Development of Indicators for Community Well-Being in Potential Host Communities

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nwmo
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Nuclear Waste Management Organization

The Nuclear Waste Management Organization (NWMO) was established in 2002 by Ontario Power Generation Inc., Hydro- Québec and New Brunswick Power Corporation in accordance with the *Nuclear Fuel Waste Act* (*NFWA*) to assume responsibility for the long-term management of Canada's used nuclear fuel.

NWMO's first mandate was to study options for the long-term management of used nuclear fuel. On June 14, 2007, the Government of Canada selected the NWMO's recommendation for Adaptive Phased Management (APM). The NWMO now has the mandate to implement the Government's decision.

Technically, Adaptive Phased Management (APM) has as its end-point the isolation and containment of used nuclear fuel in a deep repository constructed in a suitable rock formation. Collaboration, continuous learning and adaptability will underpin our implementation of the plan which will unfold over many decades, subject to extensive oversight and regulatory approvals.

NWMO Social Research

The objective of the social research program is to assist the NWMO, and interested citizens and organizations, in exploring and understanding the social issues and concerns associated with the implementation of Adaptive Phased Management. The program is also intended to support the adoption of appropriate processes and techniques to engage potentially affected citizens in decision-making.

The social research program is intended to be a support to NWMO's ongoing dialogue and collaboration activities, including work to engage potentially affected citizens in near term visioning of the implementation process going forward, long term visioning and the development of decision-making processes to be used into the future The program includes work to learn from the experience of others through examination of case studies and conversation with those involved in similar processes both in Canada and abroad. NWMO's social research is expected to engage a wide variety of specialists and explore a variety of perspectives on key issues of concern. The nature and conduct of this work is expected to change over time, as best practices evolve and as interested citizens and organizations identify the issues of most interest and concern throughout the implementation of Adaptive Phased Management

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A report submitted to the NMWO

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1.0 INTRODUCTION

In June 2007, the Government of Canada selected Adaptive Phased Management as Canada's approach for the long term management of used nuclear fuel. The Nuclear Waste Management Organization (NWMO) is now working to implement Adaptive Phased Management. The first major task for the NWMO is to collaboratively develop the process that will be used for seeking a site for this important national infrastructure initiative in collaboration with an informed, willing community (NWMO, 2009). In May 2009, the NWMO released an invitation to review a proposed process for selecting a willing host community entitled *'Moving Forward Together: Designing the Siting Process for Selecting a Site – Invitation to Review a Proposed Process for Selecting a Site'*. An overarching component of the proposed siting process is to ensure the safety of a site and foster community well-being.

Purpose

The purpose of this paper is to develop a generic approach for assessing social, economic, and cultural effects as part of work to assess the suitability of potential candidate sites. The paper provides a set of measures and indicators that can be used to assess community well-being in a potential host community. The framework can be used as a basis for internal planning and the eventual discussion with interested communities for developing site specific evaluation procedures. The development of this framework is consistent with the approach to fostering community well-being outlined in NWMO's proposed process for selecting a site (NWMO, 2009) and the general approach to social, economic and cultural effects that is outlined in Chapter 14 of NWMO's final study report (NWMO, 2005).

In addition to this paper, the NWMO has commissioned other consultant papers (AECOM, 2009a and 2009b) which set the tone for the understanding and development of the concept of community well-being.

1.1 Overview of Literature on Community Well-Being

The concept of community well-being is one of the frameworks for community assessment (among with other concepts, e.g. local community quality-of life studies, community health or community capacity). Measuring well-being in a community is vital to knowing how that community is faring; it therefore provides critical information for decision-making regarding sustainable development in regional communities. The concept is focussed on understanding the contribution of the economic, social, cultural and political components of a community in maintaining itself and fulfilling the various needs of local residents (Kusel and Fortmann, 1991). The studies of community well-being use several approaches.

Other studies focus on general well-being and try to identify factors forming well-being in the communities. These studies build on a mix of social indicators, historical information, and data collection in the communities regarding how people themselves and perceive different aspects of their lives. Community well-being is not easy to 'measure': it is largely a subjective concept. Well-being is normatively seen as a state of being for individuals or groups, and one that is often evaluated against a set of socially determined ideals (Teghe and Rendell, 2005). Well-being is associated with factors such as economic prosperity, market participation or the outcome of

good social policy. Well-being has also been associated with concepts such as happiness, life satisfaction and social capital, all of which fall under the `social quality of life'. The social quality concept identifies when social goals have been achieved as part of policy directions. Social quality can be defined as "the extent to which citizens are able to participate in the social and economic life of their communities under conditions which enhance their well-being and individual potential" (Beck, van der Maesen, Walker 1998, p 3).

1.1.1 Community Well-Being and Facility Siting

In relation to facility siting, the concept of community well-being can serve to assist the development of criteria to determine the effects of a development upon a community's social, economic, cultural, environmental and physical structure. It assumes the development can have positive or negative effects on community well-being. Fostering community well-being in siting initiatives involves a community driven process whereby local stakeholders play a pivotal role in decision making processes. When properly managed, project spending and employment can yield positive outcomes for community well-being. Taking into account issues of fairness and equity and addressing specific community needs, interests and values are also of great importance to community well-being and decision making processes (AECOM, 2009a). Fundamental to the maintenance of community well-being is the development of trust between siting authorities and the potential host community.

These ideas have been recognised internationally and were recognised by the Nuclear Energy Agency (NEA) in 2004 when it stated: '*It is now an important acquired principle in radioactive waste management world-wide to accompany siting efforts with sound local and regional development schemes taking into account the views of the affected communities. Enhanced oversight by local authorities, fully visible to stakeholders, builds public confidence in the decision-making process*'. The exact definition of what the NEA refers to as 'added value' will be *'specific to each site, and more importantly, to each community and will have to be developed in consultation with local stakeholders.'*

The ways in which these potential improvements in *'community well-being'* and '*quality of life*' may be introduced and *'add value'* have varied from country to country and reflect the varying cultural frameworks that exist. In some situations the use of so-called *'community benefits'* has been adopted to give a potential host community a way of viewing a development in terms of economic, social and infrastructure gains. This is in direct contrast to the use of terms such as *'impact mitigation'* and *'compensation'* that have been used elsewhere, and stresses real positive outcomes over potential management of negative ones.

There can of course be a marked difference between community reactions to potential changes in '*well-being*' and '*quality of life*' depending on the location. Clearly, if a proposed facility is located away from existing nuclear host communities, and where there is little or no familiarity with the nuclear industry, there could be considerable impact due to the likelihood of changes in the existing social structure. On the other hand, the case studies show that if properly managed, facilities located in communities accustomed to them can also have positive outcomes. It is these reactions and impacts which need to be assessed through the development of criteria, measures and indicators designed to cover all relevant factors.

The theory of assessing community well-being, community acceptance and the practice of applying criteria and indicators is well established in the social sciences. As early as the 1960's research out of the University of South Carolina at Chapel Hill generated the 'competition for community benefits model'. The model has since been used in siting processes to ensure equity and safety. According to the 'Facility Siting Credo', for example, for a siting process to be successful, first and foremost it must ensure that a community becomes better off with a facility than without it (Kunreuther et al., 1993). Likewise, this is the goal of promoting and maintaining community well-being in a potential host community.

The '*Moving Forward Together: Designing the Siting Process for Selecting a Site – Invitation to Review a Proposed Process for Selecting a Site'* report outlines the 'Proposed Criteria to Assess Factors Beyond Safety' (NWMO, 2009). The report provides an overview of five factors that should be considered in assessing the potential effects of the project on the long term well-being of a potential host community. The five factors are as follows:

- Potential social, economic and cultural effects, including factors identified by Aboriginal Traditional Knowledge;
- Potential for the project's enhancement of the community's and the region's long-term sustainability, including factors identified by Aboriginal Traditional Knowledge;
- Physical and social infrastructure in place and/or potential to be put in place to implement the project;
- Potential to avoid ecologically sensitive areas and locally significant features; and
- Potential to avoid or minimize effects of the transportation of used nuclear fuel from existing storage facilities to the repository site.

1.2 Development of Indicators

Indicators that best reflect individual or community well-being depend upon the purpose of the assessment. For example, locally generated indicator lists may differ from public service lists generated by consultants or project proponents. Nevertheless, there are certain widely accepted sets of indicators that focus on aspects of individual or community well-being that are easy to quantify, generalize and compare. These sets normally include such indicators as poverty, unemployment, personal physical and mental health, education etc. They also may include rates of suicide, crime, divorce and other measures of social dislocation. There are two well-being indicator approaches: qualitative-subjective and quantitative-objective. Subjective measures often require individual/community self-assessment (by selected informants or through surveys). Objective measures are based on data sets that document social structure variables. Despite the differences of the approaches, what is common for all of them is the use of social indicators as one of the main tools of well-being assessment.

Indicators of community well-being attempt to capture the level and flow of resources over time, providing measures of well-being for both the individual and society. For example, Human

Resources and Skills Development Canada (2009) have developed a set of indicators to determine community well-being in Canada. These indicators include ten areas of well-being: work, leisure, learning, financial security, housing, family life, security, environment, health and social participation.

Indicators of community well-being are further developed in this paper to assist in ascertaining social, cultural and economic effects pertaining to the Adaptive Phased Management approach. The indicators are based on case studies of nuclear facility siting and generation station siting processes.

In the context of siting a nuclear waste repository, there are specific indicators that can be used to determine the state of community well-being and the potential for future enhancement. In existing and other nuclear host communities, well-being indicators have resulted from application of the procedural aspects of the siting process. For example, the development of benefits agreements as well as legal agreements lead to discussions on community benefits and indicators, financial well-being, community infrastructure improvements, transportation routes, the creation of strategic plans in the host community, sponsorship of community events, as well as community amenities, communications and monitoring processes, etc.

2.0 METHODOLOGY

The following section describes the methodology used in the development of factors, criteria, indicators and measures applicable to identifying and analysing community well-being in a potential host community.

2.1 Development of Factors, Criteria, Measures and Indicators

Factors, criteria, indicators and measures help to evaluate the potential effects of a facility on the host community.

'Factors' are high level constructs used to outline the processes and supports that would need to be put in place to foster community well-being in a host community. The report, '*Moving Forward Together: Designing the Siting Process for Selecting a Site – Invitation to Review a Proposed Process for Selecting a Site'* identifies five factors to be considered in assessing the potential effects of the project on the long term well-being of a community (see **Section 1.1.1**). We have amended these factors somewhat to reflect the data and insights from the case studies by removing the consideration of Aboriginal Traditional knowledge because it is beyond the scope of the case studies used.

Criteria, measures and indicators are developed for each NWMO factor. For the criteria, measures and indicators, it is important that:

1) Each is measurable;

2) Each represents a hierarchical level that becomes more specific as data of greater detail is applied;

3) Each allows evaluation against other criteria;

4) Each allows comparative evaluation amongst various types of communities; and

5) To the greatest extent possible, each can be used to define thresholds of community well-being.

Their utility is defined as follows:

- *Criteria* – Broad tools to be used to evaluate community well-being based on the aforementioned five factors. The criteria provide mechanisms to assess and identify the extent to which positive and negative effects on a host community can be addressed.

- *Measures* - Used to assess whether or not there will be enhanced or reduced community well-being based on the previously determined criteria. Measures are designed to assist the evaluation of the precursors identified as necessary for community acceptance of a nuclear waste management facility by indicating direction of

change, comparative values and/or whether thresholds are being met or exceed. In determining each measure, this report identifies:

  - Why the particular measure is important to community well-being;
  - How a siting process and/or the facility (construction, operation and maintained) would influence the measure positively or negatively; and
  - How the measure will assist the NWMO in knowing what resources will be needed to help achieve siting success.

- *Community Well-Being Indicators* – Indicators are applied for practical applications to inform the measures within a siting process and to evaluate changes in well-being that may occur in relation to the host community during the siting process.

- *Data subsets* provide the specific data and information required to inform each indicator.

Figure 1 depicts the analytical framework for analysing community well-being.

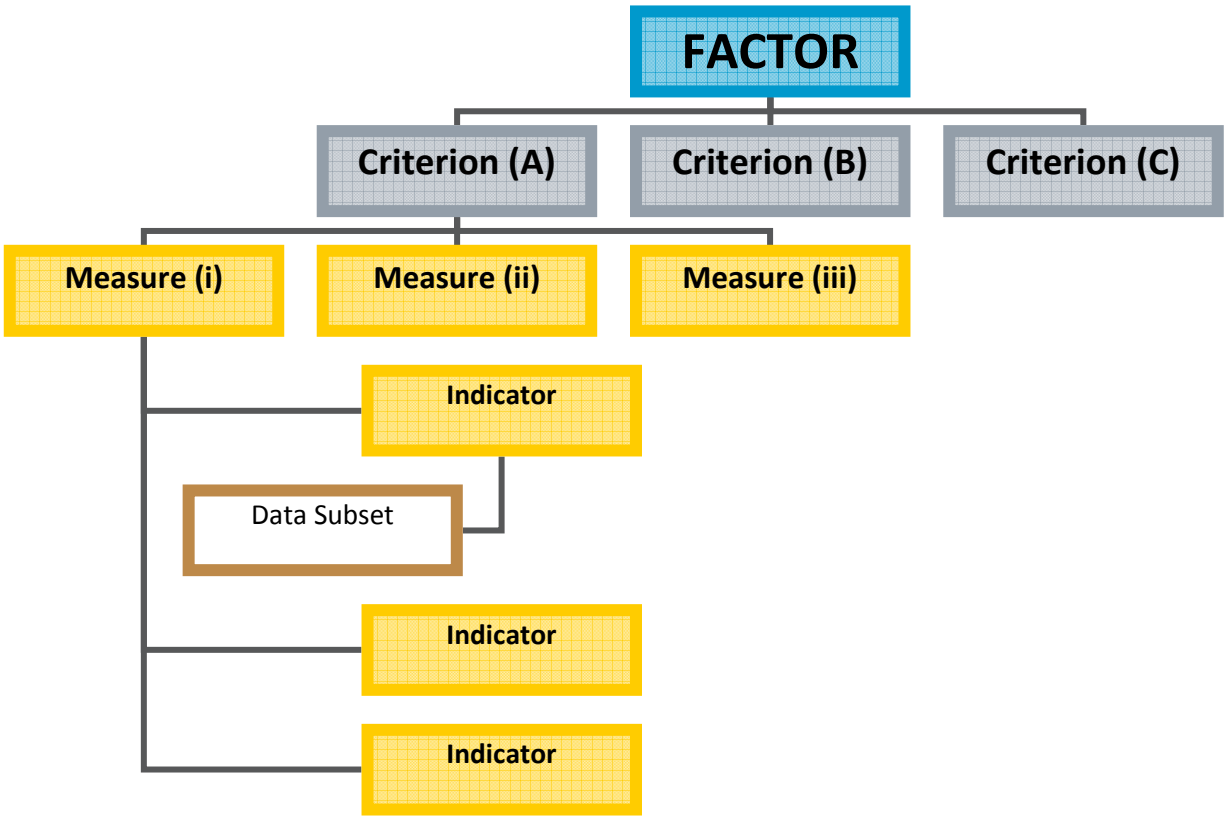

Figure 1: Analytical Framework for Community Well-Being

2.2 Data Collection

The selection of criteria, measures and indicators are informed by specific examples of community well-being and data that is derived from the case studies (See **Section 3.0**). As used in this paper, a case study is an in-depth investigation or study of a single siting experience. Case study methods involve an in-depth, longitudinal examination of a single instance or event and provide a systematic way of looking at events, collecting data, analyzing information, and reporting the results. Case studies allow for an understanding of why the instance happened as it did, and what might become important to look at more extensively in future research (Yin, 2009). Information for the case studies has been obtained through Environmental Assessment documents and other documents as well as first hand working experience with each situation.

3.0 CASE STUDIES

The following case studies are used to provide an overview of the socio-economic and procedural baselines of five nuclear host communities for low, intermediate and high level nuclear waste and one for a community that hosts a thermal generating station.

The case studies chosen include three Canadian examples and three European examples. The Canadian examples provide insight into best practices and partnership development between host communities and facility proponents in Ontario. Conversely, the European examples provide overviews of siting processes from an international perspective. The following case studies were used:

Canada:

- Low level and historic radioactive waste site selection and management in the Municipalities of Port Hope and Clarington, Ontario
- The siting of a Deep Geologic Repository for low and intermediate level radioactive waste in the Municipality of Kincardine, Ontario
- Site selection and construction of the coal fired Aitkokan Generating Station in the Township of Atikokan, Ontario

Europe:

- The selection of Eurajoki, Finland, as host for a spent fuel repository
- The selection of an area in the Meuse and Haute Marne region of France for an underground research laboratory and deep repository (final site yet to be identified)
- The study of Oskarshamn and Östhammar in Sweden as potential sites for a spent fuel repository

The case studies focus on social, economic and cultural effects assessment in the siting of deep geological repositories and similar facilities, including lessons learned. Each of the case studies provide an examination of:

- The siting process;
- The EA and regulatory process carried out;
- Social and economic impact studies performed;
- Local involvement; and

- Procedural elements (e.g. hosting agreements, property value protection programs, etc.).

3.1 The Deep Geologic Repository in Kincardine, Ontario

Community Profile
The Municipality of Kincardine is located in Bruce County, Ontario on the shores of Lake Huron. The Municipality of Kincardine has a population of 12,000. Kincardine is a 'nuclear community' and is the home of Bruce Nuclear Power Development. Bruce Power is the cornerstone of the Municipality's economic base and is the largest employer in Bruce County.

Deep Geologic Repository
Ontario Power Generation (OPG) is the proponent for the Deep Geologic Repository (DGR). The DGR is designed to manage low and intermediate-level radioactive wastes, produced from the continued operation of OPG-owned nuclear generating stations at Bruce, Pickering and Darlington, Ontario. Low-level waste consists of industrial items that have become contaminated with low levels of radioactivity, during routine clean-up and maintenance activities at nuclear generating stations. Intermediate-level radioactive waste consists primarily of used nuclear reactor components - such as the ion-exchange resins and filters used to purify reactor water systems.

3.1.1 Siting Process

In 2002, Kincardine's Municipal Council approached OPG to discuss a waste management option for low and intermediate level nuclear waste. Later in 2002, the Municipality of Kincardine and OPG signed a Memorandum of Understanding (MOU). The MOU set out the terms under which OPG would develop, in consultation with the Municipality of Kincardine, a plan for the long-term management of the low and intermediate level radioactive waste at the WWMF (OPG, 2006). The MOU also consisted of a 'work plan' that would examine the technical feasibility of a management option. The 'work plan' would also involve a socio-economic impact assessment and a review of European and American models for the long-term management of the LLW and ILW. The MOU also outlined the need for a communications plan that would address the involvement of other stakeholders, specifically the other municipalities in Bruce County.

Under the MOU, Golder Associates was commissioned to conduct an Independent Assessment of the possible long-term management options for the low to intermediate level waste. The report, which was released in 2004, compared the storage options and consulted with the local community and stakeholders. Three options were investigated as methods to dispose of the nuclear waste; enhanced processing, treatment and long-term storage, covered above-ground vault, and Deep Geologic Repository (DGR). The DGR emerged as the preferred option (OPG, 2005). A geotechnical and safety assessment was conducted for the various storage options. Additionally, there was an analysis of the environmental and socio-economic impacts, which included consultations with stakeholders and First Nations.

In 2004, The Municipality of Kincardine adopted Resolution No. 2004 – 232 endorsing the DGR

option for the long-term management of low and intermediate level nuclear wastes in Kincardine. During this time period, members from OPG and the Nuclear Waste Steering Committee (a sub-committee from the Municipality of Kincardine consisting of members of the Kincardine Council and Municipal staff) visited facilities similar to the proposed DGR in Finland, Sweden, Germany, France and the United States.

In 2004, By-Law No. 2004-157 (OPG Low and Intermediate Level Nuclear Waste Agreement) was created to authorize the signing of an agreement with OPG for the management of LLW and ILW. The legal agreement known as the 'Hosting Agreement', was negotiated in 2004 between the Municipality of Kincardine and OPG (OPG, 2006). This agreement identified the four 'Adjacent Municipalities' (Saugeen Shores, Erran-Alderslie, Brockton, Huron-Kinloss) that would also be involved.

The Hosting Agreement outlines the terms and conditions for the community consultation, which would have had to occur no later than February 28, 2005 (OPG and Kincardine, 2004). Part of the community consultation (later known as the 'official phone poll') was to ask a question that was capable of being answered affirmatively or negatively by a yes or no.

3.1.2 Environmental Assessment Process

As a pre-requisite to licensing a new deep-geological repository, an environmental assessment (EA) under the Canadian Environmental Assessment Act must be conducted before any licensing decision can be made. June 12, 2006 marked the first open house for the release 'Draft Scoping Document' for the DGR. Public comments on this document were submitted to the Canadian Nuclear Safety Commission (CNSC). Intervener funding was also announced. On October 23, 2006, a Public Hearing was conducted on the 'Scoping Document' that included a forum for public comments to be presented in front of the CNSC. On December 21, 2006, the CNSC recommended to the Minister of the Environment that the EA on the DGR be upgraded from a comprehensive study to a panel review. On June 29, 2007, the Honourable John Baird, Federal Minister of the Environment and Minister responsible for the Agency, announced the referral of the project to a review panel. The panel will be managed by the CNSC acting as the Responsible Authority under the Canadian Environmental Assessment Act.

The Canadian Environmental Assessment Agency (the Agency) and the Canadian Nuclear Safety Commission (the CNSC) released for public comment two documents — the draft Environmental Impact Statement (EIS) guidelines and the draft Joint Review Panel (JRP) agreement — related to the Ontario Power Generation proposed Deep Geologic Repository Project to store low and intermediate-level radioactive waste in the municipality of Kincardine, Ontario. The JRP Agreement establishes how the panel will function and the terms of reference for conducting the environmental assessment, and for considering the licence application to prepare a site and construct a facility.

The draft EIS guidelines released in June, 2008 identify the information needed to examine the potential environmental effects of the proposed project, as well as its requirements for a licence to prepare a site and for construction. The draft EIS Guidelines and the draft JRP Agreement were subject to public consultation from April 4 to June 18, 2008, and were amended following

consideration of the comments received. On August 29, 2009, a notice of commencement was issued for the environmental assessment process for the DGR.

3.1.3 Social and Economic Impact Studies

Western Waste Management Facility – Independent Economic and Social Analysis
In 2004, Gartner Lee prepared a document entitled Western Waste Management Facility – Independent Economic and Social Analysis. The report analysed the effects on the social and economic environment of Bruce County on each proposed alternative for storing the low and intermediate level waste (Gartner Lee, 2004).

The study examined social and economic factors from Statistics Canada, local policy documents (Official Plans, etc.) and well as public attitude research and tourist surveys that were conducted in Bruce County in 2003. Baseline conditions were analysed for the local population, employment, business activity, tourism, housing, property values, municipal finance, community character, community / recreational features and activities and public attitudes. The economic analysis reviewed the effects of each proposed alternative for waste management on indicators such as employment, housing, facility expenditures and income spending, population, property taxes, municipal taxes and tourism. The social analysis used indicators including:

- Initial impressions of the long-term waste management initiative;
- Potential for changes in public attitudes;
- Potential for changes in the attractiveness of the area; and
- Potential for changes in behaviour.

This economic analysis concluded that there are significant economic benefits to Kincardine and the Neighbouring Municipalities associated with all of the options for waste storage. These benefits are greater than those currently occurring as a result of the operation of the WWMF. The economic analysis did not identify any negative effects. The social analysis component of this study concludes that, there is little potential for significant social effects as a result of the implementation of long term waste management options at the Western Waste Management Facility (WWMF). This conclusion was determined by examining the initial impressions of people pertaining to the presence of long term waste management at the WWMF, the potential for changes in public attitudes and the potential for changes in people's behaviours.

Independent Assessment Report
Golder Associates commissioned an Independent Assessment Report that also detailed the social, economic and public attitude work as completed in the *Western Waste Management Facility – Independent Economic and Social Analysis* (Golder Associates, 2004). The Independent Assessment report stated that each of the options being considered for radioactive waste management would have significant economic benefits to Kincardine and the adjacent municipalities. These benefits would have direct expenditures and employment as well as indirect employment and associated economic activity in the community. No adverse economic effects were identified.

Draft Project Description
As part of the Draft Project Description (2005) a section was dedicated to social and economic conditions as well as land use in the local and greater community in Kincardine and Bruce County. The Draft project description also has a section dedicated to Community and Stakeholder Consultation and communications which describe the stakeholder briefings, open houses and public attitude research that was completed. This section of the report also outlined communications methods, the official phone poll ,as well as the community decision and hosting agreement. First Nations communications were also described.

Draft Environmental Impact Statement (EIS)
In the Draft EIS Guidelines (2008) there are also socio-economic effects provisions. The EIS identifies human and social as well as aboriginal factors in its identification of Valued Ecosystem Components (VECs). The EIS also outlines the requirements for the description of the socio-economic environment including an analysis of the economy, land uses, aboriginal land, transportation system as well as cultural heritage. The final EIS was released in January 2009.

3.1.4 Local Involvement

In February 2005, the Municipality of Kincardine conducted a telephone poll of its residents asking: "*Do you support the establishment of a facility for the long-term management of low and intermediate level waste at the Western Waste Management Facility?"* (OPG, 2006). The residents voted 'yes' with a seventy-three percent margin (Wilson, 2005). The poll was a formal indication of community support, which would allow the siting process to proceed to the next stage.

Community Consultation Advisory Group
The community Consultation Advisory Group consists of OPG officials and representatives from the Adjacent Municipalities as outlined in the Hosting Agreement. Throughout the regulatory review phase, the environmental and safety aspects of the project will be scrutinized by a number of interested parties and stakeholders, including local communities.

Open Houses
Throughout the duration of the initial steps in the siting process, open houses were held by Golder Associates. Prior to and just after the official phone poll, OPG also held open houses throughout Bruce County.

3.1.5 Procedural Elements

This section on procedural elements provides an overview of community well-being programs and legal agreements that have arisen out of the siting process and subsequent planning activities.

Hosting Agreement

Compensation
The Hosting Agreement (HA) describes the compensation package that Kincardine and the

'Adjacent Municipalities' would receive. The fees would be payable by lump sums and annual payments to a total of $35 million over thirty years. The sharing formula allots 105 units to be given to the five municipalities. The municipality of Kincardine will receive the lion's share with 65 units. Saugeen Shores will receive 25 units, 7 units to Huron-Kinloss and 4 units each to Arran-Elderslie and Brockton. OPG advertised all employment opportunities associated with the DGR and WWMF. The HA stipulated that there would be a one time payment of $2.1 million to the Municipality of Kincardine and adjacent municipalities in 2005 after the community consultation determines a clear mandate for the Kincardine municipal council to proceed with the siting process. An additional lump sum payment to Kincardine of $1.6 million was made in 2005. A lump sum of $2.1 million would be made to Kincardine and the Adjacent Municipalities prior to granting the DGR construction license. Each year starting in 2005, a payment of $1.05 million would be made to the Municipality of Kincardine and the Adjacent Municipalities to total the amounts designated in the aforementioned units. Since the payments coincide with project milestone. If the milestones are not achieved on schedule, the funds will remain in a trust until released (OPG and Kincardine, 2004)

Municipal taxes for the DGR will be based upon the assessment value of the DGR on a basis equivalent to that on which the Municipal Property Assessment Corporation. Finally, the Hosting Agreement states that there will be no nuclear fuel waste placed the in the DGR.

Property Value Protection
Under the HA, OPG would introduce a 'Property Value Protection Plan' (PVPP) to compensate property owners for the economic loss suffered or that may be suffered as a result of the decrease of property values. The PVPP will be issued to Kincardine and the 'Adjacent Municipalities'. OPG (as stated at the time of the agreement), will provide compensation to property owners for economic loss when the diminution of property is caused by radiation from the site or operation of the DGR. Applicants require proof of causation, proof in the diminution of value, confirmation by a qualified assessor and proof of title. The HA states that OPG may choose to pay the compensation claimed, pay a lesser amount, or deny the claim, or offer to purchase the property if an agreement is not reached the matter will proceed to an arbitration process.

Educational Opportunities
OPG will provide educational local and international tours of the DGR and will support community development initiatives such as trade and vocational schools in Kincardine and the 'Adjacent Municipalities' as well as develop an energy centre of excellence.

3.2 Low Level Radioactive Waste in the Municipalities of Port Hope and Clarington, Ontario

Community Profile
The Municipality of Port Hope is located along the north shore of Lake Ontario, in the west end of Northumberland County, and has a population of approximately 16,390. Port Hope is also considered a 'nuclear community' and the main industries and employers in the area are Cameco Corporation's uranium conversion facility and Zircatech Industries. The later firm produces fuel bundles and fuel pellets used by CANDU reactors.

The hamlet of Port Granby is on the shoreline of Lake Ontario in the Municipality of Clarington in Durham Region and is on the outskirts of the Municipality of Port Hope. The population of the Municipality of Clarington is approximately 77,800. Major industries and employers include General Motors, medium to large sized manufacturing plants and the Darlington Nuclear Generating Station in Pickering. The hamlet of Port Granby consists of several residential dwellings and farms.

History

Low level radioactive waste (LLRW) and associated marginally contaminated soil (MCS) present within the Municipality of Port Hope and the east portion of the Municipality of Clarington (Ward 4) are the result of industrial activities associated with arsenic due to gold processing and the recovery of radium from ores mined in the Northwest Territories and shipped to Port Hope for processing. The first radium and associated wastes were produced at a refinery operated by Eldorado Gold Mines Limited (Eldorado) in the Town of Port Hope in 1933. During the early years of refinery operations, the need to exercise care in the management of process wastes was not recognized as it is today. Process residues and other wastes were dumped at various locations throughout the community, including at the municipal landfill/ Waste materials were also used as a convenient source of fill material for construction and landscaping activities (AECL, 2005).

The focus of ore processing shifted in the early 1940s from radium to uranium (radium recovery was completely discontinued in 1953) and by 1948, Eldorado (which by then had become a federal crown corporation) began placing wastes at a site owned by the corporation near Welcome in the Township of Hope.

The Welcome facility was closed in 1955 and a new waste receiving site was established on the Lake Ontario shoreline near the hamlet of Port Granby in Clarington. Waste placement operations at the Port Granby WMF began in 1955 and continued until 1988. After 1960, the majority of wastes delivered to the facility were buried in trenches at the Port Granby site. The primary wastes at the site consisted of radium wastes, neutralized raffinate, calcium fluoride, metal slag, chemical wastes and industrial refuse.

Both the Welcome and the Port Granby sites were subsequently issued licences by the (former) Atomic Energy Control Board (AECB), now the CNSC. These sites are described as the Welcome and Port Granby waste management facilities and together with the other remediation sites, they are being cleaned up by the Port Hope Area Initiative Management Office, as project proponent (PHAI-MO) (AECL, 2005).

Present Day

Port Hope Project

The goal of the Port Hope Project is to build a new long-term waste management facility at the current LLRW management facility and adjacent property south of Highway 401 in the Municipality of Port Hope. Existing waste at the site will be excavated and placed in a new, engineered above ground mound. Other historic low-level radioactive waste and specified industrial waste from various sites in the urban area of Port Hope will be removed and safely

transported to the new facility. The facility is being designed to safely manage a capacity of approximately 2 million cubic metres of waste (including contingencies and daily cover materials) from within the Municipality of Port Hope. The waste is to be managed in above ground facilities designed to safely contain the waste for several hundred years (AECL, 2005).

Port Granby Project
The purpose of the Port Granby Project is to clean up and provide appropriate local long-term management of LLRW and marginally contaminated soils in the Municipality of Clarington. Also, to relocate the waste from the existing Lake Ontario shoreline site for management in an environmentally safe and socially acceptable, suitably constructed and appropriately controlled site for the long term. As with the Port Hope Project, existing waste at the site will be excavated and placed in a new, engineered above ground mound. The waste material to be contained in the new Long Term Waste Management Facility would include approximately 204,400 m3 of LLRW and approximately 101,000 m3 of associated MCS from the existing Waste Management Facility (AECL, 2007).

Port Hope Area Initiative Management Office
The Project proponent is the Port Hope Area Initiative Management Office (PHAI MO), a community-based program directed at the development and implementation of a safe, local, long-term management solution for LLRW in the Port Hope area. The PHAI MO operates under an agreement between the Government of Canada and the Municipalities of Port Hope for the management of the LLRW. The Project has been approved under the Canadian Environmental Assessment Act - Screening Level Environmental Assessment. The Project has been licensed by the Canadian Nuclear Safety Commission (AECL, 2006). Public Works and Government Services Canada is currently leading the detailed design stage and will submit the project to tender for facility construction.

3.2.1 Siting Process

A site selection process was required to find a permanent place for low level and historic radioactive waste. In 1986, the "Siting Process Task Force" was established by the federal government to assess the most suitable technologies for LLRW disposal, the areas of the Province with the best potential to use the technologies and the appropriate approaches for site selection. The Siting Process Task Force concluded their work in 1987 with the recommendation of a five phase Co-operative Siting Process based on the voluntary participation of local communities and collaborative, joint planning and decision-making with the participating communities.

During the period 1988-1996, on behalf of the federal government, a new "Siting Task Force on Low-Level Radioactive Waste Management" (Siting Task Force) carried out an Ontario-wide co-operative siting process to seek a volunteer host community for a disposal facility for the Port Hope area waste. The co-operative siting program included an environmental screening of the proposal to determine if and to what extent, environmental effects may be associated with the project (CNSC, 2009). The co-operative siting process concluded in 1996 with a Community Agreement-in-Principle (CAP) with the community of Deep River, Ontario. In consideration of certain specific social and economic benefits, it provided for the development of a disposal

facility in Deep River for the LLRW located in the communities of Clarington, Hope Township and the Town of Port Hope and Scarborough (all as they were known at the time). The initial assessment concluded that the potential adverse effects associated with the project would be insignificant and/or mitigatable and the project would bring significant direct and indirect benefits to the community. The necessary agreement was not reached and the project did not advance.

In 1997, the three affected area municipalities – Hope Township, the Town of Port Hope and the Municipality of Clarington each passed resolutions supporting a local solution and formed citizens' committees to consider options for the long-term management of wastes within their respective communities. The proposals put forward by the citizens' committees were accepted by the municipalities and the federal government as the basis of negotiations for legal agreements that would establish the terms and conditions under which the federal government would proceed with the implementation of the proposals (CNSC, 2009). In 2001, a Legal Agreement was signed by the municipalities with the federal government which indicated the terms of the waste management system that was to be implemented.

3.2.2 Environmental Assessment Process

Port Hope Project
In June of 2001, NRCan designated the Low Level Radioactive Waste Management Office (now the PHAI-MO) as proponent of the Port Hope project to be assessed at a screening level of detail. The Environmental Assessment Study Report (EASR) was released in 2005 and provided an assessment of the environmental effects of the proposed project. The scope of this document established the terms of reference for the environmental assessment of the Project, and was made available for public comment. Once the EASR was accepted as satisfactory by the responsible authorities, the Environmental Assessment Study Report was used as the basis for developing the Government's Screening Report on the Port Hope Project (CEAA, 2009).

The screening report, released in draft form in 2006 represented the Governments' view of the environmental effects of the Project and contained the findings and conclusions of the Responsible Authorities. The public was provided with an opportunity to comment on the screening report before it was finalized. In 2007, during the public hearing on the environmental assessment screening, the Commission considered the Environmental Assessment Screening Report and written submissions and oral presentations from the public, Agencies, Municipality LLRWMO and CNSC staff. The Commission proceeded, under the *Nuclear Safety and Control Act,* with its consideration of a licence application from the LLRWMO for the proposed project. In August of 2009, a two day hearing was held to decide upon granting a license for the Port Hope Project. In October, 2009, the license was granted by the CNSC (CEAA, 2009).

Port Granby Project
In July of 2001, the Low-level Radioactive Waste Management Office (now the PHAI-MO) was delegated by Natural Resource Canada (NRCan) to act as proponent for the Port Granby Project. The Responsible Authorities determined that a screening level assessment was required for the Port Granby Project. A Comprehensive Study EA was not required because the proposed

inventory of radioactive material to be accommodated for long term management does not exceed the trigger level for a comprehensive study (CEAA, 2009).

In February 2002, the public was invited to review a Draft Scoping document for the Port Granby Project. The draft Environmental Assessment Screening Report was released in May 2009 which was made available for public comment.

In August 2009, the CNSC announced that the Port Granby Project is not likely to cause significant adverse environmental effects, taking into account mitigation measures identified in the EASR.

3.2.3 Social and Economic Studies

Baseline Studies
In 2004, a 'Socio-Economic Environment Baseline Characterization Study for the Port Hope Project' was conducted. The Study provides a description of existing conditions that may change as a result of implementation of the Port Hope Project and the associated environmental effects of such change. The socio-economic baseline is characterized in terms of its population and economic base, land use and visual settings, community infrastructure, community services, traffic and transportation, municipal finance and administration, residents and communities, archaeology and cultural heritage resources, and aboriginal interests. A similar document was created for the Port Granby Project that was entitled 'Socio-Economic Environment Baseline Characterization Study for the Port Granby Project' and released in 2004 (AECL, 2004).

Environmental Assessment Study Reports
The Environmental Assessment Study Report (EASR) for the Port Hope Project (2005) and Port Granby Project (2007) incorporates socio-economic studies as part of the description of the existing environment. The socio-economic environment studies for both Projects assessed the likely effects on the same components as listed for the baseline studies. The assessments identified residual adverse effects of the Projects, each of which was judged to be a minor adverse effect after taking into consideration mitigation measures (AECL, 2005, 2007).

Screening Reports
Socio-economic issues were also documented in the Screening Reports for the Port Hope and Port Granby Projects in 2006 and 2009 respectively. For each Project, the Screening Report has a section entitled 'Socio-economic Environment – Likely Environmental Effects'. The section in each report provides an assessment of the environmental effects of the Port Granby Project on the socio-economic environment and evaluates the same components as listed for the EASR and baseline studies. In its assessment, the PHAI-MO considered socio-economic effects to occur as a result of biophysical effects related to a project work or activity. Beyond this, the PHAI-MO also considered socio-economic effects to occur when its research on public attitudes and public opinion indicated that, in the public's view, there would be socio-economic effects (CNSC, 2006, 2009).

3.2.4 Local Involvement

Local involvement differs for the Port Hope and Port Granby Projects. However, in both cases, the PHAI-MO has been charged with leading public involvement activities. The PHAI-MO hold public meetings and open houses and encourage interested individuals and groups to visit their information offices in Port Hope. Both the Port Hope Project and Port Granby Project have paid peer reviewers and paid dedicated municipal staff.

Port Hope Project
In the case of Port Hope, there have been multiple roundtable discussions with local residents and the establishment of a variety of ad-hoc working groups, an end use committee and a health and safety committee. For the most part, the municipal council has taken a leading role with local councillors representing the public in the environmental assessment and regulatory process.

Port Granby Project
In the case of Port Granby, a municipal staff member works closely with the PHAI-MO and local residents. There is an end use committee and a Port Granby Discussion group which presents a forum for discussion on all matters related to the Project. Members from the PHAI-MO, the Municipality of Clarington and the Municipal Peer Review Team are present to answer questions from local residents on matters related to the Project.

3.2.5 Procedural Elements

The following are procedural elements that support community well-being.

i) Legal Agreement

The Legal Agreement is a fundamentally important document for the Municipalities of Port Hope and Clarington. The Agreement sets the terms for community benefits for the Municipalities of Port Hope and Clarington.

During 2000, a Steering Committee of representatives of each of the three municipalities and NRCan developed *Principles of Understanding* that set out the framework for the subsequent legal agreement. An *"Agreement for the Cleanup and Long-term Safe Management of Low-Level Radioactive Waste Situate in the Town of Port Hope, the Township of Hope and the Municipality of Clarington"* (the Legal Agreement, 2001) was signed by the three municipalities in December 2000 and the Minister of Natural Resources in March 2001. The Legal Agreement commits the parties to the implementation of the concepts essentially as they were developed by the citizens' committees and endorsed by the municipalities and federal government.

Communications and Consultation
The Legal Agreement stipulates that the Municipalities of Port Hope and Clarington have equal decision making power as the federal government and AECL in the decision making process. The agreement also develops a protocol for communications, cooperation and consultation between the federal government, AECL and the Municipalities. Communications and consultation

protocols include the development of community Advisory Committees (CAC's) and their participation in the facility monitoring process.

Hosting Fee
The Legal Agreement also describes the hosting fees which include $20 million to the Municipality of Port Hope (the Municipality of Port Hope and Hope Township, which amalgamated and were previously allotted $10 million each) and $10 million to Clarington.

Municipal Revenue Protection
The Legal Agreement acknowledges that there is a risk of bringing about some financial disadvantage, on an interim basis, to the Municipalities of Port Hope and Clarington, in that if assessed property values are reduced, the Municipalities' tax revenues associated with affected properties could be diminished. The legal agreement stated that 'Canada will provide compensation to the Municipalities to mitigate against diminished property tax revenues as a result of the reduction of the assessed value of properties caused by the Project'.

ii) PVP Program

The PVP program as stipulated in the Legal Agreement states that the program 'would provide compensation or "Property Value Protection" (PVP) to property owners especially in regard to any diminution of property values and the effect that such diminution may have on mortgage renewals or the sale of the property'.

The PVP program has been further developed by the Port Hope Area Initiative Management Office. The PVP Program exists to ensure that anyone selling a property in the PVP Zone (in Clarington and Port Hope) is not financially disadvantaged by the activities of the Port Hope Area Initiative. To do this, the Program determines the unaffected fair market value of the property (as if the Initiative did not exist) and compensates the seller for any difference between this unaffected value and the selling price. The difference must be attributable to the Project.

Because the PVP Program was designed to protect owners' property values at the time of sale, PVP typically becomes involved once an Agreement of Purchase and Sale has been finalized. In such a case a seller who believes the sale may have been affected by the Project would file a PVP claim. The PHAI-MO would engage an independent certified appraisal of the property at the PVP Program's expense. The PVP program was also been developed to offer pre-sale appraisals, conditional claims, and the withdrawal of equity protection.

iii) Follow -Up Program and Project Monitoring

Follow-Up Programs
In addition to the Follow-up Program that is required as part of the licensing process, a 'Municipal Follow-Up Program' will be developed by each municipality for the Port Hope and Port Granby Projects. The goal of the program is to enhance or maintain the quality of life for local residents as well as to mitigate negative effects during facility construction and during the monitoring phase once the facility has been closed. The Follow-up Programs specifically apply to the mitigation of socio-economic effects and local community impacts. Furthermore, a

structured Follow-up Program will be used to foster good working relationship between PHAI-MO, Natural Resources Canada (NRCan), the CNSC and the Municipalities of Clarington and Port Hope during the construction and post construction phase of facility development. The Follow-up Program will provide a constant exchange of information between the Municipality of Clarington and Port Hope, the CNSC and PHAI-MO and serve to promote transparency in all Project activities. Additionally, the Follow-up Program will guide the decision making process to avoid negative Project impacts, maximize positive outcomes and mitigate undesirable effects.

Provisions in the Follow-up Program relate to mitigation and monitoring requirements for the Municipalities of Port Hope and Clarington, the local communities and the individual residents. The Follow-up Program will also serve to address input from local residents groups and individuals and can be reworded when necessary to capture changes for the local community.

Some examples of provisions in the Follow-up Program include requirements for:

- Communications and project logistics;
- Requested project amenities;
- PVP Program and property mitigation measures;
- Community liaison and monitoring representative;
- Conflict resolution;
- Socio-economic and environmental impacts mitigation;
- End use provisions; and
- Truck traffic mitigation.

Project Monitoring
Monitoring documents will be provided by the PHAI-MO. Some of the documents that will be provided during the facility licensing phase and into the construction phase of the project include:

- Radiation Protection Plan
- Radiation Material Transportation Plan
- Emergency Plan
- Safety Assessment

iv) End Use

End use strategies ensure that the facility design accommodates the Municipalities' desired end uses. The categories of end uses to be accommodated on and around the proposed site were made available to the LLRWMO prior to completion of the effects assessment and the EA Study Report.

The Port Hope and Port Granby Projects have End Use Committees that are made up of local residents as well as members of the PHAI-MO and the Municipalities of Clarington and Port Hope. Matters discussed at the End Use meeting include facility names, end uses for the facility (e.g. recreational uses maintained versus closing off the facility to the public), maintenance and monitoring of the facility.

v) Educational Programs

The PHAI-MO and the Municipality of Port Hope are working together to build a program that will attract local youth for training in the positions that will become available during the construction phase of the Project. Lists of skilled labour positions that will be required for the clean up process are to be circulated to local secondary schools to inform students of career paths that will be available in the Port Hope community.

3.3 Atikokan Generating Station, Township of Atikokan Ontario

Location

The Township of Atikokan is located in a sparsely located area of northern Ontario. It was the site of the Ontario Hydro Atikokan 200 MW coal-fired GS ("Generating Station") (Community Impact Monitoring Program, Final Report, 1985). The Atikokan GS burned low-sulphur lignite coal from Western Canada. Original plans called for four 200 MW ("mega-watt") units. However Units 3 and 4 were deferred indefinitely in the spring of 1978. The plant was approved in the mid 1970s and it became operational in 1985. It has since been decommissioned.

3.3.1 Siting Process

As part of a power expansion program approved by the Provincial Government in 1973, Ontario Hydro initiated a site selection program for a new generating station in Northwestern Ontario. This site selection program was the first to involve the public in the site selection process. In November 1973, Atikokan Township Council decided to make an application to Ontario Hydro that a thermal generating station be located in the area. In January 1974, Ontario Hydro representatives met with the Township Council and supporting business and community groups. The Council and supporting organizations gave unanimous support to the project. In May 1975, Ontario Hydro received authority from the Minister of Energy to acquire property for siting a 800 MW thermal generating station at Marmion Lake, within Atikokan Township.

3.3.2 EA Process

The Environmental Assessment process followed EA methodologies that were standard at the time. However, because the Environmental Assessment Act and its procedures were not passed before the site was approved, the Ministry of the Environment ruled that the provisions of the Act did not apply.

In January and February 1976, meetings were held with the Atikokan Township Council and a citizen's review committee to review environmental and community impact studies. Environmental impact studies examined potential natural environmental and socio-economic effects. The report, "Proposed Atikokan Generating Station Environmental Analysis" was prepared by Ontario Hydro and circulated for comment to various Ministries and special interest groups. This was followed by the distribution of a consultant's report "Marmion Lake Environmental Studies", which also received review and comment.

Following meetings with the Township of Atikokan Council, a Provincial Order-in-Council to Proceed authorized the acquisition of the land in August 1976. A two-day public information centre was held in Atikokan in September 1976 and subsequent meetings were held with the Township Council and citizens committee in December 1976. The Ontario Hydro Board of Directors approved a four 200 MW unit station to be completed by an in-service date of October 1984.

3.3.3 Social and Economic Impact Studies

In September 1975, Proctor and Redfern Limited completed a Community Impact Study which became the basis of a Community Impact Agreement. The Study was subject to extensive community and municipal input. Meetings with the Township Council, a citizens committee and members of the general public to discuss the Community Impact Report were held throughout 1976. A second phase report was completed in December 1976 and included more detailed scenarios of possible social and community impacts. In April 1977 meetings were held to discuss and design means of alleviating or lessening such impacts. The Community Impact Monitoring Program examined the following variables and data sets:

Table 1: Community Impact Monitoring Program Variables

Data Item	Information Requirements
Population	• total number by municipality • age-sex distribution • urban-rural distribution • family/ non-family households
Employment	• employment by type, i.e. jobs per sector • basic/ non-basic employment • union membership • wage rates
Housing	• housing stock by type • temporary accommodations • tenure and cost of units • factors influencing housing supply • planned housing areas
Education	• number and locations of schools • enrolment, teaching staff, school capacities • pupil teacher ratio
Health Care	• Atikokan General Hospital • number of beds by type • current bed and outpatient use • emergency services • physicians by specialty • hospital manpower • other: Atikokan clinic • ambulance and service area

Data Item	Information Requirements
	• agency referrals
Safety: Police	• size of force • equipment (Cars etc) • types of car • types of crime (major and minor/ juvenile)
Safety: Fire	• size of force • equipment and pumping capacity • losses by fire, severity of fires • frequency of calls
Libraries	• locations • number of volumes • contract agreements with regional library staff • number of books lost or damaged
Recreation	• park acreage • physical facilities • user demand on parks
Sewage and Water Treatment	• plant location, type treatment, use capacity operator
Solid Waste	• disposal and collection services • sanitary landfill sites: capacity plans
Day Care	• location and services offered • number of children involved
Administration	• municipal staffing departments • building permits – value in dollar amounts
Industrial Development	• number of services industrial jobs • new jobs by sector
Finance	• tax base • municipal budgets: operating, capital • debt service levels and limits • Provincial and Federal Grants • ratio of residential, commercial and industrial assessment
Health and Welfare	• homes for the aged • family counselling • social services and assistance • administration and delivery • cost per capita • trends in costs
Land Use	• review of Official Plan, Amendments • designations of acreage • existing uses by acreage • land values and property values
Housing	• rent by unit type • apartments • commercial and industrial • number of housing starts •

Data Item	Information Requirements
Social Factors:	
Alcoholism and Drug Addiction	• overall consumption • per capita consumption
Unemployment	• unemployment rates
Income	• average personal income, disposable income
Justice	• number and kinds of offences • number of court cases
Welfare	• number of people receiving welfare assistance, family and children's services • child abuse cases reported • increase in police, social services and clerical counselling
Cultural	• community organizations • number of members

As part of the Community Impact Monitoring process a range of studies were completed. These studies and their conclusions are summarized as follows:

Population and employment projections were completed. Particularly important was the influence of the closure of two mines at the same time that the generating station construction was about to begin. Overall, the generating station construction gave stability to population and employment levels.

Planning controls were examined. To address the deficiencies, the Township completed their Zoning Bylaw, Official Plan, Housing Policy Statement and a Maintenance and Occupancy By-Law. All of the studies and planning updates were important in providing the basis for economic development. The Housing Study predicted a shortage of housing, and the characteristics of housing were closely monitored. However, there were few areas of housing shortfall as construction workers took up spaces created by departing miners.

The CIA Monitoring process also examined effects on local industry. However, no increases in industrial activity occurred. Soft services and social services were examined, such as: education, medical, recreation, library and municipal office functions. In general, the services were designed to serve a larger population and were adequate to meet project demands. Conversely, the industrial sector did not have gains. A Tourism Coordinator was hired to insure the Tourism Sector did not suffer. The local accommodation industry benefited and through project efforts to buy locally, these retail and wholesale businesses fared well. Project employment (direct, indirect and induced) generated positive employment levels in a community that lost its main industries. The community had full employment during a recessionary period.

In regards to Fire, Police and Ambulance services, Municipal police staffing levels remained constant and the Ontario Provincial Police increased staff levels. In general the crime rate fell and no public order problems attributable to the project were reported.

Roads were also examined, as the needs for roads improvements were present before the project was initiated. Ontario Hydro did assist the community with roads funding through an amendment to the community impact agreement.

Municipal water and waste water services were studied and were seen to need of upgrading. The issue arose about the role of Ontario Hydro in aggravating this need. The Project funded engineering studies, assisted the community to achieve grants from higher levels of government and provided some financial assistance for servicing. Service improvements included: a new sewage treatment plant and interceptor sewers, a water treatment plant and elevated storage facility and a new sanitary landfill facility.

Municipal finance was also examined. The first observation was that the Township would loose tax revenue as a result of the mine closures. In addition, the Township found itself having to absorb other costs such as their share of a new home for the aged. As a result, the Township found itself in their first ever budget deficit situation. The project funded a Financial Management Study and Economic Development Plan. The project also paid grants-in-lieu of taxes which offset the loss in revenue from the mines. In addition, the Township receive impact payments of $1.4 million and it benefited from worker and project expenditures in the local economy (direct and indirect) totalling $2.6 million (Hancock et al., 1986).

Project workers were also active as volunteers in the life of the community.

3.3.4 Local Involvement

The local Township Council, a citizens committee, members of the general public and Ministries and agencies all had multiple opportunities to provide input to the project team. The consultation process was one of Ontario Hydro's first. Through public dialogue, Community Impact Studies were defined and reviewed. A community impact monitoring process was defined and community well-being benefit agreements were developed and signed. Once the Plant was under construction, project team members met with the Council regularly and staff corresponded with each other many times each week. Both the Township and Ontario Hydro nominated paid individuals who would represent each interest and be in constant dialogue during the construction process.

3.3.5 Procedural Elements

Hosting Agreement

The Township of Atikokan and Ontario Hydro entered into a Community Impact Monitoring Program based on a Community Impact Agreement. The Community Impact Monitoring Program was established in order to plan for and manage potential community impacts resulting from the construction of the generating station (Hancock et al., 1986). Compensation payments

were made to the Township for impacts anticipated and those that could be avoided. Payments were made for impacts that had already occurred.

A Main Legal Agreement ("Atikokan Agreement") and two Supplementary Agreements specific to monitoring community impacts and roads impacts were negotiated and signed prior to construction. Three additional Supplementary Agreements were negotiated and signed during construction to deal with special circumstances. The function of the agreements was to protect the community from impact related costs and to protect Ontario Hydro from unsubstantiated impacts. They defined the roles and responsibilities of the parties involved. Ontario Hydro did not want to fund programs which were the responsibility of government and did not want the Township to suffer as a result of the construction project. In return, the Township agreed to not prevent Ontario Hydro from obtain licenses for the construction and operation of the plant. The Township also received legally-based monitoring, a compensation system and community planning expertise.

The Agreement provided for three trust funds to be established: a) Special Grants for building permits and sewage treatment plant financing; b) Station Account 'A' for hard services such as road sand new infrastructure; c) Station Account 'B' for soft services. Funds not spent for Station Account A would revert back to Ontario Hydro at the end of construction. Funds remaining in Station Account 'B' would revert back to the municipality. There was also provision in Station Account 'B' for a top up if funds were not sufficient to accommodate impacts. Funds were kept in escrow and earned higher than bank interest if the funds were not drawn. While not needed, there was also provision for arbitration if Ontario Hydro and the Township could not reach consensus.

Under the Community Impact Agreement the Township received compensation to remedy verified impacts. The monitoring program was established to provide documentation of impacts. As a first step, a community baseline data set was established before construction. Information documenting change was compiled in an Annual Report. Although the Legal and Supplementary Agreements provided for funding, there was no rigid formula for assessing the significance of impacts and deciding upon appropriate compensation. The process was left to discussion and negotiation between the Township and Ontario Hydro.

Compensation

Over an eight year period of the monitoring, program payments were made monthly for the services of a Planning Coordinator and for impacts identified. Initial payments were made for the building permits and road construction and the remainder were made In the peak construction years 1982 and 1984. Total payments from the Community Impact Agreement Accounts were $1.3 million with Special Grants of $275 thousand; Station Account 'A' Grants of $337 thousand; Station Account 'B' Grants of $443 thousand and a residual payment of $319 thousand (Hancock et al., 1986).

An example of payments follows:

Sewage Treatment Facility	$215,000
Saturn Avenue 'road' Extension	$162,000
Road Repair and Maintenance	$175,000
Planning Coordinator	$141,000
Medical Clinic	$ 60,000
Municipal Financial Study	$ 26,900
Crisis Housing Support	$ 4,700
Municipal Library	$ 20,000
Traffic Control	$ 1,176

Agreements

The following are the Agreements enacted over the planning and construction period.

Table 2: Atikokan Supplementary Agreements

Name	Item	Date
Main Atikokan Agreement		January 2, 1978
Supplementary Agreement No. 1	Road Impact Agreement	June 21, 1978
Supplementary Agreement No. 2	Community Impact Monitoring	June 21, 1978
Supplementary Agreement No. 3	Saturn Avenue Extension	October 1, 1978
Supplementary Agreement No. 4	Sewage Treatment Facilities	June 30, 1978
Supplementary Agreement No. 5	Advancing of Residual Funds	November 30, 1984

3.4 The Deep Geologic Repository in Olkiluoto, Finland

Posiva Oy, a company formed in 1995 by the two main Finnish generating companies Teollisuuden Voima Ltd (TVO) and Imatran Voima Ltd, (IVO), now Fortum, has identified Olkiluoto, in Eurajoki municipality, as the preferred site for development of a deep geological repository for spent nuclear fuel. The site was selected following a step-wise siting process that took place over several decades. Olkiluoto is also the location of two operating reactors. A third is currently under construction, with a fourth planned in the future.

In accordance with Finnish waste management law, Posiva is currently developing an underground research facility, known in Finnish as ONKALO, in which to carry out tests to confirm the suitability of the site. This is in response to the regulatory requirement of carrying out the underground characterisation of host rock before submission of the application for construction license. As of December 2009 the access tunnel was 400 metres below the surface, approaching the planned total depth of 420 metres.

3.4.1 Siting Process

The Government of Finland took a so-called 'Decision in Principle' in 1983 to store spent fuel abroad, or to send it for reprocessing, but specified that the nuclear power plant licence holders, TVO and IVO, should also prepare for final disposal of these materials in Finland. The 'Decision in Principle' included a timetable for site selection for a final repository. Three stages were specified: 1) 1983–85 site identification surveys for the choice of investigation areas, 2) 1986–1992 preliminary site characterisation and 3) 1993–2000 detailed site characterisation in areas proven most suitable in the previous stage. It was later decided by the Council of State that the objectives of the whole investigation phase should be to complete preliminary site investigations by the end of 1992, select 2 or 3 sites for further study and to update the technical plans and the safety assessment by the end of 1992. The programme was only altered once in 20 years, when the submission date for a repository design was extended from 2010 to 2012.

TVO had dismissed reprocessing as a management option for spent fuel, whilst IVO exported spent fuel to Russia until 1996. TVO had therefore immediately begun a research programme in accordance with the 'Decision in Principle'. An initial list of 327 target areas was reduced to 162 on the basis of environmental factors and to 61 on geological criteria (McEwen and Äikäs, 2000). In these 61 target areas, 134 investigation areas were identified which were then divided into three groups in parallel to their geological classification by TVO, on the basis of population, landownership and transport facilities (Kojo, 2009).

Following a rationalisation of the target areas, affected to a large degree by public reaction to the Chernobyl accident in 1986, TVO began preliminary site characterisation in 1987. Five research areas were selected: Olkiluoto in Eurajoki municipality, site of the TVO reactors, Veitsivaara in Hyrynsalmi municipality, Kivetty in Konginkangas municipality, Romuvaara in Kuhmo municipality and Syyry in Sievi municipality. The sites selected represented different geological environments as was required by the Centre for Radiation and Nuclear Safety, the national regulatory agency, in order to allow meaningful comparisons to be made. In 1992 two of the sites (Hyrynsalmi and Sievi) were excluded from detailed characterisation, as their geology was found to be more complex than in the other areas. It was thought that further investigation would not yield sufficient information to reduce the uncertainty (Posiva, 1999).

An amendment to Finnish nuclear legislation in 1994 prohibited the export of nuclear waste. Therefore the transport of spent fuel from Loviisa to Russia for reprocessing ceased at the end of 1996. For this reason, TVO and Fortum (formerly IVO) signed an agreement to co-operate in the management of nuclear waste and established Posiva to carry this out. Another site at Hästholmen, close to Fortum's operating reactors at Loviisa, was added to the shortlist.

Following investigations at all four sites, Posiva applied for a Decision in Principle for the final disposal facility at Olkiluoto, in May 1999 and submitted an Environmental Impact Assessment.

Eurajoki municipality had not originally supported TVO's site investigation proposals and had obtained an agreement in 1980 that spent fuel would not be stored in the long term at Olkiluoto. However, by 1996 the municipal council had removed all reference to this agreement from its statements regarding waste management. A liaison committee was established with Posiva to investigate the practicalities of siting the repository in Olkiluoto.

It emerged in May 1999 that Posiva had signed a contract with Eurajoki regarding the Olkiluoto potential repository site, agreeing to the construction of a facility if the government and regulators granted permission (the so-called "Vuojoki-agreement"). The contract included an arrangement whereby Posiva would rent a building, originally an old people's home, for its headquarters, and grant a loan of 41 million markka for the building of a new home nearby. Rent from the offices was set at a rate which covers all the loan repayments. Eurajoki would only sign if Posiva ceased all negotiations with the other three potential site areas. The local council in Loviisa expressed dismay at this turn of events.

Under Finnish law the local municipality has a right of veto over decisions such as siting a repository, prior to government granting approval. However, the Eurajoki municipal council voted to accept the repository in January 2000, and the Finnish parliament approved another Decision in Principle in May 2001.

3.4.2 Environmental Assessment Process

Prior to a licence application for repository development, the Finnish Nuclear Energy Act requires a 'Decision in Principle' to be taken by a vote in parliament, following a similar positive Decision by the relevant local municipality, after which the ability to withdraw ceases. The implementing agency, Posiva, must hold public meetings to allow the public in the local area to understand what is being proposed and receive and respond to written submissions. The Ministry must then receive a preliminary safety assessment for a proposed facility from STUK and a comment from the Ministry of the Environment.

In a "normal" EA in Finland, the competent authority for the process would be the regional environment centre. In the case of a deep repository it was the Ministry of Trade and Industry (KTM), adding a special quality to this situation (Hokkanen, 2001). Even though the regulator, STUK retains an important status in nuclear waste management in general, its role in the EA process is minimal. It is one of those authorities from whom the KTM asks for statements regarding the EA program and report. After the EA process, in the Decision in Principle phase, the role of STUK became much more prominent because the safety issue is considered to be more important in that context.

In January 1998 Posiva submitted an outline Environmental Impact Assessment Program to the Ministry of Trade and Industry, and at the same time it was published for general review and comment. It was also circulated to the Swedish, Estonian and Russian authorities, as required under the Espo Convention (Posiva Oy, 1999b). At the same time, individual citizens and civic

associations also had the chance to submit written comments. Written addresses are the only way in which the public can participate in the EIA legislative process (Hokkanen, 2001).

Following submission of an EA program in 1998, an EA was prepared for the deep disposal concept at each of the four sites. After signing the agreement with Eurajoki, Posiva published the final version of the EIA (Posiva Oy, 1999b) and submitted an application to the government for a Decision in Principle on 26th May 1999 (Äikäs, 1999), identifying Olkiluoto as their preferred site. Posiva's original EA covered disposal of up to 9,000 MtU of spent fuel. Posiva arranged public meetings, small group encounters, information sessions and discussion meetings for the councils, collaborative or follow-up groups for public and association officials They also staged as well as staging exhibitions and conducting, municipal inquiries and thematic interviews. They imposed regional administration-based discussion meetings, central administration-based seminars, and discussion through the columns of the local and national newspapers (Posiva, 1999).

Following the decision to build new reactors at Olkiluoto and Loviisa, it was necessary for Posiva to submit an additional EA report to government and the safety authorities to allow for disposal of 12,000 MtU instead of the 9,000 MtU previously approved. An outline of the EA Program was published in May 2008 and approved by government in August 2008 following a further series of public meetings. The EA itself was published in October 2008 (Posiva, 2008).

3.4.3 Social and Economic Impact Studies

Environmental Impact Assessment Report 1999
The initial EA for the repository presented information on each of the four sites that had been investigated in detail. In additional to the normal assessment of environmental and safety related impacts from the repository, other factors that were assessed included changes in population and population structure, impact on employment, impact on production and business activities, impact on infrastructure, impact on the economy of the municipality and inhabitants and impact on the image of municipality.

Municipal Image Study 2006
In 2006 Posiva published the results of a study of the feelings among local people in Eurajoki about how development of a repository might affect the image of the community. This was an updated version of an earlier 1998 study where the image of Eurajoki was compared with the other municipalities that were potential final disposal sites. The study was conducted by telephone in October to December, 2006 and involved interviewing 500 consumers, 200 representatives of businesses and 200 residents. Eurajoki residents had a much more positive attitude to nuclear activities than residents elsewhere, and although most were less concerned about the potential impact than in 1998, there was still evident concern regarding safety-related issues as opposed to the potential economic impact.

Regional Economic, Socio-economic and Municipal Economic Impacts of a Disposal Facility for Spent Nuclear Fuel, 2007
In 2007 Posiva published an economic and social impact study of development of the deep repository at Olkiluoto. This was an update of an earlier more general study which fed into the

1999 EIA report. The study evaluated the local and regional economic impacts in terms of a number of criteria, including demographic profile, labour market, local company operations, the local economy, employment, the tax system and local municipal finances. Social impacts were examined in terms of effects on community structure and local image.

Environmental Impact Assessment Report for the Expansion of the Repository for Spent Nuclear Fuel

This assessment revisited many of the issues examined in the original EA in 1999. It also included details from the 2007 review, repeating the comment that the development of ONKALO, the agreement over the old people's home and Posiva's relocation have all had a positive impact on the local and regional economy throughout the 2000's. It claimed that local people were pleased with these impacts and that the feared negative impacts had failed to materialise.

3.4.4 Local Involvement

In Finland, the regulations state that the local municipality possesses an ultimate right to veto any development within its area. It was not necessary however for Posiva to obtain formal community approval for carrying out site investigations associated with the search for a deep repository, only when a site was approved by a Government 'Decision in Principle' for detailed investigations and an exploratory access. However, TVO (and now Posiva) always maintained close contacts with the communities around the investigation sites. This generally took the form of community liaison groups, and there were ongoing public relations and education programmes, with a local office in the nearest community to each of the four potential sites (Ryhanen, 1996) and (Avolahti, 2000).

As mentioned, during the EIA process a series of hearings was held in the four potential site communities between February and mid-April 1998 and the public was invited to make comments on the contents of the Programme and to submit written opinions. Public submissions dealt in the main with issues of perceived impact associated with construction and operation of the repository, as opposed to technical issues concerned with long-term performance and safety, although these were also raised. Although 15 local authorities and public bodies, 23 municipalities and five civic organisations and communities submitted statements to the hearings, as did 15 individuals (Ruokola and Vaatainen, 2000), the hearings themselves were not particularly well attended. Even in the best attended meeting the number of participants was less than one per cent of the local population over the age of 15. This was despite the appointment in each community of an 'EA contact person' to raise the profile of the EIA process and to encourage participation.

The issues covered in the written submissions were similar to those found at the previous stage of the EIA programme. The most critical views came from individual citizens and from civic associations, especially in their attitude towards the EA process itself. Both citizens and local associations were particularly displeased with the credibility, reliability and the implementation of the EIA process (Hokkanen ,2001).

As already outlined, before Posiva could apply for a construction license and a 'Decision in Principle' from the government, it had to obtain approval for its plans from the Eurajoki

municipal council. The agreement detailing the property purchase and rental arrangements was seen as very favourable by the council. In part this was because of changes in the national tax regime which meant a considerable reduction in the municipality income from the operating reactors. The Posiva agreement was seen as a way of protecting the local economy.

During the 2008 EIA process, Posiva and STUK organised a series of public meetings for Olkiluoto residents and near neighbours as well as a series of open days and exhibitions. In addition, Posiva undertook a series of opinion polls to determine local and national views on deep geological disposal. According to these polls, some 40 percent of Eurajoki residents appeared to be in favour of deep disposal, but around 45 percent expressed alarm at the proposed Olkiluoto site. Transport of wastes to the facility and the potential for import of foreign wastes, were the major reasons for this alarm (Posiva, 2008). Subsequently, Posiva also carried out 21 'themed interviews' involving local residents, including young people. Again, one of the main concerns was the possibility for waste import, thought by many to be the reason for the expansion of the repository capacity.

Another currently unpublished survey of local attitudes has been conducted by academics from Tampere and Jyvaskyla Universities. They found that early 60 percent of respondents agreed with the statement ''Nuclear waste poses a continuous threat to the lives of future generations'' (Kojo M, Pers. Comm. 2009). There is clearly still some concern in the local population, especially with regard to long term safety issues, as borne out by the 2006 Municipal Image study referred to above (Posiva, 2006).

3.4.5 Procedural Elements

The following are procedural elements that support community well-being.

Although many observers consider that the Vuojoki Agreement represents a comprehensive package of community benefits, in relation to similar initiatives in other countries there is in fact very little within the Agreement that brings additional benefits to the community. The rent from the building which now houses Posiva's offices balances the interest that the Eurajoki council must pay for the construction of the replacement old people's home. The tax revenue that Posiva must pay in respect of the repository is relatively insignificant compared to that from the operating and proposed nuclear reactors.

Interestingly, local municipality politicians express sincere pride in being a 'nuclear community' and claim that development of the repository and construction of new reactors has improved the local community image and its importance within the overall region (Hiitiiö Pers. Comm., 2009).

Details of Local Communities in Siting Program

Olkiluoto (in Eurajoki Municipality)
Olkiluoto is on the shore of the Gulf of Bothnia, part of the Rauma Economic Zone, a town some 10 km away. The larger city of Pori is 40 Km to the north. The municipality has a total population of 6,000, of whom around 50 percent are from outside the community (Hiitiiö, 2010). The

nuclear power plant is the largest employer but forestry, agriculture and services are also important local components.

Romuvaara (in Kuhmo Municipality)
The municipality covers 5,500 km^2 in east central Finland, with a population of over 12,000. Most employment is in the service sector, tourism, agriculture and forestry. The site was approx 30 Km northeast from the town of Kuhmo.

Hästholmen (in Loviisa Municipality)
Loviisa town is on the shore of the Baltic east of Helsinki. It has a population of around 8,000, 50 percent of whom are employed in either the service industry or in the nuclear power plant. Agriculture and forestry are very small employers. Loviisa is bilingual with a Swedish-speaking minority population.

Kivetty (in Äänekoski Municipality)
The town of Äänekoski, in south central Finland has a population of 14,000. Most employment is in the paper and timber processing sector, with service industries and agriculture very small sectors. The site was some 25 Km to the northeast.

3.5 The Deep Geologic Repository at Östhammar in Sweden

Potential sites for a repository for spent nuclear fuel have been under investigation in Sweden since the formation of the national waste management company SKB in 1977. A disposal concept known as KBS-3 was adopted in 1983, involving emplacement of spent fuel in copper canisters into short vertical boreholes in repository galleries some 500 to 1000 metres deep in Swedish crystalline bedrock.

Following a series of failed attempts to identify potential sites for detailed investigations, Swedish Nuclear Fuel and Waste Management Company (SKB) carried out a number of feasibility studies at existing nuclear sites before identifying two as possible candidates. A site in Östhammar kommun, close to the existing Forsmark nuclear power plant and the operating shallow low level and intermediate level radioactive waste disposal facility, was selected in June 2009 as the preferred location.

SKB plan to submit a license application in 2010 and begin construction in 2015. The repository would begin operation in 2023 if approved by the safety authorities.

Details of Communities in siting program
Östhammar Municipality
The Municipality lies on the eastern coast north of Stockholm, in Uppsala County. It has a population of 21,500 in an area of 2,790 km^2 - where 47 percent is water, with a 4000 km shore line. The town of Östhammar has a population of 4,700.

The government consists of a Coalition of six parties, with an annual budget of approximately 110 Million Euros and an unemployment rate of around two percent. Employment is dominated

by the nuclear power plant and SFR repository along with Sandvik Coromant who manufacture industrial cutting tools.

Oskarshamn Municipality
The Municipality lies on the eastern coast in southern Sweden. It has a population of 26,500 and a land area of 1,047 Km^2. The town of Oskarshamn has a population of 18,000. The nuclear power plant and the Interim Spent Fuel Storage Facility (CLAB) near Oskarshamn, together with Scania truck manufacture, now dominate local employment. Shipbuilding and forestry, formerly dominant, are now only minor sectors.

The government consists of a Coalition of seven parties.

3.5.1 Siting Process

Following the adoption of deep disposal as national policy in 1977, 11 sites were examined up until 1985. Extensive work was undertaken at seven (some of which was terminated because of intense local opposition), after which SKB concentrated its siting work on desk-studies.

From 1992 onwards SKB departed from a site selection process driven purely by geological criteria to one where local volunteerism played a large part. The company invited any municipality interested in the possibility of being examined as to its suitability, to volunteer for an initial desk-based feasibility study to determine whether suitable geological conditions were present. Although up to five municipalities did express an initial interest, only Storuman and Malå, both in northern Sweden, finally decided to allow initial feasibility studies to take place, although both decided not to continue in the process, following local referenda, the last in 1995. Later the same year SKB approached those municipalities that already hosted nuclear facilities to assess their interest in being examined.

In the event, five more feasibility studies were conducted, in Östhammar (adjacent to Forsmark NPP), Nyköping (site of the Studsvik facility), Oskarshamn, Tierp and Hultsfred, immediately west of the Oskarshamn nuclear power plant site. In November 2000, SKB announced that it wanted to continue investigations at Östhammar, Tierp and Oskarshamn, although the Tierp municipal council decided not to proceed. Extensive surface based investigations were undertaken at the other two sites from 2002.

SKB announced on 3rd June 2009 that it had selected a site near Forsmark, in Östhammar, as its preferred site. SKB plans to submit the required applications to the Environment Court and to the regulator by the end of 2010, with repository construction beginning in 2015 and operation scheduled for 2023.

3.5.2 Environmental Assessment Process

Although the Swedish repository licensing process only requires the submission of an environmental impact study once a candidate site has been selected, municipalities with potential repository locations have been involved in related activities for many years. EA only became a legal requirement in Sweden in 1999. Oskarshamn Municipality, for example, had

formed an EA group (LKO) as early as 1994, and had won funding for this from the Swedish Waste Fund. An EA Forum was formed at the same time by the Kalmar County Board in which the municipality lies. The aim of the initiatives was to encourage the development of the best possible decision making process and to ensure that the local population had a real impact on the siting program.
The Oskarshamn group worked closely with the nuclear regulators (Swedish Nuclear Power Inspectorate [SKI] and Swedish Radiation Protection Authority [SSI] –now merged to form Swedish Radiation Safety Authority [SSM]) to develop an open and transparent process which became known as the Oskarshamn Model. This model allowed local people and politicians to question SKB and the regulators about all aspects of waste management and disposal.

When Östhammar and Oskarshamn were identified as the two candidate sites in 2000, close co-operation developed between the EA committees in both municipalities. Fifty EA-related consultation meetings have been held since 2004 (Andersson, 2009).

In Östhammar, the EA committee has identified a range of potential effects which it is assessing and will expect to see covered in the EA report when submitted. These include Berggren (2009):

- Local supply study - goods and services;
- Potential effects on real - estate prices;
- Potential effects on tourism and image;
- Spin off effects; and
- Local environmental consequences of spin offs.

SKB submitted a preliminary draft EA in December 2009 for review by the local authorities, but this is currently only available in Swedish (Berggren, 2010).

3.5.3 Social and Economic Impact Studies

Feasibility Studies – Östhammar, Nyköping, Oskarshamn, Tierp, Hultsfred and Älvkarleby
This Summary Report (main reports only in Swedish), published in 2001, presents the overall results of the desk studies carried out in the 5 municipalities. In addition to information concerning geological and environmental suitability, the studies included superficial examination of the socio-economic situation in each. These included assessment of the potential positive impacts of repository development in terms of employment, economic life in the community and local services. The study did not provide extensive assessment of potential deleterious impacts.

The proximity of the Östhammar area to Stockholm was considered to be a distinct advantage with respect to availability of labour. Both there and Oskarshamn were assessed as already possessing excellent skills in the nuclear field and would thus be able to absorb a repository without severe impact.

Local effects of the final repository on Population and Employment in Östhammar and Oskarshamn
This study examined the potential cultural and economic impacts of repository development in either community. In particular it studied what the possible spin-off effects might be from the major investment that would take place and how each was suited to gain advantage from them. The study used experience from the expansion of the CLAB spent fuel store in Oskarshamn as a model for what might happen in the case of repository development. It concluded that the local economy in Oskarshamn was better suited to gaining most advantage, relative to Östhammar, due to the existence of a better trained workforce and more relevant industrial capabilities. It also pointed out that there will in fact be little in the way of additional investment impact beyond the repository in either community because any other major related infrastructure (the SFR low and intermediate level radioactive waste repository and the encapsulation facility) have already been sited or planned.

Socio-economic effects of large investments in Östhammar
This 2007 study concentrated on the potential economic impacts of repository development in Östhammar (the community where the final site has now been selected). It examined the impacts of a series of scenarios, ranging from no facility through to location of both the repository and the encapsulation facility and examined them in terms of their impacts on local business, employment, housing needs and road construction. Much of the work was necessarily based on simulation, given that the siting decision had not yet been made. The conclusion was that siting the repository in the municipality would lead to a significant increase in both jobs and population. It described potential SKB involvement in the community as likely to have a genuinely positive socioeconomic impact.

Again, as in the case of the study above, it did not identify or examine potentially deleterious socio-economic impacts.

3.5.4 Local Involvement

Since 1992, SKB has had local offices in each of the municipalities where it has conducted feasibility studies and has organised numerous meetings, exhibitions and open house discussions. In the 1990's in Storuman and Malå local referenda were held to determine whether SKB should continue to detailed investigations. In both cases the proposal was defeated and SKB withdrew.

As described, the LKO group was closely associated with the development of the Oskarshamn Model of transparent participation. This was developed in conjunction with the SKI Dialogue Project set up in 1990. SKI invited recognizable stakeholders in the nuclear waste issue to discuss the siting process as a national and systematic process and to propose legislative improvements. As explained by Sundquist and Elam (2006) the aim of the project was to bring together important stakeholders to discuss and formulate a trustworthy procedure for managing nuclear waste. A consensus report was written after the project was completed. Several environmental organisations took part, and afterwards they assessed the project very positively. One problem,

however, was that the most important stakeholder, SKB, declined to take part in the process as it was just beginning its volunteer process in northern Sweden.

The Oskarshamn LKO encouraged the local community to take part in numerous local debates and meetings to quiz SKB and the regulators about all aspects of the KBS-3 disposal concept. The Oskarshamn model involves the whole community, with local people regarded as both experts in their own right and as a resource to benefit the process. Local environmental groups are also closely involved. The involvement of local people has continued through the detailed site investigations in Oskarshamn and Östhammar. As described previously, Oskarshamn Municipality was closely involved with SKB siting activities from the early 1990's, including development of the Äspö underground research facility and the extension of the CLAB spent fuel store.

The Swedish National Council for Nuclear Waste (KASAM) is an independent advisor to the environment ministry on waste management issues. It has organised numerous meetings and discussions in the potential siting communities to explore technical, social and ethical issues. It recently established a Transparency Group which has examined various aspects of the SKB programme and involved local communities in this effort, which is based on the application of the principles of the Oskarshamn Model.

As in Finland, the local community had a right of withdrawal from the siting process up until the final site selection was made in June 2009, although this can still be exercised if the safety authorities do not support the safety assessment and EIA results.

The feeling locally is that the nuclear experience in both communities actively promoted a constructive dialogue and increased public acceptance (Berggren, 2009).

3.6 Site selection for a Deep Geologic Repository in France

Following failed attempts to identify a potential site for a deep geological repository in the 1980's, a new siting process, involving a Mediator and local negotiations began in 1991 to identify potential sites for two underground research laboratories (URL) to examine potential geological formations. As a result, a single laboratory has been developed in marl at Bure, in the Meuse/Haute Marne region of France, to the south west of Paris. In 2006 a new Waste Act identified the area as the sole candidate for the repository.

Research has been continuing at the URL for several years. In 2010 work is beginning to reduce the potential repository siting area and begin to identify suitable locations in order for a final selection by 2015.

Background to the Bure area
The research laboratory of Bure is situated in south of the Meuse County, belonging to the Lorraine Region. Some galleries extend beneath the town of Saudron, in the north of the Haute-Marne County, which belongs to the Champagne-Ardennes Region. Both counties and both regions are thus concerned by the development. The area has an average overall population of

less than 40 inhabitants per Km^2 and is far away from the main Departmental cities **(**Réaud et al., 2009).

Meuse County
This is the most rural county in the Lorraine Region. The population reached 192,700 inhabitants in 2005 and the municipality of Bure itself had 91 inhabitants in 2008. The majority of the active population are blue-collar agricultural workers.

Haute-Marne County
Haute-Marne had 187,000 inhabitants in 2005, but is suffering loss of population due to its mainly rural nature and the run-down of previous metallurgical industries.

3.6.1 Siting Process

Four areas of France in clay, granite, schist and salt were originally selected for examination by the government in the mid-1980s, as possible sites for a deep repository for high-level radioactive waste, spent nuclear fuel and long-lived intermediate level radioactive waste. However, due to intense local opposition at all four sites, research was terminated by the French Prime Minister in February 1990.

A new Law was passed in 1991 calling for the development of two underground laboratories, not necessarily at any of the original shortlist and in varying rock types in order to allow for comparison studies to be undertaken. No wastes would be allowed to go into the laboratories. The Law also established the new post of Mediator, to facilitate site selection and development of the laboratories. The Mediator was empowered to offer financial compensation to communities which offered themselves for further investigations. In December 1993 he submitted a report recommending four areas for further investigation, three in sedimentary formations and one in crystalline. In 1994, the national waste management agency ANDRA announced that a number of potential sites had been identified and detailed site investigations began that year.

ANDRA selected three of the sites for further examination in 1996 (ANDRA, 1996), concentrating efforts on granite below sedimentary cover in the Vienne; in Marl at Bure, in the Meuse/Haute-Marne, and in the Gard, near Marcoule, also in Marl. Local public Inquiries were held between February and May 1997. Following considerable delay, in December 1998 the government authorised ANDRA to develop a URL at Bure at a depth of approximately 500m. However, at the same time it rejected the sites in the Gard and Vienne as geologically unsuitable.

ANDRA then examined approximately 20 granitic areas in Brittany and the Massif Central, with a view to identifying potential sites for a second URL by the end of 2002. A list of 15 potential areas, derived from previous national studies during the 1980's was submitted to a panel of international experts for evaluation in October, 1999. Following this review a three person Mission was established in order to conduct local negotiations to allow ANDRA access to carry out investigations. However, following intense local opposition at all of the proposed sites, the entire project was abandoned in June 2000 and the URL at Bure remains the only facility developed.

Following a series of national public debates on nuclear waste management, as mandated under French law, a new Waste Law was passed by parliament in June 2006. It stipulates that a site for a final repository in the region around Bure should be selected not later than 2015 and confirms the suitability of the marl under investigation at the URL. ANDRA has identified a so-called "transposition zone" covering a surface area of 250 km² in which geological and other technical conditions are similar to those studied in the URL.

According to the 2006 Waste law, at the end of 2009, ANDRA was to present to the Government suggestions for implementing major aspects of the project, including facility design, operational and long-term safety, provisions for reversibility and provisions for intermediate storage to complement final disposal activities. ANDRA has identified a smaller, 30 km^2 zone where more detailed geological surveys will be carried out in order to identify where the exact repository site will be. This smaller zone is called "ZIRA" (Zone d'Intérêt pour la Reconnaissance Approfondie).

3.6.2 Environmental Assessment Process

Although French law complies with relevant European Union Guidelines concerning the requirements to carry out EA studies for attachment to relevant licence applications for construction and operation of a deep repository, there is no mandate for draft versions of these to be published prior to such an application (Ouzounian, pers. comm., 2009). In some ways this is understandable, given that to date work has concentrated on siting the URL and has only very recently moved to the stage of looking for a potential repository site.

However, an Environmental Monitoring Plan was set up by ANDRA from the start of the URL construction, in response to regulatory requirements. A baseline was obtained for the following features: water quality (surface, underground and waste water), air quality, noise levels, flora, fauna and radiology.

3.6.3 Social and Economic Impact Studies

Due to the paucity of available EA studies noted above, there is consequently little information available in the public domain regarding the potential environmental, social and economic impacts of a repository around Bure.

That said, the National Evaluation Committee (CNE), established in 1991 to review the work done by ANDRA and others on radioactive waste management, comments very clearly in its June 2009 Annual Report that the absence of socio-economic studies makes assessment of the potential impacts very difficult. It considers that there is a serious mis-match between the amount of research and assessment that has been done on the technical as opposed to the socio-economic aspects of the repository (CNE, 2009).

It should be recognised that although few studies of socio-economic impacts appear to be available, the 2006 Waste law strengthened the role of the so-called Public Interest Groups (GIPs) which manage what are referred to as 'accompaniment measures'. This is money paid to support local economic development as recognition for the siting of the URL. Because two counties are affected, both were able to establish GIPs in 2000 following a government Decree.

Up until 2006, each GIP received around €10 million/year. Since 2006 this has increased to approximately €20 million/year.

In addition to the money managed by the GIPs, which can only be used to support projects using matched funding from the municipal authorities, ANDRA and the main French nuclear agencies, CEA and EDF, have also established funds to support economic development projects in the area. Some €60 million has been distributed since 2000. There are however no reviews available to assess the impact of these activities on the local economic situation.

3.6.4 Local Involvement

As described above, the 1991 Waste law, which began the amended siting process, established the new post of Mediator, to facilitate site selection and development of the laboratories. On his recommendation, after the identification of the four potential siting areas, a 'Local Information Committee' was set up in each area to allow local officials, the public and other interested parties 'to be informed and consulted about the work' (Bataille, 1994). He also recommended that they be given sufficient resources to allow them to monitor ANDRA's activities, carry out independent analyses, and for other information and public involvement purposes. The government allocated around €1 million per site per year for this purpose, payable for as long as it remained in the process. They were chaired by the département prefects, and were the predecessors of the formal information and monitoring commissions which the Law stipulated must be set up around each chosen laboratory site.

When ANDRA selected three of the areas for further examination in 1996, a public inquiry was conducted in each by a specially-appointed commission, acting as focus for the whole process. Members of the public had to submit questions to the inquiry commissions, which were then responded to by ANDRA. The commission was then required to express its opinion on the adequacy of the documentation, as well as review and summarise all public comments (ANDRA 1996). All municipal councils bordering the potential site areas were able to take part in the inquiries, and as each potential site was less than 10 Km from the local border, as many as 100 did so. They were also able to vote on the issue at any time during the consultation period, and had to do so within three months of the start date.

Following assessment of the three areas, a decree was issued in August 1999 authorising work to commence at Bure. This also established the legal and financial framework for the local community group, known as the Local Information and Monitoring Commission (Commission locale d'information et de suivi or CLI) which monitors work at the site. It is composed of representatives from ANDRA, local and regional governments, as well as commercial and local citizens' associations. It is provided with a budget to allow it to hold hearings, publish documents and commission expert reviews of issues of its choosing.

Prior to the 2006 Waste law, which identified Bure as the sole candidate area for a repository, a National Public Debate process was held to examine the situation regarding waste management in France and to allow comment on the proposed legislation. Three 'public debates' were held in autumn 2005, examining the three main strands of research (partitioning and transmutation;

deep disposal and long term storage). In association with this, a series of local debates were held around France between November 2005 and January 2006.

A public debate in the Meuse/Haute-Marne region will take place in 2013, after which the authorities will confirm the location of the repository footprint and the surface facilities. A new Law will appear in 2015 confirming the repository development and repository operation will begin in 2025, if authorised by the safety authorities.

3.6.5 Procedural Elements

As mentioned above, no publicly available social impact studies have been performed. The GIP is only responsible for managing the funds available to it for project support. They do review the effectiveness of these in terms of leverage for additional funds, the number of jobs created and the number of companies affected, but only at a very superficial level (Varnusson, pers. comm. 2010).

3.7 Addressing Community Well-Being in the Case Studies

Table 3 provides an overview of how the communities profiled in the case studies address the concept of community well-being. Provisions include community based activities that achieve community well-being as well as mitigation and monitoring programs that are put in place to address issues of community well-being.

Table 3: How Was Community Well-Being Addressed in the Case Studies?

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
Factor: Social, Economic and Cultural Effects						
Health and safety of residents and the community	Health effects pathway study completed during EA. Hospital facilities in community. Proponent sponsored community events.	Health effects pathway study completed during EA. Goal of project is to eliminate health risk by remediating waste present in residential environment.	No health study. Extensive monitoring of health care facilities. Funds and support to medical clinic and doctors. Drugs and alcohol addiction monitoring.	Few published studies by proponent. Local CLI has commissioned independent studies. Hospital facilities exist in larger towns, but no specific site selected to date.	Lots of studies performed and reported to local population in both communities. Both communities have access to regional hospital facilities.	Potential health impacts reviewed for all 4 sites in 1999 EA studies and again in 2008.
Sustainable built and natural environments	Amenities available Hosting agreement PVP program addresses real estate values that are affected by the project	Amenities available. Detailed design regarding potential effects on built environment. Support for Harbour front development. PVP program addresses real estate values that are affected by the	Community base line monitoring. Community Impact Agreement. Consulting and financial support. Support for municipal infrastructure. Housing policy and	A final site has yet to be selected; to date only a URL has been developed at a location not expected to be the final site.	The detailed design in the license submission will take regard of potential effects on the natural environment. Local review groups have relevant sub groups to study potential impacts.	The detailed design will take regard of potential effects on the natural environment.

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
		project.	Official Plan update paid for.			
Local and regional economy and employment	Local hiring where possible. Creation of major employment hub in Bruce County for wide range of employment opportunities. Presence of skilled labour from Bruce Power. Training opportunities at Bruce Power.	Local hiring where possible. Locate office in Port Hope, creates employment. Presence of skilled labour from Cameco and Zirchatec.	Local hiring and purchasing. Support for industrial attraction and economic development. Presence of out of work labour pool.	There are no nuclear facilities in the area where the site is to be selected, except for the URL which was a totally new development. There is a lack of trained personnel for some GIP and other projects.	Both potential host communities have existing nuclear facilities, with trained staff and support industries, although Oskarshamn appeared better in this regard.	Two of the four communities have existing nuclear facilities.
Community administration and decision making	CAO as point of contact at Municipality of Kincardine for all matters relating to the DGR.	Pay for local staff administrators. Pay for studies and peer review. Municipal grants and funds for expenses.	Paid for municipal coordinator, municipal administration and consultant studies. Extensive municipal grant program.	Local mayors have some powers. Regional groupings have more.	Municipalities have strong decision-making powers. County Board also well developed.	Immediate local community has limited powers, many decisions made by municipality.

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
Factor: Project's enhancement of the community's long-term sustainability						
Inclusiveness/ community cohesion	Municipalities in Bruce County worked together to create a hosting agreement.	Community worked with Siting Task Force to decide where to site LLW.	Location decision made by Ontario Hydro. Municipality, citizens committee, local business and stakeholders all active in site selection and approval.	Only one area selected, but two counties impacted. Little co-operation between them to date, with competition for GIP funds evident between neighbouring communities.	Each community developed well structured oversight groups. The two communities also co-operated in meeting organisation etc. This has continued even after the final site selection.	Local communities were in direct competition with each other, especially the 2 with existing nuclear facilities.
Dynamic resilience of the economy/ financial sustainability	Hosting Agreement provides compensation ($35 million over 30 years) to 5 Municipalities in Bruce County. Presence of wide variety of organisations and institutions.	Legal Agreement provides $30 million in compensation to Municipality of Port Hope and Municipality of Clarington. Presence of wide variety of organisations and institutions.	Legal Agreement provides funds to address economic effects. Project replaced tax revenue lost due to mine closure. Isolated community benefited during construction and operation. Vulnerable as single industry	€20 million/year is available to support local projects, plus funding from nuclear utilities to support development of sustainable industries. Problems can arise due to GIP requirement for matched funding from small communities with very low levels of own funds.	Both communities are financially healthy. They will now receive support for a range of 'value added' projects following the final site selection.	The main driving force for the community support for the repository was the need to replace the tax payments that they had been used to receiving for the existing NPP.

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
			town.			
Community decision making Processes	Community referendum held to decide acceptance of the DGR. Community participated in public information centres.	Community working groups to discuss project activities. Community participated in public information centres.	Citizen's committee and municipal council highly engaged. Positive and trusting relationship established with Ontario Hydro. Impact monitor committee established public information centre and annual monitoring report.	Local Information Groups funded to monitor activities. A debate in the area is planned for 2013 when a final site is identified. Local communities have no right of veto in planning matters.	Local authorities in both communities had control in the siting process until the final selection was made. Local review groups funded by state to take part in the process. County active in all aspects. Good local participation in review process since 1990's.	No additional support given to local government, although Posiva did manage and support the discussions around the Vuoki Agreement. Under Finnish law the community has to agree to the Decision in Principle to proceed with a development. Once that has been approved, the right of veto disappears. Most community involvement was organised by Posiva or STUK.
Balanced growth and healthy liveable community	Baseline studies completed. Socio-economic studies indicate sustainable growth from facility.	Baseline studies completed. Follow up Programs to address mitigation measures.	Baseline studies completed. Follow-up program and funds to support avoidance and mitigation.	No studies available but GP applies some criteria to assess value of projects.	Studies suggested that there would be little local impact on jobs etc. due to existence of other major employers.	EA reviewed this and indicated benefits from jobs and increased local economical activity etc.
Sustainability Planning		Corporate Strategic Plan includes	No reference to sustainability	Large amounts of money from EDF.	Plans in place; these will be enhanced by	The impact on community finances

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
		provisions for growth and sustainability.	planning except for Official Plan. Atikokan is in a natural environmental setting.	CEA and Areva to develop sustainable industries in the area, but a lack of trained personnel locally	influx of 'value-added' funds following the final site selection	from changes in tax regime has caused difficulties in forward planning
Factor: Physical and social infrastructure in place and/or can be put in place to implement the project						
Availability of physical infrastructure required to implement the project	Already existing infrastructure due to presence of Bruce Power and other industries.	Already existing infrastructure due to presence of Cameco, Zircatech and other industries.	Infrastructure improved before project construction and subsequent improvements during construction. Upgraded municipal services and infrastructure.	Low level of suitable infrastructure in a largely rural area. Some has been developed associated with URL.	Better existing infrastructure in 2 of the 4 communities due to the presence of an operating NPP and other facilities.	Better existing infrastructure in 2 of the 4 communities due to the presence of an operating NPP.
Adaptability of community and social infrastructure to adapt to changes resulting from the project	Presence of business to support nuclear industry and DGR. Existing nuclear workforce.	Presence of business to support nuclear industry. Existing nuclear workforce.	Retail and wholesale sectors benefitted. Existing mine and local workers hired as lower skilled workers. Remote location meant few other businesses could benefit.	Largely rural area; unclear as to how a repository would be accepted, although URL appears successful.	Local communities have both adapted well to presence of various nuclear facilities. Presence of business to support nuclear industry and DGR, with an existing nuclear aware workforce	Presence of business to support nuclear industry and DGR in 2 out of 4 of the communities, with an existing nuclear aware workforce

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
Factor: Avoidance of ecologically sensitive areas and locally significant features						
Ecological sustainability and locally significant Features		Follow up program to include a management plan for biophysical environment Socio-economic Management Plan addresses locally significant features and cultural heritage. End use committee created to ensure community acceptance of facility design and features.	Extensive socio-economic monitoring plan was successful. Natural terrestrial and aquatic environmental studies completed. Effects on lake system and air shed monitored.	No site yet selected.	Final site will be developed under strict controls of the Environment Law. Little additional impact expected	EIA studies expected no major impacts, although any such would be greater in non-nuclear communities
Factor: Avoidance or minimization of effects of transportation and the transportation of nuclear waste						
Availability of transportation routes and adequacy of infrastructure	Already existing routes due to presence of Bruce Power.	Already existing routes due to presence of Cameco, Zircatech, etc. Easy access to major highway.	Some upgrading required. Road to site. Township is on a Provincial highway.	Will require development when final site chosen.	Already existing routes in both communities due to presence of NPP.	Already existing routes in the 2 nuclear communities due to presence of NPP
Availability of safe connections and intermodal	Safety protocols in place due to presence of	Safety protocols in place due to presence of existing	Road and rail line directly to site – no transfers required.	No details available, no site chosen.	Safety protocols in place due to presence of existing	Safety protocols in place due to presence of existing

CRITERIA \ COMMUNITY	Kincardine	Port Hope and Port Granby	Atikokan	France	Sweden	Finland
transfer points	existing nuclear industries.	nuclear industries. Emergency preparedness Plan as part of licensing requirements.			nuclear industries in both communities	nuclear industries in the 2 nuclear communities
Effects on transportation communities along transportation routes and at intermodal transfer points	LLW and ILW currently transported from Ontario generating stations for storage at Bruce Power site.	Local transportation impact studies and monitoring	Generating station site was isolated. No nuisance or disruption effects. Some road and traffic effects in town.	No details available concerning transport planning as no site has been selected	Impacts likely depending on transport route selected; all spent fuel currently stored in the community that was not selected. Draft EIA only recently prepared	Transport impacts unavoidable in any of the communities, unless the chosen community is a nuclear community because waste is already there.
Construction and transportation activities		Follow up programs to address mitigation measures for dust and noise.	Roads effects and mitigation measures implemented.	Follow up programs to address mitigation measures for dust and noise expected.	Follow up programs to address mitigation measures for dust and noise expected.	Follow up programs to address mitigation measures for dust and noise expected, although EIA regarded health effects as insignificant

4.0 DISCUSSION

Criteria, indicators and measures have been developed to ascertain the potential effects of a facility on a potential host community in terms of the five evaluation factors identified by the NWMO in the 2009 NWMO report '*Designing the Siting Process for Selecting a Site – Invitation to Review a Proposed Process for Selecting a Site'.* They have been used to evaluate the positive and negative effects of a nuclear fuel waste repository in assessing the opportunities for creating community well-being. This section provides the rationale for critical measures and indicators. It also describes the data collected for the assessment of community well-being. The five factors are:

1) Social, economic and cultural effects;

2) Project's enhancement of the community's long-term sustainability;

3) Physical and social infrastructure in place and/or potential to be put in place to implement the project;

4) Avoidance of ecologically sensitive areas and locally significant features; and

5) Avoidance or minimization of effects regarding the transportation of used nuclear fuel from existing storage facilities to the repository site.

Where the criteria overlap and are present under multiple factors, they are grouped in one section.

4.1 Examination of Factors, Criteria, Measures and Indicators

The following section provides a breakdown of each factor, criterion, measure and indicator. Please note that a description of the specific data subsets required for each indicator is provided in **Table 4. Appendix A** provides illustrated spider diagrams that reflect the factors, criteria, measures and indicators as listed in **Table 4**.

Table 4: Criteria, Measures and Indicators for Community Well-Being

Factor	Criteria	Measure	Indicator	Data Subset
1) Social, Economic and Cultural Effects	A) Health and safety of residents and the community	i) Health Care	Existing medical, nursing and hospital facilities able to accommodate population influx, or require enhancement	• Number of clinics • Presence of hospital • Number of doctors and nurses relative to population • Range of community wellness programs
		ii) Social Services	The welfare system in place to accommodate community can cope with influx of extra population	• Adequate range of social programs (e.g. homeless shelters, women's shelters)
		iii) Emergency Preparedness	Plans and ability to react to emergency situations	• Emergency plans to allow for evacuation of community • Community awareness of emergency planning • Presence of ambulatory, acute and chronic care facility • Emergency response services
	B) Sustainable built and natural environments	i) Housing Stock	Housing stock in place to provide affordable residential dwellings for potential facility workers	• Price range and number of houses • Types of dwelling • Presence of rental housing • Vacancy rate • Hotel, hotel vacancies
			Ability to construct more residential dwellings to accommodate growth	• Serviced land available • Presence and viability of housing developers
		ii) Amenities	Schools, recreational, entertainment, restaurants and retail, etc. that will attract/ maintain residents to live and	• Capacity of schools • Quality of schools • Places of advanced learning

Factor	Criteria	Measure	Indicator	Data Subset
			work (at a facility) in the community	• Nurseries and daycare • Access to recreational facilities • Theatres, cinemas and restaurants
		iii) Outdoor Recreation	Greenspace, parks and other natural features that will attract/ maintain residents to live and work (at a facility) in the community	• Varied outdoor recreational uses • Type and quality of parks • Outdoor recreation programs promoted
	C) Local and Regional economy and employment	i) Current types of employment	Presence of skilled labour sufficient to provide for facility construction and through facility lifespan	Presence and capacity of current types of employment: • Consulting firms • Excavation companies • Geotechnical consulting • Logistics firms • Security companies • Hospitality companies
			Educational opportunities and training in work related to facility exist, or are required	• Colleges in vicinity • Training facilities • Union training and hiring halls
			General education opportunities to attract workers and their families to the community	• Educational upgrading • Enrichment programs • After school programs • Language courses • General interest courses
		ii) Current economic activities	Experience with mining, resource development or nuclear industries	• Mining • Resource development and extraction activities • Nuclear waste management storage facilities

Factor	Criteria	Measure	Indicator	Data Subset
			Diversity of Economy	• Experience with large industry • Wide variety of retail available • Extent of services available • Availability of law firms • insurance companies and banking
	D) Community Administration and decision making processes	i) Ability to show leadership when confronted with challenges and/or opportunities	Ability to manage challenges that come with a facility	• Presence of community leaders • Number and type of service organisations • Access to discretionary resources • Experience with other proponents
		ii) Depth of financial strength	Financial Sectors	• Ratio of residential to industrial and commercial development • Existence of a Chamber of Commerce • Presence of banks and insurance companies
			Structure of municipal finance	• Financial stability of municipality • Presence of reserve funds
		iii) Existing organisations and institutions	Strengths of organizations and institutions positively influencing community outcomes	• Strength of partnerships between local government, organizations and not for profit sector • Presence of organizations addressing social welfare (e,g. homeless and women's shelters)
2) Project's enhancement of the community's long-term sustainability	A)Inclusiveness/ community cohesion	i) Characteristics of community response to opportunities or challenges	Community's ability to work together to achieve their sustainability goals	• Percentage of success submitting a grant application or similar number of goals achieved based on past experience
		ii) Extent to which people cooperate on	Community's likely ability to work together to discuss a facility with the	• Past experience of energy or resource based proponents

Factor	Criteria	Measure	Indicator	Data Subset
		issues which affect them	proponent	working with community
		iii) Level of volunteerism	The number of existing volunteer organisations that exist in the community	• Level of volunteerism • Characteristics of volunteers • Numbers of volunteers • Range of volunteer activities
	B) Dynamic resilience of the economy/ financial sustainability	i) Community-led economic development initiatives	Level of funding for community economic development programs	• Presence of an economic development strategy • Presence of a business attraction and retention strategy • Presence of a strategic plan • Presence of a tourism plan
			Level of funding for Municipal programs/plans	• Extent to which a community is successful in acquiring grants from other level of government or corporate funding • Extent to which community's current plans are fully funded or underfunded
		ii) Openness to external investment in the community for associated support industries	Degree of support for new industries in terms of planning approvals	• Presence of economic development officer and staff • Presence of a business strategy • Servicing to industrial areas provided • Streamline planning approvals
	C) Community decision making processes	i) Transparency and trust	Ability of community authority to work with proponent to build a trusting relationship	• Sophistication to openness and dialogue • Success rate in attracting other businesses • Extent to which community can obtain resources to participate in

Factor	Criteria	Measure	Indicator	Data Subset
				dialogue
			Past experience with decision making processes for large scale projects	• Community led investigations for suitability of projects • Description of approach taken by community when provided similar opportunities • Participation in previous discussions that build trust
		ii) Openness to new ideas and associated individuals	Past examples of welcoming new cultures, ways of life, services, businesses, etc.	• Presence of a welcoming committee • Presence of multicultural groups • Presence of medical staff to address special needs and multicultural issues • Presence of legal resources • Provision of language and cultural requirements
		iii) Degree of community involvement	Acceptance of and experience in community referendum	• Documentation of past experience with referendums • Voter turnout rate
			Degree of community desire to participate in decision making activities and capacity building	• Level of residents participation in consultation activities • Current levels of involvement in community affairs
	D) Balanced growth and healthy liveable community	i) Existing quality of life maintained or enhanced	Project potential for enhancement of quality of life – employment, built environment, health, recreation, leisure time, etc.	• Quality of life survey • Cost and magnitude of improving the built environment to accommodate a facility • Cost and extent to which recreational facilities need to be enhanced

Factor	Criteria	Measure	Indicator	Data Subset
		ii) Community Growth	Past growth patterns to predict if community able to handle influx of facility workers	Presence of: • Up to date Municipal Official Plan • Culture and Recreation Master Plan • Financial Plan • Asset Management Master Plan • Housing strategy
			Can the community manage a decline in population if the facility is not developed or prepare for growth if it is?	• Current level of diversification of community economy • Community has achieved critical thresholds • Presence of ancillary administrative health and educational services • Community ability to provide leadership to manage growth and decline
	E) Sustainability Planning	i) Community preparation to develop in a sustainable manner	Existence of Community-Based Sustainability Plan	• Up to date vision of sustainability • Community articulation of sustainability goals and objectives • Sustainability programs have been identified • Resources required have been articulated
3) Physical and social infrastructure in place and/or can be put in place to implement the project	A) The availability of physical infrastructure required to implement the project	i) Presence of suitable roads and other infrastructure	Physical infrastructure in place to manage community growth	• Asset management plan in place • Inventory of standards, age and capacity of infrastructure • Presence of community services capacity to handle growth • Municipal water and wastewater servicing Master Plan (MP)

Factor	Criteria	Measure	Indicator	Data Subset
				• Transportation MP • Stormwater Management MP
			Existence of sufficient Municipal staff to handle planning and development tasks that relate to the construction of a facility	• Engineering and planning department presence to support approvals
		ii) Municipal services	Presence of suitable waste management, housing, seniors, works, engineering, planning and other services to accommodate the development of a large infrastructure project (facility)	• Determination of current services meeting national and provincial standards for coverage • Extent to which changes are required to accommodate a facility
	B) The ability of community and social infrastructure to adapt to changes from the project	i) Community dynamics	Community's ability to adapt and change its economy and local industries	• Presence of centres of excellence • Presence of an economic development department • Development of ancillary business to support major industries • Entertainment
			Community's ability to withstand change in socio-economic structure	• Planning documents in place • Strength of municipal finance • Presence of volunteer organizations
		ii) Community composition	People who could work on the construction of the facility and during lifespan (before closing) as a percentage of the total workforce	• Age of workforce • Workforce skills • Commuting characteristics • Characteristics of the non-facility workforce
			Education level of workers in community is able to fulfill labour	• Number of skilled workers • Number of professionals

Factor	Criteria	Measure	Indicator	Data Subset
			requirements of facility construction and operation	• Number of college and technical institute graduates • Number of trades • Number of resource industry workers • Presence of unionised workers
4) Avoidance of ecologically sensitive areas and locally significant features	A) Ability to avoid ecological sensitive areas and locally significant features	i) Maintenance of ecologically sensitive areas	Characteristics of wetlands, terrestrial and aquatic environment in the vicinity of the community	• Inventory of features • Accuracy of mapping for ecological features • Plans in place to protect ecological areas
		ii) Natural Heritage Plan in existence	Identification of cultural heritage resources that may be affected by facility site	• Presence of conservation areas • Ecosystem area mapping • Ecosystem plans • Natural Heritage plans
			Environmental programs that address resource use in the community	• Community understanding of sustainability programs • Presence of environmental groups and resources • Brownfield remediation programs
5) Avoidance or minimization of effects of transportation and used nuclear fuel from existing storage facilities to a repository site	A) Availability of transportation routes and adequacy of associated infrastructure	i) Accessibility of highways and roads	Extent to which a host community is accessible to trucks traffic from locations across Canada	• Presence of federal and provincial highways • Proximity to national rail • Proximity to ports and docks
			Quality of roads	• Age and quality of local infrastructure (roads and bridges) • Level of repair • Road width • Topography • Presence of paved roads • Adequacy of site lines

Factor	Criteria	Measure	Indicator	Data Subset
				• Transportation services on route • Emergency protection services on route
			Sensitive uses along roads	• Number of parks and outdoor uses along route • Number of homes along route • School bus routes • Use of side of road for recreational activities
			Length of route	• Kilometres of road or rail along shipping route • Trans-shipment requirements present
	B) The availability of suitable safe connections and intermodal transfer points	i) Protection of workers and residents	Suitable provisions to minimise accidents along transportation routes	• Percentage of paid emergency response staff • Percentage of volunteer emergency response staff
			Extent to which trans-shipment and intermodal transfer points are required	• Determination of how many times trans-shipment is required • Determination of how many times intermodal transfer is required
	C) Effects on transportation communities along the transportation routes and intermodal transfer points	i) Interaction between transportation vehicles and community along the transportation route	Characteristics of the haul route leading to positive or negative interactions with the transportation communities	• Numbers of communities affected • Types of communities (small, medium , large) • Numbers of sensitive individuals • Characteristics and numbers of road side users • Characteristics of areas around trans-modal shipment zones

Factor	Criteria	Measure	Indicator	Data Subset
		ii) Community acceptance	Community acceptance of transportation routes through their jurisdiction	• Likelihood of transportation community acceptance or rejection of route • Social acceptance of transportation route • Number and type of sensitive features along route
	D) Transportation effects during construction activities	i) Transportation effects on community	Construction or transportation nuisance	• Presence of dust, noise or vibration • Extent to which service levels are exceeded • Mitigation costs
			Extent to which road, rail or dock upgrades are required	• Number of kilometres of upgrading required • Capital cost of upgrades • Requirements for environmental approvals

4.1.1 Social, Economic and Cultural Effects

The NWMO siting process will examine social, economic and community well-being benefits effects to potential host communities. This examination begins by gathering information about the social, economic and cultural characteristics of the community at both the local and regional scale. The data will help to answer two fundamental questions: 1) Can community well-being be enhanced if the community is selected as the location of the nuclear fuel waste management repository? 2) Are there likely to be critical community well-being thresholds that could be exceeded due to the project that would result in negative social, economic and cultural effects?

Four broad criteria help to provide a thorough examination of community well-being. Stated as questions, the criteria are:

- Will the facility enhance or detract from the health and safety of residents and the community?
- Can the facility help to foster sustainable built and natural environments?
- Is the facility able to promote the local and regional economy and employment?
- Will the facility improve or place pressure on community administration and decision making?

Each of the criteria is further divided into a range of specific measures and indicators. Measures and indicators are used as a community well-being assessment and evaluation tools.

Criteria:
A) Health and safety of residents and the community

Measure: Health care

The health and safety of residents is of utmost importance to every community. In the Canadian health care system, resident and community health is continually measured by health care professionals and cross community comparisons are made on a regular basis. For example, in the Province of Ontario, Local Health Integration Networks ("LHIN") identify community health and wellness goals and develop appropriate programming. Thus, information is available on the comparative health of potential host communities.

Safety issues may arise in terms of traffic impacts, construction effects and issues associated with the transportation of the nuclear material to the site. Safety will be addressed through: the Facility Environmental Assessment approvals process; formal Safety Assessments as part of the Detailed Design; a review of transportation routes and modes and; long term monitoring.

Where community well-being may differ is in the state of the supporting health care system. Northern and rural health care communities may be: underserved; served through a nursing station and linked to advanced care through an electronic health system or; will require fly out

health care services. Larger communities may also vary on the basis of the range and extent of services offered. These communities may lack specialist health services such as an orthopaedic surgeon, or supportive wellness services, such as geriatric services or neo-natal support services.

Thus, one measure of the health and safety of a community is the state of the current health and wellness system in place. 'Health' is traditionally defined as 'physical and mental' health. 'Wellness' is defined more holistically as health improvement, maintenance and avoidance of aliments. Recreation, obesity prevention, senior's support programs, early years programs all fall under this later category.

As a measure, the state of health care is important to community well-being because it illustrates the attention to the overall health of a community and its residents. The presence of a facility can increase demands on the community health care system due to increased worker (and family) population. In addition, the presence of a facility can place a burden on an existing health care system if occupational accidents occur during construction activities.

In the Atikokan case study example, the loss of one of four local doctors led to the potential shut down of project construction as there would have been a loss of 24/7 medical support for workers with injuries. Under the Atikokan Community Impact Agreement, Ontario Hydro provided funds to the community to recruit, attract, hire and supplement the salary of the new doctor. In the Municipality of Port Hope, local residents raised the issue of radon and uranium exposure. The local health care providers were not familiar with epidemiology or radiation health issues and external health care professionals had to be retained.

Whether or not there are adequate community resources for maintaining adequate health care in a community would involve preparing an inventory of the current system in place and ensuring provisions are made to increase health care standards where necessary.

The "Health Care" indicator is measured through data gathered about: the presence of existing medical, hospital and nursing facilities available to accommodate the current population and influx of facility workers; ratio of health care professionals to population; availability of hospital and clinics, and; an assessment of the range of wellness programming.

Measure: Social services

The quality of the social services within a community is also a measure of the health and safety of residents. Social services are important to community well-being because they illustrate the ability of the community to provide support for people who are vulnerable, for example: early years programs for new born children, youth at risk, addictions, children's aid, social housing, seniors services. Social services are typically provided by a combination of government, agencies, non-government organizations and faith groups. Both local residents and nuclear workers and their families need social services. In smaller, rural and remote communities these services may be absent or their provision may require social workers to visit the community. In larger communities there may be a social service network designed to provide seamless support for clients. Few communities have an in place Human Resources Plan representing a comprehensive and strategic assessment of long term social service needs.

The presence of a facility may result in increased social service funding through a proponent agreement with a community to increase and fund social programs. Conversely, the presence of a facility can potentially overload an unprepared system with an influx of workers and families who may require use of particular social services. For example, in Atikokan, Community Impact Agreement funds were used: to fund a shelter for abused women and children; an expansion of the library and; and facility employees were active as social service volunteers. The Addiction Research Foundation was paid for by the project and was active throughout the construction phase to measure alcohol and drug related effects of population increases, to recommend programs and to monitor outcomes.

For the host communities, resources would be required for helping to maintain an adequate level of social services as a component of community well-being. This would begin with an inventory of the current system in place and an assessment of gaps to ensure that provisions are made to increase social services programs where necessary.

While it would be ideal for potential host communities to develop a Human Services Plan as they consider acceptance of the facility, an inventory of programs and identification of gaps would be sufficient. To this end, the "Social Services" indicator is measured through data gathered about the range and quality of social programs in place or needed.

Measure: Emergency preparedness

Emergency preparedness is an important measure of the health and safety of residents. Larger Canadian communities have completed Emergency Response Plans since 9/11. In addition, almost all Canadian communities have fire, police and ambulance services. The capability of these services and any gaps arising are typically measured and deficiencies are normally identified as a part of the day to day management of the community. Gaps in emergency preparedness are more apparent for smaller, northern and remote communities.

With respect to the nuclear repository facility and the transportation routes, provisions for emergency preparedness are important to community well-being. Such programs provide assurance that in case of an accident, the health and safety of residents will not be compromised. Whether there is adequate emergency preparedness will be subject to review as part of the Environmental Assessment review. In addition, as hazardous goods and nuclear materials are allowed on most highways and rail lines, Federal and Provincial procedures and safety protocols are in place and tested regularly.

A facility located in a community can stimulate efforts to ensure that an emergency preparedness plan is in place and operating at a high level. In addition, it may result in more funds and other support for the improvement of such plans. For in the Atikokan Case study, funds from the Community Impact Agreement were provided to the local police force to upgrade equipment. In the Port Hope Area Initiative, facility staff are volunteers in the local fire department.

The preparation of an emergency preparedness plan is important for a community that will potentially host a nuclear waste management facility due to the inherent risks associated with

the construction process and the nature of the waste. Resources will be required for the improvement of an emergency preparedness plan and should include funding to prepare the plan as well as to conduct the proper testing to ensure its effectiveness.

If the repository were to be sited in a community already hosting a nuclear facility, well developed emergency plans will already be in place, as is the case in Östhammar (home to the Forsmark reactors and LLW repository) in Sweden and Olkiluoto (home to 2 reactors and a LLW repository) in Finland. The same is true at Kincardine (home to the Bruce reactor site and the Western Waste management facility). The development of the underground laboratory in Bure, France, has necessitated upgrading of local health provision and planning.

The "Emergency Preparedness" indicator is measured through data gathered on: the presence of an emergency preparedness plan, type of emergency services; the community's awareness of emergency planning; presence of ambulatory care and quality of emergency response services.

B) Sustainable Built and Natural Environments

Creating a sustainable built environment is essential to enable people to live within social and environmental limits and efficiently use resources while maximising quality of life. Sustainable natural environments refer to the use of resources being continued with minimal long-term effects.

Measure: Housing stock

A measure of the sustainable built environment is the state of current housing stock in a community. It is an important measure of community well-being because it shows the ability of a community to provide a certain standard of living through a full range of housing that meets the needs of all residents. For some communities, sustainability is enhanced by Leadership in Energy and Environmental Design ("LEED") building and community planning standards.

The presence of a facility can encourage the development of varied dwelling types and a variety of price ranges. Conversely, a facility can strain the current housing stock with an increased demand for worker housing that may not be available in a community. Facility workers typically look for a wide range of housing: rental, executive, condominiums, camp facilities, short term motel and boarding and single family homes. Long term facility workers will also view local home ownership as part of their investment in their future. To the extent that workers will settle and purchase homes, community well-being will be enhanced.

Some larger communities have completed a Housing Strategy and Plan. For example, this was the first study funded by Ontario hydro in Atikokan Township. However, most medium sized, rural and remote communities have minimal resources for completing such studies. In addition, new and renovated housing activity occurs so infrequently in these communities as to challenge the ability to provide support. Many communities do not have experienced private sector housing developers. Resources required for the improvement of housing stock in a community include completing an inventory of the type and quality of current housing availability and ensuring the presence of planning approvals for any required additional housing developments.

As a measure of community well-being housing has been an issue for most of the case study facilities. In Atikokan the demand for housing peaked at the height of construction. After that, housing supply increased and prices dropped as fewer employees were on site. In general, housing supply was adequate and because of project management advice, there was not a glut of housing on the market after the project was completed.

To date, the Port Granby Project has not put pressure on the housing stock as the waste management facility is within commuting distance of larger urban centres with adequate housing supplies. The Port Hope Project has not created an increase in housing demand. The Municipality has approved increases in housing stock and local housing developers are meeting the demand. The Municipality has raised a concern about the potential stigma effects seen by prospective home purchasers due to the legacy of radioactive soils. Stigma effects may occur for communities associated with the high level nuclear waste repository and affect house prices.

There are two indicators related to presence of housing. The first is the ability of the current housing stock to accommodate growth from the influx of residents. This has implications for the current population's needs for affordable and sustainable residential dwellings. The second indicator is the ability to construct additional housing stock to accommodate growth. As seen in **Table 4**, data collected to inform these indicators includes price and number of houses, vacancy rates and the availability of serviced land.

Measure: Amenities

Another measure of the sustainable built environment is the presence of amenities in a particular community. 'Amenities' include the presence of schools, parks, recreational facilities, retail and commercial services and entertainment and dining establishments. A community with ample and high quality amenities provides a measurable quality of life for its residents. As such, amenities are indicators of community well-being.

The presence of facility workers can promote the demand for new amenities in a community. Conversely, the lack of amenities can be a deterrent to facility siting due to the lack of community attractiveness to the prospective workforce. The availability of high quality day care, for example, is a critically important amenity factor in relation to community well-being. For the local female workforce, the ability to earn additional income as a day care provider has been shown to be an important source of family stability. In turn, there is a high likelihood that facility workers and their spouses will both work and will demand an adequate supply of day care spaces in support of their participation in the workforce. The provision of high quality day care is a challenge for most communities.

As a measure, 'amenities' are typically more balanced between small, rural, remote and larger communities. For example, smaller, rural and remote communities often have distinct features that help them stand out as attractive places to live. These would include excellent schools, recreation centres, small playhouses, nice restaurants and other attractions. Large communities, on the other hand, may be lacking in amenities and be less attractive places for people to locate. Larger communities typically measure the extent to which amenities are satisfactory through the completion of 'Commercial and Retail' studies and 'Culture Master

Plans'. Of course remote communities can sometimes lack any major amenities and suffer depopulation and low levels of community well being as a result.

For the Port Hope and Port Granby projects, both communities have access to playhouses, movie theatres, excellent public and private schools and ample commercial and retail shopping opportunities. Even though Atikokan was remote, it featured movie theatre, an excellent public and high school system, dining establishments and adequate retail services.

The perceived lack of 'big-city' amenities can also influence an incoming workforce. In Olkiluoto, for example, there has been some opposition amongst Posiva staff to relocation from Helsinki.

There are several data sets that assist in the analysis of amenities as a measure of community well-being. As indicated on **Table 4**, these include: quality of schools, nurseries and day care and access to recreation and shopping opportunities.

Measure: Outdoor recreation

The third measure of sustainable built and natural environments is 'Outdoor Recreation'. Outdoor recreation is an important element of community well-being because it promotes access to and responsible use of public lands for leisure activities. Outdoor recreation activities that contribute to community well-being include: soccer pitches, trails, golf courses, basketball and skate board courts, passive park activities and other uses.

The presence of a facility can be a positive force in promoting outdoor recreational activities in a community with the introduction of proponent sponsored events that promote outdoor activities. Conversely, the construction of a facility could potentially temporarily strain the use of some recreational activities due to increased use by construction and operations workers. Many larger communities already measure whether they have sufficient outdoor and other recreational activities through the completion of 'Culture, Trails and Recreation Master Plans'. Small and large, urban and rural communities are normally able to provide outdoor recreation facilities as an indicator of community well-being.

The Municipality of Port Hope has ample soccer pitches, local golf courses and an attractive waterfront area. Even so, the nuclear companies in the community have contributed time and money to waterfront remediation and the Long Term Radioactive Waste Facility is proposed as a recreation area as an end use. The Municipality refers to the facility representing an honourable legacy for the community. Atikokan experienced several changes to its outdoor recreational facilities, such as increased use for the golf course and ball diamonds. For the Port Granby facility, the end use of the radioactive waste management facility is slated for passive recreation.

The presence of green space and parklands and outdoor recreational opportunities are indicative of community well-being. It is also a measure of the ability of the community to attract and retain residents to live and work. Data sets will include a range of information on type of use, and per capita outdoor recreational opportunities.

C) Local and Regional Economy and Employment

A strong economy and full and growing employment is an indicator of high community well-being. The extent to which the facility will provide these benefits to a host community or enhance those that already exist will depend upon the characteristics of the current workforce and economy.

Measure: Current types of employment

Data about the labour force assists in the measurement of whether a community will experience benefits. The data will also help to establish a baseline upon which its training needs can be established. Local and regional employment is typically assessed using local data or Statistics Canada data on occupations (employment characteristics of people working in a community regardless of where they live) and employment (employment, education and skills characteristics of people who live in the community). Many communities complete 'Economic Development Strategic Plans' that describe their workforce. These plans and economic development goals support decisions of people who may want to invest. The more sophisticated communities will also have Employment Sector Strategies.

Based on the case studies, we know that community well-being can be enhanced if a community has a diverse range of employee skills and higher training and education levels. While the facility will undoubtedly provide employment for local communities, without the presence of higher skilled workers, jobs will be limited to civil trades, security, hospitality and other lesser skilled occupations. Programs in place to improve employment opportunities in a community would include those that inform residents of required skills in advance to enable people to plan and achieve training for the specific employment opportunities as they arise. The availability of such educational and improvement opportunities is also important to attract workers who will be moving to the community to work at the facility. High schools, community colleges, labour unions, private sector skills upgrading firms and universities would need to be community partners so as to allow local residents to take advantage of the employment opportunities.

In general, the case studies indicate that community well-being through employment opportunities is enhanced when there are firm, longer-term employment opportunities. In Atikokan, for example, the construction managers hired as many local residents as possible. However, attempts to upgrade the skills of local residents for hiring into the higher paid occupations were less than satisfactory. The training required for a trades person to receive a Red or Gold Seal certification may take up to five years. The training and union hiring halls are typically located in large urban centres. In the Atikokan situation several people did have the opportunity for such training but either chose not to return to the community to work, or there were no longer the requirements for the trade on the site once their training was completed.

In the DGR and Port Hope examples, a core of well-skilled workers and professionals has located in the community. Because of the long term nature of the waste management projects, local workers were able to plan their careers with the certainty that there would be a job available for them. The development of specialist employment at the laboratory in Bure has laid a good foundation for future opportunities when the repository is eventually located. It is also

proposed to develop centres of excellence in related disciplines. Experienced workers already exist in Östhammar and Olkiluoto, and in the former case proximity to Stockholm will ensure a steady supply in the future.

In sum, three indicators of community well-being are proposed. The first is the presence of a skilled labour force that can take advantage of jobs opening up during throughout the facility's lifespan. The second is the presence of educational and training opportunities in the community or easy access to such opportunities in surrounding areas, and the third is the presence of educational and skills upgrading opportunities.

Measure: Current economic activities

Another measure of community well-being based on the local and regional economy and employment is the current and past economic climate and activities in a community. A nuclear fuel repository can provide a variety of new economic activities to a community. However, a facility can also bring unfamiliar economic activities that a community will have to adapt to. Whether or not a community can take advantage of these opportunities is in part dependent on the current characteristics of the community, its level of preparedness to attract new industries and its history of doing so successfully.

For a community to be considered as a potential host to a facility, it is important to discern if they have had previous experience with nuclear industry or a similar industry (e.g. resource development and extraction). For example, all of the Canadian case study communities had some experience with large industrial processes, nuclear related industries or mining activity. As a town of 5,000 people, Atikokan was able to successfully attract and manage the workforce and economic activities associated with constructing a generating station employing 1,200 people at peak, in part, due to its past experience with two mines in the area. In Europe, only the communities in the Meuse and Haute-Marne regions in France were unfamiliar with such industries, both Olkiluoto and Östhammar having long and successful associations with the nuclear industry.

Some communities have up to date economic attraction strategies and many go so far as to pre-zone and service industrial parks. Others may serve economic functions (such as being retail or administrative centres) that might not be conducive to capturing growth opportunities provided by a nuclear waste repository.

Another factor is a community's experience with the 'culture' of large scale production activities. Specifically, this refers to their level of understanding that both they and the facility will need to partner, so as to meet each others needs. Finally, community well-being can be enhanced if there is already economic diversity and the presence of varied industries in a community.

D) Community administration and decision making processes

Community administration and decision making processes refers to the local government's capability's for managing change, taking advantage of opportunities, coordinating their

functions with multiple government agencies. It also includes the ability of the community to make decisions regarding the development of policies and plans in accordance with all applicable by-laws and regulations.

Measure: Leadership when confronted with challenges and /or opportunities

An important measure of community administration and decision making processes is the ability of political representatives and staff to show leadership when confronted with challenges and /or opportunities. Leadership is important to community well-being because it determines how a community will fare when faced with important decisions. When community leadership is strong, the leaders can help to ensure that community interests are incorporated into agreements made with a proponent. Conversely, the lack of community leadership can result in the inability to deal with the prospects of siting and hosting a facility.

Community leadership can be improved through training political representatives and staff. The leadership will help the community to make tough decisions and 'hold their own ground' when negotiating with a project proponent.

In each of the Canadian case studies, municipal politicians and staff worked as a team to insure they could take maximum advantage of the community well-being opportunities afforded by the facilities. The best example can be seen with the Municipalities of Clarington and Port Hope (including Hope Township). Community leaders were able to: set the ground rules for accepting the facility; provide cogent and well researched arguments; envision what success would mean (both community well-being benefits and money); and bring the Federal Government to the table to sign Legal Agreements. In both instances, the Legal Agreements functioned to insure community well-being would occur as well as bring significant financial returns to the community.

During the environmental assessment and approvals stage, the Canadian case study proponents all paid for time and costs of municipal politicians, municipal staff time and outside consulting assistance. In Atikokan, the former Reeve and some staff were paid by the Project. Ontario Hydro assigned an experienced community planner to work directly with the Town to monitor changes and recommend and approve impact mitigation measures. In Port Hope and Clarington, several staff were paid to manage the municipal requirements and they had access to a Municipal Peer Review Team ('MPRT'). The MPRT provided the municipalities with consultants who specialized in managing the community well-being effects of large facilities. The MPRT allowed both municipalities to 'level the playing field' in terms of having access to technical resources. In all of the case studies, the Mayors (Reeves) showed a very high level of leadership. They each became highly conversant about radioactive waste management or coal-fired generation, large project development and management. In many instances, local political representatives appeared as speakers at national and international conferences.

During the site selection process in Finland, the Olkiluoto municipality leadership recognised the potential contribution that a repository development could make to the area, especially in terms of economic stability, and they led negotiations with the developer through a range of working groups. In Sweden, the mayor in Oskarshamn was a leader in developing novel involvement

processes designed to ensure local control as the process moved forward. The Östhammar authorities joined somewhat later but were also intimately involved in decision making. In France, the small size of the communities around Bure has meant that the main leadership has come from politicians at the next level of authority up, namely the Département or Region.

A sign of leadership is how the community has taken advantage of past and present social, economic challenges and opportunities. Additionally, a community's success at dealing with other proponents is an indicator of the leadership abilities that are required to achieve community well-being in relation to the facility.

Measure: Depth of financial strength

A community's depth of financial strength is also a measure of community administration and decision making processes. Financial strength is important to the development of community well-being because it illustrates that a community has been well managed. It also indicates that the community is not so financially 'thin' as to not be able to manage the ancillary challenges that a facility may entail. For example, these ancillary costs may include travel costs for community leaders, studies not paid for by the facility, ability to hire and pay legal and other administrative assistance.

The presence of a facility can increase financial strength within a community due to grants and increases in municipal taxes paid. All of the Canadian case study municipalities, under Province of Ontario legislation, are not able to take municipal financial decisions that would allow them to suffer bankruptcy. Most communities do annual financial plans and five to ten year financial forecasts. Larger communities are often required to defend operating and capital spending decisions and are likely to have supportive by-laws in place, such as Development Charge By-Laws. However, whether or not a municipality is able to receive additional funds through taxation varies across the country. That said, Atikokan, the smallest of the communities, found that it had to engage municipal financial consultants to assist it to address the financial challenges brought on by the Generating Station. Fortunately, Community Impact Agreement funds allowed the Town of Atikokan to hire the consultants and the Community Impact Fund allowed money to be advanced to address the short fall. Funds were also available to pay for the required municipal infrastructure. However, the experience is mixed for the European examples.

An additional important contributor to community well-being is the presence of banks, credit unions, private sector financial advisors, law firms and accounting firms. The lack of a financial commercial sector can be a deterrent to facility siting due to the inability to accommodate increased financial activities from the new residents.

Measure: Existing organisations and institutions

The variety and strength of organisations and institutions in a community is a measure of leadership and administrative support at a community level. Volunteer organizations capture and direct the spirit, drive, resources and energy of individual members of the public. They fill in the gaps in service and community well-being not met by government. For example, the

members of local volunteer organizations typically build supportive housing; deliver after school programs and meals for the homeless. In larger communities, volunteers fill in grant applications and do the political lobbying required to build new hospitals, art galleries and cultural facilities and to obtain funding for needed social programs. When these organizations are functioning well, the opportunity to enhance community well-being increases.

Thus, the characteristics of existing organisations and institutions are important to community well-being. Their presence illustrates the provision of a support network for community activities. A facility siting process will likely involve such organizations and institutions. Conversely, organisations and institutions that may not have worked with project proponents may not have the resources or capacity to do so. For example, they may not be able to articulate the requirement for funds from the facility for needed programs. In most of the case studies, facility staff and their families also became members of the community and participated in volunteer organizations. In these instances, they helped to increase the capacity of the organization. For example, in Port Hope, facility staff are members and supporters of the volunteer fire department and arts organizations.

A positive indicator of the capability of existing organizations and institutions is the strength they have demonstrated in the past in positively influencing community outcomes. In general, smaller and rural communities tend to have stronger and more numerous volunteer organizations than in larger centres.

4.1.2 Project's Enhancement of the Community's Long-Term Sustainability

Whether the facility will enhance or detract from the community's long-term sustainability depends on the types of sustainability programs the community already has in place and the ability of the community to derive additional benefits from the facility. Six sustainability criteria are identified and, in total, they cover all facets of community sustainability (social, economic, ecological and well-being). The Federation of Canadian Municipalities has provided funding for many communities to complete Community-Based Sustainability Plans ('CBSP'). Communities that have Community-Based Sustainability Plans are more likely to benefit from the facility.

Criteria:
A) Inclusiveness/community cohesion

Community cohesion refers to the quantity and quality of interactions among people in a community, as determined by the degree residents know and care about their neighbours and participate in community activities (Cochrun, 1994). Cohesive and inclusive communities are able to cooperate in a manner that provides a greater likelihood of securing community well-being benefits.

Measure: Characteristic of community response to opportunities or challenges

Communities that traditionally have been able to come together to address opportunities and challenges are more likely to demonstrate inclusiveness and cohesion to achieve their sustainability goals. For example, even though the community was small, Atikokan residents

were able to work together and present a compelling message as to why the generating station should be located in their community. Port Hope residents were able to clearly present their needs in terms of the long term sustainability objectives for the Low Level Long Term Radioactive Waste Management Facility.

Communities that do well in this regard are able to manage both the positive and negative aspects of change. They can balance both praise and criticism of a facility proponent so to achieve their objectives. The ability to engage and rally their residents about these opportunities and challenges is a good indicator of whether the facility will be able to enhance long term sustainability. Alternatively, when a community is split into many groups and factions, it is likely there will be no support for providing funding, approving grants or making positive investment decisions. And, if a community has not worked together on common issues previously, making decisions within a facility siting process could be a challenging activity.

Measure: Level of volunteerism

The characteristics of 'volunteerism' in a community indicate whether people are able to take the time to participate in community activities which are vital to achieving community well-being benefits. The level of volunteerism is also a measure of community inclusiveness and cohesion.

Volunteerism is important to community well-being because it identifies the ability of community members to respond to community opportunities and issues beyond their regular work hours. Typically, there is a higher tradition of volunteerism among rural and smaller communities. In addition, individuals having higher education and socio-economic status are more likely to be involved in community issues.

The presence of volunteers in a community can positively influence facility siting efforts because residents are accustomed to participating in community engagement processes. For example, communities who have completed Community-Based Sustainability Plans have done so as a result of many members of the community volunteering their time to be involved in the development of the Plan. In each of the Canadian case study communities, the facility proponent worked with people who volunteered their time as community leaders. For example, the Port Granby facility in the Municipality of Clarington saw many local residents volunteering to be on a Discussion Group over a many years. People also volunteered when participating on community committees helping to achieve and shape the benefits and in reviewing reports and liaising with the proponent. In Sweden, both communities had a range of sub-groups attached to their main project oversight groups, many of whom were volunteers.

Volunteerism is indicated by the number and characteristics of volunteers within a community.

B) Dynamic resilience of the economy/ financial sustainability

The dynamic resilience of the economy and financial sustainability refers to a community's ability to withstand the effects of positive or adverse economic or financial changes. For example, in the 1960s to 1980s social scientists observed communities going through 'boom and

bust' effects due to the presence of large projects such as a mine or power station. These types of projects involved the rapid in-migration and then out-migration of the project workforce. Communities experienced strain because they could not keep up financially with the requirements for staff, infrastructure, housing or other municipal services. Today, social scientists are able to better plan for and manage these effects. That said, whether or not these effects are managed and community well-being benefits are achieved, depends upon whether the economy of the community is characterised as dynamic and resilient.

Measure: Community-led economic development initiatives

The presence of a facility in a community may support or interfere with already established community economic development initiatives and strategies. A measure of economic resilience is the presence of community-led economic development initiatives and supporting documentation. For example, all of the Canadian nuclear host communities have a relatively up to date Economic Development Strategy and Plan. The Plans include a vision, economic development goals and objectives, a staffing and action strategy and timeline for implementation. The Plans may also include Tourism Strategies and Plans. In these and other communities the economic development plans typically include business retention and attraction strategies, financing plans, human resources requirements and land-use planning requirements. Larger Canadian communities are expected to have Economic Development Strategies and Plans in place as a pre-condition of obtaining funds from higher levels of government.

The presence of an Economic Development Plan and the ability to complete economic development initiatives specified by the Plan are important to the achievement of community well-being. The Plan speaks to a community's ability to envision and achieve their economic development goals. Whether or not a community has already been successful is a further determinant of whether they can achieve the benefits afforded by a facility. The facility proponent may be able to assist the community by providing the resources to complete the Plan.

A second and supporting indicator is the level of community funding available for community economic development and sustainability initiatives. All of the Canadian case study communities had access to funds from senior levels of government and foundations. In France, AREVA, CEA and EDF have provided large amounts of money to support development of sustainable industries in the area around the Bure laboratory, in addition to the economic support funding provided to the communities via the provisions of the 1991 and 2006 legislation.

Another indicator is whether the community has enough funds on hand or in reserve funds to help the community withstanding the effects of economic or financial shocks. All of the Canadian case study communities had reasonably robust municipal funding available. They were able to plan for capital expenditure and increased operating costs attributed to growth in their populations. In each instance, municipal financial support was also provided by the facility proponent.

Measure: Openness to external investment in the community for associated support industries

An additional measure of economic resilience is the openness to external development investment in the community for associated support industries. Some communities who were potentially able to benefit from growth in primary industries have failed because they could not take advantage of attracting spin-off growth opportunities. Successful communities understand the potential additional community economic benefits and actively create the conditions to attract these industries. When most successful, the communities have economic development committees, attraction and welcoming strategies, associated workforce attraction strategies and serviced land.

Openness to external development investment in the community from associated support industries is important to community well-being because it shows that a community wants new industries in their jurisdiction. Conversely, a community that is looking for non-facility related types of industries or not interested in economic growth will not achieve the full range of potential benefits. For example, for Canadian case study communities the focus has been on attracting the primary facility rather than the rest of the businesses typically associate with the industry. As a result, rather than co-locate, the related businesses imported goods and equipment to the site, allowing other communities to benefit. Each of the Canadian case study communities were able to attract some additional spin-off benefits.

An indicator for openness to external development is the degree of support for new industries, serviced land available and the ability to provide streamlined planning approvals.

C) Community decision making processes

Community decision making processes refer to the experience a community has in making tough decisions and in involving residents in the development and implementation of community well-being strategies. If successful, a community can achieve better results for the community as a whole. Community leaders in a Maritime city (Saint John, NB) particularly adept at attracting new industry uses the phrase, *"governments give permits and people give permission"*. Community politicians and leaders may lead efforts to achieve community well-being benefits and give the necessary permits, but unless they have the support of the community they risk not achieving this goal.

Measure: Transparency and trust

The level of transparency and the development of trust is a measure of the strength of the community decision making processes. 'Transparency' means that the community has a tradition of making decisions with doors open. For example, for several of the case study communities, virtually all of the municipal meetings are open to the public. Municipal council activities are well reported and minutes are kept.
The development of trust is important during a siting process as it can lead to community acceptance. Trust needs to be reciprocal as it applies to both proponents and communities who are investigating a facility. It signifies the ability of project proponents and local political

representatives to foster and maintain trusting relationships within the community as well as among external players in decision making processes.

Measure: Openness to new Ideas and associated individuals

Another determinant of community well-being is the openness of a community to welcome new ideas and individuals. Community openness is important because it shows the ability of a community to allow for the integration of people from different walks of life. For example, some Canadian communities are not well equipped to attract and retain new immigrant workers for this reason. They have struggled to keep workers and their families as permanent residents. This is particularly challenging when it comes to attracting and keeping high demand medical and other professional workers.

People with different languages and cultures need support when deciding to settle with their families. Often lacking are language support services, introduction services to people of similar cultures, integration supports for school children and new workers and support spouses requiring culturally appropriate health care.

Community openness to new people and ideas is important to facility siting because of the need to successfully accommodate the influx of workers to a community that have a variety of backgrounds and interests. Openness is indicated by past examples of the community welcoming and accepting new cultures, lifestyles, residents and entrepreneurs.

Measure: Degree of community involvement

The degree to which a community becomes involved in the review and evaluation of a proposed facility is also a measure of sound community decision making processes. Community involvement is important to community well-being because it illustrates the desire of residents to become active and engaged in community affairs. Community involvement is important in a siting process because, ultimately, the community decides if it wishes to accept a facility. A lack of willingness among community members to participate in siting decisions would seriously hinder the candidacy of that particular site.

Resources to enable community involvement during a siting process include consultation activities with the public and municipal officials to determine if a community would like to further investigate a facility. The Municipality of Port Hope and Municipality of Clarington best depict good community involvement. After government efforts failed to find a host community the residents took it upon themselves to find a solution to their local problem. They convened meetings and explored options. The preferred option has been referred to as the 'community-led' solution. There was also a high degree of community involvement in Kincardine through the DGR referendum. In Sweden, there has been a very high level of local involvement throughout the siting process, less so in Finland and France.
An indicator of community involvement is past experience of the number and range of people who have chosen to become involved in a community decision. Capacity building exercises can enhance community involvement. Another indicator of the degree of involvement relates to the level of participation in other decision making processes, such as a referendum.

D) Balanced growth and healthy liveable community

Community well-being can also be measured through the achievement of balanced growth and a healthy liveable community.

Measure: Existing quality of life maintained or enhanced

A measure of balanced growth and a healthy liveable community is the quality of life for local residents. For some rapid growth communities a good quality of life is not achieved. Where quality of life is not being maintained, opinion polls tend to show a general level of dissatisfaction; community facilities are not keeping up with demand and the population is seen to be transient. Where quality of life is being maintained and enhanced, community support services and facilities are normally being provided ahead of demand.

A voluntary siting process is intended to make a community better off with a facility than without it. To assess whether the facility will provide the required improvements to their quality of life, communities need to first assess their current capacity to provide a good quality of life for their residents. The proposed quality of life indicator addresses how quality of life is seen through: the range of employment opportunities; quality of the built environment; health levels; recreation opportunities and leisure time availability. In support of monitoring local perceptions of quality of life, for example, the Port Hope Area Initiative Management Office (proponent) regularly surveyed residents about this and other indicators.

Measure: Community Growth

Across Canada communities have growing, stagnating or declining populations. In larger urban centres, population growth is measured through annual population projections. Most smaller and rural centres rely on Statistics Canada data to track population growth. In some Southern Ontario municipalities, population and employment growth is dictated by the Province of Ontario through their Places to Grow legislation. In terms of facility siting, the proximity of the facility to the community, decisions about where to locate offices and support facilities all have a large implication on whether the community will experience growth.

How and whether a community experiences growth is important to community well-being because it highlights the ability of a community to handle changes in growth patterns in a sustainable manner. Assessing the ability of a community to respond to growth pressures speaks directly to its ability to achieve community well-being. Most communities manage growth through Municipal Plans or Official Plans and other planning documents.

Indicators of community growth result from reviewing past growth patterns to predict if community is able to handle influx of facility workers and determining if the community can manage an increase or decline in population if the facility is not developed (or prepare for growth if it is).

In general, smaller communities, such as hamlets, will not have achieved a critical threshold size for accommodating significant growth.

E) Sustainability planning

Sustainability planning speaks to a community's ability to envision an environmentally and economically viable, resilient and healthy future. Dozens of communities across Canada have developed Community Sustainability Plans. Although, none of the Canadian case study communities have completed Community Sustainability Plans.

A measure of community well-being is whether the presence of the facility can help the community achieve its sustainability goals. Conversely, a facility may not be consistent with a community's sustainability planning objectives. Improvements in sustainability planning can occur through the facility proponent working with the community to understand its sustainability goals and objectives and provide funding and other supports.

4.1.3 Physical and Social Infrastructure in Place and/or Potential to be Put in Place to Implement the Project

The factor, 'physical and social infrastructure in place and/or potential to be put in place to implement the project' refers to the roads, water and waste water treatment facilities, schools, community centres and other physical and social infrastructure required to successfully develop the facility in the potential host community. If the infrastructure is not already in place, it will need to be determined if new infrastructure is needed or if the existing structures can be modified.

Criteria:

A) The availability of physical infrastructure required to implement the project

Physical infrastructure includes roads, bridges, rail lines, docks and associated municipal infrastructure. This infrastructure typically represents the most expensive challenge for Canadian communities. Once the facilities are completed, they represent the community's most valuable assets.

Measure: Presence of suitable roads and other infrastructure

A measure of the ability of physical infrastructure to support the implementation of the facility and generate community well-being is the presence of suitable roads, water and waste water treatment plants and other infrastructure. Social infrastructure can represent hard services (schools, day cares and community centres) or soft services (social welfare support staff, recreation centre programming or other community programs). Across Canada, Federal and Provincial governments provide financial support for infrastructure expansions and enhancements. Many large municipalities complete Asset Management Plans, Transportation Master Plans, Water and Waste Water Plans and Storm Water Plans so as to ensure they have the right infrastructure in place at the right time.

The presence of suitable roads and associated infrastructure is important to community well-being because it illustrates the ability of a community to accommodate new development. The degree to which suitable roads and other infrastructure is lacking would require additional

studies as part of the siting process. Most Canadian communities are familiar with the quality and age of their infrastructure. The challenge occurs in predicting the infrastructure improvements required to accommodate workers and equipment associated with a new facility.

Suitable infrastructure is required to accommodate and manage community growth as a result of a facility. In each of the Canadian case study communities, the facility assisted (or is committed to assist) the local municipality with physical infrastructure upgrading required as a direct result of the project. For example, in the Town of Atikokan, the project funded the upgrade of a truck by-pass route and funded the upkeep of local roads due to increased local traffic. The proponent also funded a study of upgrading the water treatment plant and then contributed funds for its upgrading. In the Municipalities of Clarington and Port Hope, the proponent is funding roads upgrading, roads monitoring programs and in some instances road construction.

Measure: Municipal services

The presence of municipal services is a necessary component of community well-being because they illustrate the ability of a community to manage the basic health and safety of its residents. For example, beyond fire and police services, municipalities are required to provide: waste management, works, housing, social welfare, tax collection, engineering and planning services. These services are essential to the development of a facility because they ensure that the municipality continues to operate well during project construction. In the Canadian case study communities, these services were occasionally strained when the demands of the project on staff time pulled them away from municipal management functions.

In smaller communities, the lack of municipal services means they need to rely on services from adjacent communities. Knowledge of the resources needed to improve municipal services would require an assessment of the current systems in place to ascertain if they meet the needs of a facility and working with a community to ensure the necessary services will be in place when they are needed.

An additional indicator is the existence of sufficient municipal staff to handle planning and development tasks that relate to the construction of a facility. In the Canadian case study communities, the proponents funded municipal staff time involved in assessing, approving and developing the infrastructure.

B) Adaptability of community and social infrastructure in place to adapt to changes from the project

The adaptability of a community refers to the ability of a community to acclimatize to changes and pressures and take advantage of opportunities. For example, many communities exist for a reason. They may be a centre of mining or forestry activity, be characterized by manufacturing or be an administrative hub. Should this role shift as a result of the presence of a high level nuclear waste repository, the community will have to be able to adapt.

Measure: Community dynamics

Community dynamics is indicated by the community's ability to adapt to changes in the local economy in relation to existing and new industries. Community dynamics measures how and whether the community can deal with change from internal and external sources. Further, it speaks to whether the community can accommodate a shift in focus from its current activity to accommodate new opportunities. How the dynamics are characterized illustrates the ability of a community to adapt and acclimatize over time.

A community will undoubtedly go through changes if it accepts the facility. New industries may locate in the community. Workers and their families will become involved in community affairs. The facility workers will generally have well paying jobs; they will have solid benefit plans and will create a change in the socio-economic characteristics of the community. An analysis of whether a community has experienced these changes or how the community has adapted previously to changes in its social and economic structure will help to understand the possible implications of facility development.

Measure: Community composition

Community composition refers to the likely number of people in the community who would be able to derive benefits from the facility during construction, operation and maintenance. Some Canadian communities, for example, have an aging population, have much of their skilled workforce emigrating to Western Canada and other Provinces, and do not have a well skilled workforce able to take advantage of community well-being opportunities. For example, in the Town of Atikokan there were few well skilled workers able to benefit from the facility. However, the community composition was such that there were lower skilled and younger workers who could take advantage of security, hospitality, labourer and other jobs. For the Municipalities of Kincardine, Clarington and Port Hope, many of the workers are able to commute in from other centres. As a result, there was some spill over of community well-being benefits to other communities.

Studies in Sweden, for example, showed that a repository would have less impact in terms of enhanced employment opportunities in Östhammar due to its proximity to Stockholm and other major population centres.

Data sets required to assess community composition include: number of skilled workers; age of workforce; commuting characteristics; number and type of trades.

4.1.4 Avoidance of Ecologically Sensitive Areas and Locally Significant Features

For the factor 'Avoidance of ecologically sensitive areas and locally significant features', it is necessary to determine to what extent there are ecologically sensitive areas and locally significant features that may be affected by a facility.

Criteria:

A) Ability to avoid ecologically sensitive and locally significant features

The ability to avoid ecologically sensitive and locally significant features refers to the intrinsic environmental components of a community including the aquatic and terrestrial environment. In general, the Environmental Assessment study under the Canadian Environmental Assessment Act will insure that the facility is sited in a manner that avoids ecologically sensitive measures. The Environmental Assessment Study Report ("EASR") will be subject to intensive Federal and Provincial and community review. The provisions and conditions for avoiding ecologically sensitive and locally significant areas will normally be carried forward into Environmental Management Plans and Detailed Design Documents. It would be expected that the EASR would be broad enough to identify and assess all potential facility environment interactions.

Measure: Maintenance of ecologically sensitive areas

A measure of community well-being is the ability to maintain ecologically sensitive areas. The maintenance of ecologically sensitive areas is important to community well-being in order to ensure that community natural resources are protected.

The level of maintenance of ecologically sensitive areas is indicated by the understanding of the characteristics of wetlands, terrestrial and aquatic environments in the vicinity of the facility. Most municipalities with up to date Municipal Plans or Official Plans have a full understanding of ecologically and locally significant features. In addition, they will have policies for their protection.

One area where many host communities have been able to maximize community benefits is in directing hosting fees to ecologically sensitive areas that have been identified for protection. Across the country, communities who have watershed plans, environmental management plans and environmental protection policies in place as part of their Municipal Plans tend to be better prepared to achieve ecosystem benefits from any development.

Measure: Natural Heritage

Appreciation of natural heritage is integral to successful facility siting. The assessment of whether natural heritage features will be protected occurs as part of the Environmental Assessment process. Natural heritage features are important to community well-being for a wide range of reasons: for existence values; spiritual values; aesthetic values; recreation values and commercial values.

Larger urban communities will typically develop and adopt Natural Heritage Plans that indicate a community's awareness of its natural resources. The Plans identify where natural heritage features are found throughout the geographic area and specify how they are to be protected.

4.1.5 Avoidance or Minimization of Effects Regarding the Transportation of Used Nuclear Fuel from Existing Storage Facilities to the Repository Site

In regards to the factor of 'Avoidance or minimization of effects regarding the transportation and construction activities', it is necessary to determine if there are conditions in the communities along transportation routes that will have ramifications for the host community. Also, the issue of transportation needs to be addressed so as to determine if host and transportation communities can manage likely construction-related impacts. The CEAA would be expected to evaluate transportation effects.

Criteria:
A) Availability of transportation routes and adequacy of associated infrastructure

The availability of transportation routes refer to the quality and presence of roads and other infrastructure providing access to a host community. Larger communities have up to date transportation policies in the Municipal Plan or Official Plan. They also have a good understanding of transportation infrastructure through their Asset Management Plan. The largest municipalities prepare forward looking Transportation Master Plans. The government of Canada also monitors the quality of road infrastructure assets.

It is assumed that the waste may also be transported by rail and barge. The quality of these assets is monitored through private companies and Transport Canada.

Measure: Accessibility of highways and roads

The accessibility of the community to highways and roads is important to community well-being because it demonstrates connectivity between different transportation and community nodes. For example, when a facility is operational, the most significant journey for the wastes will be from the current generation and/or storage site to the disposal site. The accessibility of the host community via existing highways, roads and rail is therefore important. An otherwise favourable community that is not readily accessible may therefore not be an ideal site candidate. Transportation studies will need to determine if existing routes are adequate for facility requirements. An important indicator is the quality of the roads or rail to enable easy transportation of construction and radioactive materials, as well as the presence of sensitive uses along the route and the overall route length.

Each of the Canadian case study communities has Provincial Highway access. For several of the host communities, truck transportation haul routes were identified in advance and approved. The designation of truck routes also resulted in the identification of road deficiencies. The facility proponent either agreed to provide road upgrades or to implement a roads monitoring program. Those communities with a strong understanding of their long term road and transportation needs will have a better opportunity to achieve community well being benefits. Beyond the local communities, communities along transportation routes were not assessed for road quality as radioactive material and hazardous goods already travel along Provincial Highways daily. The exception comes when there is a designated haul route for construction material or project operations.

B) Availability of suitable safe connections and intermodal transfer points

Suitable safe connections and intermodal transfer points are used to determine the logistics of moving goods from the point of origin to a final destination. It is possible that the high level nuclear material will need to be transhipped between rail, barge and/or truck. A prospective host community located in an area that requires multiple intermodal transfers may therefore be a less desirable location, as transhipments requiring greater security and safety provisions will be avoided where possible.

Measure: Protection of workers and residents

Whether or not workers and residents can be protected during connections and transhipment activities is a measure of the safety of connections and intermodal transfer points. Typically, if worker health is protected, residents will also be protected. The protection of workers ensures that precautions will be taken to maintain the health and safety standards within a community.

Facility development can provide community well-being benefits by introducing advanced safety protocols within a host community. In addition, the community can benefit from the facility assisting with hiring, funding and training emergency response staff. Conversely, if there are not certain safety and security protocols in place, a facility program may face implementation challenges due to community unfamiliarity with such precautions. Most of the Canadian case study communities do not involve intermodal transhipment. It remains to be seen what mode of transport is developed for use in France (most probably road/rail). Sea transport is used in Sweden at the present time.

The protection of workers and residents is indicated by suitable provisions to minimise accidents along transportation routes and a determination of which trans-shipment and intermodal transfer points are required.

C) Effects on transportation communities along the transportation routes and intermodal transfer points

Transportation communities are those communities that are on the route from a point of origin to the final destination. Canadian law allows the transport of all goods through communities. However, several jurisdictions have designated specific hazardous goods transportation routes. The focus has generally been on the safety of the journey and accident avoidance as opposed to finding routes minimizing population exposure.

Measure: Interaction between transportation vehicles and communities along the transportation route

A facility may require the movement of goods on routes that pass through communities. Community interests therefore need to be discerned before these routes are determined. This will require an understanding of the numbers of communities affected, the types of communities concerned, and other route characteristics. Typically, community well-being can be improved by ensuring that first responders are familiar with how to address a particular type

of accident. In some instances there may need to supplement local first response resources with computer upgrades, vehicles, conversion of a volunteer fire department to a staffed department and training. This will require coordination with officials from the transportation communities.

Measure: Community acceptance

Community acceptance of radioactive waste movement along transportation routes is another measure of whether or not the host community can achieve its community well-being benefits. All relevant communities will be informed of the transportation of the material and associated safety protocols and their reactions can affect the success of the entire project, especially if they do not perceive any benefit to their own well-being.

Community acceptance is indicated by the acceptance of the specific routes though a particular transportation community's jurisdiction. Data sets include information gathered about public opinions, and number and type of sensitive features that may be impacted. For the Canadian case study communities, only the DGR required waste to be transported through other communities. First responders have been informed but there are no indicators that transportation has become a community acceptance issue.

Most transportation route environmental assessment studies include social impact studies, stakeholder sensitivity analysis studies, community follow-up programs and public opinion polling so as to assess the level of community acceptance.

D) Transportation effects during construction activities

Transportation effects during construction involve those activities that occur whenever there is truck or rail movement through both transportation and host communities.

Measure: Transportation effects on a community

Transportation of construction material can have positive or negative impact on community well-being. Most environmental assessments completed in Canada pertaining to infrastructure and related facilities require transportation studies to be completed. These studies typically require the presentation of information about number of truck movements, type of journey, quality of roads and social and environmental characteristics of roads. These studies were required for the Port Hope Area projects, for example, and were performed as part of the EIA studies in Finland.

Transportation effects on a community may include nuisance effects such as dust, noise or vibration. Effects are also indicated by the extent to which roads, rail or docks upgrades are required to accommodate traffic related to facility construction activities. Community benefits may occur as a result of the selection of a route that least effects local residents, road upgrading, signalization improvements and improvements in other forms of transportation access.

4.2 Lessons Learned from the Case Studies

The measures and indicators developed in this paper are designed to address a wide range of potential influences on a community's suitability for hosting a waste management facility. The measures and indicators have been taken directly from the experiences gained from either first hand involvement in specific projects or from examination of available data that have been used to prepare the various case studies, or, in some situations, both.

It is immediately clear from reading the case studies that some communities are apparently much better suited to development of major projects than others. The application of the indicators and measures described here would almost certainly have supported this conclusion in many cases.

However, it is important to recognise that the case studies also demonstrate that in facility siting, there is no such thing as 'one size fits all' as regards community suitability and potential to achieve well-being. In many instances, application of the indicators developed here will need to be undertaken with a number of caveats in mind, especially those influenced by external factors which will need to be identified as the process moves forward.

We discuss below some of the observations that arise from the case studies. It should be noted that the measures and indicators developed in this paper can be of use to the NWMO as it begins assessment of potential communities. The measure and indicators can also offer a tool to communities that are considering volunteering to enable them to undertake a self-assessment exercise. This could help prevent intra-community disagreements that have characterised some of the European siting examples.

Community History

Community experience with similar industries and large scale development projects can be an invaluable asset to a potential host community, in that it allows both proponent and community representatives to begin discussions at a much higher level than in the case of a community totally unfamiliar with them. This allows many of the measures identified in **Table 4** to be addressed immediately and means that assessments of suitability can be performed using real rather than predicted datasets.

However, it is equally important to recognise that familiarity does not always engender satisfaction. The over-reliance of a community on a particular industry or activity can actually militate against well-being in that it places the community in a situation where it may feel incapable of commenting on particular aspects of a project or proposal for fear of losing its one source of income and livelihood. Where the activity is related to nuclear power, this can be doubly problematic if not handled sensitively, given the nature and perception of waste management facilities in relation to the generation side of the industry. The experience in Finland, for example, illustrates how over-reliance of the Olkiluoto community on the tax revenue from the operational nuclear power plant. This led to a complete change in position in regards to the acceptance of a deep repository because of the arrangement entered into with the implementer which helped underpin the future of the local economy.

There are also different classes of 'nuclear' communities discussed in the case studies. Port Hope, for example, only has an historic link to the industry but has a long-term impact from the discarded waste material. Having to live with radioactive material and marginally contaminated soils has created a stigma effect for almost 30 years. Both the municipalities of Port Hope and Clarington do not want more 'outside' waste coming into their communities. Conversely, Kincardine has historic links to nuclear power generation in Canada, and will be home to a waste repository. The indicators are therefore applicable to that situation but differ in their scope, as the profile of the industry in the Port Hope community is rather different than that where active nuclear generation taking place. The Municipality of Clarington is host to the Darlington Nuclear Generating Station. The contrast between Clarington, Port Hope and Kincardine thus exposes another subtle variation in terms of assessing community familiarity and therefore the likely acceptability of a facility, regardless of the apparent suitability based solely on application of the various criteria.

Community Profile

Although several of the case studies indicate that it would appear to be more straightforward to consider siting a repository in a community already hosting nuclear facilities because of this familiarity and relative confidence in the technology, the situation in France, for example, provides a counter argument. Here, a voluntary siting process led to the development of a research facility in a rural setting, one completely unfamiliar with the industry. The research site would probably score less well if assessed with regard to a number of the indicators developed here, whereas the introduction of a comprehensive support package of local project funding and development of sustainable industries has led to a generally favourable public reaction. Whether this will continue in the future when a specific site for a repository is identified remains to be seen.

Some nuclear communities have become so dependent on the industry in their midst that they have failed to develop adequate 'fall-back' positions should the activity cease. In Kincardine, municipal leaders looked to attract the DGR in efforts to diversity their local economy from a reliance on nuclear power generation, to include a new industry of nuclear waste management. However, in some cases, this has led to complacency and sometimes a lack of clear direction and leadership, whilst some more rural communities have developed extensive support programmes to ensure that the communities remain viable. The indicators outlined here and the associated measures and data sub-sets should bring out these strengths, and weaknesses, in communities which may at first sight be easy to characterise in a particular way. Again, there is no 'one size fits all' siting strategy.

Another important aspect regarding community profile, as witnessed by the criteria laid out in **Table 3** (and associated indicators, measures and data sub-sets), concerns the social infrastructure present. The influx of large numbers of construction workers has the potential to completely swamp the health and recreational provisions within a community, and is why we have discussed these in some detail. Of course such an influx will have markedly different impacts in different communities; where large industries are the norm, sufficient capacity will exist in terms of health provision, housing stock and other amenities to cope with a fluctuating population, whereas in a rural, poorly industrialised community this may not be the case

(although the Meuse Haute-Marne region in France is home to vineyards and thus has some experience of seasonal worker influx).

It is however possible for a sympathetic implementer to address such issues head on and overcome any potential difficulties. In Atikokan, for example, healthcare provision was stretched to the limit by the presence of a large construction project and when one of the four health professionals was lost to the community, the implementer, Ontario Hydro, was quick to step in and provide funding and support to the community to recruit a suitable replacement. Of course if the vulnerability of the existing provision arrangements had actually been used as a high-level discriminating factor in an original site selection process, the station may never have been sited in the community.

The level and quality of local amenities and social provision can also influence the impacts that development might have on a community and how its well-being might be enhanced. It is becoming common for repository implementers to agree to relocate the headquarters functions to the selected host community, as a gesture of good faith and confidence in the facility safety. This can help the community to develop and increase its regional and national profile and its ability to attract other new industries and employers.

This can be made considerably more acceptable to the implementer staff if the community is well-served and has a good infrastructure to start with. In Finland, however, the opposite can also be seen to be true. The decision to locate the Posiva headquarters in Eurajoki has caused some concern amongst company staff due the low level of 'big city' amenities that they have been used to in Helsinki, even though the community already hosts a nuclear facility and would therefore 'score' well in terms of many of the measures and indicators developed here. This demonstrates, again, that it is the sum effect of the assessment indicators and data sub-sets that is as important as the first pass using just the high-level criteria.

Community Interaction

In addition to the internal profile of a particular community, and the influence this can have on the potential suitability for hosting a facility, the case studies illustrate differing influences in terms of the interactions that exist between it and neighbouring or, in some cases, competing communities.

A radioactive waste management facility, wherever it is sited, will require varying amounts of waste to be transported to it from other locations. This makes the role of the 'corridor' or 'transportation' communities key in gaining wide acceptance. There are too many examples of surrounding communities and jurisdictions preventing the idea of transport to a site which appeared suitable and acceptable to the host community. A number of the case studies record the cooperation that has taken place around sites that have been selected, either involving corridor communities or in some cases other competing communities. This last case is interesting, in that several programs have recognised the co-operation and devised compensation and benefit packages that include communities other than the immediate host.

Application of the criteria and measures developed here includes some assessment of the degree of cooperation within a particular community, and could perhaps be broadened even further to include inter-community cooperation as well.

Community Location

Whilst community familiarity and community profile are important factors to be kept in mind when assessing what the likely reaction will be with regard to a facility siting proposal, the location of the community can also have important consequences. The criteria and measures concerning transport infrastructure and potential impacts on and reactions from likely transport or corridor communities can have severe consequences when assessing the potential suitability of a community that might otherwise seem well suited from other perspectives.

The communities selected in Finland and Sweden as well as the Municipality of Kincardine benefit from associated infrastructure and transport links that have been developed to service the existing nuclear facilities. Conversely, the Bure area in France is distant from such services. This did not however prevent the selection of the area as the preferred location, due to potentially suitable geological conditions at depth. Therefore it would be incorrect to assume at the first pass that a remote community that could experience community well-being benefits is unsuitable simply because of that remoteness. Such factors and measures may have to be prioritised later down the line of the selection process only if more than one geologically suitable site is identified.

The development of the Atikokan station also supports this cautionary note. It was developed in northern Ontario away from major centres of population, and was successful because of the strong local community organisation that was willing and able to accommodate the project and take a lead in negotiations etc.

5.0 CONCLUSIONS

In conclusion, the measures and indicators developed in this paper can assist the NWMO as it begins the assessment of potential host communities for a facility to management of Canada's used nuclear fuel. Furthermore, the framework developed in this paper provides a tool to the communities that are considering volunteering to enable them to undertake a self-assessment exercise on community well-being.

The identified measures and indicators offer a means to predict whether or not there will be enhanced or reduced community well-being in a potential host community from a facility siting process. The applicable data subsets offer guidance on the specific information that will need to be collected from interested communities to determine if the necessary parameters for the development of community well-being are in place.

The way in which measures and indicators can predict the state of community well-being varies between siting experiences is Canada as well as on an international basis and reflects the varying social, economic and cultural frameworks that exist in host communities. There is no 'one size fits all' framework for siting experiences. The discussion above shows that it is important to take a holistic view of a potential community in order to reach a determination as to its suitability. The criteria, indicators and measures described here will allow NWMO to develop both a qualitative and quantitative assessment but the nuances contained within the constituent data sub-sets will assist both NWMO and the communities themselves to gain a deeper insight into suitability, and allow both sides to be open and transparent in ongoing discussions.

It will be better for a community to see the real potential impacts of development before irreversible decisions are made. Conversely it will be advantageous to NWMO to be able to see behind a community's initial interest (perhaps due to potential short term benefits such as jobs, tax income etc.) and develop a real perception of suitability before major expenditure has taken place.

Whether or not a community is selected to be assessed at the next level of the siting process, the self assessment based on these indicators will provide valuable feedback and support of the goals of residents.

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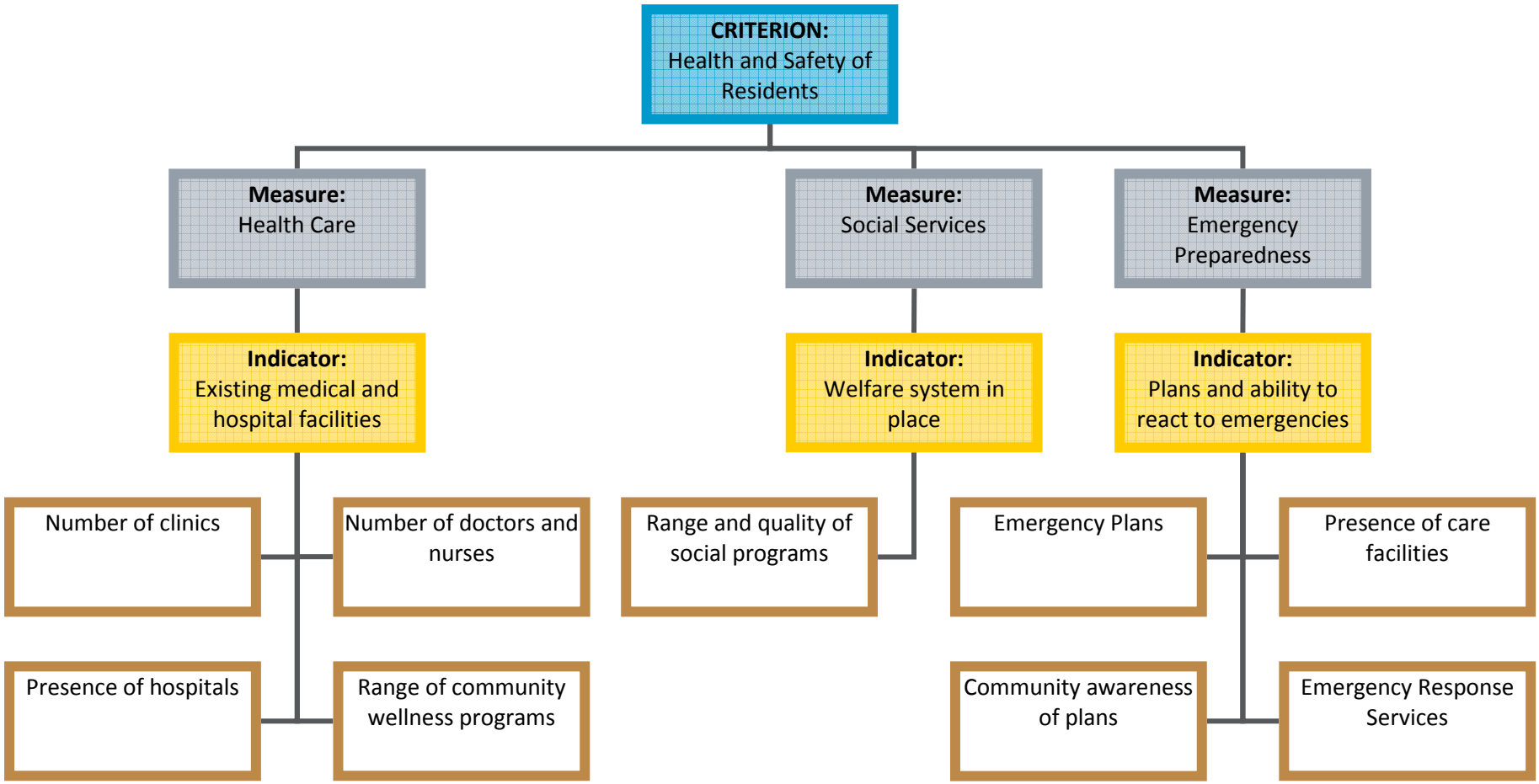
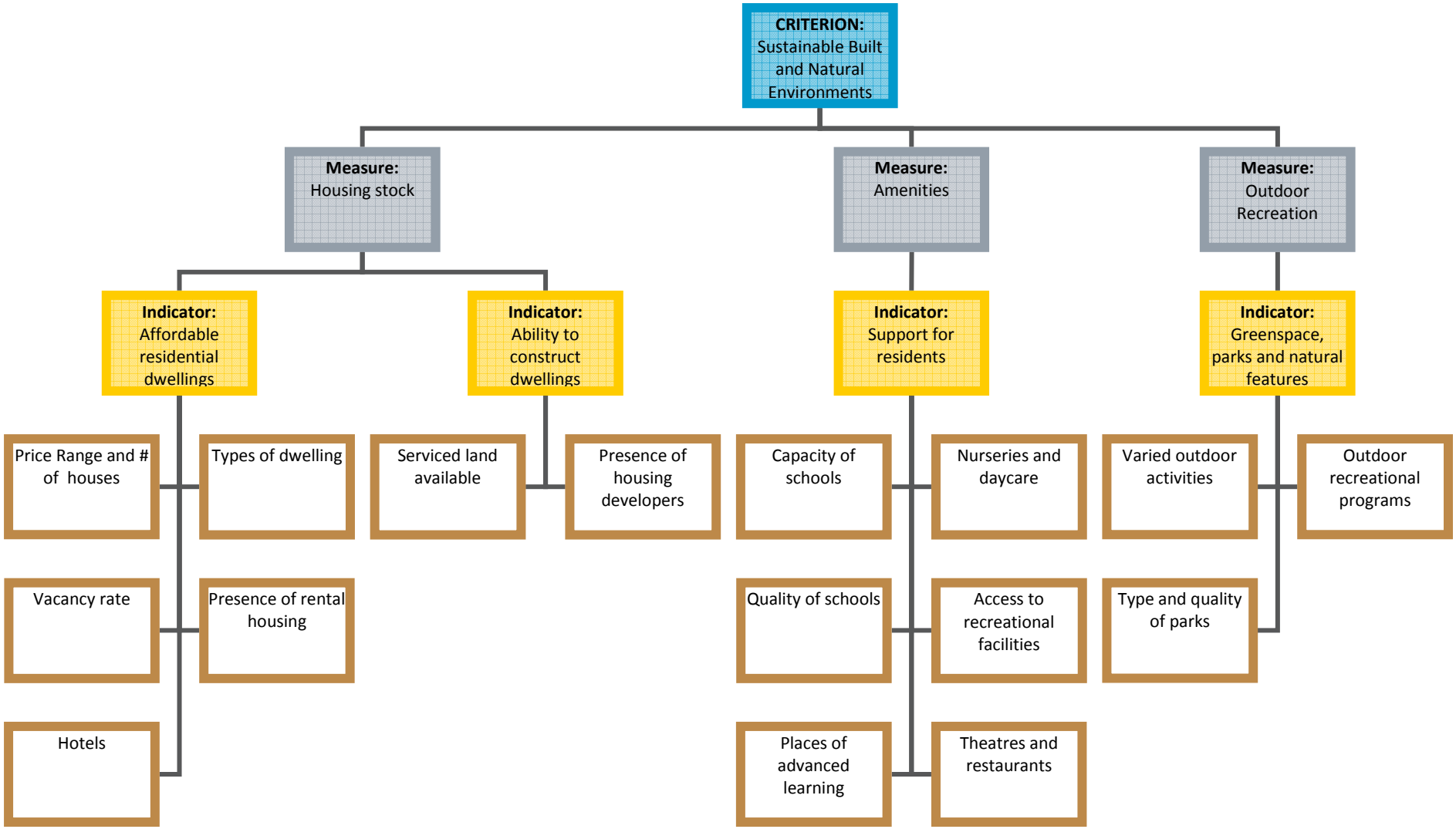
APPENDIX A: SPIDER DIAGRAMS OF CRITERIA MEASURES, INDICATORS AND SUBSETS

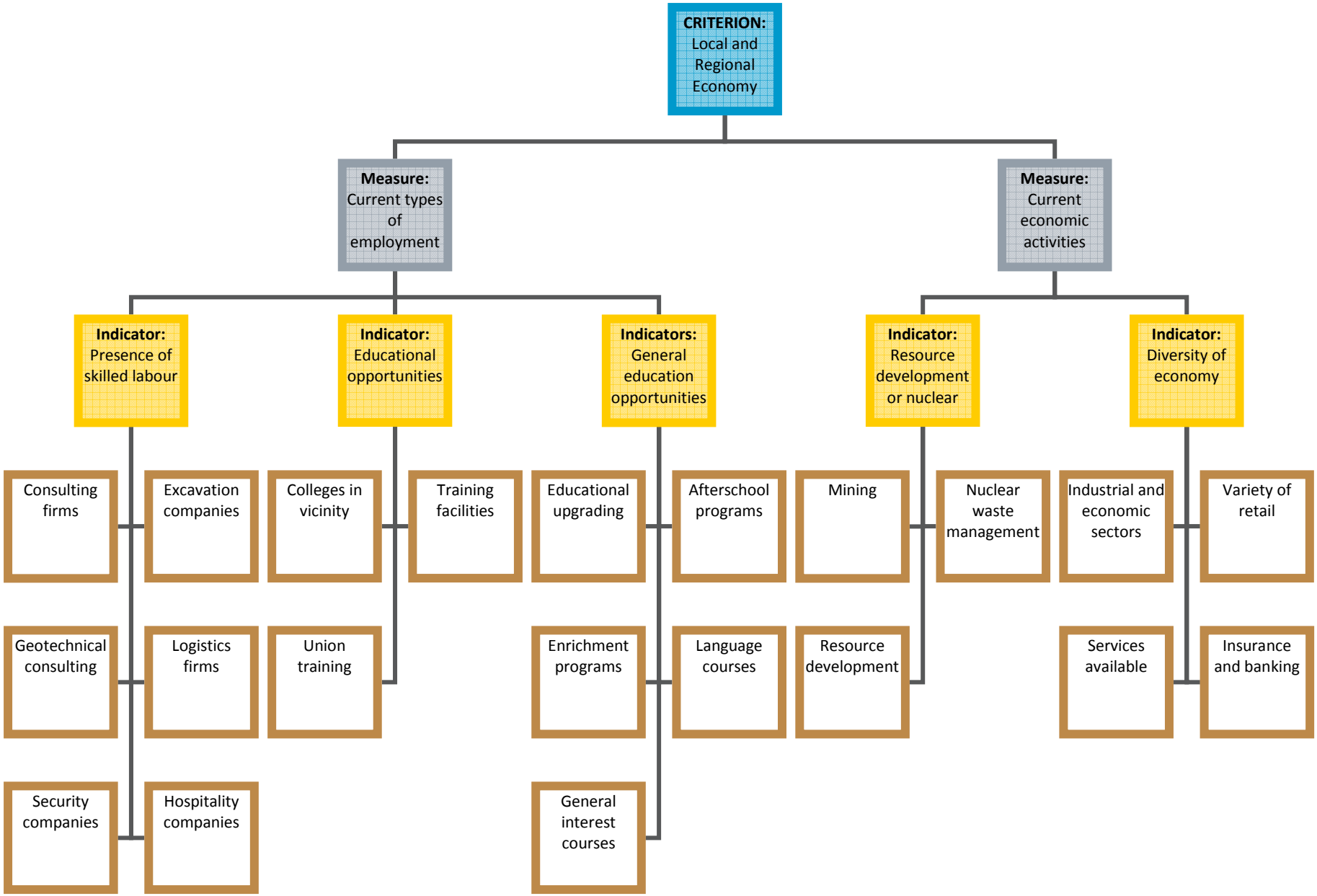
CONTENTS

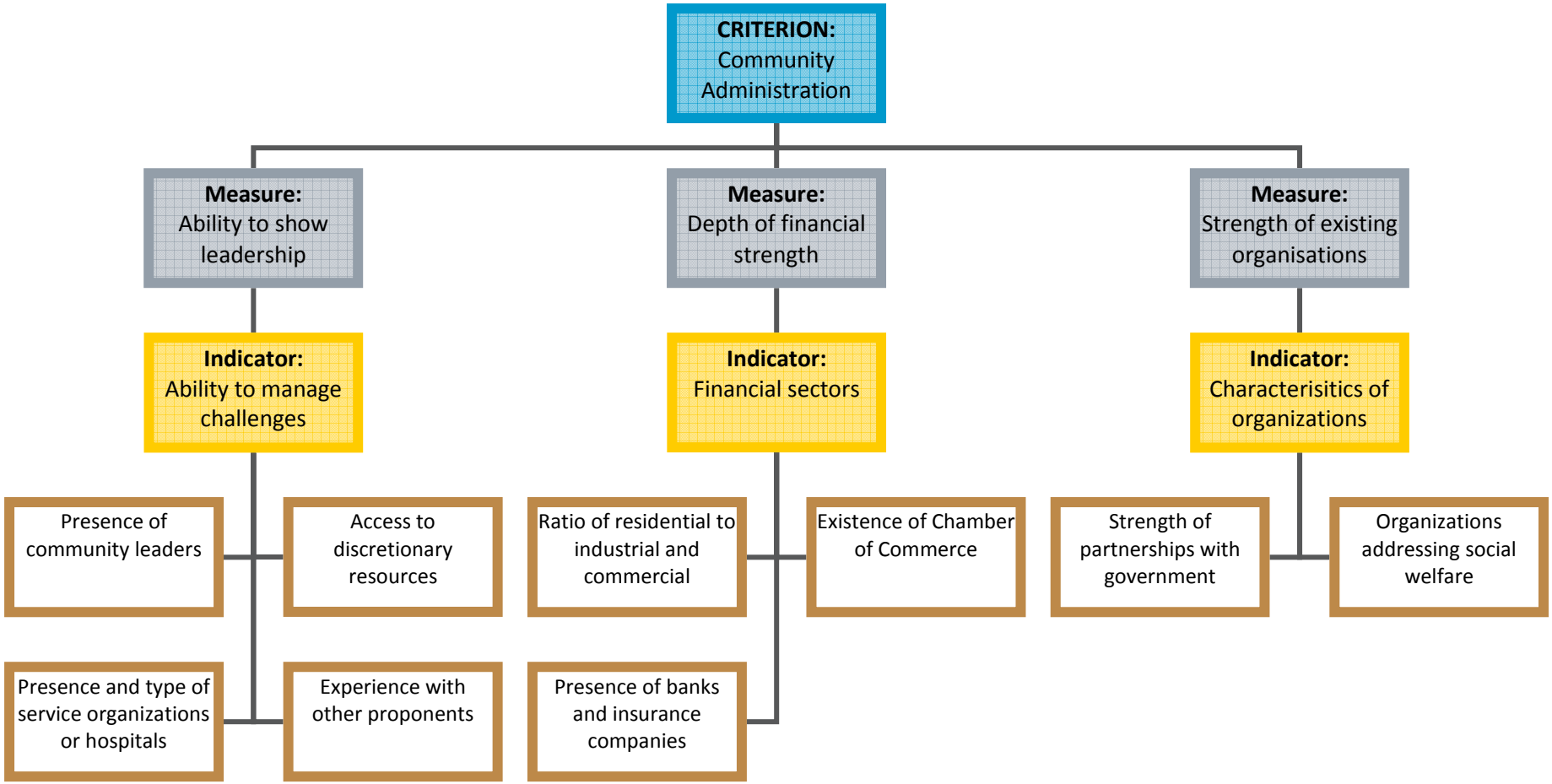
A1. Spider Diagrams of Criteria, Measures, Indicators and Subsets

FACTOR: Social, Economic and Cultural Effects

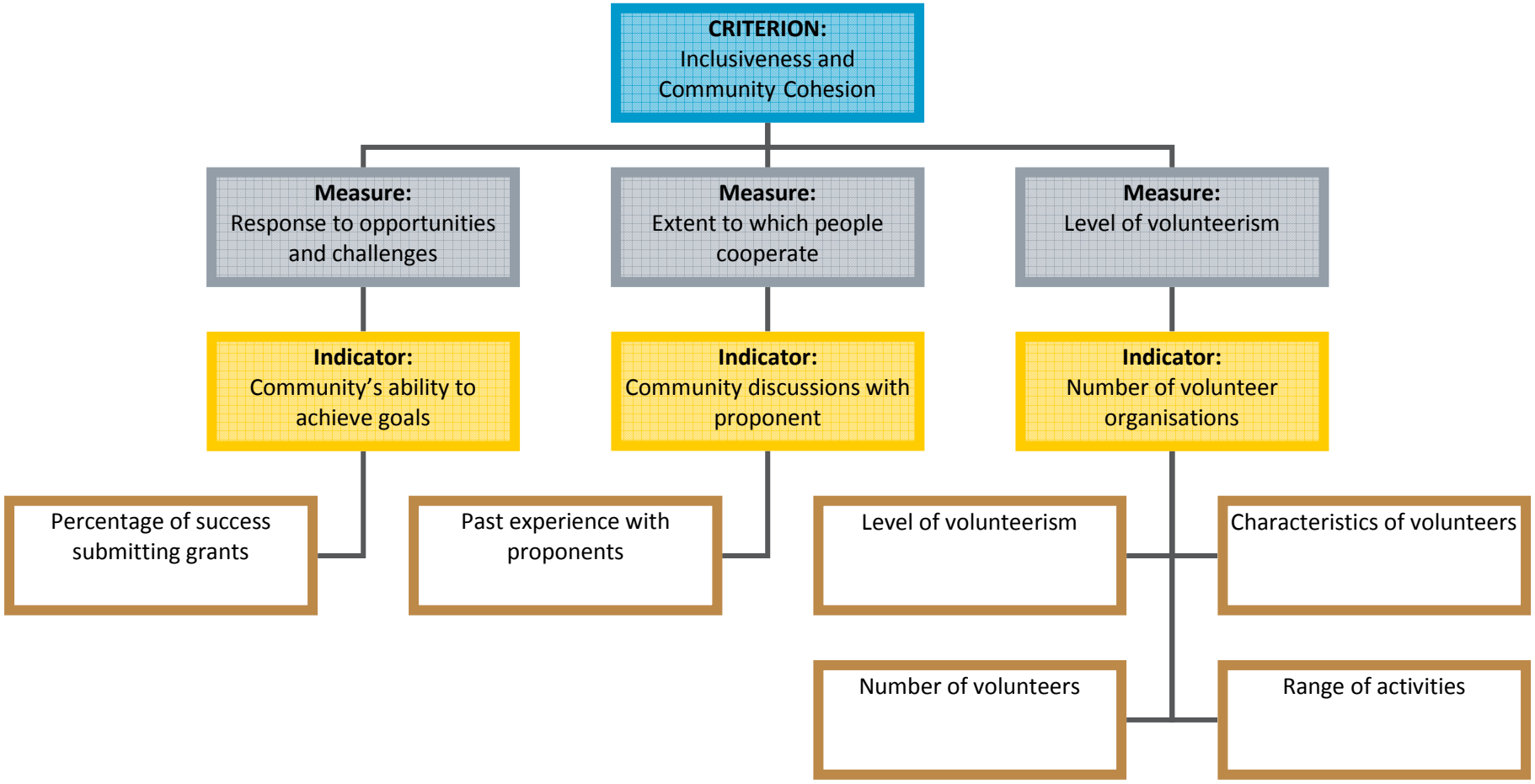


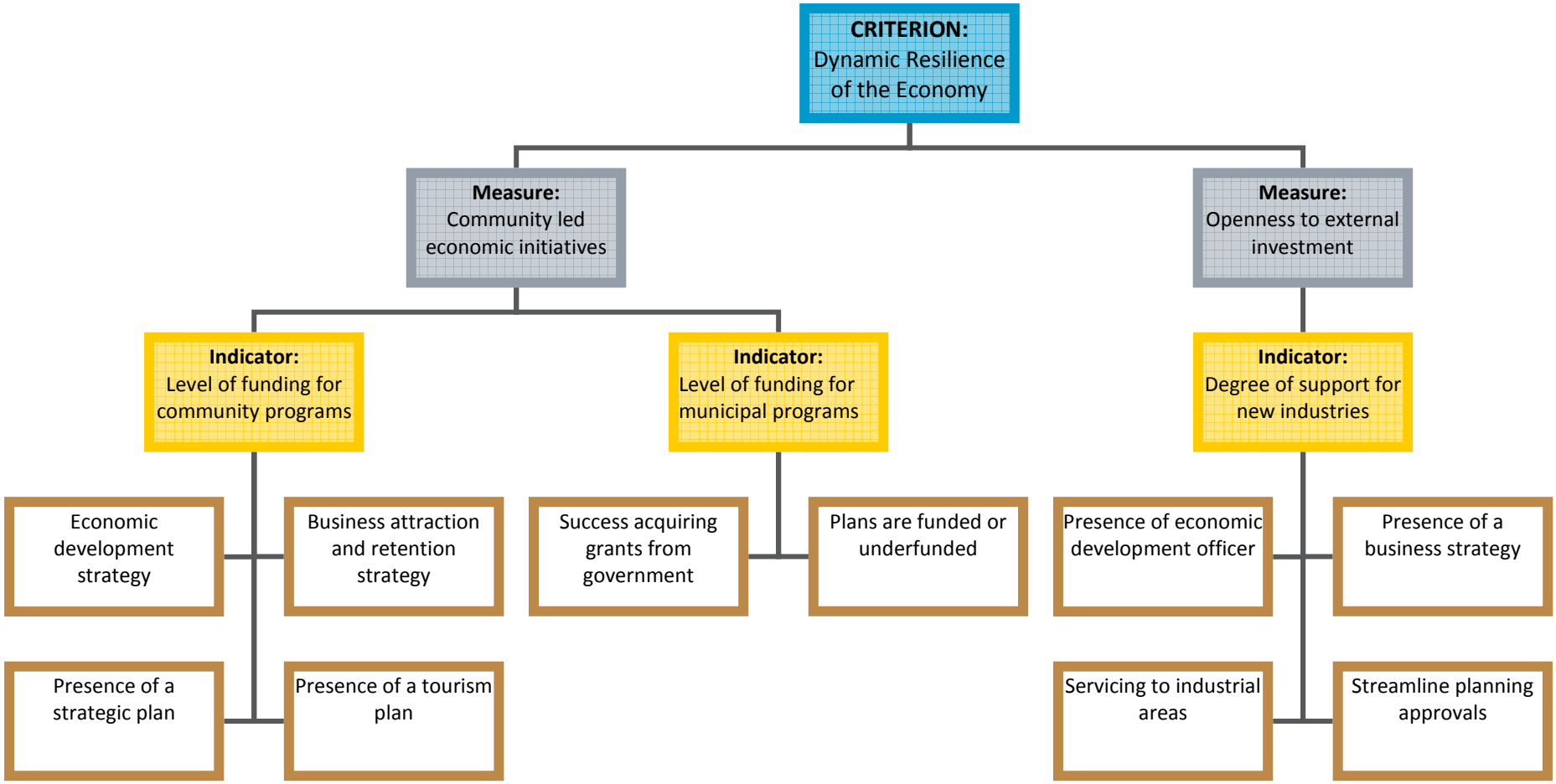

CRITERION: Sustainable Built and Natural Environments
Measure: Housing stock
Measure: Amenities
Measure: Outdoor Recreation
Indicator: Affordable residential dwellings
Indicator: Ability to construct dwellings
Indicator: Support for residents
Indicator: Greenspace, parks and natural features
Price Range and # of houses
Types of dwelling
Vacancy rate
Presence of rental housing
Hotels
Serviced land available
Presence of housing developers
Capacity of schools
Nurseries and daycare
Quality of schools
Access to recreational facilities
Places of advanced learning
Theatres and restaurants
Varied outdoor activities
Outdoor recreational programs
Type and quality of parks

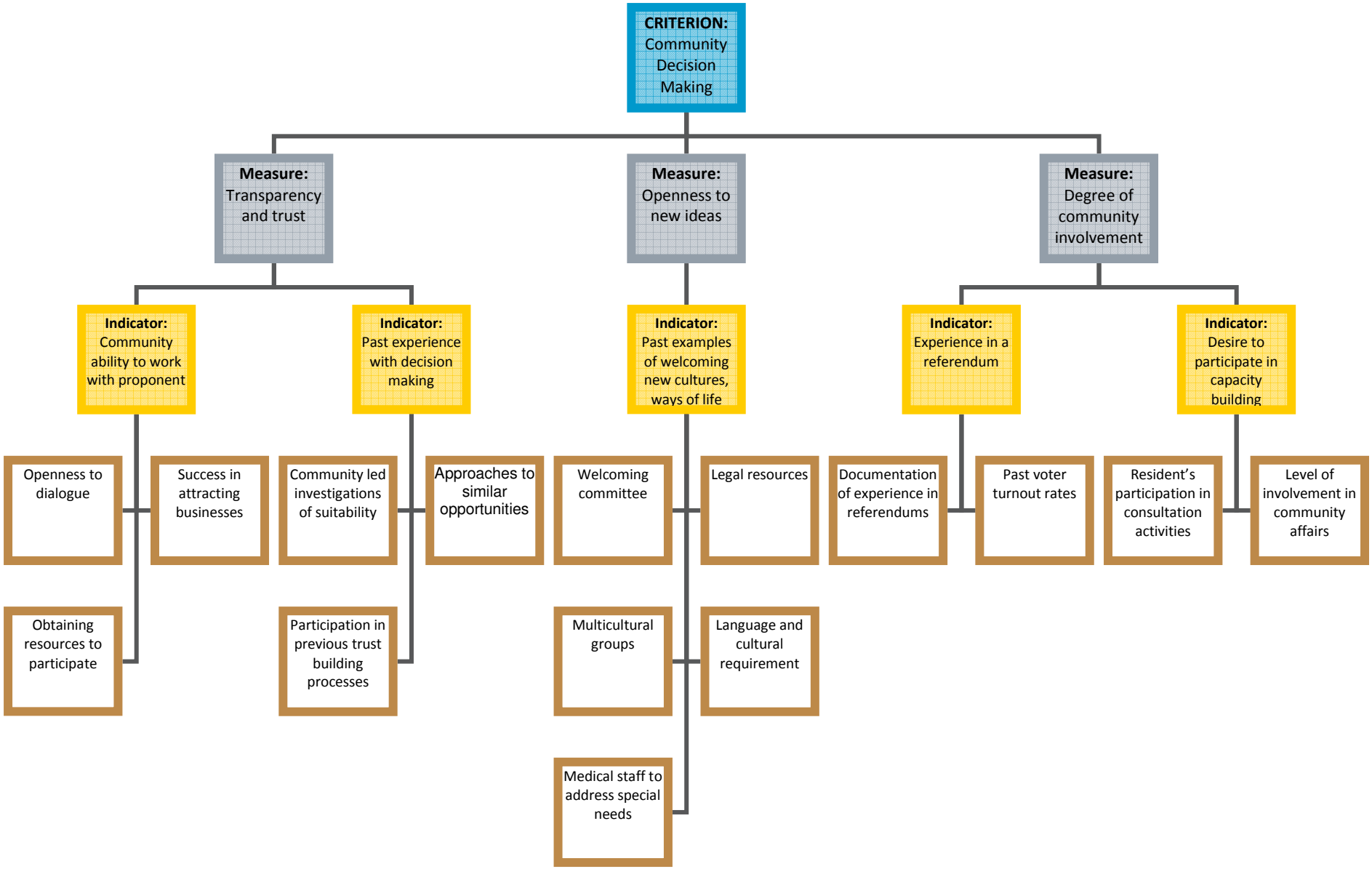

CRITERION: Local and Regional Economy
Measure: Current types of employment
Measure: Current economic activities
Indicator: Presence of skilled labour
Indicator: Educational opportunities
Indicators: General education opportunities
Indicator: Resource development or nuclear
Indicator: Diversity of economy
Consulting firms
Excavation companies
Colleges in vicinity
Training facilities
Educational upgrading
Afterschool programs
Mining
Nuclear waste management
Industrial and economic sectors
Variety of retail
Geotechnical consulting
Logistics firms
Union training
Enrichment programs
Language courses
Resource development
Services available
Insurance and banking
Security companies
Hospitality companies
General interest courses

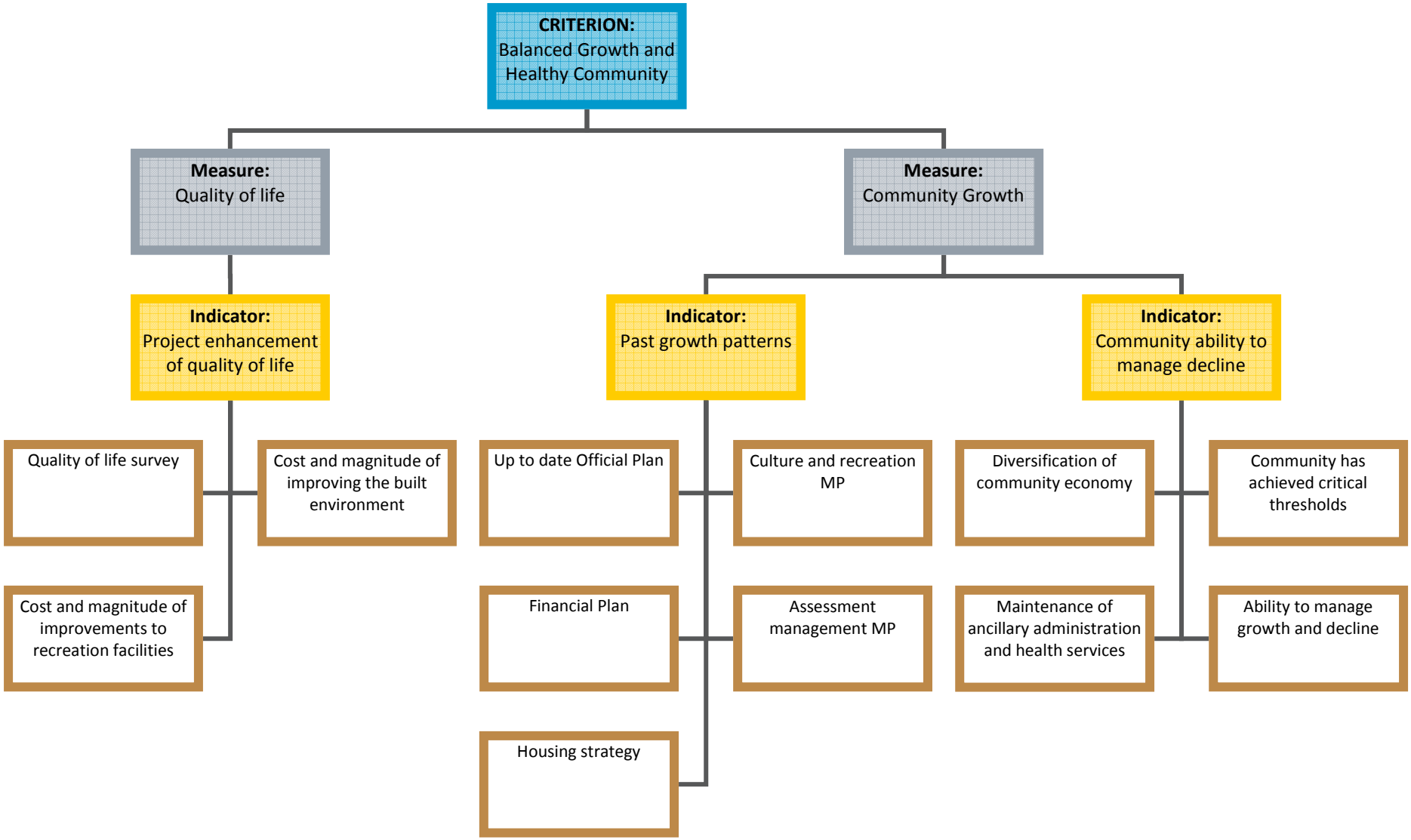

CRITERION:
Community Administration
Measure:
Ability to show leadership
Measure:
Depth of financial strength
Measure:
Strength of existing organisations
Indicator:
Ability to manage challenges
Indicator:
Financial sectors
Indicator:
Characterisitics of organizations
Presence of community leaders
Access to discretionary resources
Ratio of residential to industrial and commercial
Existence of Chamber of Commerce
Strength of partnerships with government
Organizations addressing social welfare
Presence and type of service organizations or hospitals
Experience with other proponents
Presence of banks and insurance companies

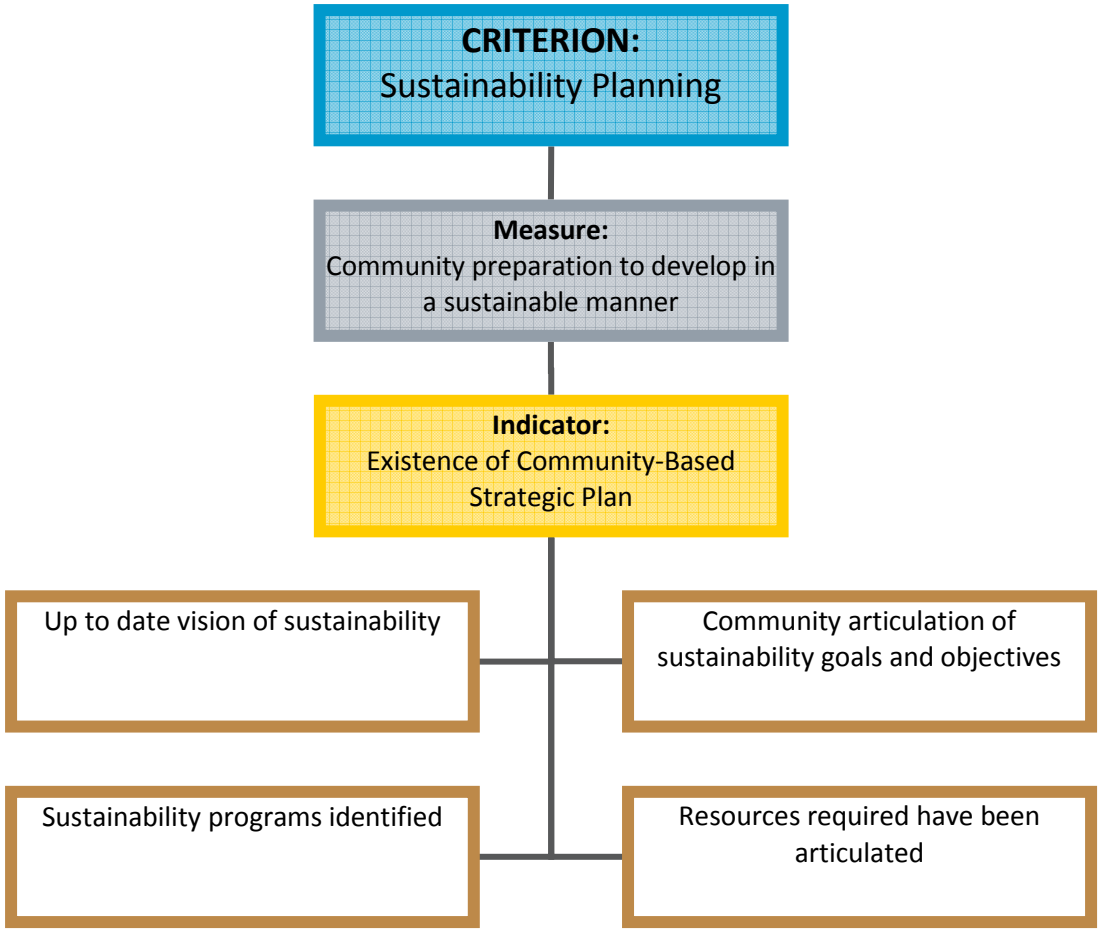
FACTOR: Project's Enhancement of the Community's Long-Term Sustainability



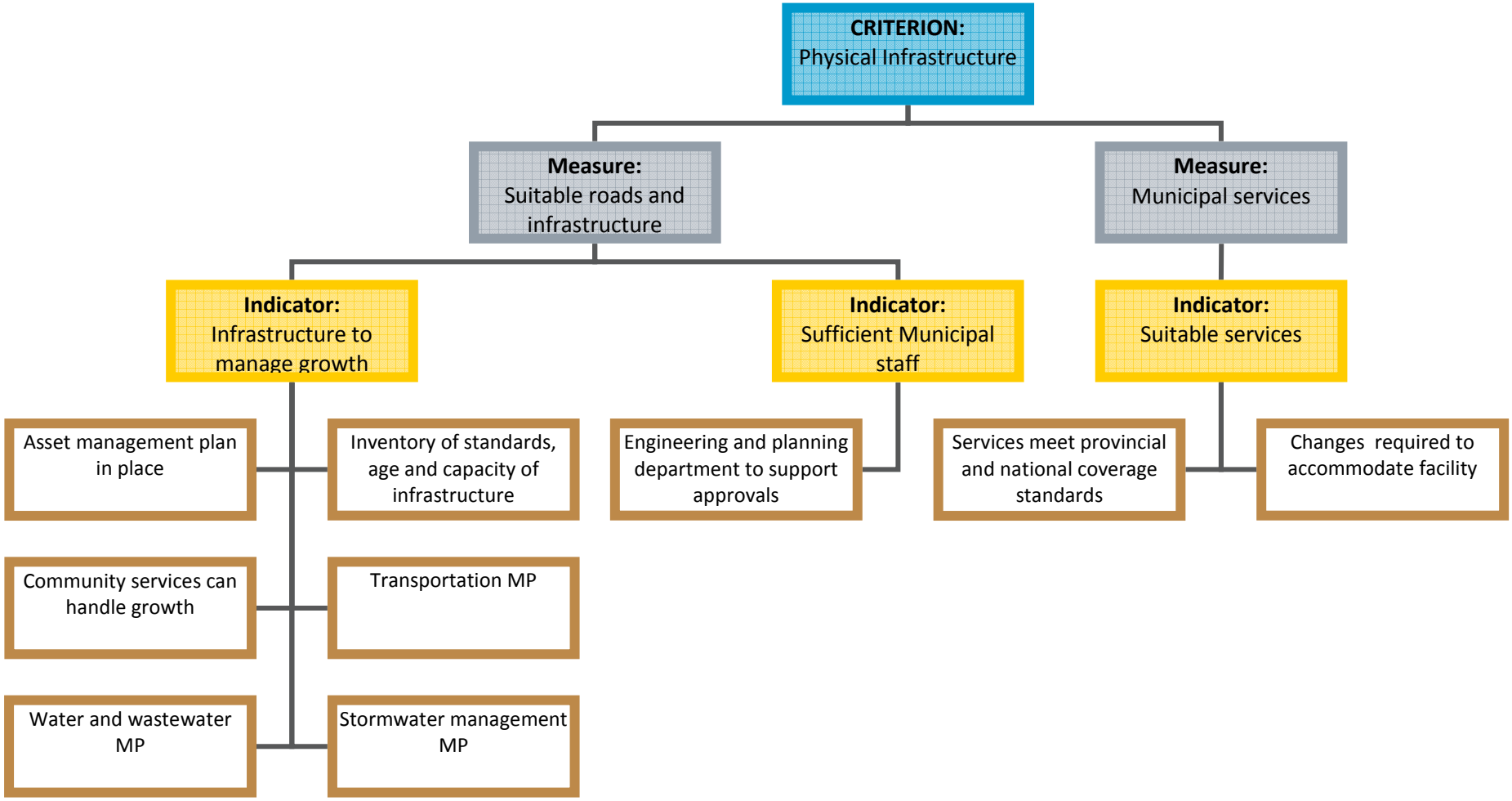

CRITERION:
Dynamic Resilience of the Economy
Measure:
Community led economic initiatives
Measure:
Openness to external investment
Indicator:
Level of funding for community programs
Indicator:
Level of funding for municipal programs
Indicator:
Degree of support for new industries
Economic development strategy
Business attraction and retention strategy
Success acquiring grants from government
Plans are funded or underfunded
Presence of economic development officer
Presence of a business strategy
Presence of a strategic plan
Presence of a tourism plan
Servicing to industrial areas
Streamline planning approvals

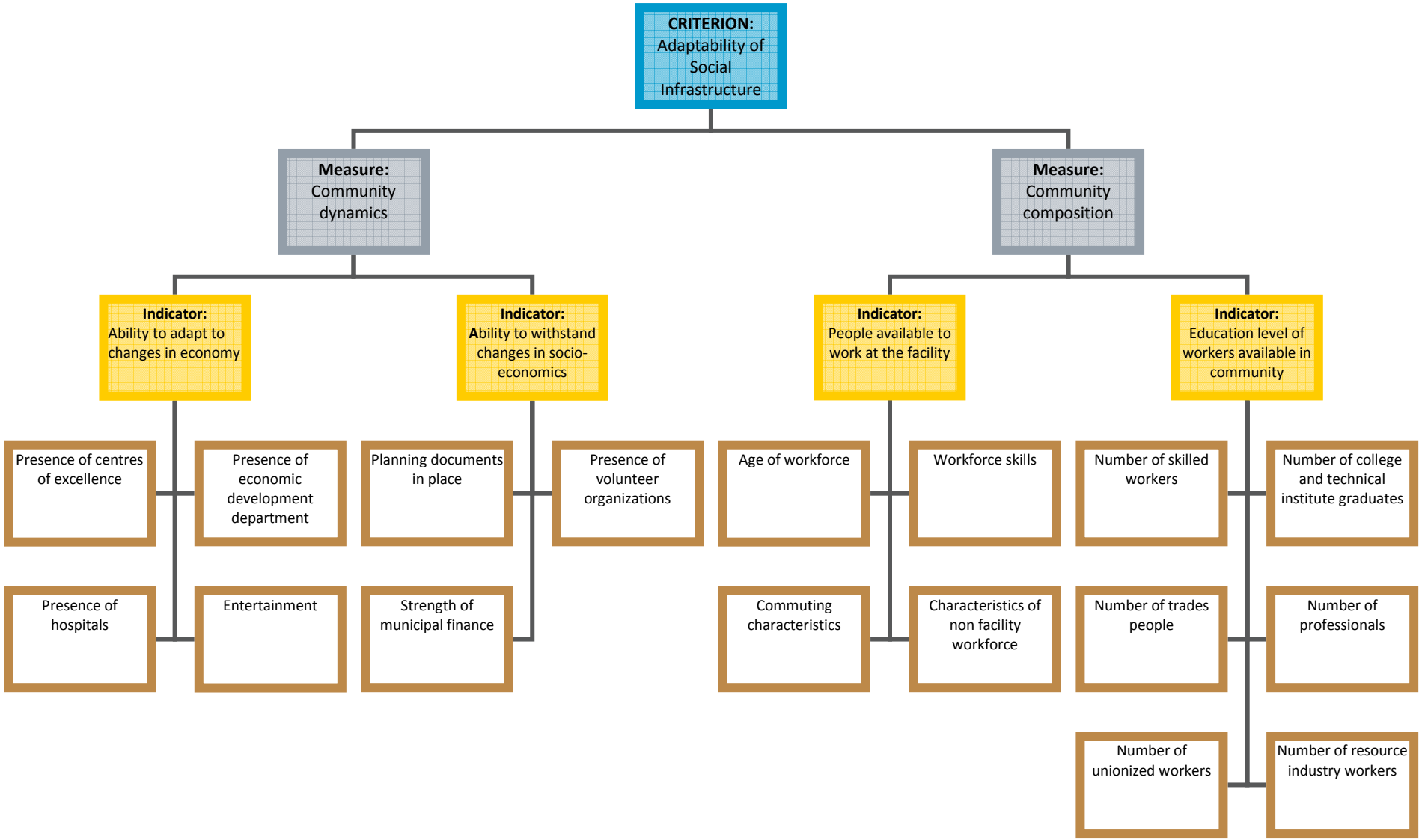

CRITERION: Community Decision Making
Measure: Transparency and trust
Measure: Openness to new ideas
Measure: Degree of community involvement
Indicator: Community ability to work with proponent
Indicator: Past experience with decision making
Indicator: Past examples of welcoming new cultures, ways of life
Indicator: Experience in a referendum
Indicator: Desire to participate in capacity building
Openness to dialogue
Success in attracting businesses
Obtaining resources to participate
Community led investigations of suitability
Approaches to similar opportunities
Participation in previous trust building processes
Welcoming committee
Legal resources
Multicultural groups
Language and cultural requirement
Medical staff to address special needs
Documentation of experience in referendums
Past voter turnout rates
Resident's participation in consultation activities
Level of involvement in community affairs


CRITERION:
Balanced Growth and Healthy Community
Measure:
Quality of life
Measure:
Community Growth
Indicator:
Project enhancement of quality of life
Indicator:
Past growth patterns
Indicator:
Community ability to manage decline
Quality of life survey
Cost and magnitude of improving the built environment
Cost and magnitude of improvements to recreation facilities
Up to date Official Plan
Culture and recreation MP
Financial Plan
Assessment management MP
Housing strategy
Diversification of community economy
Community has achieved critical thresholds
Maintenance of ancillary administration and health services
Ability to manage growth and decline

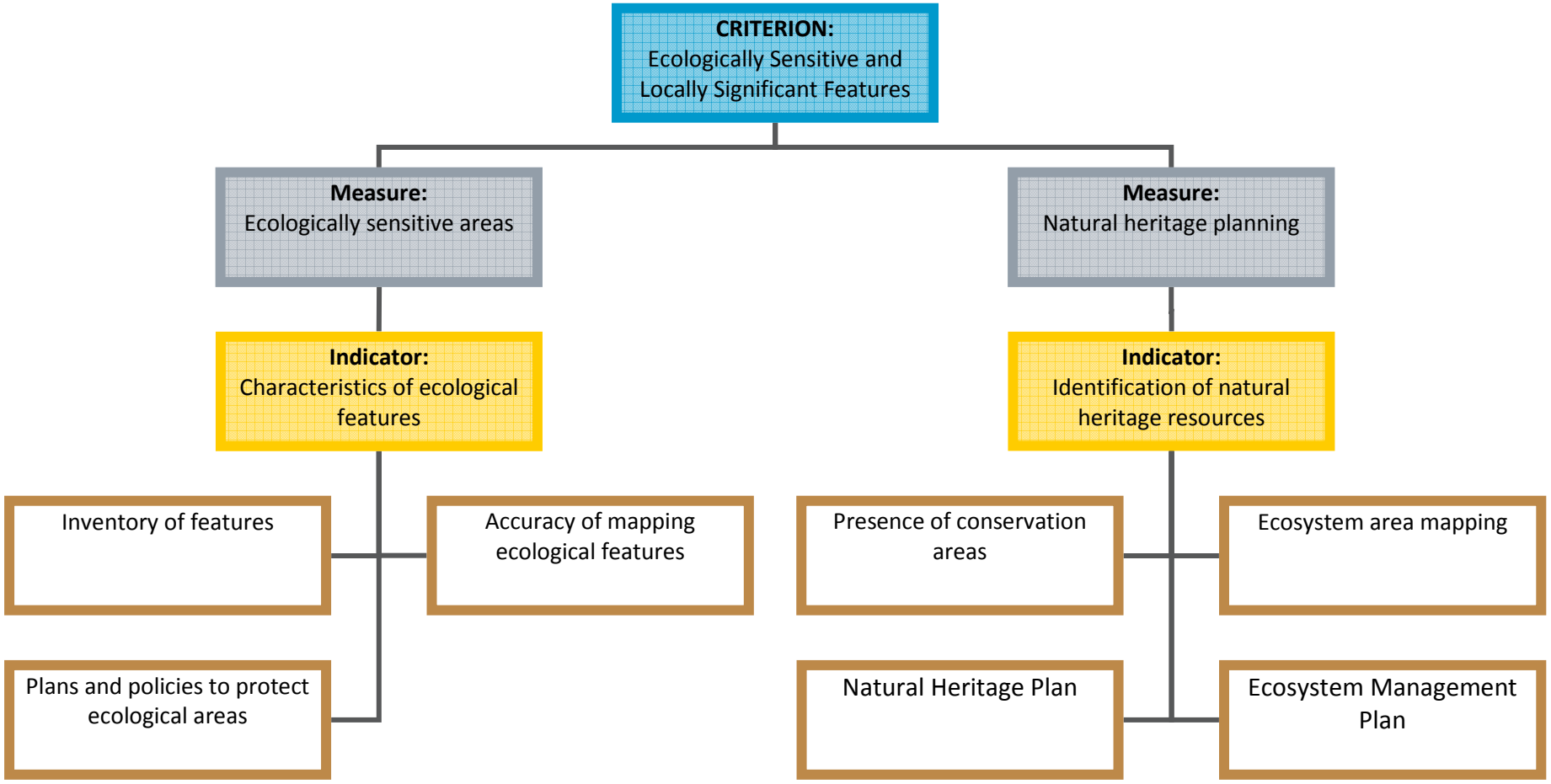

CRITERION:
Sustainability Planning
Measure:
Community preparation to develop in a sustainable manner
Indicator:
Existence of Community-Based Strategic Plan
Up to date vision of sustainability
Community articulation of sustainability goals and objectives
Sustainability programs identified
Resources required have been articulated

FACTOR: Physical and Social Infrastructure in Place and/or can be Put in Place to Implement the Project

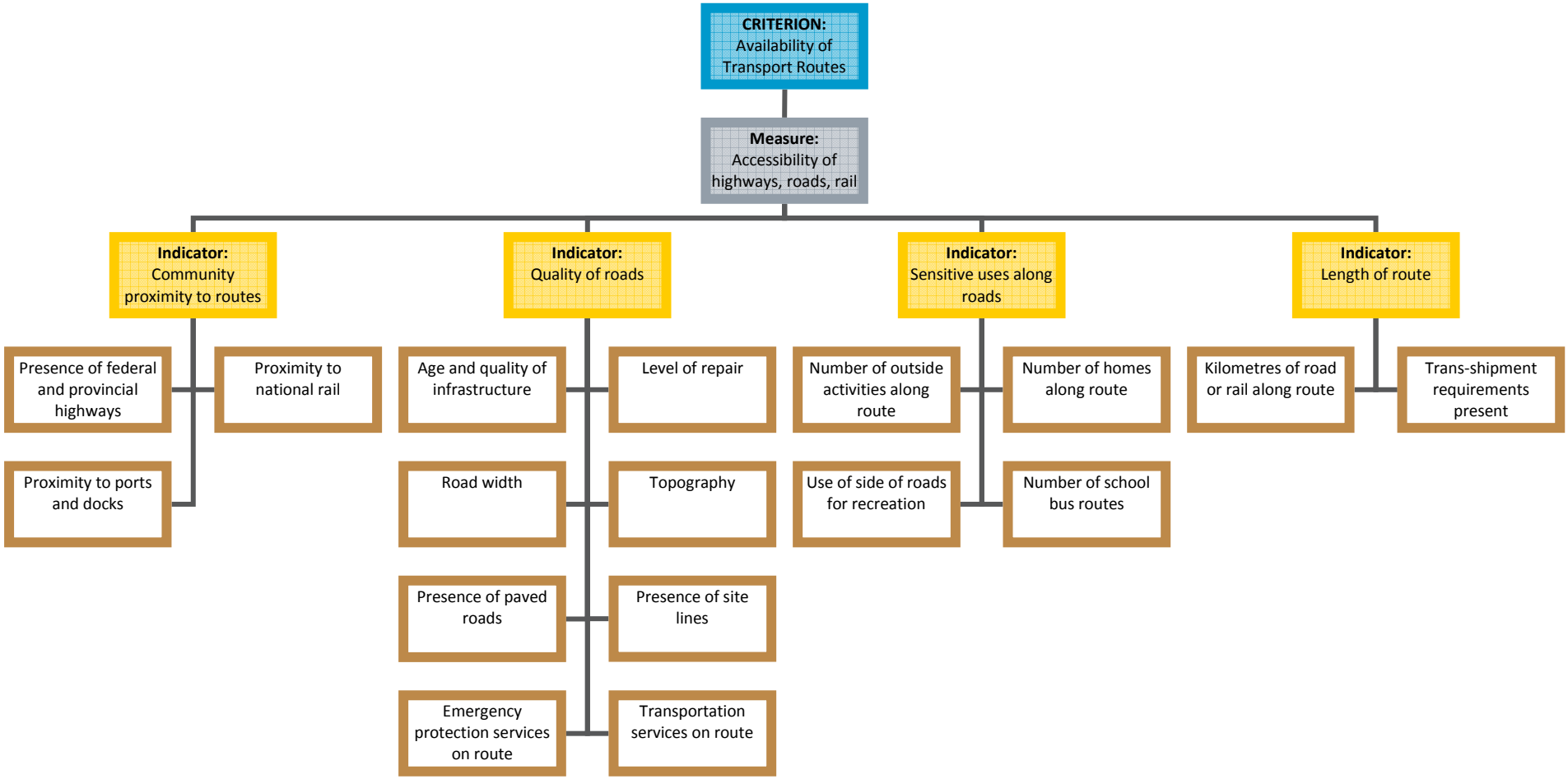


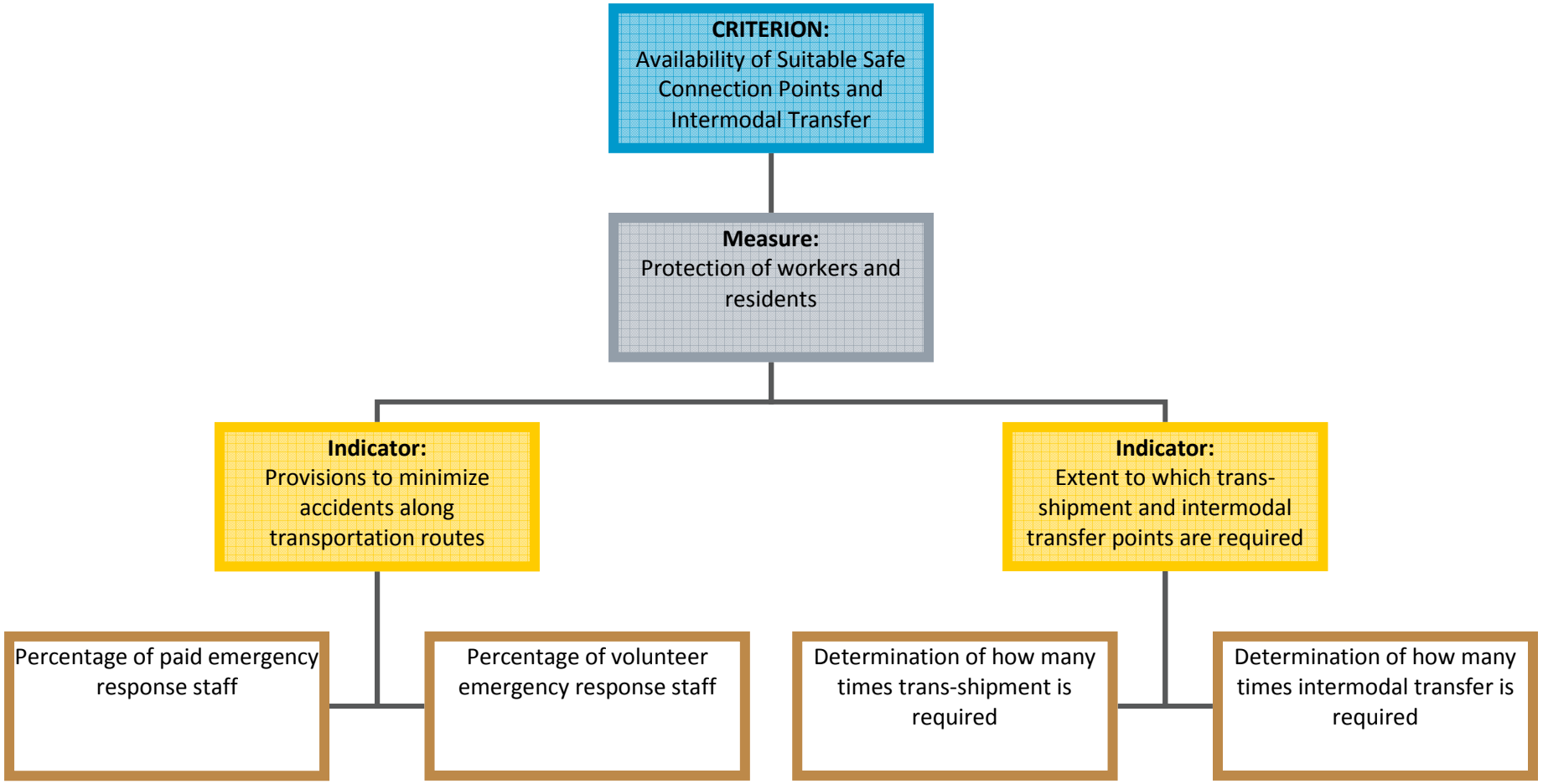

CRITERION: Adaptability of Social Infrastructure
Measure: Community dynamics
Measure: Community composition
Indicator: Ability to adapt to changes in economy
Indicator: Ability to withstand changes in socio-economics
Indicator: People available to work at the facility
Indicator: Education level of workers available in community
Presence of centres of excellence
Presence of economic development department
Planning documents in place
Presence of volunteer organizations
Age of workforce
Workforce skills
Number of skilled workers
Number of college and technical institute graduates
Presence of hospitals
Entertainment
Strength of municipal finance
Commuting characteristics
Characteristics of non facility workforce
Number of trades people
Number of professionals
Number of unionized workers
Number of resource industry workers

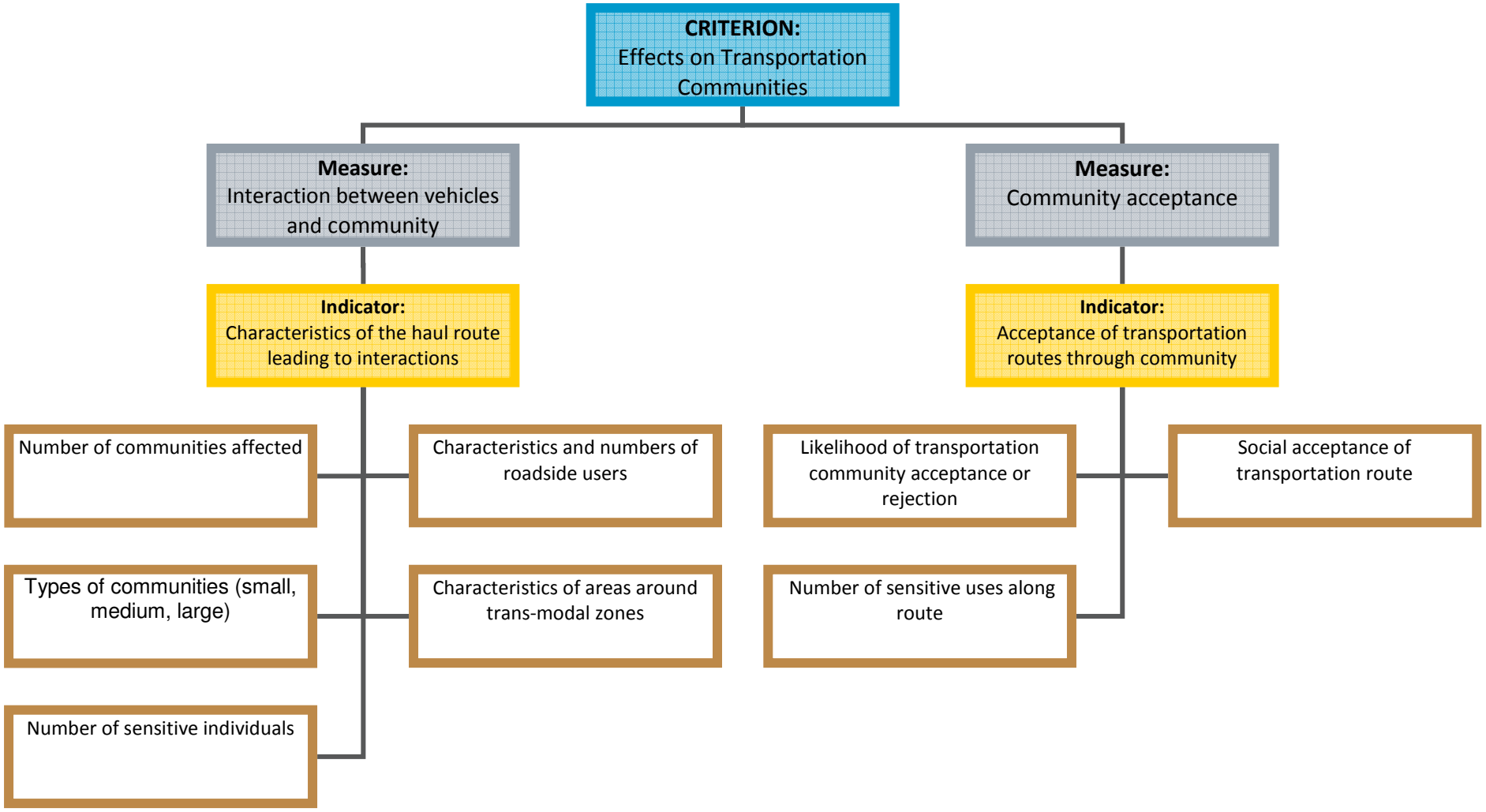
FACTOR: Avoidance of Ecologically Sensitive Areas and Locally Significant Features

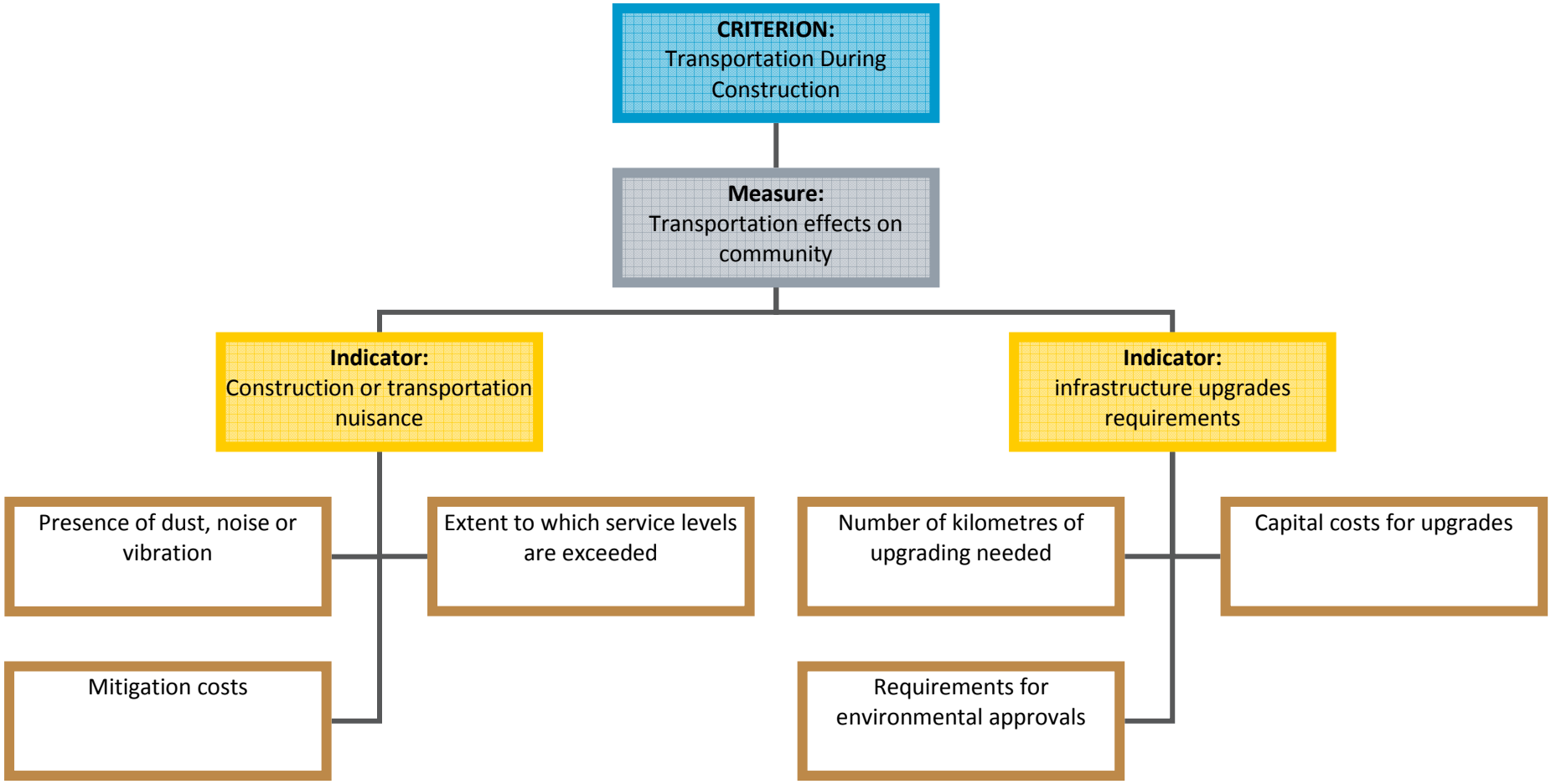


FACTOR: Avoidance or Minimization of Effects of Transportation and Used Nuclear Fuel from Existing Storage Facilities to a Repository site




CRITERION:
Availability of Suitable Safe Connection Points and Intermodal Transfer
Measure:
Protection of workers and residents
Indicator:
Provisions to minimize accidents along transportation routes
Indicator:
Extent to which trans-shipment and intermodal transfer points are required
Percentage of paid emergency response staff
Percentage of volunteer emergency response staff
Determination of how many times trans-shipment is required
Determination of how many times intermodal transfer is required


CRITERION:
Effects on Transportation Communities
Measure:
Interaction between vehicles and community
Measure:
Community acceptance
Indicator:
Characteristics of the haul route leading to interactions
Indicator:
Acceptance of transportation routes through community
Number of communities affected
Characteristics and numbers of roadside users
Likelihood of transportation community acceptance or rejection
Social acceptance of transportation route
Types of communities (small, medium, large)
Characteristics of areas around trans-modal zones
Number of sensitive uses along route
Number of sensitive individuals


CRITERION:
Transportation During Construction
Measure:
Transportation effects on community
Indicator:
Construction or transportation nuisance
Indicator:
infrastructure upgrades requirements
Presence of dust, noise or vibration
Extent to which service levels are exceeded
Mitigation costs
Number of kilometres of upgrading needed
Capital costs for upgrades
Requirements for environmental approvals