HYDROELECTRIC POWER IN THE MOHAWK RIVER WATERSHED: PAST, PRESENT & FUTURE

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Albany Engineering Corporation specializes in hydroelectric project design and development. Founded in 1924, the company prides itself on its innovative approach to hydropower projects while working within the environmental context and historic setting of each site. Their portfolio of proposed projects includes four hydroelectric projects at existing dams within the Mohawk River Watershed. The projects are Delta Hydroelectric Project, Middle Mohawk Hydroelectric Project, Cohoes Falls Hydroelectric Project and the Green Island Hydroelectric Project Expansion.

THE PAST

A 1908 New York State map shows a generous number of water power developments across the state. Within the Mohawk Watershed, the map indicates 68 developments with generation ranging from less than 100 to as much as 7,000 horsepower. Most of the developments powered grain mills, saw mills or other industrial operations. It is doubtful that any of them generated electrical energy.

THE PRESENT

Today in 2011, there are six hydroelectric projects totaling 90.2 megawatts (MW) on the main branch of the Mohawk. Another nine projects totaling 81.9 MW operate on major tributaries such as the East and West Canada Creek. Half of these 15 plants are vintage (built 1915-1920), and half were constructed in the 1980s. In addition, there is a large hydroelectric pumped storage project at Blenheim-Gilboa; it does not use the Schoharie Creek flow per se but cycles impounded water from a lower and upper reservoir to generate on-peak power. For its off-peak energy supply, it uses sources outside the watershed.

THE FUTURE

The four projects detailed in this abstract will increase the existing 172 MW of hydroelectric capacity by another 204 MW (117 MW of incremental capacity) for an increase of more than 165%. In addition, on the tributaries of the Mohawk, there are 50-100 more developed hydropower sites, but most are only a half-megawatt or less (for a total of perhaps 50 MW). Most of these small sites are not technically difficult to develop but are problematic due to institutional barriers as well as possible aesthetic and other issues.

Delta Hydroelectric Project
Capacity: 5 MW
Energy: 14,000 MWh
Head: 69 feet
Developer & Owner: City of Watervliet
Status: Preliminary Permit granted by FERC, Application for License (April 2011). Anticipated construction, 2012. Completion, June 2013.

The Delta Dam was built in 1912 when New York State flooded 3,000 acres to create Delta Lake as a water source for the Erie section of the Barge Canal. The existing cyclopean masonry dam is 1,016 feet long and 76 feet high with an operating head of 69 feet. Controlled releases from the reservoir emit from outlets in the eastern and western sections of the dam. The eastern outlets discharge into a stilling basin; the water then flows over a weir and into the Mohawk River. The western outlet supplies the NYS Fish Hatchery.

The features proposed for the new Delta Dam Hydroelectric Project include an intake structure integral to the existing dam at its west abutment, a new powerhouse, an excavated tailrace channel extending about 200 feet downstream, a new underground 13.2 kV generator lead, and fully automated control system. There are no penstocks, existing or proposed. The plant will operate in run-of-river mode.

Middle Mohawk Hydroelectric Project
Capacity: 50.8 MW
Energy: 93,700 MWh
Head: 91 feet (total for eight developed sites)
Developer & Owner: Albany Engineering Corporation
Status: Preliminary Permit granted by FERC, Application for License pending (March 2011).

The Middle Mohawk Hydroelectric Project is a proposed hydroelectric project consisting of eight hydraulically linked developments designated by their associated New York State Canal System lock numbers (Locks E-8 through E-15), all on the Mohawk River. Each of the eight locks has an existing gated, movable, bridge-type dam constructed primarily of steel. The dams range in length from 460 to 588 feet, and each has a spillway ranging from 360 to 570 feet in length. The dam heights vary from the lowest at 8 feet to the highest at 15 feet. Each dam has two-tier or three-tier slide gates. Locks E-9 and E-12 have highway structures on the dam. The plants will operate in run-of-river mode.

Each development features two standard, identical, floatable, modular steel powerhouses that rest on a foundation consisting of four concrete pylons and connect to the dam via an inflatable seal. Each powerhouse will have a water intake structure with an integral positive exclusion fish protection and bypass system for both upstream and downstream passage. Each powerhouse will contain nine turbines rated at 333 kW each. The estimated average annual energy output of each lock development will fall between 6,879 and 16,440 MWh. The installed capacity of each development is 6.35 MW with a total project capacity of 50.8 MW.

Cohoes Falls Hydroelectric Project
Capacity: 100 MW
Energy: 300,000 MWh
Head: 100 feet
Developer & Owner: Green Island Power Authority
Status: Contested regulatory status at Federal Energy Regulatory Commission (FERC) and at the U.S. Second Court of Appeals.

The Cohoes Falls Hydroelectric Project is a new hydroelectric development to be located on the Mohawk River between Cohoes, Colonie and Waterford, just upstream from the existing School Street powerhouse (owned by Erie Boulevard Hydropower, L.P.). The existing 1911 powerhouse would be repurposed as a Cultural Resource Center within the Harmony Mills Historic District. A new state-of-the-art hydroelectric facility, constructed completely underground, will sell about 50% of its power to local and state governmental agencies and 25% to regional companies as an economic development incentive.

The project will completely re-water the currently dry sections of the Mohawk River and provide continuous veiling flow over the falls 24 hours a day, 7 days a week. Aerial transmission lines will be relocated out of sight under the new project dam. There will be protection for fisheries and safe passage facilities for migratory species as well as safe access for fishermen and boaters. Scenic overlooks, parks, canoe portages and hiking trails will encourage recreational use.

The installation will include two high head Kaplan vertical turbines and generators that will be capable of utilizing the full river flow range between 522 and 16,000 cubic feet per second. There will be partial removal of the non-conforming crest on the existing historic dam, originally built c. 1831. The plant will operate in run-of-river mode.

Green Island Hydroelectric Project Expansion
Capacity: 48 MW
Energy: 152,000 MWh
Head: 22 feet
Developer & Owner: Green Island Power Authority
Status: In relicensing (License issuance anticipated March 2011).

This project is not on the Mohawk River. However, a large portion of its drainage area is from the Mohawk, because it is immediately downstream of the confluence of the Mohawk and Hudson Rivers. Thus, issues impacting the Mohawk River also affect the project.

The existing federal-owned concrete dam extends across the Hudson River from Green Island to Troy. Built in 1914, the dam consists of a main and ancillary spillway and flashboards on the main spillway allowing a maximum impoundment pool elevation of 18.5 feet mean sea level (MSL). The existing powerhouse, built by Henry Ford in 1921, contains four hydroelectric generating units with a combined total installed capacity of 6,000 kW. The current and proposed projects operate in run-of-river mode.

Future plans include lowering the fixed crest of the main spillway to 12.5 feet MSL and adding steel crest gates to maintain the impoundment pool at 18.5 feet MSL. The historic powerhouse will be expanded to the east and west to provide housing for four new turbines and generators; the

four turbines and generators in the existing powerhouse will be replaced. A new trash boom will collect river debris. Fish passage systems, including upstream and downstream provisions for migratory fish and eels, are planned. Recreational amenities will include an accessible river walk, fishing platforms and added parking.

CONCLUSION

Generating power from our rivers is an age-old practice that today provides renewable energy to the people and businesses along its path much the way it has for centuries past. With careful planning and proper management, hydroelectric plants can continue to do so long into the future.