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1.0 INTRODUCTION

This Environmental Impact Assessment (EIA) is an evaluation of the effects that a low-head run-of-river hydroelectric project on Peace River at Dunvegan would have on the environment. The EIA is required under the Alberta Environmental Protection and Enhancement Act and has been prepared following the Terms of Reference (ToR) from Alberta Environment (AENV) (included as Appendix A).

The EIA is a supplement to an application to the Alberta Energy & Utilities Board (EUB) for authorization, under the Hydro Electric Energy Act, to build and operate a hydroelectric generating facility on Peace River at Dunvegan. The National Resources Conservation Board (NCRB) will also review the EIA. It is also a supplement to an application to AENV for a license, under the Water Act, for water power purposes.

The EIA presents the issues and concerns identified by the public, First Nations, provincial and federal governments and environmental non-governmental organizations (ENGOs), the results of specialist studies, potential effects and mitigation and the cumulative effects attributed to the Dunvegan Hydroelectric Project (the Project).

1.1 Background

Glacier Power Ltd. (Glacier Power), a wholly owned subsidiary of Canadian Hydro Developers, Inc. (Canadian Hydro) is proposing to build a 100 megawatt (MW) hydroelectric facility on the Peace River near Dunvegan, Alberta.

The Peace River flows through three major jurisdictional boundaries, namely, the Province of British Columbia, Province of Alberta and Wood Buffalo National Park. The majority of the hydroelectric power potential falls within Alberta’s jurisdictions.

Communities immediately adjacent to the Peace River include Fort St. John and Taylor in British Columbia and Dunvegan, the town of Peace River, Fort Vermilion and Ft. Chipewyan within Alberta.

Several First Nations communities and reserve land exists along the Peace River between the Project and the Peace–Athabasca Delta. The closest reserve to the Project is the Duncan’s First Nations near the community of Berwyn.

The Peace River is controlled by two hydroelectric facilities; the Shrum Generating Station at the W.A.C. Bennett Dam (Bennett Dam) and the Peace Canyon Dam (Peace Canyon), both in British Columbia. Construction of the Bennett Dam was completed in 1967, water storage in Williston Reservoir began in 1967 and normal operating procedures were started in 1972. Williston Reservoir has a volume of 70 million dam$^3$, equivalent to 1.5 to 2 years of flow at Hudson Hope, 20 km downstream from the Bennett Dam. The Shrum Generating Station contains 10 turbine units, each capable of producing 260 to 311 MW of power. The system is designed to operate with a minimum of five units at any one time, so that total outflows can range from 850 m$^3$/s to 1960 m$^3$/s. The system has a total generating capacity of 2730 MW.
The Peace Canyon Dam, completed in 1980, forms Dinosaur Lake near Hudson Hope, British Columbia. Williston Reservoir provides storage while the Dinosaur Lake functions as a run-of-river reservoir. These two dams operate together to generate 3430 MW of hydroelectric power.

Before regulation, the Peace River displayed seasonal flow patterns similar to other northern rivers dominated by snowmelt runoff (i.e., high spring and summer flows and low flows in late fall and winter). Bennett Dam has significantly affected the timing of these flows. Winter flows are now nearly five times higher than natural winter flows and flows during the early summer period are five times lower than natural flows, due to Williston Reservoir refilling. Tributaries downstream from Bennett Dam and Peace Canyon now have greater influence on the flow regime during summer months, but account for only 40 percent of winter flow at Dunvegan and 8 percent (because of Smoky River inflows) at the Town of Peace River. In the late summer and fall, when tributary flows are near base flow, and in many cases are dry, the hydrographs at downstream stations reflect closely the Bennett Dam releases. Fluctuations in dam release generally result in changes to flows at Dunvegan two days later and at the Town of Peace River three days later.

1.2 History of Proposed Hydroelectric Development at Dunvegan

Numerous studies have been carried out over the years to investigate hydroelectric potential at the Dunvegan Site. In 1977, the Alberta Hydro Committee completed feasibility studies of the Dunvegan Hydroelectric Power Site, immediately upstream from the Highway 2 bridge crossing of the Peace River at Dunvegan. These studies were commissioned according to Terms of Reference given by the Alberta Government in 1974. The purpose of these studies was to assess the engineering feasibility and environmental effects three development alternatives: low- (41 m), intermediate- (69 m) and high- (120 m) head dam structures with associated storage reservoirs. The high-head dam alternative would have a $23.9 \times 10^6$ dam$^3$ reservoir covering 518 km$^2$ and back water 250 km into British Columbia to Hudson’s Hope. The Dunvegan site was not considered suitable for development of large dam structures because of the difficult foundation conditions at the site. Therefore, the project was abandoned.

In 1998, Glacier Power initiated feasibility studies for the Project; a low-head, modular, run-of-river hydroelectric development that would minimize flooding and resultant environmental effects.

Conceptual plans and preliminary feasibility studies were done in December 1998 based on present regulated flow regime in Peace River. Subsequently, conceptual design engineering, environmental programs and public and First Nations information programs were implemented throughout 1999 and into 2000.

On June 19, 2000, Glacier Power submitted an EIA to AENV. At the same time Glacier Power submitted an application to the EUB and the NRCB to build and operate a 40 MW run-of-river hydroelectric project on the Peace River about 2 km upstream from the Dunvegan Bridge on Highway 2.

A Supplementary Information Response (SIR) Report was submitted in March 2001 responding to queries from Regulatory Agencies and the EUB and NRCB Joint Review Panel. The SIR report also described the updated design of the plant which increased its capacity to 80 MW. Public hearings were held in October 2002 and the EUB and NRCB Joint Review Panel announced their decision not to support the project in March 25, 2003.
The EUB and NRCB Joint Review Panel stated in their report that they saw (Decision Report dated March 25, 2003) that “significant uncertainty remains with respect to the relationship between the potential benefits and costs of the Project”, and that they were, “The Panel is also not convinced by the available evidence that there are reasonable opportunities to ameliorate or mitigate these potential negative effects could be satisfactorily mitigated.” The two issues that played a major role in the application being denied were:

- the understanding of the effects of the Project on the Peace River ice regime and, consequently, its effects on the Town of Peace River and the operations of the ferry at Shaftesbury
- the effect of the Project on fish resources in the Peace River

As the development of renewable, low impact electrical energy coupled with sensitive environmental design is a top priority for Glacier Power, and its parent company Canadian Hydro, it was felt that the concerns identified by the EUB and NRCB Joint Review Panel could be resolved by providing additional information on the Project. Glacier Power has been working to provide and compile this additional information in a new application since 2003. This has been accomplished through further project optimization, additional studies, cooperative agreements with stakeholders, and the development of specific monitoring, adaptation, mitigation, and compensation strategies. Since 2003, Glacier Power has put a substantial effort into developing a single, comprehensive ice model for the Peace River, in collaboration with independent experts in the field and interested stakeholders. Additional information has also been collected on fisheries resources as well as mitigation and compensation strategies. Refinements have been implemented to project design based on these studies. The cumulative results of the additional information gathered since 2003 are provided in the current applications to develop the Project.

Through discussions with equipment suppliers, it became evident that the capacity of the plant could be increased without affecting the design or size of the headworks structure and headpond, thus retaining the overall objectives with respect to environmental effects. As a result, the plant capacity has been increased to 100 MW and will generate approximately 600 GWh/annum while still operating as a run-of-river facility producing power from the flow of the river without storing water, and therefore without regulating or changing the flow regime downstream from the facility.

1.3 Scope of Project

The Project includes the construction, operation, decommissioning and reclamation of the following components:

- headworks – consisting of a powerhouse with approximately forty 2.5-MW turbine generator units connected side-by-side across the main channel and a crested, gated spillway structure to maintain a head differential of 6 m between the headpond water level and the tailwater
- headpond – consisting of a deeper, slower section of river behind the headworks to provide the head differential for turbine generator operation, extending from 20 and 26 km upstream depending upon river stage
- fish passage – consisting of fish passage structures to facilitate safe upstream and downstream fish passage
• boat lock – to accommodate river traffic
• 144-kV transmission line – to interconnect with ATCO’s 144-kV line approximately 4.3 km southeast of the Project
• access roads – which will be permanent roads to access both sides of the facility and river channel
• boat ramp – located upstream from the headworks

The project powerhouse and spillway part of the headworks will be within the existing wetted river channel. The headworks abutments, boat lock, upstream passage fishways and boat ramp will be on the banks, outside the present wetted channel.

1.4 Scope of Assessment

The EIA has been prepared according to the July 6, 2004 ToR (AENV 2004) and the environmental information requirements prescribed under the Alberta Environmental Protection and Enhancement Act (EPEA) and Regulations and the Canadian Environmental Assessment Act (CEAA) and Regulations. The EIA:

• assists the public and government in understanding the environmental consequences of the Project’s development, operation and reclamation
• assists Glacier Power in its decision-making processes
• presents impact predictions in terms of magnitude, frequency, duration, seasonal timing, reversibility and geographic extent
• discusses measures to prevent, mitigate or compensate for adverse effects and monitor environmental protection measures
• identifies residual effects and their significance including cumulative and regional development considerations
• discusses proposed mitigation measures, protection plans, monitoring and research programs and other follow-up actions related to proposed activities, environmental performance objectives and anticipated regulatory requirements
• forms part of Glacier Power’s applications to the EUB and NRCB

1.5 Public Consultation

Glacier Power has been carrying out public consultation on the Project with stakeholders since early 1999. The public consultation program has included open houses, formal public notices in newspapers, presentations and information sessions and communications with regulators, First Nations, Métis and ENGOs. Information gathered from the public consultation program has been used to identify environmental issues and help define the focus of the environmental assessment. Glacier Power’s public consultation program is discussed in detail in Section 6, Public and Aboriginal Consultation.