Yukon River Bridge at Dawson City
Economic Effects Identification

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1. Introduction

The construction of the Yukon River Bridge at Dawson City will bring significant economic benefits to the Dawson City regional economy. Looking to the region's economic future beyond the construction period, the bridge is also expected to contribute to the capitalization of a variety of economic opportunities. Adverse economic effects resulting from the discontinuation of ferry service across the Yukon River at Dawson City may also accompany the project.

While planning and design work for the bridge is well underway, scoping and identification of the economic effects associated with project has not yet been carried out. As noted in the updated life-cycle cost analysis prepared in April 2004 by the Department of Highways and Public Works (HPW), "public discussion of the crossing issue has included suggestion that consideration of the wider economic effects of bridge construction should take place."[1] Accordingly, the purpose of this project is to identify, for the Dawson economic region, the wider non-transportation related economic effects expected to accompany the construction and operation of the bridge.

The primary methodology employed in the project was a desktop review of published documents including examples of economic assessments of two similar projects. This report takes as a given the results of the updated HPW life-cycle cost analysis, namely that "the lowest life cycle cost method of providing a crossing of the Yukon River at Dawson City is achieved through construction of a bridge."[2] The analysis in this report relies on the HPW finding that "…the construction of a bridge can be justified on its transportation merits alone."[3] A methodological critique of the HPW study is not within the scope of this study.

The analysis of the Yukon River Bridge at Dawson City project which follows is not a cost-benefit analysis. Many of the effects identified in the analysis are intangible in nature. Rather than including or excluding certain effects on the basis of whether or not it is possible to properly monetize and calculate their present values, the intent of the analysis is to identify the range of possible non-transportation-related economic effects.

[1] Transportation Planning and Programming, *Yukon River Crossing at Dawson City Life Cycle Analysis Update,* Yukon Highways and Public Works, April 2004, page 18.
[2] Ibid.
[3] Ibid.

2. The Deh Cho Bridge and Confederation Bridge Examples

To assist with the identification of potential economic effects of the Yukon River Bridge project, economic analysis of two other bridge projects were examined in the course of research for this paper. Both projects involve the building of a bridge and the discontinuance of a ferry operation. The studies include:

- *Benefit-Cost Analysis of the Deh Cho Bridge*[4]*,* Nichols Applied Management, September 2002 (updated February 2003); and,
- *Draft Final Report: Economic Feasibility Assessment for the Northumberland Strait Crossing,* Fiander-Good Associates Limited, 1987.[5,6]

While the two studies are in the form of cost-benefit analyses, which should by design include the wider economic effects of the projects, neither study attempted to measure the non-transportation related economic effects of the projects. For example, the Deh Cho Bridge analysis noted that "there are a number of benefits that will accrue to the NWT if the project goes ahead…including increased regional and territorial economic development stimulated by the greater efficiency and reliability of the highway network and reduced transportation costs."[7] At the same time, the study notes that "these are by their nature difficult to quantify and have not been considered in the calculation of the benefit-cost ratio presented below."[8]

Similarly, the Fiander-Good Associates study identified *economic development* as a benefit attributable to the construction of a fixed link between Prince Edward Island and New Brunswick. Notwithstanding its identification, the Fiander-Good Associates analysis deemed the developmental benefits of the Bridge to be zero noting that the largest effect would be on tourism and that the "tourism gain by one province generally results in a loss by another province, thus resulting in benefits being netted out from a global perspective."[9]

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[4] The Deh Cho Bridge will replace the existing ferry/ice bridge crossing of the Mackenzie River at Fort Providence, Northwest Territories.

[5] As described in the "Case 1: The Northumberland Strait Fixed Crossing Project" contained in Peter C. Townley's *Principles of Cost-Benefit Analysis in a Canadian Context,* 1998.

[6] The Northumberland Strait Fixed Crossing Project is of course now more familiar as the Confederation Bridge which links Prince Edward Island to New Brunswick.

[7] Nichols Applied Management, *Benefit Cost Analysis of the Deh Cho Bridge,* September 2002, page 17.

[8] Ibid.

[9] Fiander-Good Associates Limited, *Draft Final Report: Economic Feasibility Assessment for the Northumberland Strait Crossing,* 1987, page 5.17, as quoted in Peter C. Townley, *Principles of Cost-Benefit Analysis in a Canadian Context,* 1998, page 247.

In summary, the examination of broader economic effects of the Deh Cho Bridge and Confederation Bridge projects were held to be outside of the scope of the respective analyses. As a result, neither study provides much in the way of guidance in the identification of economic effects associated with construction of a Yukon River Bridge at Dawson City.

3. Framework for Analysis

With little guidance available from the economic analysis of the Deh Cho and Confederation bridge projects, a framework for analysis was developed to facilitate the systematic identification of economic effects attributable to the Yukon River Bridge project. The framework categorizes the economic effects of a project as being of one of two types. The first, Type A effects, are those which result in changes in physical economic production in the project region. The changes can be direct (e.g., improved production possibilities) or indirect (e.g., positive or negative externalities[10]). Type A effects result in changes in overall economic output that would not have occurred during the time horizon of the project in the absence of the project.

The second, Type B effects, include those which involve the redistribution of factor incomes from outside the economic region of the project to within the economic region of the project and *vice versa*. Redistribution of factor incomes may also occur within a project's economic region. Type B effects can also be direct and indirect in nature.

In contrast to Type A effects, Type B effects do not result in changes to overall economic output but instead involve one economic agent benefiting at the expense of another. Thus, the determination of 'winners' and 'losers' hinges on the where the boundaries of the economic region are drawn. For example, most, if not all, Type B effects would effectively sum to zero if the economic region is deemed to be the national economy since economic gains at the local level would be offset by economic losses elsewhere in the Canadian economy. If the economic region is deemed to consist of only the local region, however, the Type B effects are much more likely to be recorded as non-zero as the offsetting gains/losses are ignored.

[10] Externalities are created when an activity has an impact on the well-being of a bystander. If the impact of the activity is beneficial, the activity is said to create a positive externality. In contrast, if the activity has a negative impact, it is said to create a negative externality.

4. Project Description

The proposed Yukon River Bridge at Dawson City is a 365 metre long, two-lane traffic bridge. The bridge will replace the existing ferry (the George Black), which provides seasonal (mid-May to mid-October) pedestrian and vehicular access between Dawson City and West Dawson/Top of the World Highway. Construction of an ice bridge across the Yukon River, usually available for use between December and late April will also be discontinued upon bridge commissioning. Year-round maintenance of the Top of the World Highway, and thus, year-round access to Alaska is not envisioned at the present time.

As outlined by the Department of Public Works and Highways in their April 2004 *Yukon River Crossing at Dawson City Life Cycle Analysis Update,* capital costs for construction of the bridge are pegged at $28 with $3 million allocated for design and $25 for construction. An estimated $1.5 million was expected to be spent in each of 2004 and 2005 with $12.5 million being spent in each of 2006 and 2007. The design life of the bridge is 75 years.

Annual operations expenditures for the George Black ferry, including salaries, were approximately $837,000 in the 2003/04 fiscal year. An additional $39,000 was spent on maintenance of the ferry approaches and $157,000 on maintenance of the ferry. The average annual cost of the ice bridge has been estimated to be $32,000 (in 2003 dollars).

5. Identification of Effects

A variety of economic effects are expected to result from the building of a Yukon River Bridge at Dawson City. For purposes of the analysis, the effects are listed according to two time periods for the project, those expected to occur during the construction phase (2005 to 2007) and those expected to occur during the operations phase (2008 to 2083). Within each phase, economic effects are further delineated according to whether they are Type A or Type B effects.

Construction Phase Effects (2005 to 2007)

Type B Effects

Construction spending – from a national perspective, public sector construction spending represents a transfer between economic agents – from taxpayers in the Yukon and elsewhere in Canada and the businesses and individuals involved in the construction of the bridge. From the perspective of the Dawson region, however, there exists an opportunity to "capture" some of the positive economic benefits of the project. The degree to which the local economy will benefit from bridge construction activity is

directly correlated with the extent to which economic leakage associated with the project can be stemmed. The scale of the transfer also depends on the degree to which factors of production (e.g., labour) are not already otherwise in productive use.

On the basis of preliminary design estimates, Yukon Economic Development has estimated that approximately 50 person-years of employment will accrue to the Dawson City area during the construction phase of the project. As well, some significant business opportunities are anticipated during the construction phase.

Operations Phase Effects (2008 to 2083)

Type A Effects

Natural resource development – transportation-related expenses can make up a significant portion of costs related to the development of natural resources, specifically minerals. The construction of an all-year crossing of the Yukon River at Dawson City will permit the more timely transport of larger quantities of material and potentially ore. As a result, it may serve to encourage new exploration West of the Yukon River in the Dawson region which may ultimately lead to new mineral production. There are currently more than 1,500 active quartz claims and 3,200 active placer claims on the West side of the Yukon River.[11]

With regard to future agricultural development, the Dawson region, including the West side of the Yukon River, is characterized by Government of Yukon's Agriculture Branch for the purposes of future development as "mature".[12] As such, the area is not considered to hold a significant amount of untapped potential for agricultural development. In terms of potential future forestry development, an estimate of the volume of merchantable timber in the area is not available. Given the geographic latitude of the region, however, any such potential for resource development is likely minimal.

Alaska trade flows – to the extent that trade flows between the Dawson region and Alaska are limited by the timeliness and carrying capacity of the George Black ferry,

[11] The number of quartz and placer claims was tallied using the Mining Claims Database available at www.yukonminingrecorder.ca for claims located between the Yukon River and the Yukon-Alaska border north of 63^0 latitude. Claims located on map sheets for which a significant portion of land is located on the East side of the Yukon River were excluded from the analysis. Thus, claims located on the following maps sheets were included in the claim tallies: 116B04, 116C01, 116C02, 116C07, 115N02, 115N07, 115N08, 115N09, 115N10, 115N15, 115N16 and 115O05. Claims located on the following maps sheets were excluded from the claim tallies: 115N01, 115O04, 115O12, 115O13, 116B05 and 116C08.

[12] Pers. comm., Kevin Bowers, Agriculture Branch, June 16, 2005.

trade patterns may be altered between the two jurisdictions. For example, bulk fuel haulage between the Flint Hills Resources' petroleum refinery at North Pole, Alaska and Dawson City may become more economic due to significantly shorter haulage distances. If so, this could, for example, result in lower fuel costs for placer mine operators in the Dawson economic region.

While difficult to predict when (or even if) year-round access to Alaska via the Taylor Highway will come about as a result of bridge construction, the existence of the bridge will increase the probability of year-round road access to Alaska happening at some point in the future. As noted by the Tr'ondëk Hwëch'in First Nation, its plans to grow business relationships in Alaska will be facilitated by improved access to Alaska.

Land development – construction of the bridge is expected to expand land development options for land owners such as the Tr'ondëk Hwëch'in who have significant land holdings across the Yukon river from Dawson City. Some 43 settlement land parcels comprising approximately 99 square kilometres are owned by the Tr'ondëk Hwëch'in on the West side of the Yukon River. Out of the 43 parcels of settlement land, 10 are located within about 5 kilometres of the ferry landing and feature reasonable access from existing roads and comprise approximately 6 square kilometres.

With improved access, the values of existing developed properties located on the West side of the Yukon River might reasonably be expected to increase. Also, with no access restrictions during break-up and freeze-up, residence by families with school-age children becomes more of a possibility.

Infrastructure development – the topography of Dawson City serves as a constraint to future land development within the townsite. While some land development has occurred on the West side of the river in the absence of a bridge, construction of a bridge is expected to facilitate the expansion of basic infrastructure to West side residences such as electricity and telecommunications. The bridge may also provide viable alternatives to Dawson City's current sewage treatment predicament as well as providing additional options for the future development (again remembering that the time horizon of the project is 75 years) of Dawson City's solid waste management system and airport facility. The eventual development of basic infrastructure on the West side of the river would likely remove a major constraint to larger scale residential and commercial development.

Business development – the increase in population density which would accompany new residential land development on the West side of the Yukon river will likely be too

small to spawn the establishment of new businesses such as a gas station or a convenience store. It should be remembered, however, that the time horizon of the project is 75 years. Thus, while it may take many, many years, the population density required for certain business developments may reach a 'tipping point' well within the project's time horizon. In addition, given that more than half of all businesses in the Yukon are home-based[13], it would seem reasonable to expect that an increase in the number of residences on the West side of the river will also lead to an increase in home-based businesses as well.

Certain types of businesses, such as those which involve manufacturing or the secondary processing of natural resources are land-intensive by nature. The lack of available land on the East side of the Yukon River in the Dawson area currently serves as a constraint to the development of these types of operations. The expansion of land opportunities across the Yukon River will likely improve development opportunities for land-intensive businesses in the Dawson region. Similarly, business which require a less urban setting than that found on the East side of the Yukon river, such as wilderness tourism (e.g., dog-sled tours) may also benefit from improved access to the West side of the Yukon River at Dawson.

Emergency service access – emergency service access will be improved with the construction of the bridge. An expected economic effect of improved emergency access is a reduction in fire and property insurance for structures located on the West side of the Yukon River. According to information received from Yukon Economic Development, it would appear, based on a small sample of West side homeowners, that home insurance rates on the West side of the Yukon River are roughly twice those paid by East side residents for comparable coverage. In addition, the use of wood as a primary heat source makes the cost of insurance prohibitive. West side home owners who currently face higher home heating costs as a result of not being able to heat with lower-cost wood may experience a reduction in home heating costs if improved access leads to less restrictive insurance arrangements.

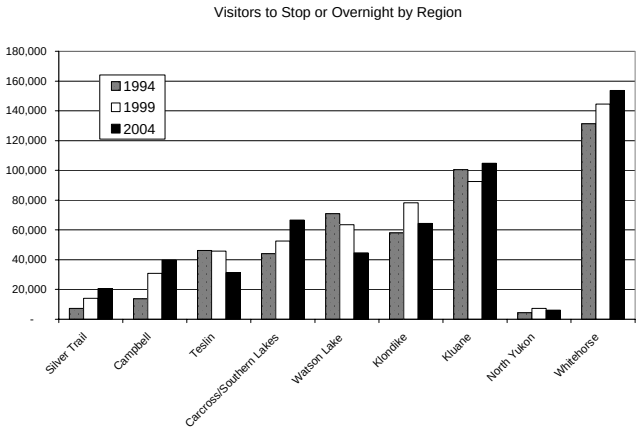
Type B Effects

Tourism activity – construction of the bridge may serve to stimulate additional tourism activity in the Dawson region. To the degree, however, that any additional traffic is found to be attributable to the existence of a bridge rather than a ferry in Dawson City, that traffic is likely to be simply diverted from the Whitehorse – Beaver Creek Alaska

[13] Results from the Yukon Bureau of Statistics most recent *Yukon Business Survey,* conducted in 2003, indicate that 56% of businesses in the Yukon are home-based.

Highway route. Thus, what Dawson may gain in increased tourism activity as a result of the bridge would likely be at the expense of the North Alaska Highway tourism region.

As shown in the chart at the right, the Klondike tourism region, which includes Dawson City, is a major visitor draw. Notwithstanding the severity of forest fires in the Dawson region in the summer of 2004, when the latest Yukon Visitor Exit Survey was undertaken, some 64,400 visitors stopped or overnighted in the Klondike region between June 1 and September 30 of that year. A bridge across the Yukon River at Dawson will more readily accommodate future growth in visitation to the Klondike region than will the existing ferry service.



Source: Yukon Bureau of Statistics, *2004 Yukon Visitor Exit Survey (Preliminary Results)* , April 2005.

Local employment – labour requirements for bridge operations are expected to be much less than those required for ferry/ice bridge operations. In the 2003/04 fiscal year, ferry operations expenditures (which include seasonal salaries) were $837,000. To the extent that the seasonal salaries constitute a significant portion of operations expenditures, the potential effect of the discontinuance of ferry/ice bridge operations is also correspondingly significant.

The Government of Yukon is a significant employer in the Dawson region. Should alternative employment arrangements be found for ferry employees which serve to maintain the total Government of Yukon staffing complement in Dawson City the net effect of the bridge project will be negligible. In the event that overall staffing levels in the Dawson region do in fact decline, the overall local employment effects are expected to be negative. Highways and Public Works has indicated that while the specifics of the job transition for ferry workers are not known at this point in time, the department will begin working with affected workers to develop a transition plan when a decommissioning date for the ferry is determined.

6. Effects Identification Summary

The non-transportation related economic effects expected to accompany the Yukon River Bridge at Dawson City include:

Construction Phase (2005 to 2007)	
Type A Effects	**Type B Effects**
• n/a	• construction spending

Operations Phase (2008 to 2083)	
Type A Effects	**Type B Effects**
• natural resource development • Alaska trade flows • land development • infrastructure development • business development • emergency service access	• tourism activity • local employment

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