1.0 PROJECT INTRODUCTION AND OVERVIEW

1.1 EXECUTIVE SUMMARY

The Mayo Hydro Enhancement Project ("Mayo B" or "the Project") involves enhancements to the existing Yukon Energy Mayo hydroelectric facilities to increase power production. It comprises the construction of a new powerhouse and related facilities, as well as adjustments to the management of water on the Mayo River system. The Project has a planned in-service date of late 2011.

The Project is located in the Yukon interior, north of the Village of Mayo. The Project will add additional infrastructure to the existing Mayo Hydro facility downstream of Wareham Lake to increase generating capacity. The immediate Project **Construction Footprint Area** south of Wareham Lake is adjacent to the Silver Trail Highway. At a larger scale, the system enhancement will alter the managed water regime, notably at Mayo Lake and flows in the Lower Mayo River, within the **Project Study Region**. The entire project lies within the Traditional Territory of the First Nation of Nacho Nyak Dun ("NND"). The precise location of the each project component of the Project will be finalized upon completion of detailed engineering design.

The existing facility was built to supply electricity to the United Keno Hill mine at Elsa in 1951, as well as serve the communities of Mayo and Keno, and includes the following components:

- **Wareham Dam** – a 32 m high earthen dam which created Wareham Lake. The dam controls the lake levels within a licensed range. From the lake, water passes through an intake structure and a tunnel to the powerhouse.

- **Powerhouse** – located on the Mayo River, the plant has two generating units of approximately 2.7 MW each, which operate with 36 metres of 'head' or vertical drop between Wareham Lake and the existing generating station.

- **Mayo Lake Water Storage** – approximately 50 km upstream of Wareham Lake, the Mayo Lake dam provides the ability to control the level of Mayo Lake within a licensed range subject to minimum flow releases. Water released from the lake flows to Wareham Lake where it is used to generate power. The Mayo Lake dam is a six meter high rock-filled wood structure, which was entirely rebuilt in 1988 and 1989.

Mayo B includes the following components:

- A new **powerhouse** with installed capacity of approximately 10 to 12 MW, approximately 3.9 km downstream of the existing powerhouse.

- A new **penstock-canal system** that will divert water from the existing intake tunnel to the new powerhouse, comprising a new tunnel extension that conveys flow to a low pressure

"upstream" penstock that extends from the existing tunnel to a new canal (approximately 460 m); a surface-run canal (approximately 2,500 m); and a pressurized "downstream" penstock from the canal to the new powerhouse (approximately 800 m).

- A new **all-weather access road** to the new powerhouse from the existing YEC access road serving the current Mayo hydro facility.
- A new **distribution line** of approximately 1,700 m operating at 12.5 kV from the new powerhouse to existing YEC 12.5 kV distribution to provide station service power and communication to the new powerhouse.
- A new **transmission line** of approximately 3,600 m operating at 69 kV from the new powerhouse to the existing Yukon Energy transmission grid substation located near the existing Mayo Hydro Plant.
- **Temporary construction-related facilities** including a work camp for a peak workforce of 50-75 workers, lay down areas, a concrete batch plant, and related facilities.

Yukon Energy Corporation (Yukon Energy) is undertaking all required planning, consultation, environmental, engineering and other related activities in order to obtain authorizations and approvals necessary to allow for a decision to commence construction of the Project in 2010. At this time, Yukon Energy has made no final decision to proceed with the Project.

Yukon government and Federal government regulatory approvals and decisions are required before any construction activities may be undertaken; however these approvals and decisions may only be made after the required screening assessment by the Executive Committee of the Yukon Environmental and Socio-economic Assessment Board (YESAB) of this Project Proposal Submission (Project Proposal). Yukon Energy submits the Project Proposal in response to YESAB guides and the requirements set out pursuant to the *Yukon Environmental and Socio-economic Assessment Act* (YESAA).

Yukon Energy undertook a public involvement program in order to incorporate community input in the Project design and environmental assessment, and to meet the regulatory requirements for public consultation in an effective and meaningful manner, and as a standing corporate principle for good planning. This included involvement with NND, the Village of Mayo, the Mayo District Renewable Resources Council, residents of Mayo and the surrounding area, various territorial and federal government departments, and other interested parties. Public involvement in Project planning occurred over an eight month period in 2008-2009. Yukon Energy shared information about the Project, the ongoing studies to assist in the assessment of effects, and sought to address the concerns and interests of individuals and organizations. Yukon Energy intends to continue its engagement with stakeholders, particularly NND and others in the Mayo area, throughout the YESAB process and during Project implementation.

The Project is proposed to occur within an existing environmental and socio-economic setting that has seen substantial development and activity over a sustained period of time. Of particular note, a dominant

feature of the existing conditions arises from the presence and influence of the existing Mayo Hydro project. The facility was constructed in 1951 by the Federal government but has been owned and operated by Yukon Energy since 1987.

Yukon Energy focused the assessment of effects of the Project from a Valued Components (VCs) perspective. VCs are elements of the Project Study Region that are valued for environmental, scientific, social, aesthetic, or cultural reasons. VCs for the Project were determined in part based on the results of consultation activities with stakeholders. Environmental VCs included both aquatic and terrestrial items, including Chinook salmon, fall spawning fish (lake trout and whitefish), wetlands, and key wildlife species. Socio-economic VCs included components related to resource use (including traditional, domestic and commercial resource use); heritage resources; local and regional economy; and the social context that are of particular concern to individuals and communities in the region and that may potentially be affected by the Project. Cumulative effects were fully considered as an integral part of the effects assessment process. The assessment process was completed based on data previously available, as well as Mayo B specific field studies, and Traditional Knowledge and local knowledge collected during the study process.

The Project, including mitigation measures set out in the Project proposal, is not expected to cause any likely significant adverse environmental or socio-economic effects. This conclusion reflects careful consideration of the Project design as well as the consideration of mitigation measures that reduce or eliminate potential adverse effects. Some residual effects (e.g., the physical presence of the facilities result in an altered landscape and other changes for as long as the facilities are in place) are anticipated, but are not expected to be significant based on criteria relevant to the YESAB assessment.

The Project will also have positive environmental and socio-economic effects in a variety of areas. Notably, the project has the potential to provide for increased renewable power being made available in Yukon and to displace diesel generation emissions. This is consistent with The *Yukon Government Climate Change Action Plan* and the *Energy Strategy for Yukon*, both of which note that development of renewable generation supports government objectives. The plan and strategy set reduction of greenhouse gas emissions as a priority. The *Yukon Government Climate Change Action Plan* identifies renewable resource development, including hydro, as a mitigation strategy to help reduce or delay global warming. Other positive effects include the potential for local jobs and business activity during the two-year construction period, and an anticipated material opportunity for NND to participate in the project financing.

1.2 PROPONENT INFORMATION

Yukon Energy is the Project Proponent.

Yukon Energy, a public utility, is owned by the Yukon Government through the Yukon Development Corporation (a Crown Corporation), and is subject to rate regulation by the Yukon Utilities Board, under the *Public Utilities Act.* Yukon Energy owns and operates the 138 kV WAF and 66/69 kV MD transmission

grids as well as over 90% of the electric generating resources on those grids; it is also the electric utility with primary responsibility for planning and development of new generation and transmission facilities in Yukon.

Yukon Energy has installed generation capacity of approximately 120 MW. Of this, 75 MW is installed capacity at three hydro facilities: Whitehorse, Aishihik, and Mayo. A further 0.8MW is installed wind generation. The remainder is installed diesel generating capacity. In addition to hydro generation, YEC owns and operates the 138kV Whitehorse Aishihik Faro grid and the 69 kV Mayo Dawson grid. Yukon Energy's wholesale customer, YECL, distributes power to 89% of Yukon retail customers, while YEC distributes power to the other 11% (about 1,900), located primarily in Dawson City, Mayo, and Faro.

Yukon Energy management reports to a Board of Directors through the President. Final approval to proceed with the Mayo Hydro Enhancement Project is subject to the approval of the Board of Directors and the territorial Minister responsible for Yukon Energy.

The designated contact for the YESAA assessment and subsequent licensing of the project is Hector Campbell, Yukon Energy's Director, Resource Planning & Regulatory Affairs.

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1.3 PROJECT BACKGROUND

The existing Mayo Hydro facility, with an installed capacity of approximately 5.4 MW, was built by the Northern Canada Power Corporation in the 1950s to supply power to Mayo and the United Keno Hill Mine. Since the closure of the Keno Hill mine in 1988/89, the plant has been operated below its full capacity. The completion of the Mayo-Dawson transmission line in 2003 resulted in a substantial increase to the load served by the existing facilities, but the facilities continue to operate below the maximum capability of the plant.

The Mayo B project concept dates back to 1968, when the facilities were still owned and operated by the Northern Canada Power Commission (NCPC). The project was investigated a number of times in the intervening years under various concepts and layouts. The current round of investigations arise from the Yukon Energy 20 Year Resource Plan, 2006-2025, and related planning activities, which identified the project as a potentially attractive enhancement to existing hydro generation.

The proposed additions to the current Mayo system include the installation of a new powerhouse approximately 3km downstream from the existing powerhouse at Wareham lake, and a water conveyance system to divert water from the existing intake to the new powerhouse, as well as other ancillary

infrastructure (such as an all-weather access road and a distribution line). The Project also includes revision to the parameters within which Yukon Energy manages water on the system. Specifically, the Project incorporates a revision to the range within which Yukon Energy is permitted to manage Mayo Lake, as well as implementation of new parameters for water management at Mayo Lake and the Lower Mayo River.

Planning activities for the Project that have been undertaken to date include a public involvement program with NND, local stakeholders, government, and broad communication with Yukoners. Details on the public involvement program are set out in Chapter 4.

1.4 PROJECT PURPOSE

By 2011 or 2012, Yukon Energy expects to need additional renewable power to help serve system-wide loads, and to ensure diesel used to generate electricity is minimized. This load growth reflects expected growth of existing non-industrial loads on each grid (residential and general service), expanded industrial loads currently forecast, and potential new mine loads. By 2012, absent new renewable power supplies, material baseload diesel generation requirements are forecast.

In 2007/08, Yukon Energy identified priority near-term renewable generation development opportunities to enhance its existing hydro capabilities.

Mayo B has been identified as the largest single near-term renewable project opportunity (approaching 40 GWh/yr of ultimate incremental hydro generation) and the least risky timeline for in-service between late 2011 and late 2012. Mayo B will develop new hydro generation without requiring a new dam and is expected to be economic relative to diesel generation alternatives. However, to keep its costs and risks to Yukon ratepayers within acceptable bounds (e.g., more in line with B.C. green market power purchase costs), government infrastructure funding was also determined to be required.

1.5 REQUIRED AUTHORIZATIONS AND REGULATORY APPROVALS

The Project is subject to a screening level assessment by the Executive Committee of YESAB, in accordance with sections 25(a) and 26 of Schedule 3 of the *Assessable Activities, Exceptions and Executive Committee Projects Regulations* as the Project will involve construction and expansion of a hydroelectric generating station with a production capacity of 5 MW or more.

Subsequent to the YESAB Executive Committee screening, review of the Project will be required by the Yukon Water Board under section 6(1) of the Yukon *Waters Act* due to the need for a new or amended Class A Water Licence for the Project.

Table 1-1 lists the regulatory permits and approvals that have been identified as being potentially required for the Project.

Table 1-1
Regulatory Authorizations Required for the Project

Activity	Authorization Required	Act or Regulation
Water use or deposit of waste in water	Water Use License	*Waters Act, Water Use Regulations*
Harmful alteration, disruption or destruction of fish habitat; destruction of fish	Fisheries Act Authorization	*Fisheries Act (Sections 32 and 35(2)); Fishery (General) Regulation*
Work, build or place in, on, over, under, through or across any navigable water	Review for possible exemption, if not exempted then file Application for an Approval of Proposed Works	*Navigable Water Protection Act Territorial Lands (Yukon) Act, Lands Act, Land Use Regulation*
Use of more than 50 kg of explosives on Commissioner's land in any 30-day period	Land Use Permit	*Territorial Lands (Yukon) Act, Lands Act, Land Use Regulation*
Temporarily using or occupying Commissioner's Land		
Construction of a trail or road		
Clearing or installing a utility right-of-way		
Permission to obtain gravel/sand from a quarry	Quarry Permit	*Territorial Lands (Yukon) Act, Quarry Regulations, Lands Act*
Burn refuse (wood)	Burning Permit	*Forest Protection Act, Forest Protection Regulation; Territorial Lands (Yukon) Act*
Tenure for land lease or agreement of sale, or other disposition	Application for Land	*Territorial Lands (Yukon) Act, Territorial Lands Regulation, Lands Act, Lands Regulations*
Construction of buildings outside a municipality	Building Permit	*Building Standards Act, Building Standards Regulation*
Gas Piping	Gas Installation Permit	*Gas Burning Devices Act*
Use of propane gas in a gas burning device		
Electrical work	Electrical Permit	*Electrical Protection Act; Canadian Electrical Code*
Plumbing	Plumbing Permit	*Building Standards Act, Building Standards Regulation*
On-site sewage disposal system	Permit to install a sewage disposal system	*Public Health and Safety Act, Sewage Disposal Systems Regulation*

Activity	Authorization Required	Act or Regulation
Operating a food premise	Permit to Operate a Food Premise	*Public Health and Safety Act, Eating or Drinking Places Regulation*
Supply of Potable water	Must meet the Health Criteria under the Guidelines for Canadian Drinking Water Quality	*Public Health and Safety Act, Drinking Water Regulation*
Operation of a solid waste incinerator	Air Emissions Permit	*Environment Act, Air Emissions Regulations*
Handling, disposal, generation or storage of special (hazardous) wastes	Special Waste Permit	*Environment Act, Special Waste Regulations*
Explosives Storage and Use	Permit of Use of Explosives; Explosives Magazine Permit; Blaster's Permit	*Explosives Act*
Oversize trucking	Over-dimensional or Over-weight Vehicle Permits (single trip or multiple trip)	*Highways Act, Highways Regulation*
Transport of dangerous goods/waste	Permit for transport of dangerous goods	*Dangerous Goods Transportation Act, Dangerous Goods Transportation Regulations*
Erect a sign within highway right of way	Sign Permit	*Highways Regulation*
Fish Research and Surveys	Fisheries Permit	*Fisheries Act, Fisheries (General) Regulations*
Collection of fish	Licence to Collect Fish for Scientific Purposes	
Search for and research at archaeological and palaeontological sites	Archaeological Sites Regulations Permit	*Historic Resources Act, Archaeological Sites Regulation*
Scientific and social scientific research in the Yukon, including studies connected with environmental assessments	Scientists and Explorers Permit required for non-resident researchers in the Yukon and optional for residents	*Scientists and Explorers Act*
Work within 4 km of aerodrome property	Transport Canada Obstacle Clearance Form	*Canadian Aviation Regulation TP 312 Standards and Recommended Practice*

1.6 ALTERNATIVES TO THE PROJECT

The proposed Project comprises a unique opportunity to enhance existing renewable generation by increasing the output available from assets already in service. In this regard, the project is consistent with other major Yukon Energy projects undertaken or underway as part of its long-term resource planning, such as the installation of a third turbine at the Aishihik facility (now underway, and targeted for in-service in 2010) and the Carmacks-Stewart Transmission Project (with Stage 1 now in-service, and Stage 2 under active planning). The Mayo B project is the largest single enhancement available (in terms of energy benefits) to Yukon Energy's existing hydro generating facilities.

Outside of enhancements to existing hydro facilities, renewable power generation for northern (i.e. has a wintertime electrical peak) climates can be pursued from only a limited number of sources. A thorough review of Power Resource Technology Options is provided in Appendix A to **Yukon Energy's 20 Year Resource Plan 2006-2025** ("20 Year Resource Plan"). A copy of the summary overview of the 20 Year Resource Plan is provided in Appendix 1A. Each of the generation technologies of notable promise (with respect to ability to effectively serve loads typical of Yukon) are under active investigation by Yukon Energy, notably geothermal, as well as further wind generation. Neither of these technologies, however, is an alternative to the Mayo B project at this time, and each can be developed in future to complement the Project. Specifically, geothermal generation is not an alternative as it remains in exploratory stages, and wind does not offer the same power characteristics as hydro enhancements (e.g., the type and degree of firmness provided by the Mayo B Project).

Outside of enhancements to existing facilities, a number of utility "greenfield" hydro sites and alternative existing hydro project enhancements have been reviewed by Yukon Energy since 1987, and by NCPC or others prior to 1987. In 2007, following the Yukon Utilities Board review of the 20 Year Resource Plan, Yukon Energy initiated an update to the studies of hydro sites and enhancements previously identified as relatively promising, in the range of 20-50 GW.h per year (subsequently expanded to 50-100 GW.h per year). The Executive Summary from this Concept Phase Study is provided in Appendix 1B, indicating estimated capabilities and costs for the various options, excluding costs of transmission (which can be material for greenfield sites). Coming out of the study, Yukon Energy proceeded with planning activities on a series of enhancements to existing hydro facilities, of which Mayo B is the largest and first to proceed. No greenfield sites were considered to be competitive on cost and timing factors to Mayo B.

1.7 SUBMISSION ORGANIZATION AND CONTENT

The project Proposal has been prepared so as to follow the *Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions (v. 2005.11)* (Proponent's Guide) in structure and content in all materials respects. As the Proponent's Guide describes in general terms the form of Project Proposal submissions, it has been applied in this document so as to reflect the specific characteristics of the Project.

The following outlines the chapter organization of this Project Proposal:

- **Chapter 1:** Project Introduction and Overview
- **Chapter 2:** Project Location
- **Chapter 3:** Assessment Approach
- **Chapter 4:** First Nations and Other Public Consultations
- **Chapter 5:** Environmental and Socio-Economic Scan
- **Chapter 6:** Project Description
- **Chapter 7:** Environmental and Socio-Economic Effects Assessment
- **Chapter 8:** Monitoring and Follow-up Programs
- **Chapter 9:** Acknowledgement & Certification
- **Chapter 10:** List of Acronyms, Glossary & References