

**A Review of Community Health Issues Related to Manitoba Hydro's
Needs For and Alternatives To (NFAT) Preferred Development Plan**

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Prepared by:



Prepared for:

The Consumers' Association of Canada (Manitoba Branch) Inc.

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1. Introduction

Manitoba Hydro is seeking government approval for its Preferred Development Plan (PDP), which includes the construction of the Keeyask generating station for a 2019 in-service date, export agreements, a U.S. transmission interconnection and the possibility of construction of the Conawapa generating station (2026 or later).

The Consumers' Association of Canada, Manitoba Branch (CAC Manitoba) is seeking to identify and describe the potential effects of the Preferred Development Plan and Alternative Plans on community health of Manitoba residents, especially Northern and Aboriginal communities, in order to help the Public Utilities Board understand the full scope of issues that the Manitoba Hydro PDP may influence.

The Terms of Reference for the NFAT Review specify that the Panel's assessment will include a review of "the socio-economic impacts and benefits of the Plan and alternatives to northern and aboriginal communities" (item 2h). This specifically refers to "a high level summary of potential effects to people in Manitoba, especially Northern and Aboriginal communities, including such things as employment, training and business opportunities; infrastructure and services; personal family and community life; and resource use."

The objective of this report is to identify and explain the health issues that could be expected to result from a project of the type that Manitoba Hydro is proposing, with specific reference to the cultural and geographic context of Manitoba. The report discusses the potential positive and negative effects of development on a wide range of community health outcomes. It should be noted that this review does not comprise an in-depth health impact assessment of the proposed alternatives.¹

It is also important to note that although this report discusses issues that are of importance to the First Nations, Metis and non-Aboriginal residents and users of the area affected by the Manitoba Hydro PDP, the report does not speak for them and does not purport to represent their views, either individually or as a collective.

2. Areas of Health Concern

Health is a broad and complex topic, and there exist a number of competing frameworks through which to organize concepts of health outcomes and health determinants.

However, for this report, we thought it best to develop a community-generated listing of issues, so that the resulting framework would be relevant for the local context. This is particularly important given that

¹ We would also like to note that we prepared a report for the Keeyask EIS entitled *Review of Community Health Issues in the Keeyask Generation Project Environmental Impact Statement*. This report is substantially different from that work in a number of ways, including that it presents information on relevant current health conditions for the affected communities; and attempts to identify potential health vulnerabilities and opportunities specifically related to Manitoba Hydro's plans, which the earlier report did not do.

the concept of health for the Keeyask Cree Nations² may be substantially different than the concept of health for other Manitoba or Canadian populations.

As described in the EIS and the *Socio-Economic Environment, Resource Use and Heritage Resources Supporting Volume* for the Keeyask Generation Project,

The KCNs understand community health through the Cree concept of living a good and honourable life or *mino-pimatisiwin*. “From a Cree perspective, health has as much to do with social relations, land and cultural identity as it does with individual physiology” (Adelson 2000). *Mino-pimatisiwin* has strong ties to people’s ability to pursue activities on the land, including the ability to hunt, trap, fish and gather food.

Pimatisowin “has everything to do with life on the land” (2000) and is “inseparable from being able to hunt, pursue traditional activities, live well in the bush, eat the right foods, keep warm and provide for oneself and others” (Adelson 2000).

Table 1 presents 10 key health areas that have been identified as relevant by various stakeholders in relation to Manitoba Hydro’s projects. These key health areas are: health effects stemming from employment, income and economy; diet and nutrition; public safety in transportation; social environment; cultural landscape; health of the land / environmental resources; health care service provision; education and training; housing; and health equity.

To put together this list, we reviewed a number of sources that included:

- Cree Nation Partners. 2012. Keeyask Environmental Evaluation. A report on the Environmental Effects of the Proposed Keeyask Project on Tataskweyak Cree Nation and War Lake First Nation.
- Fox Lake Cree Nation. 2012. Environmental Evaluation Report.
- York Factory First Nation. 2012. Kipekiskwaywinan Our Voices. York Factory First Nation Speaks About the Keeyask Generation Project.
- Eni, R., S. DeRoy, and G. Rowe. Assessing the Social, Cultural, and Health Impacts of Hydro-electric Construction in Fox Lake.
- Buckland J. and M. O’Gorman. 2013. A Community Economic Development Assessment of the Keeyask Model. A report for the Clean Environment Commission Hearings.
- Rydgren B., A. Khalil, S. Howard. 2012. Hydropower Sustainability Assessment Protocol: Official Assessment. Prepared for Keeyask Hydropower Limited Partnership.
- MNP LLP. 2014. NFAT Review: A Review of Manitoba Hydro’s Macro Environmental Considerations. On behalf of Manitoba Hydro’s Public Utilities Board.
- TyPlan. 2014. Needs for and alternatives to Manitoba Hydro’s Preferred Development Plan: Socio-economic review. Prepared for Public Utilities Board of Manitoba.
- Manitoba Clean Environment Commission. 2013. Keeyask Generation Project Public Hearing. Volume 17: Transcript of Proceedings held at Fort Garry Hotel, Winnipeg, MB. Tuesday, November 26, 2013.

² We recognize that the Fox Lake Cree Nation, York Factory First Nation, Tataskweyak Cree Nation, and War Lake First Nation are separate First Nations and not a cohesive group. However, for the purpose of presenting material in this report, the term “Keeyask Cree Nations” or KCN will be used as shorthand, as it is also a term employed term by Manitoba Hydro and the First Nations/Cree nations in the JKDA and EIS documents.

- Information requests submitted as part of the Keeyask Generation Project Environmental Impact Statement
- Information requests submitted as part of the current NFAT review, including CAC-MH I-231 a) from Round #1 and PUB/MH II-410, PUB/MH II-499 g) & h), MMF/MH II-38, MMF-MH II-39 and MMF/MH II-40 from Round #2.

It should be noted that the list of concerns cited in the second column in Table 1 is not intended to be a representation of the likely effects of the project. Rather, it is a compendium of issues identified through the sources listed above so that “like” areas could be grouped for further probing in Section 4 of this report. We recognize that the stated concerns are predominantly negative and may under-represent potential positive benefits of the Manitoba Hydro project.

Table 1: Health effect areas and key concerns raised by stakeholders

Health effect area	Key concerns raised by stakeholders
Health effects stemming from employment, income and economy	<ul style="list-style-type: none"> • Desire for long-term economic development • Ensuring there are employment opportunities for KCN members • Prevention of boom-bust cycles • Damage to current economic resources in the community from the projects (related to subsistence) • Possibility for KCNs to obtain higher skilled work positions and have the opportunity to compete with workers from the south • Stress in the community caused by uneven distribution of costs and benefits • Lost revenue due to reduction in fur bearing animals to trap because of flooding • Ensuring there is job security, respectful relations between employee and employer and between employees • Impacts of employment on family relations • The overall relationship between the cash economy and subsistence/<i>Askiy</i>-based economy (i.e. an economy based on the land, water, animals, plants and people). • The connection between employment and community socio-economic development
Diet and nutrition	<ul style="list-style-type: none"> • Viability of offsetting programs/compensation to mitigate food security and nutrition impacts related to decreased access to and quality of subsistence foods • Noise from construction scaring animals away from the area • Reduction in animals and fish due to presence of construction workers in the area • The dam will block fish movements up and down stream • Increased mercury levels in fish will pose a health hazard • There will be fewer animals such as moose, waterfowl, muskrat and beavers to harvest • Caribou habitat will be lost due to flooding • Waterfowl nesting habitat will be destroyed by flooding • Sturgeon spawning areas will be lost with the loss of two rapids • Less traditional food because of fewer animals and mercury in fish species • Recreational opportunities associated with hunting and gathering will be diminished • Traditional camp sites and cabins will be ruined • Impacts to food quality and food security in FN communities due to mercury contamination • New roads increasing access to hunting and fishing areas • Fragmentation of local forest and bog areas makes animal travel more difficult
Public safety in transportation	<ul style="list-style-type: none"> • Risk of death or injury due to increased traffic on PR 280 during construction • Traveling by boat will be less safe because of floating debris and reefs which are new and unfamiliar • Travel over ice will become more dangerous due to fluctuating water levels and

	creation of slush ice
Social environment	<ul style="list-style-type: none"> • Increased policing and security required as a result of construction workers • Increased usage of drugs and alcohol by youth because of construction worker presence • Risk of physical and sexual abuse of women • Worker and community interactions will increase on worker off-days • Social capital changes as a result of interaction with people who are not from the area • Breakdown in trust and community reciprocity • Increased social tension including racism and discrimination • Increasing violence and crimes including rapes and sexual assaults • Influx of workers and increased access to alcohol and drugs and any resulting violence
Cultural landscape	<ul style="list-style-type: none"> • Decreased opportunities to live a traditional lifestyle • Lost opportunities to teach and learn traditional lessons, passing traditional knowledge down from one generation to the next • Loss of cultural transmission (loss of stories) • Effects to Cree language, the Cree Worldview, traditional knowledge and seasonal movements • Consideration of the effects on intangible cultural heritage • Demonstrated effectiveness of off-setting programs for replacing culturally important plants • Known sacred sites will be lost due to flooding • Continued change in traditional lifestyle (physical activity, stress free lifestyle, lean traditional diet) will continue to affect health and wellbeing of people • Destruction of archeology sites/heritage sites with flooding
Health of the land / environmental resources	<ul style="list-style-type: none"> • Emotional wellbeing will be harmed knowing Keeyask and Conawapa are disrespectful to the land and that they are failing to care for the land and for other beings of Mother Earth • Balance will be disrupted between human and non-human beings • Spiritual connection to the land will be harmed • Access to medicinal plants will be altered or lost due to flooding • Members need to be ensured immediate access to medicinal plants • Loss of historical connection to the land • Continued decline of water quality • Traditional foods, including water, provide excellent nutrition and is a key source of cultural identity – any changes to these greatly impact health and wellbeing of people
Health care service provision	<ul style="list-style-type: none"> • Capacity and access to health care services • Addressing limited capacity of health care services in KCN communities
Education and training	<ul style="list-style-type: none"> • Loss of economic flexibility • Interventions to assist KCNs in obtaining employment • Skill development among youth
Housing	<ul style="list-style-type: none"> • Increased demand for housing with band members coming home to seek employment opportunities • Fear that current increased housing developments for workers will not improve access to housing for FCN members, which has a major influence on health and wellbeing
Health inequity	<ul style="list-style-type: none"> • Projects promotion of equity in terms of: distribution of benefits and risks, fair access to resources and opportunities, accounting of impacts from previous developments, shared responsibility to seek equitable outcomes and processes, promoting equity between generations • Job opportunities for people with disabilities • Stress in the community due to uneven distribution of costs and benefits amongst FN members • Goal for FCN is to raise the health and wellness in their communities so that it is equitable with other Manitobans and Canadians

These 10 health effect areas are congruent with health effect areas identified in relevant research literature on hydroelectric dams, including:

- World Health Organization Sustainable Development and Health Environments. 1999. Human Health and Dams: The World Health Organization's submission to the World Commission on Dams (WCD). Protection of the Human Environment: Water, Sanitation and Health Series.
- Lerer LB, Scudder T. 1999. Health impacts of large dams. Environmental Impact Assessment Review 19(2): 113-123.
- Environmental Health Assessment Services, Health Canada. 2004. Canadian Handbook on Health Impact Assessment, Volume 4. Ottawa: Health Canada.

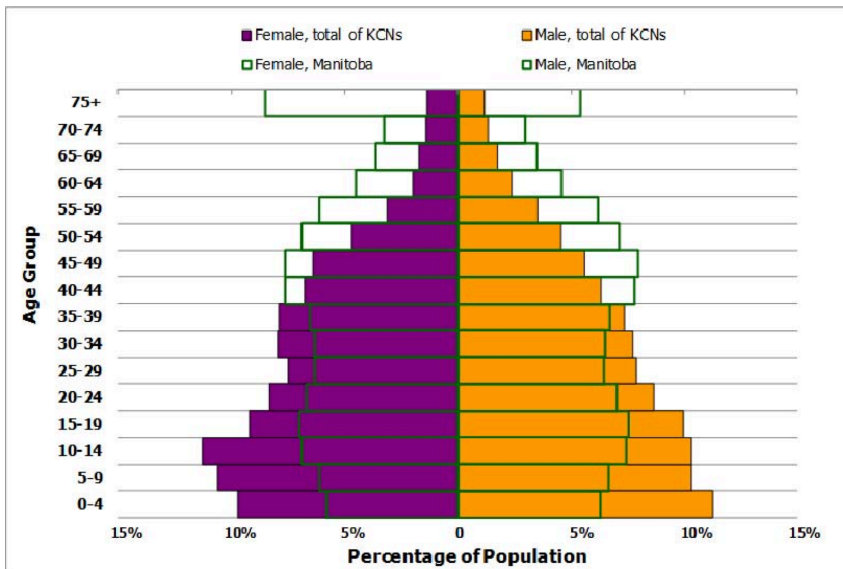
In Section 4 of this report, each of the 10 health effect areas identified in the table will be reviewed with respect to how they may be affected by the Manitoba Hydro PDP.

3. Community Health Profile

In this section, we present a brief description of the overall health of the population in the area affected by the Manitoba Hydro PDP. The purpose is to provide context for the health vulnerabilities and opportunities described in Section 4 in relation to the PDP. It should be remembered, however, that there are many important components of *mino-pimatisiwin* that, as described in Section 2, are above and beyond the characteristics of health described in this section.

Because rates of health conditions are strongly influenced by the age profile of the population, it should be noted that the KCNs have a relatively young population demographic. As shown in Figure 1, of the total population of approximately 5,350 people almost 40% were under the age of 20 (Keeyask Hydropower Limited Partnership, 2012).

Figure 1: Age distribution of KCN communities



Source: Keeyask Hydropower Limited Partnership, 2012

Health indicators are not aggregated or published at the level of the KCN or the individual communities. Data is available, however at the level of the Burntwood Regional Health Authority (BRHA), within which the KCNs are located. The population of the BRHA as of 2008 was 46,818 people, of whom 76.1% self-identify as Aboriginal. While this is much larger than the population of the KCNs (around 5,300) it represents the most accurate data source for health-related information. Information from the Burntwood RHA also represents an appropriate portrait of Northern and Aboriginal people in general, outside the KCNs, in the area in which the Manitoba Hydro developments will occur.

In 2012 the BRHA was combined with the NOR-MAN Regional Health Authority to create the Northern Health Authority (NHA). The total population of the NHA is much larger (74,175) and the geographic spread much broader; for this reason, we have chosen to present the slightly older information that is specific to the BRHA.

Overall Health Indicators and Medical Conditions

Table 2 presents a number of key indicators for overall health, chronic diseases and related conditions. As shown in the table, residents of the BRHA had worse health outcomes across all areas, including pre-term births, life expectancy, overall mortality, diseases such as asthma, arthritis, diabetes and heart disease and conditions such as high blood pressure (hypertension) and overweight / obesity.

These results are consistent with Canada-wide data that show generally poorer health outcomes among rural populations (DesMeules and Pong 2006). In addition, data from across Canada tend to show that many Aboriginal populations experience higher rates of many health conditions (Loppie Reading and

Wien 2009; Adelson 2005). It should be remembered, however, that the health experience varies widely among individuals; and also that the KCN communities represent only a portion of the Burntwood Regional Health District, and the extent to which the BRHA data is typical of conditions in those communities is unknown.

Table 2: Overall health indicators

Health Indicator	Definition	Manitoba	BRHA
Preterm Births	% live births born before 37 weeks gestation	8.2%	10.3%
Life Expectancy	Female life expectancy in years	81.5	76
	Male life expectancy in years	76.3	69.7
Mortality	Mortality rate per 1000	8.0	14.3
Potential Years of Life Lost	Potential years of life lost rate per 1000	50.9	108.7
Self-rated health	Perceived health, very good or excellent	54.1	44.2
Asthma	% of residents who self-report that they have asthma	7.2%	11.6%
Arthritis	% of residents diagnosed with arthritis	20.2%	21.9%
Osteoporosis	% of residents diagnosed with osteoporosis	12.7%	14.2%
Hypertension	% of residents with high blood pressure	23.7%	35.4%
Ischemic Heart Disease	% of residents who have been treated for ischemic heart disease	8.5%	11.8%
Overweight / Obesity	% of residents who are overweight or obese (self reported)	72.4%	54.5%
	Youth (age 12-19) who are overweight or obese	23.7%	34.9%
Diabetes	Prevalence of diabetes among adults	8.7%	21.4%
	Prevalence of diabetes among children	0.4%	0.9%

Source: (Burntwood Regional Health Authority, 2009a).

One other medical condition of particular concern in the BRHA is tuberculosis (TB). The rate of TB, which is highly correlated with crowding, is much higher in the BRHA than in other regions, ranking the highest in the province. Between 1998 and 2009, there were 533 cases of tuberculosis diagnosed among residents of the Burntwood region, and almost all of the cases (98%) were among First Nations members (Burntwood Regional Health Authority, 2009b).

Injuries

Injuries are particularly common among younger populations, and this is true also of the relatively young population of the KCN. In 2006 just over one in four (27.2%) physician visits were due to injuries (Keeyask Hydropower Limited Partnership, 2012), and injuries also comprised one of the leading causes of death. Injury and poisoning also accounted for 38.9% of all Potential Years of Life Lost (PYLL), making it the leading cause of PYLL in the KCNs.

Across the BRHA, injury also has a large impact on the health of children and youth. The types of serious or fatal injury most common include intentional injury (either to self or to others), accidental drowning, and fire. (Burntwood Regional Health Authority, 2009b).

Mental Health and Addictions

Mental health is a current challenge in the BRHA. The *Burntwood Regional Health Authority 2009 Community Health Assessment* has cited possible contributing factors as being the residential school experience, the lack of employment opportunities in some communities and lack of cohesive families and supports in the community.

Self-reported mental health provides a general indication of the population suffering from some form of mental disorder, mental or emotional problems, or distress. In 2007, the percentage of residents who self-rated mental health as "very good" or "excellent" in the Burntwood/Churchill Region was 69.9 per cent, lower than the Manitoba average of 73.5 per cent and lower than the Canadian average of 74.8 per cent. However, it is important to note that these data reflect the experiences of residents living off-reserve only, as well as those residents with a telephone and who are mentally healthy enough to participate in the survey.

Life stress is another measure of mental well-being. Sources of life stress can include financial worries, work, unemployment, parenting, health problems, aging and caregiving/elder care (Burntwood Regional Health Authority, 2009b). In this measure, residents of the BRHA fared better than most of the rest of the province. The proportion of Burntwood residents who reported "quite a lot" of life stress was 16.7% in 2007, lower than the Manitoba average of 19.4% and the Canadian average of 22.5%.

Among Burntwood adults and youths, antidepressant prescription rates are among the lowest in the province. These lower rates may not reflect actual need, but availability of physician services to provide the prescription.

Common consequences of poor mental health include addictions and the misuse of alcohol and other substances. Again, figures for these conditions are higher than provincial averages. Among BRHA males the hospitalization rate due to substance abuse is the second highest in the province and for BRHA females it is the fourth highest. Heavy drinking is also high; 26.1% among adults in the BRHA compared with 19.6% across Manitoba.

Health-Related Behaviours

Physical activity is important in maintaining a healthy life. Levels of physical activity in Burntwood/Churchill residents ages 12 and over and living off-reserve are generally at similar levels compared to Manitoba averages, with approximately 50% of the population being moderately or physically active at work, at home or in other settings.

The BRHA, however, has the highest smoking rates among all Manitoba RHAs. As shown in Table 3, rates are higher among adults and youth, as well as the among non-smokers who are exposed to second-hand smoke in the home.

Table 3: Smoking status of residents in the Burntwood Regional Health Authority

Health Indicator	Definition	Manitoba	BRHA
Smoking	Proportion of residents who smoke either daily or occasionally	22.0%	35.1%
	Proportion of youth (age 12-19) who smoke either daily or occasionally	14.8%	26.2%
	Proportion of non-smoking residents who are exposed to second hand smoke in the home	7.9%	17.9%

Source: (Burntwood Regional Health Authority, 2009a).

Health Care Service Provision

In the BHRA, there are a number of challenges in terms of health care service delivery. These include the fact that many communities, including two of the KCNs communities (WLFN and YFFN), are not accessible by all-season roads (Keeyask Hydropower Limited Partnership, 2012). Other challenges include physician turnover, the inconvenience for patients of travelling for physician appointments, and limited appointment times (Burntwood Regional Health Authority, 2009b).

These challenges are reflected in several key indicators of health care service delivery. The first is ambulatory care sensitive conditions, which describes the proportion of cases seen in hospital that should have been able to be treated with primary care in the community. The rate of ambulatory care sensitive conditions in the BRHA is 43.1 per 1,000 population, compared with 13.5 for Manitoba as a whole. However, data from the Burntwood Community Health Resource Centre indicates that many positive strides are being made in provision of primary care. For example, in 2009/10, the BCHRC had 33,831 visits to the Centre’s physicians, an increase of 20 per cent from 2006/07 (Burntwood Regional Health Authority, 2009b).

4. Areas of Vulnerability and Areas of Opportunity

In the last section, we described overall health characteristics of the potentially affected communities, including areas where there is a particularly high burden of disease. In this section we discuss areas of vulnerability and areas of opportunity; that is, the ways in which the Manitoba Hydro PDP could act on the health of the community, either for better or for worse. It should be noted that this is not a Health Impact Assessment – we are not attempting to predict what effects the proposed project will actually have. Rather, we discuss with specific reference to the PDP and the specific affected communities, possibilities for how the Manitoba Hydro PDP could improve or erode health. The sources we used to inform this analysis include published and grey literature; the Keeyask Generation Project EIS application; KCN Environmental Evaluation reports; information requests submitted as part of the Keeyask Generation Project Environmental Impact Statement; information requests submitted as part of the NFAT review; and analyses previously conducted on Manitoba Hydro projects.

In discussing health vulnerabilities and opportunities, we hope to understand where the balance lies between potential benefits and adverse effects of Manitoba Hydro’s proposed developments as well as attempt to elucidate any differences between the proposed alternatives (Section 5). The focus on

opportunities to local communities supports a recent shift in focus of the World Bank – a major global funder of resource development projects – which just concluded a three year initiative developing a framework for enhancing development benefits to local communities involved in hydropower projects. The World Bank and others recognized that local communities were bearing a disproportionate amount of negative effects of hydropower projects, while primary benefits accrued to people living far away from the project site. Although benefits, mainly financial, were touted, local communities (mainly Indigenous Peoples) were not realizing the benefits and quite oppositely, were experiencing negative effects of displacement, increases in infectious disease, and lost resources. As a result of these efforts the World Bank has recently published a guidance document entitled “A Guide for Local Benefit Sharing in Hydropower Projects” (Wang 2012).

A. Health effects stemming from employment, income and economy

Although employment and income are not part of traditional Askiy or Mino Pimatisiwan, they are important determinants of health for those who participate in the wage economy.

The health effects of income and employment are well-established and supported by the Public Health Agency of Canada (Public Health Agency of Canada 2011) and the World Health Organization (World Health Organization 2003). For instance, numerous studies suggest that income and social status affect health outcomes such as birth weight, infant mortality, self-rated health, chronic and acute infectious diseases, adult mortality, social pathologies, mental well-being, and health care service utilization (Mikkonen and Raphael 2010; Yen and Syme 1999; McIntosh et al. 2009; Lightman et al. 2009). It is important to note that the relative gap between the highest and lowest income earners in any given community, also known as income disparity, heavily influences health outcomes. Specifically, the higher the income disparity in a society, the worse off health outcomes for both rich and poor (Yen and Syme 1999; Wilkinson and Pickett 2007; Ross et al. 2006). Employment has its own unique influences on health, separate from income. A job that provides a good, safe working environment, that is appreciated and is secure can result in longer life expectancy, improved health behaviours and overall mental health, and reduce rates of chronic disease (Jin et al. 1995).

In terms of the Manitoba Hydro PDP, there exist both potential opportunities to improve health through employment, income and economic changes, and potential vulnerabilities that could compromise health.

In terms of opportunity for improved health:

- KCN members are expected to gain employment opportunities with the Manitoba Hydro projects. Employment could address high rates of unemployment in the KCN communities which presents health opportunities such as access to safe and healthy housing, food security and improved mental health. The extent to which health benefits accrue depend on the types of employment that KCN members are eligible to apply for. Economic analyses suggest many KCN members may not have qualifications to obtain many secure, safe and long-term employment positions. One exception to this could be the promise of 182 permanent jobs with Hydro after the construction of Keeyask.
- Revenue or profit-sharing as a result of KCN partnerships could lead to many improvements in vital services that support good health in the communities, including community programs, social services, health care and education. Current AEAs support programs in each KCN

community related to culture, traditional lifestyles and even mental health; however there is no formal agreement to support other services such as health care or education, which are currently lacking.

- Adverse Effects Agreements for Fox Lake, War Lake and Tataskweyak Cree Nations stipulate funding for alternative access to hunting and fishing grounds. Given that many members sell or trade game and fish to supplement their incomes, these types of stipulations present health opportunities or simply mitigate against vulnerabilities. Success of these programs will depend on how well hunters can adjust to new environments.

In terms of potential health vulnerabilities:

- The Manitoba Hydro PDP may create economic boom periods especially during construction of the major projects (Keeyask and Conawapa). This can result in rapid influx, rising living costs and scarcity of goods and housing in the area. These effects are already being observed in Thompson and disproportionately affect lower income earners in the community. There is a high proportion of low income or unemployed in the KCN communities and since low-income earners or the unemployed generally have worse health outcomes, economic boom times may leave many members vulnerable to poorer health outcomes.
- If an economic bust results following construction of either Keeyask or Conawapa, community members could see declined health resulting from lost income, fewer social networks, and loss of identity.
- It is expected that some revenue will be lost from changes to the success of trapping and hunting activities. KCN members who rely on the traditional resource economy would be vulnerable to diminished health effects.
- Work hard, play hard attitudes common in rural resource development project settings can lead to a work culture that supports heavy drinking or drug use post-shift. KCN members who obtain employment may be vulnerable to these risks; however, the communities where workers frequent (Thompson and Gillam) may also be vulnerable to negative health effects related to drug and alcohol misuse (violence, crime, sexual assault, social tension).

The magnitude of health effects will largely depend on how the projects contribute to income disparity; generally projects of this size increase income disparities in communities and increase social divisiveness between those who benefit economically and those who do not. In addition, the research on income disparity suggests that the potential positive health benefits of increased economic activity may be impaired by a lack of equity; and that this impairment would be felt not only by those who do not gain employment, but across the entire community (Yen and Syme 1999; Wilkinson and Pickett 2007; Ross et al. 2006).

B. Diet and nutrition

Access to affordable, nutritious and culturally important foods is a key component of health for KCN communities. Food insecurity – not having the resources to consistently obtain access to sufficient amounts of nutritious foods– is associated with an extensive list of poor physical and mental health outcomes.

Traditional foods for the KCNs consist of animals and fish from the lands and waterways surrounding their communities. Research has demonstrated that shifting away from these foods that are high in

protein and nutrients, to store-bought foods that are high in calories and low in nutrients is particularly conducive for the development of diabetes, obesity and other metabolic disorders. Aboriginal populations in Canada and elsewhere have experienced marked changes in disease patterns over the last several decades associated with a rapid transition to a Western diet and lifestyle (Health Canada 2008). Traditional diets remain very healthy and associated with better health outcomes, as well as important linkages to cultural practices and traditional activities and livelihoods.

In terms of health opportunities:

- Food security in KCN communities can be enhanced by the provision of jobs and income. Income earned from any employment opportunities with the Manitoba Hydro project can provide a health opportunity in that increased income can increase access to both traditional foods (allowing residents to afford gas, ammunition and other supplies required to participate in hunting and gathering) and store-bought foods. Consistent access to food helps prevent or reduce food insecurity. Although levels of food security are unknown in the KCN communities, food insecurity tends to be high in First Nation communities across Canada.
- Components of the Adverse Effects Agreements for York Factory, War Lake, and Tataskweyak Cree Nations have the potential to provide food security opportunities for these communities--specifically, York Factory's Resource Access and Use Program; War Lake's Community Fish Program and Improved Access Program; and Tataskweyak's Healthy Food Fish Program and Traditional Foods Programs. Each of these programs aims in some way to maintain consumption of fish in the communities despite the methylmercury contamination that will occur to fish in traditional fishing areas. This is a health opportunity for KCNs with these programs because it may offset detrimental health effects associated with decreased access to subsistence foods, fish in particular.

Health vulnerabilities are also likely with respect to food security:

- The offsetting programs outlined above in the Cree Nation specific AEAs are not fully tested and their effectiveness for truly offsetting the reduced availability of fish and other subsistence sources is unknown. This presents a health vulnerability because if the programs are not effective food insecurity could be exacerbated.
- The project is expected to affect methylmercury levels in fish that are consumed regularly by the KCNs. This presents health vulnerabilities for the diet and nutrition of KCN members. Worry over contamination levels can result in people avoiding subsistence foods and increasing consumption of more expensive and less healthy store-bought foods, contributing to metabolic and mental health outcomes.
- Land use and project developments have the potential to change animal patterns temporarily in the Project Areas making it more difficult to find and successfully hunt subsistence animals. A reduction in availability of subsistence foods is a health vulnerability for KCN members as it contributes to food insecurity and worse off metabolic health outcomes.
- The Manitoba Hydro projects will create population influx into the area with people seeking indirect employment opportunities. Influx can increase food and housing costs by putting pressure on existing services, making living necessities more expensive. This presents a health vulnerability for low income KCNs who are forced to make difficult choices around where to spend money: on food or shelter.

C. Public safety in transportation

Safe ice and water travel allow KCN members to participate in subsistence activities, communicate amongst each other, and travel from one place to another. Having the ability to travel along and across the Nelson River and Split Lake is important for accessing traplines, hunting and fishing areas. The waterways are also used for recreation, such as swimming, canoeing, camping, and snowmobiling and for accessing traditional lands or burial sites. The ways in which the water patterns have changed with past hydro development include: increased water level fluctuations, increased amounts of debris, creation of reefs, shoreline inaccessibility and instability and the reversal of seasonal flows. Water fluctuations and thin ice or the development of slush ice are also noted as being current effects of past hydro developments. These changes have affected the seasonal movements of band members.

Traffic safety is another key concern in the area, especially PR 280 and PR 391 for Keeyask developments. The Manitoba Hydro PDP can influence traffic safety by the addition of more vehicles on the road and the driving behaviour of workers operating company vehicles on public roads. Each of these factors contributes to overall risk of traffic collisions and resulting injury or fatalities.

The Manitoba Hydro projects present both opportunities and vulnerabilities in terms for public safety in transportation. Health opportunities include:

- It is expected that Manitoba Infrastructure and Transportation will be making road improvements on PR 280 in advance of Keeyask construction start-up. This presents the opportunity to better manage risk of traffic accidents with the addition of more vehicles on the road and lower the overall accident/injury rates for KCNs.
- Continued efforts of MH to work with KCNs on the safety of travel on the waterways (through the Water Management Plan) provides an opportunity to not only build agency within the KCNs but also to reduce any drowning or injuries that are commonly associated with dam projects (WHO 1999).

Vulnerabilities:

- Project personnel, equipment and materials will be transported along PR 280 and PR 391 for the Keeyask projects, increasing traffic levels along the roadways used by local KCNs. KCN members who utilize these roadways would be most vulnerable to changes in road safety resulting from increased traffic. Injuries are disproportionately high in First Nations communities, therefore any increase in injury rates contributes to health inequities.
- Continued changes to the Nelson River as a result of the Manitoba Hydro developments will increase risk of accidents, drowning and other injuries. Drowning is a key health effect noted in a World Health Organization report on the health effects of dams (WHO 1999). This is a health vulnerability for KCN members as they use the river often and already experience higher rates of injuries that other population groups thus changing river patterns could also contribute to health inequities.

D. Social environment

The social environment refers to the physical and social setting in which people live and also in which the Manitoba Hydro development will occur. It involves both the culture of the local community as well as the people or institutions with which locals will interact. Development projects such as the proposed projects can influence both the community demographics as well as psychological stressors such as availability of alcohol or drugs, prostitution, crime or feelings of safety and security.

Changes to the social environment are one of the greatest concerns of the KCNs, as past projects demonstrated that an influx of workers may result in substantial and unpleasant changes to the community (see Table 1 for a list of concerns).

There are numerous health effects that could potentially result from a change in the social environment in Gillam, Thompson and the surrounding KCN communities. In terms of opportunities for improved health:

- Gillam and the four KCN communities are small in size and have limited employment opportunities and frequent challenges in supporting important social structures such as community programs, sports associations, youth programs, and other social supports that aid good health (e.g., addictions counseling, Cree language programs). Economic growth is expected as a result of the Manitoba Hydro developments. To the extent that population growth, revenue generation or industry funding are able to support and renew these social structures, there may be health opportunities in the social environment that directly results from the presence of development.
- Adverse Effects Agreements for some of the KCNs include support for programs to mitigate the ill effects associated with changes to the social environment. In particular: Fox Lake is obtaining support for a Crisis Centre and Wellness Counseling Program as well as the Lateral Violence and 'Where do we go from here?' Program. These programs may help to mitigate some of the health vulnerabilities listed below for the Fox Lake Cree Nations, although their effectiveness is not known.

Conversely, there are also potential health vulnerabilities that exist with projects of this size:

- The community social environments in Gillam, Thompson, and the KCN communities could become fractured in response to rapid resource development (Davenport and Davenport 1980). Attitudes about development can become polarized, with some in the community strongly in favour of development and others strongly opposed. This divide can tear apart social structures on a personal or community level and be very stressful for individuals (Orenstein et al. 2013). Since KCN members are already divisive about whether or not to support the Manitoba Hydro developments, any further split in community views as a result of project activities could exacerbate these health vulnerabilities.
- The influx of workers and others who migrate for the economic opportunity associated with development can augment a "we-they split" between newcomers and longtime residents, and the two groups may be substantially different in terms of values and community vision (Davenport and Davenport 1980). This type of social disorganization is substantiated by higher levels of violent crime that have been documented in resource-based communities than in comparable non-resource based communities (Ruddell 2001). KCN members are very anxious about influx of newcomers into the area because of past hydro developments and the resulting social changes, including breakdowns in trust and reciprocity, sexual assaults, violence, crimes, social tension and racism.

- Resource development projects can also increase access to alcohol and drugs in a community simply by increasing demand as well as increasing opportunities for its transport. Within the KCN EIS reports, incidents of alcohol and drug use, violence, sexual abuse of women, and racism were reported on past Manitoba Hydro projects and are key concerns with the current MH proposed developments. Despite mitigation measures, it is likely that alcohol and drug use will increase in the communities as a result of the proposed developments. This health vulnerability is particularly sensitive and could add to health inequities in the Cree Nations.

E. Cultural landscape

A core component of the concept of *mino pimatisowin* – living a good life – is the opportunity to pass traditional knowledge on between generations. Traditional knowledge in this sense can be considered as language, skills in hunting and trapping, knowledge of the Cree Worldview, and learning about seasonal movements. Passing on of traditional knowledge allows for social connections between members, continuity of culture, and strengthened emotional and spiritual ties with Mother Earth.

The proposed developments could change the cultural landscape for the affected communities by altering access to land and access to traditional or sacred sites. The main pathway through which this could occur is by physical changes to the land and waterways that prevent access to traditional hunting, fishing or sacred areas. Community member employment with the projects could also change the opportunities for cultural transmission.

In terms of health opportunities, the Manitoba Hydro PDP provides support for health through Adverse Effects Agreements:

- Adverse Effects Agreements that could be particularly beneficial for supporting Cree culture include: Cultural Sustainability Program for York Factory First Nation; Youth Wilderness Traditions Program, Cree Language Program, Gravesite Restoration Program, Lateral Violence and ‘Where do we go from here’ programs and the Alternative Resource Use Programs for Fox Lake Cree Nation; Improved Access Program, Traditional Learning/Lifestyle Program, Cree Language Program and the Museum and Oral Histories Program for the War Lake First Nation; and finally, the Traditional Lifestyle Experience Program, Traditional Knowledge Learning Program, Cree Language Program, and Museum and Oral Histories Program for the Tataskweyak Cree Nation.

Health vulnerabilities lie in the success of the aforementioned programs.

- Since the stipulations outlined in the Adverse Effects Agreements are not tested, we are uncertain of how successful the programs will be in maintaining, supporting or enhancing the cultural landscape of the KCN communities. Since these programs aim to offset adverse effects, this means that there is great vulnerability in KCN members experiencing negative health effects related to the changes that the Manitoba Hydro projects will bring to the cultural landscape. Changes to the cultural landscape are a key concern of KCN members as reflected in Table 1 and potentially represent long lasting adverse effects.

F. Health of the land / environmental resources

The concept of *mino pimatisowin* defines what it means to live a good life for Cree communities. Ingrained in this concept is the interconnection between the health of the land and the health and wellbeing of the people. The connection with Mother Earth is said to be the basis of Cree language, spirituality, history and ultimately the Cree culture. Also important in understanding this relationship is the responsibility that comes with caring for the natural world. Health is supported through ensuring all parts of the land are cared for and treated with respect. When land is not being treated with respect, there is great responsibility that is felt by Cree people, which can have profound effects on the collective wellbeing of the community. Considering these concepts is essential when attempting to assess the health effects of resource development projects that make considerable changes to the environment.

The KCN communities expressed great concern over the effects to the land and environmental resources as a result of MH developments (see Table 1).

The Manitoba Hydro PDP will result in considerable changes to the land including changing water levels, flooded lands, loss of rapids, increased levels of methylmercury in the water ways and the subsequent changes to fish and wildlife, animal habitats will be lost, traditional hunting grounds will be altered, camps and trappers cabins will be lost or ruined, access to medicinal plants and traditional territories will also change.

Health opportunities present themselves through the support of Cree culture in project activities as well as in community initiatives.

- Adverse Effects Agreements made between KCNs and MH may offset some of the health vulnerabilities that arise from the environmental changes listed above, and instead provide opportunities to strengthen relationships between the land and the people even while the land is being altered. In particular, the Access Programs proposed by York Factory, War Lake and Tataskweyak Cree Nations, Environmental or Land Stewardship programs proposed by York Factory and Tataskweyak Cree Nations; and the Museum and Oral Histories Program proposed by War Lake and Tataskweyak Cree Nations all attempt to support and strengthen the ties between the Cree People and the land.
- The KCNs have endured many changes to the land in regard to past Manitoba Hydro developments. The resilience of the community and the strength gained from cultural ties represents a health opportunity. These ties will only be strengthened if the AEA's are effective.

Even with these Programs in place, health vulnerabilities do exist:

- Because the Adverse Effects Agreements have not been tested and their effectiveness in maintaining the relationship between the land the people is unknown there is still a level of vulnerability in terms of how members will cope with alterations to the land and water.
- All KCN EIS reports discussed the weight that is felt by KCN members by partnering with MH on projects that will inevitably alter the landscape forever. The burden or weight of responsibility carried presents health vulnerabilities particularly around mental health and associated health outcomes such as violence and drug and alcohol misuse.

G. Health care service provision

Health care services are essential for disease prevention and treatment in any society. In the project area, the health services that could be affected by the Manitoba Hydro PDP include community health centres, hospitals, emergency medical transport systems, and programs such as public health and environmental health. If health care services are lacking or are understaffed or overburdened this can result in delayed care and worse off prognoses for patients. Conversely, having timely and sufficient access to health services can improve physical, mental and social health status, prevent disease and disability, improve quality of life and increase timely detection and treatment of health conditions.

KCN communities currently rely on limited health care services within their communities and often travel to Thompson or Winnipeg to receive care that goes beyond minor issues. Shortages of space and staff mean there is limited capacity to treat and manage diabetes, mental health and addictions issues, and to receive timely medical treatment. Recruitment and retention of medical staff are challenges in all communities.

In terms of health opportunities:

- Stipulations in the JKDA mean that KCN communities could and likely will benefit financially from Manitoba Hydro developments. The extent to which financial gain is used to support access to and quality of health care service provision in the individual communities will determine the health opportunities that could arise. Improving access and quality of health care services could have large health benefits.

Conversely, the Manitoba Hydro PDP has the potential to create health vulnerabilities in relation to health care services. There are three specific pathways through which that could occur: a growth in population; circumstances that result in increased usage of various health services such as mental health and addictions, public health, emergency room care, and environmental protection; and challenges in recruitment and retention.

- Any project-related influx (as a result of First Nations or non-Aboriginal people relocating in search of employment) will create increased demand on health care services simply because more people means more health care needs. Since health services are already limited and lacking in KCN communities, including Gillam, this presents a vulnerability of further decreasing access to health care services.
- Traffic-related injuries, more serious workplace injuries, and consequences of alcohol and drug misuse in the community (e.g. injuries, violence, intoxication) may require emergency medical care and transportation to Thompson or Winnipeg, increasing the burden on health care services in those regions.
- Environmental health services could also be temporarily affected during construction phases of projects because of mobile work camp inspections and inspections on any new housing developments.
- Retention and recruitment of medical staff can be a challenge during developments that lead to increases in cost of living and shortages in housing. In general, it is challenging to recruit and retain staff in northern Manitoba. This is due to the remote location and the nature of the work often resulting in little time off and high demands, as well as housing shortages. If cost of living

or housing availability is affected this could subsequently make recruitment and retention of medical personnel that much more difficult.

H. Education and training

Education is strongly tied to health and well-being and is linked with a wide range of biophysical and mental health outcomes. Specific outcomes with which education has been linked include overall mortality, specific illnesses such as cancer and diabetes, mental wellbeing outcomes such as anxiety and depression, and biological precursors for disease such as changes in inflammatory markers that are risk factors for coronary heart disease (Loucks et al. 2006; Cutler and Lleras-Muney 2006). In general, higher levels of education are associated with more beneficial health outcomes, whereas lower levels of education and literacy are linked to poorer health outcomes (Furnee et al. 2008; Higgins et al. 2008; Ungerleider and Keating 2002). Education is also associated with health-promoting behaviours; people with higher levels of education tend to smoke less, to be more physically active and to have access to healthier food.

In the KCN communities, opportunities for higher education are extremely limited. Only Tataskweyak Cree Nation has K-12. In all other communities, students must travel to Gillam or Thompson to attend high school. Some post-secondary programs are offered at Tataskweyak Cree Nation and distance adult education programs can be accessed in the War Lake First Nation community; however, most post-secondary education programs in northern Manitoba are offered in Thompson. Limited affordable housing and childcare spaces provide challenges for outsiders to attend school in Thompson.

The Manitoba Hydro PDP has the potential to greatly influence educational opportunities in KCN communities. Health opportunities exist through one main pathway:

- The infusion of industry dollars into education and training opportunities can benefit both community residents (as they gain new skills and jobs) and industry (as it gains a stable base of skilled workers). This is the case in areas of the Northwest Territories where industry has partnered with government to provide training opportunities for locals through the implementation and monitoring of Socio-economic Agreements (SEAs) (GNWT 2013). Training programs like the Hydro Northern Training and Employment Initiative (HNTEI) provided KCN members health opportunities by improving the likelihood of obtaining long term, skilled employment with MH developments. Continuation of a similar program would allow KCN members to further these health opportunities with the proposed developments.

The PDP also presents health vulnerabilities in terms of education and training:

- Often it is the case that longer-term, less stressful and more fulfilling jobs go to newcomers who have the specific skills and expertise to obtain these types of jobs. This type of trend will minimize education and training opportunities for locals (Jacquet 2009) and can only be avoided if concerted effort is made to develop these training and job opportunities. If programs like the HNTEI are not continued there is risk that KCN members will become vulnerable to the aforementioned trends and opportunities for health gain through education and training will be lost.
- Some individuals may choose to leave school early in order to work on the Manitoba Hydro projects. This effect has been found elsewhere in communities booming from resource development projects (Beaudry et al. 2000; Goldin and Katz 1998; Neumark and Wascher 1995;

Rees and Mocan 1997). However, a recently published Canadian study indicated that resource development booms may simply delay educational attainment and that many school leavers return to finish their education at a later point (Emery et al. 2011). It is uncertain whether this is a risk or opportunity in the context of the MH developments.

I. Housing

Adequate housing is a basic human need and a cornerstone to achieving good population health. Unsafe housing (i.e. housing that lacks vital necessities such as adequate heating running water, requires major repairs, or contains mold) may contribute to poor physical health (Bryant et al. 2002). Overcrowding can lead to an increased risk of person-to-person transmission of infectious disease. (Guzman et al. 2005). Unaffordable housing can also be a causal factor for food insecurity if people are forced to choose between paying for housing and other basic needs. Housing must be both accessible (i.e. affordable) and adequate (i.e. safe) for it to provide maximum health benefits to a community.

Housing is a major concern for KCN communities. Currently each of the four communities experiences crowding and the majority of housing units on reserve land require major repairs, due to factors that include the presence of mould and poor ventilation. Each community also has a waitlist for members needing new housing, and there are significant financial and land availability barriers that stand in the way of meeting housing demands. Most new housing slated for Gillam is for Manitoba Hydro employees. First Nations members living in Gillam occupy accommodations in the trailer park as they are the most affordable units. Thompson has faced increases in population and a resulting increase in housing and rental costs that have led to the displacement of low-middle income residents. Temporary housing is being considered for short term stays to accommodate workers coming into town.

In terms of health opportunities around housing:

- Stipulations in the JKDA mean that KCN communities could and likely will benefit financially from Manitoba Hydro developments. The extent to which financial gain is used to provide good quality, affordable housing to KCN members will determine the health opportunities that could arise. Improving access to and quality of housing for KCN community members has the potential to have substantial health benefits.

Health vulnerabilities also exist:

- Family members could return to reserve communities in search of employment with the proposed developments, increasing the burden on local housing units. Since overcrowding and poor housing quality are major issues on all reserves this shift in population presents health vulnerabilities for KCN members, possibly exacerbating current health issues associated with crowding (respiratory illnesses and infections, injuries, violence, poor mental health, poor school performance). Family members returning home to seek employment was a key concern of KCNs.
- Adverse Effects Agreements or similar agreements between Manitoba Hydro and the KCN communities currently do not include stipulations around housing provision or improvements for KCN members. Given the large shortage of good quality, safe, affordable housing both on reserve and in Gillam and Thompson, future influx and increased demands on housing present grave health vulnerabilities for KCN members. Building new affordable housing units in Gillam

for non-MH employees would help alleviate some housing issues, at least for members of Fox Lake Cree Nation, and provide for health opportunities.

- In communities like Thompson and Gillam, housing inflation will continue to increase as demand for housing increases with influx of more workers. This trend would likely exacerbate current vulnerabilities around housing and health for KCN members living off-reserve. Displacement of low-middle income residents and even homelessness, which has severe health consequences, could increase.
- Current plans indicate that MH is planning to supply more housing units in Gillam for its employees as Manitoba Hydro developments continue. Given the lack of good quality affordable housing in Gillam for KCN members (particularly Fox Lake Cree Nation), the potential to exacerbate existing health vulnerabilities around health equity and housing is great.

J. Health inequity

Health inequity refers to unfair and avoidable differences in the distribution of illness or health supports between population groups. With respect to the Manitoba Hydro Plans, health inequity may arise if the distribution of the benefits of the development does not match the distribution of risk; for example, if the people who take on the risk of exposure to contaminants or who experience decreases in access to healthy foods are not those who stand to proportionately benefit from the profits of the Project or from the provision of jobs.

Health inequity can arise in any of the nine health effect categories described above. For this reason, it is useful to think of health inequity as a “lens” that can be fitted to examine the distribution of potential positive and adverse effects of the projects.

A number of opportunities to improve health inequity (and, conversely, vulnerabilities of exacerbating health inequities) have been described within the health effect areas above. These generally fall into two categories:

- The potential to improve / exacerbate health inequities among individuals within the KCN communities and other affected areas. This would arise from an imbalance in the distribution of individual benefits such as employment and related income. As stated earlier, employment and income have the potential to confer benefits on those who receive them. However, depending on the distribution, employment opportunities may have the unwanted effect of increasing health inequities by increasing the gap between the haves and have-nots.
- The potential to improve / exacerbate health inequities among communities. As shown throughout Section 3, for most measures of health outcomes including mortality, injuries, illnesses and health behaviors, residents of the Burntwood Regional Health Authority do not fare as well as the Manitoba average. The community revenue (and any associated benefits through the provision of electricity, for example) tied to the Manitoba Hydro projects could lead to improvements in access to services, housing conditions, and other health supports that would benefit all community members and contribute to a decrease in health inequity between the BRHA communities and the rest of Manitoba. However, the BRHA and the KCN communities in particular comprise the area in which the adverse effects of the Manitoba Hydro project on social and biophysical environments are most likely to be experienced. To the extent that these

adverse effect manifest, there is potential for them to increase health inequity between these communities and the rest of Manitoba.

5. Differences Among Alternatives

In terms of the health areas discussed in this report, it is difficult to quantitatively characterize the differences in the plans presented by Manitoba Hydro. However, there are a number of substantive differences between the plans that may influence health. For this report, we are focusing on Plans 1, 4 and 14.

Table 4: Alternatives analysis for Manitoba Hydro development plan options

	Plan #1	Plan #4	Plan #14
Overview of relevant elements of Plan	<ul style="list-style-type: none"> • Keeyask not constructed • Conawapa not constructed • No new inter-ties • New gas-fired generation installed roughly every three years starting in 2022 	<ul style="list-style-type: none"> • Construction of Keeyask with a 2019/20 in-service date • Conawapa not constructed • 230 kV inter-tie with the US in order to facilitate a 250 MW firm export contract with Minnesota Power starting in 2020. • Natural gas-fired generation starting in 2024/25 and, as needed, thereafter. 	<ul style="list-style-type: none"> • Construction of Keeyask with a 2019/20 in-service date • Construction of Conawapa with a 2026/27 in-service date • 500 kV inter-tie constructed • Natural gas-fired generation starting in 2041 and, as needed, thereafter.

With Plan 1, current trends in health outcomes and supports would continue. KCNs currently face inequities in housing, health care service provision, rates of certain diseases like diabetes and obesity, injury rates, and employment, education and training opportunities and food insecurity. Efforts by INAC, the Government of Manitoba, and the Northern Regional Health Authority (previously the Burntwood Regional Health Authority) to address challenges would be the predominant option for attempting to improve any health inequities or quality of life challenges. Potential employment opportunities may result from the installation of the gas-fired generation stations but there is no guarantee that KCNs would be hired for this work. However, because under this alternative the Keeyask and Conawapa facilities would not be constructed, potential adverse impacts to the environment, cultural landscape, social environment, public safety and diet and nutrition would not occur.

Plan 4 involves the development of the Keeyask Generation Project, and along with that, the JKDA partnership and Adverse Effects Agreements. Most of the health opportunities and vulnerabilities discussed in Section 4 are relevant under this scenario. While there is the potential for both positive and adverse effects on health with this plan, health opportunities are highly dependent on the success of the JKDA partnership, Adverse Effects Agreements and the distribution of any revenue earned from the developments by the KCN communities. On the other hand, the potential adverse effects outlined in Section 4 are well-documented with resource development projects in general, in hydropower projects specifically, and in recent history with past Manitoba Hydro developments and thus are associated with a higher degree of certainty. Nonetheless, if the aforementioned programs and agreements are

successful, Plan 4 presents an opportunity to—at least in part—mitigate health vulnerabilities that currently exist or that would be created by Manitoba Hydro developments.

Plan 14 includes the major development components outlined for Plan 4, but also includes the development of the Conawapa Generation Station. The Conawapa station therefore represents the main difference between plans 4 and 14 from a health perspective. To the extent that Conawapa additionally affects social and biophysical environments over and above any effects of the Keeyask development, associated health effects could also be expected. The potential for partial mitigation of adverse health effects would depend on whether or not the JKDA and the Adverse Effects Agreements are maintained and/or updated for Conawapa. If these partnerships and agreements are not improved or maintained then Plan 14 would present more health vulnerabilities than opportunities as Manitoba Hydro developments moved from the Keeyask to the Conawapa stage.

In summary, the KCN communities are currently experiencing health inequities across a broad range of measures that include both health outcomes such as injury, illness, life expectancy, etc. and key health supports such as housing, infrastructure and access to health services.

Because the Manitoba Hydro projects have the potential to strongly influence the economic, biophysical and social environments in the area, they also have the potential to influence health among area residents. The influence is not expected to be entirely adverse; there are opportunities to positively influence some health outcomes and, if the projects are done well and with an eye towards decreasing health inequities. However, there is also a very real potential for the Manitoba Hydro projects to exacerbate existing health vulnerabilities of the population.

Among the different proposed Plans, health effects are tied closely to the extent of economic, biophysical and social change, with greater effects seen with greater levels of change. The JKDA partnership and Adverse Effects Agreements will be critical tools in maximizing the potential for health benefits to accrue.

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