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# **APPENDICES**

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**APPENDIX I**

**LETTER SENT TO MEMBER JURISDICTIONS**



## MAXIMIZING LETTER

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Dear members,

Economic activity in Northern Canada is on the increase. Over \$100 billion in projects are under development or on the drawing board. An ongoing challenge for northerners is how to maximize the benefits that accrue from these projects.

In 2004, the Northern Development Ministers Forum working group on Maximizing the Economic and Social Impact of Major Northern Projects tabled a report that documented best practices for maximizing benefits from a diverse range of projects. This year the working group would like to build on this previous work and develop a directory of maximizing indicators and a listing of best practices.

The first step would be to gather information from all jurisdictions. In particular could you identify two important major projects in your jurisdiction that are under development or have been completed? For each project please provide the following:

1. The project name and description, including capital cost and economic, social, and environmental impacts.
2. A listing of economic and social indicators used (past and current) and the purpose of each indicator.
3. At what level is the impact of a project tracked? For example, is it at a community, regional, provincial or other level? Are there any pros and cons associated with this?
4. Issues or shortfalls from using the current indicators.
5. Other indicators you think would be more relevant.

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As well, the Maximizing Committee is interested in learning more about your experiences with indicators. For example:

1. Are the indicators designed to help your jurisdiction maximize benefits?
2. What are the difficulties in broadening the base of maximizing indicators?
3. Does your jurisdiction monitor maximizing indicators over the life of the project? How do you accomplish this?
4. Do you have any advice for other jurisdictions on how to develop and implement best practices for maximizing the benefits from major projects?

To allow enough time to analyze and compile the information submitted, we would appreciate receiving submissions from each jurisdiction by May 1, 2006. Submissions in electronic form can be sent to:

Manon Cyr  
Ministère des Affaires municipales et des Régions  
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Chibougamau (Québec) G8P 2K5  
Phone # 1-866-471-8227  
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On behalf of the Maximizing sub-group, I wish to thank you for sharing the experiences of your jurisdiction. Your submission will help build a body of knowledge and provide all jurisdictions with practical tools for maximizing the benefits from major projects.

If you have any questions, comments or concerns, please contact me or Mr. Kevin Todd at (867) 873-7364 or kevin\_todd@gov.nt.ca.

Sincerely,

Manon Cyr  
Regional director by interim

MC/db

**APPENDIX II**

**BEST PRACTICES SUBMITTED BY MEMBER JURISDICTIONS**





**Northern Development Ministers Forum  
Maximizing the Economic and Social Impact of Major Northern Projects**

***Project 1: Oil Sands Development in Northern Alberta***

**Overview**

After almost 40 years of oil sands development in Northern Alberta, only 3% of the bitumen reserves have been produced. The Alberta Energy and Utilities Board (EUB) reserves report indicates that the oil sands in Alberta contain 174 billion barrels of established bitumen reserves. Current bitumen production is over a million barrels a day, and according to projections by the EUB, production is expected to reach roughly 2.9 million barrels per day by 2015 (more than one billion barrels per year). By 2003, the oil sands industry had created a total of 120,000 direct, indirect, and induced jobs across Canada, a number expected to double to 240,000 by 2008.

The Athabasca deposit, located in northeastern Alberta in the Regional Municipality of Wood Buffalo, is the largest deposit and has the most concentrated oil sands development. Capital expenditures in the Wood Buffalo region totalled \$37.4 billion from 1996 to 2005, with conservative estimates forecasting an increase in expenditures by \$56 billion in the next five years resulting in nearly 50% more being spent than in the last ten years. In addition, operating expenditures and expenditures for sustaining capital at oil sands plants or for related projects such as pipelines and co-generation facilities will also run into billions of dollars.

Managing the economic, social, and environmental impacts of large-scale industrial development is a tremendous challenge for industry and government. Industry and government monitor environmental impacts such as water use, discharge quality and management, air emissions, energy consumption, land disturbance and reclamation, and compliance. To address social and economic impacts such as the impacts on transportation, public infrastructure and services, local employment and procurement, oil sands companies generally have policies and programs in place to maximize local benefits and express a commitment to consultation with the public and the Aboriginal population.

**Economic and Social Indicators**

A range of indicators are used by oil sands companies, industry associations, and provincial government to assess the social and economic impacts of oil sands development. The provincial government, through the EUB, requires companies to submit an assessment of the socio-economic impacts as part of a project application. In past Decision Reports, the EUB has recognized the importance of establishing indicators and measuring progress as a powerful catalyst for strategic thinking and collaborative action on socio-economic issues. The EUB has also recognized the importance of companies taking an active role in supporting initiatives aimed at ensuring that the economic benefits created by the oil sands projects are accessible to the largest possible number of local residents and businesses wanting to participate.

Although the oil sands industry is not new, it is still in the early stages of development, and it is generally recognized that some local Aboriginal and northern communities need support to participate more fully in the economic opportunities created. These needs are being addressed by the initiatives of individual companies, which often involves companies entering into an Agreement or Memorandum of Understanding with local Aboriginal communities, and by government ministries including Alberta Aboriginal Affairs and Northern Development, Alberta Economic Development, and Alberta Human Resources and Employment.

## **Industry**

Oil sands companies do not use a common set of indicators to measure the impact of their programs and practices. Instead, a company's corporate responsibility policy will determine the use of indicators that meet their own corporate and community needs, with many companies subscribing to recognized indexes such as the Dow Jones Sustainability Index.

A scan of company annual reports reveals a range of social and economic indicators that can be broadly classified under the following business activity areas: procurement, human resources, and community and stakeholder relations. These indicators are measured at the community, regional, provincial, and national level given the diverse and broad range of stakeholders impacted by the industrial development, including government, Aboriginal people, and northern communities.

## **Procurement**

- Dollar amount and percentage of goods and services purchased from local, Aboriginal, provincial, and Canadian business/suppliers

## **Human Resources**

### **Composition and Diversity of Workforce**

- Number and percentage of employees from local area, Alberta, and Canada
- Percentage of total workforce members that are Aboriginal, Aboriginal in management, visible minorities, persons with disabilities, women, and women in management

### **Compensation and Benefits**

- Ratio of lowest wage to minimum wage
- Ratio of average wage to minimum wage
- Employee benefits
- Percentage of workforce unionized
- Rate of employee turnover
- Percentage of utilization of employee and family assistance programs
- Rating of employee satisfaction on such attributes as compensation and benefits, safety, career advancement, employment security, and corporate leadership

### **Training and Development**

- Dollar amount or percentage of work hours in training and development
- Participation in collaborative training partnerships with educational institutions, businesses, industry associations, and governments

## **Community and Stakeholder Relations**

- Dollar investment in local charitable and non-profit organizations
- Dollar amount for consultation and monitoring
- Collaborative partnerships with stakeholders
- Number of people reached by public awareness campaigns

## Community Sustainability Indicators

The Regional Municipality of Wood Buffalo collaborated on the development of 21 sustainable community indicators organized into 11 categories to measure the quality of life in the Wood Buffalo region, identify pressure points, and track progress toward sustainability. Below is a summary of the indicators taken from “Sustainable Community Indicators Report, Revised Version, January 2006,” available at [www.oilsands.cc](http://www.oilsands.cc).

### Economy

1. **Affordability Index 1 (Median Income):** A relative measure of affordability based on a comparison of the median family income and cost of living in Edmonton with the median family income and cost of living in Fort McMurray and other comparator communities.
2. **Affordability Index 2 (Modest Income):** A relative measure of affordability based on a comparison of the modest family income and cost of living in Edmonton with the modest family income and cost of living in Fort McMurray and other comparator communities. Modest family income is defined here as 25th percentile income, which divides the higher 75% of income earners from the lower 25%.
3. **Housing Affordability Measure 1 (General):** Number of families in Fort McMurray and selected comparator communities that earn less than the income required to rent an average one-bedroom apartment or own an average single-family dwelling and stay within the widely accepted housing cost-to-income ratio of 30%.
4. **Housing Affordability Measure 2 (Fixed Income):** Percentage of selected low to modest fixed incomes required to rent an average apartment in Fort McMurray and selected comparator communities.

### Environment

5. **Air Quality:**
  - a. Percentage of time that air sampled at the Fort McMurray-Athabasca Valley and selected comparator monitoring stations can be described as “good” according to the standards of the Air Quality Index developed by Alberta Environment and the Clean Air Strategic Alliance (CASA).
  - b. Annual hourly and daily exceedances of the Alberta Ambient Air Quality Objectives for four continuously monitored pollutants: carbon monoxide, nitrogen dioxide, ozone (ground level), and fine particulate matter.
6. **Residential Water Use:** Average daily residential water use per person in Fort McMurray and selected comparator communities.
7. **Recycling/Composting:** Estimate of the rate at which waste is diverted from the landfill for recycling and/or composting.

### Public Safety

8. **Crime Rate:** Overall crime rate (all criminal code offences, including traffic) per 100,000 population for Fort McMurray in relation to the rate in Grande Prairie, Medicine Hat, Edmonton, and Alberta as a whole.

- 9. Traffic Collision Rates:** Traffic collision rates per 100 million vehicle kilometres for selected key roadways in the Wood Buffalo region in relation to average collision rates on comparable roadways in the province as a whole.

### **Community**

- 10. United Way Donations:** Rate of United Way giving per person in Fort McMurray in relation to the rate of giving in Grande Prairie, Edmonton, Calgary, and Red Deer.
- 11. Volunteering:** Estimate of the ability of volunteer-based agencies in Fort McMurray, Grande Prairie, Medicine Hat, and Edmonton to recruit and retain a sufficient number of volunteers. The findings are on a scale of 1 to 5, with 1 indicating low difficulty/frequency and 5 indicating high difficulty/frequency.

### **Government**

- 12. Voter Participation:** Voter participation rates for Fort McMurray-Wood Buffalo and other selected Alberta electoral districts in recent Provincial General Elections in 1997, 2001, and 2004.

### **Recreation/Culture**

- 13. Recreational/Cultural Facilities:** Number of selected municipal recreational/cultural facilities per 10,000 population in Fort McMurray, Grande Prairie, Medicine Hat, and Edmonton. The selected facilities are the following: sports fields, playgrounds, tennis courts, sheets of artificial ice, swimming pools, and libraries (including branches).

### **Housing**

- 14. Housing Availability:**
- a. Availability of rental housing in Fort McMurray and selected comparator communities in terms of vacancy rates provided by Canada Mortgage and Housing (CMH).
  - b. Availability of owned housing in Fort McMurray and selected comparator communities in terms of a supply/demand ratio based on MLS data from various Alberta real estate boards.

### **Transportation**

- 15. Public Transit:** Number of public transit passenger trips per person in Fort McMurray and other selected Alberta communities.

### **Health**

- 16. Physicians:** Number of physicians per 10,000 population in the Northern Lights Health Region and Alberta's other health regions.
- 17. Average Length of Stay in Emergency Room:** Time that patients wait in the emergency room before being discharged or (if they have been admitted as in-patients) accommodated in a hospital ward bed.

## Education

- 18. Educational Attainment:** Comparison of the level of education attained by the population in Fort McMurray, Edmonton, Grande Prairie, Medicine Hat, and Alberta as a whole.

## Other Population Resources

- 19. Population Growth:** Annual population growth rates for Fort McMurray, the Regional Municipality of Wood Buffalo, and other comparator communities based on the two most recent official population figures.
- 20. Population Migration:** Estimate of net migration from inside and outside of Canada to Wood Buffalo and other selected regions of Alberta.
- 21. Population by Age and Sex:** Breakdown by age and sex of the population of the Wood Buffalo region and other comparator communities in Alberta, including the province as a whole.

## An Example of a Best Practice

The sustainability indicators were developed through the Regional Issues Working Group's (RIWG) Sustainable Community Indicators Subcommittee. RIWG was founded in 1997 to promote the responsible, sustainable development of resources for the benefit of all stakeholders in the Regional Municipality of Wood Buffalo. It is a unique industry-funded, non-profit issues management organization with 23 current members, including 17 oil sands companies and the Regional Municipality of Wood Buffalo.

The organization's mission is to facilitate planning for growth, facilitate effective and efficient resolution of issues, involve all of the resource developers and affected stakeholders in planning, and develop plans for sharing benefits with Aboriginal stakeholders. In northwest Alberta, communities and companies are looking to follow the RIWG example by establishing a similar organization to address issues related to the development of the Peace Oil Sands.

## Benefits of RIWG

- Cooperative, multi-stakeholder initiatives to mitigate the social and economic impacts of development on the region.
- A forum to identify and deal with issues common to all stakeholders in a cooperative, timely, and cost-efficient manner.
- Non-technical information on the cumulative effects of resource development projects in the region, including social and economic impact assessment information.
- Information on ongoing studies, surveys, initiatives, and programs affecting industry stakeholders.
- Public relations, communications and survey material, and presentation on the oil sands industry in Alberta.

## ***Project 2: Alberta-Pacific Forest Industries Inc.***

### **Overview**

Alberta-Pacific operates Canada's newest and North America's largest single-line bleached kraft pulp mill, producing about 640,000 tonnes of pulp per year. The mill site is located about 200 kilometres northeast of Edmonton, Alberta. Alberta-Pacific's forest management agreement (FMA) area is the largest FMA in the province, covering much of northeastern Alberta with an area of approximately 58,000 square kilometres. About 24,000 Aboriginal people live in the FMA and another estimated 16,000 within close proximity.

Alberta-Pacific aims for industry-leading performance in three dimensions of sustainability: economics, environmental and social equity. The company strives to respect and respond to the needs and priorities of local residents, Aboriginal communities, and other interested citizens, by integrating Aboriginal Relations initiatives into every aspect of its operations, supporting community relations and business initiatives that provide local benefits and will be significant contributors to local economies, and engaging in public consultation.

### **Economic and Social Indicators**

Social and economic indicators reported on generally measure the benefits to the local community and workforce and commitment to Aboriginal communities. There are numerous environmental indicators used that are beyond the scope of this report.

#### *Benefits to local community*

- \$115 million in goods and services purchased in neighbouring communities
- \$119 million in goods and services purchased in the province
- 91% of employees reside in the area
- \$45.8 million total payroll and benefits of employees
- \$4.3 million property tax paid to municipality
- More than \$1 million contributed to local projects and communities in 2004

#### *Commitment to Aboriginal communities*

- \$22 million (for the 2004 and 2005 operating year) in service contracts for woodland activities to Aboriginal companies
- Approximately 35 Aboriginal workers employed in joint ventures with First Nations
- 16 trappers employed to assist with monitoring fur bearing animal populations

#### *Workforce:*

- \$2,300 invested per team member per year in training and development

### **Best Practices**

#### **1. Forest Management Task Force**

To help ensure stakeholders have the opportunity to provide input on forest management activities, Al-Pac regularly meets with communities and other stakeholders in and around the forest management agreement area. The company also works with a Forest Management Task Force, a 30-member advisory group that provides input and direction on forest management planning and

helped develop the operating ground rules, which set the standards that guide Al-Pac's forest management activities. The Forest Management Task Force has representation from First Nations, Metis, trappers, outfitters, hunters, anglers, sawmill operators, conservation groups, government departments, and Al-Pac representatives.

## **2. Forest Stewardship Council (FSC) Certification**

In 2005, Al-Pac achieved Forest Stewardship Council (FSC) certification, one of the most stringent forest management certifications in the world, for 5.5 million hectares of the company's forest management agreement area. FSC certification was awarded following an extensive independent third-party assessment of the company's economic, social, and environmental practices in its forest management operations. The certification conforms to FSC's 10 international principles and 56 criteria that reflect regional conditions and practices to be applied in a well-managed Canadian boreal forest.

FSC certification is a hallmark to provide customers (paper makers) and consumers of forest-based products the assurance that the product they are purchasing comes from a forest area that is managed in a socially and environmentally responsible manner. For Al-Pac, this includes socially responsible practices such as involving communities in forest management planning, supporting communities through employment and contracts, providing a safe and equitable workplace, and understanding and respecting Aboriginal values of the forest. Environmentally responsible operations include the company's ecosystem management approach to maintain biodiversity and a commitment to set aside more than 200,000 hectares of forest to serve as ecological benchmark areas.

FSC is highly regarded because of its credibility in the global marketplace, its track record as a results-oriented independent organization, its endorsement by Aboriginal people, conservation groups, and business, and its focus on achieving social and economic as well as environmental standards.

## **3. Aboriginal Relations**

Alberta-Pacific recognizes the strong connection between Aboriginal people and the forest. There are approximately 24,000 Aboriginal people and 15 diverse Aboriginal communities within the company's Forest Management Agreement (FMA) area. Each of these communities has very distinct needs and Al-Pac is committed to involving them extensively in its operations. This includes ongoing consultation including membership on the Forest Management Task Force, employment opportunities, economic development such as Bigstone Forestry Inc., a harvesting company Al-Pac created in partnership with Bigstone Cree Nation, and education partnerships such as the Aboriginal Apprenticeship Program. In 2006, Al-Pac was awarded a Gold level in Progressive Aboriginal Relations (PAR) from the Canadian Council for Aboriginal Business for the company's commitment to increasing Aboriginal employment, assisting business development, building individual capacity, and enhancing community relations.





**Northern Development Ministers Forum  
Maximizing the Economic and Social Impact of Major Northern Projects**

***Highway 1 / Vedder Interchange Reconstruction Project: The Project Name and Description, including capital cost and economic, social, and environmental impacts***

Highway 1 / Vedder Road Interchange Reconstruction Project involved the re-construction of a 1958 cloverleaf-type interchange in Chilliwack, British Columbia, to build it to current safety standards and to increase its capacity from a two-lane to a four-lane crossing. The cost of reconstruction was \$12.4 million.

The improvements yielded large provincial, municipal, and federal benefits, and encouraged cost-sharing and partnership between all levels of government.

**Benefits or Impacts from the Project**

- A Net Present Value (NPV) of \$28 million and a Benefit-Cost (B/C) ratio of 4.2
- Savings to travel time
- Savings in vehicle operating
- Safety and fuel emissions
- Community connectivity
- Economic development

A listing of economic and social indicators used (past and/or current) and the purpose of each indicator.

**Financial Performance Indicator**

Documents the investment implications of options/alternatives from both a corporate and broader government perspective. It demonstrates the cost of each option's infrastructure provider and is expressed as a life cycle cost, which is the present value of capital costs, periodic rehabilitation costs and annual maintenance costs, discounted at the appropriate discount rate over a 25-year planning period to the current year. The discounted costs include the following:

- Construction and Property costs
- Maintenance and Rehabilitation
- Salvage

**Net Present Value and Benefit Cost Indicator**

Determines the absolute and relative differences between the benefits and cost (customer service vs. financial cost). The NPV indicates the magnitude of the net benefit from or cost of each option. Since government is faced with a fixed amount of capital for transportation investments, examination of capital costs is conducted in terms of NPV rather than other measures such as Benefit-Cost ratios and Internal Rates of Return. The objective is to maximize the difference between discounted benefits and discounted costs when comparing the societal costs (or resources used) to the anticipated societal benefits.

### **Customer Service Indicator**

Indicates the net benefit or value that customers or users derive from the alternatives/options. The principal summary measure of performance is the discounted sum of annual benefits. These benefits include time savings, vehicle operating cost savings, and collision cost savings.

### **Environment Indicator**

Indicates the nature, magnitude, and significance of major biophysical and natural resource impacts. Software packages such as Micro-BENCOST and HDM (World Bank Model) calculate and quantify impacts such as fuel consumption and vehicle emissions, along with the economic performance indicators of NPV and B/C ratios.

### **Economic Development Indicator**

Indicates the nature, magnitude, and significance of the income and employment impacts. The economic development benefits of a project are subject to the empirically established principle of "Diminishing Marginal Utility" of transportation economics. The largest economic development benefits are to be found for those projects where access is created, an impediment to growth is eliminated, or new opportunities are created.

### **Social Indicator**

Indicates the major impacts of the alternatives on social, values, or goals of directly affected communities or groups.

#### **These societal impacts or benefits include the following:**

- Community severance
- Access to cultural and sporting events
- An increase in pedestrian and cycling leading to overall health benefits not captured in a traditional cost-benefits analysis
- Safety improvements in the event of an earthquake, as new structure would be built to current seismic standards, providing local community access across the bridge for emergency vehicles
- Safer access and egress to the community and developments

*At what level is the impact of a project tracked? (e.g.: Is it at a community, regional, provincial or federal level? Are there any pros and cons associated with this?)*

There are three independent categories of measures in transportation economics, which are used for the prioritization and cross-check of projects:

- Deficiency Analysis
- Economic Performance of proposed improvements (Cost-Benefit Analysis and Multiple Account Evaluation)
- Consistency of proposed improvements with other objectives of government and society

The last category would include community, regional, and federal concerns and objectives.

**PRO:** By gathering information for ranking across these three categories we are able to make the best informed decisions.

**CON:** The collection of information requires significant staff resources, and particularly if collected on a longitudinal (time-series) basis.

(Please refer to the "Capital Programming Process" document for more information.)

### **Issues or Shortfalls from Using the Current Indicators**

Benefit-Cost ratio shortfall: If used solely for capital planning purposes, the B/C ratio approach would favour low-cost projects as it would identify the best return per dollar invested rather than projects that maximize the actual difference between societal benefits and costs.

*Other indicators you think would be more relevant?*

As indicated above and in the attached document ("Capital Programming Process"), the Ministry looks at a variety of indicators and assigns points for the goal of ranking projects to create a Capital Plan (pool of projects).

*Are the indicators designed to help your jurisdiction maximize benefits?*

The Ministry strives to maximize the number of favourable outcomes subject to constraints such as budget and optimal timing. We use linear programming techniques on a database of information of which Cost-Benefit Analysis and Multiple Account Analysis are integral variables. Please refer to the "Capital Programming Process" document.

*What are the difficulties in broadening the base of maximizing indicators?*

The collection of data and availability of staff resources required to populate the database for ranking is the largest obstacle.

*Does your jurisdiction monitor maximizing indicators over the life of the project?*

As stated in the attached document, we always look at the life cycle costing of a project. In fact, the Economic/Engineering tool (MicroBENCOST) software used by the Province and numerous other jurisdictions requires such inputs for both the Base Case (Current Infrastructure) and the Proposed Case (Proposed Option).

*How do you accomplish this?*

For both the Base Case (Current Infrastructure) and the Proposed Case (Proposed Option), we would have either a rehabilitation schedule or specific deterioration curves for the life of the asset. Please refer to the attached document for more information: *Cost of Pavement Deterioration and Pavement Deterioration Extending the "Life of the Asset"*.

*Do you have any advice for other jurisdictions on how to develop and implement best practices for maximizing the benefits from major projects?*

Please refer to the "Capital Programming Process" document.

## ***THE CAPITAL PROGRAMMING PROCESS***

There are three independent categories of measures in transportation economics, which are used for the prioritization and cross-check of projects:

- Deficiency Analysis
- Economic Performance of proposed improvements
- Consistency of proposed improvements with other objectives of government and society

These three categories of measures when compared to each other often point out the fact that the optimal solution has not been chosen. For instance, a severe safety problem may exist at an intersection or curve, for which the proposed solution may yield a poor economic return, suggesting that the proposed solution saves few lives and thus produces little benefit relative to its price tag.

Furthermore, by comparing and contrasting the information (outcomes) from each of these independent categories for every project, it is possible to test reliability and validity concepts. In other words, are we measuring what we are actually trying to measure, and is each of the independent categories yielding the same conclusions for each proposed project? This practice serves as a cross-check.

The information required by the Program Development and Monitoring Branch to examine these three categories is collected from the three regions, the Planning Branch, and the continuous input from the Program Development Committee (comprising staff from the previous groups mentioned). Information is continuously collected in order to provide the Capital Program Board a ranked package (pool of candidate projects) in the spring. This ranked pool of projects form the basis of additional projects in the Transportation Investment Plan (TIP) as earlier projects are completed. The updated Transportation Investment Plan (TIP) is subsequently (in early summer) submitted to the Ministry of Finance and Treasury Board for approval and incorporated into Provincial Budget for the forthcoming year.

### **Deficiency Analysis**

The deficiency analysis deals with existing indicators such as the following:

- Capacity
- Level of Service
- Road Condition (i.e., Pavement Distress and Ride Comfort)
- Bridge Condition
- Safety – Rate and Severity

### **Cost Benefit Analysis and Multiple Account Evaluation**

A typical Cost-Benefit Analysis would include the following key cost and benefit variables (measures):

The Discounted Costs are as follows:

- Construction Cost and Salvage Cost
- +/- in maintenance and rehabilitation costs

The Discounted Benefits of most transportation projects are avoided costs to road-users and society such as the following:

- Time Savings and Vehicle Operating Cost Savings
- Accident Cost Savings
- Disbenefits occasionally caused by a project, such as disruption during construction

Economists always recommend maximizing the difference between discounted benefits and discounted costs in order to maximize the difference between the societal costs or resources used to produce the anticipated societal benefits. This is referred to as maximizing Net Present Value (NPV).

Discounted Costs	Construction Cost	Salvage Value	+/- in Maintenance and Rehabilitation	
Discounted Benefits (Customer Service)	Time-Savings	Vehicle Operating Cost –Savings	Accident Cost-Savings	Disruption During Construction

Net Present Value	Discounted Benefits – Discounted Costs (Maximizes Differences between Societal Benefits and Costs)			
B/C Ratio	Discounted Benefits / Discounted Costs (Societal Benefits relative to Societal Costs)			

Multiple Account Evaluation complements the quantitative information of Cost-Benefit Analysis with additional quantitative or qualitative information. Multiple Account Evaluation, sometimes referred to as Multi-Goal Analysis, uses the following five categories of accounts to provide decision-makers as much relevant information as possible to facilitate informed decision-making.

Financial	Customer Service	Traditional Cost-Benefit Analysis (Quantitative)		
Economic Development	Environmental	Social	Qualitative/Quantitative	

- ☑ The first two accounts, Financial and Customer Service, are the basis of traditional Cost-Benefit Analysis.
- ☑ The Economic Development account usually captures contribution to the Gross domestic product and jobs created, through the use of Input/Output models (multipliers). However, there are instances where we are able to obtain more specific information from detailed analysis provided by the Planning Branch.

## **Ranking and Program Development**

The constituent information in each of these three independent categories of measures, (1) Deficiency Analysis; (2) Economic Performance; and, (3) Consistency with other objectives of government and society, are then incorporated into a database (Unfunded Project Inventory).

The database will include the following:

- Geographic information
- Deficiency (Severity)
- Anticipated Economic Performance (CBA and MAE)
- Integration with other Ministry Objectives (i.e., Rehab, economies of scale)
- Partnership Opportunities
- Operational Savings
- RTAC recommendations

The inherent information is then subjected to the following:

- Quartile Analysis
- Optimal Timing Analysis (timing when Net Present Value is maximized)
- Budget Constraints (Annual and Multi-Year levels)

We roll up all these indicators and subject them to quartile analysis and also constraint and linear programming techniques.

- Quartile analysis is the centerpiece/underpinning of ranking. Quartile analysis splits the projects into four quarters of performance, in the same way that a median analysis indicates that half the relevant population is below or above a generated statistic, except that here we have four calculated/generated statistics (milestones). Using this approach, projects are compared to each other, rather than some artificial target, and the deficiencies are based on the empirical analysis of desirable performance. In other words, the desired superior performance is proven and thus do-able.

## ***Highway 1/Vedder Interchange Reconstruction Project***

### **Problem Definition**

Highway 1, as part of the Trans-Canada Highway (TCH), passes through the Chilliwack area approximately 90 km east of Vancouver in British Columbia. The highway severs the communities of old Chilliwack (to the north) and South Chilliwack (to the south). There are four north-south crossings of the TCH in Chilliwack (Prest, Young, Vedder, and Lickman), each being a 2-lane, grade-separated facility.

Chilliwack has experienced significant and sustained growth over much of the past decade, resulting in increased congestion on its arterial road network. The need for increased crossing capacity across the TCH in order to improve connectivity and access between the communities has become critical.

A planning study, jointly funded by Chilliwack and the Province in 2000/2001, recommended four-lane crossings of the TCH at Prest, Young, Vedder, and Lickman, and a two-lane crossing at Evans by 2020. Vedder Road, a key arterial providing access to recreation, parks, downtown, and major commercial/retail developments, is the most congested of the routes. Reconstruction of the Highway 1/Vedder Road interchange (Vedder I/C) as a full movement four-lane interchange was identified as being the highest and first priority for improving safety and capacity.

The Vedder I/C was built in 1958 and is showing its age. It is a full cloverleaf type and is constructed with old and outdated standards. The underpass is a narrow two-lane bridge with high curbs and a narrow sidewalk. It is structurally sound and wide enough to accommodate two lanes in the same direction.

The Interchange has serious safety deficiencies on all four ramps. It has a very high number of collisions and is ranked as one of the worst along the TCH corridor between 160<sup>th</sup> (Greater Vancouver) and Hope. Ramp deceleration and acceleration lanes are significantly below standard, and the radii of the ramps are very tight. Because of the short weave distances and the tightness of the loop's radii, traffic coming on and exiting must do so at very low speeds relative to the through-traffic speed. The speed differential poses a safety concern, especially as traffic volumes reach a critical level. Another problem associated with the Interchange is the multiple exit and entrance points that affect the operation of the TCH. Also, unless additional capacity is provided on Vedder Road, immediately north and south of the interchange, future traffic congestion and queuing will detrimentally affect and interfere with the performance of the interchange.

Traffic volumes through the Highway 1/Vedder Road interchange (Vedder IC) have grown over the past decade to a point that performance is poor and congested. Population growth and economic development in the area will continue to exacerbate the situation. Current and forecasted traffic volumes for the subject area are as follows:

<b>Location</b>	<b>AADT 2001</b>	<b>AADT 2020</b>
<b>Vedder Road</b> (north of Interchange)	27,000	30,000
<b>Vedder Road</b> (south of Interchange)	30,000	42,000
<b>TCH Hwy 1</b> (west of Interchange)	22,500	36,000
<b>TCH Hwy 1</b> (east of Interchange)	14,000	30,000

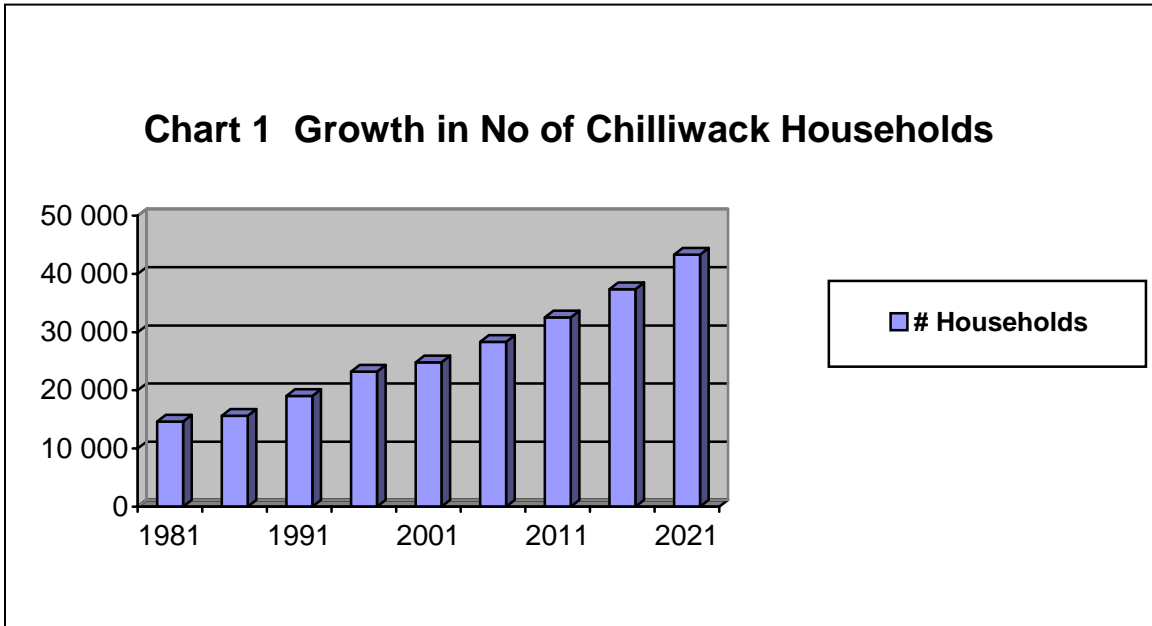
## **Background**

### **Chilliwack: Growth and Development**

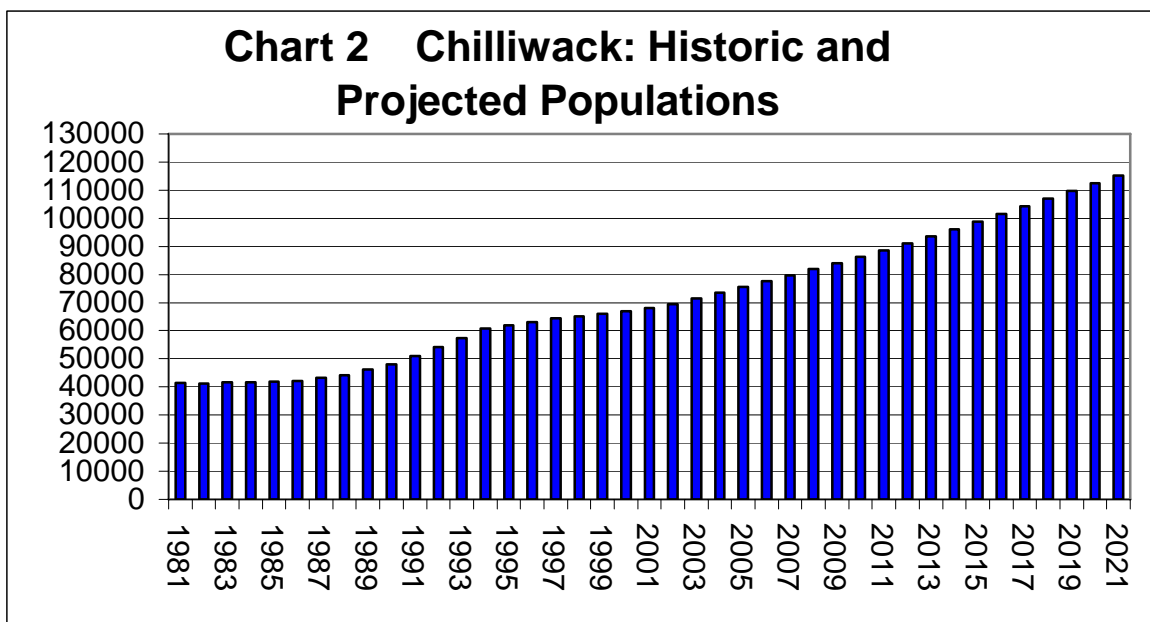
The current population of Chilliwack is estimated at 68,000. Over eighty-two percent of the population lives in urban communities or suburban neighbourhoods, and the balance reside in the rural hillsides and farming areas.

Chilliwack has gone through two growth spurts in the last 25 years – from 1979 to 1981 and from 1987 to 1994. From 1981 to 2001, Chilliwack grew at an average of 2.5% p.a. By 2010, its population could reach the OCP’s target of 85,000.

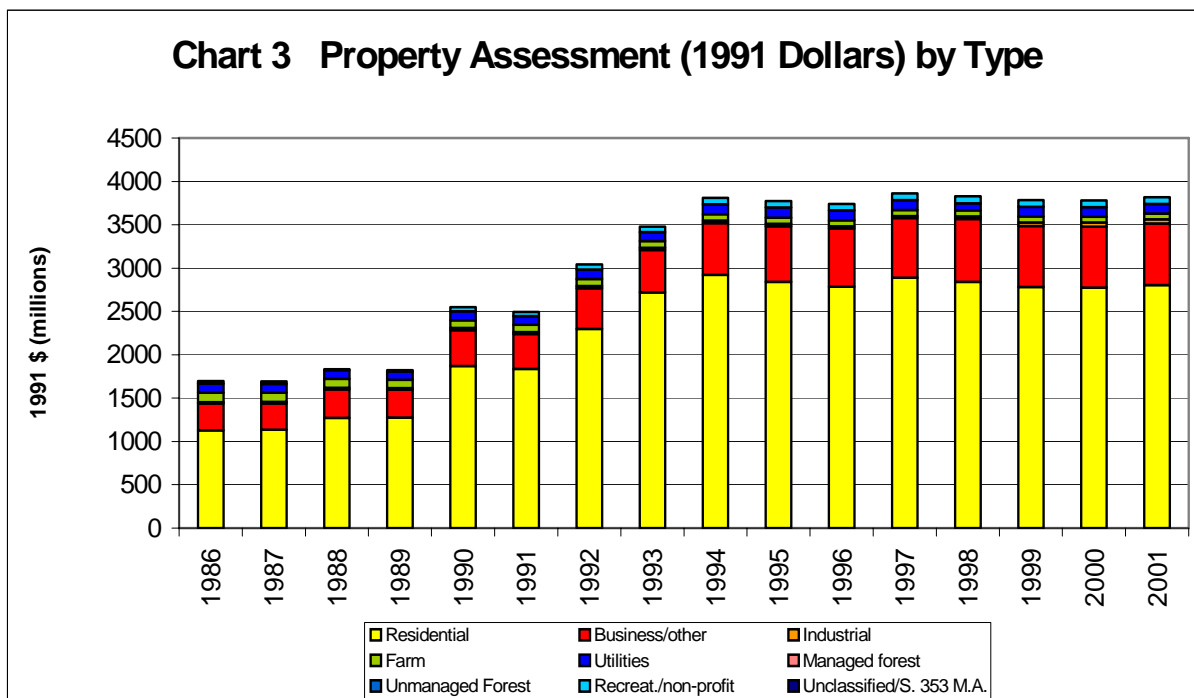
The population growth is primarily driven by migration from the Greater Vancouver Regional District (GVRD), with interregional migration accounting for up to 80% of the growth in times of boom. Many residents commute to work in GVRD, and although this pattern will continue as part of its population growth, many migrants are being attracted to Chilliwack by local employment opportunities. The economic attraction reflects successes in economic development and coming-of-age as a medium-sized community.

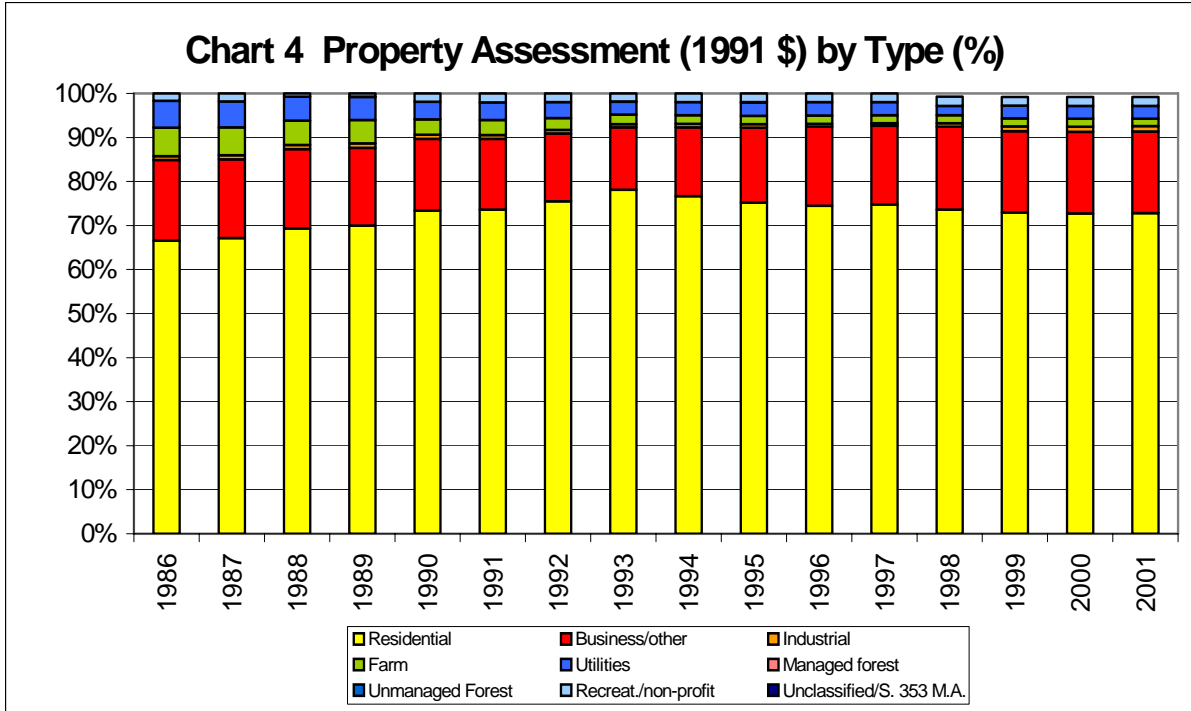






The growth of Chilliwack has manifested in its property assessment. Since 1986, property assessment in Chilliwack has grown from \$1.4 billion to \$4.5 billion, a three-fold increase. As expected, much of the growth has occurred in the residential sector, which now constitutes over 70% of the assessment total (Charts 3 & 4). The assessment peaked in 1994 and has since stayed close to that level despite a real estate recession that caused a drop in real estate values of 12%-30%, attesting to the strength of the City's growth and development. Chilliwack is optimistic about its future, and is earnest in planning infrastructure development to meet the future challenge of growth.





**Potential Societal Benefits**

There are significant Provincial, Federal, and Municipal benefits to this project, including the following:

- Improved air quality and more efficient energy use due to a reduction of idling and stop-and-go traffic situations.
- Improved safety, performance, and reliability to the municipal road network and to the Trans-Canada Highway, including decreases in traffic accidents, injuries, and fatalities.
- Safety improvements in the event of an earthquake, as the new structure would be built to current seismic standards. Provides local community access across the bridge for emergency vehicles, and provides provincial/federal benefits since the bridge crosses the disaster response route.
- Intermodal benefits, including safer pedestrian and cycling access across the bridge due to dedicated lanes.
- Travel time benefits, both cross-region and national. Benefits including removing ‘friction’ from the interchange and highway as well as improved crossing capacity of Vedder, a vital corridor, across the TCH.
- Supporting economic development in the area. Opportunities include tourism due to easy access off highway for shopping, parks, recreation, camping and hotels, the potential development of the former CFB Chilliwack Base, improved opportunities for nearby First Nations, and improved access to downtown and government services.

## Option Generation

- Option (1) Vedder Interchange Improvement – This option provides four lanes, plus turning capabilities, for the interchange structure. Six lanes are provided on Vedder from each of the interchange ramp heads to Yale Road West and Luckakuck. The concept is based on a recommended option from the functional design work undertaken by ET Consulting and UMA. The option used for analysis does not include the eastbound off-ramp connection to Topaz.
- Option (2) Two-Lane Evans Overpass – This option includes a new two-lane overpass from Yale Road to Luckakuck, with limited access at Luckakuck. The option analyzed does not include TCH on- and off-ramps.
- Option (3) Four-Lane Evans Overpass – This option is the same as above except it includes a new four-lane overpass from Yale to Luckakuck. The concept is based on a recommended option from the functional design work undertaken by ET Consulting and UMA.

Option (3) was dismissed because the incremental benefits relative to costs from moving from the two lower-cost options are minimal. More specifically, (as can be seen by reference to Figure 1), the cost of the four-lane Evans option is about \$10 million more than the two-lane version, and thus the benefits of the four lane option would need to increase by over \$13 Million just to approach the “*Net Present Value*” of the recommended Vedder option. Alternatively, in order to achieve the “*Cost-Benefit Ratio*” of the Vedder option (at 4.160), the upgrade from the two-lane version to the four-lane version of the Evans Overpass would need to generate over \$20 Million of additional benefit.

Also, Option (3) was not felt to be equivalent to the other options in that it provided additional crossing capacity that was not comparable (i.e., 4 lanes vs. 2 lanes additional).

## Methodology

A *Consumer Surplus*<sup>1</sup> approach was used to evaluate the respective options. This approach is superior to the *Cost-Difference* approach for projects/evaluations where there are network implications. Micro-BENCOST is designed to model only the Cost-Difference approach where there is limited or no induced travel (or changes in travel behaviour) resulting from the proposed improvements. More specifically, this approach does not accurately capture network or induced travel implications. Appendix 1 provides a more in-depth description of the “Consumer Surplus” methodology.

Even though *Consumer Surplus* methodology was used rather than Cost-Difference methodology of Micro-BENCOST, the default values of Micro-BENCOST were used for analysis purposes. More specifically, the prescribed discount rate of 6% as well as all other values in the “*Micro-BENCOST Guidebook: Defaults and Standardized Analysis for Highway Improvement Projects in British Columbia*<sup>2</sup>” were used for analysis purposes.

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<sup>1</sup> This approach assumes network implications (changes in travel behaviour) with their corresponding induced travel implications.

<sup>2</sup> 1998.

## Option Evaluation

### *Financial Account*<sup>3</sup>:

- **Construction Costs** – A cost estimate for the interchange was developed using the Wolski<sup>4</sup> spreadsheet methodology. This method tabulates construction costs using a quantity take-off system extended by unit rates. It then applies factors to the construction costs to develop soft-cost items such as design, engineering, project/program management, resident engineering, and contingency. Standard MoT unit rates and factors were used in this estimate. Costs for the Vedder Road Interchange have been included from the north side of the Luckakuck Way intersection to the south side of the Yale Road intersection. All of the interchange ramps have been included in the cost estimate. The City of Chilliwack provided land acquisition costs. The cost estimate is in 2002 dollars. Costs for the 2-lane Evans Road Overpass were also developed in a similar manner by UMA using the Wolski spreadsheet methodology.
- **Property Costs** – The costs in the table below were prepared by UMA; unit costs were provided by the City of Chilliwack. The property costs identified in Figure 1 (below) include the costs required for right-of-way acquisition but are not offset by the cost recovery related to surplus land sales. For additional details regarding property costs, UMA prepared a report entitled *Chilliwack's Interchanges Project Development, January 2002*.
- **Maintenance and Rehabilitation** – Road, bridge, and signal maintenance costs were based on Ministry costs for the year 2000. Rehabilitation costs are from Ministry of Transportation's "Construction and Rehabilitation Estimating Book", February 1997.

#### **Annual Maintenance Costs**

Item	Amount	Units
Road	13,581	\$/lane-km
Signal	3,600	\$/signal
Bridge	7.3	\$/sq.m.

#### **Rehabilitation Costs**

Item	Hot Mix	Cold Mill
\$/lane-km.	50,000	25,000
Year	15	7

- **Salvage** – Salvage value was assumed to be 24% of the combined construction and property costs. The apportion value was derived from a review of several regional projects proposed for the Lower Mainland (Lower Mainland Systems Level Analysis - Stage 2).

<sup>3</sup> Costs provided UMA.

<sup>4</sup> Cost-estimating methodology named after its creator, Ernie Wolski of E. Wolski Consulting.

### **Customer Service Account (Benefits)**

- Travel-Time Savings – Using the consumer surplus approach these benefits were calculated for the period modeled, the 2020 afternoon peak hour. These results were then factored up to represent a day, then a year respectively. Factors of 8.6 and 300 were used to convert the afternoon peak hour to a day and a day to a year. The factor to convert the afternoon peak hour to a day was derived based on Chilliwack traffic count data. Annual benefits were then taken over the 20-year analysis period and discounted back to the investment year at 6% per annum.
- Vehicle Operating Cost Savings – These were calculated as a proportion of travel-time savings. The ratio apportioning values were derived from recent Ministry regional studies that incorporated a consumer surplus approach (Lower Mainland Systems Level Analysis - Stage 2).
- Accident Costs Savings – These were calculated as a proportion of travel-time savings. The ratio apportioning values were derived from recent Ministry regional studies that incorporated a consumer surplus approach (Lower Mainland Systems Level Analysis - Stage 2). As the calculation of accident savings on a link-by-link basis that is aggregated up to a network level would entail significant financial resources, the apportioning method was adopted by UMA as a crude estimation of potential accident savings. The accident savings would be created through improved design, redistribution of traffic and thus decreased exposure, and fewer rear-end specific accidents. However, there is usually an offset to these accidents savings that is attributable to increased speed. More specifically, this offset has been addressed through the Consumer Surplus approach in that the accident savings attributable to the improvements are much larger than the offset due to increased speed.

### **Economic Indicators (COST BENEFIT ANALYSIS: Financial & Customer Service Accounts)**

- The Net Present Value of both options are favourable, although the Vedder Interchange upgrade generates a much better NPV of \$28 million. However, from a Benefit-Cost ratio perspective, the difference between the Vedder project coefficient of 4.2 and the coefficient for the Evans Road project of 4.8 is small and probably statistically not valid. Furthermore, on large projects, the proper measure is the NPV with only secondary importance to the B/C ratio. The B/C ratio will always favour small projects. NPV measures the net incremental benefit to society, not the comparison of costs relative to benefits. Nevertheless given fiscal constraints, the B/C ratio should still be used as a secondary decision-making tool. In other words, since the NPV of the Vedder option exceeds the NPV of the Evans option, and the two options have similar B/C ratios, then the preferred option is the Vedder option. An additional consideration here is that the Evans 2-lane option, unlike Vedder, has no access to the TCH and as a flyover is primarily a municipal element providing minimal provincial and federal benefits.
- It should also be stated that another (unquantified) benefit of this project is that considering the significant improvements being undertaken, disruption to the road user during construction is very reasonable. It is expected that impact to users on key movements such as the SB to EB ramp and through-traffic on Vedder and TCH will be minimal. Transportation economics is beginning to incorporate disruptions during construction. In fact, there have been some estimates from US studies indicating that the disruption costs of some projects are never recovered throughout the subsequent useful life of the improvement. It should also be remembered that disruption costs for truck traffic also carry a higher premium than for automobile traffic, and thus are particularly important for trucking and goods movements.

### **Economic Development Account**

- As can be seen by reference to Appendix 1A and 1B, there are economic development benefits from investment, in terms of employment and contribution to provincial GDP. More specifically, by applying

the Ministry of Finance multipliers (and appropriate recycling rate) to the respective investments, it is estimated that 203.4 Person Years of employment will be created and \$24.4 Million of economic impacts will be generated by the Vedder Interchange<sup>5</sup>. The moderate economic development benefits of this project are consistent with the empirical “Diminishing Marginal Utility” aspect of transportation economics. More specifically, the largest economic development benefits are to be found for those projects where access is created, an impediment to growth is eliminated, or new opportunities are created. This is in contrast to projects such as the proposed Vedder Interchange or Evans Road projects, where the improvement merely provides added capacity or enhances the performance of existing infrastructure and networks, and thus only limited new opportunities are created. Nevertheless, the following opportunities are possible:

- Increased tourism due to easy access off highway for shopping, recreation, camping, and hotels
- Potential development of the former CFB Chilliwack Base
- Greater access offered to nearby First Nations population
- Improved access to downtown and government services

### **Environmental Account**

Fuel consumption and vehicle emission components as presented in Figure 1 indicate that both projects would generate equivalent and very favourable environmental implications. Fuel consumption factors at different speeds and vehicle emission coefficients were obtained by UMA Engineering Ltd. from those used in recent Ministry regional studies (New Westminster Area Network Study). Fuel consumption in litres per kilometre were calculated by UMA using Emme/2 output and fuel consumption factors. Total vehicle kilometres for the 2021 PM peak hour were grouped by UMA into categories by the speed at which the vehicles operate. These values were factored up by the consultant to annual values. Emission quantities were calculated by UMA for carbon monoxide, carbon dioxide, nitrogen oxide and hydro-carbons in grams per kilometre (g/km). The four quantities were obtained by factoring Emme/2 speed-based volumes up to annual figures, and subsequently coefficients were applied by UMA to convert these quantities to emissions.

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<sup>5</sup> Gary Horne, "Provincial Economic Multipliers and How to Use Them", Treasury Board Staff, November 1996, 1990 BCIOM INDUSTRY -MEDIUM AGGREGATION- 75% RECYCLING RATE, (*Industry = Transportation*)

## Social Account

The major societal benefits include the following:

- Safer pedestrian and cycling access across the bridge due to dedicated lanes.
- Safety improvements in the event of an earthquake, as the new structure would be built to current seismic standards. Provides local community access across the bridge for emergency vehicles, and provides provincial/federal benefits since the bridge crosses the disaster response route.

<b>Figure 1 - Chilliwack - Business Case Summary</b>					
			Options	9010	9020
				Opt. 1	Opt. 2
					<b>2 Ln</b>
				<b>Vedder I/C</b>	<b>Evans O/P</b>
Account	Criteria	Measurement	Unit		
Financial	Construction Cost	Present Value	(M\$)	10.888	5.881
	Property Cost	ROW req'd for construction	(M\$)	0.334	0.979
	Maint. & Rehab Costs	Present Value	(M\$)	0.456	0.327
	Salvage Value	Present Value	(M\$)	2.693	1.646
Service	Road Network Performance (Consumer Surplus)	Value of Travel Time	(M\$)	26.465	18.704
		Value of Operating Costs	(M\$)	6.616	4.676
		Value of Accident Costs	(M\$)	4.301	3.039
<b>Economic Summary</b>	<b>Benefits</b>	<b>Present Value</b>	<b>(M\$)</b>	<b>37.382</b>	<b>26.419</b>
	<b>Costs</b>	<b>Present Value</b>	<b>(M\$)</b>	<b>8.985</b>	<b>5.540</b>
	<b>Net Present Value</b>	<b>Present Value</b>	<b>(M\$)</b>	<b>28.397</b>	<b>20.879</b>
	<b>Benefit/Cost Ratio</b>	<b>Calculated</b>	<b>Ratio</b>	<b>4.160</b>	<b>4.769</b>
Economic	Quantitative	Employment	<b>Person Years</b>	203.4	129.6
Development		Provincial Economic Impact	<b>(M\$)</b>	24.4	15.6
	----- (See Attached Appendices 1A and 1B) -----				
Environment	Fuel	Fuel consumed	Millions litres	-32.020	-36.347
	Vehicle Emissions	Carbon dioxide	Millions kg.	-83.436	-94.216
		Carbon monoxide	Millions kg.	-3.360	-3.442
		Nitrogen oxide	Millions kg.	-0.121	-0.169
		Hydro-carbons	Millions kg.	-0.371	-0.371
1 Note: Property cost includes the value of ROW required for construction, it has not been offset by the value of surplus lands available for development					
2 Salvage Costs: Ratio 24% of construction costs and property costs					

## Risks/Sensitivity Analysis

	<b>Baseline</b>	+25% in Cost	-25% in Cost	8% Discount Rate
NPV (\$Million)	<b>28.397</b>	25.611	31.182	22.290
B/C	<b>4.160</b>	3.176	6.030	3.591

## Project Implementation

- Scope

The scope of this project includes twinning of the bridge, improved lanes and ramps, and improvements to related infrastructure at the Vedder/TCH interchange. Specifically, it includes the following:

- Four-lane crossing, full-movement interchange with reconstructed ramps and associated intersection improvements
- Improvements and lengthening of each of the acceleration/deceleration lanes on the highway at the interchange
- Widening of the north leg of Vedder Road from the interchange to the south side of Yale
- Improvements to the Vedder Road/Yale intersection for traffic approaching from the interchange (i.e., northbound traffic)
- Widening the south leg of Vedder Road from the interchange to the north side of Luckakuck
- Improvements to the Vedder Road/Luckakuck intersection for traffic approaching from the interchange (i.e. southbound traffic)
- Removal of any local accesses on Vedder that interfere with the operation of the interchange

- Schedule (with federal cost-sharing)

Following is a preliminary project schedule, subject to negotiations:

- |  |           |
|--|-----------|
| ○ Obtain project approvals and funding     | 2002/2003 |
| ○ Project Definition and Project Agreement | 2002/2003 |
| ○ Request for Expressions of Interest      | 2002/2003 |
| ○ Issuance of RFP                          | 2003/2004 |
| ○ Award contract                           | 2003/2004 |
| ○ Start construction                       | 2004/2005 |
| ○ Project completion                       | 2005/2006 |

- Budget (with federal cost-sharing)

Ministry of Transportation	\$4.133 million
SHIP program	\$4.133 million
<b>City of Chilliwack to fund</b>	<b>\$4.133 million</b>
Total Project Cost	\$12.40 million



Forecasted cash flow subject to negotiations and with federal cost-sharing is as follows:

2002/2003	\$0.200 million
2004/2005	\$6.100 million
2005/2006	\$6.100 million

There is also a possibility that ICBC will contribute funds to this project, based on their assessment that the current interchange and related entry and exit points are the scene of numerous accidents.

### Conclusions/Recommendations

Based on a review of this project, it is recommended that it proceed for the following reasons:

- The Vedder Road/TCH interchange requires replacement or reconstruction of the highest priority due to the capacity and safety deficiencies.
- The proposed improvements will yield large provincial, municipal, and federal benefits, hence the opportunity for partnership and cost-sharing.
- Benefits are significant, with an NPV of \$28 million and a B/C ratio of 4.2. They include savings to travel time, vehicle operating, safety and fuel emissions, as well as contributing to community connectivity and economic development.

<b>Appendix 1A</b>				
<b>ECONOMIC IMPACTS AND INHERENT EMPLOYMENT IMPACTS GENERATED BY INVESTMENT IN THE PROPOSED VEDDER INTERCHANGE</b>				
<b>INVESTMENT</b>	<b>12.40</b>	<b>\$Million</b>		
	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Open-Model Output Multiplier</u>
Coefficients	1.00	0.57	0.40	1.97
<b>Economic Impacts (\$Million)</b>	<b>12.4</b>	<b>7.1</b>	<b>5.0</b>	<b>24.4</b>
	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Open-Model Output Multiplier</u>
Coefficients	7.3	4.7	4.4	16.4
<b>Employment Impacts (Person Years)</b>	<b>90.5</b>	<b>58.3</b>	<b>54.6</b>	<b>203.4</b>
Note: 1	Employment impacts are (PY/\$Million)			
Source:	Gary Horne, "Provincial Economic Multipliers and How to Use Them", Treasury Board Staff "November 1996 1990 BCIOM INDUSTRY -MEDIUM AGGREGATION- 75% RECYLCING RATE <i>(Industry = Transportation)</i>			

Appendix 1B				
<b>ECONOMIC IMPACTS AND INHERENT EMPLOYMENT IMPACTS GENERATED BY INVESTMENT IN THE PROPOSED 2-LANE EVANS OVERPASS</b>				
INVESTMENT	7.90	<b>\$Million</b>		
	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Open-Model Output Multiplier</u>
Coefficients	1.00	0.57	0.40	1.97
<b>Economic Impacts (\$Million)</b>	<b>7.9</b>	<b>4.5</b>	<b>3.2</b>	<b>15.6</b>
	<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Open-Model Output Multiplier</u>
Coefficients	7.3	4.7	4.4	16.4
<b>Employment Impacts (Person Years)</b>	<b>57.7</b>	<b>37.1</b>	<b>34.8</b>	<b>129.6</b>
Note: 1	Employment impacts are (PY/\$Million)			
Source:	Gary Horne, "Provincial Economic Multipliers and How to Use Them", Treasury Board Staff November 1996 1990 BCIOM INDUSTRY - MEDIUM AGGREGATION - 75% RECYCLING RATE <i>(Industry = Transportation)</i>			

## Appendix 2

### *CONSUMER SURPLUS vs. COST DIFFERENCE METHODOLOGIES*

#### Consumer Surplus

Diagram 1 illustrates the “*Consumer Surplus*” methodology that is the underpinning of all transportation economics. The initial situation is described by the intersection of Demand 1 and Supply 1 and is referred to as the Base Case. This is represented by  $C_1$  and  $V_1$ , respectively. Once a transportation improvement is implemented there is an increased number of trips. This includes generated (additional) trips over and above the original number of trips.

Under the proposed improvement, the original travellers ( $V_1$ ) receive an incremental (net) benefit of  $C_1 - C_2$  units of cost reduction. More specifically, these travellers would be willing to pay  $C_1$  to travel  $V_1$ , but only had to pay the price of  $C_2$ . Therefore, the incremental benefit to these users is equal to  $V_1 * (C_1 - C_2)$ , which is geometrically represented by area A.

The newly generated trips  $V_2 - V_1$ , which are encouraged by the lower price  $C_2$ , receive a net (incremental) benefit represented by the triangular area B. More specifically, these new users must pay the  $V_1 V_2 * C_2$ , which is represented by the rectangular area C. Therefore, the net benefit is the area B for these new users, which is the difference between the “willingness to pay” and what is actually paid for the service.

In conclusion, the combined incremental benefits are then equal to

**Area A** (Original Travellers Incremental Benefits) + **Area B** (New Generated Travellers Incremental Benefits).

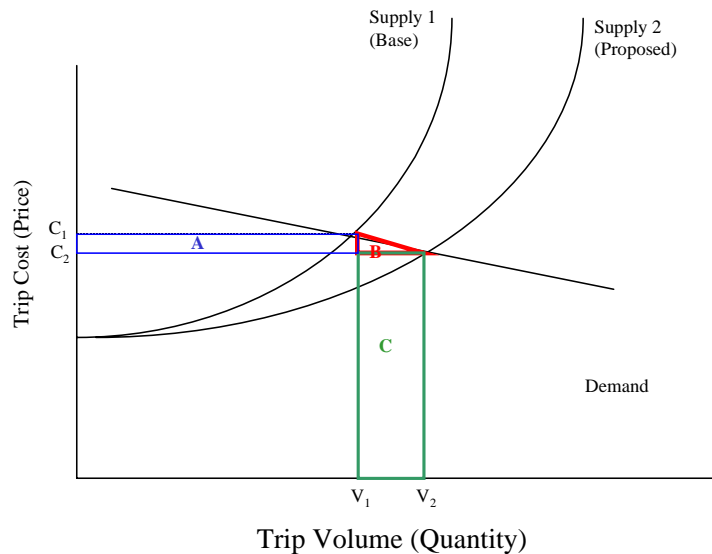
## MAE and Consumer Surplus

Micro-BENCOST software uses a method sometimes referred to as “*Cost Difference*”, which compares total time costs, vehicle operating costs, and accident costs for the proposed project to that of the base (existing) situation. The two methods are identical only when there is no change in the trip pattern. For instance, the added capacity of a passing or climbing lane will not change trip patterns. Conversely, the improvement of an existing facility or the construction of an additional link within an urban centre will have network implications and thus change trip patterns. Therefore, the adoption of the “Consumer Surplus” approach by Translink is not meant as a replacement to the existing MAE and Micro-BENCOST guidelines, but rather a method to supplement or fill a void where existing methodology is deficient. It has long been recognized that Micro-BENCOST is not well suited to capture network or regional implications. However, for the vast majority of projects that are funded by the Ministry of Transportation, where network implications are minimal or non-existent, Micro-BENCOST performs accurate Cost-Benefit analysis in a timely manner. It should also be noted there is currently no transportation economics software that can capture network implications using the *Consumer Surplus* approach.

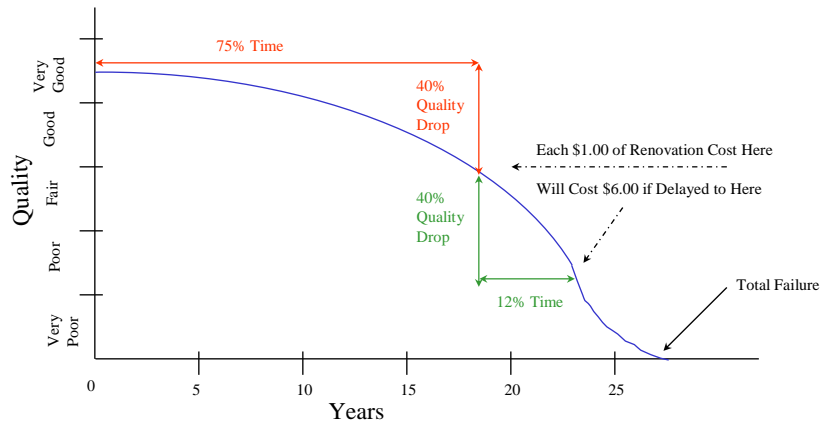
It should be understood that the *Consumer Surplus* Method and the *Cost-Difference* Method are both alternative methods of Cost-Benefit Analysis, and as such they both address the same two accounts of the MAE framework, Financial and Customer Service. The remaining accounts of Environment, Economic Development, and Social implications are not captured through either of these methods. These additional considerations (accounts) are evaluated through the examination of indirect benefits.

Diagram 1

## Consumer Surplus

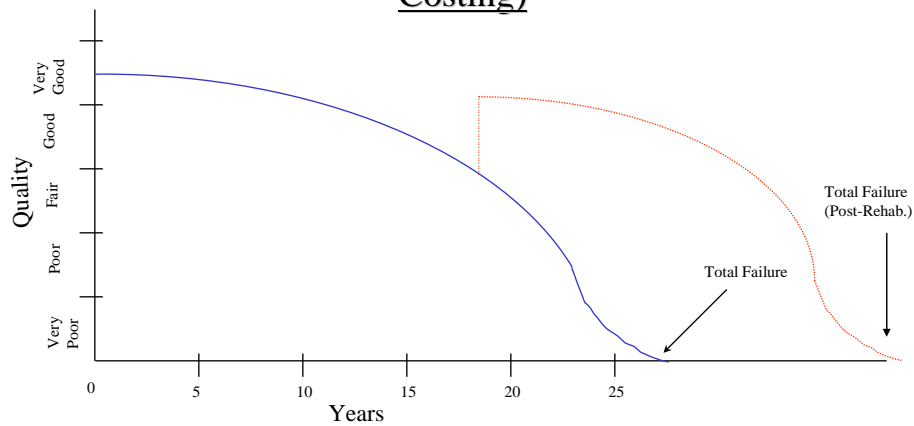


## Costs of Pavement Deterioration (Based on U.S. Experiences)



Source: L.M. Richter, Pavement Management Saves \$3 Million, American Public Works Administration, 1988 appearing in *“Highway Asset Management Systems: A Primer”*; Transportation Association of Canada, 1999

## Pavement Deterioration Extending the “Life of the Asset” (Based on U.S. Experiences from Life-Cycle Costing)



Source: L.M. Richter, Pavement Management Saves \$3 Million, American Public Works Administration, 1988 appearing in *“Highway Asset Management Systems: A Primer”*; Transportation Association of Canada, 1999

**Northern Development Ministers Forum**  
**Maximizing the Economic and Social Impact of Major Northern Projects**

*Manitoba Advanced Education and Training: Hydro Northern Training Initiative*

**Introduction**

Manitoba Hydro is proposing the construction of two hydroelectric generating stations in Northern Manitoba – Wuskwatim Generating Station at Nelson House and the Keeyask (Gull) Generating Station at Keeyask/Gull Rapids on the Nelson River.

On June 26, 2006, the Wuskwatim project was approved, with construction to begin before fall 2006. The Keeyask project is still in the negotiating stage.

The Hydro Northern Training and Employment Initiative is a “pre-construction” training project which began on a limited basis in 2001/02, is in full implementation now, and is expected to continue to 2007/08 – 2008/09. The Initiative is an integral part of ensuring that northern Aboriginal residents are prepared through training and skills development to capture employment and related opportunities presented by hydro construction.

Manitoba Hydro (\$20.0M), Manitoba (\$10.0M), and the Federal Government (\$30.3M) have contributed to a \$60.3M training and employment Initiative. \$22.0M of the Federal contribution is from the Aboriginal Skills and Employment Program. The construction of hydroelectric generating stations in the North presents the most substantial construction activity in the North in decades. The Initiative is also the largest workforce development strategy to take place in the North in decades.

Manitoba Hydro has prepared economic impact assessments for both Wuskwatim and Keeyask Generating Stations, including the specific impact on Northern Manitoba.

The economic impacts were derived using the Manitoba Bureau of Statistics’ Economic Impact Assessment Model. The report covers gross rather than net measures of benefit. It does not discuss benefits such as the development of skills for Northern people as a result of employment and increased business opportunities, or the projects’ substantial contributions to federal and provincial objectives for reducing greenhouse emissions.

The assessment and indicators used are briefly described below.

### **Economic Impact Assessment – Wuskwatim Generating Station**

The Wuskwatim project is a proposed 200 MW generating station at Taskinigup Falls on the Burntwood River near Thompson, Manitoba. The project also includes the necessary transmission facilities including a new switching station near the generating station site and a transmission line to bring the power into the existing Manitoba Hydro grid.

The generation component of the project will take six years to build, from 2006 to 2010, and is expected to operate for more than sixty years. Wuskwatim Generating Station will cost an estimated \$506 million in 2002 dollars, and the new switching station and transmission line will cost an estimated \$19.87 million in 2002 dollars.

The economic impact analysis of the project took into account only on-site expenditure costs.

### **Economic Impact Assessment - Keeyask (Gull) Generating Station Project**

Gull Generating Station is a 635 MW hydro power generating station at Gull/Keeyask Rapids on the Nelson River. Construction cost of this project is estimated at \$1,453 million (2001 dollars). Construction is expected to begin in late 2007 with an in-service date of late 2012/13. Operations will last over sixty years.

A \$210 million Northern Converter station is to be developed.

### **Economic and Social Indicators Used**

- Gross Domestic Product
- Employment
- Labour Income
- Tax Revenue

Using Wuskwatim GS impact assessment as an example, the following tables provide a sample of economic impact indicators used in assessing the economic impacts of hydroelectric construction.

**WUSKWATIM ECONOMIC IMPACT ASSESSMENT**

**Economic Impacts of Building,  
Operating, and Maintaining the WUSKWATIM Project, 2004 – 2069**

	<b>Employment (person-years)</b>	<b>Labour Income (millions)</b>	<b>Taxes (millions)</b>	<b>GDP (millions)</b>
<b>CANADA-WIDE TOTAL</b>	9,830	\$454.2	\$186.3	\$601.9
<b>MANITOBA</b>				
Construction - direct	1,853	\$246.6	\$100.2	\$274.7
- indirect	3,035			
Operation and Maintenance	828*	\$42.0	\$15.8	\$53.4
<b>TOTALS</b>	5,716	\$288.6	\$116.0	\$328.1
<b>REST OF CANADA</b>				
Construction - direct	369	\$156.6	\$66.0	\$255.1
- indirect	3,505			
Operation and Maintenance	258	\$0.9	\$4.3	\$18.7
<b>TOTALS</b>	4,132	\$165.6	\$70.3	\$273.8
<b>NORTHERN MANITOBA</b>				
Construction - direct	701	\$94.0		
- indirect				
Operation and Maintenance	372	\$42.0		
<b>TOTALS</b>	1,073	\$136.0		
<b>NORTHERN MANITOBA ABORIGINAL PEOPLE</b>				
Construction - direct	491	\$66.0		
- indirect				
Operation and Maintenance	132	\$12.0		
<b>TOTALS</b>	623	\$78.0		

\* Note: Person-years of employment during operation and maintenance of the project were calculated by taking the estimate for a typical year and multiplying it by 60 years, the operation life of the project.

Source: WUSKWATIM Impact Assessment Final Report (2003 01 15)

## ECONOMIC IMPACT ON NORTHERN MANITOBA

### Generating Station - Construction Expenditures Northern Manitoba Direct Employment Impact<sup>(1)</sup> in Person-Years *for Northern Manitoba for the Entire Construction Period*

Impact	Northern Manitoba Residents (BNA) <sup>(2)</sup>	Northern Aboriginal People (BNA) <sup>(3)</sup>
<b>Direct Employment<sup>(4)</sup></b>		
Low	532	316
Medium	649	432
High	732	532

1. Employment impacts are in “person-years.” A person-year is defined as one person being fully employed for one year.
2. Northern Manitoba residents’ impact has been estimated at 32% (low), 39% (medium), and 44% (high) of the total direct Manitoba employment of 1,663 person-years.
3. Northern Manitoba Aboriginal residents’ impact has been estimated at 19% (low), 26% (medium), and 32% (high) of the total direct Manitoba employment of 1,663 person-years.
4. On-site direct employment of Manitoba Hydro and contractor employees.

**In addition to the direct employment impact, there will be a significant level of indirect and induced employment impacts on Northern Manitoba from the project’s construction expenditures.**

Source: WUSKWATIM Impact Assessment Final Report (2003 01 15)

### Generating Station – Construction Expenditures Northern Manitoba Direct Labour Income Impact<sup>(1)</sup> in Millions of Dollars<sup>(2)</sup>

*For Northern Manitoba for the Entire Construction Period*

Impact	Northern Manitoba Residents (BNA) <sup>(3)</sup>	Northern Aboriginal People (BNA) <sup>(4)</sup>
<b>Labour Income</b>		
Low	\$70.0	\$41.5
Medium	\$85.3	\$56.8
High	\$96.2	\$70.0



1. Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.
2. In 2002 dollars.
3. Northern Manitoba residents' impact has been estimated at 32% (low), 39% (medium), and 44% (high) of the total direct Manitoba labour income of \$218.6 million.
4. Northern Manitoba Aboriginal residents' impact has been estimated at 19% (low), 26% (medium), and 32% (high) of the total direct Manitoba labour income of \$218.6 million.

Source: WUSKWATIM Impact Assessment Final Report (2003 01 15)

The economic impact assessments of the construction projects do not address benefits such as

1. the development of skills for Northern people,
2. increased employment, and
3. increased business opportunities.

### **Project Tracking**

Manitoba Hydro has stated they will be tracking employment of pre-project trainees who become employed on the construction projects. This will be done on a project and community basis. The other indicators will be tracked at a regional and provincial level.

### **Other Social and Economic Indicators Related to Hydro Construction and the Hydro Northern Training and Employment Initiative**

Through evaluation of the Hydro Northern Training and Employment Initiative, Manitoba, Manitoba Hydro, and the Federal Government will assess social and economic impacts of the investment in training upon Northern Aboriginal individuals, families, communities, and the North. Two approaches to be implemented include the following:

#### **Aboriginal Skills and Employment Program (ASEP) Evaluation**

Indicators:

##### **Individual**

- Positive labour market outcomes including opportunity for long-term employment, higher income, improving marketable skills
- Impact on quality of life
- Positive impact with respect to employment equity

##### **Employers**

- Increased supply of skilled labour in the local market to enhance local economy

## **Community**

- Improvement in self-sufficiency of Aboriginal communities and an improved quality of life for its members

## **Partnerships**

- Number, strength, and nature of partnerships enhanced within the programs

## **Manitoba Advanced Education and Training Summative Evaluation**

Indicators:

### **Training Delivery Model**

- Increased coordination and development of synergies between partners to maximize positive impacts of the training investment

### **Quantitative Data – Outputs/Outcomes**

- Number assessed
- Number of programs
- Number of trainees
- Number of successful interventions
- Number employed
  - on hydro projects (long term)
  - training related
  - in the community
  - in North
  - in Manitoba
  - other

### **Employment Outcomes**

- Number of graduates hired as a percent of overall hires (percentage of workforce)
- Number of employment opportunities lost and why

### **Qualitative Data**

#### **Quality of Training**

- Employer satisfaction with trainee skills
- Number of trainees who enter apprenticeship and progress to journeyperson level
- Aboriginal Partner satisfaction with training providers
- Cost per trainees

#### **Employment Referral System**

- Success rate in getting training graduates to the site on time

## **Community Capacity Building**

- Number of construction activities in community undertaken as a result of increase in skill base
- Increase in spin-off or new business development within communities
- Number of self-employed
- Increase in human resource development skills leadership/management/training for improved training delivery capacity in communities

## **Return on Investment**

- Increase in equity participation
- Savings to income assistance and Employment Insurance
- Impact on regional economy

## **Tracking Projects**

Both the ASEP Evaluation and Manitoba's Evaluation are undertaken at the community, regional, and provincial level.

## **Issues, Experiences, and Suggestions**

### *1. Potential for improved integration of activities*

The social and economic assessment follow-ups and evaluations are for the most part developed and carried out independently by each party.

An integrated approach would bring more economy and less duplication to the follow-up process, as well as potentially identify other beneficial and interrelated indicators.

A comprehensive framework is lacking. There would be greater opportunity for lessons learned if all follow-up data were consolidated into a report.

### *2. Lack of resources to broaden base of maximizing indicators*

Staffing and time and similar resources for the communities are issues.

### *3. Quarterly reports and reviews are used to monitor indicators over the life of the Project*

### *4. All jurisdictions would benefit from a forum on best practices in this area or access to new research and approaches in this field*



**Northern Development Ministers Forum  
Maximizing the Economic and Social Impact of Major Northern Projects**

***Project 1: The Voisey's Bay Mine/Mill Project, Labrador (Economic)***

**Project Overview**

The Voisey's Bay nickel-copper-cobalt deposit was discovered in Northern Labrador in September 1993. In 1996, Inco Ltd. acquired the rights to the Voisey's Bay property. Voisey's Bay Nickel Company Limited (VBNCL), a wholly owned subsidiary of Inco Ltd., is the company responsible for developing the Voisey's Bay project.

The Voisey's Bay project includes the construction and operation of an integrated mine and concentrator in Labrador, as well as a processing facility in Newfoundland that will receive and process the concentrate to a finished nickel product. The project will represent an overall investment in the Province of about \$3 billion over its estimated 30-year life, including \$1.5 billion in Labrador for the Mine/Mill. This overview focuses upon the Labrador component of the Voisey's Bay project.

**Economic Indicators**

Adjacency Principle – States that first priority, in terms of employment and the procurement of goods and services, will be given to residents and businesses located in communities which are adjacent to the company's mine/mill in Labrador.

Industrial and Employment Benefits Agreement (IEBA) – Includes specific provisions and measures to ensure that local residents and companies benefit to the maximum extent possible. The IEBA requires regular reports to the Province on goods and services purchased and on project employment (by gender, work location, employee residence, and number of Aboriginal employees).

**Employment Indicators**

- Gender Equity
- Location of permanent residence of employees
- Increased Aboriginal employment and skills capacity

**Procurement Indicators**

- Location of purchased goods and services

**Social Indicators**

Impact and Benefits Agreements (IBAs) signed with Aboriginal groups to provide benefits to those impacted by the development. IBAs typically include measures to optimize economic benefits for Aboriginal individuals and firms and minimize any potential negative effects, including preferential employment and contracting, training, revenue sharing, and environmental protection measures. They are formal, written agreements between the Proponent and the Aboriginal claimant groups, however, and their specific content is confidential.

## **Project Tracking**

Tracking of employment has been conducted at all levels since inception.

- Community
- Regional
- Provincial: Voisey's Bay Employment Monitor – to monitor hiring practices at the Voisey's Bay site and ensure compliance with the adjacency principle.
- Federal: Financially supports the Joint Voisey's Bay Employment and Training Authority – established to support Aboriginal human resource development activities related to the project. Primary objective to facilitate the employment of members of the Labrador Inuit Association, Innu Nation, and the Labrador Metis Nation.

## **Pros**

- Accountability/transparency of government
  - Government is accountable to the public
  - Contractors (private sector) accountable to Province
- Increased indicators

## **Issues or Shortfalls with Current Indicators**

- Having to rely on Voisey's Bay Nickel Company Limited for provision of statistics and reporting mechanisms.
- First major development in Labrador in 30 years. Therefore, limited experience to draw upon.

## ***Project 2: Torngat Recreation Commission (Social)***

### **Project Overview**

The Torngat Recreation Commission (TRC) was officially incorporated on January 14, 2003, and comprises a board of Recreation Directors representing the six Labrador North Coast communities. TRC funding for the 5 Inuit communities (Nain, Hopedale, Postville, Makkovik, and Rigolet) came from the provincial government portion of the Canada/Newfoundland and Labrador Inuit Communities of Labrador Contribution Agreement. Funding for the Innu community of Natuashish was received from the Mushuau Innu Band Council. The mandate of the TRC is *“to develop a delivery mechanism to build Leadership Capacity in the six North Coast communities, through Community Partnerships, Training, Community Activities and Sport Programming”*.

The TRC administers two programs: the Community Capacity Building/Leadership Program and the Intra-Labrador Travel Subsidy Program. The emphasis of the Community Capacity Building/Leadership Program is on building capacity by offering various leadership programs. This leadership can be in the form of volunteer recruitment, cultural workshops, and coaching/referee clinics. The Intra-Labrador Travel Subsidy program is designed to allow sport and cultural organizations, as well as individuals from the North Coast, to access funds to travel to other towns within Labrador.

### **Social Indicators**

- Level of participation by residents accessing funding
- Number of training programs offered, thus increasing capacity in the communities

- Increased community well-being overall

### **Project Tracking**

- Community
- Provincial – Accountability to the Province through direct administration by the Department of Labrador and Aboriginal Affairs in collaboration/approval with the board

### **Pros**

- Strong alliances between government and Aboriginal communities and between the communities themselves
- Accountability on the use of the funding received
- Direct administration of the project

### **Issues or Shortfalls with Current Indicators**

- Provincial funds should have stronger accountability mechanisms. This would require buy-in from all levels, community and provincial government.
- Capacity is not clearly defined by the indicators. No formal tracking conducted to determine if training was of benefit to the community.

*Note:* With the introduction of Inuit self-government in Northern Labrador, the Torngat Recreation Commission is no longer administered by the provincial government. Funding has been allocated under the new Nunatsiavut Government and will be administered within that government. Therefore no follow-up will be required.

### **Experience with Indicators**

1. *Are the indicators designed to help your jurisdiction maximize benefits?*

- Yes. With a number of potential resource developments on the horizon in Labrador, there is a strong move to maximize benefits for all residents. From a social perspective, skills capacity in Aboriginal communities will be a great asset for future projects.

2. *What are the difficulties in broadening the base of maximizing indicators?*

- Aboriginal and non-Aboriginal Stakeholders – Interests and needs may differ.
- Geography/isolation – Challenging to ensure maximization of benefits in the north when center of government is based in the southern part of the province.
- Confidentiality of Impact Benefit Agreements – Aboriginal/industry IBAs are confidential; therefore, it is difficult for government to ensure maximization.

3. *Does your jurisdiction monitor maximizing indicators over the life of the project? How do you accomplish this?*

- In recent history, monitoring of indicators has been done through formal industry reports.
- Future projects will have a stronger requirement for maximization:
  - Strong lobby effort from communities and constituents.
  - Government will demand maximization to improve the fiscal well-being of the province.

4. *Do you have any advice for other jurisdictions on how to develop and implement best practices for maximizing the benefits from major projects?*

- Collaboration of all stakeholders is the key for any major development.



### **Northern Development Ministers Forum Maximizing the Economic and Social Impact of Major Northern Projects**

*Question 1: Project name, description, capital cost, and economic, social, and environmental impacts*

The NWT submission considers the case of its two operating diamond mines. The diamond mining industry is relatively new to the north. The first diamonds were discovered in 1991. The Ekati Diamond Mine started operations in 1998, and the Diavik diamond mine started operations in 2003. Diamond mining has become the largest industry in the NWT with production valued at \$2.1 billion in 2004. The following is a description of the two mines:

#### ***Project 1: BHP Billiton (BHPB) Ekati Diamond Mine***

The mine is located in the Lac de Gras area of NWT, 300 km northeast of Yellowknife.

- Construction was carried out in 1997-98 at a cost of \$900 million CDN.
- Operations started in 1998.
- Eight kimberlite pipes are currently being mined using both open pit and underground mining.
- Annual production is ~5.5 million carats/year and the mine life is 16+ years.

An Environmental Assessment (EA) process identified environmental impacts/issues and predicted socio-economic impacts.

BHPB and the Government of the Northwest Territories (GNWT) signed a Socio-economic Agreement (SEA):

- The SEA covers monitoring of issues identified in the EA.
- Under the SEA, BHPB and the GNWT must consult with the impacted communities and other NWT point-of-hire communities on how to improve current Project results.
- The SEA includes the adaptive management concept, whereby mitigation measures are adapted to address unforeseen impacts and impacts that have been more significant than originally foreseen.
- BHPB and the GNWT produce annual reports, monitoring the indicators identified in the SEA (linked to the EA). These reports are then shared with impacted and other point-of-hire communities.
- The SEA and the GNWT annual report can be found online at ([www.itl.gov.nt.ca/industrial\\_benefit/index.htm](http://www.itl.gov.nt.ca/industrial_benefit/index.htm)).

#### ***Project 2: Diavik Diamond Project***

The mine is also located in the Lac de Gras area of the NWT.

- Construction was carried out in 2001-2002 at a cost of Cdn\$1.3 billion.
- Operations started in 2003.
- Three kimberlite pipes are currently being mined using both open pit and underground mining.
- The annual production is ~8 million carats/year and the mine life is 16-22 years.

The Diavik mine project was evaluated under the *Canadian Environmental Assessment Act* (CEAA). In addition, all of the parties incorporated the experience and knowledge gained in assessing the Ekati diamond mine. As discussed below, all affected parties signed the SEA and a Communities Advisory Board was created to monitor the impact of the project.

The Comprehensive Study Report (CSR) released by INAC and Responsible Authorities under the CEAA required an SEA as a follow-up program to the Environmental Assessment, to ensure that monitoring of the impacts occurs and that the mitigation measures identified in the Assessment are carried out and are effective:

- The SEA was signed by all the affected parties: Diavik, the GNWT, Dogrib Treaty 11 Council (Tli Cho), Lutsel K'e Dene Band, North Slave Métis Alliance, Yellowknives Dene First Nation, and Kitikmeot Inuit Association.
- Under the SEA, each Party must produce reports, monitoring the impacts identified in the EA, as defined by indicators in the SEA.
- The reporting submitted by Diavik Diamond Mines Inc. is available on their website at ([www.diavik.ca](http://www.diavik.ca)).
- The SEA created the Diavik Communities Advisory Board (DCAB), to monitor impacts of the Project.
- DCAB community members worked together to customize a list of indicators they could use to monitor community effects.
- Each Party submits its report to DCAB, which reviews all monitoring reports, analyzes the data, and merges the data into one report that highlights the key issues and impacts.
- The SEA includes the adaptive management concept, whereby mitigation measures are adapted to address unforeseen impacts and impacts that have been more significant than originally predicted;
- Based on this monitoring by all Parties, DCAB then makes recommendations regarding the commitments made in the SEA. The recommendations can be in relation to unforeseen impacts, impacts that have proven to be more significant than originally predicted, or impacts where current mitigation measures are ineffective. Formal recommendations are made to Diavik and to the GNWT.
- In making recommendations, DCAB must first determine whether the impact being addressed is more significant than originally predicted, whether it is linked to a commitment covered in the SEA (and by extension the original EA), and whether current mitigation measures are effective.
- DCAB can recommend that mitigation measures be adapted to better address the impact.
- Where Diavik or the GNWT receives formal recommendations, they must give reasons to DCAB if they are not able to comply.
- If there are differences in opinion, the SEA lays out a detailed arbitration and dispute resolution process.

SEAs are follow-up programs to Environmental Assessments. INAC is not party to SEAs.

In addition, there are Impact-Benefit Agreements (IBAs) and Participation Agreements (PAs) negotiated between the mines and the Aboriginal Authorities. Those are confidential arrangements and are not follow-up programs to a public EA.

*Question 2: A listing of economic and social indicators used (past and current) and the purpose of each indicator*

Within each SEA, the GNWT is committed to monitoring impacts using the following indicators. Data is reported at the community level where possible.

<b>BHPB SEA Indicators</b>	<b>Diavik SEA Indicators</b>
<b>Community, Family &amp; Individual Well-Being</b>	
number of injuries	age-standardized injuries
number of potential years of life lost	
number of suicides	
number of communicable diseases	communicable diseases sexually-transmitted diseases (now called sexually-transmitted infections), tuberculosis
number of teen births	
	single-parent families (also referred to as lone-parent families)
number of children in care <sup>6</sup>	children in care <sup>1</sup>
number of complaints of family violence	number of women and children referred to shelters
housing indicators	
number of alcohol- and drug-related crimes	police-reported crimes, according to the following categories: violent, property, drug-related, other
number of property crimes	
<b>Non-Traditional Economy</b>	
average income of residents	average income
	proportion of high income earners
employment levels and participation	employment
	participation rate
number of social assistance cases <sup>7</sup>	social assistance cases <sup>2</sup>
	registered businesses, bankruptcies and start-ups
high school completion	number of people 15 years and older with less than Grade 9
	number of people 15 years and older with a high school diploma

<sup>6</sup> Now called *children receiving services*.

<sup>7</sup> Now called *income assistance cases*.

<b>Cultural Well-Being &amp; Traditional Economy</b>	
	percentage of workforce-aged group engaged in traditional activities
	ratio of home-language use to mother tongue, by major age groups
<b>Net Effects on Government</b>	
	net effects on government of the project
<b>Sustainable Development</b>	
	secondary industry data and initiatives

GNWT collects its data through the NWT Bureau of Statistics, Statistics Canada, the Canadian Centre for Justice Statistics, the NWT Health and Social Services Child and Family Information System, and the NWT Health and Social Services Family Violence Shelter Reports.

Under the Diavik SEA, the communities use similar indicators to those used by the GNWT, developed by DCAB. These are more community-focused and qualitative. Perceptions are also considered through diamond mine employee surveys done by the GNWT. Diavik provides company data on employment, training, and procurement. Diavik also provides updates on initiatives in these areas, and for cultural and community well-being.

BHPB provides company data on employment, training, and procurement.

Both Diavik and BHPB provide detailed breakdowns on employment of northern, northern aboriginal, and southern workers. Business spending reporting is broken into Northern, Northern Aboriginal, and southern, and by industrial category and Project phase.

*Question 3: At what level is the impact of a project tracked? For example is it at a community, regional, provincial or other level? Are there pros and cons associated with this?*

SEAs are set up for monitoring at a community and regional level. In the case of the Diavik SEA, communities have been able to take an active role in monitoring at the community level. The GNWT also monitors the impact of the diamond mines on the territorial economy on a regular basis, through macro-economic indicators such as employment, income, GDP and investment.

The GNWT has promoted the SEA as a structure for ensuring monitoring and adaptive management of socio-economic impacts occurring throughout the life of resource development projects after an EA is completed.

*4. Issues or shortfalls from using the current indicators. / 5. Other indicators you think would be more relevant.*

A major strength of the monitoring process set up through the SEAs is that it facilitates long-term monitoring. These SEAs are in place throughout the life of the Projects, and the Agreements require that monitoring be continuous until the Projects reach their closure phase.

In addition, always using an SEA to address resource development projects creates a consistent framework for monitoring. A core list of indicators is included in every SEA. Looking at the same indicators for more than one project enables monitoring of cumulative resource development impacts.

## **Northern Development Ministers Forum Maximizing the Economic and Social Impact of Major Northern Projects**

### ***Community Services and Infrastructure***

MHBL has identified community services and infrastructure as a key socio-economic VEC in the environmental assessment. This will provide decision-makers (NIRB) with a balanced assessment of the environmental effects of the Project on communities. It will provide key information with respect to the potential adverse environmental effects as well as potential benefits to assist in community planning. Communities provide a range of services and infrastructure to residents including health and social programs, housing assistance, transportation, utilities, water supply and waste disposal, safety and security, culture and recreation, and commercial services and infrastructure. This chapter addresses the potential environmental effects of the Project on the key communities of Kugluktuk, Cambridge Bay, Gjoa Haven, and Taloyoak. Yellowknife is also referred to due to its importance as a regional centre and as the nearest full-service community. MHBL anticipates that it is these communities from which employees will be hired or specific goods and services provided.

The Project is considered a small project in terms of its scale and labour force requirements. However, MHBL understands the community concerns expressed by participants in its data gathering efforts, community information sessions, and consultation process to date. Preparation for projects by local communities is viewed by MHBL as an important aspect of a successful venture. The ability to reduce adverse environmental effects and identify enhancements for the benefit of all is critical.

### **Existing Environment**

The provision of community services and infrastructure in a region like the West Kitikmeot Region of Nunavut is a difficult and costly task. The communities constitute a relatively small total population and are distributed across an expansive area without joining road services and with a restricted open water shipping season to supply the communities in a cost effective way. The environment is an important component in the cultural perspective of the Inuit and the land has sustained the Inuit for a long time. The land has provided subsistence to the Inuit both historically and in contemporary culture even though wage employment has replaced some aspects of subsistence for many residents. MHBL believes that the Project and the economic development of mineral resources in Nunavut is an important aspect of sustainable development in the north, as long as the environment can be protected and there is active participation of the Inuit. Mineral exploration and mining can be a viable component of the wage economy in tandem with using land resources to help sustain local communities.

### **Environmental Assessment Boundaries**

The key communities that comprise the environmental assessment area for this VEC include the following: Kugluktuk, which is situated approximately 600 km west of the proposed mine; Cambridge Bay, approximately 160 km northeast; and Gjoa Haven and Taloyoak, 525 km and 570 km, respectively, to the east. Additionally, Bathurst Inlet (approximately 65 km west) and Umingmaktok (approximately 110 km southwest), both very small communities, and referred to as outpost camps by the locals, could be affected by the mine. The City of Yellowknife is also referred to in this study due to its role as a regional hub and centre for air travel, as well as key services not available in the smaller communities, such as various health, hospital, and emergency services. As the capital of the North West Territories, Yellowknife and the

Kitikmeot communities listed above historically have had a close economic and political relationship. The Project will create employment opportunities and MHBL will strive to maximize the hiring from the region. MHBL will also procure goods and services from these communities. Along with the potential for benefits and opportunities the potential for adverse environmental effects will also occur in these communities. MHBL views employment and economy (Chapter 25 Employment and Economy) largely as potential regional benefits to help offset potential adverse environmental effects on community services and infrastructure. Thus, MHBL will expand employment and economic benefits to other communities in the region to the extent possible.

The communities are administered by various Inuit Birthright Associations as well as municipal, territorial, and federal government agencies in the Kitikmeot Region. The federal government provides transfer payments to assist in the provision of services and infrastructure in the region. Nunavut Tunngavik Inc. represents the Inuit and implements the Inuit obligations of the Nunavut Land Claims Agreement and is responsible for coordinating mineral rights issues. The Nunavut government has regional offices in Kugluktuk and Cambridge Bay in the environmental assessment area. The regional offices of the departments of Education; Culture, Language, Elders and Youth; and Sustainable Development are located in Kugluktuk. The regional offices of the departments of Community Government and Transportation; Finance and Administration; Health and Social Services; Human Resources; Justice; and Public Works and Services are located in Cambridge Bay. The Nunavut Planning Commission and the Nunavut Impact Review Board are located in Cambridge Bay, and the Nunavut Water Board is located in Gjoa Haven.

Information obtained through the Elders Traditional Knowledge Workshop, sponsored by the proponent in Cambridge Bay in September 2003, and through personal community-based interviews with Nunavummiut is based upon hundreds of years and generations of experience of living off the land. Information on the existing conditions for community services and infrastructure was obtained from a variety of published sources such as the following:

- The Government of Nunavut Bureau of Statistics and Statistics Canada.
- Individuals contacted by MHBL in the Municipal Administration, Government of Nunavut, Government of the Northwest Territories, and the Government of Canada for relevant information on existing conditions.
- Community information sessions and public consultation conducted by MHBL in the four key communities to develop a good understanding of the existing conditions associated with community services and infrastructure.
- Interviews, either by telephone or in person, with community and government representatives from the affected communities, the City of Yellowknife, and Nunavut.
- Employing the services of a local Inuit resident to gather baseline data from the communities and the region.
- A literature review of relevant published and unpublished reports, such as the Updated State of Knowledge Report West Kitikmeot/Slave Study Areas and the Nunavut Economic Outlook: an Examination of the Nunavut Economy prepared by the Conference Board of Canada.
- Information collected from the proponent's community visits and meetings.
- Information collected from consultants with over 30 years of experience working with individuals and communities in the region.

- A review of notes taken at community meetings held with other mining companies between 1995 and 2003.
- Information obtained at the Doris North Gold Project pre-hearing meetings in April 2003 sponsored by the NIRB and other meetings sponsored by the NIRB, such as the prehearing and hearings related to the proposed Jericho Diamond Project.
- Information obtained at the Doris North final hearings in July 2004 sponsored by NIRB.
- MHL also considered the experience with the Inuit workers who have been employed with MHL over the last four years; they have also considered the experience related from other mining companies who have employed workers from the area over the last several years. A detailed summary of socio-economic baseline conditions is provided in Supporting Document E2.

### **Existing Conditions**

The population of the communities in the environmental assessment area in the Kitikmeot Region is approximately 4,500-5,000 residents. The unemployment rate in the region is considered high and is likely currently in the range of 19–25%. The unemployment rate in the Kitikmeot Region in 1996 was approximately 16%. The increase likely reflects a relatively high population growth in the region, a high profile of which being young and employable but without employment opportunities.

Nunavut is placing an emphasis on education, and recent trends in the levels of education indicated that since Nunavut's inception, the rate of high school graduation is increasing. For example, in 1996, 56% of the residents 15 years and older had less than high school. By 2001, the percentage of residents between the ages of 20 and 64 that had less than a high school certificate dropped to 40%, the proportion of people having completed high school and/or some postsecondary education increased to 19%, 13% had a trades certificate or a diploma, 19% had a college certificate or diploma, and 8% had a university degree.

The Department of Health and Social Services administers the largest portion of Nunavut's annual budget. The delivery of community health and social services in the region is a difficult and expensive task. Approximately 20-30% of the health budget is spent on salaries and approximately 20% on transportation. Less than 60% of the budget is available for program, supplies, facility maintenance, and the purchase of new equipment. The department administers non-insured health services and insured services on behalf of the federal government to the residents of the Kitikmeot Region.

Health professionals in the region include nurses, resident physicians, social workers, mental health workers, and wellness coordinators. Kugluktuk, with a resident population of approximately 1,200-1,300, has a total of 13 health professionals; Cambridge Bay (population approximately 1,300) has 15 health professionals; Gjoa Haven (population approximately 960) has 11 health professional; and Taloyoak (population approximately 720) has 10 health professionals. Specialist medical services are contracted through the Stanton Hospital in Yellowknife. Internists, gynaecologists, physiotherapists, and ear, nose and throat specialists visit the communities in the environmental assessment area several times each year. Like many remote regions in Canada, the communities in the environmental assessment area lack a full range of services and the delivery of services is hampered due to the lack of physical infrastructure between the communities as all access for outside services is by air. Also, there are difficulties in staffing and attracting health care professionals to the region, so the workload is demanding for those service providers in the region. Nunavut has the fastest growing population and the highest birth rate in Canada today, which will challenge existing services.

Communities in the environmental assessment area have a shortage of housing resulting in crowded living conditions, which also contribute to lower health conditions in residents. Approximately 15% of the families in Nunavut are on the waiting list for public housing. The housing shortages also compound the challenges

of recruiting service providers from outside the region to meet the existing demands in the communities. The communities in the environmental assessment area also experience relatively high rates of crime with a high proportion of violent crime (e.g., sexual assaults) compared to national averages. Similar to other community services, security and policing services are considered to be at or near capacity. Over 80% of crimes are considered to be related to alcohol abuse. The rate of suicide is extremely high across the north and is of great concern to the communities who are losing youth at such a high rate. In spite of research in that area, there is no agreement as to the root of the problem or to a solution.

In Kugluktuk, members of the Hamlet Interagency Council cited the current high incidents of alcohol-related problems. They felt that alcohol consumption will likely increase during the Project construction and operations phases, which may compound increases in ill-health conditions and therefore add burden on the health and social services facilities. Kugluktuk is a community that has had more residents with work experience in mining in the past and as a result will have more residents with experience for this Project.

Cambridge Bay has a more established infrastructure, and with the opening of the new hospital (the first floor in 2005 and the second floor in 2006), residents will see increased services available, which will likely result in more inflow for treatment from the other communities.

Taloyoak is a smaller community with a less developed infrastructure; it has a small health centre with a number of nurses. Due to the size of the community and the severe housing shortage, they continue to have challenges with attracting and retaining skilled health care professionals.

Gjoa Haven is another small community with a severe housing shortage and crowded conditions that can lead to health concerns. It is a “dry” community that does not allow alcohol into the community.

Yellowknife is expected to provide a number of workers for the Project and be a hub area for the procurement of goods and services. It will likely be the air service hub for workers from the south coming to the Project. It is not expected that employees will move from the south to live in Yellowknife with its high cost of living and housing. It should benefit a number of workers who had previously been employed with the Giant Mine or Con Mine who already have homes in Yellowknife. It is expected that the Project will have a negligible increase in demand on services. Yellowknife has always provided a high standard of health and social services to the residents of the West Kitikmeot.

Nunavut currently has the highest rate of violent crime in Canada and the third largest overall crime rate in the country (Bell, 2002). It is also the only jurisdiction in Canada where the rate of violent crime exceeds the rate of property crime (Bell, 2002). The Deputy Minister of Justice attributes 90% of the violent crime to alcohol abuse (Bell, 2002). Nunavut’s per capita sexual assault rate is about seven times the Canadian average (Nunatsiaq News, 2000). In 1999, there were 90 sexual assaults in Nunavut and in 1998 there were 80 sexual assaults, as well as 18 other sexual offences and five aggravated sexual assaults (Nunatsiaq News, 2000). Pauktuutit, a group representing Inuit women, has long been concerned by the high incidence of sexual assault and has worked with government and communities to address this matter (Nunatsiaq News, 2000).

### **Likely Future Conditions**

The existing conditions with respect to community services and infrastructure are likely to continue as they are in the near future should the Project not proceed. As the Government of Nunavut remedies key issues such as housing shortages, improved health care conditions in the long term will improve. A new regional hospital (opening in 2005) in Cambridge Bay, a healing center that has opened in Kugluktuk for those who would in the past have been incarcerated in the south, the recruitment and/or development of community health and social service professionals, and the trends in higher education will also contribute to improved conditions in the future for community services and infrastructure in the absence of the Project.



## **Environmental Effects Analysis**

From a community planning and response perspective, it is just as important to let decision makers know what is not anticipated to occur, as well as what is likely to occur, to allow for a balanced assessment of the Project and to address concerns, whether perceived or real. As previously mentioned, the Project is relatively small in scope and scale. The anticipated labour force can be fulfilled from communities in the environmental assessment area, or sourced from outside the area all serviced by the camp requirements and a fly-in/fly-out arrangement. Large numbers of workers from outside the environmental assessment area are unlikely to relocate to communities in the environmental assessment area for the purpose of employment on the Project. It is also unlikely that there will be a large demographic shift amongst the communities in the environmental assessment area in order to obtain employment on the Project. MHBL has a flexible approach to sourcing available labour for the Project and will provide free transportation from and to their communities for workers in the environmental assessment area communities so that workers will not need to move to have access to employment at the proposed mine. Flights for community workers will not go through Yellowknife to get to the work site.

The Project has a relatively small workforce during a relatively short construction period. During operations, the Project will have a workforce of approximately 165 people on a two-week rotation schedule. There will not be a permanent community established to serve the needs of the Project and workers from the environmental assessment area will not be required to move their families in order to obtain employment on the Project. The construction workforce is anticipated to be in the range of 75-80 workers over a period of approximately one year. Due to the remoteness of the site, much of the Project infrastructure needs to be pre-fabricated or partially assembled away from the Project, then shipped and finished at site.

The potential adverse environmental effects on the communities in the environmental assessment area are associated with individual choices of workers when they return to their communities on their time off. MHBL heard concerns from professional community service providers that increased disposable income creates potential adverse effects, as it can lead to inappropriate behaviour such as alcohol abuse, family violence and marital problems, increasing addiction problems, and child neglect. This is thought to be a result of increased financial resources providing greater opportunity and access to alcohol and drugs. These effects could potentially cause increased demand on the community health and social services available. Potential adverse effects at the individual and family level can occur due to increased time away from the family and adjustments to rotational work schedules. Pressure on the spouse or partner at home, without the emotional support of another adult, can be overwhelming and lead to pressure on the employee to quit their job, or lead the “stay at home” partner to make unhealthy social choices. The potential benefits that the Project offers include increased personal and family income, increased participation and experience in the wage economy for those who want it, and development of transportable skills and experience on the Project that could create future opportunities in the wage economy in Nunavut and elsewhere.

Potential adverse effects associated with time away from the community and increased income will be similar throughout all phases of the Project but will be reduced during closure and post-closure as the workforce is reduced. Work-related accidents include worker injury or death, which would cause obvious worker and/or family and community issues associated with grief, medical services, counselling, and future livelihoods. Serious worker accidents may result in prolonged periods away from the worker’s home and community in order to seek professional health services and support in Yellowknife.

Due to a skilled labour shortage in the north and across the country, there is a concern that the experienced workers and trades people employed to provide hamlet services such as snow clearing, garbage collection, and equipment repair might take work at the mine and create severe shortages in the hamlets that would adversely affect the infrastructure and services.

## **Mitigation Planning**

MHBL is experienced in developing and operating projects in northern communities in the Northwest Territories and Nunavut. It has a history of operations in Yellowknife with the Con and Giant Mines and has been conducting exploration activities in the Hope Bay Belt for several years. MHBL has employed 22 residents of Cambridge Bay, 10 residents of Gjoa Haven, nine residents of Taloyoak, five residents of Kugluktuk, and four former residents of Bathurst Inlet over the past several years. In 2004, MHBL increased the hiring from the local communities to 3,001 days of employment. MHBL experience to date indicates that employees from local communities are responsible citizens and are not causing problems or increased demands on community services and infrastructure when they return to their communities.

As preventative measures to reduce risks to health that might create more workload for the local health and social services workers, MHBL will implement the following actions:

- All employees will undergo a pre-employment medical. This will ensure that the site medical staff are able to provide the best care and treatment to employees, as the site is remote from full medical services.
- Qualified medical personnel will be available at site twenty-four hours a day and seven days a week. They will be able to treat minor illnesses. As employees will spend half of their time at site, this should relieve some burden from the local health facilities.
- Emergency response and contingency plans are in place for medical evacuation if required.
- Alcohol and drug education will be provided to all employees, and the site will continue to be an alcohol- and drug-free operation.
- MHBL will continue to follow health guidelines, procedures, and protocols for camp food. Waste handling and storage will meet all appropriate territorial regulations and standards to avoid any health concerns for employees.
- Communication and cooperation processes have been put in place with medical personnel in the camps, the Nunavut HSS, the Yellowknife hospital, appropriate monitors and inspectors, and regional health authorities. Further consultation will take place with the Wellness Centres in the communities. The new hospital that will open in Cambridge Bay in 2005 will also provide a higher level of service.
- MHBL will provide to all employees a free and confidential Employee and Family Assistance Program (EFAP) that will provide counselling for employees and their immediate families for work stress, marital and family issues etc.
- All Project contractors and subcontractors are bound to the guidelines, procedures, and protocols developed by MHBL.
- MHBL will provide government inspected country food periodically at the mine site. During operations the medical staff will be able to provide information on diet and nutrition.
- To avoid employee injury, MHBL will ensure that safety is the highest priority for the Project.
- MHBL will ensure transportation equipment is regularly inspected for safety.
- MHBL will take safety into account when planning contractor delivery schedules.

- MHLB will liaise with the RCMP and produce regular updates on project activities and plans that could influence RCMP workloads, communications between camp management and RCMP, and efficiency of RCMP response to calls for service from the camps and from project-related community calls.
- MHLB will make available life skills training such as money management, budgeting, and retirement planning to assist employees to manage their money to their best advantage.
- MHLB has had some preliminary discussion and will continue discussions with the hamlets to determine how MHLB can collaborate to keep employees for essential services such as garbage collection, sewage maintenance, etc., available in the Hamlets.
- In order to support the emotional health of employees and avoid burden on community facilities, MHLB has made available a number of methods of communication for workers with their families such as telephone and Internet. MHLB plans to keep family groups or community groups of workers together for support while away from home. MHLB will encourage opportunities for Inuit to speak and maintain their own language while at the same time operating in the language of the camp as long as safety of the employee, others or job performance is not compromised.
- MHLB will conduct criminal record checks prior to hiring employees to screen out those convicted of crimes of violence such as sexual assault. Combined with its zero tolerance for alcohol and drugs at the site and education about drugs and alcohol, MHLB and its Project will help to improve the quality of life for employees and residents through counselling and life-skill training workshops.

In addition:

- Monies returning to the communities through the NTI and KIA will enable residents to benefit and provide services to the fastest growing population in Canada.
- Additional cash flow will enable workers to provide better nutrition, recreation and housing to their families during the time that they are working.

### **Residual Environmental Effects**

The criteria used to rate the significance of residual adverse environmental effects on community services and infrastructure are as follows:

A major (significant) residual adverse environmental effect on community services and infrastructure in the assessment area is one that results in the inability of existing community services and infrastructure to meet future demands as a result of the Project. Such an effect would be the result of changes to regional demographics directly related to the Project on several communities in the environmental assessment area and will extend well beyond the life of the Project, and the effect could not be mitigated by the communities.

A moderate (significant) residual adverse environmental effect on community services and infrastructure is one that results in the inability of existing community services and infrastructure to meet future demands as a result of the Project. Such an effect would be the result of changes to demographics directly related to the Project on one community in the environmental assessment area and will occur during the life of the Project, and the effect could not be mitigated by the affected community.

A minor (not significant) residual adverse environmental effect on community services and infrastructure is one that results in a reduced ability of existing community services and infrastructure to meet future demands as a result of the Project. Such an effect would be temporary in nature (e.g., occur during construction and operations) and could be mitigated by the affected communities as a result of Project induced regional economic benefits.

A negligible (not significant) residual adverse environmental effect on community services and infrastructure is one that increases the demands on services as a result of the Project. Such an effect would occur periodically throughout the life of the Project and would not need specific mitigation measures by the affected communities. The effect would be similar to the existing conditions.

A summary of the residual adverse environmental effects on community services and infrastructure is provided in Table 24.1.

**Table 24.1 Summary of Residual Adverse Environmental Effects:  
Community Services and Infrastructure**

<b>Project Phase</b>	<b>Residual Adverse Environmental Effect</b>	<b>Significance</b>	<b>Probability of Occurrence<sup>a</sup> (Likelihood)</b>	<b>Effect on Community Function &amp; Integrity<sup>a</sup></b>	<b>Capacity of Communities to Meet Present &amp; Future Needs<sup>a</sup></b>
Construction	<p>Increased demands on community services by the individual or family members due to time away from the community, increased income</p> <p>Increased housing demands due to immigration of workers and demands on infrastructure such as from employment shifting</p> <p>Possible benefits to quality of life due to increased individual and family income</p>	Negligible (not significant)	High to moderate	Low	Moderate to high
Operations	<p>Increased demands on community services by the individual or family members due to time away from the community, increased income</p> <p>Increased housing demands due to immigration of workers and demands on infrastructure such as from employment shifting</p> <p>Possible benefits to quality of life due to increased individual and family income</p>	Negligible to minor (not significant)	High to moderate	Low to moderate	Moderate to high

**Table 24.1 (Cont'd) Summary of Residual Adverse Environmental Effects:  
Community Services and Infrastructure**

<b>Project Phase</b>	<b>Residual Adverse Environmental Effect</b>	<b>Significance</b>	<b>Probability of Occurrence<sup>a</sup> (Likelihood)</b>	<b>Effect on Community Function &amp; Integrity<sup>a</sup></b>	<b>Capacity of Communities to Meet Present &amp; Future Needs<sup>a</sup></b>
Closure	<p>Increased demands on community services by the individual or family members due to time away from the community, increased income</p> <p>Increased demands on community services associated with an employment and job search</p> <p>Possible benefits to quality of life due to increased individual and family income</p>	Negligible (not significant)	High to moderate	Low to moderate	Moderate to high
Post-Closure	<p>Increased demands on community services by the individual or family members due to time away from the community, increased income</p> <p>Possible benefits to quality of life due to increased individual and family income</p>	Negligible (not significant)	High	Low	Moderate to high
Accidental Events	Serious accident/loss of life and demand on community services	Minor (not significant)	Low	Low	Moderate

**Table 24.1 (Cont'd) Summary of Residual Adverse Environmental Effects:  
Community Services and Infrastructure**

<b>Project Phase</b>	<b>Residual Adverse Environmental Effect</b>	<b>Significance</b>	<b>Probability of Occurrence<sup>a</sup> (Likelihood)</b>	<b>Effect on Community Function &amp; Integrity<sup>a</sup></b>	<b>Capacity of Communities to Meet Present &amp; Future Needs<sup>a</sup></b>
The Project Overall	Increased demands on community services by the individual or family members due to time away from the community, increased income  Possible benefits to quality of life due to increased individual and family income	Negligible to minor (not significant)	Moderate	Low	High
* For descriptions of the categories, see Table 8.3 in Chapter 8.					

**Construction**

The residual adverse environmental effects of construction on community services and infrastructure include short-term (approximately one year) increases in the demands on existing services and infrastructure as a result of increased incomes and spending and individual and family concerns associated with time away from the family and community. The Project will also create opportunities and benefits in terms of increased income, training, and job skills development that are transportable. The residual adverse environmental effect of construction on community services and infrastructure is negligible (not significant). The anticipated adverse effects will be similar to existing conditions in the communities in the environmental assessment area.

**Operations**

The residual adverse environmental effects of operations on community services and infrastructure include short-term (approximately two years) increases in the demands on existing services and infrastructure as a result of increased incomes and spending and individual and family concerns associated with time away from the family and community. The Project will also create opportunities and benefits in terms of increased income, training, and job skills development that are transportable. The residual adverse environmental effect of operations on community services and infrastructure is negligible to minor (not significant), and depends on the specific community-based contribution to MHLB's work force.

**Closure**

The residual adverse environmental effects of closure on community services and infrastructure include short-term requirements for a reduced work force and may cause increases in the demands on existing services and infrastructure as a result of increased incomes and spending and individual and family concerns associated with time away from the family and community. The Project will also create opportunities and benefits in terms of increased income, training, and job skills development that are transportable. The

residual effects in terms of demands on services associated with employment and job search professionals will increase due to the increase in layoffs at closure. The residual adverse environmental effects of closure on community services and infrastructure are negligible (not significant), as the work force is reduced. The anticipated adverse effects will be similar to existing conditions in the communities in the environmental assessment area. Similar residual effects will occur during conditions of temporary closure.

### **Post-Closure**

The residual adverse environmental effects of post-closure on community services and infrastructure will be similar to those anticipated for closure. The residual adverse environmental effects of post-closure on community services and infrastructure are negligible (not significant), as the work force is reduced. The anticipated adverse effects will be similar to existing conditions in the communities in the environmental assessment area by the time post-closure activities occur.

### **Accidents**

The residual adverse effects of accidents, malfunction, and unplanned events are always difficult to predict due to the inherent uncertainty associated with the events. However, MHBL believes that a reasonable potential environmental effect to assess includes serious accidents causing injury or death to workers. Should such an unplanned event occur, it would create demands on community services and infrastructure such as community support for the injured and his family, extended periods away from the community and family for treatment, or grief counselling. As a result of procedures and safety training and the priority MHBL places on this aspect of operations, it is fair to say that these events should be limited. The residual adverse environmental effects of accidents, malfunctions, and unplanned events on community services and infrastructure are negligible to minor (not significant).

### **Project Overall**

The planned Project overall will result in negligible to minor (not significant) residual adverse environmental effects on community services and infrastructure.

### **Monitoring and Follow-Up Programs**

MHBL has developed a comprehensive environment, health, and safety (EH&S) management system to address anticipated Project needs (Chapter 5). Issues and concerns associated with the socio-economic environment will be addressed in a range of plans that support the EH&S management system such as the community relations plan, the impact and benefits plan and Inuit involvement. Mitigation measures to reduce potential adverse effects and programs to enhance benefits to individual workers and their families, community services, and infrastructure, as laid out in this chapter, will be monitored by MHBL as well as communities and governments. No follow-up programs are anticipated for community services and infrastructure.

Socio-economic monitoring relies on a frequent exchange of information about the Project to various components in local communities. The potential adverse environmental effects and possible benefits associated with community services and infrastructure are closely related to similar functions in employment and economy (Chapter 25).

### **Cumulative Environmental Effects**

The Project could result in cumulative environmental effects on community services and infrastructure in communities in the environmental assessment area. Other projects and activities as described in chapter 3 all create the demand for employment and increased opportunities in the wage economy. The potential adverse effects described for this Project on community services and infrastructure may be similar to those existing



in the communities as a result of increased income, increased disposable income, and the effects of poor health and social choices made by individuals. MHLB believes that overall the potential benefits arising from employment and increased incomes will lead to an improved quality of life for the majority of workers and workers families as has been the case with MHLB employees to date. MHLB is committed to responsible development and will strive to mitigate potential adverse effects through programs and information sharing, setting clear conditions of employment and offering employee and family counselling as needed to all employees and their families. MHLB considers the potential effect of the Project in combination with other projects and activities in this region to be not significant (negligible to minor).

## **References**

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**APPENDIX 24.A**

**Environmental Effects Analysis Matrix:  
Community Services and Infrastructure**

Project Phase	Project Activity	Environmental Effect	Environmental Effects Criteria				
			Magnitude	Geographic Extent	Timing/ Duration/ Frequency	Reversibility	Ecological/ Social/ Context
Construction	Increase employment  Rotational work patterns	Demands on community services, family support, and counselling	Low	Communities in the environmental assessment area	Construction phase, approximately 12 months	Reversible	Community services and infrastructures in place
	Increase income and spending	Demands on health, security, and social services to address events of problem behaviour while away from the mine	Low	Communities in the environmental assessment area	Construction phase, approximately 12 months	Reversible	Community services and infrastructures in place  Benefits include increased personal and family income
Operations	Increase employment  Rotational work patterns Increase income and spending	Demands on community services, family support, and counselling	Low	Communities in the environmental assessment area	Operations phase, approximately 2 years	Reversible	Community services and infrastructure in place  Economic benefits to Nunavut will help remedy community services and infrastructure
	Increase income and spending	Demands on health, security, and social services to address events of problem behaviour while away from the mine	Low	Communities in the environmental assessment area	Construction phase, approximately 12 months	Reversible	Community services and infrastructure in place  Benefits include increased personal and family income
Closure	Reduction in labour force requirements	Increase unemployment demands on community services and infrastructure	Low	Communities in the environmental assessment area	Long term	Reversible, employees will have transferable skills and experience to obtain employment elsewhere	Communities in the environmental assessment area are experienced with employment rate fluctuations
Post-closure	Reduction in labour force requirements	Increase unemployment demands on community services and infrastructure	Low	Communities in the environmental assessment area	Long term	Reversible, employees will have transferable skills and experience to obtain employment elsewhere	Communities in the environmental assessment area are experienced with employment rate fluctuations

**(Cont'd) Environmental Effects Assessment Synthesis Matrix:  
Community Services and Infrastructure**

Project Phase	Project Activity	Environmental Effect	Environmental Effects Criteria				
			Magnitude	Geographic Extent	Timing/ Duration/ Frequency	Reversibility	Ecological/ Social/ Cultural Context
Accidental Events	Unplanned closure will create unemployment	Increased demands on services and infrastructure capacity	Low	Communities in the environmental assessment area	Long term or permanent	Reversible, employees will have transferable skills and experience to obtain employment elsewhere	Communities in the environmental assessment area are experienced with employment rate fluctuations
The Project Overall	Project employment and increased income for local employees will offer increased opportunity for improved lifestyle	Work rotations, increase in disposable income may cause increased demands on social, health, and security services	Low	Communities in the environmental assessment area	Key employment-related and spending-related effects to occur between 2006 and 2009 during construction and operations	Reversible, employees will have transferable skills and experience to obtain employment elsewhere	Communities in the environmental assessment area are experienced with employment rate fluctuations



**Northern Development Ministers Forum**  
**Maximizing the Economic and Social Impact of Major Northern Projects**

***Ontario: Input to Maximizing the Economic and Social Impact of Major Northern Projects through the Northern Prosperity Plan***

The Northern Prosperity Plan is a range of targeted initiatives aimed at stimulating growth, job creation, and a better quality of life for Northern Ontario. The Plan is based on four pillars: Strengthening the North and its Communities; Listening to and Serving Northerners Better; Competing Globally; and Providing New Opportunities for All.

These initiatives are the Northern Ontario Heritage Fund Corporation, Grow Bonds, GO North, and the Northern Development Councils.

***Project 1: Northern Ontario Heritage Fund Corporation (NOHFC)***

- The Northern Ontario Heritage Fund Corporation works with northern entrepreneurs, companies, and business organizations while continuing to support vital infrastructure and community development projects that enhance quality of life and stimulate economic activity.
- Since October 2003, over 5,600 jobs and work placements have been created/sustained from NOHFC investments.
- The 2006 Budget includes an annual contribution of \$60 million to the NOHFC, as well as an additional \$25 million to complete existing projects.
- Examples of major NOHFC investments include the following:
  - An NOHFC investment of over \$4 million will provide some 220 young people from Northern Ontario access to internships and co-op placements that will assist these young northerners in launching their careers in the North.
  - An NOHFC investment of up to \$5 million providing matching funding to the Northern Ontario School of Medicine (NOSM) Bursary Fund that will assist in training of doctors for the North. NOSM recently announced successfully having raised their \$5 million share.
  - The NOHFC has assisted 27 young entrepreneurs to create new business opportunities in Northern Ontario. These young northerners have created new businesses in a wide variety of commercial niches including translation services, interior and graphic design, forestry services, dental care, veterinary services, and many others.

***Project 2: Northern Ontario Grow Bonds***

- MNDM launched the **Northern Ontario Grow Bonds** pilot program in February 2005. This program has two components: the sale of bonds to northern residents and a business loan program.

- Provincially-guaranteed Grow Bonds were available for purchase by northern residents between March 21 and April 18, 2005. Grow Bonds have a five-year term and fixed annual interest rate of 4%.
- The business loan program will use the proceeds from the sale of Grow Bonds to support new and existing small- and medium-sized businesses in the North. Generally, loans in the range of \$125,000 to \$1 million will be provided for capital projects that directly result in permanent, full-time employment in the North. Loan applications were accepted until May 6, 2005.
- The government created the Northern Ontario Grow Bonds Corporation, an agency of MNDM, and established a Board of Directors, comprising private sector representatives from Northern Ontario, to oversee the administration of the program and to review and approve loan applications.
- Grow Bonds provided residents of Northern Ontario the opportunity to invest in a safe and competitive savings instrument, while actively contributing to the economic future of the North.
- The proceeds from approximately \$13 million worth of bonds will be used to provide loans to new and growing businesses in Northern Ontario.

### ***Project 3: The GO North Investor Program***

- The GO North Investor Program promotes northern Ontario investment opportunities to the world and helps attract investment and create jobs in the North.
- The GO North Investor Program is composed of five components:
  - A Targeted Marketing and Investment Attraction campaign to profile the strengths and opportunities of Ontario's North to international investors in existing and emerging sectors.
  - An Investment Attraction Study identifying key sector and area market targets for GO North marketing efforts has been completed.
  - A Northern Communities Investment Readiness (NCIR) initiative to assist communities to identify investment opportunities and prepare for investment attraction was launched in November 2005, providing \$500,000 per year.
  - A partnership has been established with the Northern municipal associations (FONOM/NOMA) to ensure coordinated investment readiness preparation of northern municipalities.
  - A Coordinated Response Strategy involving the close participation of the key economic development ministries is providing potential investors a 'one-stop window' to all the programs and resources that can be brought to bear in 'closing the deal'.
- GO North takes advantage of the inherent strengths of many ministries in bringing new investment to northern Ontario. The Ministry of Northern Development and Mines works with northern communities to prepare to attract and receive new investment. The Ministry of Economic Development and Trade will identify and sell investors on northern Ontario opportunities, and the Ministry of Finance assists in 'closing the deal' with major investors bringing jobs and prosperity to northern Ontario.
- The development and release of Northern Ontario marketing pieces have included Ontario's North promotional video, brochure, and advertising insert. A GO North outset was developed in spring 2005 and released in the July and August issues of Site Selection and Corporate Leader magazines. The GO North brochure was released in the fall of 2005 along with the GO North booth for use at "CoreNet" in Las Vegas.

- Marketing pieces on the identified Northern sector opportunities including mining equipment and services, and value-added wood products have been created. The Mining Equipment and Services one-pager was completed and released in both English and Spanish. The Value-Added Wood and the Bio Products one-pagers have been completed and are now in approvals at MEDT and MNDM.
- The northern Web module incorporates northern information in one area of the OIS website including community profiles for a growing number of Northern communities, 35 to date. Video testimonials featuring northern businesses are currently under development to further enhance the northern messaging.
- On February 7, 2006, Minister Bartolucci announced the release of the “Ontario’s North” video that showcases the North’s business advantages, sector strengths, and quality of life to international audiences.
- On February 10, 2006, Minister Bartolucci and Economic Development and Trade Minister Joseph Cordiano announced provincial funding, as part of the GO North Investor Program, for a joint venture between Algoma Steel Inc. and German-based SIAG. The joint venture, SIAG Great Lakes LP, will establish a state of the art facility to manufacture steel wind towers using SIAG’s innovative technology.
- The \$34 million SIAG Great Lakes LP project will create approximately 140 new high-value, high-skilled jobs in Sault Ste. Marie. The province supported this venture with a one-time conditional grant of \$1.75 million and a \$3 million loan from the Northern Ontario Heritage Fund Corporation. The project start-up is currently delayed due to the two partners being in discussion as to the future timing of the project.
- Five provincial ministries and agencies were involved in the coordinated effort to attract the SIAG investment to Sault Ste. Marie, including MNDM, MEDT, MOF, MMAH, and NOHFC.
- Launch of Northern Communities Investment Readiness component of GO North on Nov 18, 2005, to assist northern communities to prepare for investment attraction. Includes signing an agreement with FONOM/NOMA to assist in delivery of municipal component to northern municipalities. As of June 21, 2006, 19 applications have been received, and eight approved projects have been announced.
- Northern Ontario focused advertisements have been incorporated in the 2006 “Invest Ontario” international marketing campaign, and will start to appear in publications in summer 2006

***Project 4: Northern Development Councils (NDCs)***

- On June 10, 2004, the government announced the creation of four **Northern Development Councils** to provide opportunities for northerners to provide input on provincial policies and initiatives. The four councils represent the Far North, Northeast, Northwest, and Major Cities (Greater Sudbury, Thunder Bay, Sault Ste. Marie, North Bay, and Timmins).
- Membership of three NDCs (Northeast, Northwest, and Major Cities) was announced in Sault Ste. Marie on February 18, 2005.
- The first issue the NDCs were asked to address is “Creating Opportunities for Northern Youth”. Youth out-migration is an issue that faces most Northern communities and has a significant impact on Northern communities and the economic prosperity of Northern Ontario.
- The NDCs have developed proposed objectives and strategies to create opportunities for youth in Northern Ontario. The NDCs will consult with other stakeholders in the North before finalizing the recommendations for submission to the Minister.

- In their first year, NDC members worked with MNDM and partner ministries to provide input on a range of provincial policies and programs including key elements of the Northern Prosperity Plan (the Northern Ontario Grow Bonds pilot program and the GO North Investor Program); the Ontario Mineral Development Strategy; immigration as a tool for economic development; and the report of the Water Strategy Expert Panel.
- On June 6, 2006, the first joint meeting of all four NDC's was held in Thunder Bay, which included the introduction of the Far North NDC members. At the meeting, Minister Bartolucci announced a dialogue on youth strategies to create opportunities that would encourage young persons to build their futures in Northern Ontario.
- Since the fall of 2005, interested individuals from the Far North have met with MNDM in Sioux Lookout, Sudbury, and Thunder Bay to establish the Far North NDC. The Far North NDC is finalizing its terms of reference and membership, and identifying priority topics to be discussed at their August meeting.
- On June 14, 2006, a discussion paper and survey to support the dialogue was posted on the NDC website for northern input, and dialogue sessions were held during the summer to help identify priority strategies.



**Northern Development Ministers Forum**  
**Maximizing the Economic and Social Impact of Major Northern Projects**

*Maximization Indicators*

For the purposes at hand, we will use data concerning the Eastmain-1A/Rupert/Sarcelle project, which is going through the approval process and is presently at the public hearing stage. To avoid being redundant in answering the questions, we will not deal with the Eastmain-1 project. First, we should refer to the basic principle that Hydro-Québec has set in terms of regional economic impacts.

Hydro-Québec must comply with three acceptability criteria in carrying out a new project. The project must:

- 1- be accepted by local communities affected by the project;
- 2- be profitable; and
- 3- be environmentally acceptable and comply with current statutes.

These are three indicators directly related to Point 2 of the reference framework, the promoter's intention. By studying them one at a time, we can clearly draw up a list of the many economic and social indicators used, without overlooking, of course, the environmental aspect.

Let us begin by mentioning that Eastmain-1A/Rupert/Sarcelle is a hydroelectric development project requiring a global investment of \$4 billion, including financing expenses, engineering, the work itself, and project management.

The value of the work and related activities is estimated at approximately \$2 billion. These criteria will therefore serve as a basis for analysing the potential for benefits.

There are many economic and social impacts related to the project phase. Examples can be found in sections 5 and 6 of the project's "Environmental Impact Statement Executive Summary"<sup>8</sup>.

For 30 years now, we have had the opportunity to take advantage of the experience and expertise acquired during the first two phases of hydroelectric development in the Baie-James territory, in terms of monitoring the impacts of construction.

Many indicators have guided us in improving our way of doing things and in the analysis of the economic, social, and environmental impacts. Economically speaking, the impacts are easier to control when the host community accepts the project, which we consider to be an important factor.

**The primary means of cooperation and monitoring:**

- Signing financial partnership agreements
- Coming to an agreement on the monitoring of economic impacts
- Setting up job creation mechanisms
- Using the expertise of the territory's occupants
- Tailoring the promoter's work methods to regional potential
- Creating regional committees to maximize economic impacts

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<sup>8</sup> This document is available from Hydro-Québec's Website: [www.hydroquebec.com/eastmain1a/en/pdf/sommaire.pdf](http://www.hydroquebec.com/eastmain1a/en/pdf/sommaire.pdf)

These elements make it possible to meet certain community expectations. They serve as tools to monitor results.

However, it is important to understand that, prior to the monitoring and activities, action must be taken to maximize economic impacts. It is therefore necessary for the various stakeholders of regional impacts to be involved during the contract drafting process, to analyze, at the outset, the potential for economic impacts and regional capacity. This approach will make it possible to tailor contract strategies and calls for tenders, as much as possible, to promote regional economic impacts.

In short, the ideal way to obtain indicators is to involve the community directly at all points in the process, starting at the drafting stage.

Let us take a look, for example, at the economic spin-offs from the Eastmain-1 Project. The creation of a maximization committee, on which Hydro-Québec was a partner with the community, made it possible to generate regional economic spin-offs. An analysis of the results, to date, confirms that the project's positive impacts on the economy are quite satisfactory.

With the experience it has gained, the community intends to be even more active with regard to the Eastmain-1A/Rupert/Sarcelle project. This leads us to believe that the tools set up to generate economic spin-offs were successful. This vision is also shared by regional stakeholders, who indicated, during hearings concerning the Eastmain-1A/Rupert/Sarcelle project, their satisfaction with the efforts made by Hydro-Québec and the Société d'énergie de la Baie James (SEBJ) with regard to the economic impacts resulting from the Eastmain-1 project. Already, agreements confirm that they will be involved in the second project.

Concerning social impacts, Chapter 6.4 of the executive summary contains several examples. We can safely say that there is a degree of similarity between the social indicators and the economic impact indicators. The way community stakeholders were directly involved at the design stage of the project also produced very good results in this regard. In spite of cost constraints, the promoter takes the requests of regional stakeholders into consideration and arrives at a consensus in order to carry out a cost-competitive project, satisfactory to regional stakeholders. Chapter 9 of the document mentions a series of mitigation measures that were discussed and approved by the promoter and the community, based on indicators.

As for the question of the levels at which the impacts of the project are tracked, all three levels are involved. At the first level, the contractor (SEBJ) closely monitors impacts directly related to the community affected by the construction. In cooperation with the promoter (HQ), it must also follow up at the regional level, specifically, in terms of economic impacts. At the second level, the promoter intensifies its regional actions, allowing it to be on the lookout for the stakeholders' concerns. At the third, Québec, level, the concern is more general. Energy planning for Québec's future needs is very important.

In terms of the questions on Page 2 of your document, it is clear that the indicators obtained from the process of involving the community in the project maximize the benefits. The promoter also develops measures allowing it to increase the impacts in accordance with the capacity of host communities. Broadening the base of maximizing indicators is not necessary. Instead, the past should be taken into consideration and the way of tailoring projects to the host environment should be refined. It is possible for a natural broadening of the indicators to occur because of economic and social changes in a community due to earlier projects. This results from constant monitoring, even several years after the end of a project. Chapter 11 of the executive summary contains a supervision and monitoring program related to the Eastmain-1A/Rupert/Sarcelle project.

**Northern Development Ministers Forum  
Maximizing the Economic and Social Impact of Major Northern Projects**

*1. Project name and description, including capital cost and economic, social, and environmental impacts*

***Northern Saskatchewan Uranium Mining Developments***

**Description**

Northern Saskatchewan is the largest uranium producer in the world. The region's three uranium mines (McClellan Lake, McArthur River, Rabbit Lake) and three mills (Key Lake, McClellan Lake, Rabbit Lake) account for more than 30% of the world's natural uranium production. Production of a fourth mine (Cigar Lake) is anticipated for 2007. Production is expected to continue for the next 25 years at the current extraction rate.

Mining companies in northern Saskatchewan are required to negotiate a surface lease agreement (SLA) with the provincial government every time a new project is planned. The agreement provides the proponent with land tenure, ensures adequate provincial regulatory control over environmental protection, worker health and safety, and socio-economic benefits for residents of Saskatchewan's North from northern mining operations.

The surface lease process reflects a cooperative approach by government and industry to achieve mutually beneficial northern development objectives. Social and economic benefits made by each company are detailed in an appendix and include the following (discussion of each commitment discussed in Appendix A):

- Employment commitment
- "Stay in School Program" Commitment
- Northern Business Participation Commitment
- Community Vitality Study Commitment
- Employee Education and Training Commitment
- Employee Services Commitment
- Public Involvement Commitment

Each SLA requires the proponent to enter into a separate Human Resource Development Agreement (HRDA) in which the employer commits to efforts to maximize the hiring, training, and advancement of residents in Saskatchewan's North, and increased utilization of northern contractors and businesses. Annual Human Resource Development Plans target job categories for northerner preference or advancement, and northern communities whose residents will be given priority for targeted jobs.

**Capital Cost**

Since 1980, the uranium mining industry has spent more than \$3.4 billion on Saskatchewan uranium mining projects.

## **Economic Impact**

The uranium industry is one of the major employers in northern Saskatchewan. In addition to direct employment, many northern businesses provide goods and services to the northern mine sites.

## **Social Impact**

The uranium industry has undertaken a proactive approach to supporting northern development, undertaking a number of strategies that contribute to the overall well-being of northern Saskatchewan residents. Examples include corporate donations and initiatives to improve the quality of life of northern residents, scholarship programs, and community consultations.

The Multi-Party Training Plan (MPTP), a cooperative training-to-employment initiative, addresses barriers to northern residents getting jobs and has increased the number of northern Saskatchewan residents employed in the mineral sector.

The Community Vitality Monitoring Partnership was established by the uranium mining industry to assess the community vitality (the social well-being and quality of life of residents) in northern Saskatchewan.

## **Environmental Impact**

The Northern Saskatchewan Environmental Quality Committee (NSEQC) is a vehicle for receiving perspectives from, and communicating information to, northern communities on environmental protection, worker health and safety, and socio-economic performance of the uranium mining industry, and is also a venue for the education of northerners on the industry.

2. *List of economic and social indicators, and the purpose of each indicator*
3. *Level at which the impact of project is tracked*

The following chart lists the indicators tracked by the Department of Saskatchewan Advanced Education and Employment. The purpose of each indicator and the level of impact tracked are also listed. The indicators were developed, and are ever evolving, based on feedback/requests from government, industry, and the Mineral Sector Steering Committee<sup>9</sup>.

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<sup>9</sup> The purpose of the Mineral Sector Steering Committee is to maximize northern employment opportunities and supports northern business ventures for the mineral sector. Oversees the Multi-Party Training Plan. Chaired by the mining industry.

Indicator	Purpose of indicator	Level of impact tracked
<p>Trend in total employment at mines in northern Saskatchewan:</p> <ul style="list-style-type: none"> <li>– number of northern mine employees</li> <li>– number of northern contract employees</li> <li>– number of other mine and contract employees</li> <li>– total employees</li> </ul>	<p>The indicator demonstrates the number of northerners and total employees hired at northern mine sites and by mine contractors. The indicator shows the northern mining industry’s commitment to use its best efforts to maximize the employment of northern Saskatchewan residents. The indicator is tracked over a 20+ year time period. Baseline year: 1981</p>	Industry
<p>Employment Trends – Percentage of northern and Aboriginal employment at mines in northern Saskatchewan</p>	<p>The indicator shows employment trends for northern and Aboriginal northerners in the northern mining industry. The indicator shows progress made in employing northern residents and Aboriginal northerners in the mining industry. Baseline: 1992</p>	Industry
<p>Percentage of northerners who make up each skill category at mines</p>	<p>The indicator shows the percentage of northerners who make up the following skill categories: manager/supervisor, professional, technical, trades, support services, mill operator, underground, and equipment operator. The indicator tracks the outcomes of the Multi-Party Training Plan, a cooperative training-to-employment program for the mining industry in northern Saskatchewan. Baseline: 1992</p>	Industry
<p>Number of northerners employed in each skill category compared to the number of workers from other areas</p>	<p>The indicator shows the number of northern and non-northern workers in the following skill categories: manager/supervisor, professional, technical, trades, support services, mill operator, underground, and equipment operator. The indicator tracks the outcomes of the Multi-Party Training Plan, a cooperative training-to-employment program for the mining industry in northern Saskatchewan. Baseline: 1992</p>	Industry
<p>Skill profiles of northern contractors at northern Saskatchewan mine sites (number and percentage)</p>	<p>The indicator measures the skills of northern contractors at a point in time (December 2006). The skill categories include supervisory/management, technical, trades, equipment operation, underground mining, and support services.</p>	Industry
<p>Current place of residence of 1,112 northern residents working at a northern Saskatchewan mine site (December 2005)</p>	<p>The measure shows where over 1,000 northern mine employees are living at a point of time per region (Athabasca, North Central, Northeast, Northwest, other non-North). The indicator demonstrates the percentage of northerners who remain in northern Saskatchewan.</p>	Industry

Indicator	Purpose of indicator	Level of impact tracked
Trends in Current region of Residence of Northern Residents working at mine sites – Number of people working at mines by northern area.	This indicator shows where northern workers live by northern region (Athabasca, North Central, Northeast, Northwest), and other northern areas. The indicator shows the growth trend per northern area Baseline: 1981	Industry
Number of workers at northern mine sites by residence – Current community of residence compared to community of residence when hired	This indicator tracks the community/region in which over 1,000 northern mine and contract workers lived when they were hired, to their current place of residence. The purpose is to show the percentage of northern mine and contract workers who remain in northern communities, and the percentage of northern workers who relocate to other (southern) parts of the province.	Industry
Percentage of goods and services purchased by mines from companies and joint ventures in northern Saskatchewan	This indicator shows the benefits received by northern companies and joint ventures from northern mining operations.	Industry

In addition to the indicators listed above, the Cumulative Effects Monitoring Program was created to detect and evaluate cumulative effects of contaminants from multiple mine sources. The program monitors class effects (effects that might occur when a class of similar developments have the potential to overlap in space or over time) and regional effects (effects that could possibly occur from the long range transport of contaminants over extended periods of time). Components monitored include air, water, lake sediments, benthos, aquatic plants, fish, soil, lichen, blueberries, pine needles, spruce grouse, caribou, and moose.

### **Assessment**

**1. Are the indicators designed to help your jurisdiction maximize benefits?**

The indicators demonstrate the outcomes of the Human Resource Development Agreements.

**2. What are the difficulties in broadening the base of maximizing indicators?**

Benefits are tracked quantitatively and qualitatively. Difficulties associated with broadening the base of quantitative maximizing indicators to a regional/northern level include

- the ability to influence/control broadly defined outcomes;
- the influence of other environmental factors to positively or negatively affect the result.

**3. Does your jurisdiction monitor indicators over the life of the project? How do you accomplish this?**

Yes, Saskatchewan monitors indicators over the life of the project. Specifically related to education, training, and employment, each mining company submits quarterly progress reports to the Department of Saskatchewan Advanced Education and Employment, which produces compiled statistics.

Each SLA requires the proponent to enter into a separate Human Resource Development Agreement (HRDA) in which the employer commits to efforts to maximize the hiring, training, and advancement of

residents in Saskatchewan's North, and increased utilization of northern contractors and businesses. Annual Human Resource Development Plans target job categories for northerner preference or advancement, and northern communities whose residents will be given priority for targeted jobs.

**4. Do you have any advice for other jurisdictions on how to develop and implement best practices for maximizing benefits from major projects?**

- Develop indicators with all relevant parties (industry, government, northerners, and the Mineral Sector Steering Committee).
- Adjust measures, which are ever-evolving and changing, as necessary.
- Incorporate regular reporting into the life of the project.
- Measure immediate outcomes.
- Track progress of programs used to contribute to objectives.
- Establish indicators at the beginning of the project.
- Track level of ability to influence indicators.

**Appendix A: Description of Social and Economic Benefits Commitments**

The following section describes the social and economic benefits made by each company.

**Employment Commitment:** Commitment to use its best efforts to maximize employment participation by residents of Saskatchewan's North in its mining operations in the Northern Administration District of Saskatchewan. Progress and achievements are reported annually in Human Resource Development Plans.

**"Stay in School Program" Commitment:** Commitment work in cooperation with its industry counterparts, government, and northern educational institutions to plan and implement programs that will encourage students who are residents of Saskatchewan's North to pursue higher levels of education and consider professional careers related to the mining industry. Progress and achievements are reported annually in Human Resource Development Plans.

**Northern Business Participation Commitment:** Commitment to use best efforts, in cooperation with government, to achieve the goal of Northern Businesses annually supplying 35% of overall value of goods and services purchased in support of its mining operations in the Northern Administration District of Saskatchewan. Progress and achievements are reported annually in northern business participation reports.

**Community Vitality Study Commitment:** Commitment to work with appropriate government agencies and industry counterparts, to develop and fund a means by which to study the impacts of uranium mining operations on the vitality of communities in the Northern Administration District of Saskatchewan, through the study of selected representative communities. Progress and achievements are reported in Public Involvement Program Reports.

**Employee Education and Training Commitment:** Commitment by owner of the mine and company that signs the surface lease to develop and implement education and training plans for employees to meet its needs. Progress and achievements are reported annually in Human Resource Development Plans.

**Employee Services Commitment:** Commitment to provide suitable on-site services to employees of a particular project, and to consider employee suggestions for the enhancement of on-site services to meet its (owner of the mine and company that signs the surface lease) needs. Progress and achievements are reported annually in Human Resource Development Plans.

**Public Involvement Commitment:** Commitment to work with governments, regulatory agencies, and community leaders to consult and inform residents of Saskatchewan's North with respect to its mining operations in the Northern Administration District of Saskatchewan. Progress and achievements are reported annually in Public Involvement Program Reports.



**Northern Development Ministers Forum**  
**Maximizing the Economic and Social Impact of Major Northern Projects**

***Project 1: Arts and Heritage Village***

**Description**

Plans for a wharf, walkway, courtyard, and warehouse reconstruction on the Whitehorse waterfront, with mixed cultural and commercial uses.

**Capital Costs**

\$8K for a Development Plan; estimated costs of \$11.3M to \$22M for construction (depending on plan chosen), plus \$2-3M total for operating and management expenses over a ten-year period.

**Economic, Social, and Environmental Impacts and Indicators Used**

- The Department of Economic Development is assisting the Department of Tourism and Culture, which leads the project, to ensure that the arts and heritage village maximizes economic benefits and opportunities for the private sector.
- The Arts and Heritage Village has the potential to support the current private sector interests in waterfront development, downtown revitalization, and coordinated community economic development planning for Whitehorse.
- The Department of Economic Development is committed to a coordinated and comprehensive planning approach that leads to an economically and culturally vibrant City of Whitehorse.
- Issues related to the project will be addressed through a detailed feasibility study and business case, addressing the following economic indicators:
  - True cost to Government of Yukon
  - Cost of foregoing other government initiatives
  - Commercial occupancy rate potential
  - Impact on existing property owners or leasers
  - Potential review of comparative developments such as The Forks, Granville Island
  - Commercial versus cultural space and potential benefits
  - Competition between subsidized and non-governmental tenants and commercial market-rate tenants
  - Secondary economic benefits including tourist expenditures, tax revenues, etc.
  - Seasonality issues
  - Existing planning efforts such as OCP, retail strategy, downtown plan, rail study, etc.
  - Suitability of land
  - Lease rates and NGO ability to pay
  - Issues raised revolving around insufficient economic analysis (costs, broader economic impacts, client affordability); design concerns (views, shadows, safety, wind, practicality); public consultation (limited, non-inclusive, stakeholder driven, ad-hoc); appropriateness of use (opportunity costs, public access/benefit); competition issues (duplication of private

- sector services, government as landlord); and comparative case studies utilized not relevant (large urban centre orientation)
- Costs refinement (capital, on-going subsidy requirements, affordability for clients)
- Economic aspects (market and impact analyses, displacement costs, life cycle analysis, ROI)
- Usage analysis (proposed tenant usage patterns and impacts)
- Competition issues (analysis, remedies)
- Integration with other planning documents (Retail Strategy, Downtown Plan, Riverfront update)
- Public consultation/acceptability (recommended process and execution)
- Alternate design considerations (other design options/usage recommendations)
- Cultural facility needs analysis (inventory relative to other proposals)
- Recommendations on usage of Government Heritage Buildings

Impacts are tracked at the community level. Some may impact at the regional and territorial levels (such as tourism dollars spent), and comparisons with projects in other jurisdictions are used.

Unknown.

Unknown.

## ***Project 2: Yukon Environmental and Socio-economic Assessment Board (YESAB)***

### **Background and Description**

Yukon is unique in that it negotiated with Yukon First Nations an Umbrella Final Agreement which serves as a template for individual Yukon First Nations' Final Agreements for settling land claims. There are 14 First Nations in Yukon, of which 12 have Final Agreements settling land claims based on the Umbrella Final Agreement. Chapter 12 of the Agreements requires a legislated process to assess the environmental and socio-economic effects of medium and large scale projects and other activities in the Yukon or that might affect the Yukon.

The *Yukon Environmental and Socio-economic Assessment Act* (YESAA) is a federal Act that came into force May 13, 2003, to establish the YESAB with the purpose of conducting these assessments in a manner that is consistent with the commitments incorporated into Chapter 12 of the Umbrella Final Agreement and the final land claims Agreements with First Nations.

The YESAB is an independent arms-length entity responsible for administering the YESAA assessment regime. The Board comprises seven Board Members, two of which with the Chair of the Board form the Executive Committee, which has a number of special responsibilities

There are six assessment districts announced by the Minister of Indian Affairs and Northern Development on September 30, 2004, and a Designated Office (DO) for each district: Dawson City, Haines Junction, Mayo, Teslin, Watson Lake, and Whitehorse.

The large majority of assessments, approximately 90 percent, will be done in the six community-based Designated Offices. The Executive Committee of the Board will assess larger projects that come to it directly, or are referred by a Designated Office. At times, Panels of the Board will be established to assess projects which have potential significant adverse effects, are likely to cause significant public concern, or involve the use of controversial technology (such as nuclear power). Proponents, regulators, and the public can participate in the assessment process through the YESAB online Registry.

YESAA brings about a single assessment process for all projects throughout the Yukon and includes the federal, territorial, and Yukon First Nation governments. It requires broader consideration of socio-economic factors in assessments than previously. Traditional and local knowledge are also expressly listed as factors to be considered. First Nations have guaranteed opportunities for participation, and there are provisions for public participation at all stages of assessments. Assessments include both positive and negative effects of projects.

There are mandatory timelines for both assessment and decision-making stages, to help ensure increased certainty for project proponents in completing the assessments. YESAA provides for a high level of transparency. Decisions and actions require written reasons available in an on-line registry available to the public.

### Social and Economic Indicators Used

A Yukon government inter-departmental Socio-economic Indicators group (SEIG) was formed to develop a list of standard indicators to be used for YESAB assessments. The group includes members of affected departments, the Yukon Bureau of Statistics, and the YESAB. Attached is the Most recent listing of indicators. The group has recently been revised to continue working on the indicators list.

Impacts are tracked at all levels. Although this potentially creates a cumbersome process, mandatory timelines for both assessment and decision-making stages help to ensure increased certainty for project proponents in completing the assessments.

The SEIG will continually reassess the indicators used, and add or remove indicators as necessary to ensure they are practicable and relevant.

	<b>Measure: definition</b>
1	Access to daycare (family health)
2	Addictions counselling: number of serviced clients, number of requests for service, Yukon Employment Survey, unknown
3	Age: age composition (percentage in each group), numerous Census Statistics (Yukon and Canada), Yukon Employment Survey
4	Alcohol consumption: unit volume consumption/capita, Liquor Control Board Statistics, Yukon Employment Survey
5	Availability of food: percentage population with above "x"-level of food security; is measured now within last health status report; (missing meals), but doesn't deal with traditional foods (break-up into specifics)
6	Average wage: percent average of wage by age, gender, occupation; census statistics, Yukon Employment Survey
7	Birth weight: census statistics
8	Break and enters: number of complaints and break-and-enter charges, number of complaints/capita/geographic local, RCMP, Yukon Employment Survey
9	Community activity: number of active participants in community (benefits resilience)
10	Community Justice Projects (level of, success of): number of diversions, recidivism rate, number of alternative measures to jail, number of people serving conditional sentences
11	Crime rate and domestic violence: level of reported criminal activity, incidents/capita, number of offenders in the Spousal Abuse Program at FVPU, number of assault charges
12	Dwelling count / Number of households (how many habitable places): number of residents/km <sup>2</sup> , housing statistics
13	Economic capacity: debt loads, government, Yukon Employment Survey
14	Economic proximity: number of businesses in the area, number of municipal business licenses, Yukon Employment Survey
15	Education level: percentage of people with education level "x"
16	Education, training, and traditional knowledge: percentage population with "x" skill or level of education

17	Education: rate of graduates, attendance, etc., Department of Education Statistics, Yukon Employment Survey
18	Employability of local unemployed population: percentage of unemployed with "x" skills, survey based, Employment Insurance Statistics have confidentiality issues
19	Employment capacity: number of skilled and available people
20	Employment: from region, number of full time, number of part time, in hours/week/year/person, from community, number of employed or in traditional economy compared to the number of unemployed (available through First Nation and/or Government), Working hours/times, work/non-work hours, etc., as per disruption to family, departure from family life
21	Entertainment services: number of restaurants, bars, hairdressers, retail, etc.
22	Ethnicity: demographic, baseline, number of people by ethnicity
23	Family violence: number of transition homes, number of reported spousal assaults, number of intervention orders, number of child abuse cases, via non-government organizations and Justice Department statistics
24	Family/household composition: population by marital status and gender by census years, percentage of one-parent households, two-parent households, etc., grandparents/elders living in the home, number of children in each family type, percentage of other households, head of household; Health and Social Services statistics, Yukon Employment Survey
25	Gender: indicator of health
26	Gender: percentage each, number of women compared to the number of men relative to differential impacts from projects, Bureau of Statistics and Statistics Canada
27	Health and Wellness Programs: number of programs, participation rate, number of social workers
28	Health Centre: size, programs, participation, number and type of services available, health demographic of clients served, Health and Social Services statistics, First Nation's statistics, Health Canada
29	Health clinic availability: number of clinics, number of nursing stations, number and frequency of visiting medical specialists
30	Health: mental and physical
31	Household demographic: number of married, common-law, same-sex, single, divorced, separated, widowed households; Vital Statistics, Health and Social Services
32	Household size: number of residents in the household
33	Housing availability: vacancy rate, percentage of social housing, number of people per household, by survey, Yukon Housing Survey, Health and Social Services, census, First Nation survey
34	Income by age: Statistics Canada
35	Income by gender: Statistics Canada
36	Income disparity: percentage population in each income bracket, Statistics Canada
37	Land uses: survey of local businesses/individuals
38	Language: British; French; Dutch; German; Italian; Native; First Nation; Polish; Scandinavian; Ukrainian by gender - profile, baseline from Census
39	Law enforcement: infrastructure - facility and equipment from Justice Department and observation; number of enforcement officers in community
40	Length of time an adverse impact persists (duration): Yukon Employment Survey
41	Local hire: survey of businesses
42	Migration Rate: population 5 years and over by mobility status and ethnicity, Yukon, Canada and provinces; mobility status by Census Statistics
43	Murder: number of charges/convictions, Statistics Canada, Yukon Bureau of Statistics
44	Number of convictions, indictments, charges from Yukon Bureau of Statistics
45	Number of employees in work camps from survey of local businesses/industry
46	Police and mainstream Justice Services: number of police, number of offenders in Justice Services, percentage of First Nation offenders from Yukon Bureau of Statistics
47	Population size (current and expected change): population by Census years, Yukon and Canada
48	Population structure: density, composition, race, ethnicity, gender, ability
49	Population structure: estimates of population, by age group and sex, Canada, provinces, territories, and where located
50	Population: population rate; annual growth rate population by Census years, Yukon and Canada from Census

51	Probation services: number of people on probation, caseload of probation officers on a monthly basis by community (accessible)
52	Proximity to community: length of commute time, availability of transportation, spatial distance from community (accessible)
53	Public perception of crime: number of media accounts of crime, number of complaints to RCMP (not readily available, survey)
54	Recidivism: percentage of offenders who re-offend, number of offenders who re-offend within two years of release, by age, by gender, by ethnicity (accessible or survey)
55	Recreation Centre / Recreational Activities: number of programs, participant rate, users
56	Religious services
57	Robbery: number of charges (not accessible)
58	Salaries: salaries of employed/self-employed, by age, gender, occupation; Yukon Employment Survey; census data (accessible every 5 years), tax data (not accessible)
59	Seasonal employment: number of seasonal employees, by age, by gender, by ethnicity (not accessible, survey)
60	Self-determination: political organization, voter turnout, public participation; measure of the health of the community, number of local participants in public meetings, by community, by ethnicity; Volunteerism: participation rate, health of community in relation to resilience, community cohesion, etc. (limited accessibility, survey)
61	Services availability: community asset mapping
62	Sexual assaults reported
63	Sexually transmitted diseases: number of incidents, by gender, by age (accessible)
64	Skill level of employed/unemployed: labour force (potential workforce); unemployment rate; employment-to-population rate, skill levels available by community, Trade skills availability (not readily accessible, survey)
65	Social support networks: percentage population who engage in sharing and visiting (survey)
66	Social worker availability: number of social workers by community
67	Substance abuse: number of cases with alcohol/drug factor and percentage of drug use Yukon
68	Substance use
69	Trainability of members of the community, Yukon and national level, workforce education, workforce experience
70	Unemployment ratios: current unemployment/employment rate, post project unemployment, annual ratios
71	User-days of land users: break-down into specific land use, duration, frequency, traditional vs. non, ... wage, non-wage, recreation, percentage change over time, number of land-use permits in specific area (not readily available, survey)
72	Vandalism occurrences: number of vandalism reports and charges
73	Victim services: number and type of services available, percentage change of use, annual, before project and after project
74	Wages: percentage change over time by gender; annual, before, and after project
75	Workplace accident rates: number of injuries/unit of work, Worker's Compensation Board statistics, Yukon Employment Survey
76	Fatalities on job site
77	Lost hours of employment: lost time incident rate per 200,000 hours of work, percentage of annual reduction in lost time due to injuries from previous years
78	Unsafe work place: percentage of orders written for unsafe work practices / workforce
79	Safe work places: percent annual increase in employees with safety management programs



**APPENDIX III**  
**LIST OF CONTACTS**





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