

## **APPENDIX 3**

### **Union Gas Hydroelectric Project**

#### **Agency Contacts**

## Appendix 3

### Agency Contacts

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## **APPENDIX 4**

### **Union Gas Hydroelectric Project Location and Operations**

## Appendix 4

### Union Gas Hydroelectric Project

#### Location and Operations

The Union Gas hydroelectric facility (the Union Facility) is located 6.8 miles downstream of the Messalonskee Lake on the Messalonskee Stream in the town of Waterville, Maine (see Appendix 1). The hydroelectric station was constructed at the site of the existing Union Gas dam, which failed in 2001 and was rebuilt in 2007. Project works consist of a 343-foot-long dam with 1.5-foot-high flashboards; a powerhouse containing one 1.5-MW generator; and a 1.5-mile-long impoundment with a gross storage capacity of 30 acre-feet.

Operation of the Union Facility is dependent on inflow to Messalonskee Lake and discharge from the upstream Oakland and Rice Rips hydroelectric projects. When inflow to Messalonskee Lake is greater than approximately 570 cfs, the Union project is operated as a run-of-river project. When inflow is less than approximately 570 cfs the project is cycled. All water that does not go through the turbines is passed over the spillway. MSH utilizes the top 0.5 feet of Messalonskee Lake as storage for generation during the summer months (1.0 foot during the winter months). The applicant only utilizes the top 0.5 feet because the lake is regulated and operated for recreational purposes. During the summer months, if the lake level is reduced by more than 0.5 feet camp owners on the lake complain because of the effect on their docks. The top 0.5 feet of lake provides roughly 1,500 acre-feet of storage.



## **APPENDIX 5**

### **Union Gas Hydroelectric Project**

#### **Description of Project Flows**

## Appendix 5

### Union Gas Hydroelectric Project

#### Description of Project flows

As was previously mentioned in Appendix 2 and Appendix 4, flow into the Union Project is determined by releases from the Messalonskee Lake dam and discharge from the Oakland and Rice Rips hydroelectric stations. The Messalonskee Lake dam is located approximately 6.8 miles upstream from the Union Gas dam. The water quality certificate ("the WQC") issued to the Union Project (see Appendix 5-1) recognized the effect the Messalonskee dam would have on the operation of the Union Project. The water level of the Messalonskee Lake reservoir level is managed for recreational purposes.

Messalonskee Lake receives the most recreational use of any other water bodies within the project boundaries. Existing recreational facilities include various hard-surface boat launch facilities and fishing sites along the Messalonskee stream. During summer months the WQC allows a reservoir draw down of up to 0.5 foot from an elevation of 235.4 feet. The applicant only utilizes the top 0.5 feet during the summer months because camp owners on the lake complain when the water goes lower than that. During winter months, a reservoir drawdown of 1.0 foot is allowed from an elevation of 235.4 feet. During shutdown periods a continuous flow of 15 cfs is required to be maintained through project developments until the reservoir level is built up to reestablish turbine operation and or spillage.

The Union Project is operated as a run of river facility. The Union Project impoundment level is maintained at the top of the spillway through operation of a pond level control system. When lake discharges are approximately 570 cfs or greater water is discharged through the turbine. When flows are approximately 570 cfs or less the turbine are cycled. During shutdown the turbine is required to ramp down over a 30-minute period. If the turbine is not operating water is discharged over the Union Gas dam spillway. The project is required to maintain a minimum flow of 15 cfs or project inflow, if less, through the project development.

## APPENDIX 5-1

### State of Maine Department of Environmental Protection Water Quality Certification



STATE OF MAINE  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
STATE HOUSE STATION 17 AUGUSTA, MAINE 04333

(AUTOMATIC DEVELOPMENT)  
(SUBSEQUENTLY TRANSFERRED)

DEPARTMENT ORDER

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY	)	
SIDNEY, BELGRADE, OAKLAND, WATERTOWN	)	MAINE WATER QUALITY PROGRAM;
KENNEBEC COUNTY, MAINE	)	FEDERAL CLEAN WATER ACT
MESSALONSKEE PROJECT	)	
#L-17585-33-D-N	)	WATER QUALITY CERTIFICATION
#L-17585-32-D-N (APPROVAL)	)	

Pursuant to the provisions of 38 M.R.S.A. Section 464 et seq. and Section 401 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act), the Department of Environmental Protection has considered the application of CENTRAL MAINE POWER COMPANY with its supportive data, agency review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

- a. Application: The applicant proposes the continued operation of the existing Messalonskee Project, located on Messalonskee Stream in the Towns of Sidney, Belgrade, Oakland, and the City of Waterville, Kennebec County, Maine (See Exhibit 1).
- b. Existing Project Features: The project consists of a water storage dam and 4 discrete hydroelectric generating facilities. The only commonality between the projects is that they are all operated to utilize flow provided by the uppermost dam, the Messalonskee Lake Dam.

Messalonskee Lake Development: The Messalonskee Lake Dam was rebuilt in 1992. The dam consists of a 54-foot long, 7-foot high concrete spillway dam with a crest elevation of 231.9 feet, plus 3.5 foot high flashboards, and a gatehouse section containing two 12-foot wide, 10.75 foot high, taintor gates (See Exhibit 2). The normal full pond level of Messalonskee Lake is at elevation 235.4 feet, has a surface area of 3,600 acres and an estimated 3,400 acre-ft of usable storage at a 1 foot drawdown. This dam is operated to maintain the level of Messalonskee Lake and provide storage for the 4 downstream hydro stations.

Oakland Development: Oakland consists of a dam, intake structure, penstock, powerhouse, and impoundment (See Exhibit 3). The dam is a gravity structure measuring 115 feet in length which includes a spillway and a gated section. The total head of the dam is 67.3 feet. The crest of the spillway is at elevation 207.1 feet. The intake is integral with the dam and has trashracks upstream of the gates. Water flows through the intake and into a 10-foot-diameter fiberglass and steel penstock. The concrete surge tank is 21 feet high. The powerhouse is a concrete structure measuring 38 feet 10 inches square. The powerhouse contains a single vertical Francis turbine rated at 2,800 kW at a head of 67.3 feet. The maximum hydraulic capacity of the unit is 590 cfs. The impoundment formed by the dam is 1,900 feet long, has a normal surface elevation of 207.1 feet, and has a surface area of 10 acres. The bypass reach that is created by the penstock is approximately 500 feet long and the substrate is exposed ledge.

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Rice Rips Development: Rice Rips is located 1.9 miles downstream from Oakland. It consists of a dam, an intake structure, penstock, surge pond, powerhouse, and impoundment (See Exhibit 4). The dam is a concrete Ambursen dam measuring 220 feet in length and has an intake section, a hinged flashboard section, an overflow spillway section, and two earthen embankments. The flashboards are 5 feet high with a crest elevation of 139.1 feet. The concrete intake section is integral with the dam and conveys water to the 10-foot-diameter penstock of wood stave construction. The penstock is 2,292 feet long and empties into a surge pond that is 150 feet in diameter. Water flows from the surge pond into the concrete powerhouse which measures 42.5 feet by 30.5 feet. The powerhouse contains a single, vertical Francis turbine rated at 1,600 kW at a head of 42.4 feet. The maximum hydraulic capacity of the unit is 630 cfs. The impoundment formed by Rice Rips dam is approximately 1.6 miles long, has a normal surface elevation of 139.1 feet, and has a surface area of 87 acres. The bypass that is created by the penstock is approximately 2400 feet in length and consists of coarse and cobble/gravel substrate.

Automatic Development: Automatic is approximately 5 miles downstream of Rice Rips and consists of a dam with integral powerhouse and an impoundment (See Exhibit 5). The dam is a concrete gravity structure measuring 80 feet in length. The dam has a spillway section, a gated section, and a non-overflow section. The dam is also equipped with flashboards that are 1.9 feet high. The crest of the spillway is at elevation 92.4 feet. The powerhouse contains 1 horizontal Francis turbine rated at 800 kW at a head of 23 feet. The maximum hydraulic capacity of the turbine is 615 cfs. The impoundment formed by Automatic is approximately 4.5 miles long, has a normal surface elevation of 94.3 feet, and has a surface area of approximately 68 acres.

Union Gas Development: Union Gas is the furthest downstream of the Messalonskee Project generating facilities (See Exhibit 6). Union Gas consists of a dam, an adjacent powerhouse, and an impoundment. The dam has an earthen section and a stone masonry structure consisting of a non-overflow section, a gated section, a spillway and an intake section. Total length of the dam is 343 feet. The spillway has a crest elevation of 67.6 feet. The dam is equipped with flashboards that are 1.5 feet in height. The powerhouse contains a single vertical Francis turbine rated at 1,500 kW at a head of 37.8 feet. The maximum hydraulic capacity of the unit is 660 cfs. The impoundment formed by Union Gas is approximately 1.5 miles in length, has a normal surface elevation of 69.1 feet, and a surface area of 25 acres. The usable storage of the impoundment is estimated to be 30 acre-feet at a 1.3 foot drawdown.

- c. Existing Project Operation: As previously discussed, the Messalonskee Project consists of a water storage dam and four hydroelectric generating facilities. The Messalonskee Lake water storage development is operated to provide water releases of approximately 570 cfs to the four downstream hydro stations. This is the most efficient flow for overall generation at the four stations. Once flow is released from Messalonskee Lake, each station is manually brought on-line by a traveling operator. During the summer months the 570 cfs is passed downstream until Messalonskee Lake is

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drawn down by 0.5 foot; at that lake level, the gates are closed and the lake begins to refill with inflow. During the winter months the lake is drawn down by 1.0 foot. Water flow from the upstream lakes is controlled by DEP water level order L-11097-36-A-N, dated October 30, 1985. Historically, during periods when generation flows were not being released, only leakage flows were passed downstream from Messalonskee Lake. Leakage was estimated at 12-15 cfs. In 1992 the Messalonskee Lake Dam was rebuilt and two new gates were installed. The gates are capable of passing the historical leakage flow.

When inflow to Messalonskee Lake is greater than 570 cfs, the projects are essentially operated run-of-river. All water that does not go through the turbines is passed as spillage.

When inflow to Messalonskee Lake is less than 570 cfs, the project cycles. Generation releases will generally occur daily from mid-September through early June. For the first part of this period, September through February, the generation cycle usually lasts either 8 or 16 hours per day. From February into June, the cycles are usually longer, lasting either 16 or 24 hours. During the remainder of the year, mid-June through mid-September, there may only be sufficient inflow to generate for a single 8-hour cycle per week. These generation periods are dependent upon inflow into Messalonskee Lake. After the generation flow ceases, the four generation stations are taken off-line. The first three hydro stations below Messalonskee Lake operate run-of-river, with outflow equaling inflow. The fourth project, Union Gas Development, has a computer controlled water level management system which automatically brings the station on-line when its impoundment level is full and automatically goes off-line when the impoundment has been drawn down 1.3 feet. When Messalonskee Lake is cycled, the lake level fluctuates by 0.5 feet during the summer months and 1.0 foot during the winter months.

d. Summary of Proposal: The applicant proposes to operate the project in accordance with several measures for the protection or enhancement of, or mitigation of impacts on, public resources. These measures include:

- Maintaining water levels in each of the project impoundments to within one foot of full pond elevation, except Messalonskee Lake which will be limited to a 6-inch fluctuation during the summer months, 1.0 foot during the winter, and Union Gas impoundment which will fluctuate up to 1.3 feet below normal full pond elevation;
- Providing a year-round minimum flow of 15 cfs through the Project including the Rice Rips bypass;
- Initiating a new downramping sequence at the Union Gas Development;
- Implementing the provisions of the "Messalonskee Lake Waterfowl Management Plan";
- Developing a new improved picnic site/day use area below the Messalonskee Lake Dam;

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- Installing an informational/interpretive sign at the Oakland Development, and installing project identification signs at all of the projects;
- Investigating the need for establishing a "green belt/multi use" area along the east side of Messalonskee Stream between the Oakland Development and the Rice Rips Development;
- Improving parking at the Rice Rips Development;
- Evaluating the feasibility of creating a carry-in access site to the Rice Rips impoundment;
- Developing a carry-in access at Colby College; and
- Installing a hard surface boat ramp on the Kennebec River.

## 2. JURISDICTION

Water Quality Certification. The proposed continued operation of the project qualifies as an "activity...which may result in (a) discharge into the navigable water (of the United States)" under the Clean Water Act (CWA), 33 UC 1251 et seq. Section 401 of the CWA requires that any applicant for a federal license or permit to conduct such an activity obtain a certification that the activity will comply with applicable State water quality standards.

All the projects were originally licensed as water power projects under the Federal Power Act (Oakland, including the Messalonskee Lake Dam, Project No. 2559; Rice Rips, Project No. 2557; Automatic, Project No. 2555; and Union Gas, Project No. 2556). All project licenses were issued with an effective date of May 1, 1965, and an expiration date of December 31, 1993. On February 10, 1990, the Federal Energy Regulatory Commission (FERC) granted approval for the licensee to license the four projects as a single project including five hydraulically related developments. FERC assigned the Messalonskee Project FERC No. 2555. The licensee has filed an application to continue to operate the Messalonskee Project. This application is currently pending before FERC. In accordance with FERC Relicensing Regulations, the project developments are currently operating under annual licenses which will be automatically renewed each year until a relicensing decision is made.

The Department of Environmental Protection has been designated by the Governor of the State as the certifying agency for issuance of Section 401 Water Quality Certification for hydropower projects located in whole or in part in organized municipalities subject to the Department's regulatory jurisdiction. The Messalonskee Project is located in whole in the Towns of Sidney, Belgrade, Oakland, and the City of Waterville, which are organized municipalities subject to the Department's jurisdiction.

## 3. APPLICABLE WATER QUALITY STANDARDS

- a. Classification: The waters of the Messalonskee Project are currently designated as follows:



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Messalonskee Lake - Class GPA. 38 M.R.S.A. §465-A.

From the outlet of Messalonskee Lake to its confluence with the Kennebec River, including all impoundments except Rice Rips Lake - Class C. 38 M.R.S.A. §467(4)(E)(1)(a).

Rice Rips Lake - Class GPA. 38 M.R.S.A. §465-A.

- b. Designated Uses: Class GPA waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural. 38 M.R.S.A. §465-A(1)(A).

Class C waters shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, and navigation; and as habitat for fish and other aquatic life. 38 M.R.S.A. §465(4)(A).

- c. Numeric Standards: Class GPA waters do not have numeric standards for dissolved oxygen (DO).

The dissolved oxygen content of Class C waters shall be not less than 5 parts per million or 60% of saturation, whichever is higher. 38 M.R.S.A. §465(4)(B).

- d. Narrative Standards: Class GPA waters shall be described by their trophic state based on measures of the chlorophyll "a" content, Secchi disk transparency, total phosphorous content and other appropriate criteria. Class GPA waters shall have a stable or decreasing trophic state, subject only to natural fluctuations and shall be free of culturally induced algal blooms which impair their use and enjoyment. 38 M.R.S.A. §465-A-(1)(B)

Discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community. 38 M.R.S.A. § 465(4)(C).

- e. Antidegradation: The Department may only approve water quality certification if the standards of classification of the waterbody and the requirements of the State's antidegradation policy will be met. The Department may approve water quality certification for a project affecting a waterbody in which the standards of classification are not met if the project does not cause or contribute to the failure of the waterbody to meet the standards of classification. 38 M.R.S.A. § 464(4)(F).

#### 4. DISSOLVED OXYGEN

- a. Existing Conditions: The water quality in Messalonskee Stream is characterized as poor. Point source and non-point source discharges provide phosphorous loading to the stream which in turn results in



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algal blooms. The Oakland waste water treatment facility is the major point source for phosphorous loading into Rice Rips Lake. The bacterial decomposition of dead algae causes significant depletion of dissolved oxygen in the lower levels of the lake. The levels of dissolved oxygen observed have in many instances violated State water quality standards. Water quality problems in Messalonskee Stream and Rice Rips Lake are exacerbated by the existence of the dams which reduce flushing rates and natural reaeration of the water. These reduced flushing rates enhance the residence time of phosphorus which accumulates in bottom sediments. Phosphorus that is in bottom sediments can internally recycle itself, perpetuating phosphorus loading and algal blooms in the stream.

The applicant conducted a study entitled "Hydrologic Analysis of the Messalonskee Stream Drainage". The purpose of the analysis was to provide an understanding of the watershed and examine the availability of water in Messalonskee Stream. This report can be found in Appendix E-V of the application.

The Messalonskee Stream drainage is 210 mi<sup>2</sup> at its mouth. The headwaters of the stream are formed by the Belgrade Lakes. They are North Pond, East Pond, Salmon Lake, Great Pond, Long Pond, and Messalonskee Lake. The drainage area at the outlet of Messalonskee Lake is 177 mi<sup>2</sup>. 68% (121 mi<sup>2</sup>) of the drainage is above Messalonskee Lake at the Wings Mills Dam, which is the outlet dam on Long Pond.

Operation of the Messalonskee Lake hydro developments is dependent on inflow to Messalonskee Lake. As described under Existing Project Operation (pg. 2), the applicant utilizes the top 0.5 feet of Messalonskee Lake as storage for generation during the summer months (1.0 foot during the winter months). The applicant only utilizes the top 0.5 feet during the summer because camp owners on the lake complain when the water goes lower than that. The top 0.5 feet of lake provides roughly 1,500 acre-feet of storage, which is the equivalent of 25 cfs for one month (exclusive of evaporation).

The hydrologic analysis first estimated flow duration characteristics of Messalonskee Stream in an unregulated state. This was accomplished by reviewing flow information from the Nezinscot and Sheepscot Rivers. Both rivers are unregulated, in close proximity, and have similar drainage areas. The flow duration curves that were developed estimate the unregulated August median inflow to Messalonskee Lake to be 44 cfs. The analysis then accounted for evaporation. The evaporation rate was calculated to be a net loss of 0.7 inches during the month of August. This represents the loss of over 1,100 acre-feet of water, or 18 cfs of continuous flow. Applying this evaporation rate, the estimated unregulated median inflow to Messalonskee Lake in August is 26 cfs.

Once the unregulated flow into Messalonskee Lake was estimated, the effect of the DEP water level order on the availability of flows was examined. The order governs the operation of the dams at Salmon Lake, Great Pond, and Long Pond and requires that all lake levels above Long Pond be maintained as close to their respective spillway crests as possible between June 1 and Labor Day. Because the order maintains water levels for recreational purposes, there is literally no capacity to store the runoff during significant precipitation

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events. Based on flow duration curves, the median August flow from the exit of Long Pond is anticipated to be about 15 cfs. However, the order only requires a minimum flow of 8 cfs from the Wings Mills Dam; the rest of the flow is used to maintain stable water levels that may drop due to evaporation. Considering the additional 56 mi<sup>2</sup> of drainage area between Long Pond and Messalonskee Lake and the regulation of flows by the DEP Order, the adjusted August median inflow to Messalonskee Lake is estimated to be 22 cfs. This is the amount of flow available into Messalonskee Lake during the critical summer months.

The 1990 DEP report "Messalonskee Stream Summary", discusses several options for improving the water quality of Messalonskee Stream. These options included increasing minimum flows from Messalonskee Lake; complete source elimination of effluent from the Oakland treatment plant; rerouting the effluent discharge to a location downstream of Rice Rips Lake; and removal of effluent during the summer months. Complete source elimination and rerouting the effluent were ruled out as being too expensive.

The Oakland waste water treatment plant is proposing to seasonally land apply the majority of its discharge on land owned by the applicant. CMP is leasing approximately 60 acres of land to Oakland in order to greatly reduce the amount of effluent that would otherwise be discharged into the Rice Rips impoundment. Based on calculations performed by the Department, it is estimated that approximately 56,000 gallons of waste water can be applied to each acre of land per week. The treatment facility is currently licensed to discharge 480,000 gallons/day.

- b. Applicant's Proposal: The applicant proposes to pass a year-round minimum flow of 15 cfs below all four developments and in the Rice Rips bypass.
- c. Discussion: The DEP Division of Environmental Assessment (DEA) comments that implementation of a minimum flow of 15 cfs, in combination with the proposed seasonal land application of effluent from the Oakland Waste Water Treatment Plant, should allow Messalonskee Stream to meet Class C dissolved oxygen standards; however, water quality sampling should be conducted in Messalonskee Stream to document attainment of standards.

The Town of Oakland has a pending application with the Department to renew the Town's discharge license for the Oakland Waste Water Treatment Plant. As a condition of that license renewal, the Department is assigning the Town responsibility for conducting water quality sampling in Rice Rips Lake. As a condition of this certification, the Department is assigning the applicant the responsibility for sampling dissolved oxygen in Messalonskee Stream. Based on a review of dissolved oxygen sampling performed by the applicant and the sampling performed by the Town of Oakland, the Department reserves the right, after notice and opportunity for hearing, and upon consideration of the joint responsibility of the Town of Oakland and the applicant, to require structural and/or operational changes at the Oakland Waste Water Treatment Plant and/or the Messalonskee Developments as necessary to meet Class C dissolved oxygen standards.

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There is a reasonable assurance that Class C dissolved oxygen standards in Messalonskee Stream will be met if the applicant passes a minimum flow of 15 cfs through all project developments, including the Rice Rips bypass, provided the applicant monitor water quality in Messalonskee Stream. The top 0.5 feet of Messalonskee Lake shall be used for generation flows and to augment natural flows during the summer months as necessary.

##### 5. TROPHIC STATE

- a. Existing Conditions: The only significant point source discharge to project waters occurs in Rice Rips Lake. The Oakland waste water treatment plant is licensed to discharge 480,000 gallons per day into the impoundment. Currently the plant is providing the equivalent of tertiary treatment for phosphorus removal.

A September 1992 report prepared by Department biologist Jeff Dennis, indicates the Rice Rips impoundment is not meeting classification as a result of algal blooms in the impoundment. The algal blooms are a result of high phosphorus loading from the Oakland treatment plant, internal recycling of phosphorus from the bottom sediments within the impoundment, reduced flushing due to the presence of dams, and algal washout from Messalonskee stream flow (partially controlled by the applicant), and phosphorus loading from urban and agricultural sources in the direct watershed of the impoundment.

Rice Rips Lake does not meet its GPA classification due to eutrophication from phosphorus loading. The eutrophication results in an increasing trophic state. DEA comments that the only other project water classified GPA, Messalonskee Lake, has a stable or decreasing trophic state.

- b. Applicant's Proposals: The applicant proposes to provide a minimum flow of 15 cfs through the Project including the Rice Rips bypass.
- c. Discussion: Department staff comments a minimum flow of 15 cfs should be provided below each of the Messalonskee Stream projects in order to increase the flushing in Rice Rips Lake. This minimum flow should also minimize the effect of internal recycling of phosphorus in Rice Rips Lake. It is likely that implementation of a minimum flow of 15 cfs from the Messalonskee Lake Dam, in combination with the proposed seasonal land application of effluent from the Oakland Waste Water Treatment Plant, will allow Rice Rips Lake to meet its assigned GPA classification.

The Town of Oakland has a pending application with the Department to renew the license for the Oakland Waste Water Treatment Facility. As discussed in Section 4, Dissolved Oxygen, the Town of Oakland is proposing to seasonally land apply the majority of its waste water on land owned by the applicant. As a condition of that license renewal, the Department will be requiring the Town to conduct water quality sampling of Rice Rips impoundment to ensure that Class GPA standards are being met. Sampling shall consist of seasonal sampling of temperature, dissolved oxygen, total phosphorus, chlorophyll a, and Secchi depth. Based on the results of this sampling, the Department reserves the right, after notice and opportunity for hearing, and

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upon consideration of the joint responsibility of the Town of Oakland and the applicant, to require structural and/or operational changes at the Oakland Waste Water Treatment Plant and/or the Messalonskee Developments as necessary to meet Class GPA standards.

Therefore, in order to meet class GPA narrative standards, a year-round minimum flow of 15 cfs shall be maintained at the outlet of Messalonskee Lake and from each of the downstream developments. The top 0.5 feet of Messalonskee Lake shall, in addition to being used for generation flows, be used to augment natural flows during the summer months as necessary.

## 6. FISH RESOURCES

- a. Existing Resources: Messalonskee Stream has a warm water fish population which includes black bass, pickerel, perch, and sunfish. The stream also has brown trout which were introduced into the waterway as an experiment by the Maine Department of Inland Fisheries and Wildlife (DIF&W). There are no Federally listed threatened or endangered fish species known to occur within the project area. American shad, an anadromous specie can be expected to utilize some of the habitat in the Union Gas Development tailwater. These fish move up from the Kennebec River where the Maine Department of Marine Resources (DMR) stocks them.

Messalonskee Lake contains the same composition of fish species as Messalonskee Stream with the addition of northern pike, landlocked salmon, and rainbow smelt.

There are no upstream or downstream fishways located at any of the hydroelectric developments along Messalonskee Stream. At the outlet of Messalonskee Lake there is a fish screen installed which prevents fish from passing down into Messalonskee Stream. The screen is owned by the Town of Oakland. The applicant periodically cleans the screen when it becomes clogged with leaves and other debris. When the screen becomes clogged it affects flows into Messalonskee Stream and therefore affects generation. The applicant proposes to continue cleaning the screen as needed.

Based on requests from state fisheries agencies, the applicant conducted several studies aimed at evaluating impacts of project flows and flow fluctuations and impoundment water level practices on fish habitat.

"Fishery Resources of the Messalonskee Project" is presented in Appendix E-IX of the application. Surveys of the impoundments and free flowing stretches of stream were conducted at all five developments. Three sections of the stream noteworthy of discussion are the Rice Rips bypass, the Automatic impoundment, and the stretch of stream below the Union Gas Development. The Rice Rips bypass is approximately 2,400 feet long and receives only leakage flows (estimated at 12-15 cfs) from the dam. The rest of the flow from the dam passes through a penstock prior to reaching the Rice Rips powerhouse. Automatic impoundment is a 4.5 mile riverine stretch which starts below the Rice Rips powerhouse. The stretch below the Union Gas Development is approximately 5,000 feet long before it enters the Kennebec River. All of these areas have been targeted by



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the Maine Department of Inland Fisheries and Wildlife as providing suitable habitat for adult brown trout. The Automatic impoundment is used by trout during the summer months when water temperatures are too high in the Rice Rips bypass. The area below Union Gas has also been identified by DMR as having habitat for various life stages of American shad.

"Rice Rips Bypass Channel Habitat Based Flow Study" is presented in Appendix E-X of the application. The study evaluated adult brown trout habitat in the 2,400 foot stretch of Messalonskee stream below the Rice Rips Development. Currently the bypass receives only leakage flows from the Rice Rips dam estimated at 12-15 cfs. As discussed below under Existing Management Plans, DIF&W wants to provide flows to optimize adult brown trout habitat during the spring (April 1 - June 15) and fall (Sept 15 - Sept 30) fishing seasons.

Due to the lack of habitat and unsuitable nature of the Oakland Development bypass reach, this area was not studied and no recommendations from the fisheries agencies to provide flows into this reach were made.

By linear measurement, the bypass consists of the following types of habitat: 56.5% riffle; 21.5% pool; and 32.0% riffle/run. The study team evaluated three flows in the bypass: 16.7 cfs, 27 cfs, and 51 cfs. Habitat for this study was based on Weighted Area (WA) which considers both quality and quantity of habitat. Although the study concluded that adult brown trout habitat is maximized at 27 cfs, 16.7 cfs provides approximately 94% of the maximum habitat for adult brown trout.

"Union Gas Instream Flow Study" is presented in Appendix E-XI of the application. The study incorporated the following components: Instream Flow Incremental Methodology (IFIM) study of the free flowing reach below the Union Gas dam; an assessment of habitat duration; and a ramping study. The IFIM assessed the uppermost 1,300 feet of the reach below the dam under a full range of flows (15 cfs-610 cfs). Adult brown trout and spawning and juvenile shad habitat were examined. The IFIM study concluded that adult brown trout habitat below the project was optimized at a flow of 100 cfs.

The ramping study evaluated impacts operational flows were having on fish and other aquatic life below the Union Gas dam. Changes in flow between 100% and 70% gate settings have little impact during both start-up and shut down. However, flow changes between 70% and 0% gate openings during operating shutdown result in an abrupt change in flow with rapid declines in water levels below the project. An area approximately 1/3 acre in size becomes dewatered once the project is shutdown.

- b. Existing Management Plans: Since 1986, DIF&W has managed the waters of the Messalonskee Project for an accessible urban brown trout fishery. The two locations of specific interest to DIF&W are the Rice Rips bypass and the Union Gas development tailwater. The program is only experimental and natural reproduction of brown trout is not anticipated in Messalonskee Stream. An evaluation of the program will be conducted by DIF&W in the near future.

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c. Applicant's Proposals: The applicant proposes the following measures to mitigate impacts to or otherwise enhance the fisheries resources of the Messalonskee Project.

- Providing a year-round minimum flow of 15 cfs below Messalonskee Lake Dam and through all four projects including the Rice Rips bypass;
- Restricting water level fluctuations of Messalonskee Lake (with cycling) to within 0.5 feet of full pond during the period June 1-August 31, and within 1.0 foot of full pond during the remainder of the year;
- Maintaining water levels in the Oakland, Rice Rips and Automatic impoundments (operated run-of-river) within 1.0 foot of full pond, year-round; and maintaining water levels in the Union Gas Development (with cycling) to within 1.3 feet of full pond elevation;
- Continuing to clean the fish screen at the outlet of Messalonskee Lake; and
- Implementing a new downramping sequence at the Union Gas Development.

d. Discussion: Based on the results of the bypass study and the IFIM, DIF&W recommends a minimum flow of 25 cfs through the Rice Rips bypass and a minimum flow of 100 cfs or inflow, whichever is less, below each of the projects. DIF&W comments that brown trout will utilize Rice Rips bypass during the spring, early summer, and fall months when water temperatures are cooler. During the summer months the brown trout will probably move into the Automatic impoundment where there is suitable year-round habitat.

As previously discussed in Sections 4 & 5, a minimum flow of 15 is necessary to enhance and maintain chemical water quality in Messalonskee Stream and Rice Rips Lake. It is staff's finding that a flow of 15 cfs is also adequate to protect fish resources in the bypass. It is also staff's finding that a minimum flow does not need to be provided in the Oakland Development bypass.

The Union Gas Project currently operates with a leakage flow of approximately 15 cfs and a maximum flow of 610 cfs. At 15 cfs (leakage) 76% of the peak Weighted Usable Area (WUA) for brown trout is available and at 600 cfs (maximum station discharge) 73% is available. American shad habitat is optimized at a flow of approximately 300 cfs. During normal station operation, 73% to 100% of WUA for brown trout is realized at all times. This percentage of WUA will increase with the implementation of a 15 cfs minimum flow during the summer months.

The applicant's proposals to maintain water levels in Messalonskee Lake, Rice Rips Lake, and the Oakland, Automatic, and Union Gas impoundments will be beneficial to the fish resources of the project waters.

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The applicant reviewed the results of the downramping study that was conducted below the Union Gas development and has proposed to implement a new downramping sequence at the project. As inflow to the Union Gas impoundment decreases, the wicket gate openings close from 100% open to 70%. The gates are held at 70% until the pond drops 0.7 feet. At this level, the unit gradually downramps at 1% gate closure/minute, from 70% down to about 40% while the pond drops the additional 0.6 feet. This sequence allows ample time for fish moving in the area to redistribute themselves while water levels decrease in the tailrace. State fisheries agencies agree with the applicant's proposal. DMR and DIF&W are in agreement that this new sequence will minimize fish stranding.

The applicant's proposals to provide a minimum flow of 15 cfs below all of the project developments, including 15 cfs in the Rice Rips bypass, restrict water level fluctuations in Messalonskee Lake, Rice Rips Lake, and the Oakland, Automatic, and Union Gas impoundments, and to implement a new downramping sequence at the Union Gas development appear to be adequate to achieve and maintain suitability of the project waters affected by the project as habitat for fish and other aquatic life.

## 7. WETLANDS AND WILDLIFE

- a. Existing Resources: In January of 1991, the applicant prepared a report entitled "Wetlands, Botanical and Wildlife Resources of the Messalonskee Project". This report is presented in Appendix E-VII of the application. The purpose of the study was to document the presence of these resources within the project, evaluate the effects of water level management on those resources, and evaluate opportunities for resource enhancement.

The most significant resources identified within the project area are in and surrounding the wetlands at the southern end of Messalonskee Lake. There are approximately 700 acres of inland deep water marsh and approximately 500 acres of oligotrophic lakeside bog. Loons, mink, river otter, muskrat, and beaver all utilize these wetlands for food and nesting habitat. The wetland is also recognized as a valuable migratory resting and staging area for waterfowl. The southern end of the lake is a Registered Critical Area due to the presence of the uncommon black tern. It is reported that this area is the largest and only continuously used nesting site in Maine for this bird.

The only rare plant species documented during the study was the rush aster. This was also found at the southern end of Messalonskee Lake.

- b. Applicant's Proposals: Under normal operating conditions, the applicant proposes to restrict water level fluctuations in Messalonskee Lake to within 0.5 feet of full pond during the summer months and within 1.0 foot of full pond the remainder of the year to provide flood control benefit.

The Oakland, Rice Rips, and Automatic impoundments will continue to be operated to restrict water level fluctuations to within 1.0 foot of full pond. Union Gas will continue to be operated to restrict water level fluctuations to within 1.3 feet of full pond elevation.

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- c. Discussion: DIF&W's overriding concern is providing and maintaining stable water levels to insure maximum waterfowl nesting and production. Of primary concern are the wetlands and water levels in Messalonskee Lake. DIF&W has also raised questions regarding the apparent loss of emergent marshland and whether declines in uncommon black tern numbers are related.

In response to DIF&W's comments, the applicant has prepared the "Messalonskee Lake Waterfowl Management Plan". The plan provides for management and maintenance of waterfowl nesting and brood-rearing habitat within the project area. The plan includes a specific survey of black tern use in Messalonskee Lake and provisions for consulting with state and federal resource agencies. The applicant proposes to conduct wetland assessments and waterfowl surveys within 2 years of the issuance of a new FERC license for the project. DIF&W agrees with the applicant's proposed Waterfowl Management Plan.

The applicant's proposals to restrict water level fluctuations in all the project impoundments and manage waterfowl through the "Messalonskee Lake Waterfowl Management Plan" appear to be adequate to protect and maintain wetlands and wildlife in Messalonskee Lake and all other project impoundments.

#### 8. RECREATION IN AND ON THE WATER

- a. Existing Facilities and Use: Messalonskee Lake receives the most recreational use of any of the other water bodies within the project boundaries. Existing recreational facilities include various hard-surface boat launch facilities on Messalonskee Lake; day-use sites; unimproved fishing sites along Messalonskee stream; a carry-in boat access facility at North Street Park in Waterville; several informal carry-in access sites along the stream; two nature trails below the Automatic project; and the Couture Field Boat Launch, a hard-surface boat ramp installed by the applicant in 1989 on the Kennebec River near the Union Gas Development.

Recreational use in the project area is significant. Throughout the year the waters of the project receive use by boaters, swimmers, water skiers, fisherman, snowmobilers, cross county skiers, ice fishermen, hunters, and trappers.

- b. Existing Management Plans: In 1989, the applicant developed a Comprehensive Recreational Facilities Plan which was designed to meet current and anticipated public recreational needs at CMP-owned hydro and water storage projects. The plan analyzes recreational needs on a local and regional basis.

The Maine Bureau of Parks and Recreation's 1988 Statewide Comprehensive Outdoor Recreation Plan (SCORP), has identified unmet recreational needs in this area of the state. Some of those needs include horseback riding, camping, ski touring, picnicking, bicycling, inland swimming, nature interpretation, and boat access.



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c. Applicant's Proposals: The applicant proposes the following recreational enhancements to the project area:

- Maintaining the water level of Messalonskee Lake to within 0.5 feet of full pond throughout the summer recreation season, and to within 1.0 feet during the winter months;
- Providing a minimum flow of 15 cfs through the Rice Rips bypass to support DIF&W's efforts to develop a recreational fishery for adult brown trout;
- Developing a new improved picnic site/day use area below the Messalonskee Lake Dam (Site 5 on Exhibit 7);
- Installing an informational/interpretive sign at the Oakland Development, and installing project identification signs at all of the projects;
- Investigating the need for establishing a "green belt/multi use" area along the east side of Messalonskee Stream between the Oakland Development and the Rice Rips Development;
- Developing a carry-in site at Colby College (Site 8 on Exhibit 7);
- Evaluating the feasibility of creating a carry-in access site to the Rice Rips impoundment; and
- Installing a hard surface boat ramp on the Kennebec River (Site 12 on Exhibit 7). This was completed by the applicant in 1989.

d. Discussion: The Maine Department of Conservation (DOC) comments that the applicant's recreational proposals will enhance public use opportunities within the project area. DOC also comments the applicant should monitor water oriented public use and review recreation development potential needs with DOC in accordance with FERC Form 80 requirements.

The applicant's proposals, as outlined above, appear to be adequate to achieve and maintain suitable use of waters affected by the project for recreation in and on the water, provided a minimum flow of 15 cfs is maintained in the Rice Rips bypass during the period June-September to establish a recreational fishery for brown trout.

## 8. HYDROELECTRIC POWER GENERATION

- a. Existing Energy Generation: The project generates an average of 22,999,000 kilowatt-hours (kWh) of electricity annually. This is equivalent to the energy that would be produced by burning 43,807 barrels of oil or 10,657 tons of coal each year. Project power is fed into the transmission and distribution system of the applicant for use by its customers.
- b. Existing Energy Policies/Plans: The State of Maine has developed a comprehensive energy plan (Final Report of the Commission on Comprehensive Energy Planning, May 1992) with the goal of meeting the State's energy needs with reliable energy supplies at the lowest possible cost, while ensuring that energy production and use are

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consistent with a healthy environment and a vibrant economy. Specifically, the Plan establishes the following targets for Maine's energy future:

- Reduce the State's level of dependence on oil from 50 percent to at least match the national average of 43 percent by the year 2000, with further reductions to at least the 30 percent level by 2010;
- Increase the percentage of renewable energy resources in the State's primary energy mix from 30 percent to 40 percent by the year 2000, and to at least 50 percent by 2010;
- Increase statewide energy efficiency relative to 1990 levels by 25 percent by the year 2000 and by at least 50 percent by 2010; and
- Work to stabilize long-term energy prices, in balance with Maine's other energy-related goals, with a specific emphasis on enhancing Maine's competitive position relative to New England and the U.S.

With respect to renewable energy, the Plan recommends that Maine actively encourage the development of wind and solar energy resources and support the continued utilization and further development, where appropriate, of the State's renewable, indigenous hydro and biomass energy resources.

- c. Applicant's Proposal: The applicant proposes to provide a year-round minimum flow of 15 cfs below each of the project developments including the area known as the Rice Rips bypass. The agency recommended year-round minimum flow of 100 cfs or inflow below each of the projects would result in a 22% loss in generation annually.
- d. Discussion: As proposed, the Messalonskee Lake Project will continue to provide cost-effective indigenous renewable electricity to the customers of Central Maine Power Company.

BASED on the above Findings of Fact, and the evidence contained in the application and supporting documents, and subject to the Conditions listed below, the Department makes the following CONCLUSIONS:

1. The continued operation of the project will result in the affected surface waters being suitable for all Class GPA and Class C designated uses provided that:
  - i. A minimum flow of 15 cfs is passed from the Messalonskee Lake Dam and all other downstream developments, including 15 cfs in the Rice Rips bypass;
  - ii. Water levels in Messalonskee Lake are maintained within 0.5 feet of full pond during the period June 1-August 31 and within 1.0 feet during the remainder of the year (with cycling); water levels in Oakland, Rice Rips, and Automatic impoundments are maintained within 1.0 foot of their respective full pond elevations (operated as run-

CENTRAL MAINE POWER COMPANY	16	MAINE WATER QUALITY PROGRAM;
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of-river); and water levels in the Union Gas impoundment are maintained within 1.3 feet of full pond elevation (with cycling);

- iii. The new downramping sequence is implemented below the Union Gas development;
  - iv. The "Messalonskee Lake Waterfowl Management Plan" is implemented; and
  - v. Recreational facility improvements/enhancements are made in accordance with the applicant's proposals.
2. The continued operation of the project will result in Class C dissolved oxygen standards being met in the affected waters provided that a minimum flow of 15 cfs is passed from all project developments, and the applicant conduct dissolved oxygen sampling in Messalonskee Stream.
  3. The continued operation of the project will result in Class GPA and Class C narrative standards for aquatic life being met provided that a minimum flow of 15 cfs is provided below all project developments including 15 cfs in the Rice Rips bypass, water levels in Messalonskee Lake are maintained within 0.5 feet between June 1-August 31, Oakland, Rice Rips, and Automatic impoundments are maintained within 1.0 feet of their full pond elevations, and Union Gas is maintained within 1.3 feet of full pond elevation.
  4. The continued operation of the project will comply with the State's antidegradation policy provided that the project is modified and operated in accordance with the conclusions reached above.

THEREFORE, the Department GRANTS certification that there is a reasonable assurance that the continued operation of the Messalonskee Project, as described above, will not violate applicable water quality standards, SUBJECT TO THE FOLLOWING CONDITIONS:

#### 1. MINIMUM FLOWS

- A. Except as temporarily modified by approved maintenance activities, emergencies beyond the applicant's control, as defined below, or upon mutual agreement between the applicant and Department, the applicant shall discharge an instantaneous minimum flow of 15 cfs through all project developments, including the Rice Rips bypass, at all times.

The top 0.5 feet of Messalonskee Lake shall, in addition to being used for generation flows, be used to augment natural flows to meet the 15 cfs minimum flow requirement.

- B. Operating emergencies beyond the applicant's control include, but may not be limited to, equipment failure or other abnormal condition, and orders from local, state, or federal law enforcement or public safety authorities.
- C. The applicant shall, in accordance with the schedule established in a new FERC license for the project, submit plans for providing and

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monitoring the minimum flows required by Part A of this condition. These plans shall be reviewed by and must receive approval of the DEP Bureau of Land and Water Quality.

## 2. WATER LEVELS

- A. Except as temporarily modified by (1) approved maintenance activities (2) inflows to the project area, (3) by operating emergencies beyond the applicant's control, as defined below, (4) by flashboard failure, or (5) upon mutual agreement between the applicant and Department, the following water levels shall be maintained:

Messalonskee Lake (cycling)	Within 0.5 feet of full pond from 6/1-8/31 and within 1.0 feet from 9/1-5/31;
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Oakland, Rice Rips, and <del>Automatic</del> (run-of-river)	Within 1.0 feet of full pond elevations;
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Union Gas (cycling)	Within 1.3 feet of full pond elevation.
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- B. Operating emergencies beyond the applicant's control include, but may not be limited to, equipment failure or other temporary abnormal condition, and orders from local, state, or federal law enforcement or public safety authorities.
- C. The applicant shall, in accordance with the schedule established in a new FERC license for the project, submit plans for providing and monitoring the water levels in each of the project impoundments as required by Part A of this condition. These plans shall be reviewed by and must receive approval of the DEP Bureau of Land and Water Quality.

## 3. WATER QUALITY SAMPLING

- A. The applicant shall sample dissolved oxygen, temperature, and chlorophyll a in Messalonskee Stream. The applicant shall also record flow out of the Messalonskee Lake dam and identify periods of generation during sampling. The Department will review the results of this sampling in conjunction with sampling being performed by the Oakland Waste Water Treatment Plant in Rice Rips Lake.
- B. Within 6 months following the issuance of a new FERC license for the project, the applicant shall submit a water quality sampling plan to the Department for review and approval.
- C. If it is determined, based on a review of the sampling discussed in Part A of this condition and the sampling performed by the Oakland Waste Water Treatment Plant, that Messalonskee Stream is not meeting Class C standards for dissolved oxygen or Rice Rips Lake is not meeting Class GPA standards for trophic state, the Department reserves the right, after notice and opportunity for hearing, and upon consideration of the joint responsibility of the Town of Oakland and the applicant, to require such reasonable structural and/or operational changes to the Oakland Waste Water Treatment Plant or the Messalonskee Project as are deemed necessary to meet applicable Class C or Class GPA standards, except that no changes to the Messalonskee

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Project will be required until at least 5 years have passed from the effective date of a new FERC license for the project.

#### 4. DOWNRAMPING

The applicant shall implement the new downramping sequence at the Union Gas development as outlined in the supporting documentation for the application for 401 certification.

#### 5. WATERFOWL NESTING

- A. The applicant shall implement the provisions of the "Messalonskee Lake Waterfowl Management Plan" and begin conducting wetland assessments and waterfowl surveys within 2 years of the issuance of a new FERC license for the project.
- B. The applicant shall consult with the Maine Department of Inland Fisheries and Wildlife regarding the findings of the wetland assessments and waterfowl surveys. The results of these assessments and the applicant's proposals for maintaining or enhancing wetlands and waterfowl nesting shall be submitted to the DEP Bureau of Land and Water Quality. After reviewing the results, any applicant proposals, and DIF&W comments, the Department shall order such continuation or modification of water levels established by this approval as is deemed necessary and appropriate to protect nesting waterfowl.

#### 6. RECREATIONAL FACILITIES

- A. The applicant shall maintain and improve recreational facilities and public access within the project boundaries including: installing project identification signs at all projects, evaluating the feasibility of a 'green belt/multi use' area between the Oakland and Rice Rips Development, improving parking at the Rice Rips Development, evaluating the feasibility of creating a carry-in access site to the Rice Rips impoundment, and ~~improving parking at the Automatic Development.~~
- B. The applicant shall, in accordance with the schedule established in a new FERC license for the project, submit a schedule for implementing Part A of this condition. This schedule shall be reviewed by the Department of Conservation and the DEP Bureau of Land and Water Quality and must be approved by the DEP Bureau of Land and Water Quality.

#### 7. LIMITS OF APPROVAL

This approval is limited to and includes the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. All variances from the plans and proposals contained in said documents are subject to the review and approval the Department prior to implementation.

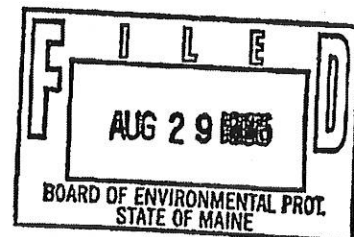
#### 8. COMPLIANCE WITH APPLICABLE LAWS

The applicant shall secure and appropriately comply with all applicable federal, state and local licenses, permits, authorizations, conditions, agreements and orders required for the operation of the project.

This water quality certification shall be effective on the date of issuance of a new hydropower project license by the Federal Energy Regulatory Commission (FERC) and shall expire with the expiration of the FERC license.

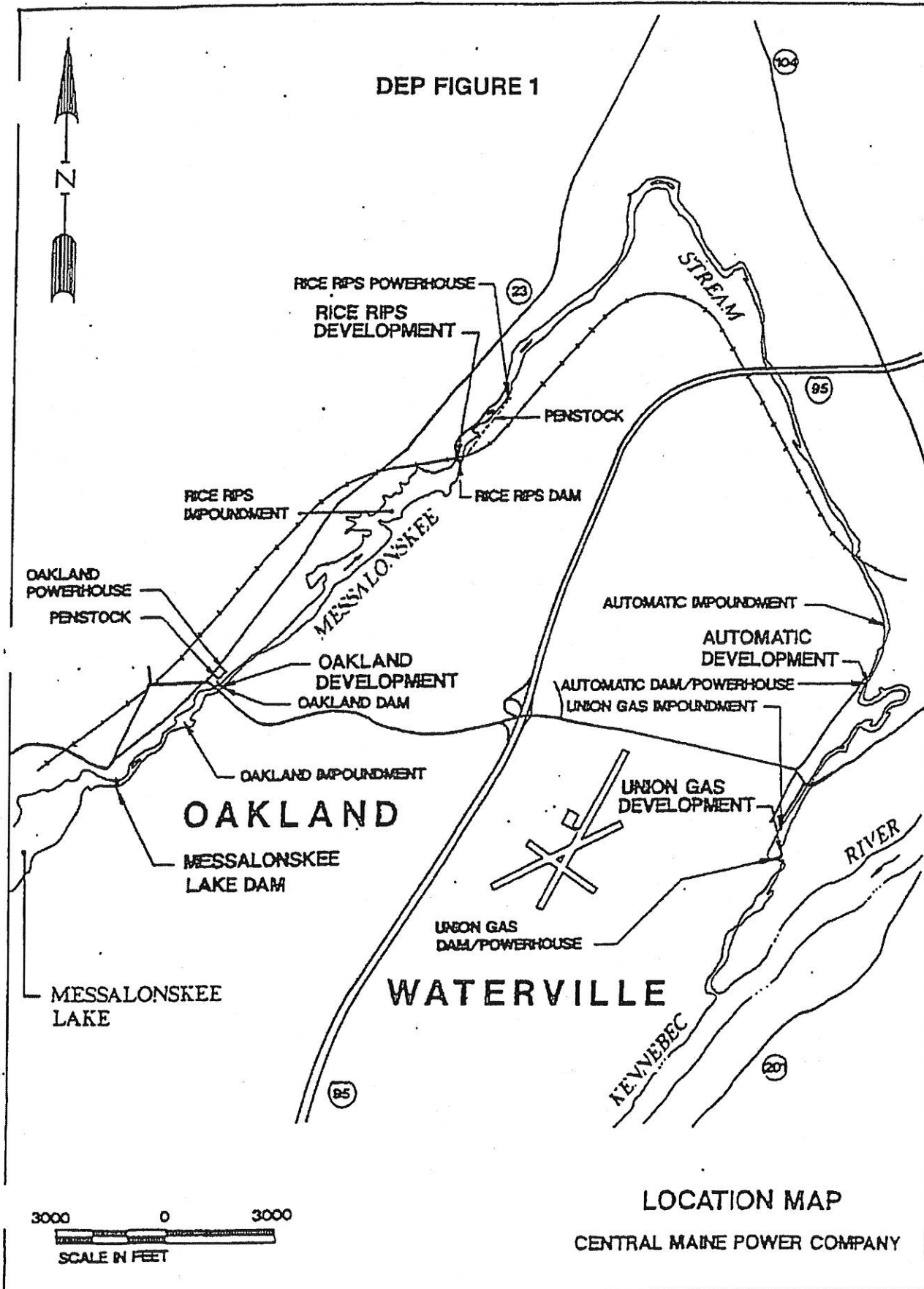
By: Edward O. Sullivan  
EDWARD O. SULLIVAN, Commissioner

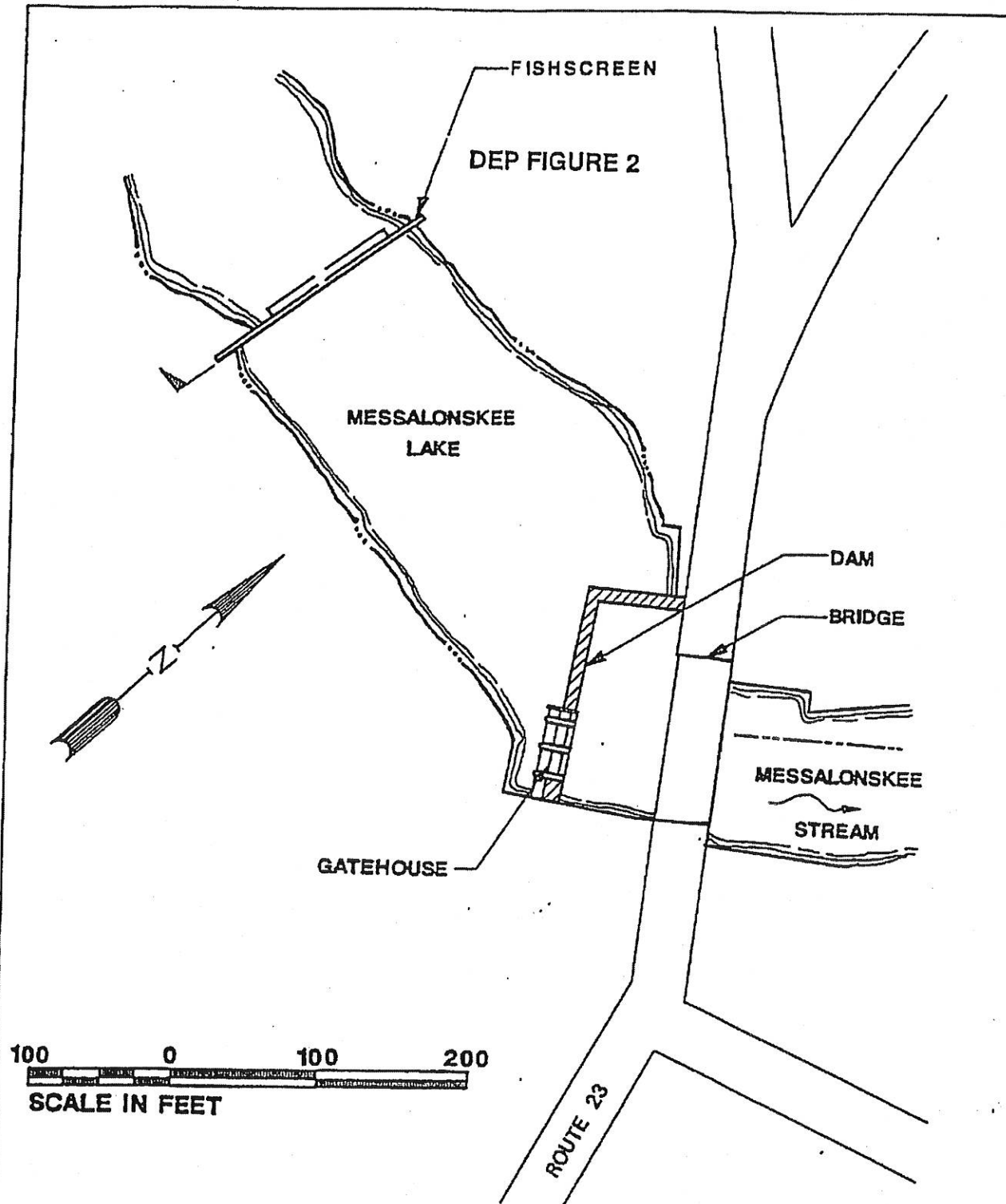
Date filed with the Board of Environmental Protection





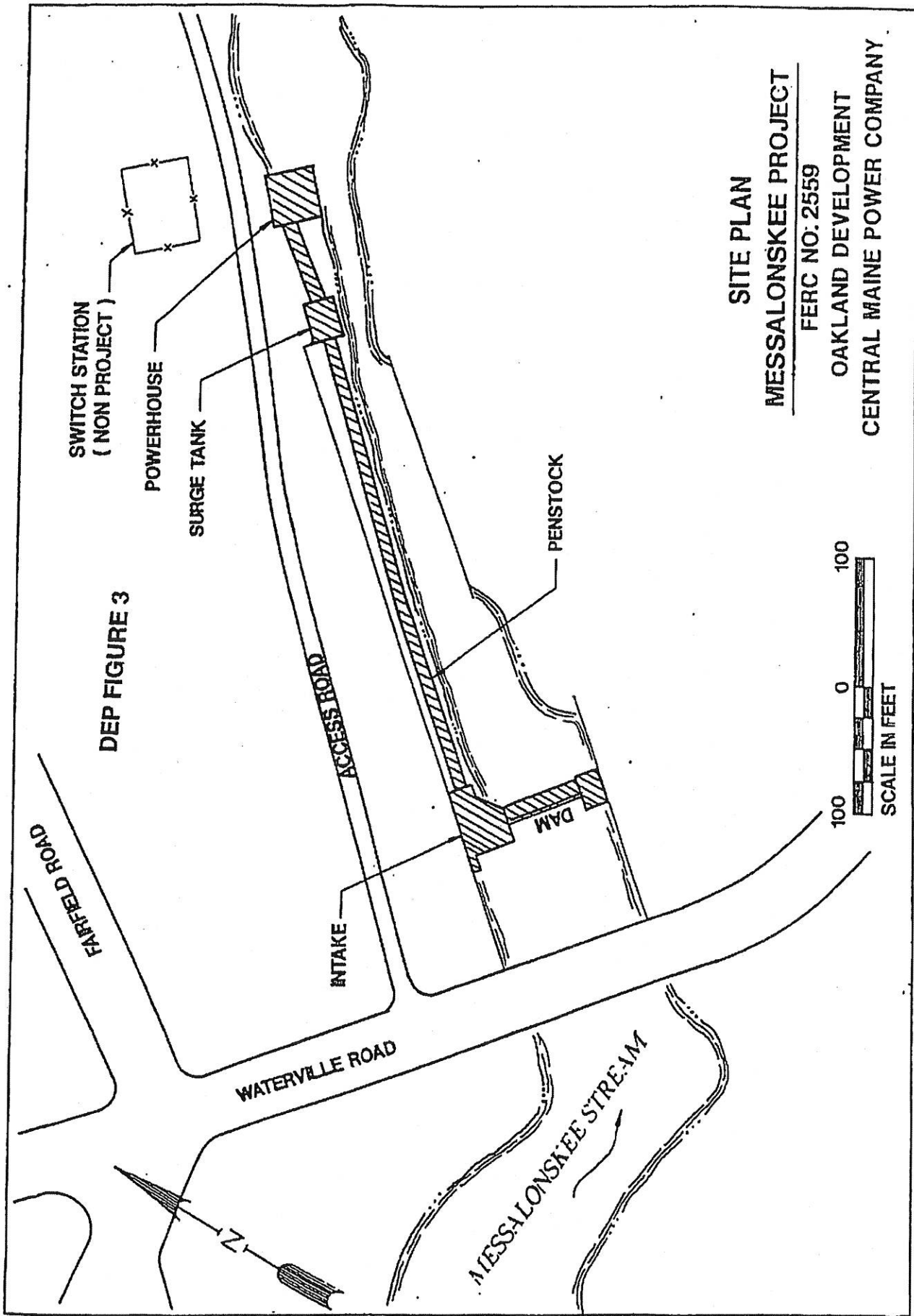
DEP FIGURE 1





SITE PLAN  
MESSALONSKEE PROJECT  
FERC NO: 2559  
MESSALONSKEE LAKE DAM  
CENTRAL MAINE POWER COMPANY





**SITE PLAN**

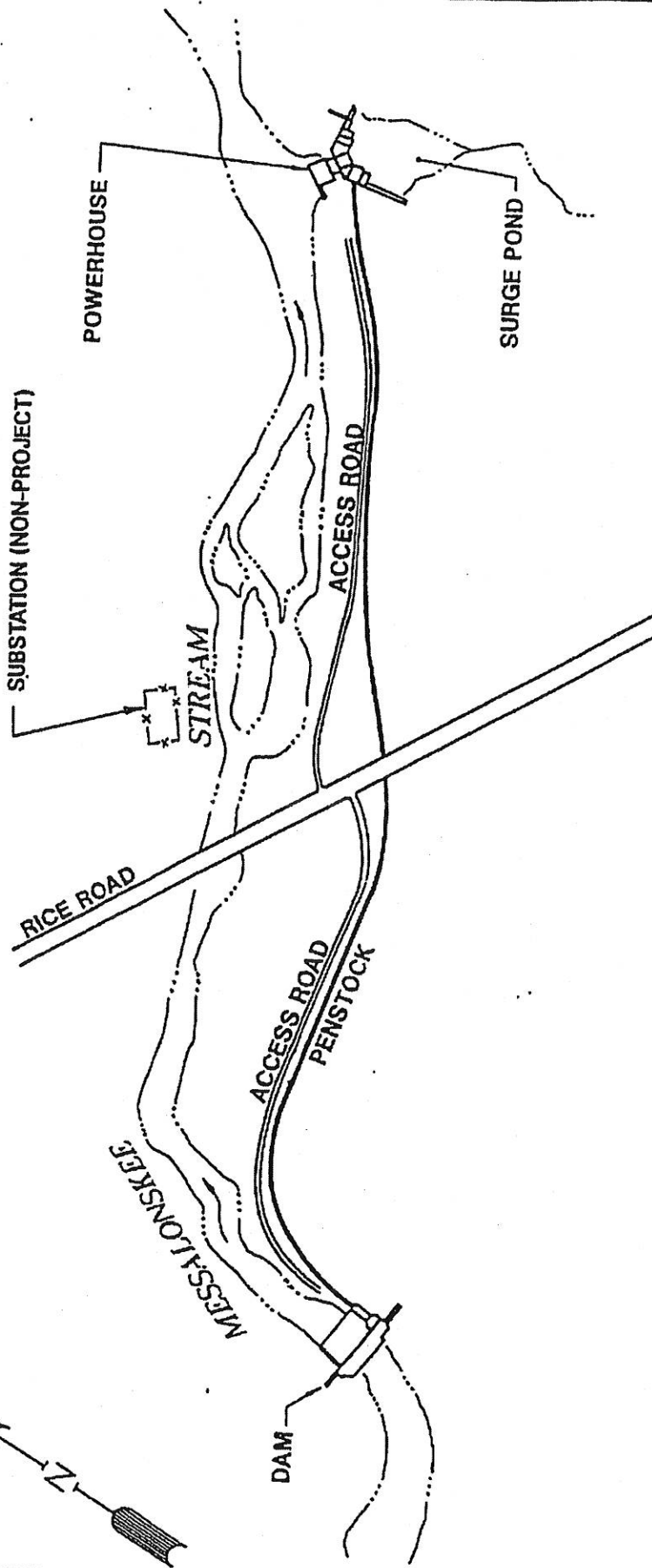
**MESSALONSKEE PROJECT**

**FERC NO: 2559**

**OAKLAND DEVELOPMENT**

**CENTRAL MAINE POWER COMPANY**

DEP FIGURE 4



SITE PLAN

MESSALONSKEE PROJECT

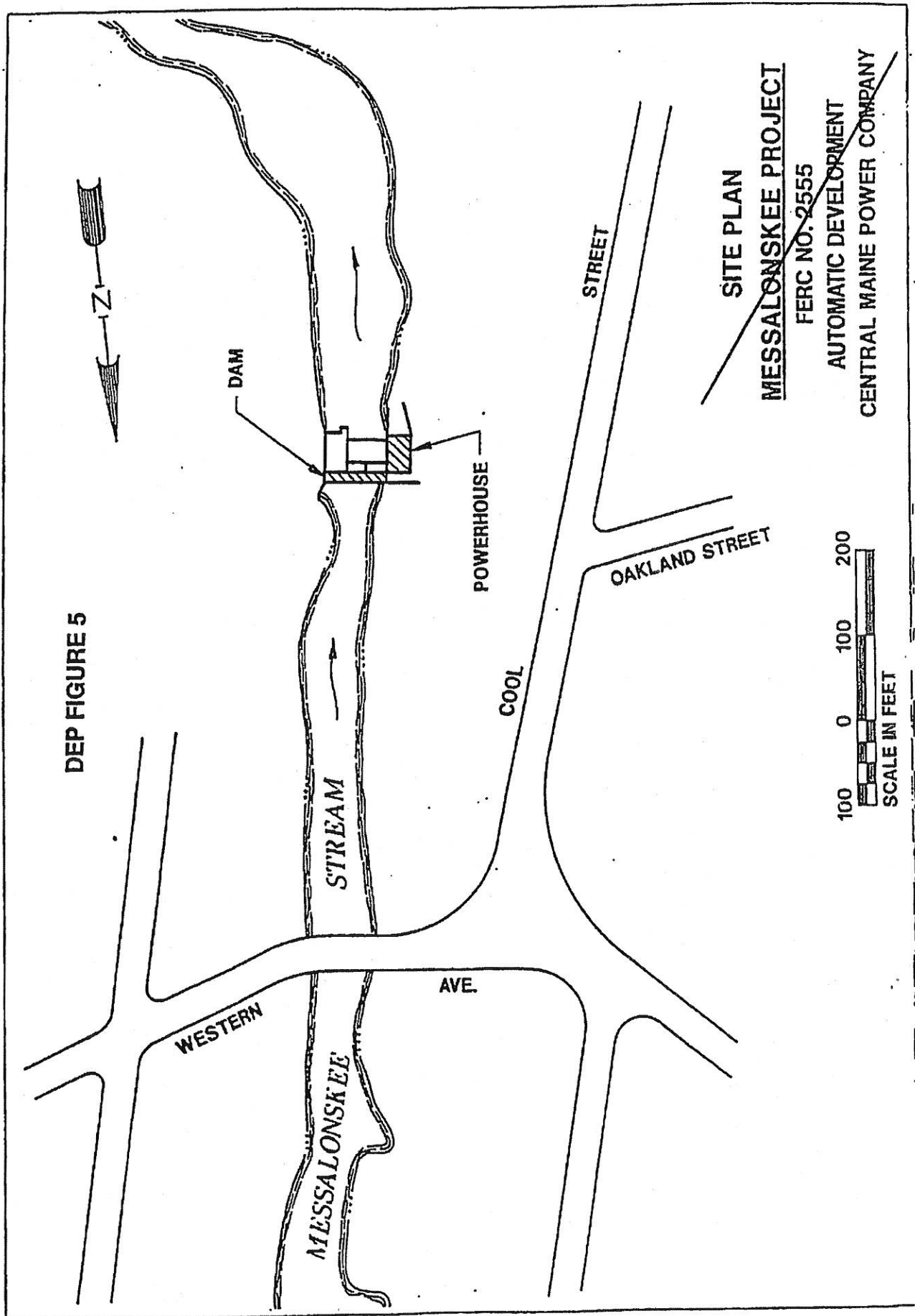
FERC NO. 2557

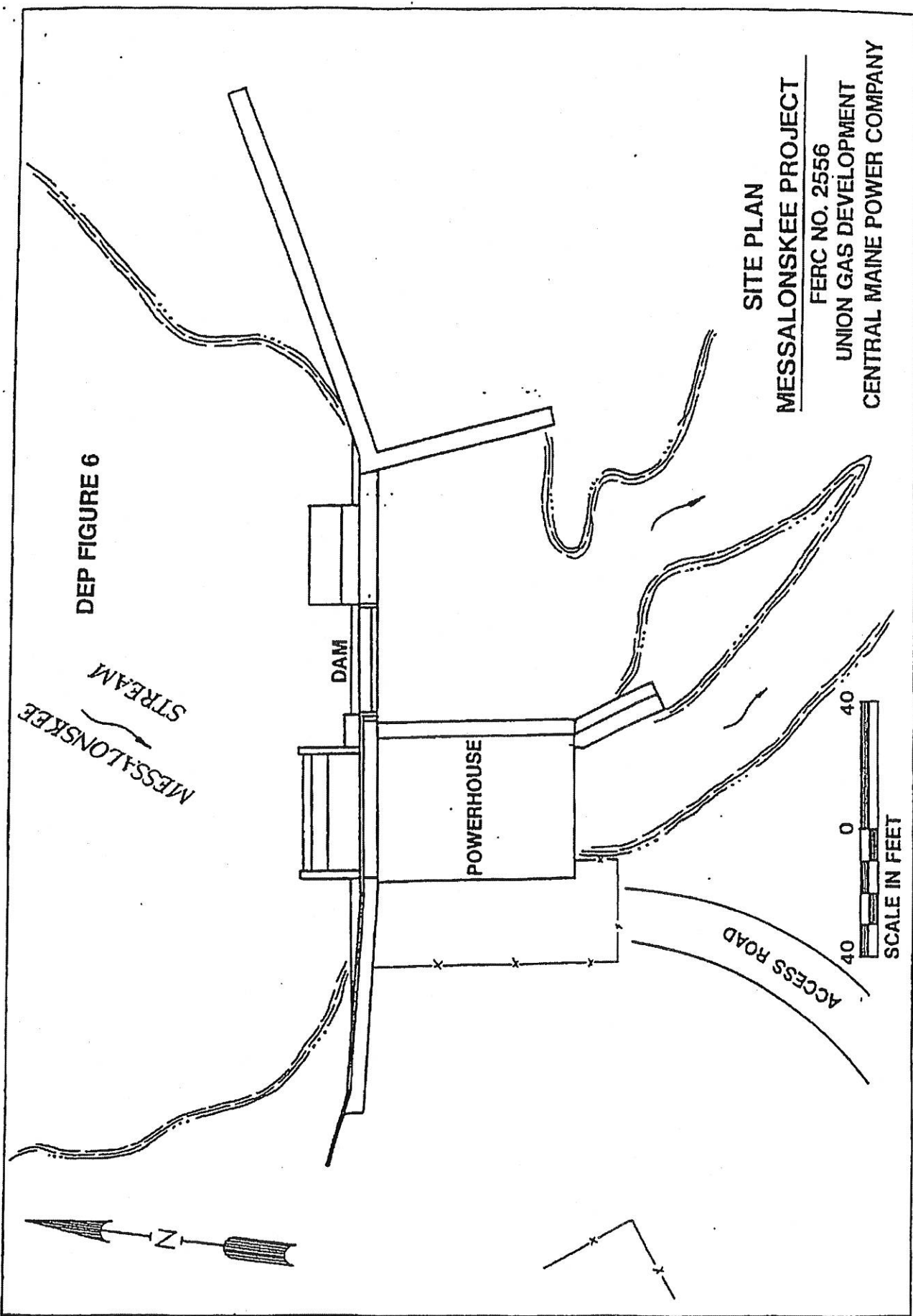
RICE RIPS DEVELOPMENT

CENTRAL MAINE POWER COMPANY



DEP FIGURE 5



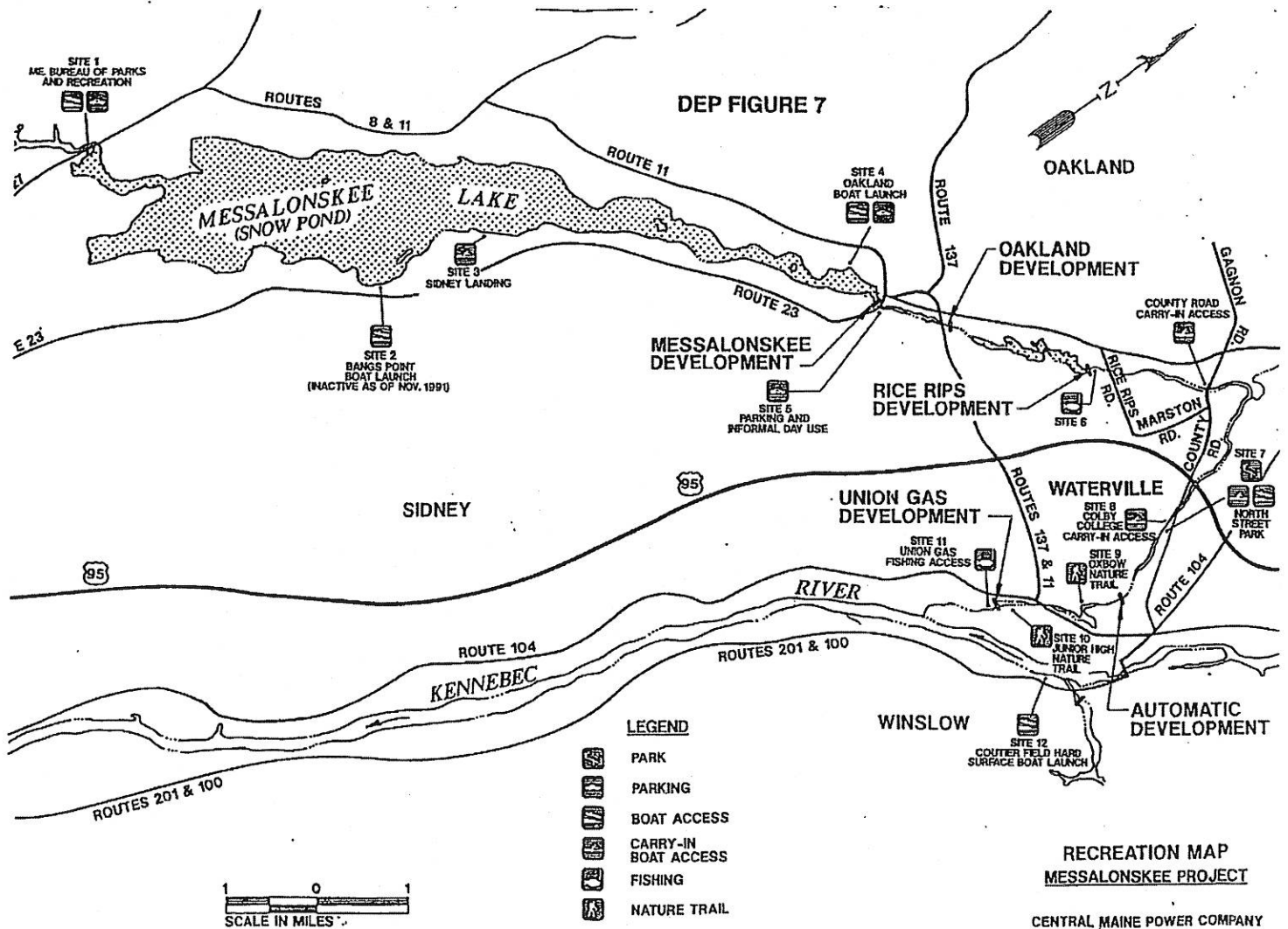


DEP FIGURE 6

SITE PLAN  
MESSALONSKEE PROJECT

FERC NO. 2556

UNION GAS DEVELOPMENT  
CENTRAL MAINE POWER COMPANY



## **APPENDIX 6**

### **Union Gas Hydroelectric Project Water Quality**

## Appendix 6

### Union Gas Hydroelectric Project Water Quality

The Project received a 401 Water Quality Certificate (WQC) from the State of Maine Department of Environmental Protection ("MDEP") on August 29, 1995 (see Appendix 5-1). The WQC noted that waters from the outlet of the Messalonskee Lake to its confluence with the Kennebec River including all waters within the parameters of the Union Project are currently designated Class C by the MDEP. Class C waters are of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, and navigation; and as habitat for fish and other aquatic life. The project is required to maintain a minimum flow of 15 cfs below the project in order to minimize the effect of internal recycling of phosphorus and maintain suitable habitat for brown trout in the tailrace of the Union dam.