LOW-IMPACT HYDROPOWER POWER INSTITUTE RECERTIFICATION APPLICATION

West Dudley Hydroelectric Project

(FERC NO. 7254, exempt)

February 2020

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1.0 FACILITY DESCRIPTION

The West Dudley Hydroelectric Project ("the project") is located on the Quinebaug River in the town of Dudley, Massachusetts (Figure 1). The project is owned and operated by West Dudley Hydro, LLC ("WDHLLC"), a Massachusetts limited liability company. The project was first granted LIHI certification in 2010 and was recertified in 2015.

Construction of the Quinebaug River Pond Dam (also called the Rhode Island Cardboard Company Dam) was completed in 1919. The West Dudley Power Company filed a notice of exemption from licensing of a small hydroelectric project, known as West Dudley, project No. 7254, on May 2, 1983. No agency comments were received in opposition to the exemption and on June 10, 1983 the Federal Energy Regulatory Commission ("FERC") issued an exemption to the West Dudley Power Company authorizing the operation and maintenance of the West Dudley hydroelectric project (FERC 7254) (see original application files on LIHI website). Project works then consisted of the dam, including existing flashboards 2 feet in height, and a brick and masonry powerhouse containing three turbine generators with a total installed capacity of 310 kw.

A&D Hydro, Inc. purchased the West Dudley project from The West Dudley Power Company in the early 1990's. On January 21, 1994 A&D Hydro, Inc. filed an Application for Amendment of Exemption with the FERC to request that paragraph (4)(i) of the Notice of Exemption for the project number 7254-MA be amended to reflect the fact that: (1) the existing flashboards were and are 4 feet in height (not 2 feet), (2) the impoundment surface elevation was and is 381.8 feet NGVD, and (3) the minimum (i.e. low flow) tail water elevation is 369 feet NGVD.

A&D Hydro, Inc stated that, to the best of its knowledge and belief, since the project's inception, no change had been made to increase the impoundment elevation or to alter the capacity or hydraulic discharge of the project's turbines. The maximum gross head is demonstrably less than 13 feet. Ownership of the project was transferred from A&D Hydro, Inc. to West Dudley Hydro, LLC in 2004.

Since last certified by LIHI, West Dudley Hydro added (4) hydraulic operated spill gates in the first section of the bridge spill area. The hydraulic gates are used to spill excess water from the project when flows exceed 150% of project operating capacity or approximately 750 CFS. At a MSL of 381.25 (top of flash boards) each gate can pass 160 cfs of flow. By strategically opening and closing the gates West Dudley Hydro personnel can attempt to maintain the river MSL of 381.25. By maintaining river levels, we can reduce the risk of flashboard failure during high flow situations. Preventing flashboard failure reduces downstream risk due to rapid high flows and reduces the number of times the pond is lowered for flashboard repair. Prior to the hydraulic gate installation and during high flow events flashboard failure to some degree would occur. When high water receded,we were left with a reduced pond level until the flow was low enough to enact repairs. Since the new hydraulic gates were installed, we have seen flashboard repairs reduced in frequency and severity.

The project is operated as a run-of-river facility. The project is required to maintain a continuous minimum flow of 76 cubic feet per second (Aquatic Base Flow = 0.5 cfsm) or the inflow to the reservoir, whichever is less. Project works consist of: (a) a reservoir with an 31-acre surface area, and a useable storage capacity of 201 acre-feet; (b) a 55 foot spillway; (c) a dam consisting of two sections, 55 feet in

length and 144 feet in length, at the junction of which is located an existing 60 foot stone and masonry powerhouse; (d) 4 foot high flashboards; (e) transmission equipment and electrical facilities;(f) appurtenant equipment and; (g) Hydraulic spill gates.

The powerhouse contains three turbine generators. Unit 1 consists of a modified Medsker brand turbine with a belt driven induction motor. It is a fixed blade Kaplan style which develops 95 kw of power. Unit 2 is also a modified Medsker brand turbine with a belt driven induction motor. It is a fixed blade Kaplan style which develops 120 kw of power. Unit 3 is a Flygt brand submersible unit with a direct-coupled planetary gearbox and induction generator. It is an adjustable blade Kaplan style with output of 95 kw. The total water flow through the project at full operation is approximately 500 cfs. The project utilizes a previously existing impoundment and the plant is unmanned, but operation is monitored on a 24/7 basis.

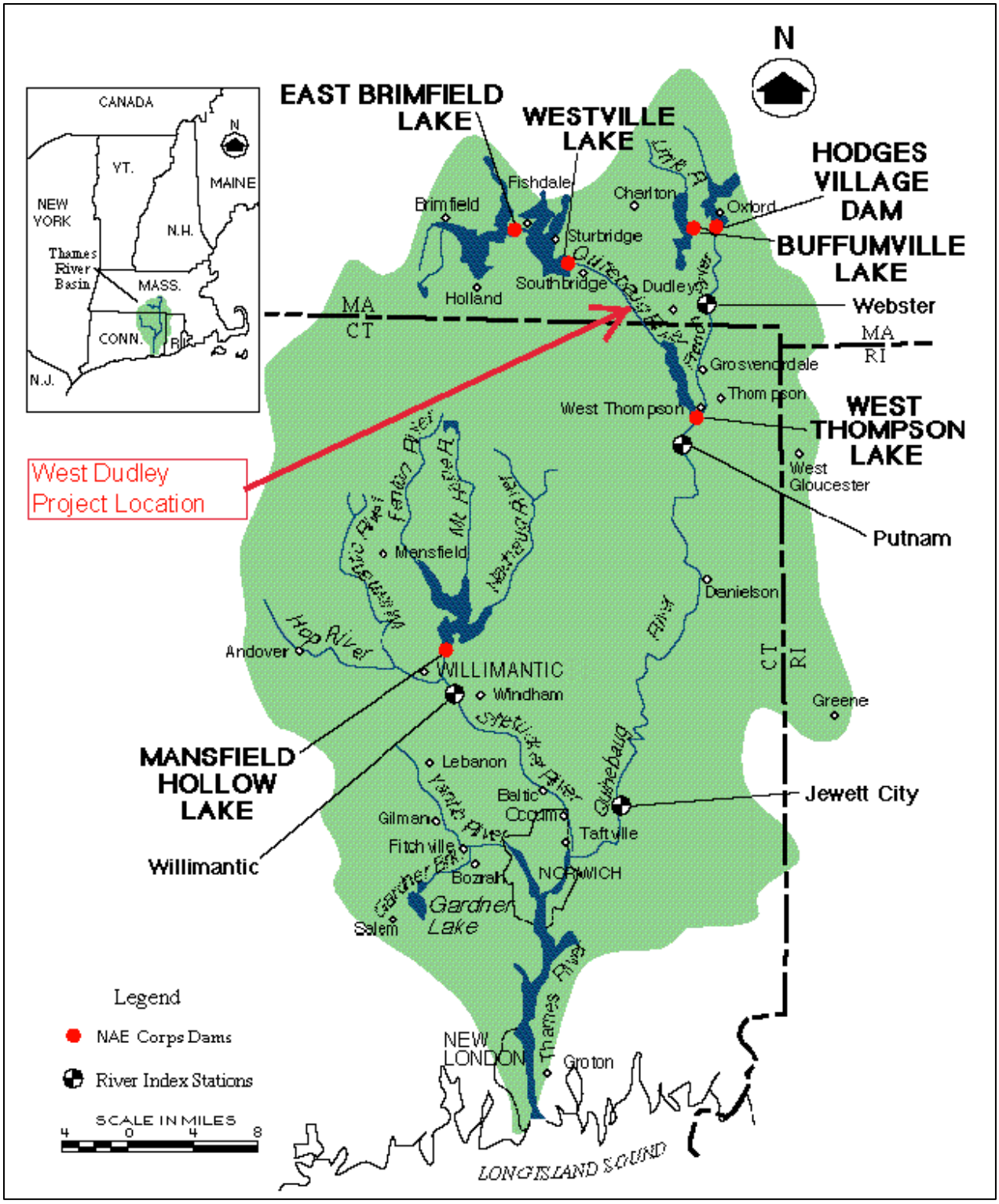


Figure 1. Project Location and Quinebaug River Basin

Table 1. Facility Description

Item	*Information Requested*	*Response (include references to further details)*
Name of the Facility	Facility name (use FERC project name or other legal name)	West Dudley Project
Location	River name (USGS proper name)	Quinebaug River
	Watershed name (select region, click on the area of interest until the 8-digit HUC number appears. Then identify watershed name and HUC-8 number from the map at: https://water.usgs.gov/wsc/map_index.html)	Quinebaug HUC-8 01100001
	Nearest town(s), county(ies), and state(s) to dam	Dudley, Worcester County, MA
	River mile of dam	~ River mile 41.1
	Geographic latitude of dam Geographic longitude of dam	42° 3'1.65"N, 71°58'52.55"W
Facility Owner	Application contact names (Complete the Contact Form in Section B-4 also):	Benjamin Rawson
	Facility owner company and authorized owner representative name.	West Dudley Hydro, LLC. Authorized owner representative: Benjamin Rawson
	FERC licensee company name (if different from owner)	
Regulatory Status	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates, or date of exemption	P-7254 exemption issued 06/10/1983
	FERC license type (major, minor, exemption) or special classification (e.g., "qualified conduit", "non-jurisdictional")	5 MW exemption
	Water Quality Certificate identifier, issuance date, and issuing agency name. Include information on amendments.	There is no state issued water quality certificate.
	Hyperlinks to key electronic records on FERC e-library website or other publicly accessible data repositories	FERC exemption application and exemption: https://lowimpacthydro.org/assets/files/W%20Dudley%20-files/Appendix%201-1%20Order%20Granting%20Exemption%20from%20Licensing%20dated%20June%2010%201983.pdf Exemption amendment 04/29/1998 https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8153599
Powerhouse	Date of initial operation (past or future for pre-operational applications)	1919
	Total installed capacity (MW)	.31MW

Item	*Information Requested*	*Response (include references to further details)*
	Average annual generation (MWh) and period of record used	611 MWh, based on 2006-2019
	Mode of operation (run-of-river, peaking, pulsing, seasonal storage, diversion, etc.)	Instantaneous run of river
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	3 Turbines, consisting of : (1) Medsker turbine with a belt driven induction motor, uses fixed Kaplan style blade. 95kw, Hydraulic capacity of 102CFS (1) Medsker turbine with a belt driven induction motor, uses a fixed Kaplan style blade 120kw, Hydraulic capacity of 220CFS (1) Flygt submersible turbine with a direct -couples planetary gearbox and induction generator, uses an adjustable Kaplan style blade. 95kw, Hydraulic capacity 90-135CFS
	Trashrack clear spacing (inches), for each trashrack	2”
	Dates and types of major equipment upgrades	In the summer of 2017 Hydraulic Spill Gates were installed
	Dates, purpose, and type of any recent operational changes	The Hydraulic spill gates were added to provide more control over the river during periods of increased flow.
	Plans, authorization, and regulatory activities for any facility upgrades or license or exemption amendments	None at this time
Dam or Diversion	Date of original construction and description and dates of subsequent dam or diversion structure modifications	1919
	Dam or diversion structure height including separately, the height of any flashboards, inflatable dams, etc.	Average 17 ft, flash boards are 4’ in height, flood gates are 4’ in height.
	Spillway elevation and spillway hydraulic capacity	No Spillway
	Tailwater elevation (provide normal range if available)	369 ft msl
	Length and type of all penstocks and water conveyance structures between the impoundment and powerhouse	n/a
	Dates and types of major infrastructure changes	Summer of 2017 Spill Gates were upgraded to hydraulic operation.
	Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)	Hydropower

Item	*Information Requested*	*Response (include references to further details)*
	Source water	Quinebaug River
	Receiving water and location of discharge	Quinebaug River
Conduit	Date of conduit construction and primary purpose of conduit	n/a
Impoundment and Watershed	Authorized maximum and minimum water surface elevations	381.20 ft msl to 381.25 ft msl
	Normal operating elevations and normal fluctuation range	381.20 ft msl to 381.25 ft msl
	Gross storage volume and surface area at full pool	Surface area = 31 acres Volume = 201 acre-ft
	Usable storage volume and surface area	Same, run of river operation
	Describe requirements related to impoundment inflow, outflow, up/down ramping and refill rate restrictions.	The Project is operated in an instantaneous run-of-river mode. There is no impoundment storage and a continuous minimum flow of 76 cfs or the inflow to the impoundment, whichever is less, is maintained. The minimum flow was developed based on the New England aquatic base flow of 0.5 cfsm. During any needed refill after an approved maintenance drawdown, 90% of inflow is passed downstream and the headpond is refilled using the remaining 10% of inflow until the normal impoundment elevation is achieved.
	Upstream dams by name, ownership and river mile. If FERC licensed or exempt, please provide FERC Project number of these dams. Indicate which upstream dams have downstream fish passage.	Upstream: Westville Lake (Army Corps) RM 55.38 Old Sturbridge Village P-6077 exempt (RM 60.8) East Brimfield (Army Corps), RM 63.5) None have downstream fish passage

Item	*Information Requested*	*Response (include references to further details)*
	Downstream dams by name, ownership, river mile and FERC number if FERC licensed or exempt. Indicate which downstream dams have upstream fish passage	Downstream: West Thompson (Army Corps) RM 40.3 (no upstream passage) MSC Hydro P-5679 exempt RM 38.6 Putman Hydro P-5645 exempt RM 38.4 (has upstream eel passage but natural barrier to anadromous fish) Cargill Falls P-13080 exempt RM 37.9 (has upstream eel passage Rogers Dam RM: 30.9 (non-powered, may install upstream fish passage) Quinebaug P-5062 licensed, RM 26.2 (may install upstream fish passage) Aspinook P-3472 licensed, RM 7.5 (will install upstream fish passage) Tunnel Dam RM 0.2 (hydroelectric, FERC non- jurisdictional, has upstream eel and anadromous passage)
	Operating agreements with upstream or downstream facilities that affect water availability and facility operation	None
	Area of land (acres) and area of water (acres) inside FERC project boundary or under facility control.	31 acres of water and 29 acres are under the control of the facility.
Hydrologic Setting	Average annual flow at the dam, and period of record used	211 CFS, period of record used 2006-2019
	Average monthly flows and period of record used	January – 227 CFS February – 239 CFS March – 322 CFS April – 329 CFS May – 185 CFS June – 170 CFS July – 88 CFS August – 79 CFS September – 103 CFS October – 117 CFS November – 187 CFS December – 217 CFS Period of record used is 2006-2019
	Location and name of closest stream gauging stations above and below the facility	Upstream: USGS 01123600 QUINEBAUG RIVER BELOW WESTVILLE DAM NEAR SOUTHBRIDGE, MA Downstream: USGS 01124000 QUINEBAUG RIVER AT QUINEBAUG, CT

Item	*Information Requested*	*Response (include references to further details)*
	Watershed area at the dam (in square miles). Identify if this value is prorated and provide the basis for proration.	~ 115 sq miles (at downstream gage = 155 sq miles, at upstream gage = 94.4 sq miles)
Designated Zones of Effect	Number of zones of effect	2
	Upstream and downstream locations by river miles	River mile 40.3 – River mile 41.6
	Type of waterbody (river, impoundment, bypassed reach, etc.)	Zone 1: impoundment Zone 2: downstream reach
	Delimiting structures or features	Dam upstream to river channel braid; dam downstream to area of riffles
	Designated uses by state water quality agency	See water quality section below.

2.0 STANDARDS MATRICES

ZOE #1: Impoundment Zone

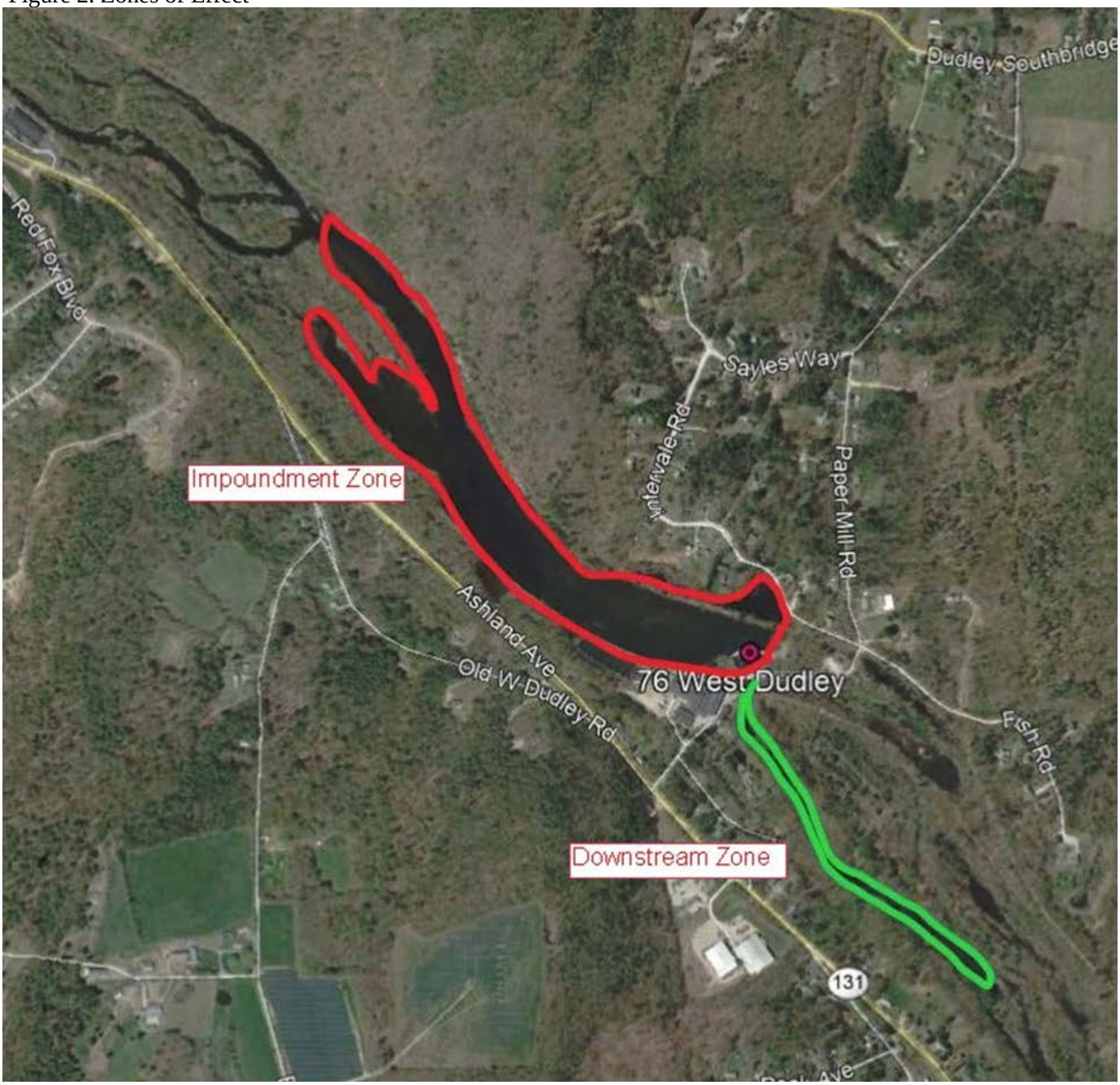
CRITERION		**ALTERNATIVE STANDARDS**				
		1	**2**	**3**	**4**	**PLUS**
A	Ecological Flow Regimes	X				
B	Water Quality			X		
C	Upstream Fish Passage	X				
D	Downstream Fish Passage					
E	Watershed and Shoreline Protection					
F	Threatened and Endangered Species Protection					
G	Cultural and Historic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

ZOE #2: Downstream Zone

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

The impoundment and tailrace/downstream Zones of Effect are shown in Figure 2. The impoundment extends approximately 0.8 miles upstream from the dam to the braided section of the river. The tailrace/downstream zone extends approximately 0.5 miles downstream from the dam to a set of riffles.

Figure 2. Zones of Effect



3.0 SUPPORTING INFORMATION

A. Ecological Flow Regimes

Both Zones qualify for Standard A-1.

Criterion	*Standard*	*Instructions*
A	1	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to dam/diversion structures and demonstrate that there are no bypassed reaches at the facility. • For run-of-river facilities, provide details on operations and demonstrate that flows, water levels, and operation are monitored to ensure such an operational mode is maintained. If deviations from required flows have occurred, discuss them and the measures taken to minimize reoccurrence. • n/a - In a conduit facility, identify the source waters, location of discharge points, and receiving waters for the conduit system within which the hydropower facility is located. This standard cannot be used for conduits that discharge to a natural waterbody. • For impoundment zones only, explain water management (e.g., fluctuations, ramping, refill rates) and 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.

The Project is operated in an instantaneous run-of-river mode. There is no impoundment storage and a continuous minimum flow of 76 cfs or the inflow to the impoundment, whichever is less, is maintained for the protection and enhancement of aquatic resources in the Quinebaug River. The minimum flow was developed based on the New England aquatic base flow of 0.5 cfsm.

As a condition of the initial LIHI certification, a flow monitoring plan was developed and implemented in 2012. The plan was approved by the United States Fish and Wildlife Service, the Massachusetts Division of Fisheries and Wildlife and the Massachusetts Department of Environmental Protection. Impoundment elevation and minimum flows are electronically monitored. During any needed refill after an approved maintenance drawdown, 90% of inflow is passed downstream and the headpond is refilled using the remaining 10% of inflow until the normal impoundment elevation is achieved.

Fish and wildlife habitat is not affected by run of river operation. During drawdown for repairs littoral habitat may be affected however, after drawdown refill typically takes less than 6 hours. There are currently no constraints on drawdown rate however we typically drawdown the pond 4’ in 6 hours, effect repairs in 2 hours and refill within 6 hours.

The inflow to the project is monitored by the PLC controlled SCADA system. The headpond level is updated every 15 minutes and adjustments are made automatically by the system void of any interaction by an operator. This system allows the project to maintain pond level within the operating restrictions. The plant consists of 2 fixed output units and 1 variable. As pond level rises due to a rain event or release

from the Army Corps dam at Westville the system activates the variable turbine (unit3). As pond level rises unit 3 adjusts blade pitch allowing more flow through the project. As water levels exceed the hydraulic capacity of unit 3, unit 1 will activate and unit 3 will ramp down. If water levels continue to rise unit (3) will ramp back up maintaining pond level. As water continues to rise unit (2) will activate at which time depending on rate of flow 2 units will respond accordingly. If water levels continue to rise past the hydraulic capacity of the power facility operator involvement is required to begin controlling the hydraulic spill gates opening as required to attempt to maintain pond level at the expense of power output due to tail water level increase. As the flows recede the SCADA system monitors and controls the turbines in reverse order until flows are insufficient to operate the turbines, at which time all units are deactivated.

B. Water Quality

Both Zones qualify for Standard B-3.

Criterion	*Standard*	*Instructions*
B	3	Site-Specific Monitoring Studies: • If facility is located on a Water Quality Limited river reach, provide a link to the state's most recent impaired waters list and indicate the page(s) therein that apply to facility waters. If possible, provide an agency letter stating that the facility is not a cause of such limitation. • Document consultation with appropriate water quality agency to determine what water quality parameters and sampling methods are required. • Present recent water quality data from the facility or from other sources in the vicinity of the facility (e.g., data collected from the state, watershed associations, or others who collected data under generally accepted sampling protocols and quality assurance procedures) and explain and demonstrate how it satisfies current applicable water quality standards including designated uses, or provide a letter from the appropriate state or other regulatory agency accepting the data.

The Quinebaug River is 76 miles long. The 28-mile portion lying within Massachusetts drains an area of 148 square miles. Municipal wastewater treatment plants in Sturbridge and Southbridge contribute to the Quinebaug River flows, along with industrial discharges. Additionally, treated municipal effluent is discharged to Cady Brook in Charlton. The river is also influenced by two flood control projects, two hydropower operations, numerous impoundments, water withdrawals (municipal and industrial), as well as non-point source runoff.

The Quinebaug River is designated as a Class B warm water in the project vicinity. These waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Class B waters are suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.[1]

The most recent Massachusetts 2016 303(d) Impaired Waters list (page 199)[2] includes the Quinebaug River in the project vicinity in Category 5 – Waters requiring a TMDL. Impairments upstream of the dam

[1] https://www.mass.gov/files/documents/2017/10/18/314cmr4.pdf
[2] https://www.mass.gov/files/documents/2017/08/zu/16ilwplist.pdf

include E coli, fecal coliform, other unspecified nutrients, dissolved oxygen, and physical alteration of habitat due to substrate embeddedness and undercut banks.[3] The Southbridge MA wastewater treatment plant discharges to the river upstream of the project. The only listed impairment downstream of the dam is for fecal coliform.

Water quality monitoring was conducted in 2011 and 2012 as a condition of LIHI certification at that time. In 2013, Massachusetts Department of Environmental Protection provided an email indicating that "After review of the submitted water quality data collected during the 2012 field season, the MA Department of Environmental Protection believes the West Dudley Hydroelectric Project (FERC # 7254) does not cause or contribute to violations of Massachusetts state water quality standards. Flow conditions during 2012 were sufficiently representative of low flow conditions."[4]

C. Upstream Fish Passage

The impoundment Zone #1 qualifies for Standard C-1 since once above a dam there is no further facility-related barrier to upstream fish movement. The downstream Zone #2 qualifies for Standard C-@.

Criterion	***Standard***	***Instructions***
C	1	Not Applicable / De Minimis Effect: • Explain why the facility does not impose a barrier to upstream fish passage in the designated zone. Typically, impoundment zones will qualify for this standard since once above a dam and in an impoundment, there is no facility barrier to further upstream movement. • 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.
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 protective). • 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.

The impoundment Zone #1 qualifies for Standard C-1 since once above a dam there is no further facility-related barrier to upstream fish movement. The downstream Zone #2 qualifies for Standard C-2.

The West Dudley project is not currently required by any state or federal agency to maintain upstream fish passage facilities. The FERC exemption includes a reservation of authority to prescribe fishways upon agency recommendations in the future. To date no agency has exercised that authority.

[3] See 2011 LIHI reviewer report https://lowimpacthydro.org/assets/files/West%20Dudley/WestDudleyCertificationFinalReport13Sept2011.pdf
[4] See 2015 LIHI reviewer report https://lowimpacthydro.org/wp-content/uploads/2011/09/RecommendationMemoWestDudley_2015.pdf

According to the Plan to Restore Diadromous Fishes to the Shetucket River Watershed there are no anadromous fish species present in this section of the river and there are several downstream dams that form barriers to passage for species including American shad, alewife, and river herring. Species targeted for restoration in the downstream Connecticut section of the river include American eel, American shad, alewife and blueback herring, gizzard shad, sea-run brown trout, sea lamprey, white perch and striped bass. There is a natural waterfall located downstream of the Putnam dam in Connecticut that forms a natural barrier to further upstream passage for all species but American eel and potentially sea lamprey. Some dams farther downstream in Connecticut (Aspinook and Quinebaug) are planning to install upstream fish passage during their FERC relicensing proceedings. The Tunnel dam, the first dam on the river has upstream passage facilities.

American eel are present in the Quinebaug River upstream and downstream of the project. Downstream dams including Putnam and Cargill Falls have installed upstream eel ways, but restoration is not yet targeted in the Massachusetts portion of the river and there are no agency recommendations for upstream passage at the project. There are no agency requirements or recommendations for monitoring of eels at the project.

D. Downstream Fish Passage and Protection

The downstream Zone #2 qualifies for Standard D-1 since once below a dam there is no further facility-related barrier to downstream fish movement. The impoundment Zone #1 qualifies for Standard D-2.

Criterion	***Standard***	***Instructions***
D	1	<u>Not Applicable / De Minimis Effect:</u> • 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). Typically, tailwater/downstream zones will qualify for this standard since below a dam and powerhouse there is no facility barrier to further downstream movement. Bypassed reach zones must demonstrate that flows in the reach are adequate to support safe, effective and timely downstream migration. • 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.

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 protective). • 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.

The impoundment Zone #1 qualifies for Standard D-2 as discussed below. The downstream Zone #2 qualifies for Standard D-1 since once below a dam there is no further facility-related barrier to downstream fish movement.

A small number of American eel are the only migratory species present in the Massachusetts section of the Quinebaug River according to resource agencies at the time of original LIHI certification. Downstream barriers block other migratory species from reaching the project. No upstream dams have downstream passage facilities. The project provides interim downstream eel passage and protection as requested by agencies during the 2015 LIHI recertification by shutting down operations and spilling inflow at night from August 15 through November 15 whenever a rain event of 0.25 inch or more occurs in a 24-hour period, or whenever there is a 50% increase in inflow over the previous three-day average flow. This time period and these flows are known to trigger eel downstream movement in the region. This is a condition of the original and current LIHI certification. The generation shutdowns continue for three nights and logs of shutdowns are kept during these periods. No other monitoring is currently required by agencies.

Riverine fish that are present in the project vicinity include Large Mouth Bass, Small Mouth Bass, Calico Bass, White Perch, Trout, and Sunfish, Carp. Currently there are no species of fish stocked in the vicinity of the project area. To date, no downstream fishways for riverine fish have been ordered at the Project, although the FERC exemption includes reservation of authority for agencies to prescribe fishways in the future.

West Dudley Hydro LLC continues to shut down all of the project's turbines on rainy nights and will continue to do so annually from August 15th thru November 15th or the successful installation of safe, timely and effective permanent downstream passage facilities that might be prescribed in the future. This operation was requested by resource agencies during the 2015 LIHI certification and continues to be a condition of certification. West Dudley Hydro LLC maintains a log book of precipitation events as well as generation records which are stored at the project powerhouse and can be made available for review by the agencies upon their request. The project is not manned 24 hours a day so West Dudley Hydro LLC would request at least 24 hours notice prior to any agency review of the log book. West Dudley Hydro LLC will continue to implement these interim downstream passage measures until permanent passage is in place or alterations to the interim plan are requested by the agencies.

On or before August 1, 2021 West Dudley Hydro, LLC proposes to permanently replace the existing 2" racks with ¾" clear spaced racks and reduce turbine output during eel outmigration to ensure approach velocities <1.5 fps. During eel outmigration (August 15 – November 15, unless otherwise directed) West Dudley Hydro, LLC would propose to close the floodgate used to provide minimum flow and instead remove stoplogs in the bay immediately adjacent to the powerhouse to release at least 3% of max turbine capacity (or 20-25 cfs, whichever is greater).

West Dudley Hydro LLC is recommending the stop log side of the dam as the area for safe eel passage because of the fact that during eel migration periods the average inflow to the project allows West Dudley LLC to operate unit 3 only. Unit 3 is closest to the stop log side of the dam. The tailwater area below the stop log side of the dam is affected by inflow to the project. During minimum flow periods the tailwater in the stop log area is approximately 1.5' to 2' deep. The riverbed in that area is a flat concrete apron extending approximately 20' away from the base of the stop logs.

During high water events, defined as inflow causing pond level to exceed 2' over the top of the dam, the project will be allowed to operate the turbines to prevent plant damage. Records will be kept showing headpond level (feet NGVD) and turbine output.

E. Shoreland and Watershed Protection

Both Zones qualify for Standard E-1.

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 FERC project or facility boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

From the central valley of the main stem of the Quinebaug River to the limits of the watershed, the landscape is broad, forested, and rural, with small towns and cities scattered throughout. Industrial, residential and undeveloped lands are all found in the project area. Some of the undeveloped land primarily on the west side of the river, close as it is to intensive industrial and commercial use, provides some wildlife habitat. Undeveloped lands include a number of wooded areas some of which are seasonally flooded. The remainder of the area consists of low-density residential and small industrial development.

There is no requirement in the FERC exemption for a shoreline management plan or similar plans. The land in the immediate vicinity of the West Dudley project is rural in character, moderately developed and privately owned. The flows below the West Dudley project have minimal effect on shoreline erosion due to the predominantly granite and gravel substrates in the tailrace areas. There has been minimal colonization of exposed shorelines by emergent plants within the 200-foot boundary area due to the commercial and residential landscape. The species that do exist consist of generally old-field primary successional species that are indicative of an area that has previously been cut over and disturbed. Layout and landscaping of the powerhouse grounds was designed in a manner to minimize visual impact and

mitigate the project's impact on the surrounding shoreline. The project boundary contains 26 acres on the eastern shore extended northward from the project and contains an uncompleted, abandoned railroad bed.

According to the Massachusetts BioMap2 report for the town of Dudley[5], core habitats for rare species and critical natural landscapes are located in the project vicinity upstream of the dam, but not within the project boundary.

F. Threatened and Endangered Species Protection

Both Zones qualify for Standard F-1.

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.

Based on an online USFWS IPaC search conducted on January 2, 2020 only the Northern long-eared bat (threatened) may be present in the project vicinity. There are no critical habitats for the species. Given the project's small footprint and lack of a need to conduct tree cutting, there is no impact from the project on that species. In any event that a tree does need to be cut, the USFWS 4(d) rule would be observed.

An online data check at the Massachusetts Oliver mapping tool conducted on January 2, 2020 is shown in Figure 3, with priority habitat for rare or listed species shown. Species information is unavailable from that source and considered confidential, but the identified locations shown are outside of the project boundary. The area identified on Figure 3 as PH 749 is downstream of and well away from the river and not impacted by the project. PH 786 is upland habitat with a small area adjacent to the river in the impoundment but the project does not own or influence these lands.

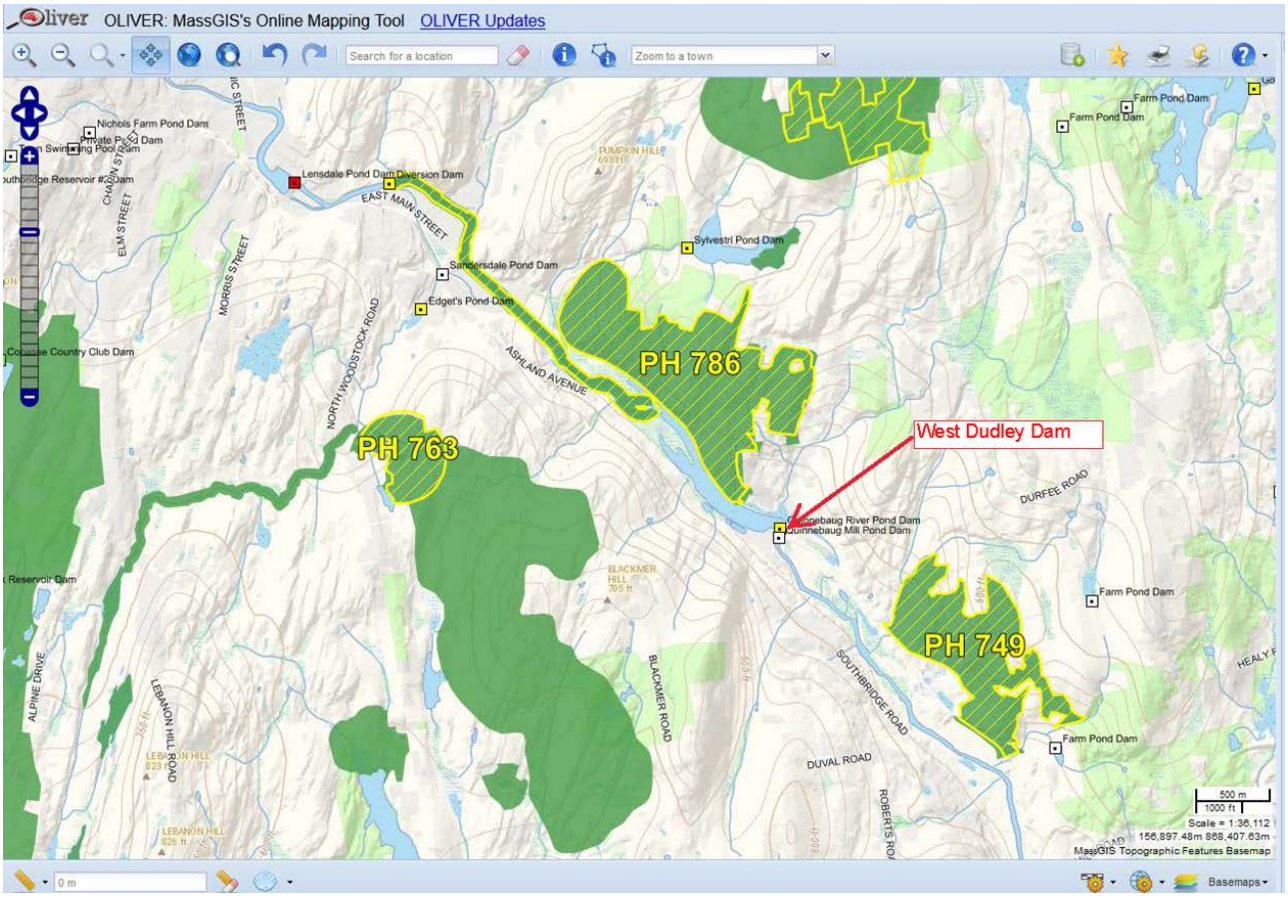
The numbered habitat areas differ between Oliver and the BioMap2 town report (Figure 4) although the areas shown are the same. The unlabeled stretch of river upstream of the project impoundment on Figures 3 and 4 is listed in the BioMap2 Dudley town report as "wetland core buffer" which is defined as "intact river corridors within which important physical and ecological processes of the river or stream occur". This area is not influenced by the project.

Core 915 is the same area as PH 749 and described as "Priority & Exemplary Natural Communities - Dry, Rich Acidic Oak Forest". The only species that may be present is shining wedgegrass (Sphenopholis nitida), a state-threatened species. Core 969 is the same area as PH 786 and also described as "Priority & Exemplary Natural Communities - Dry, Rich Acidic Oak Forest". The state-threatened large-bracted tick-trefoil (Desmodium cuspidatum) and shining wedgegrass may be present, along with the unlisted state species of concern Orange Sallow Moth (Pyrrhia aurantiago). There is no information in the town report on Core 988 but it appears to be "aquatic core" and so could include the freshwater mussel species that are noted in Core 936 (the only other aquatic core area in town) located away from the Project to the east along Route 12. The mussel species that may be present are not state-listed and include creeper

[5] http://maps.massgis.state.ma.us/dfg/biomap/pdf/town_core/Dudley.pdf

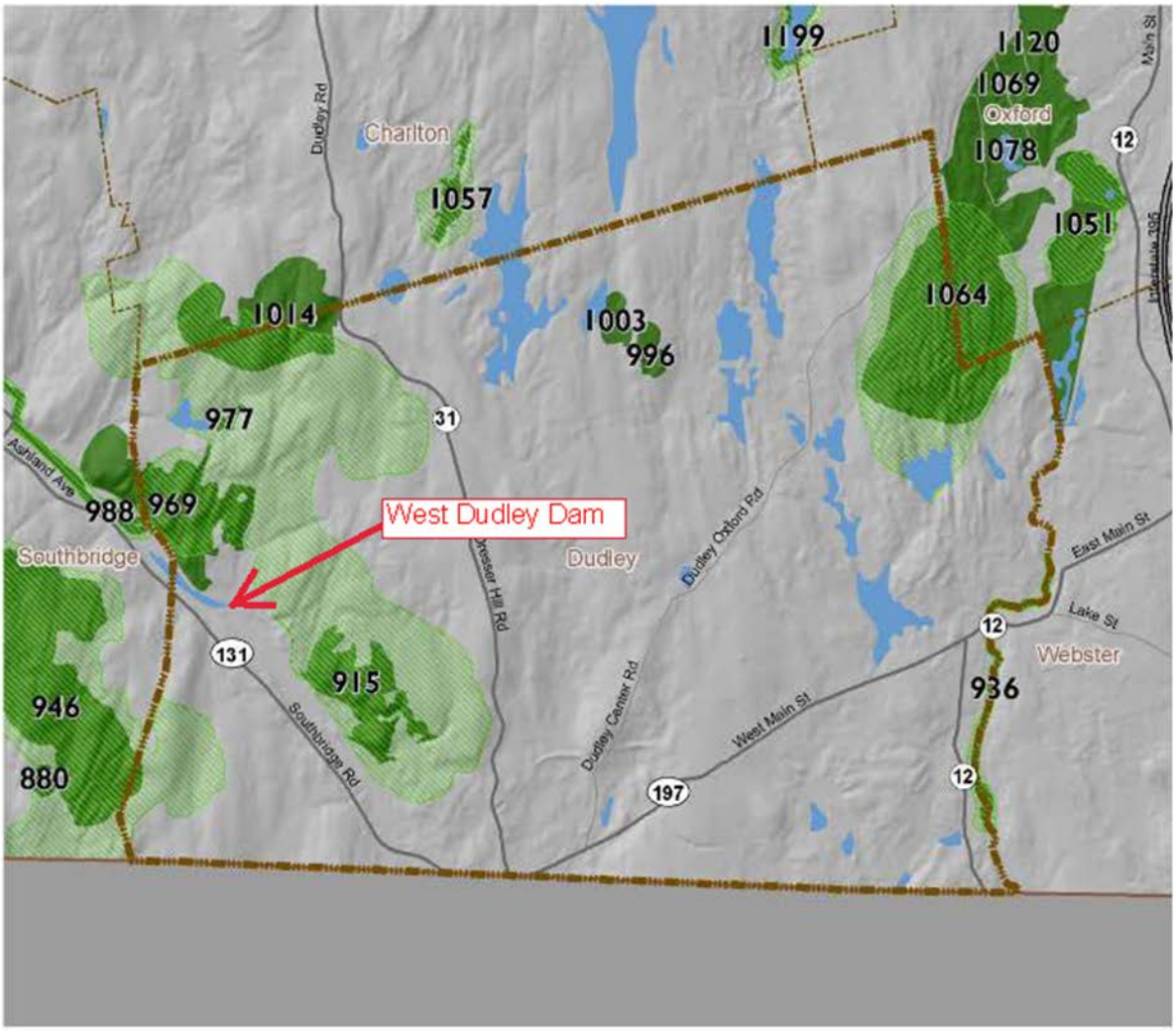
(Strophitus undulates), a species of concern and triangle Floater (Alasmidonta undulata).

Habitat for shining wedgegrass is cliffs, balds, or ledges, forests, ridges or ledges, talus and rocky slopes, woodlands. Habitat for large-bracted tick-trefoil includes disturbed areas, forests, and woodlands. These habitats are not present within the project, and the project does not impact them.



BioMap2 Core Habitat in Dudley

Core IDs correspond with the following element lists and summaries.



G. Cultural and Historic Resources Protection

Both Zones qualify for Standard G-1.

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, nor currently adversely affect any cultural or historic resources that are present on facility lands.

The dam was originally constructed in 1919. The powerhouse was constructed in 1983 at the time of the FERC exemption. At that time, the Massachusetts State Historic Preservation Office (SHPO) indicated that project construction would not adversely affect any cultural or historic resources. In 2011 as part of the original LIHI certification application, the SHPO again stated that given no new construction, demolition or other project modification, the project would not affect such resources, if any exist. The FERC exemption has no requirements related to cultural or historic resources and no project-related structures are listed on the National Register of Historic Places.[6] The only change to the project were the Hydraulic Spill Gates that were added in the Summer of 2017. These were simply upgrades to the stop logs that were installed in 1983 that were of no historic relevance. There have been no changes to the original dam or structure. . I did not contact SHPO when installing the flood gates. The stop log system under the bridge leading to the power house was constructed in the 1980's as part of the rehab and not during the original dam construction of 1919. I figured replacing the rotten stop log boards with steel would be better and last longer. I also assumed that updates only counted towards structures such as the power house or the concrete dam itself not serviceable items like stop logs or flash boards.

H. Recreational Resources

Both Zones qualify for Standard H-3.

Criterion	*Standard*	*Instructions*
H	1	Assured Accessibility: • In lieu of existing recommendations and plans for recreational uses, document the facility's current and future commitment to accommodate reasonable requests from recreation interests for adequate public access for recreational use of lands and waters of the facility, including appropriate recreational water flows and levels, without fees or charges.

The Quinebaug River is part of the "Last Green Valley National Heritage Corridor"[7] and used for recreational fishing and boating. A paddling guide[8] includes the Quinebaug River Water Trail with canoe launches in the project vicinity – a takeout just upstream of the dam and a put-in just downstream of the dam, both on the west side. There is another launch farther upstream in the riverine section above the impoundment. None of the takeout/put-ins and launches are part of the property and are subsequently not maintained by the facility. Minimal hiking and boating occurs within a safe distance of the Project. Access to the reservoir and downstream reaches of the project is permitted without fees or charges.

[6] https://nationalregisterofhistoricplaces.com/ma/worcester/state.html
[7] https://thelastgreenvalley.org/tlgv/what-is-the-last-green-valley/
[8] https://thelastgreenvalley.org/wp-content/uploads/2014/02/PaddleGuide2016xweb.pdf

4.0 FACILITY AND STAKEHOLDER CONTACTS FORMS

Project Owner:	
Name and Title	Ben Rawson, Manager/ James Rawson, Partner
Company	West Dudley Hydro, LLC
Phone	860-428-2004
Email Address	brawson@rawsonscreens.com
Mailing Address	99 Canal St, Putnam CT 06260
Project Operator (if different from Owner):	
Name and Title	
Company	
Phone	
Email Address	
Mailing Address	
Consulting Firm / Agent for LIHI Program (if applicable):	
Name and Title	
Company	
Phone	
Email Address	
Mailing Address	
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	Ben Rawson
Company	West Dudley Hydro, LLC
Phone	860-428-2004
Email Address	brawson@rawsonscreens.com
Mailing Address	99 Canal St. Putnam, CT 06260
Party responsible for accounts payable:	
Name and Title	Donna Rawson
Company	West Dudley Hydro, LLC
Phone	860-928-4458
Email Address	dmcrawson@gmail.com
Mailing Address	99 Canal St. Putnam, CT 06260

Agency Contact		*Area of Responsibility*
Agency Name	USFWS/ New England Field Office	☐ Flows ☐ Water Quality x Fish/Wildlife ☐ Watershed ☐ T&E Species ☐ Cultural/Historic ☐ Recreation
Name and Title	Melissa Grader, USFWS New England Field Office	
Phone	413-548-9138	
Email address	melissa_grader@fws.gov	
Mailing Address	103East Plumtree Rd. Sunderland, MA 01375	

Agency Contact		*Area of Responsibility*
Agency Name	MASS DEP, Division of Watershed Management	☐ Flows ☐ Water Quality ☐ Fish/Wildlife x Watershed ☐ T&E Species ☐ Cultural/Historic ☐ Recreation
Name and Title	Robert Kubit, P.E	
Phone	508-767-2854	
Email address	robert.kubit@state.ma.us	
Mailing Address	627 Main St. Worcester, MA 01608	

Agency Contact		*Area of Responsibility*
Agency Name	Massachusetts Division of Fisheries and Wildlife	☐ Flows ☐ Water Quality ☐ Fish/Wildlife ☐ Watershed ☐ T&E Species ☐ Cultural/Historic ☐ Recreation
Name and Title	Caleb Slater, Ph D., Anadromous Fish Project Leader	
Phone	508-389-6331	
Email address	Caleb.Slater@state.ma.us	
Mailing Address	One Rabbit Hill Rd. Westborough, MA 01581	

5.0 SWORN STATEMENT

As an Authorized Representative of West Dudley Hydro, LLC, 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 LIHI Certification of the applying facility is granted, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified®.

The Undersigned 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.

Company Name: West Dudley Hydro, LLC

Authorized Representative:

Name: Ben Rawson

Title: Owner/Manager

Authorized Signature: