

# LOW IMPACT HYDROPOWER INSTITUTE

## APPENDIX B – QUESTIONNAIRE

April 2014 REVISION

Background Information		
1)	Name of the Facility as used in the FERC license/exemption.	Oakdale Power Plant Project
2)	Applicant's complete contact information (please use Appendix D, Project Contact Form)	<p>Pamela Heidell (MWRA Liaison with LIHI)  Massachusetts Water Resources Authority (MWRA)  100 First Ave, Charlestown Navy Yard  Boston, MA 02129  (617) 788 - 1102</p> <p>Guy Foss, MWRA Western Operations  Manager, Transmission and Treatment  266 Boston Road  Southborough, MA 01772</p>
3)	Location of Facility including (a) the state in which Facility is located; (b) the river on which Facility is located; (c) the river-mile location of the Facility dam; (d) the river's drainage area in square miles at the Facility intake; (e) the location of other dams on the same river upstream and downstream of the Facility; and (f) the exact latitude and longitude of the Facility dam.	<p>Oakdale is located in West Boylston, Massachusetts. It is a hydroelectric conduit facility at the terminus of Quabbin Aqueduct, a 24.5 mile deep rock tunnel that is part of MWRA's transmission system. Power is generated from the transfer of water from the Quabbin Reservoir to the Wachusett Reservoir.</p>
4)	Installed capacity.	3,500 kW

river) and photographs, maps and diagrams.	hydroelectric facility and its mode of operation (harnessing energy as water drops from one elevation in the water supply system (Shaft 12 at the Quabbin Intake/Reservoir) to another location (Shaft 1, the outlet of the Quabbin Aqueduct at Wachusett Reservoir).
<p><b>Questions for “New” Facilities Only:</b></p> <p>If the Facility you are applying for is “new” (i.e., an existing dam that added or increased power generation capacity after August of 1998) please answer the following questions to determine eligibility for the program.</p>	
13) When was the dam associated with the Facility completed?	
14) When did the added or increased generation first generate electricity? If the added or increased generation is not yet operational, please answer question 18 as well.	
15) Did the added or increased power generation capacity require or include any new dam or other diversion structure?	
16) Did the added or increased capacity include or require a change in water flow through the facility that worsened conditions for fish, wildlife, or water quality (for example, did operations change from run-of-river to peaking)?	
17 (a) Was the existing dam recommended for removal or decommissioning by resource agencies, or recommended for removal or decommissioning by a broad representation of interested persons and organizations in the local and/or regional community prior to the added or increased capacity?	
(b) If you answered “yes” to question 17(a), the Facility is not eligible for certification, unless you can show that the added or increased capacity resulted in specific measures to improve fish, wildlife, or water quality protection at the existing dam. If such measures were a result, please explain.	

	related to the facility tailrace or bypassed reaches.	
3) If the Facility is unable to meet the flow standards in A.2., has the Applicant demonstrated, and obtained a letter from the relevant Resource Agency confirming that demonstration, that the flow conditions at the Facility are appropriately protective of fish, wildlife, and water quality?	YES = Pass, go to B Not applicable – facility is a conduit facility.	NO = Fail
<b>B. Water Quality</b>		
1) Is the Facility either:	PASS	FAIL
a) In Compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the Facility after December 31, 1986? Or	YES = Go to B2 Not applicable- Water Quality Cert was not required.	NO = Fail
b) In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?		
2) Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?	YES = Go to B3 <u>NO = Pass</u>	
3) If the answer to question B.2 is yes, has there been a determination that the Facility does not cause, or contribute to, the violation?	YES = Pass	NO = Fail

	of 24 mile long Aqueduct.	
<p>4) If, since December 31, 1986:</p> <p>a) Resource Agencies have had the opportunity to issue, and considered issuing, a Mandatory Fish Passage Prescription for upstream and/or downstream passage of anadromous or catadromous fish (including delayed installation as described in C.3.a above), and</p> <p>b) The Resource Agencies declined to issue a Mandatory Fish Passage Prescription,</p> <p>c) Was a reason for the Resource Agencies' declining to issue a Mandatory Fish Passage Prescription one of the following: (1) the technological infeasibility of passage, (2) the absence of habitat upstream of the Facility due at least in part to inundation by the Facility impoundment, or (3) the anadromous or catadromous fish are no longer present in the Facility area and/or downstream reach due in whole or part to the presence of the Facility?</p>	<p>NO = Go to C6  <u>N/A</u> = Go to C4            Not applicable – facility is a conduit facility.</p>	<p>YES = Fail</p>
<p>5) If C4 was not applicable:</p> <p>a) Are upstream and downstream fish passage survival rates for anadromous and catadromous fish at the dam each documented at greater than 95% over 80% of the run using a generally accepted monitoring methodology?            Or</p> <p>b) If the Facility is unable to meet the fish passage standards in 5.a, has the</p>	<p>YES = Go to C6  <u>NA</u></p>	<p>NO = Fail</p>

	as necessary. Thus far, inspections have revealed that the screens to be intact and in good condition.	
		PASS
		FAIL
<p><b>D. Watershed Protection</b></p> <p>1) Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the average annual high water line for at least 50% of the shoreline, including all of the undeveloped shoreline?</p>	<p>YES = Eligible for 3 extra years of certification; Go to D4</p> <p>The project is a conduit facility associated with water supply and the transmission of drinking water from one reservoir to another. The MWRA has a partnership with the MA Department of Conservation and Recreation Division of Water Supply Protection, who is responsible for managing the watersheds, and watershed protection activities are funded by MWRA.</p>	<p>NO = Go to D2</p>

2) If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?	YES = Go to E3 N/A = Go to E3	NO = Fail
3) If the Facility has received authorization to incidentally Take a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental Take statement; (ii) Obtaining an incidental Take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authorization pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authorization?	YES = Go to E4 N/A = Go to E5	NO = Fail
4) If a biological opinion applicable to the Facility for the threatened or endangered species has been issued, can the Applicant demonstrate that: <ul style="list-style-type: none"> <li>a) The biological opinion was accompanied by a FERC license or exemption or a habitat conservation plan? Or</li> <li>b) The biological opinion was issued pursuant to or consistent with a recovery plan for the endangered or threatened species? Or</li> <li>c) There is no recovery plan for the threatened or endangered species under active development by the relevant Resource Agency? Or</li> <li>d) The recovery plan under active development will have no material effect on the Facility's operations?</li> </ul>	YES = Pass, go to F	NO = Fail
5) If E.2 and E.3 are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?	YES = Pass, go to F	NO = Fail

associated with the Facility?	Low Impact	
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## OAKDALE DESCRIPTION

### Operation of Oakdale

The Oakdale Transfer Station and hydroelectric facility is at the terminus of the Massachusetts Water Resources Authority's Quabbin Aqueduct. To understand the nature of this hydroelectric facility and its operation, some background on the MWRA water system and operating procedures is helpful. The paragraphs below provide this background, as well as detail regarding the Oakdale facility.

The MWRA supplies wholesale water to local water departments in 50 communities, primarily in the Boston metropolitan area. On average, MWRA supplies approximately 200 million gallons per day to its water system customers. MWRA's water comes from the Quabbin Reservoir, about 65 miles west of Boston, and the Wachusett Reservoir, about 35 miles west of Boston. Both Quabbin and Wachusett Reservoirs are man-made reservoirs, constructed for water supply purposes. More than 50% of the inflow into the Wachusett Reservoir is transferred from Quabbin Reservoir via the Quabbin Aqueduct; Quabbin Reservoir water is required to meet MWRA's metropolitan demand. The Quabbin Aqueduct is one component of a transmission system consisting of over 100 miles of tunnels and aqueducts that transports water largely by gravity to points of distribution within the MWRA service area. A schematic of the MWRA water system is presented below and the following page provides more detail on the Quabbin Aqueduct and an orthophoto of the Oakdale Transfer Facility.



The Oakdale hydroelectric facility is located at the outlet of the Quabbin Aqueduct just upstream of Wachusett Reservoir and near the mouth of the Quinepoxet River. It is one of the locations in the MWRA water transmission system where MWRA currently captures energy in falling water as it conveyed from higher elevations in the western portion of the MWRA system (Quabbin Reservoir) to lower elevations in the distribution area. Generation of hydropower is secondary to MWRA's primary objective of water supply, and is legally subordinate to MWRA's obligation to provide high quality drinking water. The Oakdale facility is operated and maintained by MWRA.

Quabbin Aqueduct is a deep rock tunnel. The water enters the aqueduct at Quabbin Aqueduct Intake, Shaft 12 and travels over 24 miles to its terminus to the Oakdale



transfer station in West Boylston Massachusetts. The Oakdale station was constructed in 1929 as an outlet works of Quabbin Tunnel, and was initially operated solely as a water transfer station. In 1949, a hydropower generator was added. In 1990, FERC granted a conduit exemption for the Oakdale hydroelectric facility (FERC # 10689-000).

At Oakdale, flow may be directed to either a 84-inch man that connects to the top of the Outlet shaft or through a 72-inch bypass pipeline branch. Water that flows through either a turbine or turbine bypass is discharged to a short outlet channel that leads to the Quinepoxet River, which empties into the Wachusett Reservoir approximately 750 feet downstream of the Oakdale station (see figure on the following page). The installed capacity of the Oakdale hydroelectric facility is 3,500 kW. When the flow is directed through the turbine, the hydraulic head developed between elevation 530.00 at Shaft 12 of the Quabbin Reservoir and elevation 390.00 of the Wachusett Reservoir drives the hydro generator. The maximum net head is 115.0 feet, and regularly operates at a net head of 92.5 feet. At maximum water demand, the turbine has a hydraulic capacity of 510 ft cubic feet per second. Figure 1-1 and Figures 1-2 show the Oakdale Power Station Process flow and a profile of the Quabbin Aqueduct from Quabbin Reservoir to Wachusett Reservoir.

Average annual generation in recent years was approximately 11,500,000 kWh. The hydropower generated is sold to NGRID. Revenues from the sale of power to NGRID are used to offset the costs of operating the Massachusetts Department of Conservation and Recreation's (DCR) Watershed Protection Division. (DCR and MWRA are partners in watershed protection and MWRA rate payers fund the DCR Watershed Protection Division).

As noted above, the Oakdale hydro turbine generates power from the transfer of water from the Quabbin Reservoir to the Wachusett Reservoir. Water supply and water quality objectives determine how much water is transferred and when (transfers do not occur every day). Generation of hydropower is secondary to the primary objective of water supply. Wachusett Reservoir must be managed for continuous water availability, optimal water quality and flood control, and this requires management of the reservoir elevation within a range of high and low set points with transfers from Quabbin as needed.

Wachusett Reservoir water is 'younger' and of poorer quality and is improved at all times of the year through dilution by inflows from Quabbin which have been naturally treated by the long detention of the reservoir. During summer stratification, Quabbin transfer water can establish an 'interflow' layer in which higher quality Quabbin water moves in a narrow band through the reservoir to the Cosgrove intake. Reservoir stratification is normally established by mid-June. MWRA's empirical evidence suggests that maximum transfers provide maximum water quality benefits, and so from June- September/October about 300 mgd frequently flows through the Oakdale facility. From September/October to January or February when ice-in occurs, transfers are made through Oakdale to keep shallow areas of Wachusett Reservoir submerged to assist in bird management (after "ice in" the bird presence at the reservoir is markedly decreased) and to keep pace with water demand; transfers of 100-300 mgd are made. After ice-in and before June, the reservoir

Figure 1-1 Oakdale Power Station Process Flow

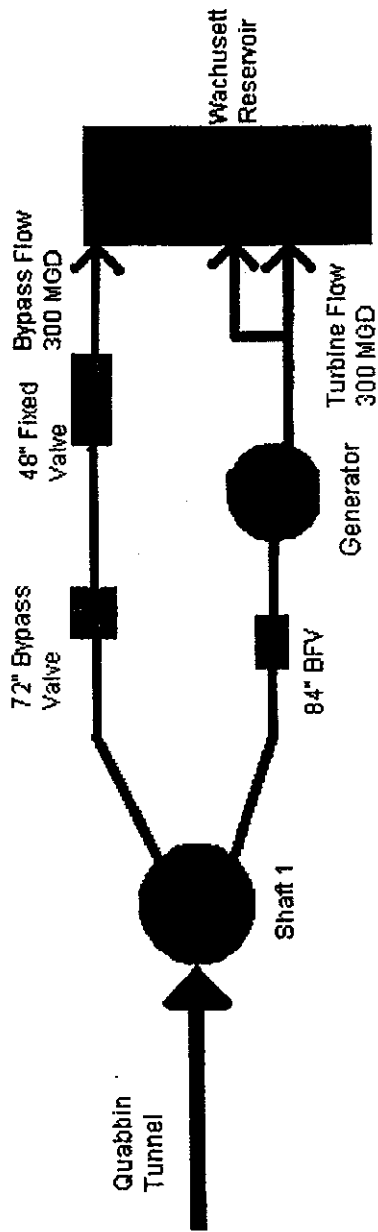


Figure 1-2 provides a Quabbin Aqueduct profile from the Quabbin Reservoir to the Wachusett Reservoir.

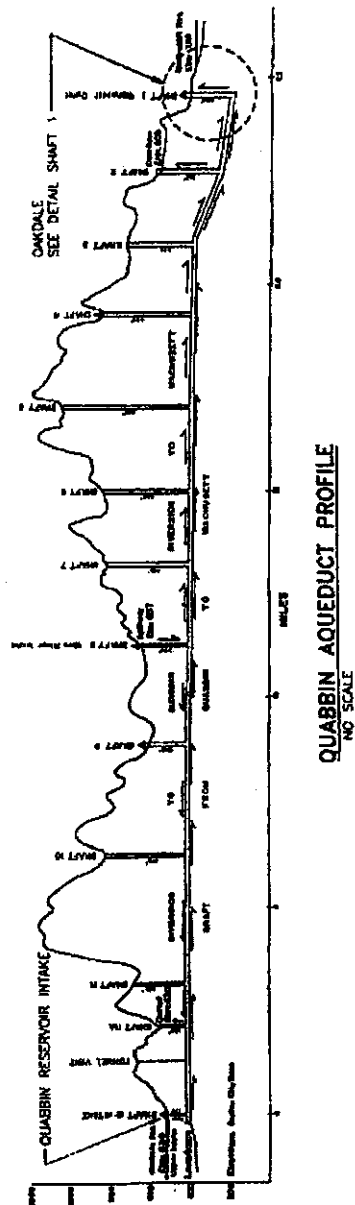
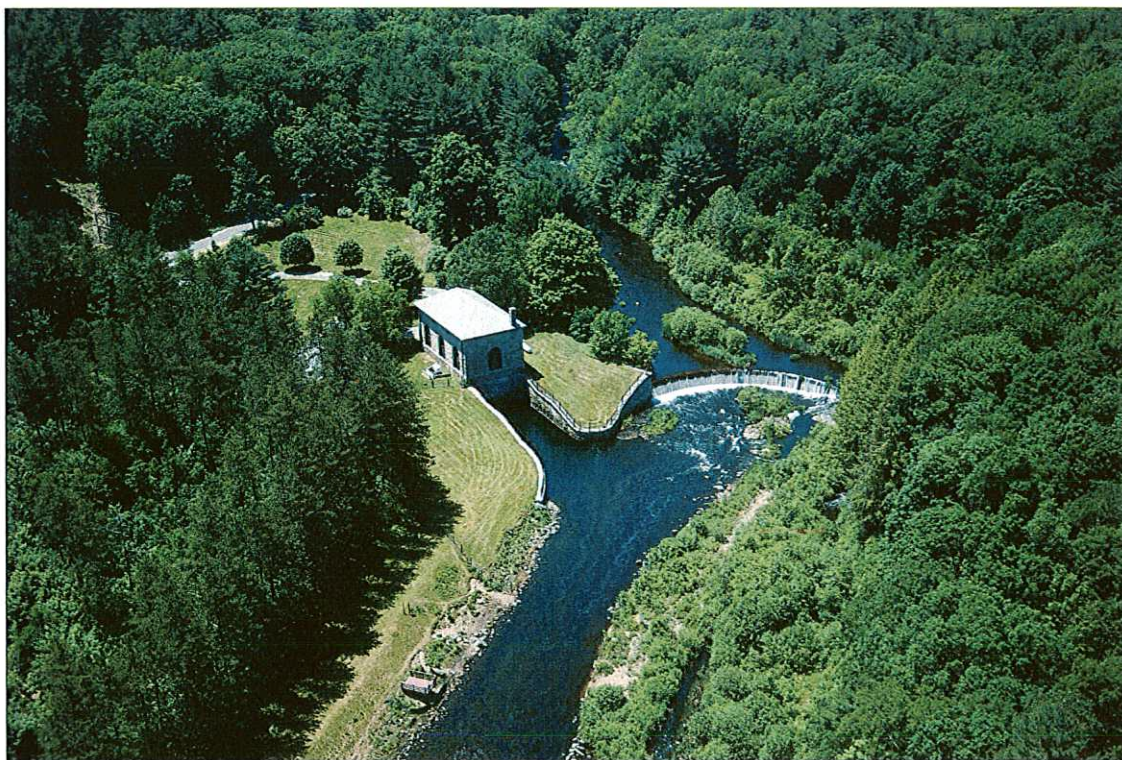


Figure 1-2 Quabbin Aqueduct Profile

elevation is lowered to create additional flood storage; transfers of 100-300 mgd may still occur.

### **Oakdale Environs**

There is a dam just upstream on the Quinepoxet River in close proximity to the Oakdale power house. The dam was built for the purpose of reducing sedimentation into Wachusett Reservoir and degrading water quality; the dam was constructed when the reservoir was constructed some 100 years ago. At this point, sediments have filled in behind the dam. The dam is not part of or appurtenant to the Oakdale station. The dam is under the care and control of the DCR. The operation of Oakdale is independent of the dam.



MWRA has received a waiver from filtration for its Wachusett and Quabbin Reservoirs; these waivers attest to the excellent raw water quality that is maintained throughout the Wachusett and Quabbin reservoirs and MWRA's water supply system, including the Oakdale station. The Quabbin and Wachusett Reservoirs are Class A water bodies and are classified under Massachusetts' regulations as Outstanding Resource Waters.

The cornerstone of MWRA's excellent water quality is an aggressive and extensive watershed protection program that includes preservation of watershed lands surrounding Wachusett Reservoir. Much of the land in the vicinity of the Oakdale station was acquired when the reservoir was first established; additional lands have been acquired through an active land acquisition program over the past two decades.

The reservoir and the protected open space provides passive recreation opportunities, and a Public Access Plan has been developed for the Wachusett Reservoir. In the project vicinity, shore-line fishing and various forms of passive recreation are allowed. Boating activities are prohibited as it is considered an unnecessary threat to water supply due to the likelihood of water contact and the fact that private boats would have the potential to introduce or perpetuate exotic and/or nuisance vegetation. As a result, canoes must be taken out of the Quinepoxet River upstream of the Oakdale Station. Hiking, walking, nature study, bird watching, snowshoeing are allowed. MWRA works in concert with DCR to maintain careful control of activities to limit negative impacts to water quality.

The Oakdale facility, along with a number of aqueducts, dams, dikes, shafts and pumping stations, and reservoir system components comprise the *Metropolitan Water Supply System*, a National Register Thematic Resource Area. The Oakdale Building is included in the Massachusetts Historical Commission's (MHC) Inventory of Historic and Archaeological Assets of the Commonwealth. MWRA and MHC have entered into a Programmatic Memorandum of Understanding that ensures projects undertaken by MWRA do not have any adverse effects on properties listed on the Register.

### **Federal Energy Regulatory Commission (FERC) Process**

On January 19, 1990 FERC granted the Oakdale Power Plant an Exemption from Licensing (Conduit), Project 10689-000. From what can be discerned from review of FERC's electronic base, few comments on the project were received during the FERC process. Resource agencies that commented included the Army Corps of Engineers and U.S. Fish and Wildlife. The Army Corps of Engineers stated it had no objection to the issuance of a conduit exemption.

USFWS comments and proposed terms and conditions primarily addressed discharges to rivers below Winsor Dam on the Quabbin Reservoir (the Swift River) and Wachusett Dam (to the South Branch of the Nashua River). MWRA discharges to these rivers are a function of MWRA's reservoir operating policies, and the Oakdale hydroelectric facility has no bearing on discharges to the Swift and Nashua Rivers. FERC found that the terms and conditions suggested by USFWS "... are not related and germane to the project and its operation" and did not attach the USFWS terms and conditions to the Exemption Order.

While not attached to the FERC Exemption, MWRA meets the following terms and conditions proposed by USFWS:

- The Exemptee shall permit access to the project area wherever possible to allow for public utilization of fish and wildlife resources, taking into consideration any necessary restrictions to maintain public safety and protect project civil works.
- The Fish and Wildlife shall be allowed to inspect the project area at any time while the project operates under an Exemption from licensing to monitor compliance with their terms and conditions and to investigate reported adverse impact to fish and wildlife resources associated with project operation.

Public access to the project area has been provided wherever possible, and in fact, fishing does occur in the project vicinity. Inspections of the environs are allowed at any time.

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UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Massachusetts Water Resources  
Authority

Project No. 10689-000  
Massachusetts

ORDER GRANTING EXEMPTION FROM LICENSING  
(CONDUIT)

JANUARY 19, 1990

On November 4, 1988, the Massachusetts Water Resources Authority filed an application to exempt the Oakdale Power Plant Project from the licensing requirements set forth in Part I of the Federal Power Act. The proposed small hydropower project is described in the attached public notice. 1/ The comments of interested agencies and individuals, including the U.S. Fish and Wildlife Service and the state fish and wildlife agency, have been fully considered in determining whether to issue this exemption from licensing.

Article 2 of this exemption requires compliance with the terms and conditions prepared by federal or state fish and wildlife agencies to protect fish and wildlife resources. These mandatory terms and conditions are contained in any attached letters commenting on the exemption application. 2/ If contested, the Commission will determine whether any mandatory term or condition is outside the scope of article 2.

After considering the mandatory terms and conditions designed to protect fish and wildlife resources, the environmental information in the exemption application, the staff's independent assessment, and other public comments, the Director finds that issuance of this order is not a major federal action significantly affecting the quality of the human environment.

- 1/ A joint motion to intervene was filed by the Town of West Boylston, Massachusetts and West Boylston Municipal Light Plant to be a party to the case proceedings.
- 2/ No relevant letters are attached to this order from resource agencies, even though the U.S. Department of the Interior filed on September 21, 1989, terms and conditions that staff has determined are not related and germane to the project or its operation.



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The Director orders:

(A) The Oakdale Power Plant Project is exempted from the licensing requirements of Part I of the Federal Power Act, subject to the attached standard articles.

(B) Article 2 of this exemption is amended to include the National Marine Fisheries Service as a fish and wildlife agency that can provide terms and conditions.

(C) The exemptee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(D) This order is issued under authority delegated to the Director and is final unless appealed to the Commission within 30 days from the date of this order.

Dean L. Shumway  
Director, Division  
of Project Review

- a. Type of Application: Conduit Exemption
- b. Project No.: 10689-000
- c. Date Filed: November 4, 1988
- d. Applicant: Massachusetts Water Resources Authority,  
Waterworks Division
- e. Name of Project: Oakdale Power Plant Project
- f. Location: On the Quabbin Pressure Aqueduct at the Wachusett  
Reservoir in Worcester County, Massachusetts
- g. Filed Pursuant to: Federal Power Act, 16 U.S.C. e 791(a) -  
825(r)
- h. Applicant Contact: Mr. William A. Brutsch  
Massachusetts Water Resources Authority  
Waterworks Division  
100 First Avenue, Charlestown Navy Yard  
Boston, MA 02129  
(617) 242-6000
- i. FERC Contact: Ed Lee, (202) 376-5786
- j. Comment Date: September 5, 1989
- k. Description of Project: The existing operating project  
consists of: (1) one turbine-generator rated at 3,500 kw;  
and (2) appurtenant facilities. The project generates an  
average of 13,000 Mwh annually. The project is owned by the  
Metropolitan District Commission. The project is operated  
and maintained by the applicant.
- l. Purpose of Project: Project power would continue to be sold  
to the New England Power Company and Boston Edison Company.
- m. This notice also consists of the following standard  
paragraphs: A3, A9, B, C, D3b.






The Massachusetts Water Resources Authority, by the undersigned, hereby affirms that the information presented in the foregoing applications to the Low Impact Hydropower Institute for certification of the Cosgrove Conduit Hydroelectric Facility, the Oakdale Conduit Hydroelectric Facility, and the Loring Road Conduit Hydroelectric facility is accurate and complete to the best of the knowledge, information and belief of those individuals from whom the information was gathered.

The primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit. The Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions. The undersigned Applicant agrees to release the Low Impact Hydropower Institute, the Governing Board and its agents from any claims arising out of any decision rendered on this or other applications or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.

Massachusetts Water Resources Authority

By:   
Its: Chief Operating Officer, Duly Authorized

Dated: 09/21/2015



# LOW IMPACT HYDROPOWER INSTITUTE

## APPENDIX D – PROJECT CONTACT FORM

Project Name: Oakdale Power Plant Project  
(please provide name used in FERC license if applicable)

### Project Owner/Operator:

Name and Title Michael Hornbrook, Chief Operating Officer  
Company Massachusetts Water Resources Authority  
Phone 617-788-4359  
Email address Michael.Hornbrook@mwa.com  
Mailing Address 100 First Ave, CIV, Bldg 31, Boston MA 02129

### Consulting firm that manages LIHI program participation (if applicable):

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Phone \_\_\_\_\_  
Email address \_\_\_\_\_  
Mailing Address \_\_\_\_\_

### Party responsible for compliance with LIHI program requirements:

Name and Title Pamela Heedell, Policy & Planning Mgr  
Phone 617-788-1102  
Email address Pamela.Heedell@mwa.com  
Mailing Address 100 First Ave, CIV, Bldg 31, Boston MA 02129

### Party responsible for accounts payable:

Name and Title Pamela Heedell, Policy & Planning Mgr  
Phone 617-788-1102  
Email address Pamela.Heedell@mwa.com  
Mailing Address 100 First Ave, CIV, Bldg 31, Boston MA 02129

[Signature]  
Project Owner/Operator Signature

09/21/2015  
Date

The Massachusetts Water Resources Authority, by the undersigned, hereby affirms that the information presented in the foregoing applications to the Low Impact Hydropower Institute for certification of the Cosgrove Conduit Hydroelectric Facility, the Oakdale Conduit Hydroelectric Facility, and the Loring Road Conduit Hydroelectric facility is accurate and complete to the best of the knowledge, information and belief of those individuals from whom the information was gathered.

The primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit. The Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions. The undersigned Applicant agrees to release the Low Impact Hydropower Institute, the Governing Board and its agents from any claims arising out of any decision rendered on this or other applications or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.

Massachusetts Water Resources Authority

By:   
Its: Chief Operating Officer, Duly Authorized

Dated: 09/21/2015





# LOW IMPACT HYDROPOWER INSTITUTE

## APPENDIX D – PROJECT CONTACT FORM

Project Name: Cosgrove Intake and Power Plant  
(please provide name used in FERC license if applicable)

### Project Owner/Operator:

Name and Title Michael Hornbrake, Chief Executive Officer  
Company Massachusetts Water Resources Authority  
Phone 617-788-4359  
Email address Michael.Hornbrake@MWRA.com  
Mailing Address 100 First Ave, CNF, Bld 39, Boston MA 02129

### Consulting firm that manages LIHI program participation (if applicable):

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Phone \_\_\_\_\_  
Email address \_\_\_\_\_  
Mailing Address \_\_\_\_\_

### Party responsible for compliance with LIHI program requirements:

Name and Title Patricia Hewell, Policy & Planning Manager  
Phone 617-788-1102  
Email address Patricia.Hewell@mwra.com  
Mailing Address 100 First Ave, Bld, 39, Boston, MA 02129

### Party responsible for accounts payable:

Name and Title Patricia Hewell, Policy & Planning Manager  
Phone 617-788-1102  
Email address Patricia.Hewell@mwra.com  
Mailing Address 100 First Ave, CNF, Bld, 39, Boston MA 02129

Michael Hornbrake  
Project Owner/Operator Signature

09/21/2015  
Date