DILLON CONSULTING

NB POWER

Social Impact Comparative Review

The Mactaquac Project (Final)

August 2016

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Executive Summary

NB Power is in the initial stages of developing and evaluating options to address the end-of-life considerations for the Mactaquac Generating Station. Currently, NB Power is undergoing assessments of the three options:

- Option 1, Repowering: Refurbish the Station by constructing a new powerhouse, spillway, and other components, followed by the removal of the existing concrete structures at the Station.
- Option 2, Retain the Headpond (No Power Generation): Build a new concrete spillway and maintain the dam as a water control structure without power generation, followed by the removal of the existing concrete structures at the Station.
- Option 3, River Restoration: Remove the Station and enable the river to return to a free-flowing state.

This Social Impact Comparative Review (SICR) is a high level overview of key social issues associated with the three options. The draft SICR was prepared as a discussion paper to facilitate dialogue with New Brunswick residents and ultimately to feed into the Public Engagement Process. This final document reflects the input received during the engagement process.

Social Issues were defined as those project issues that relate to people as opposed to the natural biophysical environment. A preliminary list was developed based on a review of secondary information sources (including documentation prepared in support of the Comparative Environmental Review process) and supplemented with specific stakeholder consultation.

Two general categories of key social issues emerged:

1. social issues related primarily to construction activities; and
2. social issues related to the primarily to drawdown of the headpond as proposed under Option 3.

Those social issues associated primarily with construction activities included:

- nuisance effects (noise, vibration, dust, odour);
- transportation effects (access, traffic, safety, road wear);
- community services, infrastructure and housing;
- land acquisition; and
- employment, expenditures and businesses.

The effects associated with these issues will be greatest in scale for Option 1, reflecting the longer construction period and more complex construction activities. The effects associated

with Option 2, are anticipated to be generally similar to Option 1, but lower in scale reflecting the shorter construction schedule of seven years compared to ten years. Demolition activities associated with Option 3 will be generally of lower scale than Options 1 and 2, reflecting the shorter demolition/decommissioning period of two years and the absence of construction activity.

Those social issues identified that related primarily to the headpond drawdown included:

- community identity;
- changes to recreational uses (boating, parks, camping, beaches, trails);
- viewshed changes;
- property value impacts;
- reduced river access;
- exposure of lands;
- intakes and outfalls impacts;
- changes to water supplies/private wells;
- ice damage to downstream infrastructure; and
- potential downstream flooding from ice jams.

While there are both positive and negative social effects associated with the drawdown of the headpond, the majority of those social issues identified that were limited to Option 3 were negative in direction. For recreational use, viewshed changes and exposure of lands due to the drawdown of the headpond , there were both positive and negative effects identified.

The presence of the headpond has shaped land use development and population growth in the area. The drawdown of the reservoir would have important ramifications for many headpond community residents. Generally, the drawdown of the reservoir will have varying degree of impacts along the length of the headpond depending on the scale of local change in water levels.

Stakeholder identification and public engagement are key requirements for an effective assessment of social impacts. A public engagement process is under development that will be rolled out in the fall of 2015 and continue into 2016. The SICR will be finalized following the integration of feedback received through the public engagement process. The overview of social impacts will be one of several inputs into the selection of a preferred option.

1.0 Introduction

New Brunswick Power Corporation (NB Power) is in the initial stages of evaluating options to address the potential end-of-life by 2030 for the Mactaquac Generating Station (MGS). The three options under consideration are:

- Option 1, Repowering: Refurbish the Station by constructing a new powerhouse, spillway, and other components, followed by the removal of the existing concrete structures at the Station.
- Option 2, Retain the Headpond (No Power Generation): Build a new concrete spillway and maintain the dam as a water control structure without power generation, followed by the removal of the existing concrete structures at the Station.
- Option 3, River Restoration: Remove the Station and enable the river to return to a free-flowing state.

The information collected and evaluated as part of this study, the Social Impact Comparative Review (SICR), along with other information generated as part of the overall assessments, will be used by NB Power in its decision-making regarding the future of the MGS.

The discussion presented in this report is based primarily on professional judgment following a review of the existing data and an understanding of the dynamics of the communities within the study area developed through a workshop with the Community Liaison Committee.

An initial draft of this report was prepared in August 2015. The document was prepared as a discussion paper tool to facilitate dialogue with the interested public. It was used to feed into the public engagement process, being led by NB Power, which occurred in the Fall of 2015 and continued through to the Spring of 2016.

Input received through the public engagement process has been incorporated into this final SICR document. As indicated in the Comparative Environmental Review (CER), a detailed account of the public input has been captured in a compendium entitled, “What Was Said”.

NB Power has, through additional investigations, evaluated the potential to rehabilitate the existing structure at the MGS. In the future, enhanced fish passage and an auxiliary sluiceway could be included in the overall design. This “life achievement option” is evaluated further in Appendix A of this report.

Following identification of a preferred option, additional comprehensive analyses of social impacts will be undertaken as part of the regulated environmental assessment approvals processes where applicable.

1.1 Study Scope

This study, commissioned by NB Power, is an evaluation of the possible societal effects of the three options. The information provided in this study should be considered in conjunction with the results of the Comparative Environmental Review (CER) to evaluate various facets of the environment whereas the CER considers the potential effects of the possible options on a number of social and economic factors.

This report is a social issues analysis, in that the potential effects on communities are evaluated temporally and spatially. Similar to the CER, this study is a comparison of the effects of the three options on the communities.

1.2 Approach

The report draws on the Comparative Environmental Review (CER) process being led by NB Power and Stantec Consulting Ltd. (Stantec). Much of the baseline information related to the SICR study area was collected by other project consultants as part of the CER process.

In addition to documents prepared in support of the CER, the SICR draws upon other project related technical reports and secondary information sources, including academic studies related to the Mactaquac Project. In addition to the readily available literature, professional experience and the CER, a consultation session was held with the established Community Liaison Committee for the MGS.

Based on these information sources, a preliminary list of key social issues was developed. Each of these issues is briefly described and compared for each of the three proposed options. A discussion of the possible influences on the community is provided, to place the issues into context. Social issues in this report are defined as those project issues that relate primarily to people as opposed to the natural biophysical environment. For the purposes of discussion, this study grouped construction activities (excavation, demolition, reconstruction of facilities, decommissioning) into one category, Project Phase. From the time the Project Phase is complete, the operation of the hydroelectric facility, maintenance of the dam, or maintenance of the river, is considered the Operation Phase.

Cultural and heritage resources, including paleontological resources, architectural resources and historic resources are considered in the CER report (Stantec 2015). First Nation issues are considered under a separate process led by Dillon Consulting Limited. Economic impacts have not been included in the scope of this study; the economic feasibility of the project is being evaluated by NB Power.

1.3 Study Area

The existing Generating Station is located at the confluence of the Mactaquac River and Saint John River in New Brunswick, approximately 15 km west of the city of Fredericton. The

headpond created by the Mactaquac Dam extends from the Generating Station to the town of Woodstock, approximately 96 km upstream along the Saint John River, covering an area of approximately 87 km^2.

The study area is defined here as the area likely to be most directly affected by any one of the three project options. This includes the area along both sides of the Saint John River (within 500m) extending upstream along the headpond to the Town of Woodstock as well as up Mactaquac Lake to the rural community of Zealand. The primary study area continues downstream of the Generating Station to the Town of Oromocto. This study area boundary is roughly adopted from other technical reports that define this area as the one that could be most greatly affected by the removal of the dam (Option 3).

Community, for the purposes of this study, is defined as an area in which people live and interact relative to a geographic location or feature. The larger community is identified as the area around the Mactaquac Headpond and Saint John River from the Town of Woodstock to the Town of Oromocto. The nearer community is identified as the area immediately around the headpond from the Village of Nackawic to the Mactaquac Dam and the immediate community is defined as the area adjacent to the Dam, including Keswick Ridge, Mactaquac Heights and Kingsclear First Nation.

Each of these communities has close ties to the river and headpond. They have grown in the last 40+ years to become areas which have close meaning and connection for residents. They are distinguished by their social fabric. Individuals in these areas are accustomed to particular traffic patterns, housing developments, recreational uses, natural systems and their ecological cycles, all which have matured and evolved to reflect the development of the headpond. The real sense of community has evolved and has developed where people identify and relate to the area as a place. The headpond itself, including its aesthetic value and local recreational opportunities, has also become linked to the surrounding communities' sense of local identity (Keilty, Sherren, Beckley, & Marmura, 2014). These characteristics and benefits also extend to non-residents who visit the area for tourism and recreation. More details regarding the communities near the headpond and contemporary land use descriptions are included in subsequent sections.

More detailed land use and socio-economic baseline information is provided in the CER.

2.0 Project Description

NB Power has identified three possible options for the station, which include the following:

1. Repowering the station with a new powerhouse and spillway and maintaining the existing earthen dam. This would most likely mean building a new powerhouse and spillway on the opposite side of the river from the existing ones.

2. Building a new spillway on the opposite side of the river from the existing ones, maintaining the earthen dam and decommissioning the existing concrete structures leaving the headpond intact. This option means there would be no ability to generate electricity at the station.
3. Restoring the river. This option means draining the headpond and removing the powerhouse, spillways and the earthen dam, allowing nature to bring the river back to a natural flow.

The following brief project description is provided as an overview of the three options under consideration.

2.1 Option 1 – Headpond - Repower

- Construction of a new approach and discharge channel, powerhouse, switchyard, fish passage facility and spillway and maintaining the existing earthen dam.
- Would extend the life of the station and allow for river control.
- New facilities would most likely be constructed on the south bank of the Saint John River while the existing facilities remain in operation.
- Taking existing concrete structures at the station out of service once new infrastructure is constructed and commissioned.

Construction of the channels, powerhouse and main spillway is anticipated to take six years. Following this, the construction of the auxiliary sluiceway and demolition of the existing structures is anticipated to take an additional five years. Therefore, the total duration to complete Option 1 is 11 years. For planning purposes, it is assumed that Option 1 will begin in 2024 and be completed in 2035.

FIGURE 1 - OPTION 1 – HEADPOND - REPOWER

2.2 Option 2 – Retain the Headpond

- Replace the two concrete spillways at the station to maintain the headpond and allow some flow control below the earthen dam.
- New spillway and fish passage facility on the south bank of the Saint John River.
- Construction of new approach and discharge channels.
- Taking existing concrete structures at the station out of service once new infrastructure is constructed and commissioned.
- No power generation with this option. An alternative source of renewable power would be required to compensate for the loss of generating capacity caused by the removal of the existing powerhouse.

Construction of the new channels and main spillway is anticipated to take five years. Following this, the construction of the auxiliary sluiceway and demolition of the existing structures is anticipated to take an additional four years. Therefore, the total duration to complete Option 2 is 10 years. For planning purposes, it is assumed that Option 2 will begin in 2024 and be completed in 2034.

FIGURE 2 - OPTION 2 – RETAIN THE HEADPOND

2.3 Option 3 – River restore – No power

- Decommission and dismantle and remove the powerhouse, main spillway, diversion sluiceway and associated infrastructure.
- Infilling of the existing power channel.
- Decommission and remove the earthen dam.
- Rehabilitate the site including areas upstream and downstream of the dam.
- Removal of some structures that were exposed by dewatering.
- Allow the Saint John River to revert to near natural flow conditions. The river would still be controlled in part by other generating stations upstream, but would flow freely through the former Mactaquac Generating Station site.
- Over time, the river channel would be expected to re-establish and the river would return to a natural flow.
- No power generation with this option. An alternative source of renewable power would be required to compensate for the loss of generating capacity caused by the removal of the existing powerhouse.

Decommissioning of the existing MGS and reclamation activities is anticipated to take seven years based on an accelerated drawdown scenario (two one-month scenarios). That is, the first phase of the drawdown is in the month period just before the spring freshet, and the second phase would occur in the fall of the same year. However, additional time may be required for drawdown of the headpond, and for rehabilitation and reclamation upstream and downstream

of the MGS. Depending on the nature and amount of sediment in the headpond, it may be possible to complete Option 3 faster than this. For planning purposes, it is assumed that Option 3 will begin in 2028 and be completed in 2035.

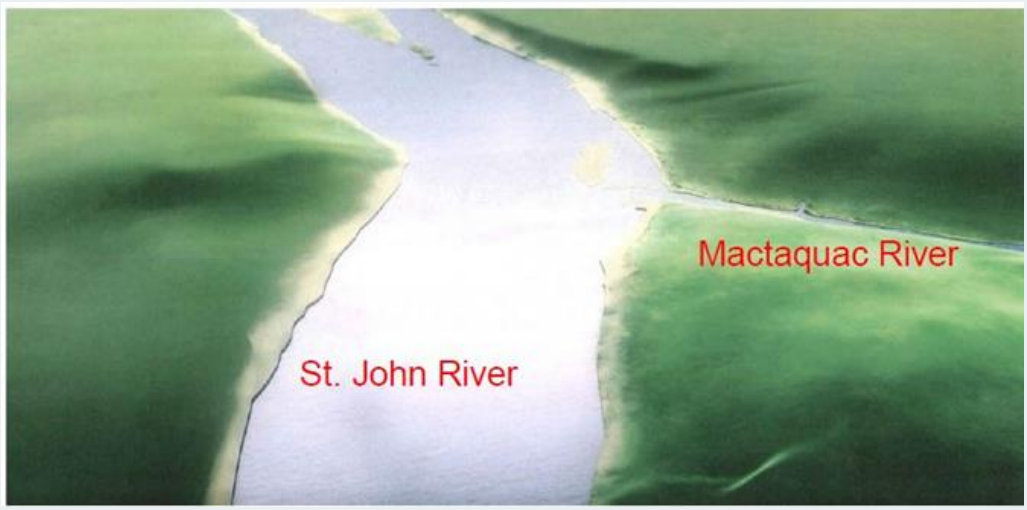

FIGURE 3 - OPTION 3 – RIVER RESTORE-NO POWER

The above project description and figures are drawn primarily from NB Power's project web site.

Each option will involve a number of very specific activities which will be executed over a period of time. For the purposes of this study, the phases, regardless of option are identified as the Project Phase and the Operations Phase. The Project phase is that part of the project which will see the majority of activity, whether construction, modification to existing facilities or demolition. The Operations Phase is from the end of the Project Phase in perpetuity.

3.0 Preliminary List of Social Issues

The following preliminary list of key social issues has been identified. It is anticipated that this list will be modified following input received through the upcoming public engagement process.

The issues are listed in alphabetical order for ease of reference. A brief description of the issue is given to highlight potential concerns or opportunities.

3.1 Access to Recreational Uses

There is a variety of recreational uses on and around the headpond. Several land uses such as parks and campgrounds also include water-related uses. In addition, the headpond is known for its recreational fishing. The headpond has greatly enhanced the area available for these recreational opportunities. Its existence provides recreation opportunities for residents and tourists.

Effect on Community

In Option 3, following drawdown of the headpond, the shallower depths of the Saint John River will likely limit the area available for recreational and commercial boating activity, including motor boating, house boating and yachting opportunities. The inlets and basins that were created by the headpond will no longer be available for most vessels. There will also be navigational restrictions resulting primarily from the significantly lower depth of the river channel. In some areas, particularly during low flow conditions, boating activity will be limited to canoeing and kayaking opportunities.

The larger community from Woodstock to Oromocto will realize these effects of a free flowing river. Similarly, the community around the headpond from Nackawic to the dam will be influenced by the river restoration. The effects will become evident as the drawdown occurs during the Project Phase and will continue through the Operations Phase.

Land-based recreation may also be disrupted during the Project and Operations Phases for Option 3. Recreation-related businesses, such as camp grounds and parks may be affected by the Project Phase, in terms of temporary disruptions, and during the Operations Phase if direct access to the river is not available.

While the recreational fishing for smallmouth bass and muskellunge may be negatively affected, other recreational fishing opportunities may result from the elimination of the MGS and return to a free flowing river. Over time, economic costs due to a decline in some recreational fish species due to habitat alteration could be offset by a net increase in productivity of other highly valued fish species (e.g., striped bass, Atlantic salmon) due to the removal of the dam, which is a known barrier to fish passage (CRI, 2011). Respondents

expressed interest in the potential reinstatement of the Atlantic salmon stock to support a recreational fishery. It should be noted that fish passage structures will be integral to the overall design in Options 1 and 2. A more detailed discussion of the potential ecosystem effects of enhanced fish passage is provided in the CER and in the Mactaquac Aquatic Ecosystem Studies (MAES).

It is anticipated that other forms of recreation will become available over time to take advantage of other new opportunities. For example, as a positive effect associated with Option 3, the dam will be removed as a navigational barrier which will allow for some vessels to travel the Saint John River from Beechwood Dam to the Bay of Fundy (subject to depth restrictions described above) which could create new recreational opportunities.

From a community perspective, many of the effects will be immediate and lasting. The length of time for new recreational opportunities to emerge is unknown.

All three options will have nuisance effects, such as noise, vibration and dust, during the Project Phase. During the Operation phase, effects to recreational opportunities, both positive and negative will be limited to Option 3.

3.2 Community Emergency Services, Infrastructure and Housing

It is anticipated that the influx of construction workers, for any of the options, will put an elevated demand on local community infrastructure and services, including emergency services, hospitals, schools, and housing. This elevated demand may lead to an immediate impact on existing services; however, with appropriate planning, this issue can likely be overcome and services can continue, uninterrupted. The creation of new infrastructure to support hydroelectric project workers has, in some cases, been a benefit to communities (International Energy Agency 2006).

Consequences of construction growth include increased employment and incomes, but where these are not matched by similar growth in infrastructure and services, there may be rapid inflation of housing and other living costs, followed by a rapid decline once the project is completed and construction workers and businesses leave the area (Cernea 1997).

At this time, there are no plans for establishing a work camp to accommodate the workforce. This may result in upward pressures on the housing market within the study area. Workers who relocate to the study area may decide to purchase homes in nearby communities including Fredericton, Woodstock and Nackawic. It is anticipated the local markets will respond to the forecasted increased demand for housing.

Effect on Community

Community emergency services including fire department and ambulance services will likely experience an elevated demand due to construction and demolition activities. To reduce demands on emergency services, appropriate emergency response training will be provided to

workers, including fire and medical emergencies. Medical assistance available on-site will also reduce demands on local emergency services. As such, the communities will not likely experience a significant reduction in service with appropriate planning.

The increased demands for housing may foster additional subdivision development in the community. While seen as a temporary disruption to the local community, generally development is viewed positively. The effect is expected to be realized for the duration of the Project Phase, with potential lasting effects throughout the Operation phase, should families find other work opportunities, once the Project Phase is complete.

All Options will interact with nearby community services and infrastructure. Demands on local community services and infrastructure will be likely most substantial with Option 1 followed by Option 2, reflecting the longer construction period and greater workforce requirements. With a peak labour force of up to 300 over a two or three year timeline, Option 3 will interact the least with community services and infrastructure public service and cause the least increase in demand.

3.3 Community Identity

A sense of place has developed over the last 40 years for the community around the headpond in particular, and for the larger community, with a population of approximately 100,000 people, from Woodstock to Oromocto. The headpond has become an area where people go to live, play and work. It is an acknowledged landmark as the second largest lake in New Brunswick. The settlement patterns around the lake and upstream and downstream have supported community units which are now proving to becoming desirable places to live as they offer more than just housing opportunities. The community structure is seen as being supportive with sufficient services being within easy access.

With the installation of the dam and the resultant flooding of the area, the Town of Nackawic was developed. Although originally a political decision to establish the papermill in the area, the community has since grown and now has clearly defined municipal boundaries.

The other community structure which has developed is the one immediately surrounding the headpond. Over the past 40 years the pattern of settlement has changed from agriculturally based to seasonal and permanent residential developments. This area, although not as clearly identified by distinct municipal boundaries, is a community where the residents interact and businesses operate.

For both community types the sense of identity and community is strong.

Effect on Community

While there is no effect anticipated to the community structures during the Project Phase of Options 1 and 2, there will likely be a loss of identity as a result of the drawdown in Option 3. The Town of Nackawic will likely experience the greatest loss of identity given its origins; it is

anticipated that this loss, however, can be offset by the local economy generated from the active mill.

Due to the dynamic nature of communities, it is anticipated that the areas will recover and reconfigure to find new opportunities and new ways to connect to their environment. The effect of lost identity may persist through to the Operations Phase, although it is anticipated that over time, the social fabric will be re-established, as a new normal settles. The time to recover from the initial loss requires more study as this is potentially a complex issue.

Through the consultation process, some thought was given to a new community structure which would be developed with river restoration as the area could become known for its recreational Atlantic Salmon fishing potential, should the stocks rejuvenate. The time frame and feasibility of this happening are unknown at this time.

This issue is limited to Option 3.

3.4 Employment, Expenditures and Local Businesses

Dam construction typically demands large amounts of unskilled and semi-skilled labour and relatively small amounts of skilled labour and has the potential to create considerable employment (Adams 2000). In addition to these direct jobs, employment will be generated indirectly (expenditures on inputs of goods and services required by the Project), or induced by further rounds of income expenditures by individuals and firms.

The existing economic sector for the headpond area is heavily centred around recreation, and recreational activities that are reliant on the headpond for their enjoyment. Other businesses also exist, including restaurants, convenience stores, as well as agricultural operations, to name a few.

Additional concern was expressed during the consultation phase for the potential for a boom-bust scenario where the sudden influx of workers could significantly boost the local economy and equally cripple the economy with a sudden departure at the completion of the project.

Effect on Community

Construction, demolition and decommissioning activities under all three options will result in substantial expenditures that will benefit the local and regional economies and thereby the greater communities. The Project Phase is expected to generate opportunities for several local area businesses. It should be recognized that the initial years of the Project Phase for all three options will see a rapid increase in expenditures and expenses. For local businesses, this will see an increased demand on services and products. It is anticipated that this effect will equalize itself over the length of time the Project Phase will take place for each option. The potential for a boom-bust scenario exists, however with foreknowledge and careful planning, significant effects can be mitigated. The potential positive effects on the economy could be appreciable.

There will also be negative economic effects to local businesses. Temporary disruptions to local businesses during the Project phase can be expected from traffic disruption, in particular.

There are a number of tourism and recreation business operators that would be negatively impacted with the drawdown of the headpond under Option 3. Commercial campgrounds, boating companies, and private marinas may be threatened at their current locations.

The immediate community will likely experience the greatest effect in terms of increased expenditures and expenses and thereby have a positive impact in the long term. Opportunities will arise for the near community around the headpond to also benefit from increased spending. Overall, increases in spending will be positive at the community level. All three options will allow for these opportunities.

Through the consultation comments were made with the effect of increased electricity costs perhaps negatively effecting economic development. This type of an effect would require additional study to attribute the potential for this to occur on electricity price increases from the project.

3.5 Exposure of Land/Islands

Under Option 3, following drawdown of the headpond, some 5,300 hectares of lands will be exposed. This will include lands on both sides of the headpond in addition to islands that were submerged during the creation of the headpond.

There are a number of potential social, economic, cultural, and traditional use values with these lands. At this time, the future use of these newly exposed lands is undetermined; opportunities for recreation, conservation, agriculture or development exist. During the public engagement sessions, these interests were expressed by adjacent landowners. The final determination of what can be done with the exposed land and the ownership thereof is outside of this report.

The exposure of these lands also raises the potential for the exposure of contaminated sediments. Once identified/characterized, these will be managed in accordance with regulatory requirements.

The management of safety risks associated with slope stability and submerged infrastructure are being assessed by NB Power and are outside the scope of this report.

FIGURE 4 - SNOWSHOE ISLAND

Photo Credit: PANB

Effect on Community

The drawdown of the headpond and the exposure of the submerged lands is perhaps one of the most intriguing issues associated with Option 3. There is considerable speculation from the public on the condition of the submerged lands and infrastructure which remained when the pond was originally created. The potential social effect of exposing these remnants may be significant particularly for those members of the community who are familiar with the area before the dam was installed. An often expressed comment during the consultation phase was why put families through the anguish again.

For the First Nations, the emergence of traditional lands will be dramatic. While the effect is anticipated to be positive, the recovery of the ecosystem to its natural state will take time. Elders of the community will remember the ceremonial importance of the area. The psychological effects require further study.

Another question often raised is the possible reinstatement of lands to previous property owners or for current adjacent property owners. Questions such as, how will this be done equitably, how much will it cost, can the land be used in the near term, etc., are commonly raised in general conversation. Addressing these issues will likely take time.

There may be limited effects to the area above Nackawic where the current river is anticipated to revert to its historic channel. Similarly, downstream of the dam, some property owners may realize effects of the reinstatement of the river. While these changes will be gradual and less pronounced to those from Nackawic to Mactaquac reach, they will, nonetheless, affect

property owners, users of the river and community members. Residents are concerned for the potential health effects in particular and also concerned over the potential smell from "rotting silt and debris". Additional concerns were expressed over the length of time for the exposed lands to "naturalize".

This issue is limited to Option 3.

3.6 Flooding due to Ice Jam Events

The construction of MGS has limited the movement of ice downstream which has effectively mitigated the effects of ice jams and associated flooding experienced along the river downstream of the dam in the past. In 2012, a state of emergency was declared up-river from the headpond in the Village of Perth Andover which resulted from the breakup and accumulation river ice and serves as an example of the damage that can be brought on by flooding. Close to one third of the village population needed to be evacuated with damage estimated to be $25 million (NBELG 2012). Flooding due to ice jam events, including information on the pre and post dam conditions, is explored in greater detail in Chapter 6 of the CER (Stantec 2015).

Effect on Community

The effects of ice jams will be realized downstream of the MGS to Oromocto and beyond and for the length of the operating period. There is limited planning and mitigation available should the river be restored to its pre-dam condition. The effect on the larger community will likely be periodic (i.e. in winter and during storm events) and can be significant. Emergency response planning can reduce the human safety risks.

The current benefit of the dam with respect to ice control cannot be overstated. It was recognized by some landowners downstream of the dam how the regulation provided by the dam has significantly enhanced the available agricultural lands and has gone a long way towards minimizing erosion. Permitting ice to travel through the river system in a natural state could potentially have negative impacts on the agricultural lands downstream of the existing station.

This issue is limited to Option 3.

3.7 Ice Damage Infrastructure

The presence of the MGS has served to control ice flows downstream of the dam. Option 3 would allow the free movement of ice, which could lead to infrastructure damage downstream of the dam. The area most at risk is in the Fredericton area approximately 16 km downstream of the station. This topic is explored in greater detail in Chapter 13 of the CER (Stantec 2015)

Effect on Community

The spatial extent of the effect will be from MGS to Oromocto as some infrastructure will be exposed to natural ice movements, not yet experienced. The effect of ice will continue throughout the life of the project and will likely require ongoing modifications to the infrastructure including design considerations for new structures. Through the consultation phase, comments were expressed regarding the inconvenience and concern for how this would be addressed.

This issue is limited to Option 3.

3.8 Intakes and Outfalls

A number of intakes and outfalls have been identified both upstream and downstream of the MGS. The headpond is also a source of water for agricultural irrigation purposes. The drawdown of the headpond may result in the stranding of some of these intakes. It is anticipated that modifications to these intakes will be required to ensure continued functionality.

The Kings Landing Historical Settlement, developed on the edge of the headpond will also realize impacts to its operation. In particular, several installations at the settlement draw directly from the headpond to operate. Similarly, AV Nackawic meets some of its water supply requirements by drawing from the headpond. In both cases, as example, the infrastructure must be modified to continue to be able to provide the basic requirements.

Wastewater outfalls have been identified for the Town of Woodstock, Woodstock First Nation, Grays Aqua, Town of Nackawic (2), AV Nackawic, Woolastook Park, Mactaquac Provincial Park and Centennial Park. In addition to the potential stranding of these outfalls, the ability for the receiving waters to safely assimilate wastewater discharges under the new flow regime and may require modifications to meet future discharge requirements.

Downstream of MGS intakes and outfalls may be affected by changing river channel characteristics or from deposition of sediments that are transported downstream. Instream infrastructure, including intakes and outfalls, is discussed in greater detail in Chapter 13 of the CER (Stantec 2015).

Effect on Community

The extent of the potential effect will be from Woodstock to Oromocto. It is expected, however, that through engineering design and planning during the Project Phase, this effect will be appropriately mitigated, for regulated infrastructure affected by a change in the headpond.

This issue is limited to Option 3.

3.9 Land Acquisition

While preliminary engineering design is ongoing, the construction footprint including staging/laydown areas, transportation corridors and disposal areas are anticipated to require the acquisition of private property. In light of the large scale expropriation that occurred during construction of the dam in the 1960s, expropriation is a matter of heightened sensitivity to area residents. For some land owners, the sale of their lands may be seen as a positive impact, assuming fair market value or a slight premium is provided for property acquisition. For others, expropriation could be seen as an incursion on their property rights. Efforts should be made minimize the level of involuntary expropriation.

Effect on Community

The immediate community, particularly adjacent to Kingsclear First Nation and the community of Kingsclear will likely be directly influenced by the need for land to support the project. The effect is for the duration of the Project phase and for those whose property was purchased or expropriated, the effect will be indefinite. The community will be directly impacted as the land uses will likely change dramatically. Community adjustments will take time and will likely result in realignment of family structures and community fabric. Land acquisition will be required for all three options with likely the most land required for Option 1 reflecting the larger construction footprint, followed by Option 2 and then Option 3.

Although considered to be an ancillary project, the new crossing location raised a number of concerns for local area residents. Assumed to be at the termination of Crock's Point Road, as indicated during the consultation phase, residents on this road expressed considerable concerns for their property and the need to adjust over the longer term to increased traffic. In addition, concern was expressed by Kingsclear First Nation over the potential economic impact to their gas bar and convenience store with the crossing being situated below the community.

These issues apply to all three options.

3.10 Municipal Water Supplies and Domestic Wells

Several municipalities and many residents that use the headpond for water may be negatively impacted by Option 3. A total of 692 groundwater well records were available in the NB OWLS database. Approximately 417 (60%) of these well records are for wells located within 300 m of the headpond. The drawdown of the headpond could interact with nearby private wells. Shallow wells and those closest to the existing headpond will be likely most at risk. Municipal water supplies connected with the river/headpond include those for Woodstock and Nackawic.

Effect on Community

A detailed discussion of the domestic water supply for properties along the headpond and the river is provided in Chapter 7 of the CER. Recognizing that the quality and quantity of potable water may be at risk with a drawdown of the headpond, considerable work has been done on

understanding the existing resource. Through the engineering design and planning portion of the project, these issues will be addressed to identify the appropriate mitigation to minimize the impact of the effect.

This issue is limited to Option 3.

3.11 Nuisance Effects during Project Phase

Nuisance effects from construction, demolition and decommissioning activities include noise, vibration, dust and odour. Anticipated to be most pronounced during peak periods of construction activity, these effects will be largely limited to the area around the construction zone. Atmospheric and acoustic effects are discussed in greater detail in Chapter 5 of the CER (Stantec 2015).

Effect on Community

All options are expected to have nuisance-type interactions during the Project Phase. Temporally the effects would be longest with Option 1, decreasing with the other options. Spatially, the effects are anticipated to be most pronounced in the immediate community, with particular influence on Kingsclear First Nation. Identified as potential negative effects on the local community, it is anticipated that mitigation will be applied to lessen the effect. Regardless, the continued operation of the construction sites and associated activities will have significant effects on the local residents, particularly Kingsclear First Nation. The proximity of the laydown area for all three options will have dramatic effects on the First Nation community, negatively influencing their daily lives.

Noise and vibration effects would remain in the local are, a not influencing the greater communities directly.

Odour and dust are anticipated effects arising during the drawdown of the headpond in Option 3. Dust will be limited to specific areas along the headpond while odour may be prevalent throughout the headpond. The length of time over which residents may experience odours is not clear and will vary depending on the rate of drawdown. The spatial extent of the effects is primarily from Nackawic to the MGS. Limited effects may be realized upstream of Nackawic on periodic bases.

All options are expected to have nuisance-type interactions during construction, demolition and decommissioning. The localized nuisance effects will be most pronounced with Option 1 reflecting the longer construction period and greater scope of construction activities.

Nuisance effects under Option 2 will be similar to Option 1 but with a shorter duration reflecting the shorter construction schedule. Noise, vibration, dust nuisance effects associated with Option 3 will be more limited and shorter in duration than Options 1 and 2.

3.12 Property Values

The landscape was significantly changed with the creation of the headpond with numerous residential dwellings and recreational properties built around the headpond since 1968. Homes have been constructed due to the attributes afforded by the headpond, including nearby access to recreational opportunities as well as scenic values. In the lower reaches of the headpond, prices for these homes are well above average for the area. As an example, in the summer of 2015, four houses were listed along Kellys Creek, ranging from $399,000 to $599,900 with a mean price of $512,000. One riverfront house in Prince William is listed at $950,000 (MLS 2015). For comparison, the average selling price for an executive two-storey home in Fredericton was $305,000 in June of 2015 (Royal LePage 2015). While home prices reflect a number of variables, including lot size, age of construction, construction quality, among many others, it is reasonable to assume that water access and water views are reflected in prices of many homes located adjacent to the headpond. A more detailed discussion of the property values evaluated between 2009 and 2013 is provided for in Chapter 12, Human Occupancy and Resource Use, of the CER.

Part of the appeal of the properties on the headpond is the concept of direct access to the waterfront. Although most properties have access, the ownership of the waterfront actually is with NB Power. Current owners of properties which abut the NB Power waterfront lot are granted access by way of a headpond licence .[1]

[1] "NB Power is the owner of the lands that comprise the submerged bed of the Mactaquac headpond ("NB Power submerged lands"). This land is owned by NB Power up to a surveyed elevation around the headpond ("NB Power perimeter lands"). The NB Power perimeter lands are located between the waters of the headpond and third party owned lots/properties around the headpond. As a result, those properties owned by landowners on the headpond, although appearing to be "waterfront", are actually not waterfront. NB Power requests that adjacent landowners make application for a headpond licence from NB Power in order to access and use the NB Power perimeter lands and the NB Power submerged lands." (NB Power pers comm)

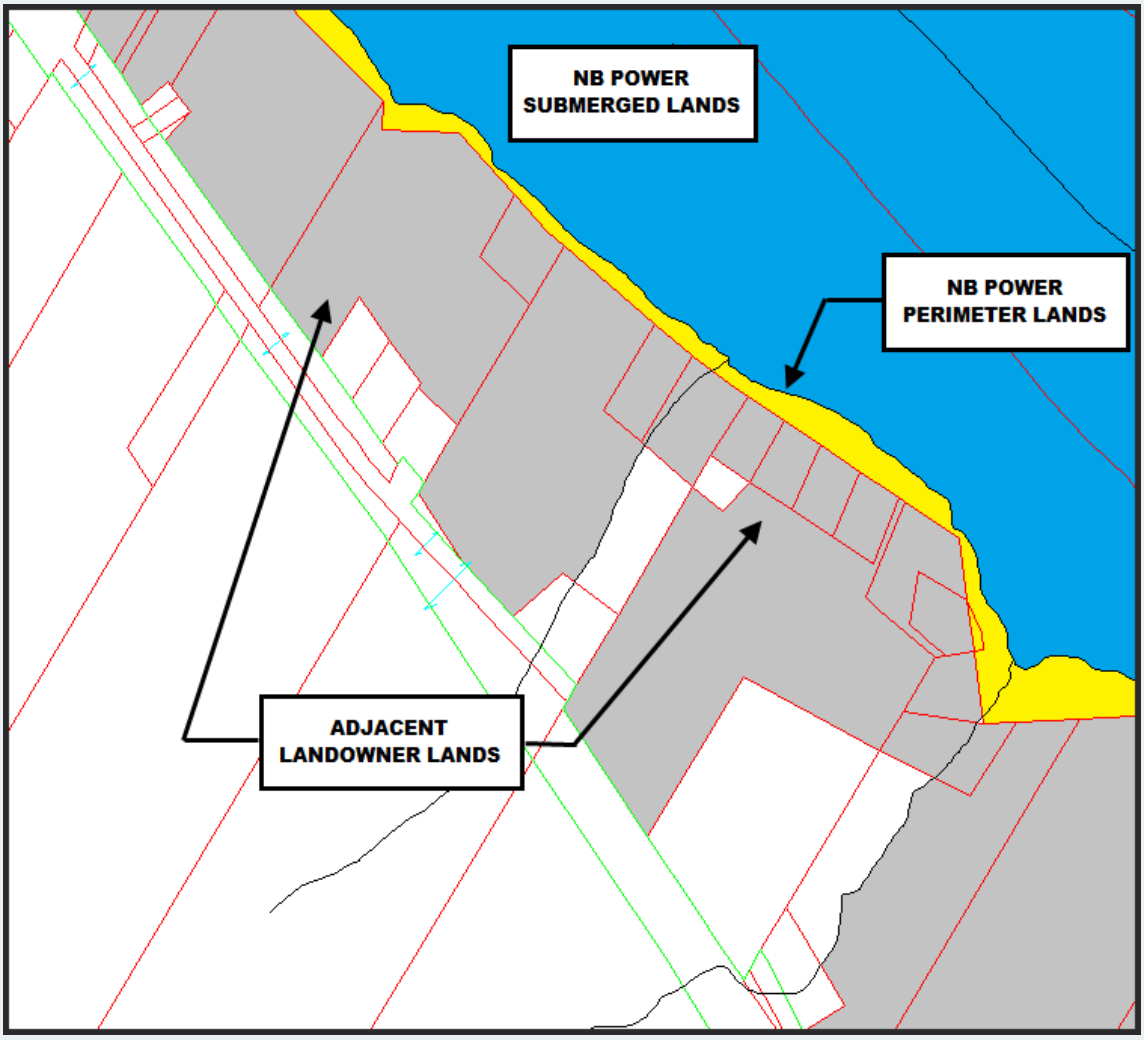

FIGURE 5 - NB POWER LANDS

Effect on Community

The value of property is dependent on many factors, most intangible. With continuous change in the economy, the value of property is highly variable. The potential effects of the Project Phase on property value or the potential effects of the operation of Option 3 on property value cannot be estimated with certainty at this time. It can be assumed, however, that properties with view planes over the water will have an inferred higher value while those properties no longer with apparent direct water access water will likely see a reduction in value. This reduction in value will logically be during drawdown and until the shoreline stabilizes and is revegetated.

A further consideration is the future ownership of the land currently submerged. For those property owners who lost their land to the development of the headpond, having the option to reinstate their original landholdings may be a benefit while for others it may be seen as a

negative impact. The treatment of this issue will require additional study as the societal effects may be significant, albeit localized.

As noted often during the consultation phase, property owners with land abutting the headpond are concerned over the continued value of their investment. Several purchased their properties with the intent that the value will increase over time and ultimately accommodate retirement needs.

The uncertainty over future property value is common to all three options.

3.13 River Access

Ample private and public access currently exists to the headpond. Many property owners in the vicinity of the headpond have access to the water across NB Power property via agreements with NB Power. The provision of limited access is planned as part of project design and will be part of the future property developments, subject to the applicable requirements.

Effect on Community

Public and private access to the river under Option 3 will likely be modified potentially affecting the larger community. New access points will be required. Temporally, the changes are short in duration, although they will be seen as an inconvenience. The community, likely over time, will adjust and create logical points of access for their continued use. Through the consultation phase, it was clear that many believed that unfettered river access will be limited. This was deemed to be a critical issue for those who perceive to have unrestricted access today.

This issue will be realized for the Project phase and Operation phase of Option 3.

3.14 Transportation Disruption

Disruption and changes to the existing transportation routes and patterns could occur from a number of project related activities. The effects include limited access to the river, delays associated with ongoing construction, damage to the existing and already taxed road infrastructure and safety concerns for the travelling public.

The primary measure to mitigate the disruption/loss of the current river crossing at the dam will be the construction of an alternative transportation link across the Saint John River. Under all three Options, access across the river will be maintained. Different transportation options are currently under consideration.

The design and construction of the preferred transportation link will be a separate project that will likely be led by NB Department of Transportation and Infrastructure. The undertaking will require a separate environmental approvals process independent of the Mactaquac Project, in advance of construction and demolition activities as part of the Mactaquac Project.

A construction camp is not currently proposed at the site and therefore many workers will travel to and from the construction/decommissioning site on a daily basis. Travel routes will vary with the majority anticipated to travel from the Fredericton area on both sides of the Saint John River. Workers are also anticipated to originate upriver from Nackawic, Woodstock and other areas. Increased construction commuter traffic coupled with construction vehicles can be expected to cause traffic delays for tourists, local residents and commercial trucking traffic.

There are safety concerns associated with the high levels of construction traffic. Workers and contractors will be expected to comply with safety policies and procedures developed to minimize safety risks. For all options, access to the construction site will be controlled and construction vehicles and equipment movements will be largely restricted to construction zones.

High volumes of heavy truck traffic are anticipated during construction and demolition/decommissioning activities. Approximate number of heavy truck movements over the duration of Options 1 and 2, range from 27,500 to 77,500 over the nine to eleven year construction period for Options 1 and 2, respectively (exp 2015). Anticipated volumes of heavy truck traffic will have detrimental effects to road integrity, in addition to effects on road congestion, safety, and noise.

Transportation effects are discussed in greater detail in Chapter 14 of the CER (Stantec 2015).

Effect on Community

The effect of changes to the established traffic patterns will likely be most noticed by the immediate community. Residents of the local community who utilize the dam to connect from highway 105 to 102 and vice versa will also be impacted by the scheduled relocation of the access. The effects will be immediate and are anticipated to continue for the duration of the Project Phase.

For the duration of the Operation Phase, with a new crossing, the existing traffic congestion on the dam caused by frequent maintenance will likely be minimized if not eliminated. With a more consistent access opportunity, more traffic may occur. This could lead to further opportunities as the community adjusts to these changes.

It is expected that there will be ongoing concern for safety to the travelling public with the scale of the project. Similarly, the concern for the integrity of the existing road infrastructure will be expressed. These issues will affect the local community for the duration of the Project phase. Additionally, through the consultation phase, concern was expressed about the ability for emergency vehicles to respond given the increased and congested traffic on existing roads.

Transportation impacts will be most substantial with Option 1 followed by Option 2, reflecting the longer construction period and greater scope of construction activities. Estimated traffic volumes expected with Option 3 are unknown but would be substantially lower.

3.15 Viewshed Changes

The headpond is generally recognized as a scenic asset that is enjoyed by local residents and tourists alike. Many dwellings, roads, camper sites, parks and trails around the headpond offer view planes of the headpond. As indicated property values are in part influenced by the viewshed; equally water views are important visual features with intrinsic value for many residents, tourists and recreational users in and around the headpond.

Much of the waterfront development that has occurred around the headpond, including both residential and recreational properties, has been influenced by the water views. The views of the headpond are not limited to waterside properties, with many homes in communities adjacent to the headpond offering headpond views (e.g. Mactaquac Heights in Keswick Ridge).

Effect on Community

The community affected will extend from Nackawic to the dam with some additional influences below the dam. Under Option 3, lands previously inundated will be exposed and many water views that currently exist will be temporarily replaced by headpond bed (sediment/mudflats) that will likely be naturally re-vegetated. It should also be recognized that many headpond views will be replaced by a free flowing river also with considerable aesthetic appeal. For some this view may in fact be preferable to the more lake-like headpond view.

It is difficult to quantify or describe the magnitude of the impact on the visual landscape under Option 3. There are innumerable view planes around the headpond and scenic quality is subject to individual values and preferences which will vary from one person to the next. While this issue is perhaps most apparent to Option 3 for Options 1 and 2 there will likely be a change in the view for a limited number of residents in the immediate vicinity of the station.

FIGURE 6 - WATER VIEW FROM A HOME ON KELLYS CREEK

4.0 Discussion

The Project Phase, as indicated in the discussion, will likely affect all communities identified. The immediate community, Kingsclear First Nation and the residents immediately adjacent to the project site in particular, will likely realize the greatest impact from the construction related activities. In particular, the direct effects of the construction work area and laydown area which is indicated to be immediately adjacent to the First Nation community will be felt for all three options. The duration of effect is longest for Option 1 and relatively shortest for Option 3.

For the community around the headpond, the construction activities which involve transportation will likely have the most impact. The relocation of the crossing will affect limited areas downstream. It will also affect those from around the headpond who have become accustomed to a particular traffic pattern. These effects are relatively short term in duration.

After the completion of the Project Phase, the Operations Phase for Option 1 and 2 will see limited if any direct effect on the communities around the headpond and the greater community from Woodstock to Oromocto. Kingsclear First Nation will likely experience the

greatest effect from construction and will also be able to see the opportunities from the changes. Generally, for Options 1 and 2, the status quo does not change after construction is completed. Additional community infrastructure (roads, emergency services) will likely be available to permit the community to continue its own economic growth.

As identified during the public consultation phase, there is support for retaining the Mactaquac facility to meet the obligation on NB Power to provide green energy. It appears that this support is provided in recognition of the potential associated costs.

It is evident that Option 3 will likely have the greatest impact, relative to the current situation, on not only the biophysical environment but equally the social environment. The Project Phase will, similar to the activities associated with Options 1 and 2, have more dramatic effects on the immediate community. Nuisance effects will be most prevalent. The change to the headpond will be most noticeable to all communities. For Kingsclear First Nation, the possible emergence of the islands, the societal effects will be significant. For others who live and play on and near the headpond, the effect will be dramatic and potentially negative.

Referred to as the second largest lake in New Brunswick, the effects of a complete drawdown will be lasting and will influence the community fabric. The economic effects could have significant influence on the societal values. It is anticipated that the community structure will be altered and a loss of identity will be most notable. Although these effects are expected, opportunities will be available for other forms of recreation. Changes will occur and in time a new community identity will likely emerge. The societal cost of this, however, has not been calculated and requires further study. It should be recognized that the identification of this potential issue is the first step towards possible mitigation.

The ability for communities to assimilate these changes is the measure of impact. Significant changes in community structure should be expected where some people, who can no longer accept the changes, will leave. Alternatively some will stay to create a new community. The societal effects of these changes require further study, as the degree of influence of each effect can result in different responses to recovery.

The Town of Nackawic will experience the possible transition of community identity. Conversely, Kingsclear First Nation will be able to reconnect with the river under Option 3. The value of community identity cannot be underestimated; the connection to place is an important societal value.

The headpond which was created over 40 years ago has become a destination for recreational pursuits as is evidenced by the campgrounds, beaches, trails and parks. The larger community has enjoyed many opportunities from this manmade waterbody. The effects of Option 3 will be realized by all recreational users, including tourists.

A comparison of the effects on the issues from the three options is provided in Table 1.

TABLE 1

Issue	Option	Effect	Duration
Access to Recreational Uses	3	Negative and Positive	Project Phase and Operation Phase
Community Emergency Services, Infrastructure and Housing	1, 2, 3	Negative	Project Phase
Community Identity	3	Negative	Project Phase and Operation Phase
Employment, Expenditures and Local Businesses	1, 2, 3	Negative and Positive	Project Phase and Operation Phase
Exposure of Land/Islands	3	Negative and Positive	Project Phase and Operation Phase
Flooding due to Ice Jam Events	3	Negative	Project Phase and Operation Phase
Ice Damage Infrastructure	3	Negative	Project Phase and Operation Phase
Intakes and Outfalls	3	Negative	Project Phase
Land Acquisition	1, 2, 3	Negative	Project Phase and Operation Phase
Municipal Water Supplies and Domestic Wells	3	Negative	Project Phase
Nuisance Effects during Project Phase	1, 2, 3	Negative	Project Phase
Property Values	3	Negative	Project Phase and Operation Phase
River Access	3	Negative	Project Phase
Transportation Disruption	1, 2, 3	Negative	Project Phase
Viewshed Changes	3	Negative and Positive	Project Phase and Operation Phase

5.0 Summary

The headpond is viewed as an integral part of the communities surrounding it. Over the last five decades, the presence of the headpond has shaped land development and population growth in the area. Many of the social issues listed above collectively contribute to headpond community character and the drawdown of the reservoir would have important ramifications for many headpond community residents and visitors.

The social issues arising from the drawdown and effective removal of the headpond are permanent and warrant a discussion distinct from construction, demolition and other decommissioning activities.

Communities are made of individuals who share different values and opinions; perception of viewsheds and recreational values will vary from one person to the next. Unlike biophysical impacts which are based on scientific fact, social impacts are more subjective and value based and therefore more difficult to assess. Following the implementation of the public engagement process, it is anticipated that a better sense of common community values and sentiments associated with the three options will emerge.

References

About Nackawic. (2012). Retrieved July 3, 2015, from http://nackawic.com/about_nackawic.htm

Adams, W. 2000. Downstream Impacts of Dams. Prepared for the World Commission on Dams Thematic Review 1.1: Social Impacts of large Dams Equity and Distributional Issues.

CRA. 2015. Report on Submerged Infrastructure - The Mactaquac Project. Prepared for NB Power. August 2015

Canadian Rivers Institute (CRI). 2011. The Saint John River. A State of the Environment Report. The Canadian Rivers Institute. University of New Brunswick.

Cernea, M. 1997. Hydropower Dams and Social Impacts: A Sociological Perspective. The World Bank,Washington, DC.

Hospitals in New Brunswick. (2015). Google Maps. Retrieved from https://goo.gl/maps/Frq0M

Dick, B. R. (1977). *Agricultural land loss in New Brunswick* (Masters Thesis). University of British Columbia).

exp Services Inc. (2014). *Transportation Background Study of the Mactaquac Generating Station and Surrounding Area*. Final Report.

exp Service Inc. (2015). *Transportation Study of Mactaquac Project Options*. Draft Report.

Forkey, N. S. (2007). "Thinking like a River": The Making of Hugh MacLennan's Environmental Consciousness. *Journal of Canadian Studies/Revue d'études canadiennes*, 41(2), 42-64.

Government of New Brunswick. (2015). *First Nations Communities*. Accessed on 24 June 2015 at http://www2.gnb.ca/content/gnb/en/departments/aboriginal_affairs/fnc.html

Hodge, G., & Robinson, I.M. (2007). *Planning Canadian Regions*. UBC Press.

International Energy Agency. 2006. Implementing Agreement for Hydropower Technologies and Programmes, Annex VIII, Hydropower Good Practices: Environmental Mitigation Measures and Benefits.

Keilty, K., Sherren, K., Beckley, T., & Marmura, H. (2014). *Rebuild, rewild or decommission: Consulting locals about the fate of the Mactaquac Dam, Canada, using floating focus groups*. Poster session presented at the International Symposium on Society and Resource Management, Hannover, Germany.

Kenny, J. L., & Secord, A. G. (2010). Engineering Modernity: Hydroelectric Development in New Brunswick, 1945-1970. *Acadiensis*, 3-26.

Multiple Service Listing. (2015). Taken from: http://www.realtor.ca/Residential/Single-Family/15899202/

Nalcor Energy (2009). Environmental Impact Statement. Lower Churchill Hydroelectric Generation Project. Volume III. Socio-Economic Assessment. February 2009.

NBELG. 20102. *Flood History Database*. Taken from: http://www.elgegl.gnb.ca/0001/en/Flood/Details/322auted

New Brunswick Power Corporation. (2014). *Preliminary Project Concept: Mactaquac Project, Mactaquac, New Brunswick*.

New Brunswick Public Schools. (2014, September 26). GIS shapefile, GeoNB. Retrieved from http://www.snb.ca/geonb1/e/DC/NBPS.asp

Public Archives of New Brunswick. Wilson Studio Fonds. P322-5134. Taken from: http://dalspatial.maps.arcgis.com/

Royal Lepage (2015). Taken from: http://www.royallepage.ca/realestate/info-and-advice/market-reports-and-surveys

Si, Z. (1993). *A Theoretical Framework for Social Impact Analysis with Special Reference to Population Relocation at the Mactaquac Dam Project on the Saint John River* (Doctoral dissertation). Dalhousie University, Halifax, Nova Scotia.

Stantec Consulting Ltd. (2015). Draft Comparative Environmental Review. The Mactaquac Project. Prepared for NB Power. August 2015.

Statistics Canada. (2008a). *Profile for Canada, Provinces, Territories, Census Divisions and Census Subdivisions, 2006 Census* (No. 94-581-XCB2006001). Statistics Canada. Retrieved from http://www12.statcan.gc.ca/

Statistics Canada. (2008b). *Profile for Designated Places, 2006 Census* (No. 94-581-XCB2006008). Statistics Canada. Retrieved from http://www12.statcan.gc.ca/

Statistics Canada. (2012a). *Census Profile - Age, Sex, Marital Status, Families, Households and Dwellings for Canada, Provinces, Territories, Census Divisions and Census Subdivisions, 2011 Census* (No. 98-312-XCB2011006). Statistics Canada. Retrieved from http://www12.statcan.gc.ca/ Statistics Canada. (2012b).

Census Profile - Age, Sex, Marital Status, Families, Households, Dwellings and Language for Designated Places, 2011 Census (No. 98-314-XCB2011013). Statistics Canada. Retrieved from http://www12.statcan.gc.ca/datasets/

Statistics Canada. (2012c). *Focus on Geography Series, 2011 Census* (No. 98-310-XWE2011004). Ottawa: Statistics Canada. Retrieved from http://www12.statcan.gc.ca/census-recensement/2011/

Thrive Consulting. (2015). *A Social Ecological History of the Saint John River Watershed: With particular emphasis on New Brunswick and the Mactaquac Dam Region*. Draft report.

Appendix A

Addendum: Life Achievement Option

DILLON CONSULTING

NB POWER

Social Impact Comparative Review

The Mactaquac Project
ADDENDUM – Life Achievement Option

August 2016

Table of Contents

Executive Summary

New Brunswick Power Corporation (NB Power) has evaluated three options which include repowering, retaining the head pond without power, and river restoration to address the end-of-life considerations for the Mactaquac Generating Station (MGS). Through the course of study and evaluation other options have been identified. Referred to as Life Achievement, NB Power is considering a process by which the life of the facility can be extended to 2068 through in situ reconstruction. This report is to be read as an appendix to the already released Social Impact Comparative Review (SICR).

Social Issues were defined as those project issues that relate to people as opposed to the natural biophysical environment. A preliminary list was developed based on a review of secondary information sources (including documentation prepared in support of the Comparative Environmental Review process) and supplemented with specific stakeholder consultation.

In this appendix, the key social issues identified in the first report are evaluated against the fourth option. The social issues relate primarily to the construction activities and include:

- nuisance effects (noise, vibration, dust, odour);
- transportation effects (access, traffic, safety, road wear);
- community services, infrastructure and housing;
- land acquisition;
- flooding downstream; and
- employment, expenditures and businesses.

1.0 Introduction

NB Power has evaluated three options to address the end-of-life potential for the Mactaquac Generating Station (MGS). The three options are:

- Option 1, Repowering: Refurbish the Station by constructing a new powerhouse, spillway, and other components, followed by the removal of the existing concrete structures at the Station.
- Option 2, Retain the Headpond (No Power Generation): Build a new concrete spillway and maintain the dam as a water control structure without power generation, followed by the removal of the existing concrete structures at the Station.
- Option 3, River Restoration: Remove the Station and enable the river to return to a free-flowing state.

Following further evaluation, NB Power has identified a fourth option which would extend the life of the facility through maintenance or refurbishment of components affected by Alkali Aggregate Reaction (AAR). In addition, a new fish passage structure could be constructed as well as an auxiliary sluiceway. These additional structures would be implemented at some point in the future.

More detail on the four options is provided in the Comparative Environmental Review (CER) and the appendix to the CER.

The discussion presented in this report is based primarily on professional judgment following a review of the existing data and an understanding of the dynamics of the communities within the study area based on information obtained through consultation with the Community Liaison Committee. Similar to the findings in the Social Impact Comparative Review, this document provides a high level review.

Following identification of a preferred option, additional comprehensive analyses of social impacts will be undertaken as part of the regulated environmental assessment approvals processes, where applicable.

1.1 Study Scope

This study, commissioned by NB Power, is an evaluation of the possible societal issues of the fourth option on the local area of the headpond and downstream of the project area, and where relevant, on the people of New Brunswick. The information provided in this study should be considered in conjunction with the results of the Comparative Environmental Review (CER) and the associated appendix to evaluate various facets of the environment.

1.2 Approach

Similar to the development of the SICR, the report draws on the Comparative Environmental Review (CER) process being led by NB Power and Stantec Consulting Ltd. (Stantec). Much of the baseline information related to the SICR study area was collected by other project consultants as part of the CER process. The information obtained for this portion of the study has been derived from the appendix to the CER and from direct discussions with NB Power.

Based on these information sources, a preliminary list of key social issues was developed. The fourth option will be evaluated relative to each of these social issues and only those which apply will be reported on in this report. As with the approach in the development of the SICR, a discussion of the possible influences on the community is provided, to place the issues into context. Social issues in this report are defined as those project issues that relate primarily to people as opposed to the natural biophysical environment. Economic impacts have not been included in the scope of this study; the economic feasibility of the project is being evaluated by NB Power.

1.3 Study Area

The existing generating station is located at the confluence of the Mactaquac River and Saint John River in New Brunswick, approximately 15 km west of the City of Fredericton. The headpond created by the Mactaquac Dam extends from the Generating Station to the town of Woodstock, approximately 96 km upstream along the Saint John River, covering an area of approximately 87 km^2.

The study area for this report is defined as the area likely to be most directly affected by the fourth project option. This includes the area along both sides of the Saint John River (within 500m), which will be referred to as the immediate community and extending downstream to the Town of Oromocto, which will be referred to as the regional community.

More detailed land use and socio-economic baseline information is provided in the CER.

2.0 Project Description

NB Power has identified, in addition to the three possible end of life options for the station, a fourth option which will involve the continued maintenance, refurbishment, and, where necessary, removal of the existing concrete affected by AAR in the powerhouse. As well, the existing spillway may be modified to allow for greater spill capacity. Similar to Option 1, fish passage is also being considered. More information on the project and its scope is provided in the appendix to the CER.

The two phases considered in this SICR appendix are the Project Phase which includes the removal of material and the construction of new structures and the Operation Phase which is the operation and maintenance of the various facilities and structures.

3.0 Preliminary List of Social Issues

The following preliminary list indicates those societal issues which may arise from implementation of the fourth option. It should be noted that only those issues applicable to the fourth option are being evaluated. The complete list of issues is presented in the SICR document.

The issues are listed in alphabetical order for ease of reference. A brief description of the issue is given to highlight potential concerns or opportunities.

3.1 Community Emergency Services, Infrastructure and Housing

It is anticipated that the influx of construction workers, estimated to be 170 individuals throughout the duration of the project from 2020 to 2036, will place additional demands on local community infrastructure and services, including emergency services, hospitals, schools, and housing. This demand may lead to an immediate impact on existing services; however, with appropriate planning, this issue is easily overcome and services can continue, uninterrupted. The creation of new infrastructure to support hydroelectric project workers has, in some cases, been a benefit to communities (International Energy Agency 2006).

Consequences of construction growth include increased employment and incomes, but where these are not matched by similar growth in infrastructure and services, there may be rapid inflation of housing and other living costs, followed by a rapid decline once the project is completed and construction workers and businesses leave the area (Cernea 1997).

At this time, there are no plans for establishing a work camp to accommodate the workforce. This may result in upward pressures on the housing market within the study area. Workers who relocate to the study area may decide to purchase homes in nearby communities including Fredericton, Woodstock and Nackawic. It is anticipated the local markets will respond to the forecasted increased demand for housing.

Effect of Community

Community emergency services including fire department and ambulance services will likely experience a higher demand due to construction and demolition activities. To reduce demands on emergency services, appropriate emergency response training will be provided to workers, including fire and medical emergencies. Medical assistance available on-site will also reduce

demands on local emergency services. As such, with appropriate planning, the communities will likely not experience a significant reduction in service.

The increased demands for housing may foster some additional development in the community. While seen as a temporary disruption to the local community, generally development is viewed positively. The effect is expected to be realized for the duration of the Project Phase, with potential lasting effects throughout the Operation phase, should families find other work opportunities in the area.

There is some interaction anticipated between this option and the nearby community services and infrastructure. It is likely, however, that the smaller workforce and an overall lower intensity of project activities will place lesser demands on local community services and infrastructure than Options 1 and 2. Similar to Option 3 with a lower peak labour force of only 150 over a three or four year timeline, the interaction with community services and infrastructure public service is likely to cause the least increase in demand.

3.2 Employment, Expenditures and Local Businesses

Based on the project description, it is anticipated that there will be a number of skilled and unskilled labour positions required to facilitate the reconstruction of the dam. While not to the same level of effort as with Option 1, this large capital project has the potential to create local employment. In addition to these direct jobs, it is expected that employment will be generated indirectly (expenditures on inputs of goods and services required by the Project), or induced by further rounds of income expenditures by individuals and firms.

The existing economic sector for the headpond area is heavily centred around recreation, and recreational activities that are reliant on the headpond for their enjoyment. Other businesses also exist, including restaurants, convenience stores, as well as agricultural operations, to name a few.

Effect on Community

Construction activities associated with Option 4 will result in expenditures that will likely benefit the local and regional economies. The Project Phase is anticipated to generate opportunities for several local area businesses. It should be recognized that any construction over three consecutive periods will provide for a more sustained rate of expenditures and expenses; that is, the boom and bust scenario with the other options will be likely not be as significant with Option 4.

There may also be negative economic effects to local businesses. Temporary disruptions to local businesses during the Project phase can be expected from traffic disruption. As the location of the river crossing has as yet not been confirmed, this creates a level of uncertainty for local area residents. Equally, this uncertainty may extend into the tourist traffic and thus to the local area businesses which cater to this clientele.

The immediate community will likely experience the greatest effect in terms of increased expenditures and expenses and thereby have a positive impact in the long term. Overall, increases in spending are anticipated to be positive at the community level; albeit the benefits will reflect the scale of the project.

3.3 Flooding due to increased spill capacity

The construction of MGS has limited the movement of ice downstream which has effectively mitigated the effects of ice jams and associated flooding experienced along the river downstream of the dam in the past. While the need for the spillway is still under consideration, it is understood that the primary function will be to alleviate pressures upstream As noted, the existing spillway has limited capacity.

Effect on Community

The effects of flooding will be realized downstream of the MGS to Oromocto and beyond and for the length of the operating period. The effect on the larger community will likely be periodic (i.e. in winter and during storm events) and can be significant. Emergency response planning can reduce the human safety risks. It is also assumed that the flooding will be controlled allowing for appropriate emergency response. This however, does not negate the potential and periodic effects to downstream properties.

3.4 Land Acquisition

While preliminary engineering design is ongoing, the construction footprint including staging/laydown areas, transportation corridors and disposal areas are anticipated to require the acquisition of private property. In light of the large scale expropriation that occurred during construction of the dam in the 1960s, expropriation is a matter of heightened sensitivity to area residents. For some land owners, the sale of their lands may be seen as a positive impact, assuming fair market value or a slight premium is provided for property acquisition. For others, expropriation could be seen as an incursion on their property rights. Efforts should be made minimize the level of involuntary expropriation. For Option 4, the amount of land necessary has yet to be determined.

Effect on Community

The immediate community, particularly adjacent to Kingsclear First Nation and the community of Kingsclear will likely be directly influenced by the need for land to support the project. The effect is for the duration of the Project Phase and for those whose property was purchased or expropriated, the effect will be indefinite. The community will be directly impacted as the land uses will likely change dramatically. Community adjustments will take time and will likely result in realignment of family structures and community fabric. Land acquisition will be likely required for Option 4 similar to the other three options.

3.5 Nuisance Effects during Project Phase

Nuisance effects from construction and demolition activities for the fourth options include noise, vibration, dust and odour. Anticipated to be most pronounced during peak periods of construction activity, these effects will be largely limited to the area around the construction zone. Atmospheric and acoustic effects are discussed in greater detail in the Addendum to the CER (Stantec 2016).

Effect on Community

All options are expected to have nuisance-type interactions during the Project Phase. Temporally the effects would be longest with Option 1, although the schedule for construction proposed for Option 4 may result in prolonged periods of nuisances. Spatially, the effects are anticipated to be most pronounced in the immediate community, with particular influence on Kingsclear First Nation arising from the proximity of the construction laydown area. Identified as potential negative effects on the local community, it is anticipated that mitigation will be applied to lessen the effect. Regardless, the continued operation of the construction sites and associated activities will likely have significant effects on the local residents, particularly Kingsclear First Nation.

3.6 Transportation Disruption

Disruption to the existing transportation routes and patterns could occur from a number of project related activities. The effects include limited access to the river, delays associated with ongoing construction, damage to the existing and already taxed road infrastructure and safety concerns for the travelling public.

The primary measure to mitigate the disruption/loss of the current river crossing at the dam will be the construction of an alternative transportation link across the Saint John River. Under all Options, access across the river will be maintained. Different transportation options are currently under consideration.

The design and construction of the preferred transportation link will be a separate project that will likely be led by NB Department of Transportation and Infrastructure. The undertaking will require a separate environmental approvals process independent of the Mactaquac Project, in advance of construction and demolition activities as part of the Mactaquac Project.

While a relatively smaller workforce than with the other options, it is anticipated that many workers will travel to and from the project site on a daily basis. Travel routes will vary with the anticipated workers to travel from both sides of the Saint John River. It is likely that workers will travel from Fredericton, Oromocto, Nackawic, Woodstock and other areas. Increased construction commuter traffic coupled with construction vehicles can be expected to cause traffic delays for tourists, local residents and commercial trucking traffic.

There are safety concerns associated with the high levels of construction traffic. Workers and contractors will be expected to comply with safety policies and procedures developed to minimize safety risks. For all options, access to the construction site will be controlled and construction vehicles and equipment movements will be largely restricted to construction zones.

High volumes of heavy truck traffic are anticipated during construction and demolition/decommissioning activities related to Options 1 and 2. Although not yet determined, it is expected that Option 4 will also generate a significant volume of traffic to and from the project site. Heavy truck traffic will have detrimental effects to road integrity, in addition to effects on road congestion, safety, and noise.

Effect on Community

The effect of changes to the established traffic patterns will likely be most noticed by the immediate community. Residents of the local community who utilize the dam to connect from highway 105 to 102 and vice versa, will also be impacted by the expected relocation of the access. The effects will likely be immediate and are anticipated to continue for the duration of the Project Phase and potentially extend into the Operation Phase. It has yet to be determined the exact location of the new crossing. With the fourth option, the potential for maintaining the existing crossing once the Project Phase has been completed should not be discounted. Should this scenario be viable, disruptions to traffic at the existing crossing during the Project Phase could range from none to limited access. Regardless, this uncertainty and the potential disruptions require effective and timely mitigation to minimize the negative effects.

4.0 Summary

The life achievement option, similar to Option 1 and 2, will have the greatest influence on the community during the Project Phase. The scope of the project, however, will determine the degree of influence. It is anticipated that most of the project activities will be contained within the existing footprint of the facility. The requirement for laydown areas will be scaled down and the labour force will be significantly smaller than that of Option 1.

While the scale and scope of the life achievement option will likely be different, the effects felt by the communities may not vary significantly across all four options. For the fourth option, the influence would be primarily during the Project Phase. The addition of an auxiliary spillway may influence downstream communities during operations when there is a need to increase spilling..

For the community around the headpond, the construction activities which involve transportation will likely have the most impact. The relocation of the crossing will affect limited areas downstream. It will also affect those from around the headpond who have

become accustomed to a particular traffic pattern. These effects are relatively short term in duration.

If access across the river is relocated to areas downstream, the effect on the travelling public and more localized effects on property owners will likely have longer term influences until adjustments are made and the changes accepted. This will require particular attention to mitigative measures to minimize negative impacts.

Kingsclear First Nation will likely experience the greatest effect from construction and will also be able to see the opportunities from the changes. Additional community infrastructure (roads, emergency services) will likely be available to permit the community to continue its own economic growth.

A comparison of the effect of the options on the societal issues is provided in **Table 1**. Only those issues which are likely to arise from implementation of the life achievement option are considered for comparison purposes.

TABLE 1

Issue	Option	Effect	Duration
Community Emergency Services, Infrastructure and Housing	1, 2, 3, 4	Negative	Project Phase
Employment, Expenditures and Local Businesses	1, 2, 3, 4	Negative and Positive	Project Phase and Operation Phase
Flooding due to increased spilling	1, 2, 3, 4	Negative	Project Phase and Operation Phase
Land Acquisition	1, 2, 3, 4	Negative	Project Phase and Operation Phase
Nuisance Effects during Project Phase	1, 2, 3, 4	Negative	Project Phase
Transportation Disruption	1, 2, 3, 4	Negative	Project Phase

References

International Energy Agency. 2006. Implementing Agreement for Hydropower Technologies and Programmes, Annex VIII, Hydropower Good Practices: Environmental Mitigation Measures and Benefits.

Stantec Consulting Ltd. (2015). Draft Comparative Environmental Review. The Mactaquac Project. Prepared for NB Power. August 2015.

Stantec Consulting Ltd. (2016). Comparative Environmental Review – Addendum. Life Achievement Option. Prepared for NB Power. March 2016.