TRANSCANADA HYDRO NORTHEAST INC.
DEERFIELD RIVER PROJECT (LP 2323)

LOW IMPACT HYDROPOWER CERTIFICATION APPLICATION

ATTACHMENT C
PROJECT DESCRIPTION

Project Overview

TransCanada Hydro Northeast, Inc. (the Company) owns and operates the Deerfield River Project (the Project) on the Deerfield River, a major tributary to the Connecticut River. The Project is located in Bennington and Windham Counties in Vermont, and in Berkshire and Franklin Counties in Massachusetts. It consists of eight developments: Somerset, Searsburg, Harriman, Sherman, Deerfield No. 5, Deerfield No. 4, Deerfield No. 3 and Deerfield No.2, having a total installed capacity of 86 megawatts (MW). All dam operations and generation operations are controlled remotely from the Deerfield River Control Center in Monroe Bridge Massachusetts, located near the Deerfield No. 5 Dam.

The Project area encompasses about a 65-mile reach of the river, including reservoirs. Two other developments not owned by the company are also located within this area. They are Brookfield Renewable Power's Bear Swamp Project located downstream of the Deerfield No. 5 development; and Consolidated Edison's Gardner Falls Project located downstream of the Deerfield No. 3 development. Exhibit 1 depicts the general Project area.

Settlement Agreement

The Deerfield River Project was one of the first FERC Projects to be relicensed under a comprehensive Settlement Agreement approach executed in 1994. A five-year cooperative consultation process involving state and federal resource agencies, various non-governmental organizations (NGOs) and the licensee (at that time New England Power Company) resulted in settlement by the parties. The process of reaching this agreement included examination of the power and non-power tradeoffs and effects of a wide variety of operational scenarios. This negotiation process, after careful consideration of alternatives, resulted in a balancing of power and non-power interests associated with the Project through the Settlement Agreement. The FERC License conditions for the Project consist of the operational and environmental measures defined by the Settlement Agreement. The Settlement Agreement demonstrated the ability of diverse interests to come together in good faith to balance environmental quality, recreation, fishing, energy production, land preservation and other purposes. The agreement ensures that the Deerfield River will be managed over the License term to improve resource protection while recognizing the value of hydropower as a renewable energy resource.

Project Developments

In Vermont, the Project facilities are located in the Towns of Somerset, Searsburg, Wilmington, Whitingham, and Readsboro. They consist of:

- Somerset Dam at River Mile (RM) 66, a storage reservoir with no hydropower generation.
- Searsburg Dam at RM 60.3 and Searsburg Powerhouse at RM 56.8
- Harriman Dam at RM 48.5 and Harriman Powerhouse at RM 44.1

In Massachusetts, the Project facilities are located in the Towns of Monroe, Rowe, Florida, Charlemont, Buckland, Shelburne, and Conway. They consist of:

- Sherman Dam and Powerhouse at RM 42
- Deerfield No. 5 Dam at RM 41.2 and Deerfield No. 5 Powerhouse at RM 38.5
- Deerfield No. 4 Dam at RM 20 and Deerfield No. 4 Powerhouse at RM 18.5
- Deerfield No. 3 Dam at RM 17 and Deerfield No. 3 Powerhouse at RM 16.8
- Deerfield No. 2 Dam and Powerhouse at RM 13.2.

Description of Project Facilities

SOMERSET

The Somerset facility is located on the East Branch of the Deerfield River, and is the furthest upstream, It consists of a storage reservoir, dam, outlet works and spillway. There are no power generating facilities at this development.

Somerset Reservoir is roughly 5.6 miles long and 1.1 miles across at its widest point, with a surface area of 1,514 acres and gross storage of 57,345 acre-feet. For the normal operating range from elevation 2128.10 msl to 2113.10 msl, Somerset Reservoir provides 20,614 acre-feet of storage.

The earth-fill dam is about 110 feet high and 2,101feet long. Water can be conveyed from the reservoir at two locations. The main outlet works, located in the gatehouse at the eastern end of the dam has two gated 48-inch diameter pipes used to control reservoir discharge and minimum flow. In addition to the main outlet works, there is a side channel spillway with 3-foot flashboards located at the western end of the dam. The spillway channel is about 800 feet long, 45 feet wide, and from 6 to 30 feet deep. This spillway is used only for extreme flood events.

SEARSBURG

The Searsburg development is operated on a peaking, daily storage basis. It consists of an earth-fill dam and spillway, intake and penstock, powerhouse, and substation. Searsburg Reservoir is roughly 0.9 miles long and 0.16 mile across at its widest point. It has a surface area of 30 acres, 412 acre-feet of gross storage and 197 acre-feet of useable storage within its operating range.

Searsburg Dam is an earth-fill structure about 50 feet high and 475 feet long with a 137-foot long concrete gravity spillway, penstock intake gate, and sluice gate which is located in the south abutment. Water is conveyed by either the overflow spillway, the 6-foot by 8-foot sluice gate or the penstock, which leads to the powerhouse. The dam has 5 feet of flashboards on the spillway from May 1 to October 31 each year. In addition to the active outlet works, there is a construction bypass works located on the north abutment of the spillway that is sealed.

The intake facility includes a penstock intake gate with an 8-foot diameter wood stave conduit that runs 18,412 feet to a steel differential surge tank 50 feet in diameter and 34 feet high, and a steel penstock 6.5 feet in diameter and 495 feet long. Bond Brook, which enters the Deerfield River at RM 58.6, is diverted into the wood stave conduit.

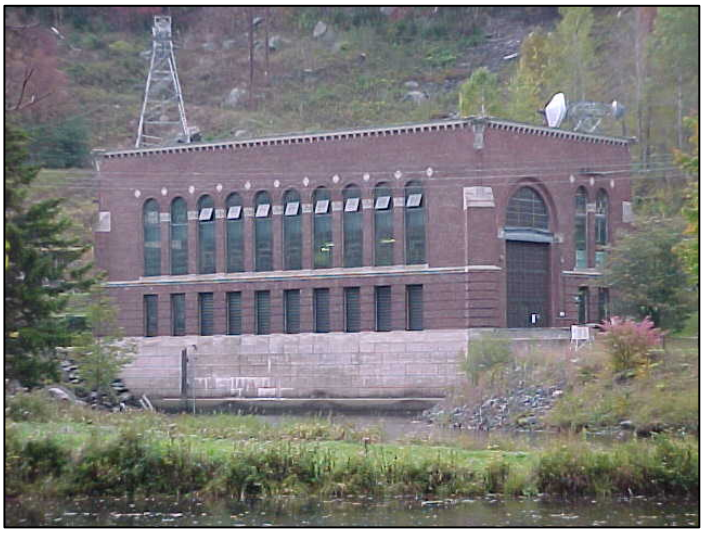
The powerhouse is a steel frame and brick structure constructed in 1922. It contains one vertical Francis unit with a nameplate capacity of 4,160 KW. The powerhouse also contains appurtenant mechanical and electrical facilities. The transformer yard is located outside, just east of the powerhouse and contains a single air break switch and motor operator, an overhead bus structure and the station Generator Step-up (GSU) transformer and accessories. The GSU is a three-phase transformer rated at 5000 kVA, stepping up voltage from 2.4 to 69 kV for the transmission system.

In addition to the 69 kV transmission interconnection, there is a small local distribution feeder supplied from this station.

HARRIMAN

The Harriman Development is operated on a peaking, seasonal storage basis. The facility consists of a storage reservoir, an earth-fill dam, a “morning glory” spillway, intake, conveyance tunnel and penstocks, powerhouse, and substations. Harriman Reservoir is approximately 9 miles long and 0.78 mile across at its widest point, and has a surface area of 2,039 acres. It has a maximum depth of 180 feet and a useable drawdown of 86 feet. It has 103,375 acre-feet of useable storage and 117,300 acre-feet of gross storage. The Harriman Dam is an earth-fill dam 215.5 feet high and 1250 feet long.

Most spill is through the “morning glory” spillway, which is equipped with 6 feet of flashboards. A 21.5-foot high horseshoe shaped tunnel discharges water from the spillway to the downstream channel. There is also a 4-foot diameter pipe that leads from the original construction diversion tunnel to the morning glory spillway tunnel. In 1998 the outlet pipe was modified to hold a 14-inch diameter fixed cone discharge valve. This valve is used to discharge the minimum flows for the bypass. The flow of water to the powerhouse intake is controlled by two 8-foot diameter valves. Water is conveyed through these valves to the powerhouse via a 12,812-foot long, 14-foot diameter concrete lined horseshoe shaped tunnel, a steel differential surge tank 34 feet in diameter and 184 feet high, and three steel penstocks 9 feet in diameter and 620 feet long.



The powerhouse is a steel frame and brick structure built in 1925. It contains three vertical Francis units with a nameplate capacity of 11,200 KW each. The powerhouse also contains appurtenant mechanical and electrical facilities. There are two switchyards located at Harriman Station. One is rated at 69 kV, and the other at 115 kV. The only equipment owned by the Licensee in these switchyards includes a small section of overhead bus structure, two Generator Step-up (GSU) transformers rated at 12/16/20 MVA with accessories, six single phase hook stick operated disconnect switches and two 115 kV oil circuit breakers located in the 115 kV yard. The GSU transformers step up the voltage from 6600 volts to 115kV.

SHERMAN

The Sherman Development is operated on a peaking, weekly storage basis. The facility consists of an earth-fill dam and spillway, intake and penstock, powerhouse, and substation. Sherman Reservoir is roughly 2 miles long and 0.25 miles across at its widest point with a surface area of 218 acres, 1359 acre-feet of useable storage and gross storage of 3593 acre-feet. The impoundment also formerly provided once-through cooling water for the now decommissioned Yankee Atomic Electric Power Company's (YAEC) Rowe Station.

Sherman Dam is an earth-fill structure 110 feet high and 810 feet long with a 179-foot long concrete gravity spillway and a concrete and brick intake structure. Four feet of flashboards are maintained on the spillway year round. Water is conveyed from Sherman Reservoir either through spillage, or via the powerhouse intake. Water is conveyed to the powerhouse via a concrete conduit 98 feet in length with a cross-sectional area of 142 square feet, and a steel penstock 13 feet in diameter and 227 feet long. There are no diversion canals or tunnels.

The powerhouse is a steel frame and brick structure built in 1927. It contains one vertical Francis unit with a nameplate capacity of 7,200 KW. The facility also contains appurtenant mechanical and electrical facilities.

The switchyard is located outside the powerhouse and contains four transformers, each rated at 3,000 kVA (one transformer per phase and one spare) that step up the voltage from 2.4 kV to 115 kV. The yard also contains lightning arresters, disconnect switch, and air break.

DEERFIELD NO. 5

The Deerfield No. 5 Development is operated on a peaking, daily storage basis. The facility consists of two dams, a series of diversion tunnels, canals and penstocks, the powerhouse, and a substation. The impoundment is about 0.75 mile long and 180 feet across at its widest point with a surface area of 38 acres, and gross storage of 118 acre-feet. It is comprised of a concrete gravity spillway 35 feet high and 90 feet long; a concrete intake structure that directs water to a minimum flow pipe; two low level sluices; and a power tunnel located in the west abutment.

Water is conveyed from the impoundment by spillage, the minimum flow pipe, the sluice gates, or by the intake tunnel to the powerhouse. Hydraulically controlled steel flap gates are used to maintain normal reservoir elevation along the entire spillway crest. The control gates in the western abutment intake structure are composed of two 8-foot wide by 7.75-foot high sluices and a single 12.5-foot by 13-foot intake gate.

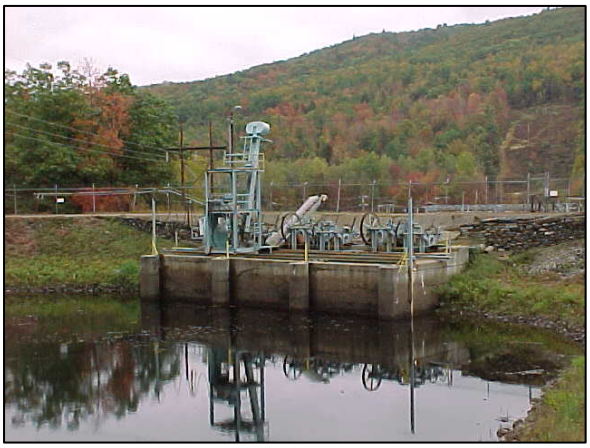
Two tunnels, two concrete conduits, and three canals criss-cross River Road and total 14,941 feet in length. There is also small diversion structure on Dunbar Brook, which is a concrete gravity structure approximately 12 feet high and 160 feet long. Water is directed from Dunbar Brook into one of the tunnels. Collectively, these structures convey water from the dam to a 400-foot long, 10-foot diameter steel penstock and then to the powerhouse.

The powerhouse is a steel frame and concrete structure constructed in 1974. It replaced the original station which was removed when the Bear Swamp Pumped Storage Project (#2669) was built. The powerhouse contains one vertical Francis unit with a nameplate capacity of 17,550 KW, as well as appurtenant mechanical and electrical facilities. The switchyard is located on River Road across from the Bear Swamp Visitor's Center. The only switchyard equipment owned by the Licensee includes one 15 kV oil circuit breaker used as a terminal line switch from the 13.8 kV overhead line from the Fife Brook Station, part of the Bear Swamp Project, and a set of three single phase hook- operated disconnect switches from the Deerfield #5 Station bus.

DEERFIELD NO. 4

The Deerfield No. 4 Development is operated on a peaking, daily storage basis. The facility consists of an earth-fill dam, spillway and sluice gates, intake and tunnel, forebay and penstocks, powerhouse, and substation. The impoundment is roughly 2 miles long and 500 feet across at its widest point, with a surface area of 75 acres, gross storage of 467 acre-feet and usable storage of 432 acre-feet.

The dam is comprised of an earth-fill embankment (with a concrete core) approximately 50 feet high and 160 feet long, a 241-foot long concrete gravity spillway, and three sluice gates located in the east abutment. The dam is equipped with flashboards ranging in height from 6 to 8 feet. Water is conveyed from the impoundment either by spillage or by sluice gates located in the eastern abutment. The intake gates include a 10-foot by 10-foot, an 8-foot by 10-foot and a single 10-foot by 14-foot surface sluice. In addition, a 6-foot by 12-foot surface sluice gate is located adjacent to, and downstream of, the power tunnel intake racks. This gate discharges into a 10-foot diameter vertical conduit which in turn, discharges into a 4-foot diameter pipe that discharges into the tailrace. It has an electric operator that is remotely controlled from the River Control Center, and used to pass minimum flows and is the intended downstream fish passage.



The power tunnel conveys water from the intake structure at the impoundment via a 12.5-foot diameter, 1,514 foot long concrete and brick lined horseshoe shaped tunnel that leads to the powerhouse forebay. The earthen forebay has a 12,000 square foot surface area and a 35-foot depth. From the forebay, water is conveyed through three 10-foot diameter, 154 foot long steel penstocks to the powerhouse.

The powerhouse is a steel frame and brick structure constructed in 1913. It contains three horizontal Francis units each having a nameplate capacity of 1,600 KW, and appurtenant mechanical and electrical facilities.

A Generator Step-up (GSU) transformer rated at 5,000/7000 kVA is located outside adjacent to powerhouse. It steps up voltage from 2.3 to 69 kV. A spare 3,000 kVA transformer is located in the high tension room of the powerhouse. There is also an outdoor 69 kV switchyard located across the Deerfield River which contains a single 69 kV sulfur hexafluoride (SF6) gas circuit breaker and a single gang-operated 69 kV disconnect switch. There is also a small local distribution feeder that is supplied from this station.

DEERFIELD NO. 3

The Deerfield No. 3 Development is operated on a peaking, daily storage basis. The facility consists of a concrete gravity dam and sluice gates, intake, tunnel, forebay and penstocks, powerhouse, and substation. The impoundment is roughly 1.3 miles long and 300 feet across at its widest point with a surface area of 42 acres, 221 acre-feet of gross storage and 200 acre-feet of useable storage. The dam is composed of a concrete gravity spillway approximately 15 feet high and 475 feet long equipped with 6-foot flashboards, two sluice gates and a power tunnel intake located in the south abutment. The sluice gates in the south abutment include a 10-foot wide surface sluice and an 8-foot wide by 4-foot high submerged sluice. A 6 foot by 10 foot surface sluice gate. located adjacent to, and downstream of, the power tunnel intake racks, discharges directly into the tailrace. This gate has an electric operator that is remotely controlled from the River Control Center and used to pass minimum flows and is the intended downstream fish passage.

The power tunnel exiting the gated intake is a 677-foot long, 17-foot wide by 12.5-foot high concrete conduit. It runs underground to an 880-foot long forebay from which water is conveyed via three 59-foot long, 10-foot diameter steel penstocks to the powerhouse.

The powerhouse is a steel frame and brick structure built in 1912. It contains three horizontal Francis units with a nameplate capacity of 1,600 KW each. The powerhouse also contains appurtenant mechanical and electrical equipment, and the switchyard.

A Generator Step-Up (GSU) transformer, rated at 5,000 kVA is located outdoors adjacent to the Station. This transformer unit steps up the voltage from 2,300 volts to 69kV. In addition to the 69kV transmission interconnection, there is a small local distribution feeder that is supplied from this station.

The tail-water for Deerfield No. 3 is formed by the headwaters of the downstream impoundment of the Gardner's Falls Plant (owned by Consolidated Edison, FERC License No. 2334). The Deerfield No. 3 powerhouse discharges into an impounded section of the river even when Gardner's Falls is maintained at its lowest level.

DEERFIELD NO. 2

The Deerfield No. 2 Development is operated on a peaking, daily storage basis. The facility consists of a concrete gravity dam and sluice gates, an inflatable bladder, trippable flashboards, intake and penstocks, powerhouse, and substation. The impoundment is roughly 1.5 miles long and 500 feet across at its widest point with a surface area of 63.5 acres, 550 acre-feet of gross storage and 500 acre-feet of useable storage. The dam consists of a concrete gravity spillway approximately 70 feet high and 447 feet long, with an inflatable bladder, trippable flashboards, sluice gates and an integral powerhouse located at the western end of the spillway. Water can be conveyed from the impoundment by either spillage, sluice gates or through the powerhouse.

Ten feet of trippable flashboards on top of the spillway crest and the inflatable bladder (112 feet long by 10 feet high) are used to maintain normal impoundment elevation. When water is at the top of the bladder, it will deflate automatically if inflow exceeds the powerhouse discharge. The two surface sluices are each 10 feet wide. A 6-foot by 16-foot surface sluice gate is located between the two 10-foot wide sluices and the inflatable bladder. It discharges directly into the tailrace, downstream of the dam. This gate has an electric operator which is remotely controlled from the River Control Center and is the intended for use as the downstream fish passage.

The powerhouse is a steel frame and brick structure constructed in 1913 and integral to the Deerfield No. 2 Dam. The powerhouse includes a gated intake structure with three steel penstocks, each of which is 11 feet in diameter and 35 feet long. The powerhouse contains three horizontal Francis units, each with a nameplate capacity of 1,600 KW and appurtenant mechanical and electrical facilities, as well as the switchyard.

A single Generator Step-Up (GSU) transformer rated at 5000/6250 kVA steps up the voltage from 2300 volts to 69 kV. This GSU transformer unit is located outside adjacent to the powerhouse. There is also a spare 69 - 2.3 kV, 3000 kVA transformer located in the high-tension room of the powerhouse.