Island Pond Development – Feasibility Update, p. B-5, $998,000

Q. Please provide summaries of the results of the feasibility studies that were completed in the late 1980 and in 1996.

A. Summaries of the results of the studies completed in 1988 and 1996 regarding the potential Island Pond development are as follows:

Island Pond Development, Final Feasibility study, January 1988, prepared by Shawmont Newfoundland Limited (1988 Study)

The construction of the Bay d'Espoir facilities at the Meelpaeg Reservoir in 1967 provided head and flow conditions in the region of the Ebbegunbaeg Control structure for a possible power development. The 1988 Study was carried out to confirm the viability of the concept and to more accurately establish the cost and benefit of developing the potential of the Island Pond site. The work consisted of hydrological studies, site surveys and geotechnical investigations, and conceptual layout, preliminary design and optimization studies as required for optimization of construction and equipment details, costs and energy benefits for the project.

The concept for the power development includes the construction of a 23 m high embankment dam across the North Salmon River Valley, about 600 m upstream from Crooked Lake, and an intake-penstock-powerhouse complex located in a rock cut on the east bank, adjacent to the dam. (See the attached development area map). Discharge from the powerhouse would flow through a tailrace excavated along the original riverbed to Crooked Lake. The powerhouse would have two 15 MW units supplied through twin

intakes and two 5.4 m diameter buried steel penstocks. Permanent access to the project site would require construction and upgrading of about 31 km of road from the existing North Salmon Road. The total duration of on-site construction for this project was estimated to be 40.5 months.

A transmission connection to the existing Upper Salmon Terminal Station would deliver power and energy from the development. Assuming an overall plant efficiency of 89.4 %, the average annual energy output of the development is estimated to be 191 GWh per year. The operation of the overall Bay d'Espoir system for maximum benefit, with the Island Pond development in place, results in a decrease in output from the downstream plants of 6 GWh per year. Therefore, the net benefit derived from the addition of the Island Pond Development to the system is estimated to be 185 GWh per year. The annual firm energy output of the development was estimated at 155 GWh.

The study effectively upgraded the concepts and parameters as developed by the Pre-feasibility Study and no substantial changes in the previously proposed details were found necessary. The 1988 Study confirmed that the Island Pond Development is technically feasible.

Regulation studies and the optimization of the hydraulic parameters and costs for the canals and channels within the proposed development confirmed that no change in operating level in the Meelpaeg reservoir should be considered. Operated under the existing storage regime for the reservoir, an average net head of 22.69 m can be provided at the power complex. The average flow available at Island Pond, including local runoff, is 109.3 m^3/s. The flood routing capability of the Meelpaeg Reservoir would not be altered

by the addition of Island Pond. Floods on Island Pond would be routed back through the diversion canal into storage on the Meelpaeg reservoir without significant increase in the maximum flood level of the reservoir. The development would raise the normal water level on Island Pond between 3 and 4 meters from its original level.

Recommendations

The 1988 Study recommended that the following be carried out:

- A survey of access road and stream crossings;
- Surveys and subsurface investigations of the construction camp site and the Ebbegunbaeg freeboard dyke;
- A survey of the intake, penstock and powerhouse site, during the early stages of construction to accurately delineate sound rock surfaces;
- Further testing and inventory of the T-1 and T-2 deposits to confirm borrow areas and access requirements; and
- Further inquiries and analysis to determine if horizontal axis ('s') turbines could result in cost savings.

Island Pond/Granite Canal Re-Optimization and Cost Update Study, January 1997, prepared by AGRA Shawmont LTD. (1996 Study)

The 1996 Study was carried out to confirm whether "S" type turbines would be suitable at Island Pond, to further optimize the specific elements of each project, and to reevaluate the issue of one turbine versus two turbines and to update the capital cost estimates to reflect current (1996) prices.

Findings

The 1996 Study effectively updated the information on “S” type turbines and compared the relative costs of multiple “S” units to two Francis units at Island Pond. The conclusion reached was that the problems earlier experienced with large “S” units had not been effectively resolved and that multiple small units (minimum of four) would be required to replace two Francis units. However, it was shown that this was not cost effective and there would be unquantifiable technical concerns with the “S” units. It was decided that vertical axis Francis turbines would provide the best technical and economic installations at Island Pond and that one unit was more preferable than two units due to a lower overall capital cost.

The re-optimizations for energy and capacity resulted in a general increase in size for the elements considered. The plant capacity for Island Pond increased from 30 MW to 36 MW and the penstock diameter increased from 5.4 m with a two-penstock arrangement, to a diameter of 8.4 m with a one-penstock arrangement. The invert elevation of the diversion canal was raised from 258 m to 258.5 m. The average net head and average energy output decreased from the previous (1988) values as a result of the re-optimizations. The average net head decreased from 22.69 m to 22.35 m and the average annual energy output decreased from 191 GWh to 188 GWh.

The total duration of on-site construction for the project was reduced from 40.5 months to 38 months.

Recommendations

The 1996 Study made the following recommendations relative to Island Pond, which did not exclude those made in the previous 1988 report except for the type of units at Island Pond:

- One vertical axis Francis turbine was recommended for Island Pond;
- A plant capacity of 36 MW;
- An invert elevation of 258.5 for the diversion canal; and
- A penstock diameter of 8.4 m.

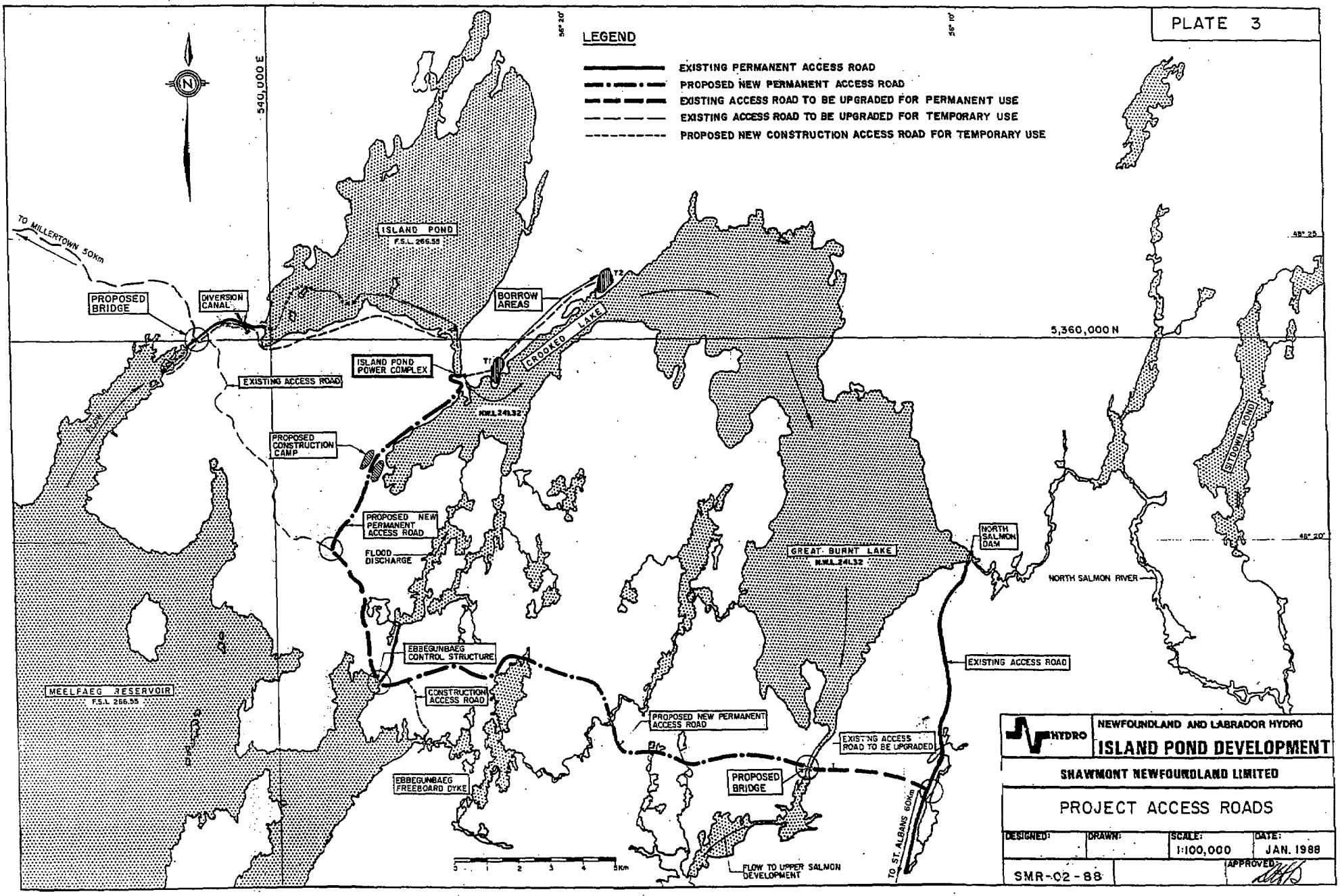
PLATE 3
LEGEND
EXISTING PERMANENT ACCESS ROAD
PROPOSED NEW PERMANENT ACCESS ROAD
EXISTING ACCESS ROAD TO BE UPGRADED FOR PERMANENT USE
EXISTING ACCESS ROAD TO BE UPGRADED FOR TEMPORARY USE
PROPOSED NEW CONSTRUCTION ACCESS ROAD FOR TEMPORARY USE
540,000 E
5,360,000 N
TO MILLERTOWN 50Km
ISLAND POND
F.S.L. 266.55
PROPOSED BRIDGE
DIVERSION CANAL
BORROW AREAS
CROOKED LAKE
ISLAND POND POWER COMPLEX
EXISTING ACCESS ROAD
PROPOSED CONSTRUCTION CAMP
PROPOSED NEW PERMANENT ACCESS ROAD
FLOOD DISCHARGE
EBBEGUNBAEG CONTROL STRUCTURE
CONSTRUCTION ACCESS ROAD
MEELPAEG RESERVOIR
F.S.L. 266.55
EBBEGUNBAEG FREEBOARD DYKE
PROPOSED NEW PERMANENT ACCESS ROAD
EXISTING ACCESS ROAD TO BE UPGRADED
PROPOSED BRIDGE
FLOW TO UPPER SALMON DEVELOPMENT
TO ST. ALBANS 60Km
GREAT BURNT LAKE
N.W.L. 241.32
NORTH SALMON DAM
NORTH SALMON RIVER
EXISTING ACCESS ROAD
STOCKS POND
HYDRO
NEWFOUNDLAND AND LABRADOR HYDRO
ISLAND POND DEVELOPMENT
SHAWMONT NEWFOUNDLAND LIMITED
PROJECT ACCESS ROADS
DESIGNED:
DRAWN:
SCALE: 1:100,000
DATE: JAN. 1988
APPROVED:
SMR-02-88