced by natural forces to such low levels that they will involve no measurable contribution to air pollution in the United States. The pollutants from Nanticoke with some potential for affecting air quality in the United States are emissions of sulfur dioxide (SO_2) and emissions of nitrogen oxides (NOx). These pollutants can be transported long distances and are generally believed to contribute to acid precipitation, although there is substantial uncertainty regarding cause-effect relationships between pollutant emissions and the measured acidity of precipitation. Estimates of annual SO_2 and NOx emissions from generating 1000 MW of power at Nanticoke are presented in Table 4.2. The estimates are based on current practice at Nanticoke, which does not include the use of pollution-control equipment but does include coal blending and coal washing to reduce the sulfur content of coal.

Table 4.2. Emissions from Nanticoke Generating Station for 1000 MW of Electricity

Pollutant	Emission Rate (tons/year)
Sulfur dioxide (SO_2)	144,100†[1]
Nitrogen oxides (NOx)	27,594†[2]

†[1] Assumes 8760 Megawatt hours, heat rate of 10,000 BTU/kilowatt hour, and emission rate of 3.29 lb $SO_2/10^6$ BTU.

†[2] Assumes 8760 Megawatt hours, heat rate of 10,000 BTU/kilowatt hour, and emission rate of 0.63 lb NOx/10^6 BTU.

It should be noted that the estimates in Table 4.2 do not reflect OH plans to add special burners at Nanticoke to reduce NOx emissions or the potential addition of scrubbers to reduce SO_2 emissions (Parrott 1981).

Trends in national emissions are presented in Figure 4.1 for SO_2 and in Figure 4.2 for NOx (U.S. DOE 1981). Tables 4.3 and 4.4 show the distribution of SO_2 and NOx emissions by those states that together account for approximately 80% of national emissions (U.S. DOE 1981). In comparison to national levels, the emissions listed in Table 4.2 represent approximately 0.5% of SO_2 emissions and 0.1% of NOx emissions. In comparison to the emissions shown in Tables 4.3 and 4.4 for a group of states (Illinois, Indiana, Michigan, Minnesota, Wisconsin, and Ohio) generally upwind (west) from the region that is likely to receive any transported SO_2 and NOx emissions from Nanticoke, the emissions in Table 4.2 represent approximately 1.7% of SO_2 emissions and 0.6% of NOx emissions. On the basis of these comparisons, the SO_2 and NOx emissions resulting from the proposed interconnection are considered to represent a small incremental increase to the problem of air pollutants in the United States.

It should be noted again that the above comparisons do not reflect OH plans to install a special burner to reduce NOx emissions or the possible addition of scrubbers to reduce SO_2 emissions. Moreover, the comparisons reflect the worst-case assumption that 100% of the power for the interconnection would be generated at Nanticoke. Since OH plans to generate only 50%, and perhaps less, of the power at Nanticoke, the emissions listed in Table 4.2 are approximately double what is likely to occur and the above comparisons, therefore, indicate contributions much larger than what is also likely to occur if the interconnection project is implemented.

4.1.2 Socioeconomics

4.1.2.1 Construction

(a) Work Force. Construction of the proposed transmission line will take place from 1982 to 1986 (Fig. 4.3). Construction of the onshore portion of the line, including the converter station, will take approximately three years (1982-1985) and will require a peak work force of 145 people (GPU 1981b). Approximately 25 workers will be needed for the overhead portion of the line and 120 workers for the converter station (GPU 1981b). Construction of the submarine portion of the line will also take approximately three years (1984-1986) and will require a work force of 180 people. Employment will peak during 1984 and 1985 when both phases of the project will overlap, and the total work force will be 200 people. Most of the anticipated work force needed for onshore construction will come from the basic construction trades, and approximately half will be electricians. Most of these workers can be hired from within the Erie Building and Construction Trades Council. County-wide unemployment in the construction trades is currently running at 10.5% (Dombrowski 1981). This percentage includes approximately 50 to 55 electricians. The work force required for the submarine portion of the line, which will consist of crews for the cable-laying barge (e.g., divers, equipment operators, and captain) and three of four navigational vessels (e.g., laborers and deck hands), will also be composed of local labor for the most part. It is anticipated that approximately 150 workers could be hired locally from U.S. and Canadian labor forces.

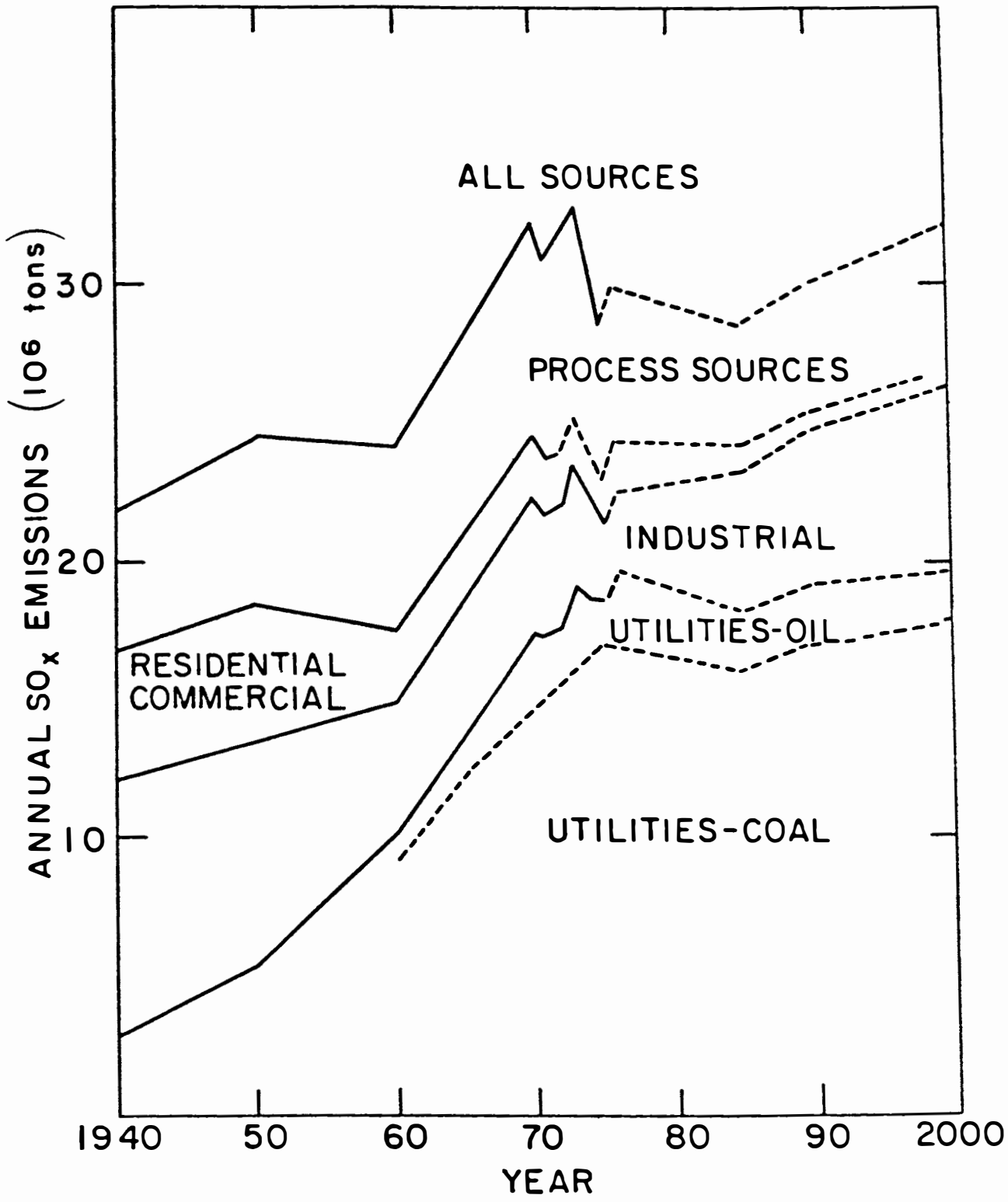


Figure 4.1. Sulfur Oxides Emissions Trends for the United States, 1940-2000. Source: GCA Corporation (1981).

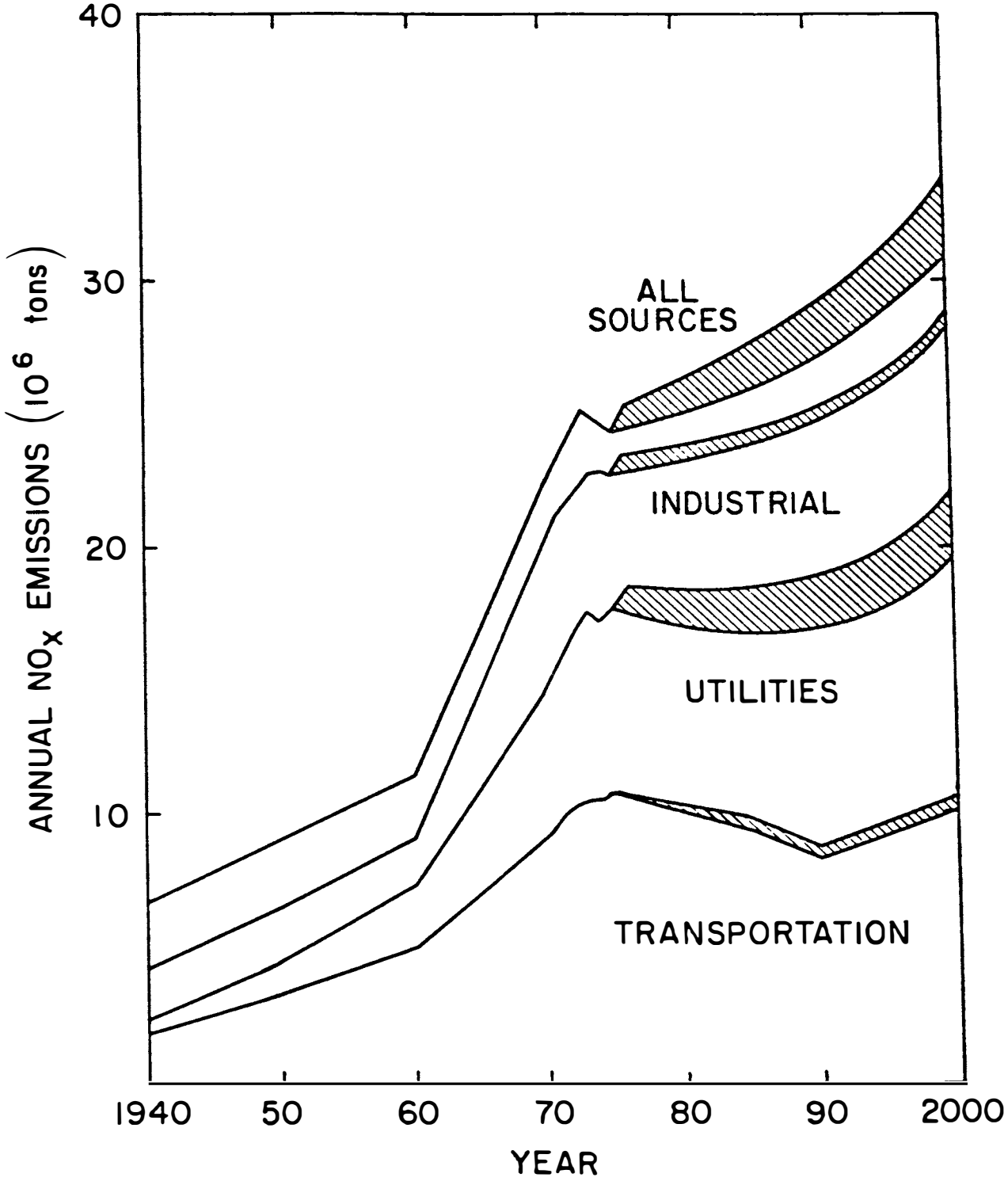


Figure 4.2. Nitrogen Oxides Emissions Trends for the United States, 1940-2000. Source: GCA Corporation (1981).

Table 4.3. National Distribution of 1977 Sulfur Oxides (SOx) Emissions

State (by rank)	SOx Emissions (10^6 tons)	% U.S.	Major Source(s) - Percentage of State Emissions†[1]
1. Ohio	3.26	10.3	EG/BC - 82
2. Pennsylvania	2.5	7.9	EG/BC - 56; IF/PG - 10, IF/BC - 8, PM - 11
3. Indiana	1.89	6.0	EG/BC - 79
	Subtotal	24.2	
4. Illinois	1.71	5.4	EG/BC - 78
5. Kentucky	1.63	5.2	EG/BC - 94
6. Texas	1.54	4.9	CM - 25, IF - 17, PM - 14, EG/L - 13, PI - 11
7. Missouri	1.5	4.8	EG/BC - 83
8. Tennessee	1.28	4.1	EG/BC - 85
9. Arizona	1.24	3.9	PM - 88
	Subtotal	52.5	
10. West Virginia	1.23	3.9	EG/BC - 85
11. Michigan	1.22	3.9	EG/BC - 72, IF/BC - 8.5
12. Alabama	1.04	3.3	EG/BC - 75, PI - 3, T - 2.5
13. New York	1.02	3.2	EG/BC - 25, EG/RO - 25, CIF/RO - 13, IF/RO - 11, IF/BC - 9
14. Florida	0.989	3.1	EG/RO - 39, EG/BC - 37, CM - 6.5
15. Georgia	0.7	2.2	EG/BC - 73, EG/RO - 9
16. California	0.675	2.1	PI - 19, EG/RO - 18, T - 16, IF/RO - 16, EG/DO - 9, CM - 7
17. Wisconsin	0.666	2.1	EG/BC - 70, IF/BC - 15
18. North Carolina	0.618	2.0	EG/BC - 68, IF/RO - 12
19. New Mexico	0.576	1.8	PM - 43, EG/BC - 25, PI - 16
	Total	80.1	

†[1] Abbreviations: BC = bituminous coal; CIP = commercial/institutional fuel use; CM = chemical manufacturing; DO = distillate oil; EG = electric generation; IF = industrial fuel use; L = lignite; PG = process gas; PI = petroleum industry; PM = primary metals; RO = residual oil; T = transportation.

Source: GCA Corporation (1981).

Table 4.4. National Distribution of 1977 Nitrogen Oxides (NOx) Emissions

State (by rank)	NOx Emissions (10^6 tons)	% U.S.	Percentage of State Emissions: Fuel Combustion	Percentage of State Emissions: Transportation
1. Texas	2.12	9.8	59	31.5
2. California	1.28	5.9	28	60
3. Illinois	1.27	5.9	61	35
4. Ohio	1.19	5.5	61	37
	Subtotal	27.1		
5. Pennsylvania	1.02	4.7	54	42
6. Indiana	0.96	4.4	68	28
7. New York	0.91	4.2	50	48
8. Louisiana	0.80	3.7	58	26
9. Michigan	0.74	3.4	46	49
10. Florida	0.68	3.1	41	53
	Subtotal	50.6		
11. Missouri	0.62	2.9	56	40
12. Kentucky	0.57	2.6	67	31
13. Tennessee	0.56	2.6	54	42
14. North Carolina	0.514	2.4	47	50
15. Alabama	0.511	2.4	53	41
16. Georgia	0.472	2.2	38	57
17. West Virginia	0.471	2.2	79	18
18. New Jersey	0.45	2.1	37	58
19. Wisconsin	0.44	2.0	46	42
20. Virginia	0.42	1.9	39	57
21. Kansas	0.35	1.6	53	41
	Subtotal	75.5		
22. Minnesota	0.34	1.6	39	58
23. Washington	0.31	1.4	32	57
24. Oklahoma	0.306	1.4	42	53
25. Maryland	0.305	1.4	39	55
	Total	81.3		

Source: GCA Corporation (1981).

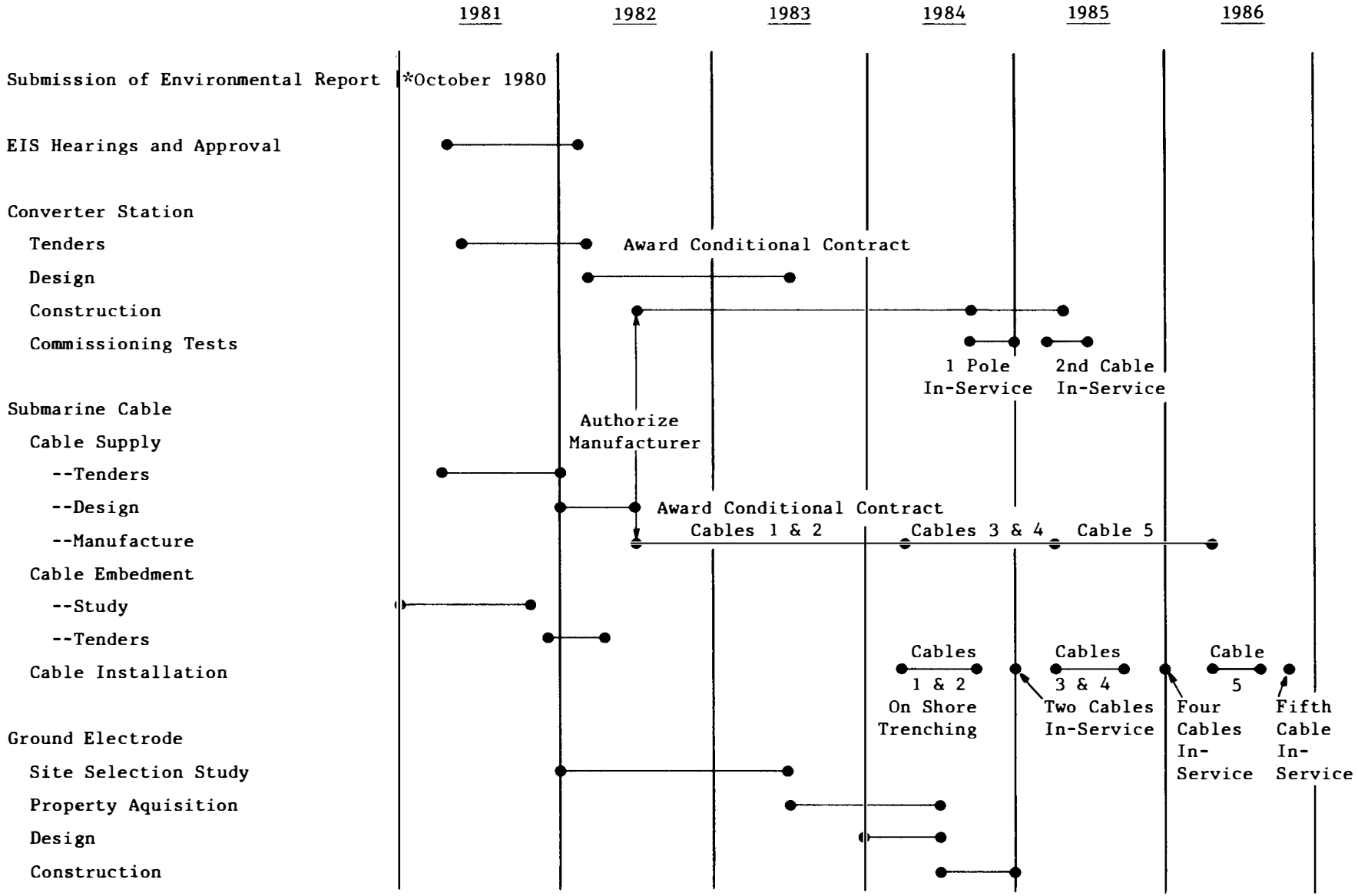


Figure 4.3. Lake Erie Interconnection Project Schedule. From Comment GPU-22.

If onshore workers are hired from within the local area and commute from their present residences, and if only 30 workers on the submarine portion have to move to the area temporarily, it can be expected that approximately 30 workers will need housing and services for the duration of submarine construction. However, weather conditions will not allow construction to be continuous over the three-year period. The submarine cable can be laid only during Lake Erie's open-water season, primarily spring and summer. Because of this variability and discontinuity in effort during the construction period, no workers are expected to relocate permanently and hence there should be no long-term impact on population trends. A short-term shortage of rental units in the Girard/Lake City area could occur. An estimated 47 rental units are available in Girard Borough, Lake City Borough, Girard Township, and Springfield Township, and any shortage could be offset by the availability of units in the City of Erie (976 units) (Vitanza 1981).

Short-term benefits from the construction force will be a reduction in local unemployment and an increase in cash flow to the local area. Workers who occupy rental units during the week and commute to their permanent residences on the weekend are expected to spend at most 25% of their disposable income in the local area (GPU 1980a). Those workers who are hired from the local area will probably maintain existing spending patterns, spending most of their income at their existing place of residence. A net increase in cash flow to the area, however, will result from hiring unemployed construction workers. Workers who move to the area for the duration of the spring/summer construction season, and then move back home, should spend between 67% and 80% of their disposable income in the local area for rent, gas, food, and other nondurable goods and services (ANL 1981).

(b) Transportation. The proposed transmission line will cross seven public roads. Four are light-duty roads, one is a heavy-duty road, and two are four-lane highways. Construction of the line should have minimal impact on these routes. Traffic flow and traffic congestion will increase due to movements of the construction work force, but the small size of this force (145 people) and the span of the project should minimize these impacts. There could be a need for temporary rerouting of traffic when construction occurs adjacent to a roadway, and this would inconvenience people using those roads.

The proposed line will cross three railroads (Conrail, Norfolk and Western, and Bessemer and Lake Erie). Construction of the line should not impact the operation of these railroads. The proposed corridor will parallel an abandoned Conrail rail line for much of its length.

4.1.2.2 Operation/Maintenance

(a) Work Force. Operation of the line will not require a permanent work force, except for the first few years when the switching structure and connector station will be manned by a single operator. Helicopter and foot patrols of the transmission corridor will be conducted periodically to inspect and maintain the line, the conductors and insulators, and the towers and for inspection and control of vegetation and erosion. It is anticipated that any new access roads constructed for the project will be maintained as necessary to facilitate these inspections. These operations will require approximately three people.

The operational and maintenance activities at the sites of the switching structure and converter station will be limited to periodic inspections, routine maintenance testing or overhauling of equipment as instructed by the manufacturers, and maintenance of the structures and surrounding grounds. A slight increase in the amount of human activities around the existing substation can be expected as a result of these actions.

(b) Transportation. The distance from existing airstrips to the proposed corridor is sufficient to ensure that there is no danger of a collision with the proposed overhead transmission line during takeoff or landing.

4.1.3 Cultural Resources

4.1.3.1 Construction

(a) Cable Laying in Lake Erie. Subsurface prehistoric, historic, and ethnohistoric sites could exist in Lake Erie in the area of the proposed corridor (ANL 1981). The Applicant will take the necessary precautions to avoid such sites if they are located prior to or during construction.

(b) Onshore Construction Activity. The proposed line will not impact any onshore sites of national historical, archeological, architectural, or cultural significance that are listed in the National Register of Historic Places.

In October of 1979, an archeologist from Commonwealth Associates, Inc., conducted a records search and initial reconnaissance of selected portions of the GPU Coho site and surrounding area (Kern 1979). He concluded that portions of the project area are archeologically sensitive, having a "high potential for past human occupation."

The Applicant has completed a cultural resources survey for the onland portion of the corridor (Lantz 1981), which identified archeological sites in the project vicinity. This work is being coordinated with the Pennsylvania State Historic Preservation Officer. Construction of the proposed transmission line could disturb archeological sites that have not yet been identified. Movement of equipment, installation of structures and conductors, and vegetation clearing will disturb upper soil layers along the ROW and could disturb archeological evidence.

4.1.3.2 Operation/Maintenance

(a) Offshore Operation. Operation of the proposed transmission line should have little impact on subsurface prehistoric, historic, and ethnohistoric sites. Maintenance and repair of the line should also have no impact on these sites as long as cables are not moved from the corridor into unsurveyed areas.

(b) Onshore Operation. Operation and maintenance of the line should have little impact on onshore prehistoric, historic, and ethnohistoric sites, provided that a more comprehensive archeological survey of the final route is performed. This survey should identify potential sites so that maintenance crews can avoid them while working on the line. There is a possibility that maintenance activity would disturb sites missed during the survey.

4.1.4 Land Use

4.1.4.1 Construction

(a) Land Area Affected by Construction. The major impacts on land use will result from construction of 9.6 km (6 mi) of high-voltage direct-current (HVDC) transmission line and its associated facilities. As a result of construction of the line and the converter stations, approximately 79 ha (195 ac) of the 190-ha (470-ac) existing corridor will be impacted.

Approximately 762 m (2500 ft) of transmission cable will be imbedded underground between the Lake Erie shore and the converter station. Trenching for cable placement will require that a corridor be cleared through the hemlock-hardwood woodlands on slopes west of Elk Creek. The corridor will be approximately 6 m (20 ft) in width. Construction at the switching and converter stations will include clearing, grading, and fencing the sites, and laying the foundations. The switching station will be located in an old-field area and occupy less than one-quarter acre. Impacts from construction activities will be the removal of mature vegetation, erosion, and sedimentation. These areas will be pre-empted from other uses during the lifetime of the project. Expansion of the Erie West Substation to include the converter station will occupy an additional 5 ha (12.7 ac) of land within the Substation boundaries (GPU 1981b).

The remainder of the transmission line will be erected along an existing ROW, which terminates at the Erie West Substation. The transmission corridor will cross approximately 10 ha (25 ac) of wetlands, 12 ha (30 ac) of woodland, and 57 ha (140 ac) of agricultural land, including 24 ha (60 ac) that have been designated as "prime farmland" and 32 ha (80 ac) that have been designated as "additional farmland of statewide importance" by the Important Farmland Inventory of Pennsylvania (USDA 1978). No portion of the study area is classified as "unique farmland" (USDA 1978). Construction activities for this portion of the transmission line will include excavation and backfilling of tower foundations, clearing of the ROW, and construction of new access roads. The major impact from these construction activities will be the modification of current land uses in the existing corridor to include the HVDC transmission line.

Agricultural areas crossed by the line will continue to be used for farming, except in the immediate vicinity of the new tower structures. The Applicant anticipates that approximately 67 towers will be needed along this portion of the ROW. Since farmland occupies approximately 72% of the total area of the corridor, it can be assumed that approximately 72% of the towers (i.e., 48 of them) would be situated on farmland. Since the base of each of these 48 towers will be 2.4 m (8 ft) in diameter and will occupy 4.6 sq m (50 sq ft), this will mean that approximately 220 sq m (2400 sq ft) will be lost from productive use. This is less than 0.02 ha (0.05 ac). In addition, some farmland around the towers will be lost from cultivation due to the inability of farm machinery to operate close to the towers.

Forested areas crossed by the line [12 ha (30 ac)] will be cleared where necessary and subsequently managed to encourage growth of herbaceous vegetation and shrubs. Wetlands will be avoided whenever possible. Impacts to wetlands as a result of construction are discussed in Section 4.1.1.3.

(b) Recreation Areas. The nearest active recreational facility to the corridor is the Lake Erie Community Park, located approximately 1.5 km (1 mi) to the northeast of the mouth of Elk Creek. Due to the distance separating the line from existing recreational facilities, construction of the proposed line should have no major impact.

Although not yet designated as a regional recreational area, the mouth of Elk Creek and the shore of Lake Erie provide recreational opportunities for local residents. Both areas are used for sport fishing, and Elk Creek experiences heavy use during the spring trout season and again during the fall salmon migration. The mouth of Elk Creek is also used for seasonal residences. About 20 cottages are situated below the main bluff on a terrace 9 m (30 ft) high (Great Lakes Research Institute 1975). Recreational demand along the Lake Erie coastline is expected to increase significantly within the next decade, and Elk Creek has been proposed as candidate for recreational development because of its location, its access to the lake, and its other amenities. The construction of the onshore portion of the line will result in some esthetic degradation of the slopes flanking Elk Creek to the west. Removal of vegetation for trenching and grading purposes, noise and dust from construction machinery, and erosion and siltation from runoff could temporarily affect those people using Elk Creek for fishing, boating, summer vacationing, and other forms of recreation. Construction activities could reduce the value of the recreational experience by interfering with people's activities and the esthetic appeal of the area.

(c) Residential Areas. The new lines will not be located in any existing residential community. Fewer than 15 residences are located with 150 m (500 ft) of the edge of the 79-ha (195-ac) area that will be required for the new lines. These residences could be subjected to increased noise and dust levels during construction, as well as inconvenience due to the movement of men and machinery.

(d) Natural Areas. The proposed line will not impact any nationally significant natural areas listed in the National Registry of Natural Landmarks. Presque Isle in Erie, Pennsylvania, is the closest national landmark to the proposed project, and it is located approximately 22.5 km (15 mi) away.

No waterways within or adjacent to the transmission route have been designated as National Wild and Scenic Rivers by the U.S. Department of the Interior. However, Elk Creek is listed in the Pennsylvania Scenic Rivers Inventory (GPU 1980a). The construction of the line would reduce the scenic quality of the creek, as well as the recreational value that users of the creek, especially fishermen, receive from their visits. Visitors during the laying of the cables could experience esthetic intrusion due to the presence of machinery, construction noise and dust, and the clearing of vegetation in the western embayment.

The Western Pennsylvania Conservancy has identified two natural areas within the study area: (1) the Lake Erie Bluffs, including Springfield and Girard Townships,; and (2) the mouth of Elk Creek (Erdman and Wiegman 1974). In addition, the Crooked Creek corridor, which the proposed line would cross, has been identified by Pennsylvania's Coastal Zone Management Program as a unique area and a state conservation stream (Department of Environmental

Resources 1978). The ecologic impact of the construction of the proposed transmission line in these areas is discussed in Section 4.1.1.

At present, the Applicant plans to clearcut a corridor and trench from the shore to the converter station at the base of the bluff in order to embed the cables. Construction along the bluff's edge and removal of mature vegetation could accelerate erosion and recession. Construction along the bluffs in an area that has been designated as a critical hazard area (the mouth of Elk Creek) by the Pennsylvania Coastal Management Program could violate the Pennsylvania Bluff Recession and Setback Act if erosion control practices are not adequate. The Act states that facilities be setback from the bluff's edge a specified distance, depending on the municipality, and that facilities be constructed utilizing sound land use practices that minimize disruption of the bluff face. These activities will have an impact on the hemlock-hardwood woodlot, as noted in Section 4.1.1.2.

The construction impact to Crooked Creek should be minimal because the line will cross Crooked Creek at a fairly narrow point in the stream corridor. Users of Crooked Creek could suffer esthetic intrusion due to construction activities.

The widest 100-year floodway, which is the stream channel plus adjacent floodplain area that must be kept free of encroachment in order that the 100-year flood may be carried without a substantial increase in flood height, that the proposed transmission line will cross is approximately 33 m (108 ft) across. This distance can be spanned without difficulty with the planned tower spacing of 229 m (750 ft). Construction of the line should have minimal impact on floodplains since no tower bases will be constructed in wetlands or floodplains (GPU 1980b). Construction crews and equipment will use existing roads and bridges whenever possible to avoid crossing streams.

4.1.4.2 Operation/Maintenance

(a) Land Area Affected by Operation. Approximately 79 ha (195 ac) of the 190-ha (470-ac) corridor will be impacted as a result of operation of the line. Operation of the proposed project will have little direct impact on regional land use. The reasons for this are threefold: (1) the HVDC line will be located in an existing corridor; (2) agricultural and other land uses will continue as before, except in the vicinity of the tower structures; and (3) county and local-community land use plans have anticipated the change in land use.

The fifth cable (a spare) will be used as a neutral line for metallic return of the unbalanced current. Thus the ground (earth) will not be used for the return, so ground currents will be negligible and will cause no significant corrosive effects on pipelines and other underground structures (GPU 1980a).

(b) Recreation Areas. Operation of the line will have little effect on Elk Creek, except for the esthetic impact due to visibility of the corridor. Lake Erie Community Park will not be affected by operation of the line.

(c) Natural Areas. For the Lake Erie Bluffs, the mouth of Elk Creek, and Crooked Creek, the major impact from operation of the line will be esthetic

intrusion. A cleared corridor will be maintained through the hemlock-hardwood woodlands near Elk Creek bay and will result in visual impact because it disrupts the wooded character of the area.

Operation of the line will have an incremental esthetic impact on Crooked Creek because the line is visible along the overhead route. This will be especially true where the 18 to 30 m (60 to 100 ft) towers are visible.

The presence of the line will not affect the four floodways crossed by the transmission corridor. No transmission towers will be located in the floodways (GPU 1980b).

The existing corridor crosses several roads, and the proposed addition with its new access roads could offer off-the-road vehicles (ORVs) further access (legal or illegal) to the corridor. ORV operators could use the corridor for access to natural areas unless ORV traffic is properly controlled. However, this is not a new problem since the new corridor is just an expansion of an existing corridor.

(d) Field Effects from Operation of Overhead Lines. The operation of the overhead portion of the Lake Erie Interconnection could produce several significant electric field effects, such as radio interference (RI), television interference (TVI), and audible noise. The line could also produce various charging effects, including charge buildup (increased shock potential) in men, animals, parallel fences, nearby buildings, and vehicles, and could result in electrostatically induced ignition of fuel. Most of these field effects are caused by a phenomenon called "corona loss." As explained in Section 4.1.1.2.2, the total corona loss from the transmission line is expected to be about 1 MW, a 0.1% power loss.

Radio interference could be caused by corona loss from the transmission line. Electromagnetic energy radiated by the dc transmission line will have frequency components encompassing AM broadcast frequencies. For this noise to fall within the acceptable RI tolerance level for radio reception, studies by the Electric Power Research Institute (EPRI) indicate that the signal-to-noise ratio (SNR)--i.e., the ratio of broadcast signal to line noise--must exceed 10:1 (EPRI 1976). For a receiver placed at the edge of a transmission-line corridor 60 m (198 ft) wide, the SNR for a bipolar line voltage of 300 kV was measured to be 19:1. Since this RI is well within the acceptable tolerance level, it should not be a serious problem with the Erie Interconnection Project. Additionally, the radio noise level resulting from the overhead transmission line is calculated to be 43.28 dB 15 m (50 ft) from the positive conductor. An upper level of 53 to 58 dB at the edge of the ROW is considered the maximum desired level of noise interference. Radio interference effects due to any corona discharges on the indoor HVDC conversion equipment can be limited by equipment design and can be suppressed by radio-frequency shielding which will be constructed as part of the equipment building. Radio interference due to switching effects at the converter station thyristors will also be minimized by equipment design and by building screening. Installation of damper circuits suppresses conduction of interference outside of the building on HVDC conductors. Corona effects on the outdoor switching structure will be limited by design to a value no higher than that allowed in the normal high-voltage ac switchyards (GPU 1981b).

Corona-induced audible noise should not be noticeable. The faint crackling and popping often heard in the vicinity of high-voltage transmission lines is due to the ionization of air at the conductor surface. This ionization produces compressions and rarefactions that are propagated through the air as acoustical energy, i.e., as audible noise. The audible noise level resulting from the overhead line is calculated to be 34.50 dB 15 m (50 ft) from the positive conductor. An upper level of 40 to 45 dB at the edge of the ROW is considered the maximum desired level of audible noise interference (GPU 1981b).

Tests conducted by EPRI (1976) indicate that if audible noise and radio noise are kept within the above limits, TVI should be no problem on dc lines. Corona-induced television interference (TVI) is usually seen as television picture alterations in the form of short black bars. TVI is due to a combination of charge accumulaton on the receiving antenna and line-radiated interference (similar to RI). The charge develops ionic currents on the antenna, and these produce the same type of picture distortions as the line-radiated TVI. However, EPRI studies show that TVI is of little concern at distances greater than 25 m (82 ft) from the line for line voltages of 600 kV (EPRI 1976). Since the proposed line will operate at about 300 kV, and since there will be no homes within 25 m (82 ft) of the line, TVI will be negligible.

The action of switching the ac outputs from the converter station transformers produces harmonics in the current wave of the ac lines. It is possible for these harmonic currents to appear on the ac transmission lines, and they may cause interference to nearby voice-frequency telephone circuits. Since the dc output voltage of the converter is not a constant unchanging voltage this can also cause telephone interference. However, telephone interference due to the HVDC-transmission system will be kept within acceptable limits by transmission line and converter system design. Harmonic currents can be suppressed by use of capacitors and inductances. Additionally, the cable shield will reduce the propagation of these voltages away from the transmission line.

The electric-field effects of transmission lines consist primarily of charge accumulation in humans and animals, fences, buildings, and vehicles; this can result in a shock hazard. An uncomfortable shock occurs at 0.25 joule (J) (EPRI 1976). The induced voltage needed to produce this shock depends on the capacitance of the object (human, fence, building, etc.) and its associated "leakage" resistance to the ground. Potential shock hazard from the proposed transmission line will not be severe, a "carpet-type" shock being the strongest field-induced shock attainable. This shock would be on the order of 0.005 J (EPRI 1976).

The voltage required for a man to sense a shock is 12.5 kV. The induced voltage on a man standing directly under a 300-kV bipolar transmission line is about 8 kV. Thus, a person would feel no physical sensation caused by the electric field of a 300-kV transmission line (EPRI 1976).

Another shock hazard could come from fences paralleling the transmission line. To pose any hazard, the fence must be well insulated from the ground. In an EPRI study, a barbed wire fence with wooden posts ran for 9.1 km (5.7 mi) along the edge of the corridor 30 m (100 ft) wide of a 600-kV test line. This study showed that the continuous total current that could develop in this

fence would exceed the threshold of perception (5.2 mA) only 1% of the time (EPRI 1976). Since the Erie transmission line has a voltage of 300 kV and the length of its corridor is 9.6 km (6 mi), just slightly longer than the 600-kV line in the EPRI study, the continuous total current that could develop in the longest possible parallel fence in the transmission corridor will be below the threshold of perception.

Another concern with fences is the transient discharge from a highly insulated fence. Wooden posts, such as those often found on rural fences, can provide quite effective insulation and hence can permit the retention of a charge on a parallel fence. EPRI studies indicate that a 2-km (3.2-mi) fence 17 m (56 ft) from a 600-kV dc line yields a barely perceptible shock sensation (EPRI 1976). Greater lateral distance from the line and lower line voltage would permit a correspondingly longer fence before the threshold of sensation is reached. In actual field practice, most utilities ground all fences within the high voltage ac transmission line ROW. This would appear to be a prudent practice for HVDC lines also.

There is a high probability of vehicular traffic under the proposed transmission line; farm and line-maintenance vehicles could typically be stationary under or near the line for extended periods of time. These vehicles could build up an electrostatic charge if they were highly insulated from the ground and if they remained under the line for an extended time. Because most vehicles are not highly insulated from the ground (i.e., they have a low leakage resistance), it is seldom possible to store enough energy on large objects, such as trailer trucks, to deliver more than a "carpet type" shock (0.005 J) (EPRI 1976).

Vehicle operators are naturally concerned about the possibility of fuel ignition in vehicles near the transmission line. Under normal conditions, however, neither vehicles nor humans can attain the stored energy necessary to ignite gasoline (EPRI 1976). Under certain conditions, however, refueling under high-voltage transmission lines could be hazardous. Therefore, precautionary measures include grounding the vehicle and bonding the fuel dispenser to the vehicle before starting the fueling operation.

Various groups are conducting scientific studies identifying health effects due to dc electric fields. Measurable biological effects attributable to electric fields, ions, or shock have been demonstrated in laboratory studies for ac lines. To extrapolate these effects and apply them to the dc power line environment is not possible at present (Minnesota Environmental Quality Board 1980).

4.1.5 Water Use

4.1.5.1 Municipal/Industrial Supplies

(a) Construction. Cable laying in Lake Erie is the only construction aspect of the project that could impact the intakes at Erie, Pennsylvania. However, resuspended sediments and dissolved trace elements are not expected to adversely affect water quality of the Erie Water Company intakes which are located 4.8 km (3 mi) from the cable corridor, as was seen earlier in Table 4.1 and the associated discussion in Section 4.1.1.1.1(a).

(b) Operation/Maintenance. Impacts associated with maintenance of the cable route will be similar to those for construction but less significant because breaks in the cable should be infrequent.

4.1.5.2 Fisheries

(a) Construction Effects on Commercial Fishing. The noise and increased turbidity caused by the trenching activity will probably lead fish to avoid the construction area. The severity of this impact will depend on the construction time in the approach zone. The trenching rate is projected to be 1 km per day (3280 ft per day) (GPU 1980a). The Applicant anticipates that trenching activities will take three summers.

Gill-netters will find it necessary to avoid construction equipment in the major fishing areas along the cable route. The impacts on the commercial fishery are expected to be short-term and minor.

(b) Construction Effects on Sport Fishing. Temporary disruption of sport fishing and other recreational activities at the mouth of Elk Creek and nearshore Lake Erie are expected to occur as a result of the physical disturbance, noise, and turbidity resulting from nearshore and onshore construction activities. As discussed in Section 4.1.1.1, these impacts will be short-term and minor on a lake-wide basis.

(c) Operation/Maintenance. Routine operation of the cable will have no impact on the commercial or sport fishery. No electric field will emanate from the cable because the cable will be shielded and grounded (GPU 1980a). Impacts associated with maintenance will be similar to construction impacts but less frequent.

4.1.5.3 Ports/Shipping/Navigation

(a) Construction. The cable-laying barge and three or four tugboats (ANL 1981) constitute a negligible increase in ship traffic and will have an insignificant impact on Lake Erie shipping. Existing port facilities in the Lake Erie region--harbors, docks, wharves or piers, and space for maintenance, repairs, and storage--should be able to absorb the peak increases in vessel traffic attributable to construction activities.

Commercial ship traffic will need to avoid construction equipment along the cable route. The cable-laying barge will be equipped with audio and visual warning devices. Because cable laying is a continuous process, there will be only short-term rerouting of ship traffic at any given site. The trenching rate is expected to be 1 km per day (3280 ft per day). Overall construction activities are expected to last three summers.

(b) Operation/Maintenance. There is little likelihood that a ship's anchor will snag a cable. Cables will be buried in the nearshore area, which is where recreation vessels most often anchor. Large commercial vessels avoid nearshore waters at all times except when entering harbors through maintained channels. Ships normally do not anchor in the open water; however, there are reports of ships dropping anchor for stabilization during storms (PDER 1980). The cable route, however, will be well marked on navigational charts and ship pilots and captains will be advised to consult these charts before anchoring.

Moreover, the likelihood of snagging more than one cable in the deep-water zone will be reduced by laying the cables at 250-m (820-ft) intervals. However, if a ship's anchor should penetrate the cable and contact the conductor, the potential shock hazard to the ship's crew will be negligible. The water will carry away any charge that might accumulate on the ship over the 30 milliseconds before current disconnection (GPU 1981b).

Electromagnetic fields will exist along the cable route and will affect magnetic compasses. The magnetic field produced will be detectable at the water surface. Field strength will depend on conductor current and distance from the cable, but it will be greatest at the cable surface and decay quickly as one moves away from the cable route. Given a current of 1000 A the expected field flux density (strength) for the Lake Erie cable would be about 3.33×10^{-3} tesla at the cable surface, 2.00×10^{-4} tesla at one m (3 ft) and 1.00×10^{-5} tesla at 20 m (66 ft) away. These values can be compared with the existing background magnetic field of 6.20×10^{-5} tesla exerted by the earth.

Simplified calculations show that the magnetic compass error for a vessel directly above a cable might be on the order of 65° where the water is 5 m (16.4 ft) deep but would diminish to about 6° where the depth is 100 m (328 ft). In most cases this error would rapidly diminish and disappear as the vessel crossed over the cable, but it could be serious on headings paralleling the cable route (GPU 1980a). Impacts to large ships should be minor because magnetic compasses are used only as back-up systems. Burial of the cable in the shallow water of the nearshore zone will minimize this impact. Small craft nearshore where magnetic compass error is likely to be greatest tend to navigate by sight rather than with a compass.

The effects on magnetic compasses will be thoroughly explored with the U.S. Coast Guard and other responsible agencies, and it is anticipated that no mitigative measures will be required. The cable route will be shown on lake charts, together with a warning that magnetic compass headings may be unreliable in the vicinity of the cable. Magnetic effects emanating from the cable do not affect other navigational devices such as Loran, Sonar, depth sounders, radar, radio beacons, etc. (GPU 1980a).

Maintenance activities will have minimal impact on ship traffic and ports.

4.1.5.4 Recreation

(a) Construction. Construction activities will temporarily interfere with pleasure boating, fishing, and swimming in the nearshore area of Lake Erie as well as at the mouth of Elk Creek. Though these impacts will last for the duration of construction in the active cable-laying area, there are no anticipated long-term impacts.

(b) Operation/Maintenance. The magnetic field associated with routine operation of the cable may adversely affect navigation of pleasure boats, as described in Section 4.1.5.3(b). Also, pleasure craft will need to avoid areas where maintenance is in progress.

The presence of maintenance vessels, and increased turbidity associated with maintenance activities, could adversely affect recreation activities; however, these impacts should be short-term.

No electric field will emanate from the cable because the cable will be shielded and grounded (GPU 1980a). Therefore, there will be no impact to people who might be diving or swimming in the vicinity of the cables.

4.1.5.5 Commercial Sand and Gravel Extraction from Lake Erie

Direct impacts to sand and gravel developments in Lake Erie will depend on the exact cable corridor, whose width will vary from several meters in the nearshore zone to 1250 m (4100 ft) in the deep-water zone. It is unlikely that sand and gravel resources in the corridor will be developed during the operational lifetime of the proposed project.

4.1.5.6 Natural Gas Development in Lake Erie

COE/EPA is preparing a programmatic environmental impact statement on development of natural gas in Lake Erie (COE/EPA 1980). At this time, there is no drilling for oil or natural gas in U.S. waters of Lake Erie. Impacts associated with interaction of the proposed project's operation/maintenance and natural gas development will be discussed in site-specific environmental reviews. However, it is unlikely that natural gas resources can be developed completely within the corridor during the operational lifetime of the proposed project.

4.1.6 Seismic Activity

The overall frequency and intensity of seismic activity in the region is low and should not adversely impact the proposed project. In support of this conclusion, over 30 years of offshore drilling in Canadian waters of Lake Erie has not resulted in any documentable problems caused by seismic activity (COE/EPA 1980).

4.2 CONSEQUENCES OF ALTERNATIVES TO THE PROPOSED LAKE ERIE CONNECTION

4.2.1 Enhanced Conservation, Increased Load Management, Decentralized Energy Sources

The impacts of this alternative would be those associated with the manufacture and use of such devices and materials as insulation; storm or thermal windows; caulking; weather stripping; solar shade screens; thermostats with automatic setbacks; more efficient meters, lights, motors, appliances, and heating and cooling systems; photovoltaic systems; and wind-energy conversion systems. The magnitudes of these impacts would depend on the quantity of equipment and material manufactured and used. If the enhanced conservation program were to fulfill GPU's "Conservation and Load Management Master Plan" it would require the manufacture and installation of about 296,000 storage water heaters (with a commensurate number of off-peak meters), 77,000 storage space-heating units, and similar quantities of other conservation/management devices or materials (GPU 1980a).

4.2.1.1 Natural Resources

The manufacture and use of the needed equipment and materials would utilize some petroleum products and nonrenewable resources. The amount used would depend on the market penetration. Materials needed for an additional 143,000 residential/commercial solar hot-water heating units, an additional 14,000 residential solar heating and cooling units, an additional 18,000 residential photovoltaic systems, and an additional 10,000 residential/commercial wind-energy systems, are given in Table 4.5.

Special impacts associated with the photovoltaic systems would be those related to the extraction, production, processing, transportation, and handling of the materials used in the manufacture of the receivers (Theodore and Buonicore, 1980). Substances used or under consideration for use in these devices are: silicon, cadmium sulfide, gallium arsenide, selenium, and group III phosphides. Without proper controls, surface and groundwater could be polluted during ore mining, ore roasting, smelting, refining, and device fabrication. Cadmium could enter the surface waters in the mining and smelting process; it could also leach into groundwater from slag heaps and gross disposal. Silicon cell production yields effluents containing hydrogen fluoride and acetic and nitric acids; and gallium extraction from bauxite generates alumina sludges and waste water containing trace metals. However, none of these effluents would result in either surface or groundwater pollution if the processes are in compliance with U.S.EPA regulations.

Other aquatic or terrestial impacts associated with the manufacture and use of the needed equipment and materials would include contamination of water and land from spilled coolant (antifreeze, corrosion inhibitors), collision of birds with wind-machine rotors, and the loss of vegetation and habitat associated with the land needed for commercial solar collectors, photovoltaic devices, and wind machines (Theodore and Buonicore 1980).

4.2.1.2 Socioeconomics

Manufacture of the conservation, load management, and decentralized energy devices would involve a risk of worker injury, the amount depending on the quantity manufactured.

Extraction, production, and processing of the materials used in the photovoltaic cells would pose a potential hazard to human health (Theodore and Buonicore 1980). Production of cadmium sulfide cells capable of delivering 1000 MW would result in the release to the atmosphere of 3-4 metric tons (3.3-4.4 tons) of cadmium. This is about 0.5% of the present annual emission from all U.S. zinc refineries. Silicon cell fabrication would be expected to emit several toxic agents to the atmosphere. One such agent, PH_3, is lethal for man at 8 ppm. Gallium arsenide, another substance used or under consideration for use in photovoltaic cells, is not very toxic unless dissociated to release elemental arsenic which is highly toxic.

The use of the materials and devices by the consumer would involve some risk. Experience with urea-formaldehyde (foam-in-place) insulation has shown that unanticipated toxic reactions can occur (Bryssee 1978; NAS 1980), and experience with wind-energy converters has shown that rotors sometimes fly

Table 4.5. Materials Needed for Manufacture of Decentralized Energy Sources

Material	143,000 Residential/ Commercial Solar Hot-Water Heating Units (metric tons)	14,000 Residential Solar Heating/ Cooling Units (metric tons)	18,000 Residential Photovoltaic Systems (metric tons)	10,000 Residential/ Commercial Wind-Energy Conversion Systems (metric tons)
Steel	239,000	27,500	4,000	60,500
Concrete	-	-	-	1,300
Glass	5,200	5,100	-	-
Urethane	3,500	2,300	-	-
Copper	1,900	1,600	1,100	165,700
Coolant	5,200	5,000	-	-
Plastic	-	-	18,000	-
Silicon	-	-	5,500	-
Sulfuric acid	-	-	8,000	-
Lead	-	-	28,400	-
Aluminum	-	-	30	-
Silver	-	-	25	-

Source: U.S. Department of Energy. 1980. "Technology Characterizations, Environmental Information Handbook", DOE/EV-0072. Wash. D.C.

apart because of the mechanical stress imposed at high speed (Theodore and Buonicore 1980).

4.2.1.3 Cultural Resources

One cannot assess the specific impacts on archeological, historical, or natural areas as a result of the manufacture and use of the conservation, load management, and decentralized energy devices without knowing where these devices would be manufactured and used. However, the use of commercial solar collectors, photovoltaic receivers, and wind-energy conversion devices, no matter where they would be placed, would generally result in visual intrusion (Theodore and Buonicore 1980). Large areas of collectors and receivers would be esthetically displeasing, and the glare might be irritating to people on the ground or in nearby buildings.

4.2.1.4 Land Use

The collector area needed to replace 1000 MW of conventional electricity with photovoltaic power would be about 23 sq km (9 sq mi) (Theodore and Buonicore 1980). The area needed for solar thermal energy conversion would be similar. Wind energy converters would require less area, about 27 ha (68 ac) for about 10,000 units (DOE 1980).

4.2.1.5 Air Quality

If the extraction, production, and processing of materials used in the photovoltaic cells results in the uncontrolled release of toxic substances into the atmosphere, these could pose a health hazard (Sec. 4.2.2). However, compliance with U.S.EPA regulations would prevent this. EPA regulations would also limit the release of other primary and secondary air pollutants (SO_2, NO_x, particulates, etc.) associated with the production of the materials needed and with the manufacture of the conservation, management, and energy devices (Theodore and Buonicore 1980).

4.2.2 Purchase of Additional Power from U.S. Utilities

It is not possible to quantify the adverse environmental impacts associated with the purchase of additional power from other U.S. utilities without knowing the type and location of the generating plants. However, certain generalizations can be made if one assumes that the fuels used would probably be oil or coal and the location would be the northeastern, middle Atlantic, or east central U.S.

Since the alternative would involve the purchase of power generated at existing plants, there would be no construction impacts. The following discussion is, therefore limited to operational impacts.

4.2.2.1 Natural Resources

Increased operation of existing plants would result in increased solid wastes (ash, scrubber sludge), the amount of which would depend on the kind and quality of fuel. Oil is virtually ash free (0.1-0.3%) while eastern coal has an ash content of about 10% (Theodore and Buonicore 1980). Oil and coal

also often have high sulfur contents (2.8-4.0%). Ash is collected by electrostatic precipitators. Sulfur is removed from the flue gas by a chemical reaction that yields a partially dewatered semi-solid (scrubber sludge). The amount of wastes that would result from the combustion needed to produce an added 1000 MW would vary from a small amount [23,000 metric tons (25,000 tons)] if a low-sulfur oil were used to an annual production of 280,000 metric tons [300,000 tons (400,000 cu m)] if high-sulfur coal were used (GPU 1979; U.S. EPA 1977). Water pollution resulting from disposal of this ash/sludge waste should be minimal because U.S. EPA regulations would have to be implemented. However, there would be an incremental loss of terrestial or aquatic habitat [up to 10 ha (25 ac) per year if the 400,000 cu m of ash/sludge waste is assumed to be spread 4 m (13 ft) deep].

4.2.2.2 Socioeconomics

Although a typical 1000-MW generation plant would require an operating work force of about 150 (oil) to 300 (coal) people (Theodore and Buonicore 1980; U.S. DOE 1980), the number needed to provide an added 1000 MW from existing plants probably would be less. The exact number would depend on whether the added generation at an existing plant was sufficient to cause an incremental increase in work force.

4.2.2.3 Cultural Resources

The most likely cultural or esthetic impact of added generation at existing plants would be visual intrusion resulting from the disposal of the additional ash-sludge waste and decreased visibility due to increased air pollution.

4.2.2.4 Land Use

The land area preempted for the incremental waste disposal would be no more than 10 ha (25 ac), on the assumption that the 400,000 cu m (300,000 tons) per year of additional waste would be piled 4 m (13 ft) deep.

4.2.2.5 Transportation

The movement of additional raw materials, waste materials, and people would result in an incremental increase in transportation.

4.2.2.6 Air Quality

Although air quality in northeastern U.S. is generally good (Sec. 3.2.5), pollutant concentrations are generally highest in the industrial and population centers of these regions. Although the generation stations that would produce added electrical power would not be permitted to exceed U.S. EPA air emission limits, increased emissions would result in a commensurate decrease in air quality. However, 1000 MW would be only about 5% of the annual average capacity in use in either the NPCC or MAAC area, or 2% of that in the ECAR area. On a regional basis, the impact would be minimal.

4.2.3 Construction and Operation of Coho-1*

An environmental impact statement will be prepared by the appropriate federal authority prior to construction and operation of the Coho-1 generating facility. Construction and operation of the Coho-1 generating facility and its transmission line would produce both short-term and long-term impacts. Short-term construction impacts would include noise, dust, erosion, increased runoff, sedimentation, socioeconomic impacts, and traffic congestion. Long-term construction effects would result from site clearing and changed land use.

Major operational impacts would include those associated with fuel handling and storage, combustion, solid waste disposal, and water intake and discharge. Lesser impacts would be those associated with cooling tower drift, the work force needed to operate the plant, and the visual instrusion of the plant itself.

4.2.3.1 Aquatic Ecology

Increased runoff and accelerated erosion and sedimentation would be most severe during active construction. Additional runoff from the coal pile and solid-waste disposal area would occur during operation. This runoff, if uncontrolled, could cause severe water pollution and impacts to aquatic ecosystems; however, compliance with U.S. EPA regulations would prevent this.

Impacts associated with water intake and discharge during station operation include fish impingement and entrainment, and water quality and thermal effects. Most adult fishes would be able to swim against the flow rates that would occur at the intake structure, but fish eggs and larvae would be entrained and destroyed. Although about 32 million fish larvae and 12 million fish eggs would be entrained during the 40-year life of the station, the impacts of this entrainment on the Lake Erie commercial catch would be less than 1% (0.003-0.8%).

The amount of water withdrawn from Lake Erie for plant operations would range between 21.2 and 36.3 million liters (5.6 and 9.6 million gallons) per day. Approximately 4 million liters (1 million gallons) per day would be discharged back to the lake. The only substances that would be added to the discharge streams are reagents to control the pH (acid and lime), traces of an EPA-approved biocide, and constituents of the discharge from the sewage treatment plant. The offshore outlet structure would provide mixing of the discharge with the lake water. The total dissolved solids would be only about 10 mg/L above ambient concentrations at 30 m (100 ft) from the discharge outlet. Concentrations of ammonia, nitrates, and phosphates would approximate ambient levels at this same distance.

Thermal effects would be minimal. The effluent would be 4-6°C (7-11°F) above ambient at point of discharge but would decrease to 0.5°C (1°F) above ambient within a distance of 1.2-2.4 m (4-8 ft). Because of the velocity of the plume near the discharge point [1 m/s (3 ft/s)], most fishes would be

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*Unless otherwise noted, the information in this section was obtained from GPU (1979).

unable to maintain a position in the thermal plume at temperatures higher than 0.5°C (1°F) above ambient.

4.2.3.2 Terrestrial Ecology

Construction of the station would generate noise that would be audible at a number of dwellings and annoying [more than 5-10 dB(A) above background] at two nearby residences. The highest noise level would occur during pile driving operations and during the initial blowout of the major stream lines. These activities would be confined to daylight hours. Fuel handling during operation (emptying coal cars, working the coal pile by bulldozer, conveying the coal on belts) would also produce noise. The noise level at the nearest site boundary would be about 50 dB(A), the approximate level of a quiet street or average urban interior (Fowler and Mervine 1974).

Fugitive dust would result from both construction activities (clearing, earth moving, vehicular traffic) and operations (coal handling). If uncontrolled, the impacts would be severe. However, GPU's mitigation measures (including paving or sprinkling heavily traveled areas; water spraying of coal) would reduce the uncontrolled amount to only a slight increase above current levels.

Clearing the site would result in long-term impacts. All vegetation would be moved from about 100 ha (250 ac) for the power station and from a smaller area [less than 1 ha (2.5 ac)] for the transmission-li towers. About 60 ha (150 ac) are cultivated fields and fence rows. This clearing of trees, field crops, and other vegetation would result in a long-term loss of habitat for resident animals.

Additional vegetation and habitat [about 160 ha (400 ac)] would be lost as a result of solid-waste disposal. The area would be cleared in increments of 8 ha (20 ac) during the life of the unit. When one increment is filled with wastes, it would be covered with soil and revegetated and the next increment prepared. Thus, only about 8 ha (20 ac) would be disturbed and unreclaimed at any one time.

Site clearing and other construction and operational activities would not affect any rare or endangered species based on present knowledge. Consultation, as required by Section 7 of the Endangered Species Act of 1973, would be initiated with the U.S. Fish and Wildlife Service. This consultation would either confirm that no rare or endangered species would be affected or it would lead to the requirement of appropriate mitigation measures.

4.2.3.3 Socioeconomics

The maximum construction work force would be about 950 people. Of this total, about 80% (760 people) would commute daily from their present homes in the local area and the remaining 20% (190 people) would be new to the area. The 190 new people would require local housing during their employment and would use community services.

Operation of the station would require a labor force of about 245 people. About half of these people would be expected to commute daily from their present residences; the remainder would move into the area. The impact on

community services would be minimal as these services appear adequate to accommodate added residents. The effect on the local economy would be a positive one resulting from wages earned and spent by the relocated workers for local goods and services (annual payroll = $97-396 million; 1988-2027), as well as taxes paid by the utility. There would be positive economic benefits from domestic coal production and utilization.

Automobile and truck traffic in the vicinity of the plant would be increased greatly during construction (25-50%) and to a lesser extent during operation (6-13%). The most pronounced impacts of this added traffic would occur along the north-south roads between the site and U.S. 20 and I-94. These local roads, currently in marginal condition, now serve as minor collectors with limited carrying capacity.

4.2.3.4 Cultural Resources

The Lake Erie Bluffs have been designated as a critical area by the Pennsylvania Coastal Zone Management Program (Office of Resource Management, Pennsylvania 1977) and are protected by the Pennsylvania Bluff Recession and Setback Act (Pennsylvania 1980). GPU had planned no construction within 76 m (250 ft) of the Lake Erie Bluffs other than tunneling under them for the intake and discharge structures. The Act requires that construction practices in the vicinity of the bluffs minimize erosion and recession of the bluffs.

Although there are no listed historic places within the project area, there is a high density of prehistoric sites. A total of 23 such sites has been identified within 3.2 km (2 mi) of the station and waste-disposal areas. Construction and operation of the station could disturb these sites and others not yet identified. A complete survey by a qualified archeologist would be necessary to locate all sites and, in consultation with the Pennsylvania Historical Preservation Officer, to develop appropriate mitigation measures.

Construction and operation of the station would result in esthetic impacts caused by visual intrusion. These intrusions would include the plant, the coal pile, the ash/sludge disposal area, the cooling tower with its plume, and the associated transmission line. The cooling tower would be the most noticeable facility because of its immense size. Operation of the tower would produce a plume which would reach a considerable height at times. In addition, the tower would be situated on a bluff overlooking the lake, giving users of Lake Erie a generally unobstructed view of it.

4.2.3.5. Land Use

Construction and operation of the facility would change the use of about 400 ha (990 ac) of land from rural farmland and woodlands to heavy industrial for at least 45 years. About 175 ha (435 ac) of the 400 ha (990 ac) are now classified as prime agricultural land and 160 ha (395 ac) as farmland of statewide significance. The remaining 65 ha (160 ac) are classified as "other land."

About 80 ha (195 ac) would be traversed by the transmission line. Of this 80 ha (195 ac), about 25 ha (60 ac) are now woodland and 55 ha (135 ac) are rural agricultural land. The forest areas would be trimmed to prevent interference with the lines, but the agricultural land and its use would be little changed.

The solid-waste disposal portion of the site [160 ha (400 ac)] would be reclaimed and revegetated as used. The station itself could be demolished after decommissioning and its portion of the site [100 ha (250 ac)] could be regraded and revegetated.

4.2.3.6 Air Quality

Coho-1 will be designed to meet the most stringent Federal New Source Performance Standards and Prevention of Significant Deterioration (PSD) regulations. In complying with these requirements the station will utilize the most advanced means of sulfur dioxide and particulate removal equipment that is technically available (Best Available Control Technology). A detailed assessment of air quality impacts can be found in GPU (1979).

Through the use of diffusion modeling, the effects of Coho-1 operation are predicted not to exceed the appropriate (Class II) increments for either SO_2 or particulate matter. The maximum increases in SO_2 and suspended particulate concentrations are predicted to be as shown in Table 4.6.

Table 4.6. Expected Maximum Increases in the Average Concentrations of SO_2 and of Suspended Particulates as a Result of the Operation of the Coho Unit 1 Generating Plant

Maximum Increase for:	SO_2		Suspended Particulates	
	Av. Concentration (μg/cu m)	% of PSD Increment	Av. Concentration (μg/cu m)	% of PSD Increment
1-year period	1.1	5.5	0.05	0.3
24-hour period	31	34.1	1.5	4.1
3-hour period	99	19.3		

Source: Adapted from GPU (1979).

Although the station would meet PSD standards, through the use of pollution control equipment (i.e., precipitator, scrubber, boiler control of NOx, and other commercially available technologies) releases to the atmosphere over the life of the plant would include up to 383,000 metric tons (442,000 tons) of SO_2, 445,000 metric tons (490,000 tons) of NOx, and 19,000 metric tons (21,000 tons) of fly-ash particulate matter, including 450 metric tons (500 tons) of trace elements. These emissions would contribute to the deterioration of regional air quality and to the problem of acid rainfall. The U.S. EPA issued a PSD permit for Coho-1 on August 1, 1981.

4.3 COMPARISON OF IMPACTS EXPECTED FROM ALTERNATIVES

The impacts associated with the proposed project and the three alternatives are summarized in Table 4.7.

Most of the impacts associated with the Lake Erie Interconnection are unique (among the alternatives) in that most are submarine. Only the terrestrial construction aspects are comparable to those of the new station alternative; these are only a small fraction of the latter. Operational impacts within the U.S. related to power generation will be minimimal with a very small increase in air pollution and acid rain within the U.S to be expected from increased operation of OH generating plants.

The impacts from the enhanced conservation, management, decentralized sources alternatives are more difficult to assess. In general, they are related to the manufacture of the devices and materials needed for this alternative. These impacts could be small if one assumes that all manufacturing (including mining, ore handling, etc.) were done in accordance with all laws and regulations. The risk of worker injury could, however, be significant (assuming full implementation of the enhanced conservation aspects).

Impacts associated with the purchase alternative would be limited to operational impacts as there would be no new construction. The operational impacts would be much the same (per kWh) as those associated with any power generating station.

The new station alternative would include all the construction impacts associated with building a power plant plus all the operating impacts (comparable to the operating impacts associated with the purchase alternatives).

4.4 MITIGATIVE MEASURES

Mitigative measures are those that might reduce or modify the environmental impacts of the proposed project or its alternatives. Detailed discussion of such measures is confined to those applicable to the proposed Lake Erie Interconnection, for the reasons stated in Section 4.4.2.

4.4.1 Mitigation for the Proposed Lake Erie Interconnection

4.4.1.1 Cable Laying in Lake Erie

(a) Construction Impacts

The construction impacts (sediment resuspension, disruption of benthic habitat, and increased turbidity) will be more severe in the shallow-water zone than in the deep-water zone because of the trenching required in the former. Aquatic biota will be impacted adversely temporarily. The Applicant will implement a construction schedule to mitigate these impacts to the extent possible (GPU 1980a). The final trenching schedule and methods will be coordinated with the appropriate agencies to minimize impacts to the Lake Erie fishery. This schedule will be consistent with the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

Table 4.7 Impacts Expected from Alternatives

Erie Interconnection	Enhanced Conservation, Land Management, Decentralized Sources	Purchase	New Station
Sedimentation	Worker injury	Solid wastes	Noise
Removal of vegetation	Water pollution	Loss of vegetation	Dust
Loss of agricultural land	Noise	Loss of habitat	Erosion
Loss of habitat	Visual intrusion	Erosion	Runoff
Magnetic field effects	Safety hazard	Water pollution	Sedimentation
Electrical field effects		Air pollution	Worker impacts
Archeologic impacts			Loss of vegetation
Natural area impacts			Loss of agricultural land
Preemption of sand and gravel extraction			Visual impacts
			Air pollution
Preemption of natural gas extraction			Solid wastes
			Fish impingement/entrainment
			Visual impacts

Commercial and sport fishing and other recreational activities will be disrupted temporarily in the immediate vicinity of the construction activities. The proposed route and construction schedule will be published by the Applicant in local and regional papers, fishing newsletters, and other appropriate publications to minimize the disruption. Additionally, commercial vessel traffic will need to avoid the cable-laying vessel(s) along the cable route. Because cable laying is a continuous process, only temporary rerouting of ship traffic will occur at any given location. Construction operations will be compatible with the regulations of the Pennsylvania Department of Environmental Resources, the U.S. Army Corps of Engineers (COE), and the U.S. Coast Guard.

Shipwreck sites could exist in the proposed Lake Erie corridor. However, no sites were identified during the detailed bottom mapping (GPU 1981c). Any sites that are found during subsequent activities will be recorded and their eligibility for the National Register of Historic Places will be determined. Significant sites will be avoided if at all possible; if not, possible impacts to them will be mitigated by a recovery and curation program or by other mitigative procedures approved by the Pennsylvania State Historic Preservation Officer. These measures will be consistent with the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

(b) Operation/Maintenance Impacts

Operation of the cable will have three major impacts: (1) navigational interference; (2) the potential for anchor snagging; and (3) interference with natural gas, sand, and gravel development. These impacts will be mitigated to the extent possible by showing the cable corridor on navigational charts, along with warnings (1) that anchor dragging should be avoided in the area; and (2) that magnetic compass headings will be unreliable in the immediate vicinity of a cable. It is unlikely that sand, gravel, and natural gas resources can be developed completely in the Lake Erie corridor during the operational lifetime of the proposed project.

4.4.1.2 Cable Laying on Land

Construction operations associated with cable laying from the shore to the switching station will increase erosion. Lake Erie water quality and aquatic biota could be impacted adversely as a result of increased erosion. The Applicant will implement effective erosion- and sedimentation-control measures to reduce these potential impacts. These measures will be consistent with the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

The Applicant will develop construction and operation/maintenance management plans that will include specifications for (1) clearing and chemical treatment, (2) erosion and sediment control, and (3) vegetation management of the transmission corridor and other impacted areas including floodplains and wetlands. These plans will be approved by the appropriate agencies prior to any construction activities.

Lake Erie Bluffs in the proposed project corridor have been designated as a critical hazard area in the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980). The Applicant's construction practices,

therefore, will be consistent with the Pennsylvania Coastal Zone Management Program and will be designed to minimize erosion and recession of the bluffs.

Parts of the proposed project area have "a high potential for past human occupation." A 100% surface reconnaissance of the ROW will be conducted by a qualified professional archeologist (GPU 1980a). The Applicant has completed a cultural resources survey for the onland portion of the corridor (Lantz 1981). Any sites that are found prior to or during construction will be recorded and their eligibility for the National Register of Historic places will be determined. Significant archeological sites (historic or prehistoric) will be avoided if at all possible; if not possible, impacts to them will be mitigated by a recovery and curation program or other mitigative procedures approved by the Pennsylvania State Historic Preservation Officer. These measures will be consistent with the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

4.4.1.3 Transmission Corridor

(a) Construction Impacts

Construction of the overhead transmission line will result in increased erosion and stream sedimentation. Increased erosion due to surface disturbances along access roads, at tower sites, at the switching and convertor stations, and in other areas will be reduced by a number of construction practices (GPU 1980a). Road widths will be kept to the minimum required to accommodate the equipment that will use the road, cuts will be made only where necessary to reduce road grades to acceptable levels, and access roads will be designed to cross streams as nearly as possible at right angles. Towers will not be placed on steep, highly erodable slopes such as those adjacent to the Crooked Creek mainstream. Erosion- and sedimentation-control procedures will be implemented, siltation dams will be placed on graded slopes during construction, and disturbed areas will be seeded and mulched as soon as practicable after construction is completed. These measures will be consistent with the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

Wetlands and floodplains could be impacted adversely along the corridor route. Although the Applicant will avoid these areas whenever possible, some construction activities in wetlands will be unavoidable (GPU 1980a). The placement of tower structures will be specifically designed to avoid wetland and floodplain areas. To minimize the potential impacts, special equipment designed for construction in wetlands and floodplains will be used. Construction activities in wetlands will be limited to seasons when the ground is frozen or entirely dry. (Much of the "wetlands" area is actually "wet" only during the spring.) These measures will be consistent with the Pennsylvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

Crooked Creek, which the transmission lines will cross, has been designated as a unique area and a state conservation stream by the Pennsylvania Coastal Zone Management Program (1980). Impacts to Crooked Creek will be esthetic intrusion and an increase in erosion and sedimentation. Esthetic impacts will be minimized by crossing the stream where it is fairly narrow. Erosion and sedimentation impacts will be minimized by means of the erosion- and sedimentation-control procedures described above (GPU 1980). These

measures will be consistent with the Pennsylvania Coastal Zone Management Program (1980).

Mitigative measures for the Lake Erie Bluffs, outlined in Section 4.4.1.2, will be employed.

The construction and operation/maintenance plans will be implemented as indicated in Section 4.4.1.2.

Mitigative measures for the cultural resources are outlined in Section 4.4.1.2.

(b) Operational Impacts

Right-of-way impacts include those associated with periodic inspection, routine maintenance, and repairs. Helicopters and foot patrols (rather than land vehicles) will be used to inspect the line and the corridor. Adequate tree clearance will be maintained by trimming.

The existing corridor crosses several transportation routes, and the proposed addition with its new access roads could provide off-the-road vehicles (ORVs) further access (legal and illegal) to the corridor. The corridor could be used by ORV operators to access natural areas unless ORV access is properly controlled. Access to the ROW by ORV traffic will be prohibited to the extent possible by constructing barriers at access points.

Field effects resulting from operation of the overhead line will be mitigated by the design of the dc conductors, which will be corona-free under normal conditions. Field effects resulting from operation of the converter station and the switching station will be mitigated by building and system design (GPU 1981b).

The construction and operation/maintenance management plans will be implemented as indicated in Section 4.4.1.2.

4.4.2 Mitigation for Alternatives to the Lake Erie Interconnection

For the project alternative of enhanced conservation and decentralized sources, the expected environmental impacts would arise mainly from increased extraction and processing of raw materials, from increased manufacturing of equipment and devices, and from transportation and installation of these products. These impacts would be only a small fractional increment in the indistinguishable existing impacts associated with mining, manufacturing, and commerce in the U.S. Mitigation of such impacts could be achieved only by broad governmental control measures such as those already implemented by state agencies and federal agencies such as the Environmental Protection Agency, the Occupational Safety and Health Administration, and the Department of Transportation. Since neither GPU nor the DOE would have the responsibility or authority for such measures, it would not assist the DOE decision process to consider them in detail.

For the project alternative of purchase of additional power from U.S. utilities, neither DOE nor GPU has the responsibility or the authority to impose mitigative requirements on the generation of the purchased power.

Moreover, the incremental power that existing plants owned by other utilities would generate for sale to GPU would be practically inseparable from the normal generation at the same plants.

For the project alternative of construction and operation of Coho-1, DOE does not have the responsibility or the authority to impose mitigative requirements. To the extent possible, mitigative measures have been discussed in Section 4.2.3.

4.5 SIGNIFICANT ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED IF PROJECT IS IMPLEMENTED

4.5.1 Commercial Vessel Traffic

Anchor dropping by commercial vessels will be prohibited in the Lake Erie corridor during the operational lifetime of the proposed project.

4.5.2 Sand, Gravel, and Natural Gas Development

It is unlikely that sand, gravel, and natural gas resources can be developed completely in the Lake Erie corridor during the operational lifetime of the proposed project.

4.5.3 Cultural Resources

Construction of the proposed transmission lines could impact cultural resources. The submarine and overland portions of the transmission line will be surveyed for cultural resources. Some of these sites may be eligible for the National Register of Historic Places, while others may have little cultural or scientific value.

4.5.4 Esthetics

Construction of the transmission line, substation, and converter will introduce other man-made intrusions, further altering the visual character of the landscape. Areas of natural significance (i.e., Lake Erie Bluffs, Elk Creek, and Crooked Creek) will be impacted.

4.5.5 Ecology

Disturbance of aquatic and terrestrial habitats and their populations will be the major ecological impact. The environmental impacts expected from construction and operation of the proposed Lake Erie Interconnection appear to be mainly transitory effects on aquatic life due to construction, provided that possible impacts are mitigated by appropriate practices. Impacts to regional habitat and population will be minor.

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Resources that would be committed to this project include manpower, materials, and energy. The major portion of these resource commitments would occur during cable-laying operations. The commitment of materials would not

be absolutely irreversible, as in most cases the material could be recycled. It is unlikely that sand, gravel, and natural gas resources could be developed completely in the Lake Erie corridor during the operational lifetime of the proposed project. The land commitment would be relatively minor, and in most cases it could be returned to its original condition.

4.7 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

The energy required for this project is included in fabricating the underwater cable, towers, wire, insulators, and other hardware. In addition, energy will be required for construction activities (i.e., trenching, cable laying, ROW clearing, and tower installation).

When operational, the project will utilize excess Canadian power-generation capacity, thus reducing demand for domestic and imported fuels.

4.8 POSSIBLE CONFLICTS BETWEEN PROPOSED ACTION AND OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL LAND-USE PLANS, POLICIES, AND CONTROLS

There are no known conflicts between the project and governmental policy, plan, regulation, or control.

Applicable environmental regulations have the objective of preserving sensitive areas, unique habitats, and significant cultural resources. However, other governmental policies affecting electric utilities' responsibility to serve expected demands, stewardship of resources, and conservation of energy mandate they undertake projects with the potential to save energy. The project will create the possibility that sensitive areas, unique habitats, and cultural resources will be disturbed. However, measures are being implemented that will adequately mitigate these expected effects.

4.9 GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

Project design, material fabrication, and construction will be done by existing companies. A minor temporary increase in the local resident population is expected due to the construction work force.

The Applicant's proposed interconnection will not increase GPU's resources and therefore no additional power will be available to accommodate growth. the interconnection will provide for increased reliability and economic energy exchanges. Purchase of power from Canada will not occur until a purchase agreement is executed by GPU and OH.

4.10 SUMMARY

The Applicant's proposed alternative will have environmental impacts on water, land, and air. The water impacts of the proposed alternative appear to be transitory, occurring mainly during and immediately following construction. Impacts on land use will be both transitory (construction) and permanent during the life of the proposed line. Air impacts of the proposed line will

occur mainly during construction, with some minor impacts during maintenance operations. Most impacts can be substantially reduced by application of good engineering practices or reasonable mitigation measures.

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8. COMMENTS ON THE DRAFT EIS AND RESPONSES

In this section, the letters of comment on the Draft EIS, 300-kV Submarine International Transmission Line, Erie, Pennsylvania, to Nanticoke, Ontario, Canada, General Public Utilities Corporation are reproduced in full. The DOE responses are located after each letter of comment.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 24 1981

Mr. James W. Workman, Acting Director
Utility Systems and Emergency
Communications Division
Office of Emergency Operations
Department of Energy
Washington, DC 20461

Dear Mr. Workman:

This is in response to your request for comments on the Draft Environmental Impact Statement for 300-kV Submarine International Transmission Line Erie, Pennsylvania to Nanticoke, Ontario, Canada General Public Utilities Corporation.

NRC-1 We have reviewed the statement and determined that the proposed action has no significant radiological health and safety impact, nor will it adversely affect any activities subject to regulation by the Nuclear Regulatory Commission.

Since we made no substantive comments, you need not send us the Final Environmental Statement when issued.

Thank you for providing us with the opportunity to review this Draft Environmental Statement.

Sincerely,

Daniel R. Muller

Daniel R. Muller, Assistant Director
for Environmental Technology
Division of Engineering

Response to comment of the United States Nuclear Regulatory Commission

September 24, 1981

NRC-1

Comment noted.

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

REGION THREE

31 Hopkins Plaza
Baltimore, Maryland 21201

October 1, 1981

IN REPLY REFER TO: HEP-03.1

Department of Energy
System Coordination and Generation
Performance Branch
2000 "M" Street N.W.
Washington, D.C. 20461

Dear Sirs:

This office has reviewed your DEIS for the proposed 300 KV Transmission Line under Lake Erie between Canada and Erie, Pennsylvania.

DOT-1 The probable transportation impacts for that portion crossing several public highways and within an existing transmission line corridor from Lake Erie to the substation have been adequately presented.

Sincerely yours,

Vincent Ciletti

Vincent Ciletti
Associate Regional Administrator

Response to comment of the United States Department of Transportation

DOT-1

October 1, 1981

Comment noted.

(216) 522-4435

16475

OCT 16 1981

Department of Energy
Mr. Robert J. Stern
Director, NEPA Affairs Division
Washington D.C. 20461

Re: Your letter dated 4 September 81 concerning Draft Environmental Impact Statement (DEIS) for the proposed 300 KV international interconnection between Erie, Pa and Nanticoke, Ont.

Dear Mr. Stern:

CG-1 The Ninth Coast Guard District has reviewed the referenced document and requests that the Coast Guard be consulted regarding the effects of the submarine cable on magnetic compasses as stated in paragraph 4.1.5.3.(b) on page 4-19. In addition, the Coast Guard requests that compass errors also addressed in that same paragraph be clearly depicted on appropriate charts.

CG-2 Please keep us advised as further documentation for this project becomes available.

Sincerely,

R. D. PETERSON
Commander, U. S. Coast Guard
District Planning Officer
By direction of the Commander,
Ninth Coast Guard District

Copies to: U.S.Department of Transportation, Region III, Philadelphia, PA
Economic Regulatory Administration, Washington, D. C.
Pennsylvania Electric Company, Johnstown, PA
Argonne National Laboratory, Argonne, Illinois
COMDT(G-WS-1) Washington, D.C.

Response to comments of the United States Coast Guard, Ninth Coast Guard District

October 16, 1981

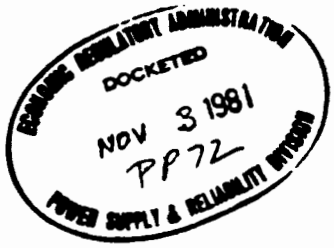
CG-1

The Marine Chart Division of the National Oceanic and Atmospheric Administration (NOAA) has been contacted by the Applicant to ensure that appropriate navigational chart changes will be made once the cables are installed and operating. The U.S. Coast Guard will be informed of the effects of the submarine cable on magnetic compasses. Compass errors will be clearly demarcated on appropriate charts (Section 4.1.5.3).

CG-2

The U.S. Coast Guard will be advised of future project documentation. The Applicant will continue to coordinate with NOAA and the Coast Guard through licensing and construction processes.

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230



OCT 29 1981

Mr. Garet A. Bornstein
System Coordination and
Generation Performance Branch
U.S. Department of Energy
2000 M Street, N.W., Rm. 4110
Washington, D.C. 20461

Dear Mr. Bornstein:

This is in reference to your draft environmental impact statement entitled "300 KV Submarine International Transmission Line, Erie, Pennsylvania to Nanticoke, Ontario, Canada, General Public Utilities Corporation - Docket No. PP-72." The enclosed comment from the National Oceanic and Atmospheric Administration is forwarded for your consideration.

Thank you for giving us an opportunity to provide this comment, which we hope will be of assistance to you. We would appreciate receiving four copies of the final environmental impact statement.

Sincerely,

Robert T. Miki
Director of Regulatory Policy

Enclosure Memo from: Eugene J. Aubert
Environmental Research Laboratories
National Oceanic and Atmospheric
Administration

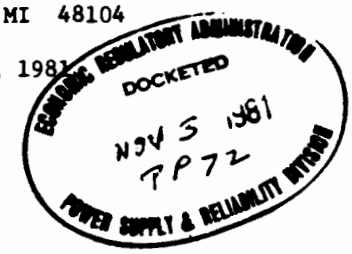
Response to comment of the United States Department of Commerce, General Counsel

No response required.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES

Great Lakes Environmental Research Laboratory
2300 Washtenaw Avenue
Ann Arbor, MI 48104

October 16, 1981



TO: PP/EC - Joyce Wood

FROM: RD/RF24 - Eugene J. Aubert

SUBJECT: DEIS 8109.17 - 300-KV Submarine International Transmission Line, Erie, Pennsylvania to Nanticoke, Ontario, Canada, General Public Utilities Corporation

The subject DEIS prepared by the U.S. Department of Energy, Office of Emergency Operations on Submarine Transmission Line across Lake Erie has been reviewed and comments herewith submitted.

DOC-1 Construction and operation of a submarine transmission line across Lake Erie will cause only insignificant effects in deeper parts of the lake. More pronounced erosion damage should be expected in the nearshore and bluff areas by waves and ice and by water runoff. Frequent inspection and proper maintenance will be required.

Response to comment of the United States Department of Commerce, National Oceanic and Atmospheric Administration

October 16, 1981

DOC-1

Position noted. Erosion damage will be minimized through approved mitigative procedures (Section 4.4).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

OCT 27 1981

Mr. James W. Workman
Acting Director
Utility Systems and Emergency
Communications Division
Office of Emergency Operations
Department of Energy
Washington, DC 20461

Dear Mr. Workman:

We have completed our review of the Draft Environmental Impact Statement concerning the 300KV Submarine International Transmission Line, Erie, Pennsylvania to Nanticoke, Ontario, Canada.

EPA-1 On the basis of the information presented in this document we have placed the proposal in EPA reporting category LO-1. This means we believe the statement adequately describes the proposal and that we have no objections to the project.

T e classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

Sincerely yours,

for John R. Pomponio
Chief
EIS & Wetlands Review Section

Response to comment of the United States Environmental Protection Agency

October 27, 1981

EPA-1

Comment noted.

DEPARTMENT OF THE ARMY

BUFFALO DISTRICT, CORPS OF ENGINEERS

1776 NIAGARA STREET

BUFFALO, NEW YORK 14207

NCBCO-S Re: Docket No. PP-72 5 November 1981
Comments on Draft Environmental Impact Statement

Mr. Garet A. Bornstein
Department of Energy
System Coordination and Generation Performance Branch
2000 M Street, N.W., Room 4110
Washington, DC 20461

Dear Mr. Bornstein:

My staff has completed review of the Draft Environmental Impact Statement prepared by the Department of Energy entitled "300-KV Submarine International Transmission Line Erie, Pennsylvania to Nanticoke, Ontario, Canada General Public Utilities Corporation" dated September, 1981.

In general, this document is adequate for our purposes for the preliminary review of this project. However, there are three areas mentioned in the DEIS that should be addressed more specifically in the Final EIS.

DOA-1 a. In Section 4.1.5.5 of the DEIS, it is stated that "It is unlikely that sand and gravel resources in the corridor will be developed during the operational lifetime of the proposed project." I have enclosed a map indicating the location of a sand and gravel dredging operation by the Erie Sand Steamship Company in Lake Erie approximately seven miles off Presque Isle that has been authorized by the Corps of Engineers. From the information supplied in the DEIS, the exact location of the proposed cable corridor in relation to this dredging operation as well as any effects the project may have on the operation cannot be determined.

DOA-2 b. In Section 4.1.5.6, The DEIS states that "Impacts associated with interaction of the proposed project's operation/maintenance and natural gas development will be discussed in site specific environmental impact statements. However, it is unlikely that natural gas resources can be developed completely within the corridor during the operational lifetime of the proposed project." The Corps of Engineers has not made any predetermination to prepare such site-specific EIS's for each lease area. Depending upon the scope of a proposed gas development activity, a decision will be made as to the need for an EIS or a more simplified environmental review. In any case, a public interest review would be performed and an environmental assessment prepared. The public interest review would afford the opportunity to governmental agencies, the general public and other interested parties, such as owners/operators of utility lines in the area, to comment on the proposal. We therefore recommend replacing the term "site-specific environmental impact statements" in this paragraph with "site-specific environmental reviews".

Response to comments of the United States Department of the Army, Buffalo District, Corps of Engineers

November 5, 1981

DOA-1

Figure 1.2 is revised to indicate the relative locations of the sand and gravel dredging operation and the proposed cable corridor (Section 1.2). Potential conflicts will be resolved through the Pennsylvania Department of Environmental Resources (Encroachment Permits: cross, enter, or work in waterway).

DOA-2

The language in Section 4.1.5.6 has been revised to read "site-specific environmental reviews."

NCBCO-S
Mr. Bornstein

DOA-3 c. In Section 2.1.1.2 of the DEIS, it is stated that in deeper water the five cables could be spaced up to 0.6 miles apart. This would result in a cable corridor at least 2.4 miles wide. It is possible, depending on the final location and route of the corridor, that significant acreage could be removed from the potential area available to the Commonwealth of Pennsylvania for gas development leasing. We recommend that you contact Mr. Eugene Frund of the Pennsylvania Department of Environmental Resources at the following address:

Eugene Frund, Chief
Minerals Section
Pennsylvania Department of Environmental Resources
Bureau of Forestry
P.O. Box 1467
Harrisburg, PA 17120

DOA-4 For your information, I have enclosed a map showing the reference program gas drilling leasing areas in Lake Erie which were analyzed in our Draft EIS.

DOA-5 In order to fully assess the Corps' regulatory authority and allow a complete assessment of the environmental effects that would result from the proposed project, I request that you send us specific information concerning construction methodology when it becomes available.

Thank you for the opportunity to comment on this project. If you have any questions, please contact Carol J. Rath of my Environmental Analysis Section by calling A/C 716-876-5454, extension 2322 or FTS 473-2322.

Sincerely,

Incl
as stated

FRANK J. HENRY, Chief
Regulatory Functions Branch

DOA-3

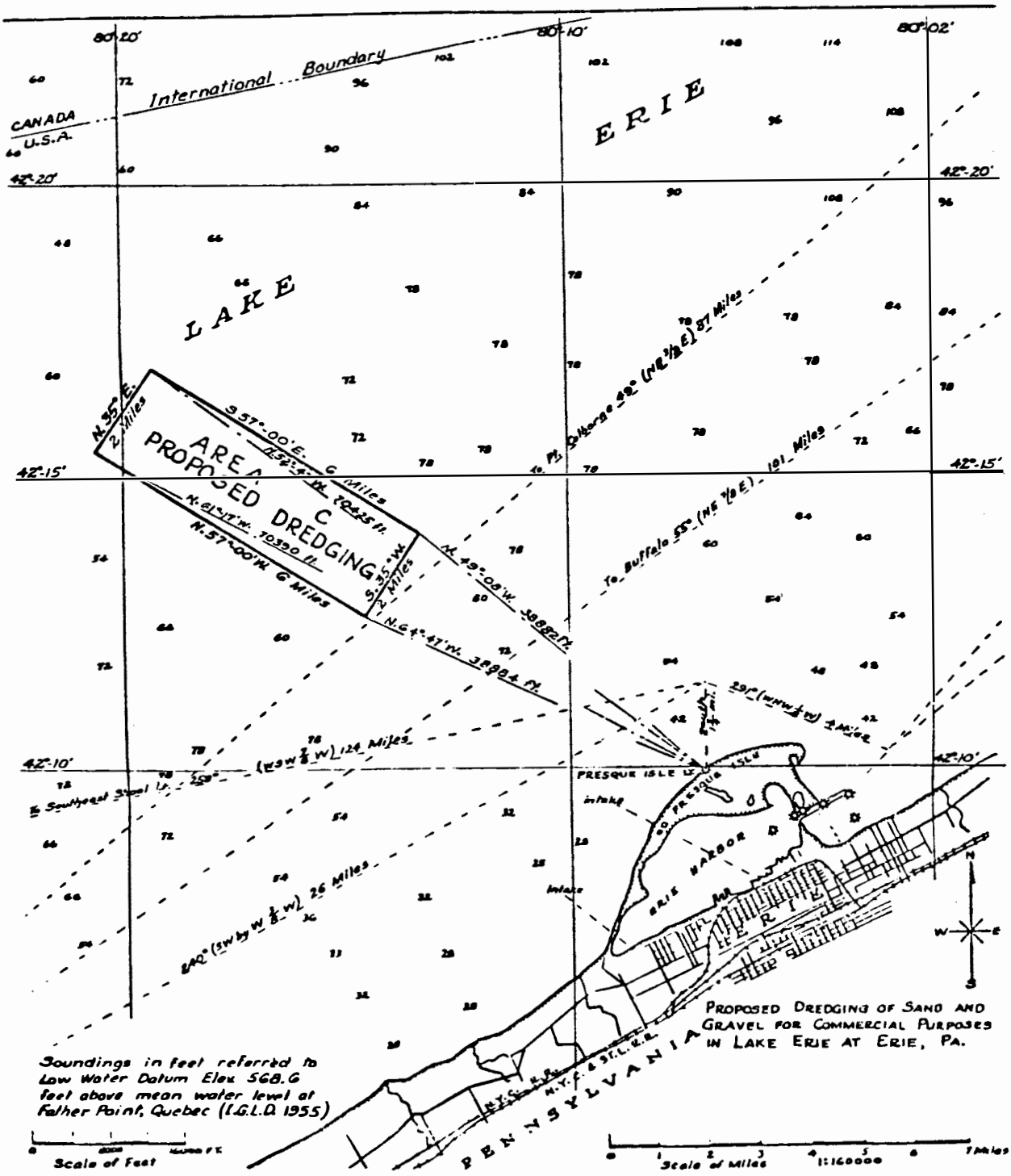
Section 2.1.1.2 has been revised to indicate the "anticipated corridor width will be 1250 m (4100 ft)." Recommendation noted. The Applicant has been informed.

DOA-4

Information noted.

DOA-5

Specific information concerning the construction methodology will be provided to DOA for approval when it becomes available.


80°-20'
80°-10'
80°-02'
42°-20'
42°-15'
42°-10'
International Boundary
CANADA
U.S.A.
ERIE
LAKE
AREA C
PROPOSED DREDGING
N. 35° E. 2 Miles
S. 57°-00' E. 6 Miles
N. 61°-12' W. 10390 ft.
N. 57°-00' W. 6 Miles
S. 35° W. 2 Miles
N. 61°-47' W. 38984 ft.
N. 49°-08' W. 39882 ft.
To Buffalo 55° (NE ⅞ E) 101 Miles
To Cleveland 82° (ENE ½ E) 87 Miles
29° (WNW ½ W) 2 Miles
(E by S ⅞ S) 124 Miles
(SW by W ⅛ W) 26 Miles
PRESQUE ISLE LT.
Intake
ERIE HARBOR
PENNSYLVANIA
N.Y.C. R.R.
N.Y.C. & St.L. R.R.
Soundings in feet referred to Low Water Datum Elev. 568.6 feet above mean water level at Father Point, Quebec (I.G.L.D. 1955)
Scale of Feet
Scale of Miles
1:160000
PROPOSED DREDGING OF SAND AND GRAVEL FOR COMMERCIAL PURPOSES IN LAKE ERIE AT ERIE, PA.

SHEET 1 OF 1

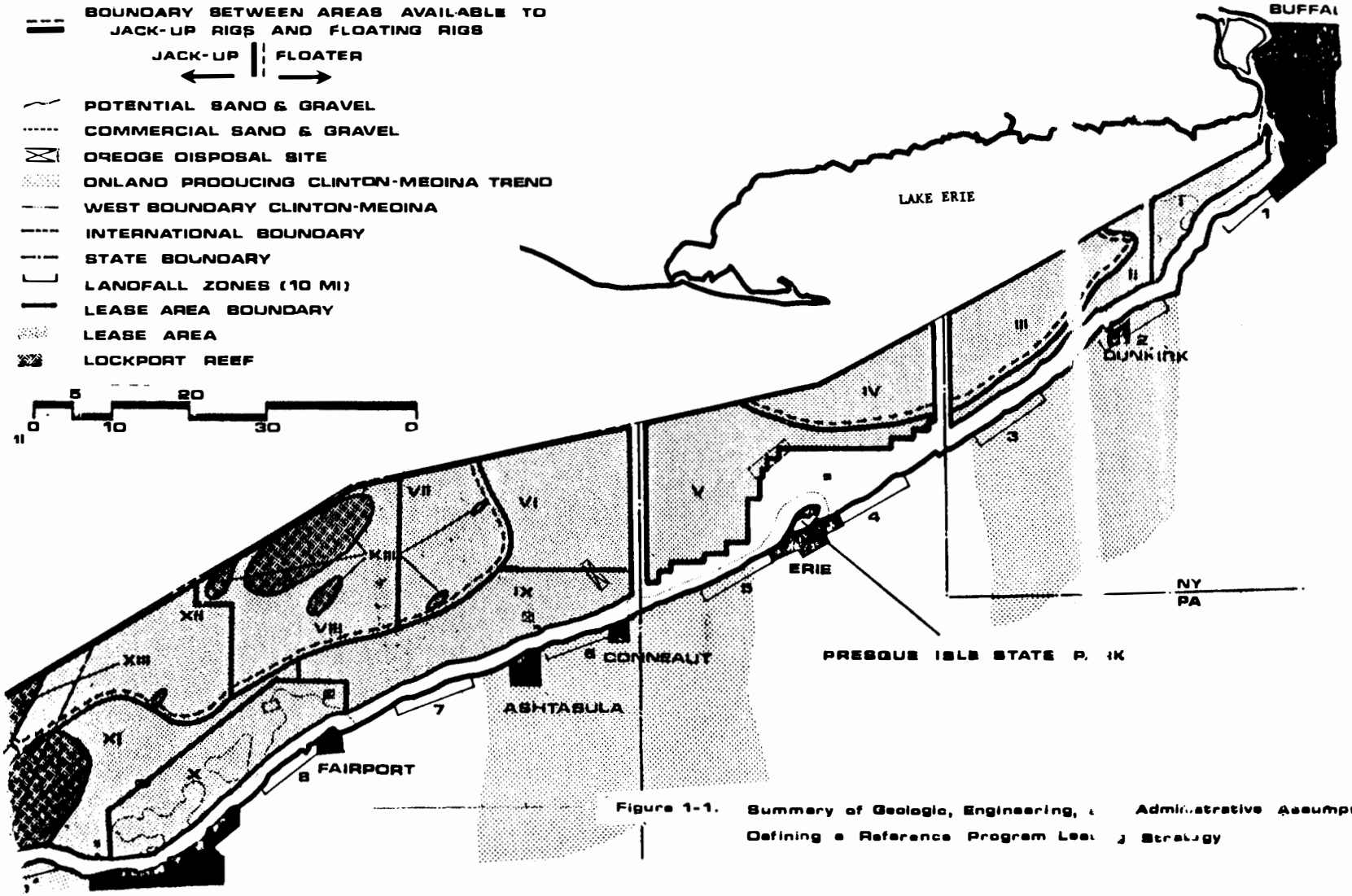
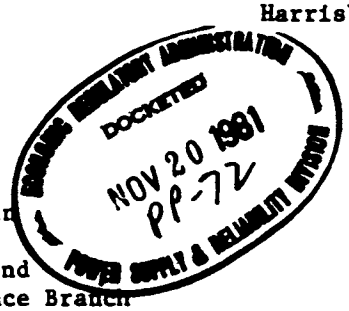


Figure 1-1. Summary of Geologic, Engineering, & Administrative Assumptions Defining a Reference Program Lease Strategy

United States Department of Agriculture

Soil Conservation Service

Box 985
Federal Square Station
Harrisburg, Pennsylvania 17108



November 12, 1981

Mr. Garret A. Bornstein
Department of Energy
Systems Coordination and
Generation Performance Branch
2000 M Street NW, Room 4110
Washington, DC 20461

Re: Draft EIS 0079 - Issuance of a Presidential Permit to Jersey Central Power and Light Company

Dear Mr. Bornstein:

SCS-1 The draft EIS needs to address the soil resources where cable line will be conducted between Lake Erie and the Coho Switching Station in Pennsylvania. The soils along Lake Erie can be highly erosive and difficult to stabilize, once disturbed.

SCS-2 The Erie County Soil Survey is available to provide information on soil location, suitabilities, and limitations. The soil survey and technical assistance is available from Lewis Steckler, District Conservationist, Soil Conservation Service, R. D. #5, Route 19, Waterford, PA 16441, telephone 814-796-6784.

Thank you for the opportunity to review your draft Environmental Impact Statement.

Sincerely,

John J. Mank
Assistant State Conservationist
for Natural Resource Projects

cc:
Norman A. Berg, Chief, SCS, Washington, DC
Carter Christenson, Area Conservationist, SCS, Clarion, PA
Lewis Steckler, District Conservationist, SCS, Waterford, PA

Response to comments of the United States Department of Agriculture, Soil Conservation Service

November 12, 1981

SCS-1

Position noted on the erosive nature of the Lake Erie area soils. Background information on soils is presented in Section 2.1.3. The potential for erosion is recognized in Sections 4.1.1.1.1(b) and 4.1.4.1. Mitigative measures are presented in Sections 4.4.1.2 and 4.4.1.3.

SCS-2

Information noted.

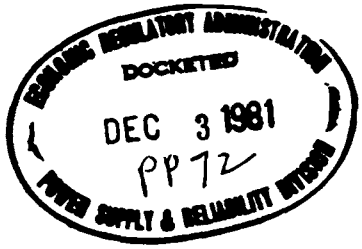
United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 81/1978

NOV 23 1981

Mr. James W. Workman
Acting Director
Utility Systems and Emergency
Communications Division
Office of Emergency Operations
Department of Energy
Washington, D.C. 20461



Dear Mr. Workman:

Thank you for your letter of September 4, 1981, transmitting copies of the draft environmental impact statement for a 300-kV Submarine International Transmission Line from Erie, Pennsylvania to Nanticoke, Ontario, Canada. Our comments are presented according to the format of the statement or by subject.

Aquatic Ecology

DOI-1 It is noted that most of the Lake Erie cable crossing will be in the central depression of the eastern basin. The bottom sediments in the depression are mainly soft muds. We suggest that the final statement also should consider the potential for any adverse effects on water quality that may result from any resuspension of bottom sediments during trenching within the depression, especially where excessive thicknesses of muds are excavated.

Cultural Resources

DOI-2 The statement notes the possibility of the proposal's impact on historic and prehistoric resources. We, therefore, urge the General Public Utilities Corporation to consult with the State Historic Preservation Officer on survey methods before reconnaissance or survey of rights-of-way for archeological sites. In this manner, the validity of the survey can be assured.

Threatened and Endangered Species

DOI-3 The statement that endangered eastern cougars (Felis concolor cougar) "...range into and are occasionally observed in the region" should be revised with respect to the eastern cougar in the project area in the United States. We are not aware of any recent confirmed sitings of eastern cougars in Pennsylvania.

Therefore, except for occasional transient species, no federally listed or proposed endangered or threatened species under the jurisdiction of the U.S. Fish and Wildlife Service are known to exist in the project impact area. Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

Response to comments of the United States Department of the Interior

November 23, 1981

DOI-1

Trenching activities will not occur in the central basin (Section 2.1.1.2). Water-quality impacts associated with cable laying without trenching will be substantially less than with trenching (Section 4.1.1.1.1).

DOI-2

The Applicant will consult with the Pennsylvania State Historic Preservation Officer (Section 4.4).

DOI-3

The text has been revised to incorporate this comment (Sections 3.1.4 and 4.1.1.4).

Fisheries

DOI-4 The draft statement correctly recognizes the value of the salmonid fishery and the heavy sportfishing pressure in the project vicinity in the spring and fall. We suggest that construction be planned to minimize activity in the vicinity of Elk Creek from mid-April to early May and from September to mid-November.

Fish and Wildlife Coordination Act

DOI-5 The Fish and Wildlife Service concurs with the conclusion that impacts on fish and wildlife resources will be mostly transitory in nature if construction follows the principles outlined in the draft statement. Project implementation would require permits from the U.S. Army Corps of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act of 1972, as amended (P.L. 92-500). However, in the Service's review of the permits pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), it would not object to project construction as described in the draft statement, but may recommend project modifications or other measures to mitigate for losses of wetland habitats, if necessary. For further information, you may contact the Area Manager, U.S. Fish and Wildlife Service, 1500 N. Second Street, Harrisburg, Pennsylvania 17102 (FTS 590-3743).

We hope these comments will be helpful to you in the preparation of a final statement.

Sincerely,

Bruce Blanchard, Director
Environmental Project Review

DOI-4

Position noted. The final schedule will be coordinated with appropriate agencies to minimize impacts to the Lake Erie fishery.

DOI-5

Position and information noted.

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION
WILLIAM PENN MEMORIAL MUSEUM AND ARCHIVES BUILDING
BOX 1026
HARRISBURG, PENNSYLVANIA 17120

October 13, 1981

Mr. James W. Workman
Acting Director
Utility Systems and Emergency
Communications Division
Office of Emergency Operations
United States Department of Energy
Washington, D.C. 20461

Re: Environmental Impact Statement
International Interconnection Between
GPU and Ontario Hydro
DOE/DEIS - 0079
Our file # ER 81 042 1020

Dear Mr. Workman:

The above named application has been reviewed by the Bureau for Historic Preservation in accordance with Section 106 of the National Historic Preservation Act of 1966, Executive Order 11593 and the regulations of the Advisory Council on Historic Preservation (36 CFR 800).

PHMC-1 Significant archeological sites are located in or near your project area & others are likely to exist. These resources could be adversely affected by project activities. Intensive testing of the archeological resources will be needed to determine their eligibility for listing in the National Register of Historic Places. For assistance in developing the necessary scope of work, please contact Kurt Carr of the Division of Planning & Protection, Bureau for Historic Preservation, Pennsylvania Historical and Museum Commission. The sites and areas that concern us are listed below.

Er 57

Sincerely,

Brenda Barrett
Director
Bureau for Historic Preservation
(717) 783-8947

Response to comment of the Commonwealth of Pennsylvania, Pennsylvania Historical and Museum Commission

October 13, 1981

PHMC-1

Surveys covering both the onland and underwater portions of the transmission line have been provided to the Pennsylvania State Historic Preservation Officer for review. The Department of Energy will complete compliance with procedures under the National Historic Preservation Act of 1966 prior to the time the Applicant begins construction.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

P.O. Box 2063
Harrisburg, PA 17120

October 15, 1981

Garet A. Bornstein
Department of Energy
System Coordination and Generation
Performance Branch
2000 M Street, NW., Rm. 4110
Washington, D.C. 20461

Dear Mr. Bornstein:

The Department has reviewed the Draft Environmental Impact Statement covering the proposed International Transmission Line from Erie, Pennsylvania to Nanticoke, Canada.

DER-1 The Department feels the draft EIS is an adequate review of environmental impacts from the project. We would be interested in reviewing the Final EIS when it becomes available.

DER-2 For your records, our Department has been assigned the responsibility to coordinate state agencies comments on documents required by the National Environmental Policy Act. Future EIS's should be sent to Walter A. Lyon, Deputy Secretary for Planning, P.O. Box 2357, Harrisburg, PA 17120 (717) 783-3940, to obtain the comments of Commonwealth agencies.

Thank you for the opportunity to review this report.

Sincerely,

CLIFFORD L. JONES
Secretary of Environmental Resources

Response to comments of the Commonwealth of Pennsylvania, Department of Environmental Resources

October 15, 1981, and November 24, 1981

DER-1

Comment noted.

DER-2

Information noted.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
P. O. Box 1467
Harrisburg, Pennsylvania 17120

(717) 783-9500
Office of the Deputy Secretary
Resources Management

In reply refer to
RM-CZM
CZ 7:SPE

November 24, 1981

Mr. Robert W. Vocke
Division of Environmental Impact Studies
U. S. Department of Energy
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, Illinois 60439

Dear Mr. Vocke:

In response to your letter of October 5, 1981, I am providing comments to the Draft Environmental Impact Statement prepared for the 300-KV Submarine International Transmission Line, Erie, Pennsylvania, to Nanticoke, Ontario, Canada General Public Utilities Corporation.

DER-3 In our review of the document, I have noted several incorrect interpretations of the Pennsylvania Coastal Zone Management (CZM) Program. The statements contained on pages 4-3 and B-3 referring to CZM are not technically correct. The statements regarding CZM should be changed to reflect the following fact. The Commonwealth of Pennsylvania has formally designated the Lake Erie shoreline bluff as a bluff recession hazard area (BRHA) under the authority of the Bluff Recession and Setback Act of 1980, not under the authority of the CZM Program. (A single CZM Act in Pennsylvania does not exist, since the Program is based on networking of existing State authorities.) All construction activities and mitigative measures in the BRHA must be approved under the conditions established by the Bluff Recession and Setback Act, not the CZM Program. By complying with standards and criteria for construction activities within the BRHA, which are enumerated in Title 25, Chapter 85, of the Department of Environmental Resources's Rules and Regulations, the activity would be deemed consistent with the Pennsylvania CZM Program.

In conclusion, I trust that this information will help you to clarify the intent of these statements made in this report. If you have any questions on this matter, please feel free to contact me at the above listed number.

Sincerely,

E. James Tabor, Manager
Coastal Zone Management Office
Resources Management

DER-3

The text has been revised (Section 4.1.1 and Appendix B).

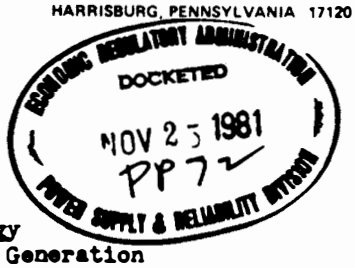
COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

P. O. BOX 1567
HARRISBURG, PENNSYLVANIA 17120

ADMINISTRATIVE DIVISIONS

ACCOUNTING	787 - 4492
ADMINISTRATION	787 - 5670
LICENSE SECTION	787 - 2084
PERSONNEL	787 - 7836
GAME MANAGEMENT	787 - 5529
	787 - 6711
INFORMATION & EDUCATION	787 - 6286
LAW ENFORCEMENT	787 - 5743
LAND MANAGEMENT	787 - 6818
REAL ESTATE	787 - 6568



105 S. State Street
Millville, Pa. 17846
November 20, 1981

Garet A. Bornstein
U.S. Department of Energy
System Coordination and Generation
Performance Branch
2000 M Street, NW., Room 4110
Washington, D.C. 20461

In re: Comments on Draft Environmental Impact Statement, 300-KV Submarine International Transmission Line, Erie, Pennsylvania, to Nanticoke, Ontario, Canada - Dooket No. PP-72

Dear Mr. Bornstein:

The attached report contains our agency's findings and recommendations regarding the proposals contained in the Draft Environmental Impact Statement for this project.

If you should have any questions or comments concerning this report, please direct them to me, or to Mr. Gregory J. Grabowics, Wildlife Impact Review Supervisor, Pennsylvania Game Commission, P. O. Box 1567, Harrisburg, Pa. 17120, (717) 783-8743.

Sincerely yours,

J Hugh Palmer,
Game Biologist
(717) 458-6320

cc: J. Bariah, DOE NY
R. Vocke, Argonne Nat. Lab.

Response to comments of the Commonwealth of Pennsylvania, Pennsylvania Game Commission

November 20, 1981

See p. 8-35.

PENNSYLVANIA GAME COMMISSION

ENVIRONMENTAL IMPACT REVIEW REPORT

Prepared by: J Hugh Palmer, Land Management Division, Pennsylvania Game Commission, November 20, 1981

Project: 300-KV Submarine International Transmission Line, Erie, Pennsylvania, to Nanticoke, Ontario, Canada - General Public Utilities Corporation

Scope: Review of Draft Environmental Impact Statement Prepared by U.S. Department of Energy

Investigator: J Hugh Palmer, Game Biologist, Land Management Division

Introduction

PGC-1 The international transmission line is one of three projects being considered by General Public Utilities. The other two are the Coho and Seward Seven Generating Stations. The overall wildlife impacts of the transmission line will be significantly less than those of the generating stations.

Species Affected

PGC-2 The information on page 3-9 is not a complete listing of the wild bird and mammal species found on the project site. However, it does list the major species and species groups. In addition, the site is described as being located on a major migratory bird flight path. We find this material to be generally adequate and acceptable.

The Game Commission has no information indicating the project area serves as resident habitat for any bird or mammal species listed as threatened or endangered by the U.S. Fish and Wildlife Service or defined as being of special concern by the Commission.

Interference With Commission Lands

PGC-3 No lands owned or leased by the Game Commission will be impacted by this project.

Reduction in Wildlife Habitat

PGC-4 Figure 3.2 adequately indicates the general habitat types found on the project area. Wetlands constitute the most significant wildlife habitat. It appears all wetland areas have been identified, but this should be verified against the U.S. Fish and Wildlife Service National Wetlands Inventory maps. Our experience in this area indicates extensive wetlands interspersion within the mesophytic forest.

The description of switching station and transmission corridor construction indicates land clearing will be conducted, but this is not quantified. Impacts of land clearing for transmission lines can usually be offset by proper revegetation, but it is still necessary to delineate the area involved to assess overall impacts. Information on page 4-14 indicates 195 acres of transmission corridor land will be diverted from its present use, but there is not sufficient data to indicate the impacts on wildlife habitat.

Information on pages 3-8, 3-9, 3-10, 4-6, and in Appendix B indicates a potential impact on wetlands, but again this is not quantified. As these areas constitute the most significant habitat type, probable impacts should be clearly indicated.

With the above-mentioned exception of wetlands losses, we find the material

PGC-1

Information and position noted.

PGC-2

Information and position noted. See Comment DOI-3 for statement on endangered and threatened species.

PGC-3

Information noted.

PGC-4

Paragraph 1 - Position and information noted. The wetlands will be verified against the U.S. Fish and Wildlife Service National Wetlands Inventory maps to the extent possible prior to DOE's publication of the final floodplain/ wetlands assessment and determination. A draft assessment is contained in this FEIS (Appendix B).

Paragraph 2 - Land clearing is quantified under Section 4.1.4, Land Use. The statement that 79 ha (195 ac) of transmission corridor land will be diverted from its present use is incorrect and has been revised.

Paragraph 3 - A loss of wetlands is not anticipated; only minor disturbances are expected during construction activities. See Response PGC-7.

PGC-4 on habitat reduction to be adequate and acceptable.

Reduction in Wildlife Populations

PGC-5 Reductions in wildlife habitat generally result in proportional reductions in wildlife populations. As habitat loss is not quantified in the DEIS, it is not possible to assess population reductions.

Page 4-5 indicates population losses will be minimized through relocation of impacted animals to other areas. Such relocation will result in temporary increases in population levels in the immigration areas. However, these populations will subsequently revert to pre-immigration levels resulting in an indicrect but real population reduction.

Development of Wildlife Mitigation Programs

PGC-6 Mitigation measures are discussed in Section 4.4. Generalized programs are outlined, but there are no specific proposals for wildlife mitigation. Such plans should be developed.

Comments, Conclusions, and Recommendations

PGC-7 It is the opinion of the Game Commission that under terms of the Fish and Wildlife Coordination Act, consultation between the Commission and the Department of Engergy should occur on this project. Prior to this report, such consultation has not been conducted. In fact, the copy of the DEIS we received to review came from the Fish and Wildlife Service, not DOE. We are requesting that such consultation continue for the remainder of project review. While the official review period for the DEIS has ended, we are requesting our comments receive full and proper consideration due to the factors outlined above and the lack of timely notification through proper channels.

The Commission is not opposed to the construction of this project if accomplished in an environmentally-acceptable manner. Our recommendations for affecting this are detailed below. We will not oppose the issuance of the U.S. Army Corps of Engineers Section 404 permit under the same conditions. Due to the unresolved wetlands issues, we may request specific assessment measures during permit review and the conditioning of the permit to insure proper mitigation of the unavoidable impacts.

The Game Commission makes the following recommendations to insure the environmental acceptability of this project:

1. The wildlife habitat losses resulting from project implementation must be quantitatively and qualitatively identified.

2. A wetlands preservation and mitigation plan must be developed through interagency coordination involving the U.S. Fish and Wildlife Service, U.S. EPA, the Pennsylvania Fish Commission, and the Game Commission. Any permanent wetlands losses will require mitigation.

3. A revegetation and management plan for the transmission corridors and other impacted areas must be developed through interagency coordination involving the U.S. Fish and Wildlife Service and the Game Commission.

PGC-5

Position noted. Habitat loss is quantified and described in the EIS in Section 4.1.4, Land Use, and in Section 4.1.1.2, Terrestrial Ecology. Additional information has been added to Section 4.1.1.2, Terrestrial Ecology. The statement was made that "Some individual small mammals may be unavoidably lost during the construction phase; but larger, more mobile species will relocate during construction, and most will return after construction activities cease. See Response PGC-6.

PGC-6

Proper implementation of the construction and operation/maintenance management plans (see Response PGC-7) should minimize impacts to wildlife. We believe that, under the circumstances, no additional mitigative measures are required.

PGC-7

The Pennsylvania Department of Environmental Resources received the DEIS (see Comment DER-2). Coordination will continue for the remainder of the project review. All Pennsylvania Game Commission comments will receive consideration. Wildlife habitat losses resulting from the project are described in Section 4.1.4, Land Use, and in Section 4.1.1.2, Terrestrial Ecology.

The Applicant will develop standard construction and operation/maintenance management plans, which will include specifications for (1) clearing and chemical treatment, (2) erosion and sediment control, and (3) vegetation management of the transmission corridor and other impacted areas including floodplains and wetlands. These plans will also include the detailed wetlands preservation and mitigation plans. These plans will be approved by appropriate agencies prior to any construction activities. The text has been revised to reflect this (Section 4.4). Mitigative measures will be required for any permanent wetlands losses. A final floodplain/wetlands determination will be made by DOE following comment on the assessment contained in this FEIS.

GPU Service Corporation
Post Office Box 1018
Reading, Pennsylvania 19603
215 371-1001
TELEX 136-482
Writer's Direct Dial:
215-371-5355

October 15, 1981

Mr. James Barker, Chief
System Coordination & Generation Performance Branch
Department of Energy
Room 4110
2000 M Street, N.W.
Washington, DC 20461

Dear Mr. Barker:

We have received the draft Environmental Impact Statement and are currently reviewing it.

In order to keep your office informed, enclosed is a copy of our filing with the MAAC Executive Board dated October 9, 1981. We anticipate review by the MAAC Area Coordinating Committee within the next month.

Very truly yours,

R. W. WERTS
Assistant Vice President
System Operations

RWW/rp
Enclosure

GPU Service

GPU Service Corporation
Post Office Box 1018
Reading, Pennsylvania 19603
[redacted] 215 371-1001
TELEX 136-482

Writer's Direct Dial No.
215-371-5355

October 22, 1981

DEIS Comment Coordinator
Department of Energy
System Coordination and Generation
Performance Branch
2000 M Street, NW
Washington, DC 20461

Dear Sir:

SUBJECT: Docket No. PP-72, Comments on Draft Environmental Impact Statement

On behalf of the General Public Utilities System Companies, I am pleased to submit comments on the Draft Environmental Impact Statement for the Lake Erie Interconnection.

We are generally satisfied with the document and offer only minor comments for clarity and completeness. As requested, two copies of our comments are enclosed.

If you require assistance in resolving any of the comments received from others or need further clarification on any matter, please contact myself or Mr. Paul Feldman at (814) 533-8576.

Very truly yours,

ROBERT W. WERTS
Assistant Vice President
System Operations

RWW:jrb

Enclosure

bcc: Messrs. P. S. Feldman
G. H. Huston
J. R. King

COMMENTS ON LAKE ERIE INTERCONNECTION DEIS

Cover Page

GPU-1 The title without punctuation is confusing since it links Canada with GPU. We suggest the following: Environmental Impact Statement, ±300-KV dc Submarine International Transmission Line, Nanticoke, Ontario, Canada to Erie County, Pennsylvania, Ontario Hydro and General Public Utilities.

Page 1.1., Section 1.1, Paragraph 2

GPU-2 Standard abbreviations used in EIS have Penelec as PN and Philadelphia Electric as PE. We suggest using PN for Penelec to avoid confusion.

Page 1.1., Section 1.1, Paragraph 2, Lines 7-10

GPU-3 Although GPU benefits will accrue, benefits to Jersey Central should be emphasized. The 1000 MW firm capacity will be credited to Jersey Central in the GPU interconnection arrangement. Also, line 10 should state that the U.S. portion would be constructed "in PN territory," but not necessarily by PN.

Page 1-4, Section 1.3

GPU-4 We regard this as too brief to adequately explain and emphasize the need for the project and consequences of it not being built.

Page 2.1, First Sentence

GPU-5 This sentence is somewhat confusing in describing how many options and routes were considered.

Page 2-1, Paragraph 2

GPU-6 Realistically, GPU does not have a "no action" alternative. Something must be done to meet demand. Section 2.1 may be titled: The Preferred Alternative, and reference that although specific design is not yet available, the impacts within limits have been estimated. Vendors will act within these limits.

Page 2-1, Paragraphs 4 and 6

GPU-7 Correct terminology, as used elsewhere, is ±250-325 kilovolts (KV) dc.

Response to comments from the General Public Utilities System Companies

October 22, 1981

GPU-1

The title has been revised to eliminate this confusion.

GPU-2

PE has been changed to PN (various pages).

GPU-3

Benefits to Jersey Central are noted (Section 1.1, paragraph 2). Line 10 has been revised to state "in PN territory but not necessarily by PN."

GPU-4

The information on need is adequate for this Environmental Impact Statement. Additional technical studies (Section 1.4) will be evaluated by DOE prior to granting or denying the Presidential Permit.

GPU-5

We do not believe the language is confusing; no changes have been made in the text (Section 2).

GPU-6

Comment noted. However, the statement as presented is correct and no revision has been made in the text (Section 2).

GPU-7

Suggestion noted. However, the presentation used is preferred (Section 2.1.1), and appropriate revisions have been made elsewhere in the text (various pages).

Page 2-5

GPU-8 Further definition on the cable spacing in deep water may allow revision of the mid-page sentence to read: "In the deeper central basin of the lake, the cables will be laid on the bottom, spaced a minimum of 250 meters apart with a buffer zone of 125 meters on either side of the outside cables. The cables will be allowed to sink into the bottom sediments."

Thus the anticipated corridor width is 1250 meters.

Page 2-6, Last two paragraphs

GPU-9 For case of comparison, common units should be used, such as kilometers per day or kilometers per week, not both.

Page 2-7, Paragraph 2

GPU-10 Second sentence should read: "Plans are to excavate a single trench for the cables with a backhoe, allowing spacings of about 1 meter (3 feet) between each cable."

Page 2-7, Paragraph 4

GPU-11 The statement ".... the Applicant will be prohibited from constructing any structures in the floodplains and wetlands (GPU 1980a)" is incorrect and too restrictive. The DOE has correctly stated in Appendix B (page B-3) that "Although the applicant will avoid these areas whenever possible, some construction activities in wetlands will be unavoidable...." and goes on to explain how these impacts will be minimized. Drawings C-12723 provided with Supplement 5 to the Environment-l Report specifically detail the location and degree of impact on wetlands and floodplains.

Also, we believe the DOE should define its use of "wetlands" and "floodplains."

Page 2-10, Section 2.1.2

GPU-12 This section could be entitled "Alternative Interconnection Routes."

Page 2-11, Section 2.2.1

GPU-13 This should begin "GPU has developed a two-pronged energy management strategy to meet future energy and capacity needs during the 1980's."

Page 2-11, Section 2.1.2, top paragraph, last sentence

GPU-14 The transmission would be of benefit mainly to New Jersey (not Pennsylvania; therefore, public and political support in Pennsylvania might also be lacking.

GPU-8

New information noted. The text has been revised (Section 2.1.1.1).

GPU-9

Comment noted.

GPU-10

New information noted. The text has been revised (Section 2.1.1.3).

GPU-11

The Applicant will be prohibited from placing any structures in wetlands and floodplains. However, it is recognized that construction activities will occur in wetlands and floodplains, and appropriate mitigative measures will be taken to reduce these impacts. The text has been revised to clarify this point (Section 2.1.1.4).

The Glossary now contains the DOE definitions of wetlands and floodplain as presented in the Federal Register ("Compliance with Floodplain/Wetlands Environmental Review Requirements," March 7, 1979, Part IV).

GPU-12

Comment noted. However, the language used is correct, and no change has been made in the text (Section 2.1.2).

GPU-13

Comment noted. The text has been revised (Section 2.2.1).

GPU-14

Comment noted. The text has been revised (Section 2.1.2).

Page 2-11, Section 2.2.1, last sentence

GPU-15 Such an offer may not yet be approved by the PaPUC and the NJ BPU.

Page 2-13, Paragraph 3

GPU-16 Existing units would probably not be equipped with scrubbers.

Page 2-17

GPU-17 The DOE should define " nlinear symbiotic effects of appreciable magnitude."

Page 3-9, Paragraph 2

GPU-18 The scientific name for sycamore is Platanus occidentalis (not Acer platanoides).

Page 3-16, Paragraph 1 and Page 4-11, Paragraph 6

GPU-19 The results of the survey by Carnegie Institute and excavation by Gannon University should be included.

Pages 3-16, 3-23, 4-13 and 4-14

GPU-20 Reference to recreation areas does not mention the proposed Elk Creek Recreation Area adjacent to the Coho side on the west side of Elk Creek. In March, 1981, Penelec finalized an agreement with Girard Township, leasing 46.6 acres on a 25-year renewable term. In August, 1981, the park was dedicated and construction began by the township with matching funds from the Coastal Zone Management program. The statement on page 4-13 that "construction of the line would reduce the scenic quality of the creek, as well as the recreational value that users of the creek, especially fishermen, receive from their visits" is more than offset by construction of the part on land leased from Penelec.

Page 4-8, Section 4.1.2.1 (a)

GPU-21 The number in the work force may be revised to state that about 200 people will be required during peak construction periods. They break down as follows:

1983

60 in the summer for sea trials
60 for dredging

1983-1984 and 1985

20 for land cable entrenchment
120 for submarine cable
60 for dredging

GPU-15

The use of "will" in paragraph 2 of Section 2.2.1 is subject to Master Plan approval. No change is required.

GPU-16

Comment noted. The text has been revised (Section 2.3).

GPU-17

Comment noted. The statement has been deleted (Section 2.5).

GPU-18

Comments noted. The text has been revised (Section 3.1.2).

GPU-19

New information noted. The survey has been incorporated (Sections 3.3.2 and 4.1.3.1).

GPU-20

New information noted. The text has been revised (Section 3.4.2). Position on offsetting impacts is noted.

GPU-21

New information noted. The text has been revised (Section 4.1.2).

GPU-21 Page 4-8, Section 4.1.2.1 (a) (cont'd.)

1986

120 for the submarine (5th) cable

This revision is to allow for double shifts (of 60 workers each) and a separate dredging crew.

The last sentence on page 4-8 should be revised to state that about 150 workers will be hired from the U.S. and Canadian labor forces.

Page 4-9

GPU-22 A revised schedule is enclosed.

Pages 4-12, 4-14

GPU-23 The statement that "79 ha (195 ac) of the 190 ha (470 ac) corridor will be diverted from current uses" is incorrect and inconsistent with the statements that follow which indicate that a maximum of 5.02 ha will be diverted from current uses.

Page 4-14

GPU-24 Construction of the trench by means proposed and subsequent stabilization would tend to increase shoreline stabilization, thus decreasing erosion potential, not accelerating erosion and recession. The Pennsylvania Coastal Zone Management Program and Girard Township will issue a variance from the Bluff and Setback Act for the portion of the buried cable route. Furthermore, the Erosion and Sedimentation Control Plan has been approved by the USDA-Soil Conservation Service and Erie County Conservation District.

Page 4-28

GPU-25 The U.S. EPA issued a PSD permit for the Coho-1 Generating Station on August 1, 1981.

Page 4-30, Paragraph 5

GPU-26 The statement that the applicant will restrict trenching activities to the period mid-June through August is too restrictive. The actual schedule will be determined the the availability of labor and coordinated with the PaDER and Pennsylvania Fish Commission to minimize impacts on the Lake Erie fishery.

Page 4-31

GPU-27 With regard to shipwreck sites, please make it clear that no such sites were found in two detailed surveys on the U.S. side of the international border. One was identified adjacent to the corridor on the Canadian side.

GPU-22

New information noted. The revised Figure 4.1 has been placed in the text (Section 4.1.2).

GPU-23

The error is acknowledged. The text has been revised (Section 4.1.4).

GPU-24

Information and position noted. The text remains unchanged (Section 4.1.4).

GPU-25

Information noted. The text has been revised (Section 4.2.3.6).

GPU-26

Information noted. The text has been revised (Section 4.4.1.1).

GPU-27

New information noted. The text has been revised (Section 4.4.1.1).

Page 4-34

GPU-28 If sand, gravel and natural gas resources development is unlikely during the lifetime of the project, it does not follow that this is a "significant environmental effect."

Page 4-34

GPU-29 The relatively insignificant effects to ecological resources should be defined in more detail.

Page 4-35, Paragraph 1

GPU-30 Should read "..... demand for domestic and imported oil."

GPU-28

Position noted. However, the potential conflict in resource development is a significant environmental effect (Section 4.5.2).

GPU-29

Comment noted. The text has been revised (Section 4.5.5). The reader is referred to Sections 4.1.1.1 and 4.1.1.2 for additional information on ecological resources.

GPU-30

Comment noted. The text is correct as presented (Section 4.7).

APPENDIX A. GLOSSARY

Amphipod--Any of a large group (Amphipoda) of small crustaceans (as the sand flea) with a laterally compressed body.

Anoxic--A lack of dissolved oxygen, which in turn alters various physical and chemical reactions, as well as inhibiting organisms which require oxygen to survive.

Anthropogenic--Of, relating to, or influenced by the impact of man on nature.

Benthic--Relating to, or occurring at the bottom of a body of water.

Biota--The flora and fauna of a region.

Capacitor--Electrical component formed by conductors and separated by a dielectric which may be a vacuum, paper, mica, glass, air, or other substance.

COE--United States Army Corps of Engineers.

dB--Decibel.

Decentralized--The dispersion of energy generation from a central location to individual homes and businesses.

ECAR--East Central Area Reliability Coordination Agreement.

EPA--United States Environmental Protection Agency.

EPCE--Estimated Permissible Concentration based on Ecological Effects.

EPCH--Estimated Permissible Concentration based on Health Effects.

EPRI--Electrical Power Research Institute.

ER--Environmental Report.

Eutrophic--The chemical condition or state of a lake containing high levels of nutrients, which results in biologically "rich" environments. Eutrophic lakes are generally shallow and warm.

Firm Purchase (Transfer)--The power and associated energy to be purchased is intended to be available at all times during the period covered by the committment. The power is usually obtained outside the power pool of the purchasing utility.

Floodplain--The lowlands adjoining inland and coastal waters and relatively flat areas and flood-prone areas of offshore islands including, at a minimum, that area inundated by a 1% or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0%) floodplain. The critical action floodplain is defined as the 500-year (0.2%) floodplain.

Forbs--Any herb other than grass.

GPU--General Public Utilities Corporation.

HVDC--High voltage direct current.

Hypolimnetic--Pertaining to the cold bottom layer of water of a stratified lake, which is of an essentially uniform temperature.

Inductance--That property of a circuit which, when carrying a current, is characterized by the formation of a magnetic field and the storage of magnetic energy.

Lacustrine--Of, relating to, or growing in lakes.

MAAC--Mid-Atlantic Area Council.

Macrobenthos--The large organisms that live on or in the bottom of bodies of water.

Macroinvertebrates--The larger species of animals that lack a spinal column. Generally used in describing aquatic forms of insects, although snails, worms, clams, and other organisms are included.

Mean Dentention Time--The average time it takes the total volume of water in a lake (such as Lake Erie) to flow into the downstream lake or river.

Mesophytic--Grows under medium conditions of moisture, where water supply is neither scanty nor abundant.

Microbenthos--The smaller organisms that live on or in the bottom of bodies of water.

NPCC--Northeast Power Coordinating Council.

PSD--Prevention of Significant Deterioration Program; the purpose of the program is to prevent deterioration of air quality in attainment areas, where current air quality is better than the National Ambient Air Quality standards (NAAQS).

RI--Radio interference.

Riparian--Relating to, or living, or located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tide-water.

ROW--Right-of-way; the land used by a public utility (as for a transmission line).

SNR--Radio broadcast signal-to-noise ratio.

Taxa--Classifications of plants and animals according to their presumed natural relationships.

Tesla--A unit of magnetic flux density.

Thyristor--Semiconductor device for bistable switching between high conductive and nonconductive modes.

Till--Unstratified glacial drift consisting of clay, sand, gravel, and boulders intermingled. Produced by the erosion of rocks caused by moving ice.

TSP--Total suspended particulates; a measure of air quality.

TVI--Television interference.

Wetlands--Those areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds.

APPENDIX B. FLOODPLAIN/WETLAND ASSESSMENT

I. Project Purpose and Description

General Public Utilities (GPU), a U.S. electric utility holding company, and Ontario Hydro (OH), a crown corporation of Canada, propose in cooperation to construct and operate the Lake Erie Interconnection, a 109-km (68-mi) long, 325-kilovolt high-voltage direct current (HVDC) line for transmission of electric power between existing substations near Erie, Pennsylvania, and Nanticoke, Ontario (Figs. 1.1 and 1.2). The purpose of the proposed Lake Erie Interconnection is to provide an adequate transmission path for a proposed firm purchase of 1000 MW from OH during the years 1985 through 1994. GPU proposes to construct and own the U.S. portion of the facility whereas OH would construct and own the Canadian segment.

Approximately 99 km (62 mi) of the transmission line would be submerged under Lake Erie. Approximately 10 km (6 mi) of onshore transmission line would be constructed to connect the Erie West Substation to a switching station located near the U.S. side of the Lake Erie shore. The proposed onshore transmission line would cross part of the Lake Erie shore, two small drainage courses of Duck Run Creek, the Crooked Creek mainstream, and two small tributaries of Crooked Creek.

II. Floodplain/Wetland Effects

The area where GPU proposes to locate its transmission line is characterized by flat narrow plains, incised by drainage patterns; all waters drain towards Lake Erie. Most of the existing vegetation along the proposed transmission route is either cropland or mixed mesophytic forest. Portions of the proposed transmission route consist of forested and unforested wetlands and floodplains (Fig. B.1). The forested wetlands are "shrub" and "wooded swamps", some of which are abandoned cropland or timbered areas which are influenced by the successional process. The unforested wetlands consist of naturally occurring openings supporting an herbaceous growth and areas kept clean by various cultural practices.

Construction operations associated with cable laying from the shore to the switching station (0.4 km; 0.24 mi) will result in a temporary increase in erosion and sedimentation and loss of vegetation on the Lake Erie shore. In addition, operations will affect the Lake Erie bluffs, which have been designated as a critical hazard area in the Pennsyvania Coastal Zone Management Program (U.S. Department of Commerce 1980).

Approximately 16.7 hectares (41.2 acres) of floodplain/wetlands are located in the proposed overhead transmission line corridor, mostly in association with tributaries to the Duck Run Creek and Crooked Creek areas. Although the Applicant will avoid these areas whenever possible, construction activities

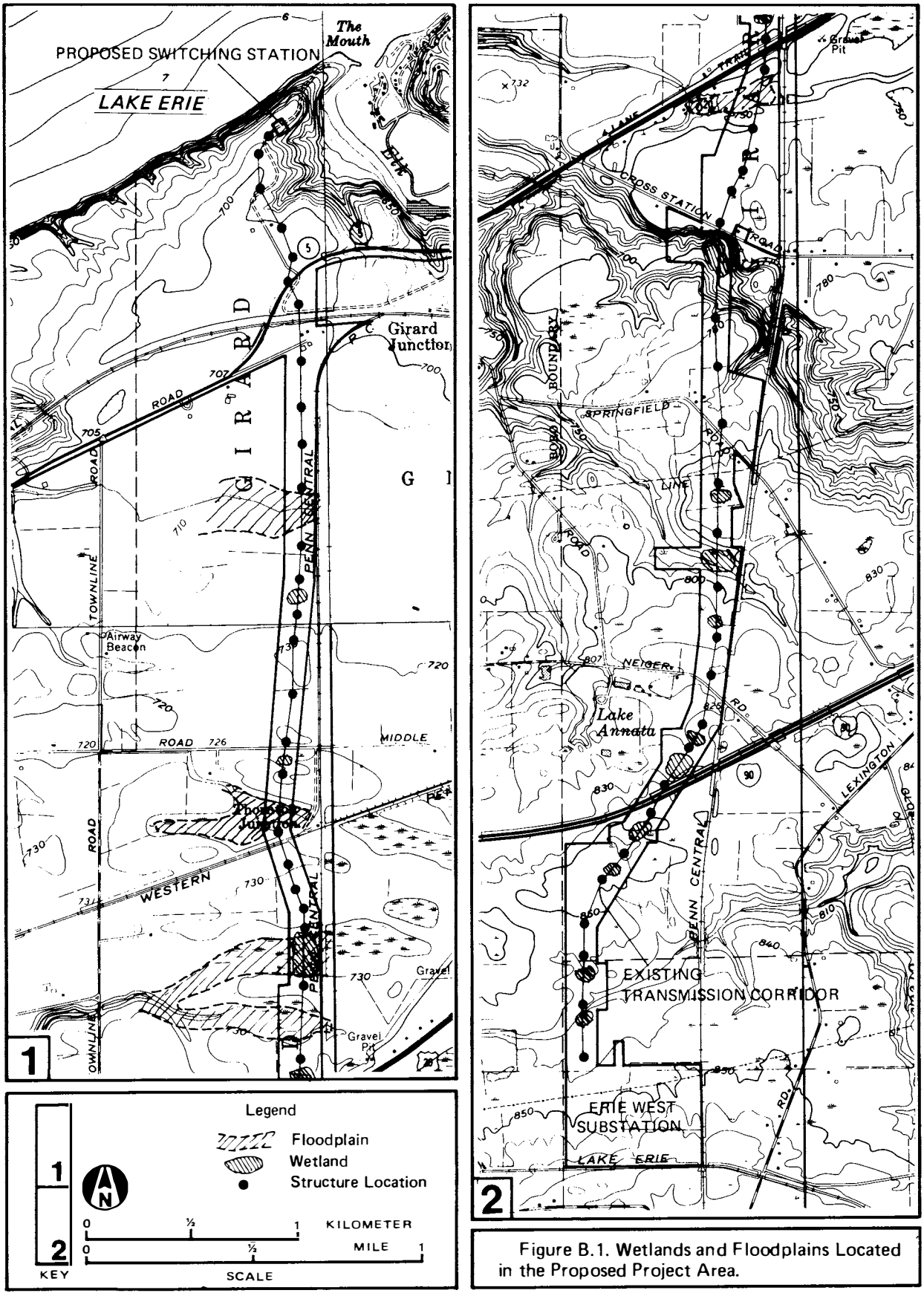


Figure B.1. Wetlands and Floodplains Located in the Proposed Project Area.

for the overhead transmission line are expected to unavoidably impact 0.8 hectares (2.1 acres) of floodplains and wetlands, resulting in a temporary increase in erosion and stream sedimentation. Vegetation (i.e., riparian floodplain and shrub-wooded wetland) in the transmission corridor will be cleared. Trees will be replaced with lower-growing vegetation forms.

Crooked Creek, which the transmission lines will cross, has been designated as a unique area and a state conservation stream by the Pennsylvania Coastal Zone Management Program. Impacts to Crooked Creek will be esthetic and a temporary increase in erosion and sedimentation.

To mitigate impacts to the Lake Erie bluffs and affected streams, the Applicant's construction practices will be in compliance with the Pennsylvania Bluff Recession and Setback Act and designed to minimize erosion and recession of the bluffs. In a letter of November 24, 1981, the Pennsylvania Department of Environmental Resources indicated that Applicant compliance with the standards and criteria for construction activities within the hazard area (Title 25, Chapter 85, of the Pennsylvania Department of Environmental Resource's Rules and Regulations) would cause the construction activity to be deemed consistent with the Pennsylvania Coastal Zone Management Program.

Temporary increases in erosion and stream sedimentation due to construction of the overhead transmission line will be reduced by construction practices. Road widths will be kept to the minimum required to accommodate the equipment that will use the roads; cuts will be made only where necessary to reduce road grades to acceptable levels, and access roads will be designed to cross streams as nearly as possible at right angles. Erosion and sedimentation control procedures will be implemented, siltation dams will be placed on grade slopes during construction, and disturbed areas will be seeded and mulched as soon as practicable after construction is completed.

The placement of tower structures will be specifically designed to avoid wetland and floodplain areas. Towers will not be placed on steep, highly erodable slopes such as those adjacent to the Crooked Creek mainstream. GPU will minimize potentially adverse environmental impacts in the wetland areas through the use of special equipment for wetland terrain designed to minimize impacts to vegetation and soils. The use of this equipment will be limited to seasons when the ground is frozen or entirely dry to further minimize impact. Esthetic impacts to Crooked Creek will be minimized by crossing the stream where it is fairly narrow.

III. Alternatives

Possible alternatives to the proposed Lake Erie transmission line interconnection include enhancement of conservation and use of decentralized energy sources, purchase of additional power from U.S. sources, and construction of additional generating capacity. GPU already has implemented a Conservation and Load Management Plan. It appears unlikely that enhancement of this plan would remove the need for the firm purchase from OH. "No action" by DOE would be equivalent to denial of the Permit.

GPU considered four alternative routes in determining the most desirable location for the interconnection between Ontario Hydro and the Pennsylvania-

Jersey-Maryland Interconnection (PJM): (1) the proposed Lake Erie Interconnection, (2) a combined overland and submarine cable route, (3) a route through the New York Power Pool (NYPP), and (4) another via Michigan and Ohio. The combined overland-submarine, NYPP, and Michigan-Ohio routes are not preferable for GPU's 1985-1994 energy needs. The applicant's preferred alternative is expected to generate environmental impacts no greater than any of the other alternatives.

The environmental impacts expected from the enhanced conservation and decentralized source alternatives would be mainly those due to increased mining, manufacturing, and transportation required to supply the materials and equipment necessary to implement this alternative. These impacts would be national in extent but imperceptible (or nearly so) at any specific locality. This alternative would not provide the enhancement of reliability which would be a benefit from the proposed interconnection.

The alternative of purchase of additional power from other U.S. sources could have a wide variety of impacts, depending upon how and where the power is generated. Since these impacts would be spread over many locations, they would be nearly imperceptible in any specific locality.

Construction impacts would result from the alternative of construction and operation of additional generating capacity. The impacts of operation would be roughly comparable to those associated with additional power purchases, but mainly confined to a single, small region in which they could be significant.

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