LOW-IMPACT HYDROPOWER POWER INSTITUTE RECERTIFICATION APPLICATION

HOLYOKE GAS & ELECTRIC DEPARTMENT HYDROELECTRIC SYSTEM (LIHI #89)

Prepared for:

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Holyoke, Massachusetts

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1. Introduction

This Application for Low Impact Hydropower Institute (LIHI) is for recertification of Holyoke Gas & Electric Department Hydroelectric System LIHI #89 which expired on January 1, 2017 and was currently extended to June 1, 2017 as part of this recertification process. It includes fifteen developments under nine separate FERC licenses. Responses to some questions require individual responses for each station or license. However, the majority of the questions require a discussion of the entire Holyoke Gas & Electric Department (HG&E) hydropower system, encompassing the Hadley Falls station on the Connecticut River and sixteen stations on the Holyoke Canal System. This is due to the fact that the Holyoke License, which includes the Hadley Falls Station and six of the canal stations, includes numerous conditions that affect all sixteen canal stations despite their separate licensing status (e.g., fish passage and protection measures, rare, threatened and endangered (RTE) species monitoring, and canal flows and operations).

The following Tables 1, 2 & 3 provide project/development names, location, regulatory status, and power plant characteristics in response to several questions on the Application Form below. There have been several unit rehabilitations, retirements and fish passage enhancements since the previous LIHI certification that will be discussed in the following sections as well as detailed responses to most questions

Table 1 - Location

FERC Project Number	Project Name	Development	Location	Latitude	Longitude
2004	Holyoke	Hadley Falls	River	+42° 12' 43.3764"	-72° 36' 10.1592"
		Beebe Holbrook	1st Level to 2nd	+42° 12' 18.05"	-72° 36' 14.83"
		Boatlock Station	1st Level to 2nd	+42° 12' 31.91"	-72° 36' 1.06"
		Chemical	3rd Level to River	+42° 11' 31.96"	-72° 36' 31.19"
		Riverside 4-7 Station	2nd Level to River	+42° 12' 2.90"	-72° 35' 39.61"
		Riverside 8 Station	2nd Level to River	+42° 12' 3.82"	-72° 35' 38.31"
		Skinner	1st Level to 2nd	+42° 12' 10.30"	-72° 36' 26.57"
2768	Albion Mill A	Albion Mill A	2nd Level to River	+42° 12' 31.02"	-72° 35' 37.21"
2766	Albion Mill D	Albion Mill D	2nd Level to River	+42° 12' 30.69"	-72° 35' 36.79"
2771	Nonotuck Mill	Nonotuck Mill	2nd Level to River	+42° 12' 23.85"	-72° 35' 34.34"
2386	Holyoke No. 1	City #1	1st Level to 2nd	+42° 12' 1.10"	-72° 36' 37.39"
2387	Holyoke No. 2	City #2	1st Level to 2nd	+42° 11' 56.02"	-72° 36' 39.20"
2388	Holyoke No. 3	City #3	2nd Level to 3rd	+42° 11' 43.02"	-72° 36' 46.49"
7758	Holyoke No. 4	City #4	1st Level to 2nd	+42° 12' 2.03"	-72° 36' 36.15"
10806	Valley Hydro (Station No. 5)	Valley Hydro (Station No. 5)	2nd Level to River	+42° 12' 32.65"	-72° 35' 45.60"

Table 2 – Regulatory Status

FERC Project Number	Project Name	Development	FERC License Issuance Date	FERC License Experation Date	FERC License Type or Special Classification	Hyperlinks	Water Quality Certification
2004	Holyoke	Hadley Falls	8/20/1999	8/31/2039	No Special Classification	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1977101	February 14, 2001
		Beebe Holbrook	4/20/2005			Major Amendment per Settlement: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4293711	
		Boatlock Station					
		Chemical					
		Riverside 4-7 Station	3/23/2015			License Amendment for Hadley 1 Upgrade and Fish Exclusion Rack: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14315139	
		Riverside 8 Station					
		Skinner					
2768	Albion Mill A	Albion Mill A	06/29/89	2/28/2021	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1145024 Albion A FERC Notice for Relicense: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14454462	CWA Section 401- 3/30/1989 See Appendix B-8-MassDEP correspondence confirming no separate WQC is needed for relicense of Albion A, D & Nonotuck.
2766	Albion Mill D	Albion Mill D	06/29/89	2/28/2021	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1144993 Albion D FERC Notice for Relicense: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14454465	
2771	Nonotuck Mill	Nonotuck Mill	06/29/89	2/28/2021	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14454467 Nonotuck FERC Notice for Relicense: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1144969	
2386	Holyoke No. 1	City #1	02/28/89	1/31/2019- under relicensing	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1102614 City 1 Relicense Application: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14491405	CWA Section 401- 8/24/1987 MAED Confirming 2011 Water Quality Cert: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14505492
2387	Holyoke No. 2	City #2	09/28/88	8/31/2018 - under relicensing	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1049636 City 2 Relicense Application: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14491422	CWA Section 401- 3/30/1987 MAED Confirming 2011 Water Quality Cert: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14505492
2388	Holyoke No. 3	City #3	09/28/88	accelerated 2/20/2019 - under relicensing	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1049639 City 3 Relicense Application http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1049639	CWA Section 401- 7/14/1987 MAED Confirming 2011 Water Quality Cert: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14505492
7758	Holyoke No. 4	City #4	08/15/06	8/31/2039 (32 years 6 months)	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4430640	4/19/06- Waived due to Certified under Project No. 2004
10806	Valley Hydro (Station No. 5)	Valley Hydro (Station No. 5)	06/29/90	5/31/2030	Minor Project	http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1257317	CWA Section 401- 8/16/1989

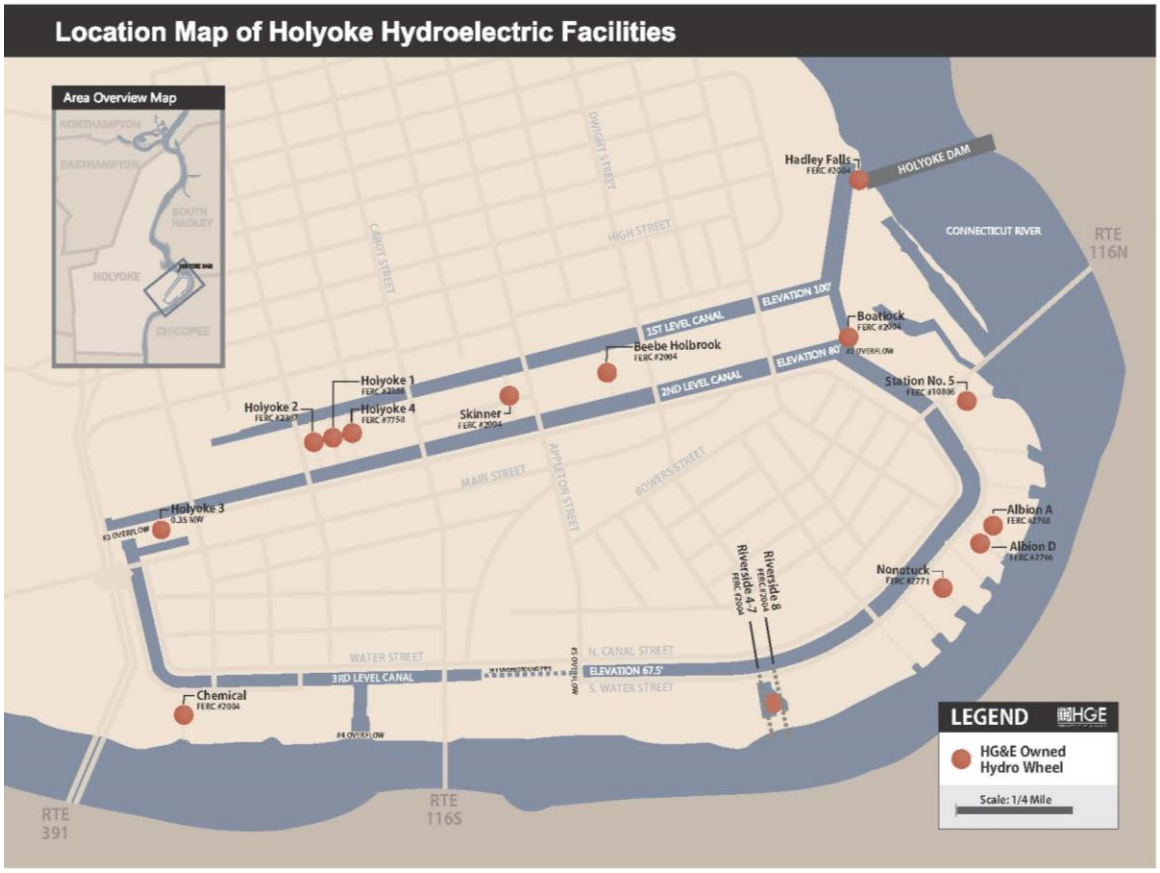
Table 3 - Plant Characteristics

FERC Project Number	Project Name	Development	Commercial Operation Date	Gross Name Plate Capacity (MW)	Annual Generation (MWh)	Number of Turbines	Type of Turbines	Min and Max Hydraulic Capacity (CFS)		Dates and Types of Major Equipment Upgrades since last certification	Dates, Purpose, and Type of any Recent Operational Changes
2004	Holyoke	Hadley Falls		30.610	186,112	2	Unit 1 - (15,600 kW) Vertical Adjustable Blade, Kaplan-type Unit 2 - (15,010 kW) Fixed Blade, Propeller type	Unit 1 - 880 Unit 2 - 880	Unit 1 - 4,520 Unit 2 - 4,060	Hadley 1 - Complete generator overhaul and rehabilitation - May 2015 to May 2016 Hadley 1&2 - Installation of a Fish Exclusion Rack June to December 2015	
		Beebe Holbrook	January 1, 1948	0.266	757	2	Unit A - Unoperational Unit E&F - Vertical Francis type (266 kW)	Unit E&F- 121.8	Unit E&F- 304		Revised Comprehensive Canal Operations and Flow Plan (2015)
		Boatlock Station	January 1, 1924	3.340	12,745	3	Unit 1 - Mavel vertical Kaplan (700 kW) Unit 2 - Vertical Francis (1,200 kW) Unit 3 - American Hydro Vertical Francis (1,440kW)	Unit 1 - 213 Unit 2 - 482 Unit 3 - 482	Unit 1 - 397 Unit 2 - 980 Unit 3 - 980	Unit 2 - Complete generator overhaul and rehabilitation - June 2014 to May 2015	
		Chemical	January 1, 1935	1.600	4,107	2	Unit A Vertical Adjustable Kaplan-Type Unit B - Vertical Fixed Blade. Each 800 kW	Unit A - 206 Unit B - 206	Unit A=524, Unit B=527		
		Riverside 4-7 Station	January 1, 1921	3.040	13,515	4	Unit 4 (880 kW), Unit 5 (600 kW) & Unit 6 (600 kW Unoperational) - Horizontal, Double-Runner Francis-type Unit 7 (1,560 kW) - Vertical, Francis-type	Unit 4 - 90 Unit 5 - 255 Unit 7 - 411	Unit 4 - 500 Unit 5 - 404 Unit 7 - 760		
		Riverside 8 Station	January 1, 1931	4.000	22,177	1	Vertical, Propeller-type	1,402	2,008		
		Skinner	January 1, 1924	0.300	1,389	1	Vertical, Francis-type	85	236.5		
2768	Albion Mill A	Albion Mill A	January 1, 1919	0.320	0*	1	Vertical, Francis-type	107	201		
2766	Albion Mill D	Albion Mill D	January 1, 1919	0.400	0*	1	Vertical, Francis-type	127	241		
2771	Nonotuck Mill	Nonotuck Mill	January 1, 1919	0.500	0*	1	Vertical, Francis-type	251	87.5		
2386	Holyoke No. 1	City #1	January 1, 1923	1.000	4,730	4	All 4 units are Vertical, Francis-type, 1A=270 kW, 1B=230 kW, 1C=270 kW, 1D=230 kW	1A - 115 1B - 84.5 1C - 111.5 1D - 92	1A - 233 1B - 188 1C - 233 1D - 188.5		
2387	Holyoke No. 2	City #2	January 1, 1923	0.800	3,569	1	Vertical Fixed Blade Kaplan type	172.5	842.5		
2388	Holyoke No. 3	City #3	January 1, 1923	0.450	3,206	1	Vertical Fixed Blade Kaplan type	222.5	720.0	Complete generator overhaul and rehabilitation - August 2013 to April 2015	
7758	Holyoke No. 4	City #4	January 1, 1923	0.750	3,470	2	Both Units are Vertical, Adjustable, Kaplan-type sized at 375 kW each	4J - 169 4K - 185	4J - 322 4K- 344	Complete generator overhaul and rehabilitation - October 2010 to March 2011	
10806	Valley Hydro (Station No. 5)	Valley Hydro (Station No. 5)	November 1, 1994	0.790	3,697	1	Vertical, adjustable blade, Kaplan - type	139	485		

2. Facility Description

This Application for LIHI Recertification is for the Holyoke Hydroelectric System, which includes fifteen developments under nine separate FERC licenses. The Holyoke Project License (FERC No. 2004) includes the Hadley Falls Station and six of the canal stations. The remaining canal stations are separately licensed, as listed in Section 1, Table 2, of this Application. Only one of the stations, Hadley Falls, has a dam and an impoundment. The remaining stations are located on the Holyoke canal system (Figure 2-1).

Figure 2-1



2.1 Hadley Falls Station

The Hadley Falls Station is the largest generating station in the HG&E system. Hadley Falls is part of the Holyoke Project (FERC No. 2004), which passes Connecticut River flows by means of releases through the Hadley Falls generating station and the Holyoke Canal Gatehouse, both located at the Holyoke abutment of the dam. Upstream and downstream eel and fish passages, and fish exclusion/protection facilities, are installed at the Projects. Between June and December of 2015 new downstream fish passage enhancements were constructed at the Hadley Falls Station. These enhancements included (but were not limited to): a new vertical bar rack with 2" clear spacing located in front of the Hadley Falls Station to exclude fish from unit entrainment, as well as surface and submerged bypasses to facilitate passage of fish over the Holyoke Dam. These new facilities replaced the existing downstream fish passage measures at the Hadley Falls intake, which had previously consisted of 8-10' flow blocking panel overlays on the Hadley Unit 1 and 2 intakes, as well as a weir insert in the Bascule Gate. These facilities are discussed further in Section 3 of this Application. The normal headwater level is at

elevation 103.1'(HWP local datum) while the normal tailrace level is at elevation 53.50' when both units are operating.

2.1.1 Holyoke Dam

Holyoke Dam is oriented in the north-south direction and is of rubble masonry construction finished with ashlar granite. The structure is about 30 feet high above the foundation rock and 1,020 feet from abutment to abutment. Five 3.5-foot-high, inflatable flashboard sections were installed on the spillway crest of the Holyoke Dam in 2001, replacing the previous wooden flashboards. The inflatable flashboard system extends across the entire crest, except at the south end adjacent to the powerhouse intake, where an approximately 25-foot-wide bascule gate with a permanent crest elevation of 94.60 feet is located. The inflatable flashboard system sections are automated with a programmable control system, but can also be operated manually if the need arises. They are programmed to sequentially deflate at the pond elevation settings such that the Holyoke pond will not drop below the minimum pond elevation.

2.1.2 Hadley Falls Station Units

There are four gated openings at the Hadley Falls Station leading to two 28-foot-diameter reinforced concrete penstocks extending to each unit. The majority of each penstock is buried. Hadley Unit 1 was installed in 1950 and had a 15.8 MW generator. Hadley Unit 1 is a full Kaplan (double regulated) turbine with a diameter of 14 ft, 2 in, and a hydraulic capacity of 4,500 cfs. Between May 2015 and May 2016, this unit underwent a complete generator and rehabilitation which consisted of dismantling all major components, generator rewind, rotor pole refurbishment, excitation system refurbishment, new electric switchgear equipment, runner replacement and generator core restack including a new state-of-the-art vertical Kaplan turbine runner. This refurbishment resulted in a generator name plate of 15.600 MW. Hadley Unit 2 was installed in 1983 and has a 15.010 MW generator. Hadley Unit 2 has a turbine with a fixed blade propeller with a 13 ft diameter, and a hydraulic capacity of 3,750 cfs. Flows passed through the Hadley Falls Station are discharged into a 2,750-foot-long tailrace, a walled channel between the shore and the streambed.

2.1.3 Impoundment

The Hadley Falls Impoundment is a long narrow reservoir, extending approximately 25 river miles from the Holyoke Dam upstream on the river with a surface area of approximately 2,290 acres. The elevation at the dam at normal maximum is 100.60 feet NGVD (103.1 ft HWP local datum). The Impoundment is divided into an upper section (the portion upstream of the narrow section of the river adjacent to the local landmark known as Dinosaur Footprints) and a lower section (the portion between the narrows and the Holyoke Dam, 5 miles south of the narrows). The upstream end of this riverine reservoir is relatively shallow while deeper waters exist in the downstream section nearer the dam.

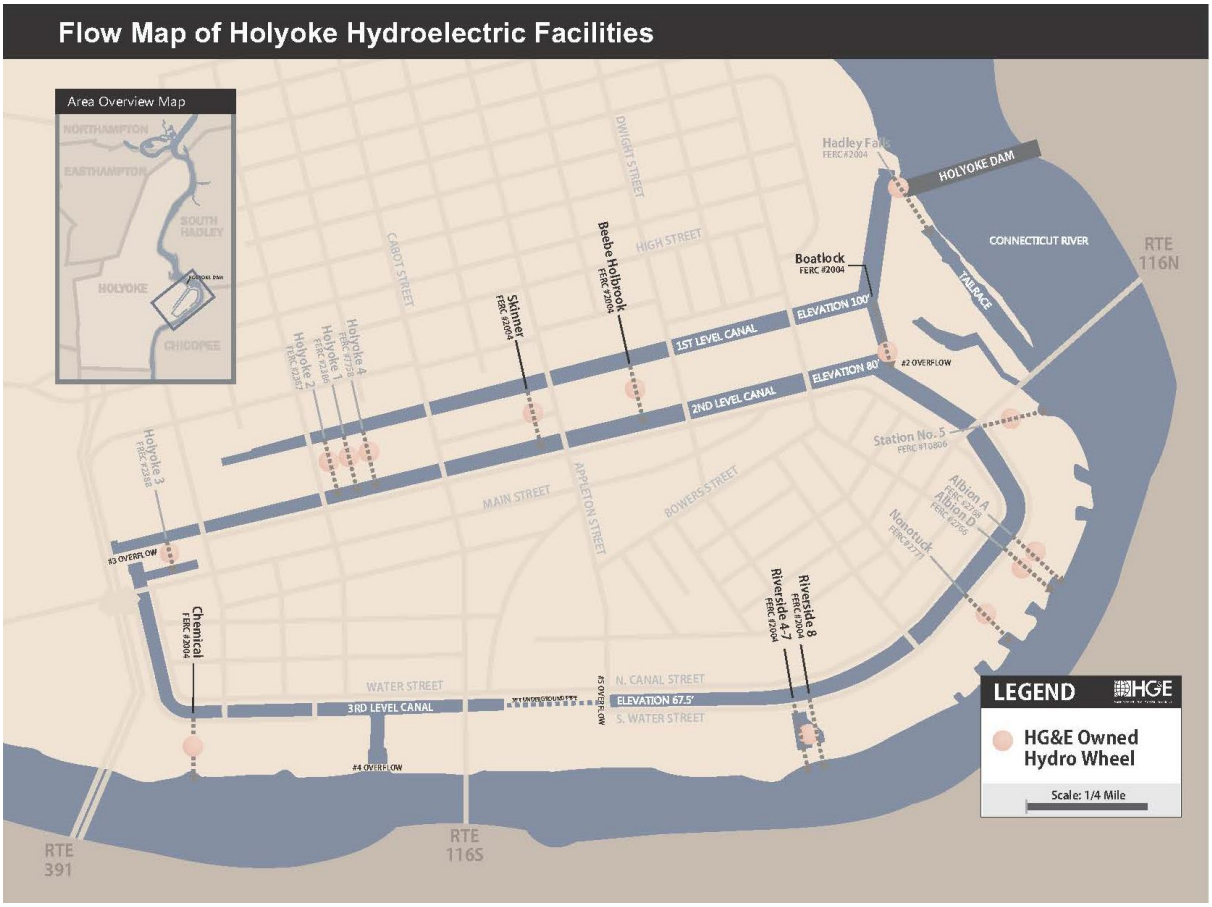
2.1.4 Bypass Reach

The Hadley Falls Bypass Reach is a wide, rocky section of river that extends approximately 3,000 feet from the Holyoke dam downstream to its confluence with the Hadley Falls Station tailrace and Second Level Canal (Valley Station) tailrace, and is comprised of three channels (i.e., the East Channel, the Center Channel, and the West Channel). The upper Bypass Reach, from the dam to the Route 116 Bridge, is characterized by shallow rocky areas with bedrock, boulder and cobble substrates. The reach is well scoured with little fines. The lower Bypass Reach, from the Route 116 Bridge downstream to the tailrace Canal, contains large deep pools. The No. 2 Overflow raceway is also part of the Bypass Reach. This is 2,500-foot long remnant channel that extends from Boatlock station downstream to the Hadley Falls tailrace. This raceway contains a mixture of cobble, gravel and sand substrates with pools, runs and riffles.

2.2 Holyoke Canal System Stations

The Holyoke Canal system consists of three levels, referred to as First, Second, and Third Level Canals (Figure 2-2). There are a total of fourteen hydroelectric generating stations with twenty-three generating units currently in service on the Holyoke Canal system that are owned and operated by HG&E. The Canal system begins with the Canal gatehouse structure located between the Hadley Falls Station and the western shore. There is a downstream fish passage Louver facility, which begins 554 ft downstream of the Canal gatehouse. The fish exclusion louver system is angled across the Canal and is 440 ft long. It ends at a bypass facility and pipe which transports migrating fish to the Hadley Falls Station tailrace. The gatehouse discharges water into the First Level Canal, a subsystem about 6,500 ft long, running through the City of Holyoke. The No. 1 Overflow structure, which is located immediately downstream of the gatehouse, discharges water directly back to the Hadley Falls Station tailrace, or to the fishlift attraction water.

Figure 2-2



The First Level Canal discharges water into the Second Level Canal through seven generating stations located along its length; six of these stations are owned and operated by HG&E. The HG&E licensed Projects (all operational) on the First Level Canal are: Boatlock, Beebe-Holbrook, and Skinner (all covered in FERC No. 2004); Holyoke 1 (FERC No. 2386); Holyoke 2 (FERC No. 2387); and Number 4 Hydro (FERC No. 7758). The First Level Canal also includes an unlicensed project—Aubin (also known as Anitec) that is not owned or operated by HG&E.

The Second Level Canal includes seven in-service generating stations, the No. 2 Overflow structure that discharges into the Hadley Falls Station tailrace, the No. 3 Overflow. The following stations on the Second Level Canal are located between the Second Level Canal and the Connecticut River about 3,500 ft north of the Boston & Maine Railroad bridge: Riverside 4-7(FERC No. 2004), Riverside 8 (FERC No. 2004), Station No. 5 (FERC No. 10806), Albion Mill D (FERC No. 2766), Albion Mill A (FERC No. 2768), Nonotuck (FERC No. 2771) are also located on the Second Level Canal. The Holyoke 3 station (FERC No. 2388) is located between the Second and Third Level Canals.

During our previous LIHI certification term, the following HG&E owned generation stations which are all located on the Second Level Canal have been formally retired with FERC and have no material impact on the operations of the canal system:

- Mt. Tom Mill (FERC No. 2497) was retired as of October 2013.
- Gillmill A (FERC No. 2772), was retired as of October 2012
- Gillmill D (FERC No. 2775). was retired as of October 2013
- Crocker Mill A and B (FERC No. 2758) was retired as of October 2012 and
- Crocker Mill C (FERC No. 2770) was retired as of October 2012

During our previous LIHI certification term, the following generation stations that are not owned by HG&E were retired and have no material impact on the operations of the canal system:

- Sonoco (unlicensed) is located between the Third Level Canal and the Connecticut River. This station ceased operations and closed their head gate in December of 2009. They have not to date installed a concrete plug.
- The Parsons station on the First Level Canal, intakes were plugged and the equipment removed as part of the demolition of the mills this past year. The plugging of the intakes occurred during the spring canal outage in March of 2016.

The Third Level Canal is supplied with water from the Holyoke 3 station and the No. 3 Overflow. It is about 4,000 ft in length, and is located largely at the low-lying southern end of the Canal system in the City of Holyoke, mostly parallel to the bank of the Connecticut River. The Third Level Canal includes the No. 4 Overflow structure located between the Canal and the Connecticut River. The Chemical (FERC No. 2004) stations is located between the Third Level Canal and the Connecticut River about 3,400 ft south of the railroad bridge.

2.2.1 Boatlock Station (FERC No. 2004)

The Boatlock station is located between the First and Second Level canals. The powerhouse structure is an L-shaped building with a concrete substructure and a brick superstructure with a length of 120 feet and widths of 42 feet and 60 feet. The power station dates from the early 1920's and houses one 700-kW unit, one 1,200-kW unit, and one 1,440-kW unit. All are vertical axis Francis units. The 1,200 kW unit underwent a complete generator overhaul and rehabilitation from June 2014 to May 2015. The normal headwater level is at elevation 100' while the normal tailrace level is at elevation 80'.

2.2.2 Beebe-Holbrook Station (FERC No. 2004)

The Beebe-Holbrook station is also located between the First and Second Level canals, about 2,000 feet south of the Boatlock Station. The powerhouse is a concrete and brick structure with a length of 126

feet, a width of 42 feet and a height of 29 feet. The power station dates from the late 1940's and houses one 266 kW vertical-axis Francis unit. The normal headwater level is at elevation 100' while the normal tailrace level is at elevation 80'.

2.2.3 Skinner Station (FERC No. 2004)

The Skinner station is located between the First and Second Level canals, about 1,600 feet south of the Beebe-Holbrook Station. The installation dates from 1924, and is housed in a non-project building. Water is delivered through a 150-foot long, 9-foot diameter steel penstock. There is one 300-kW, vertical-axis, and Francis unit. The normal headwater level is at elevation 100' while the normal tailrace level is at elevation 80'.

2.2.4 Holyoke 1 (FERC No. 2386)

The Holyoke 1 Project, located between the First and Second Level canals, was constructed in 1893 to generate electricity using available flows and a 19.5-foot differential between two levels of the Holyoke Canal System. The Holyoke 1 station consists of a brick powerhouse 38 feet wide and 50 feet long containing two 230-kW and two 270-kW turbine-generators with a total capacity of 1,056 kW; two steel penstocks 10 feet in diameter and 36.5 feet long; two tailraces 328.5 feet long and 20 feet wide; and appurtenant facilities. The normal headwater level is at elevation 100' while the normal tailrace level is at elevation 80'.

2.2.5 Holyoke 2 (FERC No. 2387)

The Holyoke 2 Project, located between the First and Second Level canal, commenced operation in 1938. Project works consist of: an intake at the wall of the Holyoke first level canal; two parallel 9-foot diameter steel penstocks each 240 feet long; one surge tank about 17 feet high and 10 feet in diameter; a powerhouse 60 feet long, 40 feet wide and about 50 feet high, containing one vertical turbine-generator unit rated at 800 kW and 1,017 hp; two parallel brick arched tailrace conduits, each 9 feet wide, 10 feet high and 120 feet long, discharging into the Holyoke second level canal; one 4.8-kV transmission line, 800 feet long; and appurtenant facilities. The normal headwater level is at elevation 100' while the normal tailrace level is at elevation 80'.

2.2.6 Holyoke 4 (FERC No. 7758)

The Holyoke 4 Project is also located between the First and Second Level canals. Project works consist of: two 7-foot-diameter, 76-foot-long penstocks drawing water from the first level canal of the Holyoke Canal System; a powerhouse with two 375-kW generating units with a total installed capacity of 750 kW (one of the generating units which was destroyed in an October 2004 fire underwent a complete generator overhaul and rehabilitation between October 2010 and March 2011 which took place during our previous LIHI application review period. The application stated this unit was not operating.); two 13-foot-wide, 300-foot-long tailraces discharging into the second level canal; a 25-foot-long, 4.8-kV transmission line; and appurtenant facilities. The normal headwater level is at elevation 100' while the normal tailrace level is at elevation 80'.

2.2.7 Riverside (FERC No. 2004)

The Riverside Station is located between the Second Level canal and the Connecticut River about 3,500 feet north of the Boston & Maine Railroad bridge. The station has two distinct powerhouses of concrete and brick. Units 4, 5, 6, and 7 are housed in a structure 105 feet long, 58 feet wide and 24 feet

high. Unit 4 is an 880-kW set and Unit 5 is a 600-kW set. Both are horizontal-axis Francis units. Unit 6 is also a horizontal-axis Francis unit, but it has been partially dismantled and placed in deactivated reserve status. It is rated 600-kW when active. Unit 7 is a 1,560-kW vertical-axis Francis set. Unit 8 is housed in a separate powerhouse of concrete and brick, with a length of 47 feet, a width of 35 feet, and a height of 31 feet. Unit 8 is vertical-axis propeller set, rated at 4,000 kW. The normal headwater level is at elevation 80' while the normal tailrace level is at elevation 50'.

2.2.8 Station No. 5 (Valley) (FERC No. 10806)

Station No. 5 (Valley) Project is located between the Second Level canal and the Connecticut River. Project works consisting of: a gated intake with trashracks located on the Second Level Canal of the Holyoke Water Power Company; two 75-foot-long, 6.5-foot-diameter, steel penstocks; a refurbished single-runner, vertical Kaplan turbine connected to a 790-kW generator; a 375-footlong, 16.5-footwide by 11-foot-high arched brick-lined tailrace tunnel; (a steel gate where the tailwater empties into the Connecticut River; a 4.8-kilovolt, 370-foot-long interconnection with HG&E's underground service line, and appurtenant facilities. The normal headwater level is at elevation 80' while the normal tailrace level is at elevation 52'.

2.2.9 Crocker Mill A and B (FERC No. 2758) and Crocker Mill C (FERC No. 2770) – Retired October 2012

The ice boom, trash racks, walk ways, headgates, stems and operators were removed and a permanent concrete bulkhead at the penstock intake was placed. The tailgates were secured and each penstock was sealed with concrete. The main electrical ties from the generator switchgear to the transformer have been removed.

2.2.10 Albion Mill D (FERC No. 2766)

The Albion Mill, located between the Second Level canal and the Connecticut River, was constructed in 1877 and the present hydroelectric generating unit was installed in 1954 and rebuilt in 1983. Project works consist of: a gated intake with submerged trashracks located on the second level canal; a 190-foot-long, 9-foot-diameter steel penstock; a single runner, Francis turbine directly coupled to a 400-kilowatt (kW) Westinghouse generator; a 205-foot-long, 9-foot-wide by 12-foot-high arched, brick-lined tailrace tunnel; a concrete gated outlet structure where the tailwater empties into a channel that leads to the Connecticut River; a 0.6-kilovolt (kV), 605-foot-long transmission line, and a 13.8-kV, 90- foot-long transmission line and appurtenant facilities. . The normal headwater level is at elevation 80' while the normal tailrace level is at elevation 50'.

2.2.11 Albion Mill A (FERC No. 2768)

The Albion Mill, located between the Second Level canal and the Connecticut River, was constructed in 1877 and the present hydroelectric generating unit was installed in 1954 and rebuilt in 1983. Project works consisting of: a gated intake with submerged trashracks located on the Second Level Canal; a 180-foot-long, 8-foot-diameter steel penstock; a single runner, Francis turbine directly coupled to a 300-kilowatt (kW) Westinghouse generator; a 260-foot-long, 16-foot-wide by 9- foot-high arched, brick-lined tailrace tunnel; a concrete gated outlet structure where the tailwater empties into a channel that leads to the Connecticut River; a 0.6-kilovolt (kV), 650-foot-long transmission line, and a 13.8-kV, 90-foot-long transmission line; and appurtenant facilities. The normal headwater level is at elevation 80' while the normal tailrace level is at elevation 50'.

2.2.12 Mt. Tom Mill (FERC No. 2497) – Retired October 2013

The gated intake rack on the 2nd Level Canal was closed with a concrete cap. The Mt. Tom tailrace was secured by closing the gates at the flood structure wall and the penstocks were plugged with concrete. The Mt Tom building suffered a fire in March 2012. The electrical equipment was disconnected and the building demolished.

2.2.13 Nonotuck (FERC No. 2771)

The Nonotuck Mill, located between the Second Level canal and the Connecticut River, was constructed in 1880 and the present hydroelectric generating unit was rebuilt in 1984. Project works consist of: a gated intake with submerged trashracks located on the second level canal; a 10.5-foot-diameter penstock 225 feet long; a 500-kW generating unit located in Nonotuck Mill building; a two parallel 9-foot-wide by 9-foot-high arched brick-lined tailrace tunnel 190 feet long extending from the draft tube to an existing concrete outlet structure; a concrete gated outlet structure where the tailwater empties into a channel that leads to the Connecticut River; a 13.8-kV transmission line; and appurtenant facilities. The normal headwater level is at elevation 80' while the normal tailrace level is at elevation 50'.

2.2.14 Gillmill A (FERC No. 2772)-Retired October 2012

The Gill Mill A was located between the Second Level canal and the Connecticut River. The generator was completely removed. The tailgates were secured and the penstock and intakes was sealed with concrete.

2.2.15 Gillmill D (FERC No. 2775) – Retired October 2013

The Gillmill D was located between the Second Level canal and the Connecticut River. The ice boom, trash racks, walk ways, headgates, stems and operators were removed and a permanent concrete bulkhead at the penstock intake was placed. The tailgates were secured and each penstock was sealed with concrete. The main electrical ties from the generator switchgear to the transformer have been removed.

2.2.16 Holyoke 3 Station (FERC No. 2388)

The Holyoke 3 Project commenced operation in 1940 and is located between the Second and Third Level canals. Project works consisting of: an intake trashrack about 47 feet long and 11 feet high covering an opening in the Holyoke Second Level Canal; two headgates about 11 feet square; two low pressure brick penstocks each about 85 feet long and 93 square feet in cross section; a reinforced concrete powerhouse about 42 feet long, 34 feet wide, and 28 feet high, housing one turbine-generator unit rated at 450 kW with an average head of 12.5 feet; an open tailrace about 118 feet long, 29.7 feet wide, and 10 feet deep; 4.8-kV generator leads that connect directly to the 4.8-kV area distribution system; and appurtenant facilities.

2.2.17 Chemical (FERC No. 2004)

The Chemical Station is located between the Third Level canal and the Connecticut River about 3,400 feet south of the railroad bridge. The installation is housed in a non-project industrial building. Water is delivered through a masonry flume about 260 feet long and 22 feet wide. The building housing the generating units is constructed of concrete and brick. The two units were installed in 1935. Unit 1 is a

vertical-axis Kaplan set rated at 800 kW. Unit 2 is a vertical-axis fixed-blade set, also rated 800 kW. The tailwater is carried to the river by two covered masonry flumes, each about 125 feet long, 15 feet wide and 9.5 feet high.

Table B-1. Facility Description Information for Holyoke Gas & Electric Department HydroElectric System (LIHI #89 if a recertification).

Information Type	*Variable Description*	*Response(and reference to further details)*
Name of the Facility	Facility name (use FERC project name if possible)	See Table 1 for project names, and the development(s) included in each FERC licensed Project
Location	River name (USGS proper name)	Connecticut River and Holyoke Canal System, Massachusetts
	River basin name	Connecticut River
	Nearest town, county, and state	Holyoke, Hamden County, Massachusetts
	River mile of dam above next major river	86
	Geographic latitude	See Table 1 for each development
	Geographic longitude	See Table 1 for each development
Facility Owner	Application contact names (IMPORTANT: you must also complete the Facilities Contact Form):	Paul Ducheney, City of Holyoke Gas & Electric Department
	- Facility owner (individual and company names)	James Lavelle, City of Holyoke Gas & Electric Department
	- Operating affiliate (if different from owner)	Paul Ducheney, City of Holyoke Gas & Electric Department
	- Representative in LIHI certification	James Lavelle, City of Holyoke Gas & Electric Department
Regulatory Status	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates	See Table 2 for each development It should be noted that subsequent to issuance of the Holyoke License in1999 the project was purchased from the Holyoke Water Power Company by HG&E. HG&E then initiated settlement discussions to address unresolved rehearing requests. A Settlement Agreement between HG&E, state and federal resource agencies and non-governmental organizations was filed with FERC on March 12, 2004. The terms and conditions of the Settlement Agreement and the related 2005 FERC License Amendment supersede the 1999 license, and the previously-filed agency recommendations for the Holyoke Project.
	FERC license type or special classification (e.g., "qualified conduit")	See Table 2 for each development
	Water Quality Certificate identifier and issuance date, plus source agency name	See Table 2 for each development)

	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	See Table 2 for each development
Power Plant Character-istics	Date of initial operation (past or future for operational applications)	See Table 3 for each development
	Total name-plate capacity (MW)	See Table 3 for each development
	Average annual generation (MWh)	See Table 3 for each development
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	See Table 3 for each development
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	All of HG&E's projects are operated in a Run-of-river mode. Operation of all projects is directed by the numerous flow requirements established under the Settlement Agreement and 2005 Amended License and the 2015 Amended License for Hadley 1 Upgrade and Fish Exclusion Rack. Therefore, project operations are addressed in Section 4 for each zone.
	Dates and types of major equipment upgrades	See Table 3 for each development
	Dates, purpose, and type of any recent operational changes	See Table 3 for each development
	Plans, authorization, and regulatory activities for any facility upgrades	See Table 3 for each development
Character-istics of Dam, Diversion, or Conduit	Date of construction	1847-1848
	Dam height	See Section 2
	Spillway elevation and hydraulic capacity	See Section 2. The hydraulic capacity is N/A, because it is an overflow-type structure.
	Tailwater elevation	See Section 2
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	See Section 2
	Dates and types of major, generation-related infrastructure improvements	See Section 2
	Designated facility purposes (e.g., power, navigation, flood control, water suppy, etc.)	Industrial and Power
	Water source	Connecticut River
	Water discharge location or facility	Connecticut River
Characte-ristics of Reservoir and Watershed	Gross volume and surface area at full pool	Gross volume unknown - surface area 2,290acres
	Maximum water surface elevation (ft. MSL)	100.6 NGVD (103.1 HWP local datum)
	Maximum and minimum volume and water surface elevations for designated power pool, if available	Not available

	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	• Bellows Falls Project, TransCanada Hydro Northeast, Inc. FERC No. 1855, River mile 173.7 • Vernon Project, TransCanada Hydro Northeast, Inc. FERC No. 1904, River mile 141.9 • Cabot/Turners Station, FirstLight, FERC No. 1889, River mile 122
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	None
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	No operation agreements have been made with upstream or downstream facilities.
	Area inside FERC project boundary, where appropriate	We do not have a calculated value for the area of the FERC project boundary.
Hydrologic Setting	Average annual flow at the dam	Average annual flow is measured at USGS gage No. 01170500 and is 16,330 cfs.
	Average monthly flows	Average monthly flows are measured at USGS gage No. 01170500: • Jan-15,200 cfs • Feb-10,900 cfs • Mar-19,900 cfs • Apr-37,600 cfs • May-21,500 cfs • Jun-15,300 cfs • Jul-10,700 cfs • Aug-9,080 cfs • Sep-7,480 cfs • Oct-14,100, cfs • Nov-15,700 cfs • Dec-18,700 cfs
	Location and name of relevant stream gauging stations above and below the facility	Upstream Gage: Montague City, MA USGS 01170500 Downstream Gage:
	Watershed area at the dam	11,765 square miles
Designated Zones of Effect	Number of zones of effect	Four
	Upstream and downstream locations by river miles	Zone 1: 112 to 86 river mile Zone 2: 86 to 83 miles Zone 3: 4.4 miles Zone 4: 83 to 80 river mile(Chicopee River)
	Type of waterbody (river, impoundment, by-passed reach, etc.)	Zone 1: River Zone 2: River Zone 3: Canal System Zone4: River
	Delimiting structures	Zone 1: Holyoke dam upstream ~25 river miles Zone 2: Holyoke dam downstream to

		Chemical tailrace Zone 3: Intake to Canal, level 1, level 2, level 3 See Attachment A – Figure 1 Zones of Effect Map Zone 4: Chemical tailrace to the Chicopee River
	Designated uses by state water quality agency	Zone 1: MA Class B (swimming & recreation) Zone 2: MA Class B (swimming & recreation) Zone 3: Zone 4: MA Class B (swimming & recreation)
Additional Contact Information	Names, addresses, phone numbers, and e-mail for local state and federal resource agencies	See Section 5. Contact Forms
	Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders	See Section 5. Contact Forms
Photographs and Maps	Photographs of key features of the facility and each of the designated zones of effect	See Appendix A
	Maps, aerial photos, and/or plan view diagrams of facility area and river basin	See Appendix A

3. Standards Matrices

Facility Name: Holyoke Hydroelectric System **Zone of Effect: Upstream of the Dam**

		Alternative Standards				
	Criterion	***1***	***2***	***3***	***4***	***Plus***
A	**Ecological Flow Regimes**	X				X
B	**Water Quality**		X			
C	**Upstream Fish Passage**	X				
D	**Downstream Fish Passage**		X			X
E	**Watershed and Shoreline Protection**		X			
F	**Threatened and Endangered Species Protection**			X		
G	**Cultural and Historic Resources Protection**		X			
H	**Recreational Resources**		X			

Facility Name: Holyoke Hydroelectric System **Zone of Effect: Downstream of the Dam**

		Alternative Standards				
	Criterion	***1***	***2***	***3***	***4***	***Plus***
A	**Ecological Flow Regimes**		X			
B	**Water Quality**		X			
C	**Upstream Fish Passage**		X			
D	**Downstream Fish Passage**		X			
E	**Watershed and Shoreline Protection**	X				
F	**Threatened and Endangered Species Protection**			X		
G	**Cultural and Historic Resources Protection**		X			
H	**Recreational Resources**		X			X

Facility Name: Holyoke Hydroelectric System **Zone of Effect: Canal System**

		Alternative Standards				
	Criterion	***1***	***2***	***3***	***4***	***Plus***
A	**Ecological Flow Regimes**		X			
B	**Water Quality**		X			
C	**Upstream Fish Passage**	X				
D	**Downstream Fish Passage**		X			
E	**Watershed and Shoreline Protection**	X				
F	**Threatened and Endangered Species Protection**			X		
G	**Cultural and Historic Resources Protection**		X			
H	**Recreational Resources**	X				

Facility Name: Holyoke: Holyoke Hydroelectric System **Zone of Effect: Downstream of Chemical Tailrace**

		Alternative Standards				
	Criterion	***1***	***2***	***3***	***4***	***Plus***
A	**Ecological Flow Regimes**	X				
B	**Water Quality**	X				
C	**Upstream Fish Passage**	X				
D	**Downstream Fish Passage**	X				
E	**Watershed and Shoreline Protection**	X				
F	**Threatened and Endangered Species Protection**	X				
G	**Cultural and Historic Resources Protection**	X				
H	**Recreational Resources**	X				

4. Supporting Information

A. Ecological Flows Standards

Ecological Flows Standards: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
A	1	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

- As this zone includes the Holyoke Impoundment, and is therefore located upstream of the dam and powerhouse, there is no bypassed reach within this zone.

- The Holyoke Dam is currently operated in a modified run-of-river (ROR) mode. The Comprehensive Operations and Flow Plan (COFP) sets forth operational protocols to maintain compliance to ecological flow requirements, including modified ROR. The most recent version of this plan was filed with FERC on August 20, 2015, and is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14368130

  Revised License Article (LA) 405 of the Project No. 2004 License as well as Condition 9 of the 2001 Water Quality Certification (WQC) for the Holyoke Project required that the Project be operated in a ROR mode and maintain a minimum impoundment elevation of 100.4-feet NGVD, with an allowable headpond level fluctuation of 0.2 feet. It further directed the HG&E to conduct an evaluation of potential modifications to ROR operations in order to minimize water fluctuation impacts to the federally and state endangered Puritan tiger beetle.

  Pursuant to Amended License Article 405, HG&E evaluated the effects of operations in a modified ROR mode in 2002 and from 2004-2011, and in a cumulative report that was filed with FERC on July 16, 2012, it was determined in consultation with agencies that those modified operations resulted in the benefits identified on page 3 of the report. The cumulative study report filed in 2012 is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14038354

  In summary, the 2012 cumulative modified ROR report at the link above concluded that operating in a modified ROR mode (i.e. 1.2 ft allowable fluctuation) enabled HG&E to better

attenuate variable inflows from peaking facilities located upstream, and therefore minimize fluctuations to and better balance flows upstream and downstream of the Holyoke Dam as opposed to operating in standard ROR mode (i.e. 0.2 ft allowable fluctuation). Overall conclusions relative to Modified ROR operations are summarized in Appendix F of the cumulative report (see page 136), and the graphs in that Appendix (see page 146) provide visuals showing the reduction in fluctuations caused by Modified ROR operations. Agency concurrence that the Modified ROR operations reduce both upstream and downstream fluctuations as compared to standard ROR is provided in Appendix G of the report (see page 148).

The goal of modified ROR operations in the impoundment are to minimize water fluctuation impacts to the federally and state endangered Puritan tiger beetle.

Under the Modified ROR operations approved by the FERC in 2012, HG&E operates the Project Modified ROR mode to maintain the Impoundment elevation with a minimum Impoundment elevation of 99.2 NGVD (101.7 HWP local datum) and a maximum Impoundment elevation of 100.6 NGVD (103.1 HWL local datum).

Monitoring and documentation of Modified ROR operation is performed at the Project. Head pond fluctuations within the range specified above are maintained by operating the Canal Headgates, Hadley Falls station, the Bascule Gate, and the Rubber Dam. HG&E utilizes a headpond sensor installed during the completion of the Rubber Dam as the primary source of tracking elevations. The sensor periodically records head pond elevation data, which is archived and averaged over an hour. The hourly average is transmitted to the gatehouse operator and recorded on the log. A headpond sensor located near the Canal Headgate abutment is also used as a backup source. All signals from these devices are sent to the Canal Gatehouse, which is manned 24 hours per day, year round. Station operators adjust and balance flows through the station, Canal Headgate and Bascule Gate, or utilize sections of the Rubber Dam, to maintain normal pond elevations, while also providing any minimum flows to the Canal, fishways and Bypass Reach that are also required by the License.

- N/A – This is not a conduit project.

- As discussed in Bullet 2 above, the Modified ROR operations serve to minimize water fluctuations in the impoundment and better protect the habitat of the Puritan Tiger Beetle.

Criterion	*Standard*	*Instructions*
A	PLUS	Bonus Activities: • If an adaptive management program is in place, provide sufficient information to understand. • If non-flow habitat enhancements have been applied, explain what they are, how their benefits are being monitored, and how they are achieving a positive net benefit to fish and wildlife resources.

- Non-flow habitat enhancements: Upstream of the dam, HG&E conducts annual treatment and removal of an invasive water chestnut infestation at Log Pond Cove. Log Pond Cove is a ~16 acre cove in the Connecticut River just upstream of the Rte. 202 Bridge in Holyoke. Since 2001, in partnership with Holyoke Conservation Commission and the United States and Wildlife Service Conte Refuge, HG&E has worked to control water chestnut growth at this site through a variety of efforts which have historically included: herbicide application, mechanical harvesting and hydroraking. HG&E has historically provided project management and funds for these efforts, and since 2001, has incurred treatment costs totaling over $200,000 and countless in-kind labor resources.

  Every year, a report is completed relative to the efficacy of treatment at the site and provided to invasive species stakeholders. Although the infestation at Log Pond Cove has not yet been eradicated, these efforts do create a very substantial decrease in water chestnut before and after treatment on an annual basis. Most importantly, this annual control of water chestnut is believed to have substantially helped to prevent the spread of this invasive plant to other areas of the Connecticut River.

  Per the Project No. 2004 FERC license, HG&E's annual requirements relative to invasive plant species along the river are limited to annual monitoring (which is conducted annually per FERC requirements). HG&E has no regulatory requirement for invasive control efforts, and this annual Log Pond Cove work has been entirely a good faith effort on the part of HG&E.

Ecological Flows Standards: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
A	2	Agency Recommendation (see Appendix A for definitions): • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations).

- Revised LA 406 (1999 FERC License) and 2001 WQC Condition 11 require the release of certain seasonally-adjusted flows in the Bypass Reach and Canal System, and require that plans be developed to provide measures to distribute the flows into the Bypass Reach, and to provide means for measuring, recording, and reporting flows in the Bypass Reach. The 2001 WQC Condition 12 prescribes the method and priority of releasing flows from the Project and require the development of plans describing how the required releases will be made during low-flow and normal operational years; the provisions in 2001 WQC Condition 12(a) and 12(b) were affirmed in Section 4.4(b) of the Settlement Agreement (executed in 2004).

- Pursuant to Revised LA 406(a)(1), for ZOP flows HG&E releases flows to the Bypass Reach sufficient to achieve the water surface elevation in the Bypass Reach that corresponds to the 1997 Barnes & Williams IFIM Study[1] of 1,300 cfs flow, as measured in the Bypass Reach. As confirmed in Revised LA 406(a)(1), that ZOP flow is achieved for compliance purposes by flows corresponding to a water surface elevation of 62.85 +/- 0.1 feet NGVD at the Texon Gage.

  Pursuant to Revised LA 406(b), for Habitat flows HG&E will release flows to the Bypass Reach sufficient to achieve the water surface elevations in the Bypass Reach that correspond to the 1997 Barnes & Williams IFIM Study of 840 cfs flow as measured in the Bypass Reach. As confirmed in Revised LA 406(b)(1), that Habitat flow is achieved for compliance purposes by flows corresponding to a water surface elevation of 62.3 +/- 0.1 feet NGVD at the Texon Gage.

- The goal of Revised LA 406 (i.e. agency recommendation) was to provide flows sufficient for the protection and enhancement of water quality and aquatic and fisheries resources. The goal of Bypass ZOP Flows is to provide flows sufficient so that diadromous and resident fish can safely and successfully pass without injury or significant impairment to essential behavioral patterns.

[1] Barnes and Williams Environmental Consultants, LLC. Bypassed reach habitat assessment using the instream flow incremental methodology for the Holyoke Project FERC No. 2004, Massachusetts. Binghamton, New York. March 1997.

- HG&E releases seasonally-adjusted minimum flows into the Bypass Reach, correlated to the Texon Gage, which is located just downstream of the dam, on the South Hadley side, for: (1) the protection and enhancement of water quality and aquatic and fisheries resources (Bypass Habitat Flows); and (2) effective flows for migratory fish passage (Bypass ZOP Flows). The Bypass Zone-of-Passage (ZOP) Flows will be released whenever the fishlifts are operational, which is from April 1 through November 15 of each year, as refined by USFWS, NOAA Fisheries, MADFW on an annual basis.

  Further details on how flow is prioritized at the Holyoke Project, as well as procedures to implement minimum Bypass Reach flows are provided in the COFP, the most recent version of which is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14368130

Ecological Flows Standards: Canal System ZOE

Criterion	*Standard*	*Instructions*
A	2	Agency Recommendation (see Appendix A for definitions): • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations).

- Revised LA 406 and 2001 WQC Condition 13 require, among other things, the release of certain seasonally-adjusted minimum flows in the Bypass Reach and Canal System and the implementation of drawdown procedures to protect aquatic resources.

  The Canal System is operated in accordance with Revised LA 406 and the 2001 WQC, which require that a minimum flow of 400 cfs be passed through the Canal System downstream of the louver bypass system. Upstream of the louver bypass system, 440 cfs is required at the No. 1 Overflow during upstream fish passage. The 440 cfs is the maximum flow for the upstream fish passage attraction facilities: up to 200 cfs at the spillway entrance and up to 120 cfs at each tailrace entrance. During downstream fish passage, 150 cfs bypass flow is required for the louver bypass system.

- The technical basis for the 440 cfs at Overflow No. 1 for fish passage is because that is the design capacity of the fish passage attraction flow system. The scientific basis for the minimum Canal flow of 400 cfs after the louvers is provided in Section 3.2.1 of the CCOP at the following link: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14368130.

- The goal of Revised LA 406 (i.e. agency recommendation) was to provide flows sufficient for the protection and enhancement of water quality and aquatic and fisheries resources.

- Section 3 of the Comprehensive Canal Operations Plan (CCOP) provides a comprehensive overview of HG&E's methods to: (1) release and circulate the required 400 cfs continuous minimum flow through the canal system downstream of the louver bypass; and (2) achieve and maintain the minimum canal flow and protective requirements for aquatic resources, including mussels during canal maintenance drawdowns. The most recent version of the CCOP is available at the link provided above. The 400 cfs continuous canal flow is intended to keep water flowing throughout the canal system at all times (except during maintenance drawdowns) in order to maintain good water quality. The canal drawdown procedures in the CCOP are intended to protect mussel habitat within the Canal System.

Ecological Flows Standards: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
A	1	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

- As this zone begins directly after the last Canal unit tailrace and continues downstream, there is no bypassed reach associated with this zone.

- The Holyoke Dam is currently operated in a modified run-of-river (ROR) mode. The Comprehensive Operations and Flow Plan (COFP) sets forth operational protocols to maintain compliance to ecological flow requirements, including modified ROR. The most recent version of this plan was filed with FERC on August 20, 2015, and is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14368130

  Revised License Article (LA) 405 of the Project No. 2004 License as well as Condition 9 of the 2001 Water Quality Certification (WQC) for the Holyoke Project required that the Project be operated in a ROR mode and maintain a minimum impoundment elevation of 100.4-feet NGVD, with an allowable headpond level fluctuation of 0.2 feet. It further directed the HG&E to conduct an evaluation of potential modifications to ROR operations in order to minimize water fluctuation impacts to the federally and state endangered Puritan tiger beetle.

  Pursuant to Amended License Article 405, HG&E evaluated the effects of operations in a modified ROR mode in 2002 and from 2004-2011, and in a cumulative report that was filed with FERC on July 16, 2012, it was determined in consultation with agencies that those modified operations resulted in the benefits identified on page 3 of the report. The cumulative study report filed in 2012 is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14038354

  In summary, the 2012 cumulative modified ROR report at the link above concluded that operating in a modified ROR mode (i.e. 1.2 ft allowable fluctuation) enabled HG&E to better attenuate variable inflows from peaking facilities located upstream, and therefore minimize fluctuations to and better balance flows upstream and downstream of the Holyoke Dam as opposed to operating in standard ROR mode (i.e. 0.2 ft allowable fluctuation). Overall conclusions relative to Modified ROR operations are summarized in Appendix F of the

cumulative report (see page 136), and the graphs in that Appendix (see page 146) provide visuals showing the reduction in fluctuations caused by Modified ROR operations. Agency concurrence that the Modified ROR operations reduce both upstream and downstream fluctuations as compared to standard ROR is provided in Appendix G of the report (see page 148).

Under the Modified ROR operations approved by the FERC in 2012, HG&E operates the Project Modified ROR mode to maintain the Impoundment elevation with a minimum Impoundment elevation of 99.2 NGVD (101.7 HWP local datum) and a maximum Impoundment elevation of 100.6 NGVD (103.1 HWL local datum).

Monitoring and documentation of Modified ROR operation is performed at the Project. Head pond fluctuations within the range specified above are maintained by operating the Canal Headgates, Hadley Falls station, the Bascule Gate, and the Rubber Dam. HG&E utilizes a headpond sensor installed during the completion of the Rubber Dam as the primary source of tracking elevations. The sensor periodically records head pond elevation data, which is archived and averaged over an hour. The hourly average is transmitted to the gatehouse operator and recorded on the log. A headpond sensor located near the Canal Headgate abutment is also used as a backup source. All signals from these devices are sent to the Canal Gatehouse, which is manned 24 hours per day, year round. Station operators adjust and balance flows through the station, Canal Headgate and Bascule Gate, or utilize sections of the Rubber Dam, to maintain normal pond elevations, while also providing any minimum flows to the Canal, fishways and Bypass Reach that are also required by the License.

- N/A – This is not a conduit project

- As discussed in Bullet 2 above, the Modified ROR operations serve better minimize water fluctuations below the dam than standard ROR operations due to the peaking nature of other hydro facilities upstream of the Holyoke Project not owned by HG&E.

B. Water Quality Standards

Water Quality Standards: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

- A copy of the MADEP Massachusetts Year 2014 Integrated List of Waters (most recent version) pursuant to Clean Water Act Sections 305(b), 314 and 303(d) is available at the following link: http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf

  According to this report, the Connecticut River within the Holyoke Project boundaries is a Category 5 impaired water (i.e. requiring Total Maximum Daily Loads). TMDL pollutants identified in this report include: Escherichia Coli, PCB in Fish Tissues and Total Suspended Solids. Appendix B-1 is Confirmation from MADEP that the Holyoke Project is not the cause of this impairment.

- The WQC for Project No. 2004 was issued on February 14, 2001 and a copy of it is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2134287

  This WQC was amended on March 17, 2015, as part of a FERC License Amendment Process for the construction of fish passage enhancements. A copy of the WQC Amendment is available as Appendix A of the 2015 License Amendment, which is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14315139

  Administrative & Procedural Condition 1 of this amendment confirmed that "All conditions contained within the Section 401 Water Quality Certificate originally issued for this project (revised on February 14, 2001) as further revised by the Settlement Agreement and Administrative Consent Order issued by MassDEP on April 2, 2004 remain in effect". The new conditions under the amended WQC were specifically related to compliance during temporary construction activities for the new fish passage enhancements.

- The 1999 Project No. 2004 FERC License and the 2004 Settlement Agreement include provisions relating to water quality, however, these provisions all mirror the provisions in the 2001 WQC.

- Appendix B-2 shows HG&E's compliance status for all 2001 WQC conditions. Pursuant to the 2001 WQC, HG&E monitors water quality in the vicinity of Project No. 2004 in accordance with the most recent version of its Water Quality Monitoring Procedure, which is attached in Appendix B-3.

  Pursuant to that monitoring protocol, HG&E currently monitors water quality at one location in the impoundment (ZOE #1); just upstream of the Hadley Falls Intake. Parameters measured are temperature, dissolved oxygen and pH, and grab samples are collected one time each in May and November, with an additional sample combined with three-day monitoring event in August each year. Results of the past five years water quality grab samples in the impoundment are shown in the table below. As evidenced below, water quality measurements over the past five years have all been within MA Class B Standards, and MADEP did not provide comments on those reports.

  Impoundment Grab Sample Results

Year	Month	pH	Temperature (°C)	DO (mg/L)
2016	November	7.22	8.05	11.08
	August	7.75	22.5	7.85
	May	7.36	21.01	8.71
2015	November	7.32	5.54	13.53
	August	7.94	26.08	6.01
	May	7.28	14.89	11.44
2014	November	7.71	4.94	12.71
	August	7.93	22.50	7.99
	May	7.80	15.10	10.30
2013	November	7.63	3.55	13.43
	August	7.84	24.95	8.72
	May	7.91	15.71	9.48
2012	November	8.04	7.74	12.32
	August	7.71	24.95	8.72
	May	8.01	12.99	11.11
MA Class B Waters Standards		**6.5 – 8.3**	**< 28.3**	**> 5.0**

Water Quality Standards: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

- A copy of the MADEP Massachusetts Year 2014 Integrated List of Waters (most recent version) pursuant to Clean Water Act Sections 305(b), 314 and 303(d) is available at the following link: http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf

  According to this report, the Connecticut River within the Holyoke Project boundaries is a Category 5 impaired water (i.e. requiring Total Maximum Daily Loads). TMDL pollutants identified in this report include: Escherichia Coli, PCB in Fish Tissues and Total Suspended Solids. Appendix B-1 is Confirmation from MADEP that the Holyoke Project is not the cause of this impairment.

- The WQC for Project No. 2004 was issued on February 14, 2001 and a copy of it is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2134287

  This WQC was amended on March 17, 2015, as part of a FERC License Amendment Process for the construction of fish passage enhancements. A copy of the WQC Amendment is available as Appendix A of the 2015 License Amendment, which is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14315139

  Administrative & Procedural Condition 1 of this amendment confirmed that "All conditions contained within the Section 401 Water Quality Certificate originally issued for this project (revised on February 14, 2001) as further revised by the Settlement Agreement and Administrative Consent Order issued by MassDEP on April 2, 2004 remain in effect". The new conditions under the amended WQC were specifically related to compliance during temporary construction activities for the new fish passage enhancements.

- The 1999 Project No. 2004 FERC License and the 2004 Settlement Agreement include provisions relating to water quality, however, these provisions all mirror the provisions in the 2001 WQC.

- Appendix B-2 shows HG&E's compliance status for all 2001 WQC conditions. Pursuant to the 2001 WQC, HG&E monitors water quality in the vicinity of Project No. 2004 in accordance with

the most recent version of its Water Quality Monitoring Procedure, which is attached in Appendix B-3.

Pursuant to that monitoring protocol, HG&E currently monitors water quality at two locations downstream of the Dam (ZOE #2): 1) At the beginning of the Hadley Falls tailrace; and 2) in the Bypass Reach, just upstream of the Rte 116 bridge. Parameters measured are dissolved oxygen and temperature, and grab samples are collected one time each in May and November, with an additional grab sample combined with three-day monitoring event in August each year. Results of the past five years water quality grab samples in the tailrace and bypass reach are shown in the tables below. As evidenced below, water quality measurements over the past five years have all been within MA Class B Standards, and MADEP did not provide comments on those reports.

Hadley Falls Tailrace Grab Sample Results

Year	Month	Temperature (°C)	DO (mg/L)
2016	November	8.06	11.30
	August	25.48	7.58
	May	20.85	9.36
2015	November	7.76	11.00
	August	26.08	9.08
	May	14.83	9.26
2014	November	4.83	13.96
	August	22.25	8.35
	May	15.08	11.02
2013	November	3.54	13.57
	August	24.50	8.38
	May	15.69	9.60
2012	November	7.60	13.26
	August	24.50	8.38
	May	12.95	11.15
MA Class B Waters Standards		**< 28.3**	**> 5.0**

Bypass Reach Grab Sample Results

Year	Month	Temperature (°C)	DO (mg/L)
2016	November	8.16	12.56
	August	26.67	9.33
	May	21.32	10.56
2015	November	7.68	13.27
	August	25.58	8.09
	May	14.77	10.83
2014	November	4.83	13.96
	August	22.25	8.35
	May	15.08	11.02
2013	November	2.86	13.76
	August	24.72	7.31
	May	15.31	7.89
2012	November	7.40	11.55
	August	24.72	7.31
	May	13.10	11.39
MA Class B Waters Standards		**< 28.3**	**> 5.0**

Water Quality Standards: Canal System ZOE

Criterion	*Standard*	*Instructions*
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

- A copy of the MADEP Massachusetts Year 2014 Integrated List of Waters (most recent version) pursuant to Clean Water Act Sections 305(b), 314 and 303(d) is available at the following link: http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf

  According to this report, the Connecticut River within the Holyoke Project boundaries is a Category 5 impaired water (i.e. requiring Total Maximum Daily Loads). TMDL pollutants identified in this report include: Escherichia Coli, PCB in Fish Tissues and Total Suspended Solids. Appendix B-1 is Confirmation from MADEP that the Holyoke Project is not the cause of this impairment.

- The WQC for Project No. 2004 was issued on February 14, 2001 and a copy of it is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2134287

  This WQC was amended on March 17, 2015, as part of a FERC License Amendment Process for the construction of fish passage enhancements. A copy of the WQC Amendment is available as Appendix A of the 2015 License Amendment, which is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14315139

  Administrative & Procedural Condition 1 of this amendment confirmed that "All conditions contained within the Section 401 Water Quality Certificate originally issued for this project (revised on February 14, 2001) as further revised by the Settlement Agreement and Administrative Consent Order issued by MassDEP on April 2, 2004 remain in effect". The new conditions under the amended WQC were specifically related to compliance during temporary construction activities for the new fish passage enhancements.

- The 1999 Project No. 2004 FERC License and the 2004 Settlement Agreement include provisions relating to water quality, however, these provisions all mirror the provisions in the 2001 WQC.

- Appendix B-2 shows HG&E's compliance status for all 2001 WQC conditions. Pursuant to the 2001 WQC, HG&E monitors water quality in the vicinity of Project No. 2004 in accordance with

the most recent version of its Water Quality Monitoring Procedure, which is attached in Appendix B-3.

Pursuant to that monitoring protocol, HG&E currently monitors water quality at one location in the Canal System (ZOE #3), at the end of the First Level Canal, which is expected to indicate the worst possible water quality within the system. Parameters measured are dissolved oxygen and temperature, and grab samples are collected one time each in May, August and November. Results of the past five years of grab samples in the Canal System are provided in the table below. As evidenced below, water quality measurements over the past five years have all been within MA Class B Standards, and MADEP did not provide comments on those reports.

Canal System Grab Sample Results

Year	Month	Temperature (°C)	DO (mg/L)
2016	November	8.33	10.65
	August	26.21	8.76
	May	21.07	8.69
2015	November	7.66	10.64
	August	25.71	7.66
	May	15.36	8.87
2014	November	4.18	11.78
	August	22.35	7.36
	May	14.98	9.56
2013	November	3.12	13.30
	August	24.86	8.43
	May	15.62	9.30
2012	November	7.57	12.62
	August	24.86	8.43
	May	14.35	11.62
MA Class B Waters Standards		**< 28.3**	**> 5.0**

Water Quality Standards: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
B	1	Not Applicable / De Minimis Effect: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Explain rationale for why facility does not alter water quality characteristics below, around, and above the facility.

- A copy of the MADEP Massachusetts Year 2014 Integrated List of Waters (most recent version) pursuant to Clean Water Act Sections 305(b), 314 and 303(d) is available at the following link: http://www.mass.gov/eea/docs/dep/water/resources/07v5/14list2.pdf

  According to this report, the Connecticut River within the reach of river applicable to ZOE#4 (Downstream of Chemical Tailrace) is a Category 5 impaired water (i.e. requiring Total Maximum Daily Loads). TMDL pollutants identified in this report include: Escherichia Coli, PCB in Fish Tissues and Total Suspended Solids. Appendix B-1 is Confirmation from MADEP that the Holyoke Project is not the cause of this impairment.

- Since there are no Project facilities located in this ZOE, and there is ongoing water quality monitoring in other upstream ZOEs in which project facilities are located, there are no impacts to water quality associated with the Project in this ZOE.

C. Upstream Fish Passage Standards

Upstream Fish Passage: Upstream of the Dam ZOE

Standard C-1 – Not Applicable/De Minimis Effect: Because fish in this zone have already passed upstream, the facility does not create a barrier to upstream passage in this specific zone of effect.

Upstream Fish Passage: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
C	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- Upstream Fish Passage Requirements are set forth in the Project No. 2004 FERC License, as revised by an April 2005 FERC License Order (111 FERC ¶ 61,106) a March 2015 License Amendment (150 FERC ¶ 62,192).

  The goal of the upstream fish passage facilities as defined in revised License Article (LA) 411 provides that: HG&E will install, operate, and maintain upstream fish passage facilities at the Project that ensure that all upstream migrating diadromous and resident fish are able to safely and successfully pass upstream of the Project without injury or significant impairment to essential behavioral patterns. Upstream passage shall include the federally and state endangered shortnose sturgeon and resident fish only when the resource agency(ies) determines it is necessary or appropriate as described under the Settlement.

  Specifically, LA 411(a)(1) provided that HG&E operate the then-existing upstream passage facilities including the following facilities/enhancements completed after issuance of the 1999 License Order. In addition, LA 411(a)(4)-(8) provides certain requirements for the operation of the upstream fish passage facilities consistent with the 2005 Order.

  LA 411(b) provided for Phase 2 enhancements to upstream passage facilities, which were completed in the 2004 – 2005 timeframe. LA 412(a)-(c) provides for upstream fish passage for American eel and annual reporting, on an interim and a permanent basis.

  Provisions in the April 2005 Order for enhancements to the upstream fish passage facilities in new LA 401 require that HG&E shall continue to operate and maintain the inflatable Rubber Dam installed in November 2001 at the Project. This Rubber Dam provides enhancements and protection for upstream fish passage (as well as downstream fish passage).

- The technical basis behind the license provision for upstream fish passage improvements was primarily to increase the capacity of an already successful, existing fish lift system.

- Pursuant to LA 413, HG&E undertakes evaluation and monitoring of the upstream fish passage facilities and measures during the fish passage season and files annual reports with FERC by January 31st each year. In addition, pursuant to pursuant to LA 412(c), HG&E distributes annual reports on upstream passage of American eel on or before March 1st of each year.

  Current evaluation and monitoring measures are further described in Section 8.0 of the 2016 Upstream Fish Passage Plan, which is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14449238

  A list of species that occur, or have historically occurred at the Holyoke Project is provided below:

Common Name	**Scientific Name**
Sea Lamprey	*Petromyzon marinus*
American Eel	*Anguilla rostrata*
Blueback Herring	*Alosa aestivalis*
American Shad	*Alosa sapidissima*
Gizzard Shad	*Dorosoma cepedianum*
Golden Shiner	*Notemigonis crysoleucas*
Spottail Shiner	*Notropis hudsonius*
Fallfish	*Semotilus corporalis*
White Sucker	*Catostomus commersoni*
Brown Bullhead	*Ameiurus nebulosus*
Chain Pickerel	*Esox niger*
Striped Bass	*Morone saxatilis*
Rock Bass	*Ambloplites rupestris*
Redbreast Sunfish	*Lepomis auritus*
Pumpkinseed	*Lepomis gibbosus*
Bluegill	*Lepomis macrochirus*
Smallmouth Bass	*Micropterus dolomieu*
Largemouth Bass	*Micropterus salmoides*
Black Crappie	*Pomoxis nigromaculatus*
Tessellated Darter	*Estheostoma olmstedi*
Yellow Perch	*Perca flavescens*
Walleye	*Stizostedion vitreum*
Common Shiner	*Hybognathus regius*
Longnose Dace	*Rhinichthys cataractae*
Shortnose Sturgeon	*Acipenser brevirostrum*
Alewife	*Alosa pseudoharengus*
Atlantic Salmon	*Salmo salar*

Upstream Fish Passage: Canal System ZOE

Standard C-1 – Not Applicable/De Minimis Effect: Fish do not pass upstream through the Canal System (ZOE#3), but instead pass upstream within ZOE#2 (Downstream of Dam). Therefore, this specific zone of the facility does not create a barrier to upstream passage.

Upstream Fish Passage: Downstream of Chemical Tailrace ZOE

Standard C-1 – Not Applicable/De Minimis Effect: The Holyoke Dam (i.e. barrier to passage at the Project) is not located in this zone, but instead upstream in ZOE#2 (Downstream of Dam). Therefore, there is no barrier to fish passage within this zone.

D. Downstream Fish Passage and Protection Standards

Downstream Fish Passage and Protection: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- Project No. 2004 FERC License Article (LA) 410 required that HG&E operate and maintain existing downstream fish passage facilities at the Project and further required HG&E to construct enhancements to the downstream fish passage facilities, construct new downstream passage and exclusion facilities, and conduct additional research to better understand shortnose sturgeon so that such enhancements (both structural and/or operational) will meet the goal of safely and successfully passing shortnose sturgeon at the Project without injury or significant impairment to essential behavioral patterns. LA 412(d) cross-references the general downstream passage provisions of LA 410 and recognizes that they address downstream passage of American eel.

  In accordance with LAs 410 and 412, after nearly 15 years of research, studies and design, HG&E constructed downstream fish passage enhancements at the Project in 2015, which, on the upstream side of the dam, included an exclusion rack at the Hadley Falls Intake as well as submerged and surface fish bypasses.

- The scientific basis for these recently constructed downstream fish passage enhancements is summarized in Downstream Passage of Shortnose Sturgeon at the Holyoke Dam White Paper, which is provided starting on page 685 of the August 15, 2014 Superseding Application to Amend License for Project No. 2004, which is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14243203

- According to LA 413, HG&E shall monitor the use and effectiveness of the new downstream fish passage facilities. Effectiveness monitoring efforts for American Shad and American eel are currently ongoing, and monitoring plans are available in Appendixes H and I, respectively, of the 2016 Downstream Fish Passage Plan for Project No. 2004, which is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14449238

In addition, a status update with regards to Shortnose Sturgeon monitoring is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14428909

Criterion	*Standard*	*Instructions*
D	PLUS	Bonus Activities: • If advanced technology has been or will be deployed, explain how it will increase fish passage success relative to other options. • If a basin-scale redevelopment strategy is being pursued, explain how it will increase the abundance and sustainability of migratory fish species in the river system. • If adaptive management is being applied, describe the management objectives, the monitoring program pursuant to evaluating performance against those objectives, and the management actions that will be taken in response to monitoring results.

- In 2016, HG&E completed modifications to its Hadley Falls Intake intended to enhance fish passage, particularly for downstream migrating Shortnose Sturgeon (SNS). These downstream fish passage enhancements include: a vertical exclusion rack with 2" clear spacing, surface and subsurface downstream bypasses at the Bascule Gate, as well as a training wall, apron deflector and plunge pool downstream of the dam.

  Additional upstream fish passage enhancements include an extension of the upstream fish passage flume, fishway entrance modifications and rock excavation in the vicinity of the fishway entrance. These improvements were informed with over 10 years of studies and design, which included flume studies, field studies, data analyses and computational fluid dynamic models.

  Post-construction monitoring efforts for these passage enhancements are currently ongoing, and a report on initial findings from the 2016 studies will be completed in 2017. Initial results are looking favorable to date.

The Challenge

The major challenge of this project was balancing the economic viability of the FERC Project while providing effective fish passage and protection. Throughout the early to mid-1900s, the main focus was on upstream passage which resulted in the development of the highly successful Holyoke Fish Lift in 1955.

Several enhancements to upstream passage have been made over the years, including the latest in 2005 by HG&E. These improvements increased the fish lifting capacity to one million shad and other species during the spring migration run. However, downstream fish passage at the dam (Hadley Falls Station Intake) and canal system continued to be problematic and a difficult challenge to undertake. After taking control of the FERC license in 2001, HG&E was determined to find solutions that would

meet the goal and objectives of the resource agencies without compromising the economics of the project.

Downstream fish passage improvements began in 1992 with Northeast Utilities (HG&E's predecessor) constructing a 15 degree (partial depth) angled louver structure on the first level canal system. This proved successful in guiding surface-oriented fish back into the river, but lacked the capacity to guide other fish species and prevent turbine entrainment in the canal system. In 2002, HG&E enhanced the louver structure by installing full depth steel bar racks, which provided guidance and passage of bottom-oriented species (SNS and American Eel). The louver system proved successful, it was easy to construct due to the amount of real estate available and more favorable water flow patterns.

Hadley Falls Station Intake at the Holyoke Dam posed much different and more complex challenges than the canal. Since the early 1990's several attempts were made to improve downstream fish passage at the dam, with little improvement for SNS. They included a 8.5 foot depth surface weir in the bascule gate adjacent to the intake, 10 foot overlays on the upper portion of the intake racks (covering 1/3 the rack surface area), and curtailing generation during peak out-migrating periods.

The settlement agreement called for the design and construction of facilities that met several criteria including: approach flow velocities less than two feet per second, rack spacing of two inches, and passage along the 35-foot total water depth. Due to the hydraulic capacity of the station (8400cfs), approach velocities into the intakes were two to three times greater than the resource agencies had prescribed. A reduction in velocity would result in a substantial decrease in generating capacity. Further, due to the orientation of the civil works (intake, dam, spillway, and flow patterns) constructing a louver structure similar to the canal system was not possible. Since the facility infrastructure could not be modified, HG&E had to design a facility that could be fit within the current physical layout and meet the overall objectives.

At the time, there was little known about the migration habitat of SNS as they approached any hydroelectric facility. As such, HG&E began collaborating with resource agencies, biologists, engineers, and construction experts. It would take over 10 years of extensive study to reach a final design. This research and develop program came at a great cost to HG&E, however HG&E felt that it made more sense to develop concepts that would work in the real world, versus the approach of construct, test, and rebuild facilities at will in the field.

One of the major challenges for researching was to study live SNS. Due to the Endangered Species Act, special permits were required. Further, a large flume with capacity to test SNS was also required. Over a five year period, HG&E contracted with various vendors to conduct flume tests. During the testing period various rack structures and flow regimes were used to determine swimming behaviors at varying intake velocities. This included reactions to light and sound, and the use of multiple bypass devices. By the conclusion of the flume studies, HG&E had a valuable set of data that helped define the criteria needed for the design of the new facilities. Over the next five years, with the support from contractors, HG&E developed computer models noting all the structural details of the new facilities.

These model runs helped support the layout of the rack and bypass structures. It also provided a valuable medium for the resource agencies and other stakeholders to approve the concept.

In all, HG&E spent nearly $20 million in the development, construction and testing of the successful downstream passage of SNS at the Holyoke Dam.

Innovation

HG&E is considered a small hydro power producer, yet was challenged by this project in ways that would have tested even the largest utilities in the country, utilities that have significantly more resources. In addition, there were no previously completed downstream fish passage projects of this magnitude. In collaboration with contractors, consultants, and vendors, HG&E guided a highly innovative approach to this project, backed by extensive research. In particular, design of the major components, such as the submerged bypass structures and deflector on the dam apron, were some of the most important breakthroughs.

Some of the techniques used are as follows:

CFD Modeling

As data was processed from the flume studies, a series of computational fluid dynamic (CFD) models were developed to help gain more knowledge on the best possible alternatives for the design. Over the course of approximately 10 years, 17 CFD models were developed for flow interactions below the dam and 23 CFD models were developed for flow interactions at the intake area above the dam. Throughout this process HG&E worked collaboratively with regulatory agencies to develop the parameters for the design of the new downstream passage facilities.

HG&E and the team of experts prioritized essential items that needed to be achieved in the final design, including: continue to providing successful upstream passage at the spillway fishlift; improve upstream passage of SNS; provide safe and effective downstream passage; maintain dam spillway structural stability; and stay within project budget and construction schedule parameters in order to avoid disruptions to upstream fish passage and generation.

Every aspect of the design was scrutinized for constructability, modularization and speed of installation. While the team designed the new facilities, HG&E was simultaneously planning for construction in the field. The schedule was carefully developed to assure that the installation could be completed in compressed construction window, June to December.

Construction

While the actual site work began in March of 2015, drawings and prefabrication of modular sections were constructed at off-site facilities as early as January of 2015. Construction of the downstream fish passage facilities were broken down into a number of major tasks, including:

1. Assembly of trestle, crane and barge access facilities at the launch area.

   There was no access for the large equipment at the dam and very little laydown area to stage materials. In order to move equipment and materials between the laydown area and the

worksite, the team assembled a trestle. From there, barges, large crane, and other major components were deployed.

2. Construction of the fish exclusion rack and installation of a trash rack cleaning machine (trash rake).

   The new trash rack facilities were designed to reduce the velocities at the intake from about 5ft/s down to 2.2ft/s. In order to achieve this lower velocity, the available rack area for the intake was increased by approximately 30%. In the new design the intake was moved 30' further into the river on the upstream end of the rack and 14' on the downstream end. In its new location the contractor drilled five 42" diameter rock sockets, 10' into the bedrock. The shafts were filled with concrete and rebar, supports for the new modular rack section. Once the modular section of rack was installed, the underwater dive team made the connection with the steel framing. Above the water line the new decks was erected and bar racks were completed.

   While the new bar rack spacing would meet the downstream passage goals, HG&E anticipated there would be an increase in debris due to the 2" bar rack spacing (vs the previous 5" spacing). The increase in debris could potentially clog the intakes. In an effort to minimize this challenge, a new trash rake cleaning system was installed. The new rake will be programed to perform various cleaning routines as dictated by the amount of debris flowing downstream.

3. Retrofit of the Bascule Gate and installation of surface and subsurface downstream fish bypasses.

   The new fish bypasses were an essential element in the success of the new facilities. The laboratory flume testing and CFD models helped greatly to define the design parameters and their ultimate location within the new facility.

   Prior to this project there was only an 8.5' deep surface bypass facility at the intake. This meant that fish lower in the water column would need to rise up and search for the entrance to the bypass. With the new facilities the entire 35' of water column would now be available for passage and benthic fish would no longer need to rise up and search for a downstream passage.

   In order to achieve this objective, two 8' tall x 3' wide intakes were fabricated. Attached to the new intakes were two 3' square ducts that transport fish up over the bascule gate. The upper portions of the bypasses are removable thus allowing for the full width of the bascule gate to be available during periods of higher than normal river flows.

4. Construction of a downstream flow deflector and plunge pool, as well as excavation of rock in front of the spillway fish lift entrance.

   The final pieces of the new facilities were fabricated almost entirely in the field. The modular design techniques utilized by the contractor helped greatly in reducing construction time. In order to construct the new downstream facilities, the first order of business was erect a

sandbag cofferdam, approximately 80' x 65', and pump out the water. With the water removed the contractor began demolition of the old concrete spillway fish lift entrance. At the same time the contractor drilled and removed the bedrock 30' downstream of the apron in order to form the new plunge pool (27'w x 47'lx 15'd). Once the rock was removed, concrete was formed to line the pool and prevent scouring.

To direct the water and fish being discharged over the bascule gate, a guide wall was constructed between the bascule gate and the discharge of rubber dam #5. The flow deflector was built at the downstream end of the dam apron. The purpose of the flow deflector is to get fish over the attraction flow for the redesigned fish lift entrance at the spillway and into the newly constructed plunge pool.

The final piece of the downstream construction was to lower the invert of the fish lift entrance to match the invert of the river. A 20' wide by 50' long area of rock was removed and a concrete overlay was installed. This provided a smooth surface for discharging attraction water from the newly constructed spillway entrance thereby making the attraction water flow uniformly from the entrance and making the entrance very noticeable for the upstream migrating fish.

After many years of preparation, research, and design, HG&E was pleased to complete this important project on-time and on-budget.

Results

Since purchasing the project in 2001, it has been HG&E's goal to balance the economic viability of the hydroelectric generating capacity while providing effective fish passage and protection. Through collaboration with interested parties, extensive research and development, and thoughtful construction techniques, the project regained economic viability in an environmentally sustainable setting, which some had thought impossible in the late 1990's.

Although final post construction monitoring is ongoing, HG&E and project stakeholders have been pleased with the performance of the new facilities to date. With these improvements completed, migrating fish can be safely transported downstream, including SNS.

Total cost for the project was $20 million, with construction netting $13 Million. The modular design techniques utilized by the contractor helped greatly in reducing construction time in the water. Conventional methods (cofferdams) working in the dry was estimated to be in the $30 million range with the potential loss of generation from Hadley Station for more than 12 months.

In 2016, HG&E and its consultants began performing post-construction monitoring tests at the new facilities. Most notably was the performance of the newly redesigned entrance at the spillway fish lift. Prior to 2016, typically 1 to 4 SNS would use the upstream passage facilities. In 2016 a total of 94 SNS were lifted using the upstream passage facilities. Further, HG&E is developing a tagging and tracking program to be implemented during the next five years to track their movements once they are lifted above the project.

While SNS were not tagged and tracked in 2016, HG&E did monitor American Shad, American Eel and Juvenile Shad. The preliminary data is being processed and analyzed, but after initial review HG&E is on target to meet the goals developed in the Settlement Agreement of 2004

Agency comments discussing the innovative nature of the new fish passage enhancements at the Holyoke Project are attached in Appendices B-4 and B-5.

Downstream Fish Passage and Protection: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- Project No. 2004 FERC License Article (LA) 410 required that HG&E operate and maintain existing downstream fish passage facilities at the Project and further required HG&E to construct enhancements to the downstream fish passage facilities, construct new downstream passage and exclusion facilities, and conduct additional research to better understand shortnose sturgeon so that such enhancements (both structural and/or operational) will meet the goal of safely and successfully passing shortnose sturgeon at the Project without injury or significant impairment to essential behavioral patterns. LA 412(d) cross-references the general downstream passage provisions of LA 410 and recognizes that they address downstream passage of American eel.

  In accordance with LAs 410 and 412, after nearly 15 years of research, studies and design, HG&E constructed downstream fish passage enhancements at the Project in 2015, which, on the downstream side of the dam, included an apron deflector with training wall, and a plunge pool located downstream of the concrete apron.

- The scientific basis for these recently constructed downstream fish passage enhancements is summarized in Downstream Passage of Shortnose Sturgeon at the Holyoke Dam White Paper, which is provided starting on page 685 of the August 15, 2014 Superseding Application to Amend License for Project No. 2004, which is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14243203

- According to LA 413, HG&E shall monitor the use and effectiveness of the new downstream fish passage facilities. Effectiveness monitoring efforts for American Shad and American eel are currently ongoing, and monitoring plans are available in Appendixes H and I, respectively, of the 2016 Downstream Fish Passage Plan for Project No. 2004, which is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14449238

In addition, a status update with regards to Shortnose Sturgeon monitoring is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14428909

Downstream Fish Passage and Protection: Canal System ZOE

Criterion	*Standard*	*Instructions*
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- Under Project No. 2004 License Article (LA) 408(b) HG&E is to continue to operate, clean and otherwise maintain the full depth louvers installed in 2002 in the First Level Canal of the Holyoke Canal System; LA 408(b) also contains a contingency plan in the event that the full depth louver facility is out of service or there is a failure of the canal louver bypass system.

- Partial depth louvers in the Canal System, installed and tested prior to HG&E taking ownership of Project No. 2004, were found to be effective at excluding surface migrants, such as Atlantic salmon smolts and juvenile shad and herring. These louvers were converted to full-depth in order to better exclude mid and bottom-dwelling migrants including the Shortnose Sturgeon and the American eel.

- LA 408(c) provides that HG&E shall study the effectiveness of the full depth louvers. In accordance with LA 408(c), HG&E has conducted the following louver effectiveness studies:
    1. Kleinschmidt Associates. June 2004. Evaluation of Full-Depth Louver Velocities in the Holyoke Canal.
    2. Electric Power Research Institute (EPRI). March 2006. Evaluation of an Angled Louver Facility for Guiding Shortnose Sturgeon to a Downstream Bypass.
    3. EPRI. August 2007. Movement Behavior of American Eel (Anguilla rostrata) at an Angled Louver Array at a Hydroelectric Project.

Downstream Fish Passage and Protection: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
D	1	Not Applicable / De Minimis Effect: • Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines). • For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles. • Document available fish distribution data and the lack of migratory fish species in the vicinity. • If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

- Fish that enter this ZoE have already passed downstream of all Holyoke Project Facilities. Since there are no Project Facilities within this zone, there are no associated barriers to downstream passage for any fish moving or migrating downstream through this ZOE.
- Since this ZoE only includes natural river (and no hydroelectric facilities), there are no adverse effects to any riverine fish populations in this ZoE.
- N/A – the same migratory fish that encounter the Holyoke Dam in ZoE#2 are anticipated to be present within this ZoE, however, there are no impacts to those fish within this ZoE due to the lack of project facilities.
- N/A – see above bullet.

E. Shoreline and Watershed Protection Standards

Shoreline and Watershed Protection: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
E	2	Agency Recommendation: • Provide copies or links to any agency recommendations or management plans that are in effect related to protection, mitigation, or enhancement of shoreline surrounding the facility (e.g., Shoreline Management Plans). • Provide documentation that indicates the facility is in full compliance with any agency recommendations or management plans that are in effect.

- Project No. 2004 Plans for the protection of shoreline include the Buffer Zone & Riparian Management Plan (BZRMP) and the Shoreline Erosion Remediation Plan (SERP). Links to the plans are provided below:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13684630

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4390606

- Project No. 2004 is in full compliance with the requirements of its associated BZRMP and SERP. A discussion of compliance measures that HG&E undertakes with regards to the BZRMP is provided in Sections 4.5 and 4.6 of the BZRMP (link to plan provided above). Confirmation from FERC of HG&E's fulfillment of monitoring requirements under the SERP is available at the following link:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13739866

Shoreline and Watershed Protection: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

- The Downstream of Dam ZOE is bounded on one side by Downtown Holyoke, and on the other side by Downtown South Hadley and Chicopee. Land use in these areas is heavily developed and highly urbanized, and there are therefore no lands of significant ecological value within the boundaries of this ZOE.

- Although there is a Buffer Zone & Riparian Management Plan (BZRMP) and Shoreline Erosion Remediation Plan (SERP) for the Holyoke Project, this plan is limited to the facility's FERC Project Boundaries, and therefore applies to the Upstream of Dam ZOE. There is no such plan for areas in the Downstream of Dam ZOE that are outside of the FERC Project Boundaries.

Shoreline and Watershed Protection: Canal System ZOE

Criterion	*Standard*	*Instructions*
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

- The Canal System is located entirely within downtown Holyoke, which is a highly urbanized area with very limited ecological value. There is no specific shoreline associated with the Canal System as the boundaries of the water resource are marked by man-made walls.

- Although there is a Buffer Zone & Riparian Management Plan and a Shoreline Erosion Remediation Plan in place for Project No. 2004, the provisions of these plans aren't applicable to the specific Canal System ZOE.

Shoreline and Watershed Protection: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

- HG&E does not have sufficient data to determine whether or not there are lands with significant ecological value within this ZOE, but it is reasonable to conclude that even if there was, the Holyoke Project operations would not impact them. The upstream-most boundary of this ZOE is located after the last Canal Unit's tailrace, therefore there is no bypassed reach associated with this ZOE. In addition, as discussed above in the Ecological Flows Standards section, Modified ROR operations at the Holyoke Project reduce fluctuations in water levels downstream of the dam.

- Although there is a Buffer Zone & Riparian Management Plan and a Shoreline Erosion Remediation Plan in place for Project No. 2004, the provisions of these plans aren't applicable to the specific Downstream of Chemical Tailrace ZOE because this ZOE is located outside of the Holyoke Project FERC Project Boundary.

F. Threatened and Endangered Species Standards

Threatened and Endangered Species: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
F	3	Recovery Planning and Action: • If listed species are present, document that the facility is in compliance with relevant conditions in the species recovery plans, incidental take permits or statements, biological opinions, habitat conservation plans, or similar government documents. • Document that any incidental take permits and/or biological opinions currently in effect were designed as long-term solutions for protection of listed species in the area.

- Protection measures for the Puritan Tiger Beetle, Bald Eagle, Yellow Lampmussel and Shortnose Sturgeon are applicable to the Upstream of the Dam ZOE.

  The Threatened and Endangered Species (T&E) Plan for Project No. 2004, developed pursuant to License Article (LA) 416, includes provisions for protection of the Puritan Tiger Beetle, Bald Eagle, Yellow Lampmussel and the federally endangered Shortnose Sturgeon. A copy of the Project No. 2004 T&E Plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2298930

  Provisions to protect the federally endangered Shortnose Sturgeon are more explicity provided in the Biological Opinion (BiOp) and Incidental Take Statement (ITS) for Project No. 2004. The most recent version of the BiOp/ITS was issued by the National Marine Fisheries Service (NMFS) in February 2015, and is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14302081

  Provisions to protect all four species provided for in the T&E Plan are applicable to the Upstream of the Dam ZOE.

  HG&E is in compliance with both its T&E Plan and the BiOp/ITS for Project No. 2004. For the Puritan Tiger Beetle, HG&E filed a final report in April 2008, and FERC's written confirmation that the report meets the requirements of the T&E Plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13635137

  For the Bald Eagle, HG&E constructed 3 nests along the Connecticut River within the vicinity of the Project and monitored those nests for 5 years. FERC's written

confirmation of HG&E's fulfillment of obligations for the Bald Eagle pursuant to the T&E Plan is available at:

http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13713660

For the Yellow Lampmussel, HG&E implements measures to protect mussels during Canal drawdowns, and conducted a 12 year monitoring program in the Connecticut River and Canal System. FERC's acceptance of the Cumulative 12 year monitoring report is available at:

http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14268120

Every year, HG&E files a report on Shortnose Sturgeon relative to compliance to the ITS. The 2014 (no report in 2015 due to the construction of fish passage enhancements requiring closure of fishway) Incidental Take Report is available at:

http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14283002

- The existing BiOp/ITS for Project No. 2004 was designed as a long-term solution for the Shortnose Sturgeon as take amounts provided in the BiOp/ITS are set until 2039 (when Project No. 2004 would be issued a new license). The BiOp contemplates an increase to the Shortnose Sturgeon population between now and 2039 because the distinct population segment of Shortnose Sturgeon downstream of the dam would now be allowed to pass upstream (due to safe downstream passage now available because of the fish passage enhancements) and spawn with the distinct population segment located upstream of the dam.

Threatened and Endangered Species: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
F	3	Recovery Planning and Action: • If listed species are present, document that the facility is in compliance with relevant conditions in the species recovery plans, incidental take permits or statements, biological opinions, habitat conservation plans, or similar government documents. • Document that any incidental take permits and/or biological opinions currently in effect were designed as long-term solutions for protection of listed species in the area.

- Protection measures for the Bald Eagle and Shortnose Sturgeon are applicable to the Downstream of Dam ZOE.

  The Threatened and Endangered Species (T&E) Plan for Project No. 2004, developed pursuant to License Article (LA) 416, includes provisions for protection of the Puritan Tiger Beetle, Bald Eagle, Yellow Lampmussel and the federally endangered Shortnose Sturgeon. A copy of the Project No. 2004 T&E Plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2298930

  Provisions to protect the federally endangered Shortnose Sturgeon are more explicity provided in the Biological Opinion (BiOp) and Incidental Take Statement (ITS) for Project No. 2004. The most recent version of the BiOp/ITS was issued by the National Marine Fisheries Service (NMFS) in February 2015, and is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14302081

  Provisions to protect the Bald Eagle and Shortnose Sturgeon as provided for in the T&E Plan are applicable to the Downstream of the Dam ZOE.

  For the Bald Eagle, HG&E constructed 3 nests along the Connecticut River within the vicinity of the Project and monitored those nests for 5 years. FERC's written confirmation of HG&E's fulfillment of obligations for the Bald Eagle pursuant to the T&E Plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13713660

  Every year, HG&E files a report on Shortnose Sturgeon relative to compliance to the ITS. The 2014 (no report in 2015 due to the construction of fish passage enhancements requiring closure of fishway) Incidental Take Report is available at:

http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14283002

- The existing BiOp/ITS for Project No. 2004 was designed as a long-term solution for the Shortnose Sturgeon as take amounts provided in the BiOp/ITS are set until 2039 (when Project No. 2004 would be issued a new license). The BiOp contemplates an increase to the Shortnose Sturgeon population between now and 2039 because the distinct population segment of Shortnose Sturgeon downstream of the dam would now be allowed to pass upstream (due to safe downstream passage now available because of the fish passage enhancements) and spawn with the distinct population segment located upstream of the dam.

Threatened and Endangered Species: Canal System ZOE

Criterion	*Standard*	*Instructions*
F	3	Recovery Planning and Action: • If listed species are present, document that the facility is in compliance with relevant conditions in the species recovery plans, incidental take permits or statements, biological opinions, habitat conservation plans, or similar government documents. • Document that any incidental take permits and/or biological opinions currently in effect were designed as long-term solutions for protection of listed species in the area.

- Protection measures for the Yellow Lampmussel and Shortnose Sturgeon are applicable to the Canal System ZOE.

  The Threatened and Endangered Species (T&E) Plan for Project No. 2004, developed pursuant to License Article (LA) 416, includes provisions for protection of the Puritan Tiger Beetle, Bald Eagle, Yellow Lampmussel and the federally endangered Shortnose Sturgeon. A copy of the Project No. 2004 T&E Plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2298930

  Provisions to protect the federally endangered Shortnose Sturgeon are more explicity provided in the Biological Opinion (BiOp) and Incidental Take Statement (ITS) for Project No. 2004. The most recent version of the BiOp/ITS was issued by the National Marine Fisheries Service (NMFS) in February 2015, and is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14302081

  Provisions to protect the Yellow Lampmussel and Shortnose Sturgeon as provided for in the T&E Plan are applicable to the Upstream of the Dam ZOE.

  For the Yellow Lampmussel, HG&E implements measures to protect mussels during Canal drawdowns, and conducted a 12 year monitoring program in the Connecticut River and Canal System. FERC's acceptance of the Cumulative 12 year monitoring report is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14268120

  Every year, HG&E files a report on Shortnose Sturgeon relative to compliance to the ITS. The 2014 (no report in 2015 due to the construction of fish passage enhancements requiring closure of fishway) Incidental Take Report is available at:

http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14283002

- The existing BiOp/ITS for Project No. 2004 was designed as a long-term solution for the Shortnose Sturgeon as take amounts provided in the BiOp/ITS are set until 2039 (when Project No. 2004 would be issued a new license). The BiOp contemplates an increase to the Shortnose Sturgeon population between now and 2039 because the distinct population segment of Shortnose Sturgeon downstream of the dam would now be allowed to pass upstream (due to safe downstream passage now available because of the fish passage enhancements) and spawn with the distinct population segment located upstream of the dam.

Threatened and Endangered Species: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
F	1	Not Applicable / De Minimis Effect: • Document that there are no listed species in the facility area or affected riverine zones downstream of the facility. • If listed species are known to have existed in the facility area in the past but are not currently present, explain why the facility was not the cause of the extirpation of such species. • If the facility is making significant efforts to reintroduce an extirpated species, describe the actions that are being taken.

- Listed species may be present within this ZOE, but there are no Project facilities or bypassed reaches in this specific ZOE. As discussed in the Ecological Flows Regimes standard section above, the Modified ROR operations help to moderate water level fluctuations below the dam even better than standard ROR operations. Therefore, there are no impacts to any endangered species associated with this ZOE.
- N/A – No known extirpated species in this ZOE. Listed species within this ZOE have not been studied because this ZOE is located outside of the influence of the Holyoke Project Facility and therefore there are no impacts to threatened species within this ZOE.
- N/A – No such efforts are being taken.

G. Cultural and Historic Resources Standards

Cultural and Historic Resources: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
G	2	Approved Plan: • Provide documentation of all approved state, provincial, federal, and recognized tribal plans for the protection, enhancement, and mitigation of impacts to cultural and historic resources affected by the facility. • Document that the facility is in compliance with all such plans.

- Cultural impacts associated with Project No. 2004 are covered under the Cultural Resources Management Plan (CRMP) for the Project. A copy of the CRMP is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2089277

- Project No. 2004 is in compliance with the requirements of the CRMP. Each year, HG&E files a report to FERC documenting consultation pursuant to the CRMP for the previous year, which includes any comments received from the MA State Historic Preservation Officer (SHPO). Reports from the past five years are available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14487922
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14367957
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14244626
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14146774
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14049508

Cultural and Historic Resources: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
G	2	Approved Plan: • Provide documentation of all approved state, provincial, federal, and recognized tribal plans for the protection, enhancement, and mitigation of impacts to cultural and historic resources affected by the facility. • Document that the facility is in compliance with all such plans.

- Cultural impacts associated with Project No. 2004 are covered under the Cultural Resources Management Plan (CRMP) for the Project. A copy of the CRMP is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2089277

- Project No. 2004 is in compliance with the requirements of the CRMP. Each year, HG&E files a report to FERC documenting consultation pursuant to the CRMP for the previous year, which includes any comments received from the MA SHPO. Reports from the past five years are available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14487922
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14367957
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14244626
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14146774
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14049508

  Efforts relative to demolition of the Texon Mill and development of the Texon Park were completed pursuant to the CRMP, and involved the development of a Memorandum of Agreement with the Army Corps of Engineers and the Massachusetts Historical Commission; a copy of which is attached in Appendix B-6.

Cultural and Historic Resources: Canal System ZOE

Criterion	*Standard*	*Instructions*
G	2	Approved Plan: • Provide documentation of all approved state, provincial, federal, and recognized tribal plans for the protection, enhancement, and mitigation of impacts to cultural and historic resources affected by the facility. • Document that the facility is in compliance with all such plans.

- Cultural impacts associated with Project No. 2004 are covered under the Cultural Resources Management Plan (CRMP) for the Project. A copy of the CRMP is available at: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2089277

- Project No. 2004 is in compliance with the requirements of the CRMP. Each year, HG&E files a report to FERC documenting consultation pursuant to the CRMP for the previous year, which includes any comments received from the MA SHPO. Reports from the past five years are available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14487922
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14367957
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14244626
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14146774
  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14049508

Cultural and Historic Resources: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
G	1	Not Applicable / De Minimis Effect: • Document that there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility. • Document that the facility construction and operation have not in the past adversely affected any cultural or historic resources that are present on facility lands.

- There are no Project facilities within this ZOE, therefore there are no impacts to cultural or historic resources located on facility lands within this ZOE.
- Because there are no Project facilities within this ZOE, they have not impacted any cultural or historic resources within this ZOE in the past.

H. Recreational Resources Standards

Recreational Resources: Upstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

- There is a Comprehensive Recreation and Land Management Plan (CRLMP) in place for Project No. 2004. A copy of this plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4104885

- HG&E is in compliance with the requirements of the CRLMP. In support of this statement: every two years, HG&E voluntarily (i.e not requirement of CRLMP) holds a meeting with CRLMP in order to provide an update on compliance activities relative to the CRLMP and general recreational considerations associated with Project No. 2004. Appendix B-7 is a copy of the agenda from the most recent update meeting, conducted in May 2016, which includes an update matrix of compliance to the CRLMP requirements.

Recreational Resources: Downstream of the Dam ZOE

Criterion	*Standard*	*Instructions*
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

- There is a Comprehensive Recreation and Land Management Plan (CRLMP) in place for Project No. 2004. A copy of this plan is available at:

  http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4104885

- HG&E is in compliance with the requirements of the CRLMP. In support of this statement: every two years, HG&E voluntarily (i.e not requirement of CRLMP) holds a meeting with CRLMP in order to provide an update on compliance activities relative to the CRLMP and general recreational considerations associated with Project No. 2004. Appendix B-7 is a copy of the agenda from the most recent update meeting, conducted in May 2016, which includes an update matrix of compliance to the CRLMP requirements. In addition, HG&E is in compliance with LIHI Certification #89 Condition #2 (dated July 26, 2012) as the Shad Derby has been reinstated to two weekends in May each year.

Criterion	*Standard*	*Instructions*
H	PLUS	Bonus Activities: • Document any new public recreational opportunities that have been created on facility lands or waters beyond those required by agencies (e.g., campgrounds, whitewater parks, boating access facilities and trails). • Document that such new recreational opportunities did not create unmitigated impacts to other resources.

- HG&E recently completed the construction of a new visitor center at its fishway, which will be open to the public starting on May 3, 2017. The total budget for the design, installation and landscaping of this visitor center was about $570,000. HG&E's FERC license requirements involve opening the fishway to the public each year – there is no such requirement to develop a visitor center. In addition to the overall building costs, HG&E will spend more the $15,000 outfitting the building with furniture and enhanced educational materials for visitors.

In addition, although HG&E is only required to open the fishway to the public during a 6 week period from mid-May to June, we also provide private tours of the facility outside of this timeframe. Just from January to March 2017, HG&E has already hosted approximately 400 visitors for educational tours and presentations of Hadley Station/Fishway this year.

HG&E has worked with the Holyoke Public School system to establish a program where all fourth graders go on a field trip to the fishway. In 2015, when the Hadley Falls Station was closed due to the construction of downstream fish passage enhancements at the Dam, in lieu of visits to the Fishway, Holyoke Gas and Electric offered a 90-minute presentation to fourth grade classes titled Fish Migration and the Connecticut River. Twelve classes with a total of 278 students participated.

HG&E also hosts special events at its fishway – events hosted in 2016 included:

1. Mother's Day celebration (693 visitors)
2. Infrastructure Day (658 visitors)
3. World Fish Migration Day celebration (497 visitors)

On May 17, 2017, HG&E will be hosting a special event for the Chamber of Commerce at the fishway.

- The additional recreational opportunities offered by the new visitor center, private fishway tours and HG&E's willingness to host special events at its fishway not only do not create unmitigated impacts to other resources, but they enhance the existing recreational opportunity that exists at the fishway.

Recreational Resources: Canal System ZOE

Criterion	*Standard*	*Instructions*
H	1	Not Applicable / De Minimis Effect: • Document that the facility does not occupy lands or waters to which public access can be granted and that the facility does not otherwise impact recreational opportunities in the facility area.

- For safety purposes, the Canals are fenced (and associated hydro facilities have access barriers in place) in order to prevent all public access. Therefore, there are no recreational opportunities within the Canal System.

Recreational: Downstream of Chemical Tailrace ZOE

Criterion	*Standard*	*Instructions*
H	1	Not Applicable / De Minimis Effect: • Document that the facility does not occupy lands or waters to which public access can be granted and that the facility does not otherwise impact recreational opportunities in the facility area.

- There are no Project facilities within this ZOE, and therefore no recreational effects caused by the Holyoke Project within this ZOE.

5. Contacts Forms

FACILITY CONTACTS FORM

1. All applications for LIHI Certification must include complete contact information to be reviewed.

Project Owner:	
Name and Title	James Lavelle, Manager
Company	Holyoke Gas and Electric Department
Phone	413-536-9311
Email Address	jlavelle@hged.com
Mailing Address	99 Suffolk St, Holyoke, MA 01040
Project Operator (if different from Owner):	
Name and Title	Paul Ducheney, Hydro Superintendent
Company	Holyoke Gas and Electric Department
Phone	413-536-9340
Email Address	ducheney@hged.com
Mailing Address	99 Suffolk St, Holyoke, MA 01040
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	
Company	
Phone	
Email Address	
Mailing Address	
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	Paul Ducheney, Hydro Superintendent
Company	Holyoke Gas and Electric Department
Phone	413-536-9340
Email Address	ducheney@hged.com
Mailing Address	99 Suffolk St, Holyoke, MA 01040
Party responsible for accounts payable:	
Name and Title	Brooke McMahon, Accountant
Company	Holyoke Gas and Electric Department
Phone	413-536-9305
Email Address	Bmcmahon@hged.com
Mailing Address	99 Suffolk St, Holyoke, MA 01040

2. Applicant must identify the most current and relevant state, federal, provincial, and tribal resource agency contacts (copy and repeat the following table as needed).

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _X_, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	United States Fish and Wildlife Service
Name and Title	Ms. Susi von Oettingen
Phone	603-223-2541, Ext. 22
Email address	Susi_vonOettingen@fws.gov
Mailing Address	70 Commercial St, Suite 300, Concord, NH 03301

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _X_, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	United States Fish and Wildlife Service
Name and Title	Mr. Thomas Chapman
Phone	603-223-2541, Ext 26
Email address	Tom_chapman@fws.gov
Mailing Address	70 Commercial St, Suite 300, Concord, NH 03301

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _X_, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	Mass. Division of Fish and Wild Life Natural Heritage Endangered Species Program
Name and Title	Mr. Thomas French
Phone	508-389-6355
Email address	Tom.french@state.ma.us
Mailing Address	1 Rabbit Hill Rd, Westborough, MA 01581

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _X_, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	Mass. Division of Fish and Wildlife
Name and Title	Mr. Caleb Slater, Anadromous Fish Project Leader
Phone	508-389-6331
Email address	Caleb.slater@state.ma.us
Mailing Address	1 Rabbit Hill Rd, Westborough, MA 01581

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds _X_, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	MassDEP, Division of Watershed Management
Name and Title	Mr. Robert Kubit, P.E.
Phone	508-767-2854
Email address	Robert.Kubit@stat.ma.us
Mailing Address	8 New Bond Street, Worcester, MA 01606

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	Mass Dept of Fish and Game, Division of Ecological Restoration
Name and Title	Ms. Cindy Delpapa, Riverways Program Manager
Phone	413-572-8837
Email address	Cindy.delpapa@state.ma.us
Mailing Address	251 Causeway St. Suite 400, Boston, MA 02114

6. Sworn Statement

Sworn Statement and Waiver Form

All applications for LIHI Certification must include the following sworn statement before they can be reviewed by LIHI:

SWORN STATEMENT

As an Authorized Representative of the Holyoke Gas and Electric Department, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The undersigned further acknowledges that if certification of the applying facility is issued, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified.

The undersigned Applicant further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.

PLEASE INSERT ONLY FOR PRE-OPERATIONAL CERTIFICATIONS (See Section 4.5.3)**:**

For applications for pre-operational certification of a "new" facility the applicant must also acknowledge that the Institute may suspend or revoke the certification should the impacts of the project, once operational, fail to comply with the certification criteria.

Company Name: The Holyoke Gas and Electric Department

Authorize Representative Name: James M. Lavelle James M. Lavelle
Title: Manager

State of Massachusetts

County of Hampden

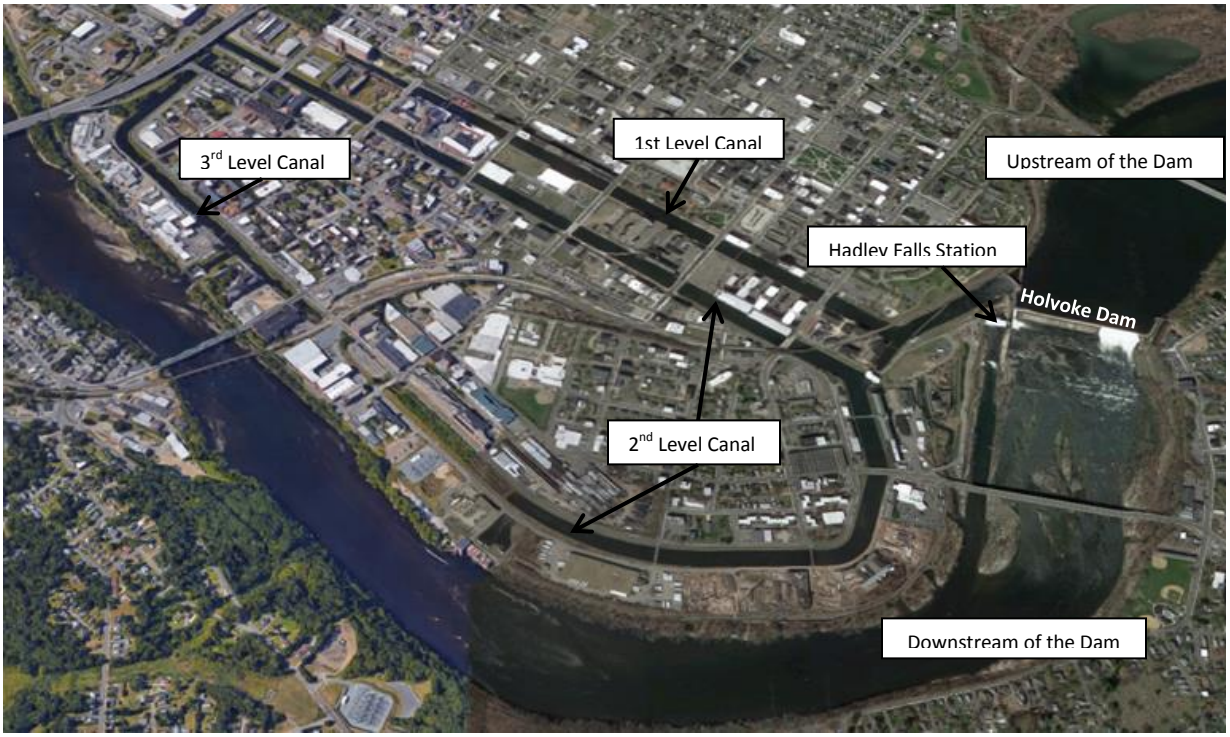
On this, the seventh day of April, 2017, before me a notary public, the undersigned officer, personally appeared James M. Lavelle, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument, and acknowledged that he executed the same for the purposes therein contained. In witness hereof, I hereunto set my hand and official seal.

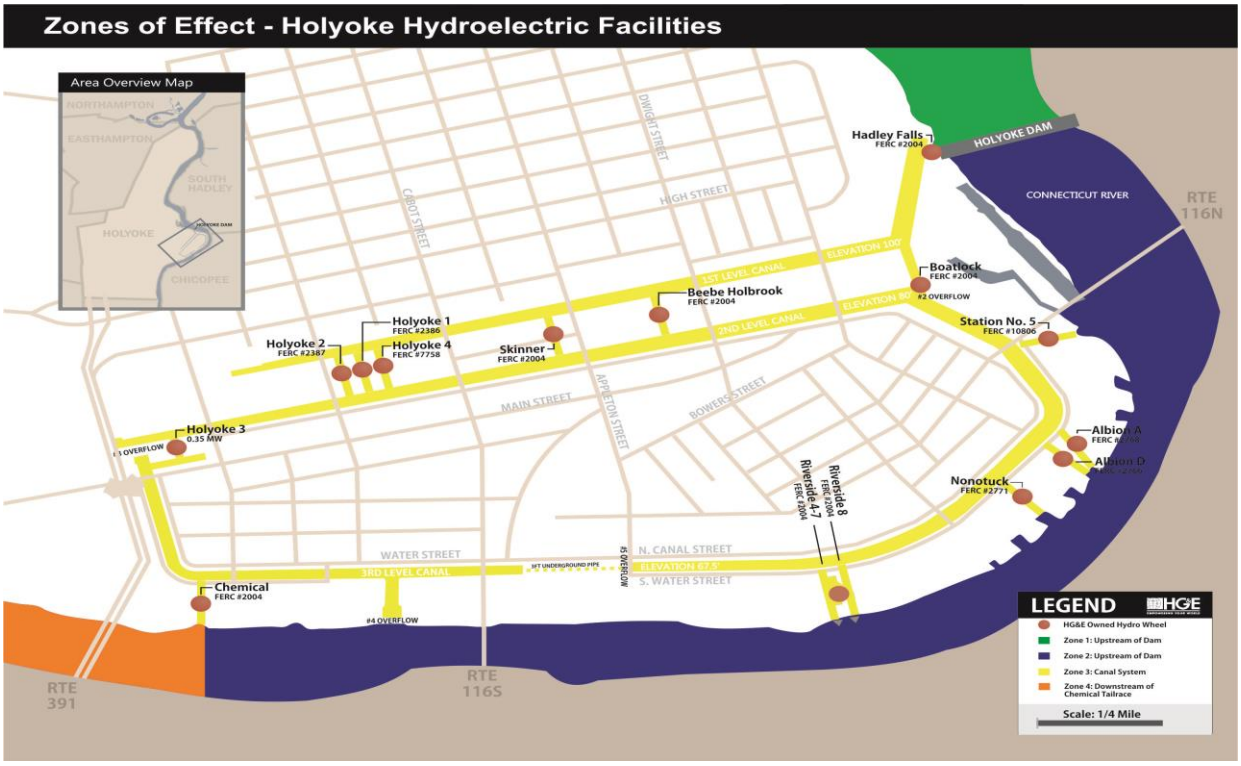
Notary Public: Tanya E. Roman Tanya E. Roman

TANYA E. ROMAN
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
April 6, 2023

7. Appendix A -- Photographs and Maps

Figure A-1





Hadley Falls Station

Holyoke Dam

Canal

Louver


CAUTION
EQUIPMENT
MAY START
AUTOMATICALLY
REPUBLIC
SERVICES
413-557-6700

8. Appendix B – Supporting Documents

B-1 MADEP Category 5 Impairment

From: "Kubit, Robert (DEP)" <Robert.Kubit@MassMail.State.MA.US>
To: Sarah LaRose <SLaRose@hged.com>
Cc: Paul Ducheney <ducheney@hged.com>, "McKenna, Timothy (DEP)" <timothy.mckenna@state.ma.us>

Date: Monday, March 27, 2017 11:43AM
Subject: RE: Project No. 2004 - LIHI Application - Connecticut River Category 5 Impairment

History: This message has been forwarded.

Hi Sarah,

The Holyoke Project, FERC #2004, is not the source of Escherichia Coli, PCB in Fish Tissue or Total Suspended Solids in the area of the Connecticut River around the Holyoke Project. The Holyoke Project is not the cause of Category 5 impairments listed in the Massachusetts Integrated List of Waters for this reach of river.

Please let me know if I need to provide additional information.

Bob

Robert Kubit, P.E.

MassDEP

Division of Watershed Management

8 New Bond Street

Worcester MA 01606

Telephone: (508) 767-2854

Email: robert.kubit@state.ma.us

Fax: (508) 791-4131

From: Sarah LaRose [mailto:SLaRose@hged.com]
Sent: Thursday, March 23, 2017 11:42 AM
To: Kubit, Robert (DEP)
Cc: Paul Ducheney; McKenna, Timothy (DEP)
Subject: Project No. 2004 - LIHI Application - Connecticut River Category 5 Impairment

Hi Bob,

I hope that you have been doing well! I'm reaching out today because Holyoke Gas & Electric is developing its application for LIHI Recertification for Project No. 2004, and one of the Water Quality Standards requirements involves a determination relative to 303(d) impaired waters, and MADEP concurrence that the Project is not the cause of that impairment. Based on MADEP's Massachusetts Year 2014 Integrated List of Waters (which appears to be the most recent version currently available), the Connecticut River within the Holyoke Project No. 2004 boundaries is a Category 5 impaired water, and TMDL pollutants in this vicinity are: Escherichia Coli, PCB in fish tissue, and TSS. Per the LIHI requirements, can you please provide confirmation that the Holyoke Project No. 2004 is not the source of E Coli, PCB in fish tissue and TSS in this area in the CT River, and therefore not the cause of Category 5 impairment in the specified reach of the Connecticut River?

Thank you,

Sarah LaRose
Project Engineer
Holyoke Gas & Electric
99 Suffolk Street
Holyoke, MA 01040
Phone: (413) 322-1522
Email: slarose@hged.com

B-2 WQC Compliance Table

WQC Section	Provision	Settlement Agreement	Expected Deadlines	Compliance Status
1-8	Compliance	-	Upon Certification	Ongoing
9(a) & (b)	Run of River	Section 4.1	Upon Certification	Ongoing – ROR requirements updated in 2012 based on studies.
10	Rubber Dam	-	Plan by April 15, 2001	Complete
11(a) – (d)	*Bypass Reach Flows*	Section 4.2		
11(a)	Minimum 840 cfs habitat flow (11/16 – 3/31 each year) Monitor SNS if reach dewatered	4.2(a)	Upon Certification	Ongoing
11(b)	1,300 cfs bypass reach ZOP flows 4/1 – 11/15 each year	4.2(b)	Upon Certification	Ongoing
11(c)	Provide plan to redistribute flow in bypass reach and implement	4.2(c)	Plan by 11/1/2001; Implementation after rubber dam installation	Plan prepared; implementation ongoing
11(d)	Provide and implement interim plan to estimate bypass reach flows. Provide final plan to measure flows to MADEP for approval and implement. Measure flows hourly.	4.2(d) – (e)	Interim plan 3/1/2001 Final plan 3 months after rubber dam installation. Implement after MADEP approval. Measure flows ongoing.	Plans prepared; implementation ongoing
12(a) – (c)	*Project Flows*	Section 4.4		
12(a)	4/1 – 6/15 American salmon smolt downstream flow prioritization.	4.4(b)	Upon Certification	Ongoing
12(b)	9/1 – 11/15 juvenile clupeid downstream flow prioritization	4.4(b)	Upon Certification	Ongoing
12(c)	Low flow contingency plan to MADEP	4.4(c)	Within 3 months of Certification	Complete
13(a) – (e)	*Canal Operations*	Section 4.3		
13(a)	Implement interim canal system operations	4.3(b)	Upon Certification	Complete
13(b)	Submit plan to provide 400 cfs continuous canal flows; implement plan	4.3(c)	Submit Plan Within 3 months of Certification; implement upon MassDEP approval	Complete; implementation ongoing
13(c)	Implement interim canal resource protection plan until new plan completed	4.3(d)	Upon Certification	Complete
13(d)	Submit 5 year plan for protection and monitoring of aquatic resources in Canal System; implement plan	4.3(e) – (f)	Submit plan by June 1, 2001; implement upon MassDEP approval	Complete; implementation ongoing
13(e)	Submit plan to exclude SNS and other fish from fishlift attraction water; implement plan	4.3(f)	April 15, 2001	Complete; implementation ongoing
14	*Fish Passage Facilities*	Sections 4.3, 4.5, 4.6,		

		4.7, 4.8 and 4.9		
14(a)(1)-(3)	Fishway Improvements	Sections 4.3, 4.5, 4.6, 4.7 and 4.8	Phase I – 2001 Phase II – 2002 Phase III – 2003	Complete
Phase I 14(a)(1)(i)	Replace wooden flashboards with rubber dam	-	2001	Complete
14(a)(1)(ii)	Install full depth louvers in canal	4.3(f)	10/31/2001	Complete
14(a)(1)(iii)	Modify fish lifts for 40k cfs operation and attraction water up to 200 cfs at spillway entrance and 120 cfs at tailrace	4.5(d), 4.6(b) – (c)	2001	Complete
14(a)(1)(iv)	Removal of rock outcrop at west tailrace entrance	4.6(b) – (c)	2001	Complete
Phase II 14(a)(2)(i)	Upgrade tailrace lift capacity to 33 cfm.	4.6(b) – (c)	2002	Complete
14(a)(2)(ii)	Upgrade spillway lift capacity to 46 cfm.	4.6(b) – (c)	2002	Complete
14(a)(2)(iii)	Modify new exit flume to connect to new spillway lift	4.6(b) – (c)	2002	Complete
14(a)(2)(iv)	Eel passage at both fish lifts	4.8(b)	2002	Complete
Phase III 14(a)(3)(i)	Increase width of fish lift exit channel to 14 feet up to the fish counting station	4.6(b) – (c)	2003	Complete
14(a)(3)(ii)	Install high capacity drain valve in fish flume	4.6(b) – (c)	2003	Complete
14(a)(3)(iii)	Addition of second fish trap in exit flume	4.6(b) – (c)	2003	Complete
14(a)(3)(iv)	Modify the fish trapping and hauling system	4.6(b) – (c)	2003	Complete
14(a)(3)(v)	Install eel ladder at South Hadley side of dam	4.8(b)	2003	Complete
14(a)(3)(vi)	Construction of fish passage enhancements	4.7(c)(1)(A) – 4.7(c)(3)	2003	Complete
14(a)(3)(vii)	Construction of the Overflow No. 2 channel barrier	4.5(c)	2003	Complete
14(b)	Meet with agencies to develop detailed construction plans and schedules; to extent practical fish lift interruptions will be during July or August.	4.9	4/15/01 – First Plan; annual review	Ongoing
14(c)	Submit plan to study louvers, rock removal and channel modifications. Submit additional plan to study effectiveness of all other modifications.	4.3(g), 4.6(d) 4.7(c)(3) – (4)	First Plan – by 12/31 of year of modification Second Plan – 12/31/2003	Plans have been submitted; implementation ongoing
14(d)	Operation of upstream fish passage facilities	4.5(b)	Ongoing – 4/1 to 7/15 and 9/15 to 11/15 each year	Ongoing
14(e)	Ledge excavation on west wall of tailrace	4.6(b) – (c)	2001	Complete
14(f)	Implement SOW for fishway monitoring	4.6(e)	Ongoing until 12/31/2020 Commencing upon Certification	Ongoing
14(g)	Meet with agencies and submit plan to evaluate and monitor upstream and downstream resident	-	Submit plan by 12/31/2003; Implement upon MassDEP	Plan has been submitted, implementation is

	fish passage. Implement plan as approved.		approval	ongoing.
14(h)	Meet with agencies to develop, design and install a new fish trapping and hauling system.	4.6(b) – (c)	Plan by 1/31/2003	Complete
14(i)	Consult with agencies and submit final design for downstream fish passage improvements. Initiate hydraulic study to support design. Complete facility construction as approved.	4.7(a) – (c)(4)	Study by 7/31/2001 Construction by 12/31/2003	Complete
14(j)	Submit to agencies final design for upstream eel passage at fish lifts and on South Hadley side; implement.	4.8(a) – (b)(2)	Fish lifts plan in 2002 South Hadley side plan in 2003	Design complete; implementation ongoing
14(k)	Submit plan to meet upstream/downstream SNS needs and implementation schedule. Conduct effectiveness study of measures taken.	4.7(a) – (c)(4)	Plan by 1/31/2002 Study commencing by 4/1/2004	Plan complete. Effectiveness studies are ongoing.
14(l)	Operate Boatlock downstream bypass until louvers have been installed.	4.3(d)	Upon Certification and through full depth louvers installation	Complete
15	*Holyoke Fishway Monitoring*	4.6(e)		
15(a)	Fish monitoring	4.6(e)	Ongoing until 12/31/2020 Commencing upon Certification	Ongoing
15(b)	Fish counts	4.6(e)	Ongoing until 12/31/2020 Commencing upon Certification	Ongoing
15(c)	Shad biological sampling, trapping and loading	4.6(e)	Ongoing until 12/31/2020 Commencing upon Certification	Ongoing
15(d)	Salmon trapping and holding	4.6(e)	Ongoing until 12/31/2020 Commencing upon Certification	Ongoing
15(e)	Shortnose sturgeon	4.6(e)	Ongoing until 12/31/2020 Commencing upon Certification	Ongoing
16	Access to Project	-	Upon certification	Ongoing
17	Cooperative Research/Management Activities	-	Upon certification	Ongoing
18	Moratorium	-	Upon certification	Ongoing
19	Submit and Implement Riparian Management Plan	4.11(h)	Plan one year after Certification Implement upon MassDEP approval	Plan Complete; implementation ongoing
20	Sale of Land within Riparian Zone	-	Upon certification	Ongoing
21	Additional Plans – T&E Species and Invasives Monitoring – Develop and Implement	4.11(c) – (d)	Plans one year after Certification; Implement upon MassDEP approval	Plans Complete; implementation ongoing
22	Water Sampling Standard Operating Procedures – Develop and Implement	4.11(b)	Procedures three months after Certification; Implement upon MassDEP	Complete/Ongoing

			approval	
23	Force Majeure	-	Upon certification	Ongoing

B-3 Water Quality Sampling Protocol

Water Quality Sampling

1.0 Purpose

To standardize the method by which water quality samples are collected, processed, recorded and reported. Water quality samples will be collected three times per year.

2.0 Applicability

This procedure satisfies the requirements of the Holyoke Dam FERC License (2004), Article 404 and Condition 30 of the Massachusetts 401 Water Quality Certificate.

3.0 References

3.1 APHA, AWWA, WEF (American Water Works Association, American Public Health Association, Water Environment Federation) 1992. Standard Methods for the Examination of Water and Wastewater, 18th Edition. Am. Public Health Assoc. Washington, DC .

3.2 USEPA (United States Environmental Protection Agency). 1986. Quality criteria for water 1986. Office of Water Regulations and Standards, Washington. EPA 440/5-86-001.

3.3 USEPA (United States Environmental Protection Agency). 1995. Quality criteria for water, 1986. Update number 1. Office of Water Regulations and Standards, Washington.

4.0 Definitions

4.1. Dissolved oxygen	a. Shall be not less than 5.0 $mg \cdot L^{-1}$ in warm water fisheries unless background conditions are lower b. Natural seasonal and daily variations above this level should be maintained; percent saturation shall not be lowered below 60% of saturation in warm water fisheries due to a discharge
4.2. Water Temperature	a. For warm water fisheries, shall not exceed 83°F (28.3°C) and the rise in temperature due to a discharge shall not exceed 5°F (2.8°C) b. Natural seasonal and daily variations shall be maintained
4.3. pH	Shall be in the range of 6.5 to 8.3 standard units and not more than 0.5 units outside of the naturally occurring range.

4.4. Fecal coliform bacteria	Shall not exceed a geometric mean of 200 organisms·100mL^{-1} in any representative set of samples nor shall more than 10% of the samples exceed 400 organisms·100mL^{-1}.

5.0 Responsibilities

5.1 Manager, Holyoke Water Power, is responsible for the implementation of this procedure, ensuring its provisions are applied appropriately. The manager also ensures the procedure is current.

6.0 Instructions

6.1 Precautions

6.1.1 Hard hat, work shoes and safety glasses are worn within the facility perimeter. In addition, a life vest will be required when conducting water quality sampling.

6.2 Procedures

6.2.1. Collection of water samples and analytic methods will follow 'Standard Methods for the Examination of Water and Wastewater, 18th Edition' (Reference 3.1). Grab samples will be collected at each sampling location in May, August and November, will be taken at each of the stations using a Multi-parameter Water Quality Meter. Data will be recorded on the Holyoke Dam Water Quality Sampling Sheet (Attachment 1).

6.2.2. Sampling should begin early in the morning – time of sample collection shall be recorded. At each of the 4 sites, different parameters will be measured (6.2.3; Attachment 7.2).

6.2.3 Site 1- Hadley Falls Intake. Sample should be taken in front of the Hadley Falls intake. Meter can be deployed directly at this site. Parameters to be measured at this site at dissolved oxygen (DO), pH and water temperature (WT).

Site 2- Hadley Falls Station Tailrace. Mater can be deployed directly at this site. Parameters to be measured at this site are dissolved oxygen (DO), and water temperature (WT).

Site 3- Holyoke Canal System. Sample should be taken at the end of the first level canal by Parson Paper. Meter can be directly deployed at this site. Parameters to be measured at this site are dissolved oxygen (DO), and water temperature (WT).

Site 4- Hadley Falls Bypass Reach. Sample should be taken on the South Hadley side of the river. Access the area at the entrance to the Texon property and proceed down the dirt road to just under the Coolidge Bridge. Meter can be directly deployed at this site. Parameters to be measured at this site are dissolved oxygen (DO), and water temperature (WT).

Site 5- [OMITTED]

6.2.4 Continuos Parameter Sampling. Additional water quality assessments will be conducted for water temperature and DO which will be monitored continuously over a 72 hour period in August during low flow summer conditions at the Hadley Falls intake, the Hadley Falls tailrace and the Bypass reach using Hydrolab DataSonde® 3 Water Quality Multiprobe Loggers or equivalent. Parameters to be measured included water temperature and DO concentration; DO percent saturation was also determined by the instrument. Data will be recorded once an hour over the duration of the 72 hour period.

6.3 Reporting

6.3.1. All data will be stored and maintained by Holyoke Gas & Electric or their designee. An annual water quality monitoring report will be submitted to the Massachusetts DEP and FERC before March 31st of the following year.

7.0 Attachments

7.1 Holyoke Dam Water Quality Sampling Sheet

7.2 Holyoke Dam Water Quality Monitoring Site Location Map and Directions

Attachment 7.1

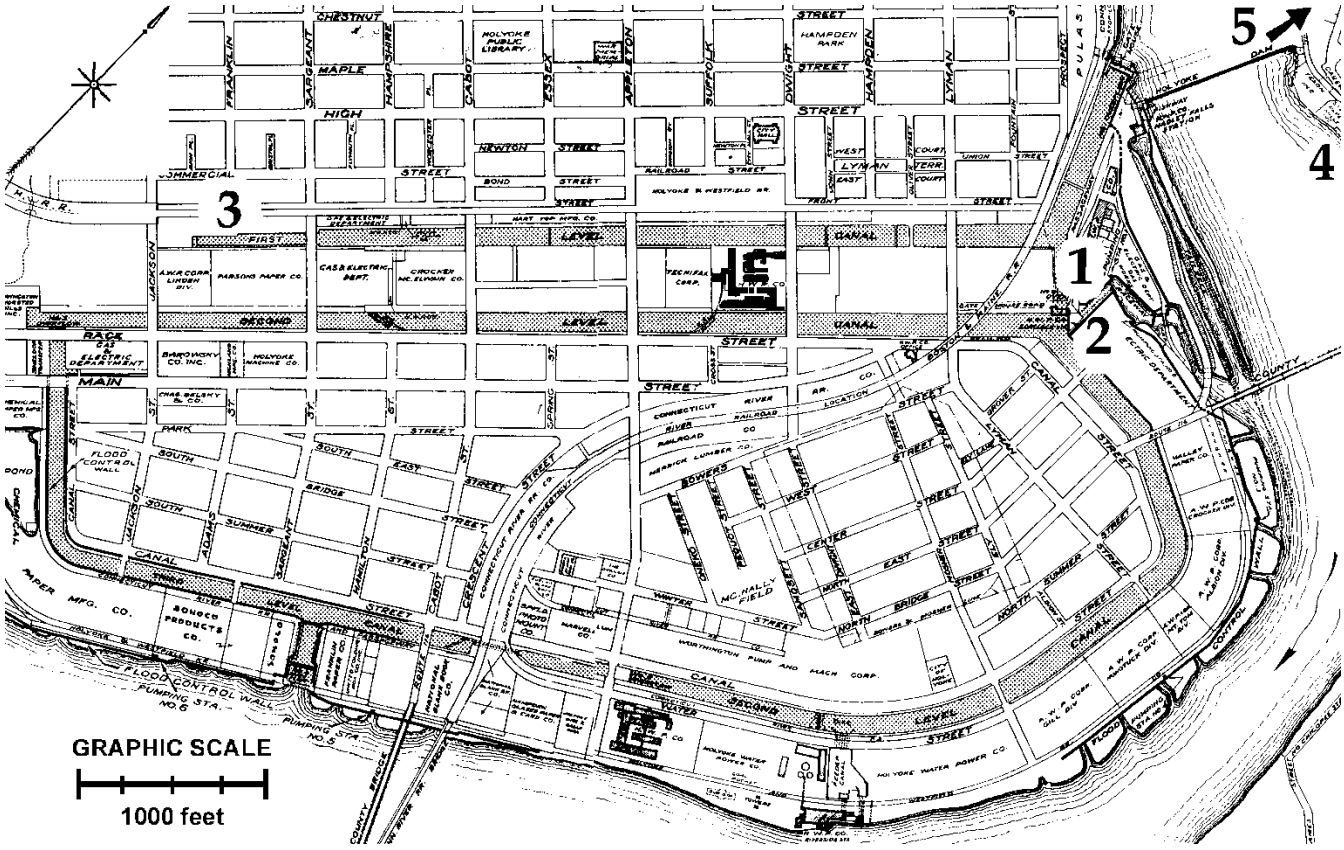
Holyoke Dam Water Quality Sampling Sheet

Date _____

Station 1 Intake	pH _____ DO _____ WT _____
Station2 Tailrace	DO _____ WT _____
Station 3 Canal	DO _____ WT _____
Station 4 Bypass	DO _____ WT _____
Station 5 Cove Island	[OMITTED]

DO: dissolved oxygen
WT: water temperature
FC: water for in lab fecal coliform testing

Attachment 7.2
Holyoke Dam Water Quality Monitoring Site Location Map and Directions



Sites

Site 1- Hadley Falls Intake. Sample should be taken in front of the Hadley Falls intake. Water can be collected by bucket or Nansen-type collection bottle. Parameters to be measured at this site at dissolved oxygen (DO), pH and water temperature (WT).

Site 2- Hadley Falls Station Tailrace. Sample should be taken at the fish lift entrance by a bucket or Nansen-type collection bottle. Parameters to be measured at this site are dissolved oxygen (DO), and water temperature (WT).

Site 3- Holyoke Canal System. Sample should be taken at the end of the first level canal by Parson Paper. Meter can be directly deployed at this site. Parameters to be measured at this site are dissolved oxygen (DO), and water temperature (WT).

Site 4- Hadley Falls Bypass Reach. Sample should be taken on the South Hadley side of the river. Access the area at the entrance to the Texon property and proceed down the dirt road to just under the Coolidge Bridge. Meter can be directly deployed at this site. Parameters to be measured at this site are dissolved oxygen (DO), and water temperature (WT).

Site 5- Cove Island. [OMITTED]

DATA LOGGERS

Hadley Falls Intake use Logger 1- attach in front of rack

Hadley Falls Tailrace use Logger 2- attach in vicinity of spillway fishlift entrance

Bypass Reach - use Logger 3- may need an anchor. Put in deeper water, may need to go down by the bridge.

B-4 USFWS OSAW Application Comment

Quote 1. John Warner, USFWS

Hi Paul - I understand that Holyoke Gas and Electric (HGE) is submitting an application with the National Hydropower Association for their Outstanding Stewardship of America's Waters Award.

We have worked with HGE for many years to design, implement and evaluate upstream and downstream fish passage facilities at the Holyoke Project. Since the relicensing of the project, HGE completely redesigned and re-constructed the upstream fish lift system, making it a state-of-the-art facility for passage, counting, trapping and trucking of fish. HGE has managed the operation and maintenance of the facility to the highest standards.

The recently completed downstream passage redesign at the main Hadley Falls Station powerhouse is an even more impressive achievement. The facility redesign needed to take into account safe passage of surface migrants like American shad, as well as demersal species like American eel and the federally listed shortnose sturgeon and also correcting poor hydraulic conditions at the spillway upstream fish passage entrance that interfered with passage of many species, especially sturgeon, all the while continuing to effectively operate the hydro facility. HGE undertook extensive modeling and engineering studies to develop this innovative, state-of-the-art final design which incorporates a mid-level and lower-level bypass to for the passage of fish migrating at any depth. Finally, HGE set off on an aggressive construction plan and schedule and completed the facility well ahead of schedule. While effectiveness testing of the downstream passage facilities is still underway, the facilities have operated as planned and initial operations indicate improved upstream passage by sturgeon.

Overall, the fish passage improvements that HGE has implemented over the years are a model for others to follow, and have been achieved through close, cordial, and constructive consultation between the City, resource agencies and other parties.

Based on the above, we strongly support HGE's application for the OSAW Award. Best of Luck!

-- John Warner

John P. Warner

Assistant Supervisor, Migratory Fish/Hydropower

New England Field Office, U.S. Fish and Wildlife Service

70 Commercial Street, Suite 300

Concord, NH 0330-5087

phone: 603-223-2541, Ext. 6420

B-5 NOAA FER Comment

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JAN 2 4 2017

Francis J. Hoey III
Commission Chairman
Holyoke Gas and Electric
99 Suffolk Street
Holyoke, MA 01040

Dear Chairman Hoey,

Recently, we completed consultation pursuant to Section 7 of the Endangered Species Act with the Federal Energy Regulatory Commission (FERC) regarding the effects of the continued operation of your Holyoke Hydroelectric Project on shortnose and Atlantic sturgeon. This consultation was the conclusion of a tremendous effort by Holyoke Gas and Electric (HG&E) to ensure that the project is operated in a manner that provides safe and successful upstream and downstream passage for shortnose sturgeon and does not have adverse impacts on Atlantic sturgeon.

We are appreciative of the leadership demonstrated by Paul Ducheney of HG&E as well as Richard Murray and Sarah LaRose of his staff. Paul and his team have worked tirelessly since you acquired the project in 2001 to include the Federal resource agencies and many stakeholders in project development. Paul successfully led the cooperative consultation team to produce a comprehensive settlement filed with FERC in 2004. Since then, we have been working collaboratively with HG&E and other partners to improve fish passage at the project. Shortnose sturgeon have not been passed above the dam since 2001. After passage improvements were complete in 2016, more than 90 shortnose sturgeon were collected in the fish lift, far more than any year on record. These improvements will help ensure that shortnose sturgeon will again have access to important upstream habitats. The placement of the new racks and bypass above the dam are expected to greatly increase the survival of downstream migrating sturgeon. We are hopeful that these passage improvements will result in growth of the Connecticut River shortnose sturgeon population and increase the likelihood of its recovery.

We are excited about the improved fish passage facilities at your project and truly appreciative of the efforts of Paul and his staff. Thank you for your positive contributions to the recovery of shortnose sturgeon in the Connecticut River.

Sincerely,

Julia E. Crocker

Julia E. Crocker
ESA Fish Recovery Coordinator

B-6 TEXON MOA

MEMORANDUM OF AGREEMENT BETWEEN THE UNITED STATES ARMY CORPS OF ENGINEERS, THE MASSACHUSETTS HISTORICAL COMMISSION, AND THE CITY OF HOLYOKE GAS & ELECTRIC DEPARTMENT REGARDING THE TEXON MILL DEMOLITION PROJECT, SOUTH HADLEY, MASSACHUSETTS

WHEREAS, the City of Holyoke Gas & Electric Department (HG&E) has proposed to demolish the Texon Mill Building on the bank of the Connecticut River in South Hadley, Massachusetts (the undertaking); and

WHEREAS, the proposed demolition requires a permit from the U.S. Army Corps of Engineers, New England District (Corps); and

WHEREAS, the Corps has determined that the proposed undertaking will have an adverse effect on the Texon Mill Building (MHC #SOH.111), and the South Hadley Falls Canal Historic District (MHC # SOH.B), historic properties listed in or eligible for listing in the National Register of Historic Places, and has consulted with the Massachusetts State Historic Preservation Office (MA SHPO) pursuant to the Corps regulations at 33 CFR Parts 320 through 330 and the 36 CFR Part 800 regulations implementing Section 106 of the National Historic Preservation Act of 1966, as amended [16 U.S.C. Part 470(f)]; and

WHEREAS, The removal of the Texon Mill Building will serve as a catalyst for redevelopment of the South Hadley Falls Area; and

WHEREAS, Northeast Generation Services, the previous owner of the property, has completed photographic documentation of the Texon Mill Building, which has been accepted by the MA SHPO and submitted to the Massachusetts State Archives and the South Hadley Historical Commission; and

WHEREAS, HG&E has conducted a marketing effort to sell the Texon Mill Building for rehabilitation, a plan that was approved by the MA SHPO, and there were no interested parties; and

WHEREAS, the Corps and MA SHPO believe the marketing effort was made in good faith, and agree that no further marketing is required; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), the Corps has notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect determination with specified documentation and the ACHP has chosen not to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

WHEREAS, the South Hadley Selectboard and the South Hadley Historical Commission have participated in the consultation and have been invited to concur in the Memorandum of Agreement; and

NOW, THEREFORE, the Corps, the MA SHPO, and HG&E agree that the undertaking will be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

The Corps and HG&E shall insure that the following measures are implemented in consultation with the MA SHPO

I. DONATION OF HISTORICAL ITEMS

HG&E shall donate items of historical interest from the main Texon Mill Building and the former Boiler House to the Town of South Hadley. The South Hadley Historical Commission has determined the items to be salvaged and HG&E will turn over these items to the Town when they are removed from the building. HG&E will store some of these items until they are needed for installation at the Texon Mill Park, required in Stipulation II below.

II. TEXON MILL PARK

HG&E shall create a Texon Mill Park after the Texon Mill Building is demolished. The construction of the Texon Mill Park is part of a plan to create an overall riverside park, which is not a mitigation measure for this undertaking. The design for the Texon Mill Park shall include all of the following design elements: planting of native vegetation within the footprint of the Texon Mill Building; re-use of the Texon Mill Building granite cornerstones to outline the footprint of the Texon Mill Building; installation of interpretive signage; salvaging the Texon Mill Boiler House doors for use by the Town; designated viewing platforms/areas overlooking the Holyoke Dam, the Texon Mill Building footprint, and the South Hadley Falls Canal inclined plane and canal lock areas; footpaths interconnecting Texon Mill Park with Lower Riverside Park and Upper Gatehouse Park; and placement of appropriate stones to generally delineate the location of the 'river side' wall of the historic South Hadley Falls Canal. The most appropriate stones for delineation of the riverside edge of the South Hadley Falls Canal are the existing cap stones, if they are currently visible at the ground surface or within 6 inches of the surface. HG&E will dig along the alignment of the Canal wall to a depth of at least 6 inches in an effort to locate the existing cap stones. Where such existing cap stones cannot be located, appropriate substitute stones will be provided.

A new access road will be built on the site and integrated into the Texon Mill Park. This access road will be used by HG&E to access the Holyoke Dam from the South Hadley bank. This access road will also provide handicapped-accessible pedestrian access to the lower platform overlooking the Holyoke Dam.

A. HG&E has provided the Corps, MA SHPO, the South Hadley Selectboard, the South Hadley Historical Commission, with a design layout plan for the Texon Mill Park that depicts the layout and amenities for the Texon Mill Park. The design layout plan, which is entitled "Holyoke Gas & Electric Department – Texon Area" and is dated "11-07-12", is attached as Appendix A of this MOA. The Corps, the MA SHPO, the South Hadley Selectboard and the South Hadley Historical Commission have accepted the design layout plan dated "11-07-2012".

B. Once completed, the Texon Mill Park shall be operated and maintained in accordance with the attached Operation & Maintenance Plan Elements document (see Appendix B).

C. If project plans materially change, then HG&E shall provide current plan drawings to all the consulting parties for their review and comment. Wetlands mitigation constructed in the vicinity of the project area that does not materially alter park design elements shall not constitute a material change.

The construction of the Texon Mill Park shall be completed within two (2) years of the Corps of Engineer's execution of this MOA.

III. STANDARDS FOR REHABILITATION OF THE SOUTH HADLEY FALLS CANAL

All construction associated with the Texon Mill Park shall be conducted in accordance with the *Secretary of the Interior's Standards for Treatment of Historic Properties* (36 CFR 68) (1992)

IV. POST REVIEW DISCOVERIES

HG&E will ensure that if previously unidentified historic properties are discovered which may be affected by the undertaking, they will notify the Corps and the MA SHPO. The Corps and the MA SHPO shall consult pursuant to 36 CFR 800.13 and apply the National Register criteria of eligibility (36 CFR 60).

V. DURATION AND AMENDMENT

This MOA will be null and void if its terms are not carried out within five (5) years from the date of its execution. Prior to such time, the Corps may consult with all the other signatory parties to reconsider the terms of the MOA and amend it in accordance with 36 CFR § 800.6(c) (7).

VI. DISPUTE RESOLUTION

Should any signatory party to this MOA object in writing to any actions proposed or the manner in which the terms of this MOA are implemented, the Corps shall consult with such party to resolve the objection. If the Corps determines that such objection cannot be resolved, the Corps will:

A. Forward all documentation relevant to the dispute, including the Corps's proposed resolution, to the ACHP. The ACHP shall provide the Corps with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the Corps shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and the signatory parties, and provide them with a copy of this written response. The Corps will then proceed according to its final decision.

B. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, the Corps may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the Corps shall prepare a written response that takes into account any timely comments regarding the dispute from the signatory parties to the MOA, and provide them and the ACHP with a copy of such written response.

C. The Corps's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

VII. TERMINATION

If any signatory party to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other parties to attempt to develop an amendment per 36 CFR § 800.6(c)(7). If within thirty (30) days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, the Corps must either (a) execute an MOA with signatories pursuant to 36 CFR § 800.6(c) (1); or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. The Corps shall notify the signatories as to the course of action it will pursue.

Execution of this MOA by the Corps and the MA SHPO, its subsequent filing with the ACHP, and implementation of its terms by HG&E, evidence that the Corps has taken into account the effects of this undertaking on historic properties.

SIGNATORIES:

UNITED STATES ARMY CORPS OF ENGINEERS

By: JMcCarthy Date: 29 Oct 2013

Jennifer McCarthy
Chief, Regulatory Division
U.S. Army Corps of Engineers, New England District

MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER

By: Brona Simon Date: 10/4/13

Brona Simon
Executive Director
Massachusetts Historical Commission

CONCURRING PARTIES:

CITY OF HOLYOKE GAS & ELECTRIC DEPARTMENT

By: _____ Date: _____

James M. Lavelle
Manager

SOUTH HADLEY SELECTBOARD

By: _____ Date: 10/18/13

John Hine
Chairperson

SOUTH HADLEY HISTORICAL COMMISSION

By: Robert Szklarz Date: 10/18/13

Robert Szklarz
Chairperson

B-7 2016 CRLMP Update Meeting Agenda

Agenda

FERC Project No. 2004

CRLMP – Stakeholder Update Meeting

Holyoke Gas & Electric Department

May 18, 2016

Location: HG&E Main Office
99 Suffolk Street
Holyoke, MA 01040

Invitees:

Kevin Mendik	NPS
Andrew French	USFWS
Paul Jahnige	MADCR
Chris Curtis	PVPC
Michael Sullivan	Town of South Hadley
Richard Harris	Town of South Hadley
Andrea Donlon	CRWC
Joshua Knox	TTOR
Kristen Sykes	Appalachian Mountain Club

Time: 10 am – 12 pm

Discussion of CRLMP Compliance Items:

Requirement	**Status**
Gatehouse Park	Park is open for the 2016 recreation season (May 1 – Sep 30).
Riverside Park	Park is open for the 2016 recreation season (May 1 – Sep 30).
Texon Park	Park is open for the 2016 recreation season (May 1 – Sep 30).
Bicentenntial Canal Park	HG&E owns part of the Bicentennial Canal Park property and, per its obligation under the CRLMP, has continued to lease it to South Hadley.
Slimshad Point	Site is open for the 2016 recreation season.
Canal Walk	• HG&E provides assistance as needed. • Phase II activities recently completed.
FERC Form 80	• HG&E collected data during the 2014 recreational season. • Form 80 filed with FERC in April 2015
Fishway	• Turn around, parking area and landscaping improvements recently completed. • HG&E will continue to explore additional enhancements. • Facility is open to the public from May 4 to Jun 12 in 2016.
Toilet Facilities	HG&E provides toilet facilities at Slimshad Point, Fishway, Hatfield Boat Ramp, South Hadley Parks, and Ellwell Recreation Area.
Channel Marking Program	Upon invoice/request, HG&E provides $5,000 adjusted for inflation every year for the buoy program. In 2016, the buoy fee paid was $7,138.
Canoe Portage	• HG&E provides free canoe portage over the Holyoke Dam year-round. • Portage is advertised on HG&E's website and via signage at Brunelle's Marina.
Shad Derby	HG&E continues to hold the derby two weeks each year, in mid-May.
Dam Release	• Although there is currently no warning horn that goes off, there is a loudspeaker

Warning System	and video surveillance. • These measures are appropriate because water overtopping the dam rises slowly.
River Ranger	• HG&E has historically provided ~$15,000 per year for this position. • Due to lack of resources with other involved parties, this position has not been in place over the last few years. • HG&E reached out to the Environmental Police last year, but feedback was that no funding was necessary.
Cove Island	• Update filed with FERC on June 10, 2014. • FERC approval via letters dated January 22, 2015 and November 19, 2015. • Based on this, Cove Island licenses have been extended to 2038.
Conservation Restriction (CR): BBSB	• CR held by South Hadley. • Mt. Holyoke Boathouse constructed on property.
CR: Cove Island	Neither South Hadley nor DCR wanted to be CR co-holders.
CR: Log Pond Cove	• HG&E tried to develop CR with various parties, but no party wanted to be a co-holder. • HG&E funds annual water chestnut control at Log Pond Cove.
Access Map	Map available on HG&E website.
CRWC Funding	• In the past, CRWC has not opted to take the $500 annual funding • Accordingly, in 2009, HG&E agreed to use that $500 to support local river related school education efforts • HG&E programs involve: funding field trips to the fishway for all Holyoke 4th graders, annual tours of facilities and presentations to HHS Environmental Science Class, coordination with any interested local colleges/universities to provide tours and/or presentations.
Permit Program	• Dock permits for HG&E to monitor recreational use in its impoundment. • Generally receive 1-2 requests for permits per year. No permits issued in 2015.
Annual Monitoring Tour	• Now conducted in August each year. • Outreach to Conservation Directors/MADEP each year in order to determine any specific areas to check in on, and report back afterwards
Puritan Tiger Beetle	• HG&E funded study to determine operations and recreation effects on the Puritan Tiger Beetle. • Upon request, provides stipend funding to graduate students for Rainbow Beach tiger beetle research.
TTOR MOA	Upon request, HG&E provides funds for herbicide or contractor services for wood chipping.

B-8 MassDEP Correspondence

From: "Kubit, Robert (DEP)" <Robert.Kubit@MassMail.State.MA.US>
To: Sarah LaRose <SLaRose@hged.com>
Cc: "McKenna, Timothy (DEP)" <timothy.mckenna@state.ma.us>

Date: Monday, February 08, 2016 04:49PM
Subject: RE: Albion A, Albion D and Nonotuck Relicensing (FERC Nos. 2768, 2766 & 2771)

Hi Sarah,

The MassDEP concurs with your request to use the Traditional Licensing Process for these three Projects. It is our position that due to their location within the Holyoke Canal System, the Water Quality Certificate and subsequent Settlement Agreement issued for the Holyoke Dam Project (FERC No. 2004) specifies all the conditions necessary to meet State water quality standards for the Albion A (FERC No. 2768), Albion D (FERC No. 2766) and Nonotuck (FERC No. 2771) Projects.

Bob

Robert Kubit, P.E.

MassDEP

Division of Watershed Management

8 New Bond Street

Worcester MA 01606

Telephone: (508) 767-2854

Email: robert.kubit@state.ma.us

Fax: (508) 791-4131

From: Sarah LaRose [mailto:SLaRose@hged.com]
Sent: Wednesday, January 20, 2016 5:20 PM
To: John Warner; Julie Crocker; Slater, Caleb (FWE); Kubit, Robert (DEP); Don Pugh; Andrea Donlon; Andrew Smith; Olivia M; kevin_mendik@nps.gov; morsea@ci.holyoke.ma.us; Marcos A Marrero; McKenna, Timothy (DEP); Paul Sneeringer; Josh Knox; John
Cc: Paul Ducheney
Subject: Albion A, Albion D and Nonotuck Relicensing (FERC Nos. 2768, 2766 & 2771)

Dear Agencies and Potential Stakeholders,

Holyoke Gas & Electric intends to start a coordinated relicensing process for its Albion A (FERC No. 2768), Albion D (FERC No. 2766) and Nonotuck (FERC No. 2771) Projects. Accordingly, attached hereto please find the draft Pre-Application Documents (PAD), Notices of Intent (NOI) and Requests for Traditional Licensing Process (TLP) for the relicensing of these three hydroelectric projects for your review and comment. Please provide comments by **Monday, February 22, 2016** as we plan to file final documents with FERC by February 28, 2016. Furthermore, HG&E requests that you provide concurrence with its TLP Request. Please let me know if you have any questions.

Thank you,

Sarah LaRose
Project Engineer
Holyoke Gas & Electric
99 Suffolk Street
Holyoke, MA 01040
Phone: (413) 322-1522
Email: slarose@hged.com