

CHAPTER 5

TABLE OF CONTENTS

5.1	INTRODUCTION	83
5.2	SCOPING THE PROJECT	84
5.2.1	<u>PROJECT NEED AND PURPOSE</u>	84
5.2.2	<u>ALTERNATIVES</u>	86
5.3	THE RECEIVING ENVIRONMENT	88
5.3.1	<u>IDENTIFICATION OF VALUED COMPONENTS</u>	88
5.3.2	<u>TEMPORAL AND SPATIAL BOUNDARIES</u>	88
5.3.3	<u>BASELINE INFORMATION</u>	89
5.3.4	<u>TRADITIONAL KNOWLEDGE</u>	90
5.4	IMPACT ASSESSMENT	92
5.4.1	<u>IMPACT PREDICTION</u>	92
5.4.2	<u>PROponents' COMMITMENTS, MITIGATION AND ENHANCEMENT</u>	92
5.4.3	<u>UNCERTAINTY AND THE PRECAUTIONARY APPROACH</u>	93
5.4.4	<u>MONITORING AND ADAPTIVE MANAGEMENT</u>	95
5.4.5	<u>CUMULATIVE IMPACT ASSESSMENT</u>	97
5.4.6	<u>SIGNIFICANCE OF PROJECT IMPACTS</u>	99
5.4.7	<u>THE PANEL'S SUSTAINABILITY ASSESSMENT FRAMEWORK</u>	103

CHAPTER 5

APPROACH AND METHODS

5.1 INTRODUCTION

Public confidence in the outcome of the Panel's review will depend in part on the clarity and transparency of the methods the Panel used to make its findings and recommendations. The Panel was provided some guidance for its approach and methods in the *Joint Review Panel Agreement* (JRPA), the Environmental Impact Statement Terms of Reference for the Mackenzie Gas Project (EIS Terms of Reference), and in guidance documents issued by the Canadian Environmental Assessment Agency ("the Agency") and the Mackenzie Valley Environmental Impact Review Board (MVEIRB). The Panel also took into consideration prevailing best practices in environmental impact assessment.

These materials did not provide complete or unambiguous guidance on all issues. Participants sometimes differed on the approach to impact assessment that the Panel should take, and on the methods it should use in its assessment. These differences were particularly evident with respect to:

- the scope of the Project, particularly for the purpose of identifying cumulative impacts;
- the characterization of the receiving environment (e.g. valued components, baseline conditions);
- the identification and assessment of Project and cumulative impacts;
- the determination of the significance of Project and cumulative impacts; and
- the net contribution of the Project to sustainability of the northern environment, economy and society.

The purpose of this chapter is to describe how the Panel resolved the issues identified above, and applied them to its review. Some of these methodological issues are discussed in more detail in subsequent chapters as they apply on a topic-specific basis or with respect to particular valued components.

Early in the public hearing schedule, the Panel convened a technical session on *Approaches and Methods for Evaluating the Information in the EIS and Supplementary Submissions*. To assist the participants and the Panel itself in considering these issues, the Panel retained

four specialist advisors to prepare reports addressing four areas of impact assessment methodology particularly relevant to the review:

- frameworks for sustainability-based environmental impact assessment;
- impact significance criteria and judgments;
- indicators of social, economic and cultural cumulative effects; and
- scenario-based cumulative effects assessment.

These reports were presented during the hearings with the opportunity for review and comment by participants. The reports were intended to identify and review different perspectives, approaches and methods for evaluating and assessing information about development impacts generally (positive and negative) and their significance, and to identify current best practices in environmental assessment. The advisors were directed not to address Project-specific issues or to comment specifically on the Proponents' EIS.

A further purpose of the technical session was to provide participants with an opportunity to comment on the Proponents' impact assessment methodology as it applied to any subject matter addressed by the EIS and supplementary filings by the Proponents.

Both the commissioned reports and the technical session were of great assistance to the Panel, and informed its approach to the review in important ways. This was reflected, in part, in the Hearing Guidance document that was issued and updated by the Panel during the course of its hearings. In addition to identifying the subject matter under discussion, the Hearing Guidance document also provided an indication of the Panel's expectations with respect to the treatment of key questions and issues that the Panel wanted to see addressed by the Proponents and participants. A description of the contents and role of the Hearing Guidance document is set out under Section 5.5.2.

This chapter sets out the Panel's approach but contains no recommendations with respect to the methodological issues that it addresses.

5.2 SCOPING THE PROJECT

5.2.1 PROJECT NEED AND PURPOSE

The Panel is required to consider the "need for the Project" and the "purpose of the Project." In doing so, the Panel relied on the Agency's Operational Policy Statement entitled "Addressing 'Need for,' 'Purpose of,' 'Alternatives to' and 'Alternative Means' under the *Canadian Environmental Assessment Act*."

NEED FOR THE PROJECT

The Agency's Operational Policy Statement provides the following definition for the "need for" a project: "the problem or opportunity that the proposed project is intending to solve or satisfy. That is, 'need for' establishes the fundamental justification or rationale for the project." The Operational Policy Statement goes on to define the "purpose of" a project as "what is to be achieved by carrying out the project."

The Proponents stated in their closing remarks:

During the JRP hearing process, Mr. Ottenbreit indicated that the demand for natural gas in North America in 2002 was in the order of 68 billion cubic feet per day, and projections call for the demand for natural gas to continually increase. That, coupled with the fact that traditional supplies of natural gas in North America are maturing, illustrates the need for the MGP.

Further, Mayor Tout of Norman Wells also indicated that the MGP will provide the Town with a continued supply of natural gas and extend the life of the existing oil field production by a decade. (J-IORVL-01050, p. 23)

Some participants questioned the need for the Project, primarily in the context of the burning of the gas that would be produced and transported by the Project, and their specific concerns are addressed in subsequent sections of this chapter and in subsequent chapters of the Panel's Report.

PANEL VIEWS

At the close of the Panel's record, the Proponents affirmed that there was a demand for the gas that would be produced and transported by the Project to the North American market. The Panel is of the view that the Proponents and others have established there is a need for the Project.

PURPOSE OF THE PROJECT

The Proponents stated:

The purpose of the MGP is to develop and produce currently stranded onshore natural gas and associated NGLs from the three Anchor Fields held by the Proponents, and to transport that natural gas and NGLs to Alberta and to consumers throughout North America. (J-IORVL-01050, p. 24)

Several participants disagreed with this characterization, primarily because in their view the purpose of the Mackenzie Valley Pipeline (MVP) was to provide fuel to the existing and planned expansions of oil sands operations of the Proponents' in northern Alberta. Elizabeth May, then Executive Director of the Sierra Club of Canada (SCC), described the MVP as a "pipeline to nowhere" in that:

the Mackenzie Valley Pipeline includes no links to pipeline infrastructure in northern Alberta that would allow the natural gas to be shipped to market. However, TransCanada PipeLine documents make it clear that TCPL intends to ship 1.5 bcf/day of Mackenzie gas to Fort McMurray to fuel

expansion of oil production from the Alberta tar sands from 1 million to 4–5 million barrels per day by 2030. TCPL has already negotiated a protocol agreement with the Dene Tha' First Nation of northern Alberta to facilitate construction of the so-called Northcentral Crossing Pipeline that would carry Mackenzie gas from the terminus of the Mackenzie Valley Pipeline to Fort McMurray. In its May 2004 report, the Mackenzie Valley Environmental Impact Review Board found that "the extension of the Alberta [pipeline] system to connect to the Mackenzie Gas Project is not a stand-alone development but an integral part of the Mackenzie Valley pipeline. Neither component can exist without the other." (J-SCC-00002, p. 3)

The SCC cited the proposed North Central Corridor pipeline in Alberta to demonstrate the likelihood of Mackenzie gas being used at the oil sands. The SCC also provided a map of that proposed pipeline and, just prior to the close of the Panel's hearings, filed a newspaper article indicating that TransCanada PipeLines had just filed a regulatory application to build the North Central Corridor pipeline linking the eastern and western regions of northern Alberta.

Submissions were received from a number of other groups and individuals that were based on the assumption that MGP gas was destined for the oil sands. They noted the close links between Alberta's oil sands and the MGP and raised concerns associated with those oil sands projects that, by extension, the MGP would induce, enable and perpetuate. Those concerns included:

- increased levels of greenhouse gas emissions from the oil sands themselves to 9% of Canada's total emissions in 2010 (or 12% of Canada's Kyoto target for that year);
- development of oil sands resources at a rate and scale too rapid and too extensive to enable appropriate environmental and social planning and protection to be put in place;
- increased fragmentation and destruction of large areas of the Boreal Forest; and
- increased exports of oil and gas to the United States in the absence of a Canadian Energy Strategy that focuses on "Canada's energy security needs, not just growing U.S. demand for oil and gas," that makes "current and future production, distribution and use of Canadian energy environmentally safe and sustainable" and that reinforces, rather than trumps, "international environmental, social and human rights obligations." (J-OHP-00240, p. 3)

Of these participants, several recommended that the MGP not be approved if the gas that is produced and delivered was for use in the oil sands.

In response to these assertions, the Proponents stated:

Once in the NOVA system, Mackenzie Delta natural gas could be purchased and delivered to any of about 200 delivery

points that service markets in Alberta, other provinces and the United States.

While none of the Mackenzie Gas Project proponents have made any arrangements to market their Mackenzie Delta natural gas, it would be reasonable to expect that Mackenzie gas will be used to heat homes and businesses, to generate electricity, to manufacture chemicals, and to meet a variety of other industrial purposes...

Production of oil in the Fort McMurray area over the past 40 years has not used natural gas from the Mackenzie Delta. Second, recent expansions of existing oil sands facilities and construction of new oil sands facilities have been completed and started up without natural gas from the Mackenzie Delta. And third, recognizing that the Mackenzie Gas Project has not been approved, future oil sands developments that have been approved or applied for are also not dependent on natural gas from the Mackenzie Delta.

All of this activity is proceeding independent of what happens with Mackenzie gas. In other words, oil sands development in the Fort McMurray area is not dependent on what happens with the development of Mackenzie Delta gas.

The assumption that the Mackenzie Gas Project needs or depends on oil sands demand for natural gas is also not correct.

In North America, the demand for natural gas today is in the order of about 70 billion cubic feet per day, and that's expected to grow, approaching 100 billion cubic feet per day in about 25 years. Natural gas demand associated with oil sands development is only 1 to 2 percent of that total amount.

And so, even if there was no growth in oil sands development, or if there was no production at all from the Alberta oil sands, there would still be a need for additional supplies of natural gas such as those anchoring the Mackenzie Gas Project.

In summary, development in the Fort McMurray area is independent of whatever happens to Mackenzie gas, and conversely, we would be looking at developing the Mackenzie Gas Project even if there was no oil sands development in the Fort McMurray area. (Randy Ottenbreit, HT V83, pp. 8173–74)

PANEL VIEWS

The Panel agrees that the purpose of the MGP is to develop and produce onshore natural gas and associated NGLs from the three Anchor Fields held by the Proponents, and to transport that natural gas and NGLs to Alberta and to consumers throughout North America. The Panel notes that, as proposed, the MVP is not a "pipeline to nowhere." If constructed as proposed, the MVP would connect with NOVA Gas Transmission Ltd.'s (NGTL's) existing Alberta System immediately south of the Northwest Territories–Alberta border where gas would enter NGTL's pipeline

network that gathers natural gas for use both in Alberta and for delivery to provincial border points for export to North American markets.

The Panel has no evidence that it would be necessary to use gas from the MGP for the purpose of oil sands development in northeastern Alberta. Notwithstanding that a pipeline may be built at a future point in time between the northwest Alberta facility and the oil sands, one does not currently exist and, the Panel notes, oil sands expansions are taking place in the absence of a firm commitment and authorizations that would enable the MGP to indeed be constructed.

5.2.2 ALTERNATIVES

The Panel is also required to consider “alternatives to” the Project and “alternative means of carrying out the Project that are technically and economically feasible.” (JRPA, p. 12)

ALTERNATIVES TO THE PROJECT

The Agency’s Operational Policy Statement defines “alternatives to” the Project as being “the functionally different ways to meet the project need and achieve the project purpose” and recommends that:

- “alternatives to” a project should be established in relation to the project need and purpose and from the perspective of the proponent; and
- analysis of “alternatives to” a project should serve to validate that the preferred alternative is a reasonable approach to meeting need and purpose and is consistent with the aims of the CEA Act.

In their closing remarks, the Proponents addressed both the null alternative and the various alternatives to transporting the gas from the Anchor Fields. The Proponents stated that they had considered a number of different alternatives to the MGP, including:

- transporting the Mackenzie Delta natural gas as liquefied natural gas instead of by pipeline;
- managing the NGLs in alternative ways, including transporting the NGLs by barge to Norman Wells or Alaska, or re-injecting the NGLs back into the ground; and
- developing and transporting the Mackenzie Delta natural gas in alternative ways, such as combining the development of Mackenzie Delta natural gas with the development of Alaskan natural gas.

The above alternatives either did not meet the need or satisfy the purpose of the Project, or were not feasible on an economic or technical basis.

Delaying the MGP or not proceeding with the Project at all were also considered as alternatives to the proposed Project, but were rejected. Delaying the Project would reduce the

likelihood of it proceeding, would reduce the likelihood of other oil and natural gas development in the North, and would reduce related Northern business opportunities and the flow of benefits. Not proceeding with the Project would mean that the purpose of the Project, and its contribution to sustainability, would remain unfulfilled.

The Proponents submit that given the stated need and purpose of the MGP, as well as the benefits to be realized by the development of the Project...the JRP should endorse the Proponents’ view that there are no viable alternatives to the Project as proposed. (J-IORVL-01050, pp. 24–25)

Some participants to the Panel’s review recommended that the Project not proceed at all — the null alternative. Reasons for this view included:

- objection to the amount of greenhouse gases (GHG) that would be emitted by the Project itself;
- the uses to which the gas would be put;
- the lack of preparedness of northern people and institutions to manage a project of the size and scope of the Project; and
- the additional activities the Project was likely to induce.

These views are set out more fully in this Report in this chapter under “purpose” of the Project and in subsequent chapters.

PANEL VIEW

The Panel is satisfied that the Proponents have examined functionally different ways to meet the Project need and purpose. In the Panel’s view, the Proponents’ preferred approach for transporting gas from the Anchor Fields to market is reasonable.

ALTERNATIVE MEANS

The Agency’s Operational Policy Statement defines “alternative means” as “the various technically and economically feasible ways the project can be implemented or carried out. This could include, for example, alternative locations, routes and methods of development, implementation and mitigation.” The Policy Statement sets out a process to assist in the assessment of alternative means, including identification of the alternative means; the environmental effects of each of the alternative means; and the preferred means.

During the course of the Panel’s proceedings, the Proponents made a number of changes to the design and location of certain components of the Project. Some of these changes were in response to input from affected participants or responsible authorities. Other changes represented refinements to the Project made by the Proponents as their assessments and design considerations advanced. Changes to the Project were conveyed to the Panel on two separate occasions, each of which included supporting information setting out the details of the proposed changes as well as their biophysical and socio-economic impacts, and the community consultation program carried out regarding

those details. The details and impacts of some of these changes are described in the appropriate topic-specific chapters of this Report. The Proponents predicted that the changes proposed to the Project in their 2005 Project Update would have the same or reduced impacts as would the Project components originally assessed in the 2004 EIS. With respect to changes proposed in their 2007 Project Update, the Proponents commented that their assessment of the biophysical and socio-economic effects of these updates concluded “that these updates further mitigate potential adverse project impacts and result in enhanced project benefits.” (J-IORVL-00953, p. 1)

Throughout the course of the hearings, there were instances of participants, particularly communities and individuals, who raised concerns about particular sites for Project facilities or for the pipeline right of way. These concerns were addressed by the Proponents and either resulted in a change to the Project or confirmation by the Proponents that, after consideration, their preferred option was the one they were proposing for the Project. Alternative means for carrying out specific elements of the Project that were raised as concerns by participants but not accepted by the Proponents are addressed by the Panel in other chapters of this Report.

Some participants urged the Panel to take a broader view of alternative means of carrying out the Project in light of the Panel’s Mandate to consider the Project from the perspective of sustainability. These comments focused on the need for government preparedness and for the Project, as an Arctic project, to mitigate the effect global GHG emissions are having on the Arctic by purchasing carbon credits to offset the GHG emissions that would be emitted from the Project and from the burning of the gas that would be produced by the Project.

These participants recommended that the Project not proceed at this time — not so much because they opposed the Project as such, but because in their view government and other northern institutions were not ready for this development and that, in order for the people of the North to benefit, the alternative means for developing the Project had to include an institutional infrastructure capable of properly managing the Project. In its closing remarks, Alternatives North Coalition told the Panel:

our position is that it is not in the public interest to proceed with the MGP as currently proposed...Our governments and many northerners are not ready for development of this scale and pace. We do not have in place, and cannot expect to have in place in time for the MGP, adequate and specific measures and plans to protect the environment and residents, or to ensure a fair and equitable distribution of the costs and benefits of the MGP.

The Joint Review Panel has the option to recommend that the MGP proceed or not. We submit that it is your duty to recommend the MGP not proceed. Failing that, we urge you to set the bar high. If approved, this multi-billion dollar energy project will surely transform the NWT in unpredictable and

undesirable ways; in ways that no order of government has adequately prepared for.

If you determine that the project can proceed, we urge you to craft recommendations that:

- are guided primarily by public interest and concern for net contribution to sustainability;
- are sufficiently detailed to ensure they can be incorporated into regulatory permits and licenses to control the MGP’s impacts;
- consider the project from “cradle to grave,” including proper reclamation and closure plans, as well as social and economic transition planning; and
- call for the use of best practices in aspects of the design, construction, operation, and decommissioning of all project components of the MGP. (J-ANC-00085, p. 4)

The preferred option of the SCC was that the Panel recommend that the Project not be approved so as to allow time for government and northern institutions to improve their level of preparedness for the development and induced development, including the conduct of a scenario-based cumulative effects assessment and policies proven to reverse Canada’s negative trend towards GHG emission contributions. This, suggested SCC, could be interpreted as a temporal alternative. In its view “the JRP has heard enough to conclude that under the current state of readiness, the MGP will likely lead to significant adverse environmental impacts and will not contribute to sustainability.” (J-SCC-00119, p. 4) In the alternative, the SCC’s second recommendation was that “should the JRP reject this SCC recommendation #1 and instead recommend approval, SCC urges the JRP to recommend that such approval not occur until after a sufficient level of readiness is attained.” (J-SCC-00119, p. 20)

Under the slogan “do it right, do it green or don’t do it at all,” Ecology North recommended that the Panel “require that the Mackenzie Gas Project fully offset both operational and end-use greenhouse gas emissions through the purchase of certified carbon credits.” (J-ECNO-00030, p. 17)

In response to the issue of being required to make the Project carbon neutral, the Proponents stated:

Other interveners have suggested that the Proponents be bound by financially onerous conditions tied to greenhouse gas emissions, such as the requirement to be carbon neutral or to purchase offsets. For example, Ecology North has argued that the Proponents should be required to be carbon neutral by completely offsetting its greenhouse gas emissions, either through the purchase of carbon credits or by some other alternative means. The alternative means that were proposed by Ecology North in its Topic 4 presentation were to require the Project to construct 7,700 wind generators, renovate 6.4 million homes and/or

preserve 21 million acres of forest. Ecology North estimated that the cost of purchasing offsetting carbon credits for both the Project and the end use of MGP natural gas would be 19.48B\$. Ecology North did not provide an estimated cost for the recommended alternative means.

The Proponents disagree with Ecology North and others' recommendation that the Project be made subject to financially onerous, Project-specific conditions, which go far beyond any requirement for any other project in Canada. As stated by Mr. Ottenbreit, the Proponents do not agree that any constraints should be placed on the MGP that are not placed on other Canadian projects with which the MGP has to compete. Notably, the Federal Government has also indicated that Ecology North's approach would do little to address Canada's contribution to overall carbon footprint in a comprehensive manner. Furthermore, giving effect to Ecology North's proposal would clearly make the Project uneconomic.

Although a project's emissions can and should be considered in a project-specific environmental assessment (as was done in this case), global/national issues relating to strategies for reductions of greenhouse gas emissions properly fall within the ambit of national interests and international obligations, and must be addressed in a fair and consistent manner by legislation and its respective regulatory bodies. The Federal Government has indicated its intent to develop industry-wide targets for greenhouse gas emissions, the timing of which is not tied to the Project. (J-IORVL-01050, pp. 141–42)

PANEL VIEWS

The Panel is of the view that the Proponents have considered alternative means of carrying out the Project and notes they have stated that they would continue to do so. Changes to location and timing of Project facilities, made in response to community concerns or Project costs or design, were generally well received by community and government authorities. The Panel is satisfied that the Proponents have adequately identified and examined alternatives to the Project and alternative means of carrying out the Project that were technically and economically feasible, and have identified the environmental impacts of each alternative means in determining their preferred alternative. These alternative means were presented by the Proponents and were considered by the Panel and the public during the course of the Panel's hearings. The changes proposed by the Proponents were accepted by the Panel as forming "the Project" that was the subject of the Panel's review.

5.3 THE RECEIVING ENVIRONMENT

5.3.1 IDENTIFICATION OF VALUED COMPONENTS

To focus their assessment of Project impacts, the Proponents selected valued components of the biophysical and human environment for study. These valued components (VCs) were selected on the basis of regulatory status, community concerns, socio-economic importance, ecological vulnerability, information availability, and as established in previous environmental assessment practice. For each of these VCs, the Proponents identified key indicators, that is, features of a VC that can be measured and used to predict impacts. The prediction of impact is based on the hypothetical pathways by which a Project activity could affect a VC. This is a well-accepted approach in impact assessment and was not disputed in principle during the Panel's proceedings.

There were some differences of views among participants with respect to the actual selection of valued components, indicators and pathways. These are for the most part considered in the topic-specific chapters, notably Chapter 10, "Wildlife." The thematic organization of topics reviewed during the course of the hearings was not substantially different from the Proponents' EIS. During the hearings, however, issues emerged that the Proponents had not originally addressed. The individual chapters in the Panel's Report are therefore organized primarily on an issue basis, rather than a sequential consideration of VC by VC.

5.3.2 TEMPORAL AND SPATIAL BOUNDARIES

TEMPORAL BOUNDARIES

Temporal boundaries encompass the period of time over which the Project is anticipated to be in existence and to give rise to impacts on the environment. The EIS Terms of Reference required that the Proponents "assess the potential impacts on the environment...for all phases of the proposed Project. Temporal boundaries should recognize the proposed lifespan of Project activities and facilities, and duration of potential impacts." (EIS Terms of Reference, p. 41)

The Proponents set out temporal boundaries that, as revised according to the 2007 Project Update, included three phases with dates estimated at that time as follows:

- Project Definition Phase (2002–2009);
- Design and Construction Phase (2009–2014, with field construction beginning in the summer of 2010); and
- Operations Phase (2014, continuing as long as there is economic gas production in the region).

The Proponents stated:

Temporal boundaries are the time frames that were used in the assessment to consider project effects. The assessment considered the effects of the project at a number of different stages in the life-cycle of the project, because the nature of effects on the environment varies from one stage of the project to another.

The EIS started with a baseline scenario that represented the biophysical and socio-economic conditions between 2002 and 2004. In the EIS, the effects likely to occur during the construction period were considered. In general, this is the period when the highest effects are expected because it will be the period of maximum disturbance, both to biophysical and socio-economic conditions. Effects were also predicted for the operational period.

Effects of the activities related to project decommissioning and abandonment were also examined. (Bette Beswick, HT V6, p. 494)

A number of participants raised concerns based on their experience with other oil and gas development in the Mackenzie Beaufort Delta. Chief Charlie Furlong, a director of the Gwich'in Tribal Council and chief of the Aklavik Indian Band, told the Panel there had been impacts from oil and gas activity that took place in the 1970s and from the boom and bust "when industry pull out their stakes and left a legacy of social problems, some of which are still impacting us today." Chief Furlong also saw that there could be benefits associated with the Project that would extend beyond the life of the Project. In the context of his support for the Project, he told the Panel "We must take full advantage of this huge opportunity because we know the benefits of this project will last over many, many generations." (HT V6, p. 538)

The Panel acknowledges that adverse impacts and positive benefits can take place for periods of time extending beyond the life of the Project and has addressed the temporal nature of predicted impacts as they relate to specific valued components throughout this Report.

SPATIAL BOUNDARIES

PROJECT ASSESSMENT BOUNDARIES

The Proponents used several scales of "study areas" for their assessment, depending on the purpose. The biophysical study areas chosen were specific to each topic. The Proponents used two types of areas for assessing environmental impacts:

- Local Study Area (LSA): an area used to assess Project-specific effects; and
- Regional Study Area (RSA): an area used to assess Project-combined effects and cumulative effects.

The study areas selected were determined according to the expected spatial extent of the Project effects and the mobility of valued components.

The LSAs were generally a 1-km-wide corridor for pipelines and a 1-km-wide buffer around each infrastructure and facility site.

The three key RSAs for biophysical purposes were:

- Pipeline corridor study area: a 30-km-wide corridor on either side of the centre line of the right-of-way;
- Production area study area: a 40-km-wide buffer around the Project footprint plus the western half of the Tuktoyaktuk Peninsula and the winter range of the Cape Bathurst caribou herd; and
- Marine area study area: the Mackenzie Delta and estuary, and the Beaufort Sea to the 50-m depth contour.

The Proponents used a single socio-economic study area based mainly on community proximity to the Project where, in the Proponents' view, the direct or indirect effects of the Project could affect permanent residents.

Further details on the Proponents' study areas are provided in the relevant topic-specific chapters, as are participants' views on the suitability of these boundaries.

PROJECT REVIEW AREA

The term "Project Review Area" is a generic term established by the Panel for use in this Report to describe the area that encompasses the subject matter referred to in the comments and submissions from participants in the Panel's proceedings. While the term may overlap areas covered by the "Project Area," "Project Study Area," "Regional Study Area" and "Local Study Area" — terms that were developed and used by the Proponents in their EIS — "Project Review Area" is not to be confused with these other terms. Although the focus is primarily related to the western NWT, Yukon and northwest Alberta, the subject matter considered during the Panel's review in some cases extended beyond that area. As such the Project Review Area is not a single geographic area with a fixed geographical boundary. It is a term of convenience that is context sensitive and has no legal status.

5.3.3 BASELINE INFORMATION

A sound baseline understanding of existing conditions in the Project Review Area is needed for at least two reasons. The first is to provide the review process, and in particular the Panel, confidence that the status and trends of the valued components identified by the participants are factually grounded. This is essential to evaluating whether the mitigations and enhancements proposed suit the conditions to which they will be applied, and thus the likelihood of their success, on which the determination of impact significance depends. As specified in the EIS Terms of Reference:

The description of the environment should, when read in combination with the Project description...allow the Panel to reasonably identify and understand the selection of Valued Environmental Components (VECs) for the physical,

biological and human environments...potential interactions, and potential impacts that may be caused by the Project. (EIS Terms of Reference, p. 23)

The second reason is to provide governments at all levels, as well as interested organizations and individuals, with an adequate base of information, should the Project proceed, on which to verify impact predictions, to monitor the effectiveness of Project mitigations and enhancements, and to modify them as necessary. This base of information should also enable others to judge how well the Proponents, governments, communities and individuals are responding to the challenges and opportunities that the Project may provide.

The Panel thus requires not only a sufficient baseline of information for its own review of the assessment of Project impacts, but also assurance that a sound baseline exists (or will exist) for the benefit of those charged with monitoring Project mitigations and outcomes. In both cases, the quality and comprehensiveness of the baseline must be sufficient to inspire confidence both in impact predictions (whether those made by the Proponents or participants) and in the measures taken to mitigate or enhance impacts.

It is first necessary to determine if the valued components have been correctly identified. These valued components should focus on what the affected population values and considers being at risk and what or who is vulnerable in relation to Project impacts. The baseline should accurately portray the status of those valued components and their trends over time. This in turn depends on selecting indicators that directly illustrate the conditions and can provide a measure of change over time. In the topic-specific chapters that follow, the Panel considers:

- whether the indicators used by participants (and particularly the Proponents) are appropriate; and
- whether the measurement (quantitative or qualitative) of those indicators provides a sound understanding of both conditions and trends with respect to any particular VC.

In the Panel's view, the requirement for adequate baseline information applies not only to the Proponents but also to those who will be responsible for monitoring impacts, testing effectiveness of mitigations and implementing follow-up programs. It is in large measure governments, organizations and communities that will need an adequate baseline. It is by no means the Proponents' exclusive responsibility to provide that baseline.

While a comprehensive and authoritative baseline does not necessarily have to emerge from the review itself, the Panel must be satisfied that adequate baseline information either does exist or can be produced for the purposes specified should the Project proceed. Is there, or would there be, a sufficient basis for predicting project impacts — both adverse and beneficial? Is there, or would there be, a sufficient basis for monitoring the impacts of the Project, and for developing programs and

strategies to ensure that potential adverse impacts are avoided or potential benefits captured? Is there, or would there be, a sufficient understanding of conditions and trends without the Project, and hence what benefits or adverse impacts would result from the Project by comparison? Would this baseline enable one to attribute impacts to the Project itself (or to the cumulative impacts of the Project), rather than to other factors?

The Panel considers, in the topic-specific chapters, whether the review process actually produced a comprehensive and credible baseline, and if not, whether the needed baseline information would be produced in a timely and useful way for the purposes required of it. Specific recommendations on addressing baseline needs will be found in those chapters.

If the baseline is neither methodologically robust nor comprehensive in coverage, then the user cannot be confident of conclusions, predictions or monitoring based on it. Is this a problem? If so, for whom is it a problem, who if anyone should fix it and how, and what beneficial result would occur? These more general questions are considered in Chapter 18, "Monitoring, Follow-up and Management Plans."

5.3.4 TRADITIONAL KNOWLEDGE

The EIS Terms of Reference directed the Panel to:

promote and facilitate the contribution of traditional knowledge to the environmental impact review process. It is recognized that approaches to traditional knowledge, customs, and protocols may differ among Aboriginal communities and persons with respect to the use, management, and protection of this knowledge. The Joint Review Panel can consider the views of communities and traditional knowledge holders during the environmental impact review process and determine which information should be kept confidential. (EIS Terms of Reference, p. 9)

The Terms of Reference also directed the Proponents to "use and incorporate traditional knowledge into the EIS" (EIS Terms of Reference, p. 11) and, in their impact analysis methodology, to "specify and reference sources for any contributions based on traditional knowledge." (EIS Terms of Reference, p. 40)

The Proponents chose to obtain Traditional Knowledge (TK) for the purposes of their EIS chiefly by organizing a program of TK studies in the Project area communities. The key components of the program included:

- reviewing existing information;
- collecting new information; and
- producing TK baseline reports.

Under their TK studies program, the Proponents initiated discussions with each community to ascertain whether it wished to undertake such a study. If so, contractual agreements for conducting the study were negotiated, with the Proponents

providing all funding. Under these agreements, the TK studies were carried out under the direction of local working groups, not the Proponents or their consultants. The Proponents were authorized to use the data for Project planning and for environmental impact assessment. However, the agreements specified that TK belonged to the individuals and communities providing the information, and their organizations were “encouraged” to retain ownership of the maps and reports produced.

At the time the EIS was filed (October 2004), none of the community TK studies had been completed. The Panel therefore requested additional information on the progress and use of these studies in the review process. In March 2005, the Proponents advised that:

- only one study had been completed, several were still in progress, and some were still in the planning stage;
- while they had permission to use the TK studies, each individual community would decide whether the reports would be publicly disclosed, and
- pending completion of the TK studies, the Proponents were relying on information obtained through their public participation program and from Project-related concerns expressed by community members, and on existing published sources of TK.

The Panel issued advice by way of an announcement to all participants in May 2005 regarding the use of TK in its review. The Panel observed that most of the Proponents’ TK studies had not yet been completed, that no arrangements had yet been confirmed to release any of these studies on the public record, and that this state of affairs might persist into the hearing phase of its review. The Panel therefore encouraged the submission of information based on TK independently of the submission of the Proponents-sponsored TK studies. This could be done either by informal presentations by individuals and community groups at Community and General Hearings on matters related to issues identification, baseline information and local capacity to respond to the Project or by formal submissions based on TK by participants at Technical Hearings relating to Project impacts, mitigations and follow-up monitoring.

Early in the public hearings, the Panel questioned the Proponents further on the status and availability of the TK reports, their scope, methods, quality and consistency, and on how and to what extent the Proponents would be relying on them for their assessment. The Panel understood from the responses that the TK reports, to the extent that they might become available, would supply information mainly relating to wildlife and fisheries, community use of lands and resources, and sites or areas of particular importance, but little or no information on current social and economic conditions. The studies were not themselves intended to provide significance determinations of Project impacts, but rather to provide the Proponents with a basis for making these determinations according to their own criteria.

Neither the Proponents nor their consultants exercised any control over the consistency of study content, selection of study leaders or report writers, representativeness of information provided or verification of that information. These matters were under the direction of the working groups themselves. The Proponents were provided the results of the studies, but not raw data for independent analysis.

Ultimately the Panel received five TK reports. In three cases (Sambaa K’e Dene Band, Jean Marie River First Nation and Pedzheh Ki First Nation), the communities in question applied to have certain portions of the reports (chiefly with respect to site-specific information) kept confidential, in accordance with the Panel’s *Directions for Procedures for Hearings*, and its *Criteria for Confidentiality Orders for Traditional Knowledge Study Reports*. The Panel granted these applications, all of which came from the Dehcho Region where no comprehensive land claim agreement or resulting information-sharing provisions for land and resource management are in place. The Panel recognized that in these circumstances, the reports for which confidentiality orders were sought might contain information that the communities might not wish to, and were not compelled to, disclose to third parties.

Seven presentations based on TK reports were made to the Panel at community hearings; all of them in the Dehcho Region. These presentations were all placed on the public registry, with certain mapped information removed with the Panel’s authorization, on the same basis of confidentiality granted to the TK reports themselves.

The Panel also received a report prepared in 1997 on the Dene Tha’ First Nation traditional use area. The Dene Tha’ First Nation advised the Panel that this study was not comprehensive with respect to the Project, and that they hoped to add to that information before the construction of the Northwest Alberta Facilities.

The EIS Terms of Reference defined TK for the purposes of this review. Neither the Proponents nor any participant suggested that the Panel should adopt an amended or alternative definition, and the Panel does not find it necessary or appropriate to comment any further.

Because none of the TK studies was completed, and some not even begun, when the EIS was submitted, the Panel concludes that the EIS was not informed by the TK studies program. To the extent that TK was used to inform the Proponents’ assessment and their significance determinations, the Panel understands that the source of this TK was either previously published information or information obtained through the Proponents’ public participation program. How the Proponents actually used this information was not disclosed in the EIS or in subsequent filings.

Because the Panel itself received only 5 of the 13 TK studies undertaken, the TK information generated by the Proponents for the purposes of the review was incomplete. However, some of the studies that were filed with the Panel provided

clear and precise information about specific concerns, mainly with respect to valued components of lands and resources, local concerns about potential Project impacts and how Project routing and siting could be amended to avoid these impacts. The Panel considers that, during the course of many community and general hearings, it heard considerable TK information from participants. The Panel has relied on this information, in addition to the TK studies it received, to ensure that it has taken TK into account in accordance with the EIS Terms of Reference.

5.4 IMPACT ASSESSMENT

The impact assessment process examines the interaction of the Project with the receiving environment. It begins by identifying the potential impacts of the Project, and predicts whether residual impacts would be likely to occur after the application of the Proponents' designs, management plans and mitigations. The impact assessment process then considers the uncertainty associated with these predictions and mitigations and assigns significance to residual impacts on the basis of some stated criteria. Finally, it identifies means by which impacts (positive or negative) would be monitored and, if necessary, corrected (adaptive management). These were in essence the principles that the Proponents used in their EIS. These general principles were not disputed by participants, although there were many disagreements about how the Proponents applied them and over the conclusions the Proponents reached.

The steps identified above are in fact iterative and interconnected, although the Panel considers them in sequence for the purposes of this discussion, which also includes a consideration of cumulative impact assessment.

The Project as described in the EIS and subsequent filings was at a conceptual stage in both engineering design and project mitigation. The Panel accepts that Project design and mitigation were at a conceptual stage during its review, and that for the most part the Proponents had provided sufficient information for the Panel's review, given that stage of Project development. As a consequence, however, the Panel has necessarily applied a precautionary approach in its assessment and has sought to provide guidance to downstream regulators as they consider the Project in greater detail, should it proceed. The Panel's views on these matters are set out in further detail in subsequent chapters, particularly Chapter 6, "Project Design, Construction and Operations," and Chapter 10, "Wildlife."

The Panel observed that participants used the terms "impact" and "effect" interchangeably and without distinction. The *Canadian Environmental Assessment Act* does not use the term 'impact' yet both the *Mackenzie Valley Resource Management Act* and the JRPA use the term "impact on the environment" to include any effect on the biophysical, social or cultural environment. Consequently, in addition to being mindful of the full definition of the term "impact on the environment" in the JRPA, the Panel

has used the term "impact" as opposed to "effect" throughout its Report to refer to any change the Project might cause to the biophysical, social or cultural environment including any impacts of such change and any cumulative impacts.

5.4.1 IMPACT PREDICTION

The overall approach taken by the Proponents to the identification and assessment of potential impacts was to apply sufficient mitigation to each Project-related impact to the point where significant adverse impacts would be considered not likely to occur. If significant adverse impacts were not considered likely to occur as a result of the individual Project activities, the Proponents then concluded that, in aggregate, there would also not be any significant cumulative adverse impacts. The Proponents' conclusion was dependent upon the effective application of mitigation measures, monitoring and adaptive management.

The Panel notes that, for the Proponents' significance determinations to be valid, their mitigation measures would need to be appropriate to the situation in which they were applied and be fully effective in their implementation. During the Panel's review, however, it became clear that site-specific information was not complete in terms of baseline environmental information and that appropriate mitigation measures had not been fully designed. Nevertheless, the Proponents expressed confidence that they had appropriate and effective mitigation measures available to them and that they could and would apply them.

The net effect of the Proponents' approach is that, if accepted, all other participants and the Panel would have to:

- rely on the implementation of measures and actions some of which are not yet completely known;
- assume that these incompletely described measures and actions would be entirely effective; and
- trust that the Proponents and other parties would know when those measures and actions have not been effective and take the appropriate action to remedy an unforeseen situation.

The Panel is not entirely persuaded of the merits of this approach and acknowledges the concerns that a number of participants expressed about it. In general, the Proponents' approach reinforces the need, in the Panel's view, for a precautionary approach to impact prediction. The Panel identifies its specific reservations about the Proponents' impact predictions and makes recommendations as appropriate in the topic-specific chapters.

5.4.2 PROPONENTS' COMMITMENTS, MITIGATION AND ENHANCEMENT

Notwithstanding its reservations regarding the Proponents' approach to impact predictions, the Panel notes that the Proponents proposed many detailed plans, actions and measures

to avoid, reduce or otherwise minimize the potential adverse impacts of the Project, whether on the biophysical or the socio-economic environment. These were embodied in commitments that were made over the course of the Panel's review. These commitments ranged from the ones formally stated by the Proponents in their Commitment Tables filed with the Panel in March 2007 to less formal undertakings that were given orally during the hearings, not all of which were necessarily included in the Tables. In some cases, these commitments were subsequently formalized through agreements with other parties, for example, the Socio-Economic Agreement with the Government of the Northwest Territories (GNWT).

Except where otherwise noted, the Panel, and presumably participants in the Panel's review, have relied on many of the commitments made by the Proponents. The effect of these commitments as mitigation measures has been a factor in the Panel's significance determinations.

In this context, the Panel has considered the enforceability of the Proponents' commitments and has noted in this regard the following proposed condition tabled by the National Energy Board (NEB) for comment in the Mackenzie Gas Project Hearing Order GH-1-2004 proceeding that has been made for each of the Proponents of the Project:

1. Unless the NEB [or Chief Conservation Officer] otherwise directs, [the Proponents] shall cause the approved facilities to be designed, located, constructed, installed and operated in accordance with the specifications, standards, policies, mitigation measures, procedures, and other information referred to in [their] application or as otherwise agreed to during the GH-1-2004 Hearing. (J-IORVL-01040 pp. 4, 18, 20 and 22)

The Panel understands that the effect of this condition would be to elevate all of the Proponents' commitments to the same status as specific conditions included in the NEB authorizations and thus be enforceable by the NEB.

In order to achieve a similar result for commitments made by the Proponents during the Panel's review, the Panel recommends as follows:

RECOMMENDATION 5-1

The Panel recommends that the National Energy Board's proposed conditions tabled by the Board in the Mackenzie Gas Project Hearing Order GH-1-2004 proceeding be amended for each of the Proponents to the Mackenzie Gas Project as follows:

1. *Unless the National Energy Board (or Chief Conservation Officer) otherwise directs, or except where the Joint Review Panel for the Mackenzie Gas Project (the Panel) has recommended otherwise, [the Proponents] shall cause the approved facilities to be designed, located, constructed, installed and operated in accordance with the specifications, standards, policies, mitigation measures, procedures, and other information referred to in their application or in the*

Environmental Impact Statement or other filings with the Panel or as otherwise agreed to during the GH-1-2004 Hearing or the review conducted by the Panel.

The Panel believes that the effect of this amended version of the proposed NEB conditions would be to elevate the status of all commitments made during the Panel review to the same level as those made in the NEB proceeding.

The Panel notes that NGTL filed with the Panel in November 2007 its own Commitments Table. As noted in Chapter 2, "Project Description," the Panel is aware that, since the conclusion of its hearings, the NEB has issued a Declaratory Order that the TransCanada Alberta System (which the Panel understands is, in effect, NGTL) is under federal jurisdiction and subject to regulation by the NEB. The Panel therefore recommends that conditions similar to those recommended for inclusion in any NEB authorizations issued for the MGP should also apply to the Northwest Alberta Facilities.

RECOMMENDATION 5-2

The Panel recommends that the National Energy Board include in any certificate or approvals it might issue in relation to the Northwest Alberta Facilities those conditions the Panel has recommended for inclusion in any certificate or approvals for the Mackenzie Gas Project that could be applied to the Northwest Alberta Facilities, with such modification as the National Energy Board may determine is appropriate having regard to the location, nature and scope of those facilities.

The Proponents applied the term "mitigations" specifically to the actions they would undertake to avoid significant adverse impacts of their own activities. The Proponents also undertook to provide "enhancements" to the Project that are intended to augment its benefits and strengthen its net contribution to sustainability. The Panel acknowledges this distinction and uses it in the same sense as the Proponents.

Finally, other participants, chiefly governments, undertook to implement various actions intended to minimize adverse Project impacts or augment beneficial Project impacts. The Panel refers to these as "measures," as distinct from "mitigations," which refers solely to the Proponents' own actions with respect to their own activities.

5.4.3 UNCERTAINTY AND THE PRECAUTIONARY APPROACH

One of the principles identified in the EIS Terms of Reference to "provide context for the [Environmental Impact Review] process" was the precautionary approach. (EIS Terms of Reference, p. 7) The Terms of Reference noted that "there is not one universally agreed upon definition of the precautionary approach or principle. The term has been used in environmental decision-making to address the increasing...prevalence of scientific uncertainty" and "informs the decision-maker to err on the side of caution,

especially where there is a large degree of uncertainty or high risk.” (EIS Terms of Reference, p. 10)

The Proponents stated that they applied a precautionary approach by applying conservative assumptions to ensure that impacts were not under-predicted:

[T]hroughout a conservative approach was used when considering what a potential effect might be and how it should be addressed as part of design, mitigation and residual effect categorization...For example, in cases where we weren't certain if the project would cause an adverse effect, we assumed it would. (David Kerr, HT V6, pp. 487–90)

With respect to socio-economic impacts, the Proponents indicated that the result of this approach was a tendency to understate the potential benefits and overstate the potential adverse effects of the Project and that it provides both regulators and planners with a conservative approach that addresses the difficulties of accurate effects prediction. The Proponents also identified the relative degree of uncertainty in prediction, which they considered most important for monitoring and adaptive management.

Many participants questioned the Proponents regarding their precautionary approach and suggested that the conclusions reached by the Proponents on a number of important impact predictions were not reflective of this approach.

Fisheries and Oceans Canada (DFO) identified uncertainties associated with the Project as one of its key ongoing concerns:

We have emphasised the need for a precautionary approach when dealing with these uncertainties and want to emphasise in our closing comments where this approach will need to be fully considered in the design, construction and operation/maintenance of the project if it proceeds. (J-DFO-00103, p. 2)

Environment Canada expressed the view that the Proponents' cumulative impacts assessment had not followed a precautionary approach as it applied to many areas of Project uncertainty. Similarly, Indian and Northern Affairs Canada (INAC) expressed the view that its inability to confirm the Proponents' conclusions in a number of areas warranted a precautionary approach.

As a consequence of uncertainties with respect to the Project, the Project context and the Proponents' assessment of and conclusions about Project impacts, DFO, INAC, Environment Canada and the GNWT emphasized the need for the Proponents to take a more precautionary approach with respect to mitigation, monitoring and adaptive management. In practical terms, the government departments told the Panel this meant that the Proponents should be more proactive and anticipatory and less reactive in designing and applying measures to address uncertainty in prediction and mitigation:

DFO has recommended to the Panel and to the proponents that a precautionary and adaptive management approach

must be applied at the outset of engineering design, construction and operation phases to mitigate impacts from frost hazards such that 1) they are prevented from happening; 2) any unforeseen impacts or mitigation failures are detected early; and 3) clear commitments made that through an effective monitoring program steps are taken to rectify them forthwith. (J-DFO-00103, p. 3)

Throughout this review, DIAND and other government agencies have been underscoring the importance of a proactive approach to avoiding and then mitigating environmental effects. And we have been concerned that, in some cases at least, the proponent seems to be relying on a more reactive approach: when problems arise, they'll solve them. Our experience suggests that prevention is better than cure and, in the North in particular, prevention is much — a much more effective way. So that is what we are talking about; a precautionary, preventative approach rather than a more reactive approach relying on solving problems as they arise. And in addition, again, we underscore the importance of ensuring that all mitigations, all best practices and improvement in best practises, and implementation of the blueprint are necessary to achieve this objective. (David Livingstone, HT V106, p. 10524)

With respect to the guidance offered in the EIS Terms of Reference, the Panel notes that a precautionary approach and the Precautionary Principle, as embodied in the Rio Declaration, have two distinct meanings and should not be conflated. The Precautionary Principle was rarely invoked and rarely applied in the Panel's proceedings. The Panel has focused on the need for a precautionary approach in the face of uncertainty and uses that term in preference to other variants used by a number of participants.

The Panel understands a precautionary approach as one that is designed to treat areas of impact uncertainty, especially when there is a threat of serious adverse or irreversible consequence. The Panel notes that the Proponents generally adopted a conservative approach to Project design and mitigation. Whether they had done so appropriately in all cases is considered in the topic-specific chapters.

The Panel observes that disagreement amongst the participants arose from uncertainties relating to:

- limited information about the nature and location of reasonably anticipated development beyond the Project as Filed;
- the reliability of predicted impacts of the Project, especially cumulative impacts;
- the effectiveness of proposed mitigation measures; and
- the adequacy of monitoring and adaptive management plans.

The Panel has approached the issue of uncertainty and the application of a precautionary approach mindful of the following considerations in determining whether the Project could result in

serious or irreversible damage and in the consideration of trade-offs between positive and negative impacts:

- the novelty of Project interaction in the receiving environment, and the proven or likely effectiveness of the Proponents' designs, management plans and mitigations in that environment;
- the degree of uncertainty about potential positive and negative impacts;
- the magnitude and duration of potential impacts and the extent to which they might be irreversible; and
- the extent and scale at which potential impacts could impair biological productivity, ecosystem health, local and regional capacities and community well-being.

The Panel accepts that a precautionary approach requires that:

- uncertainty is an explicit factor in significance determination;
- the implications of uncertainties for decision making are explicitly considered; and
- greater emphasis on monitoring and adaptive management is required.

As noted above, the Panel has applied this approach in view of the largely conceptual nature of the Project at the stage in which it was reviewed.

5.4.4 MONITORING AND ADAPTIVE MANAGEMENT

The Proponents stated that management of change was integral to their business. They explained how adaptive management would be incorporated during the life of the Project and stated that it was a key attribute of environmental plans:

Adaptive management is a process that involves changing mitigation that is not achieving the desirable effect or the predicted result. It will be used throughout each phase of the project and will be applied during inspection, where change in field conditions may be encountered during construction. (Kerr, HT V89, p. 8802)

The Proponents acknowledged the need to monitor impact predictions, listen to emerging stakeholder concerns and use adaptive management to ensure that this information was considered and adjustments made. The Proponents stated that local communities would have an opportunity to provide input on the success of mitigation measures and the need for adaptive management through their community monitors and other mechanisms. The process would follow industry standard protocols and procedures, and all adaptive management decisions would be reported and documented for use in subsequent monitoring programs.

Environment Canada and INAC both expressed concerns over the Proponents' approach to uncertainty and their approach to the exercise of precaution in impact mitigation and monitoring, and as a consequence, the implications for adaptive management, especially with regard to cumulative impacts. Environment Canada concluded that:

significant levels of uncertainty remain with regard to the nature and extent of potential project-specific cumulative effects and that, because of this uncertainty and the lack of detail available on aspects of project-specific mitigation, monitoring and follow-up and approaches to adaptive management, Environment Canada has limited confidence that the proponent will manage these potential effects appropriately; or that the proponent's approach to monitoring and management will make an effective contribution to assessments and management of regional cumulative effects.

Therefore, Environment Canada recommends that the proponent be required to demonstrate exemplary performance in all aspects of mitigation, monitoring and follow up and adaptive management, the identification, utilization and continuous improvement of best practices and through contribution to broad-based cumulative effects initiatives, such as the cumulative effects assessment and management framework and the cumulative impacts monitoring program, as outlined in our written submissions to the Joint Review Panel to date. (Chuck Brumwell, HT V104, p. 10263)

INAC stated that:

we couldn't confirm the Proponents' conclusions, and therefore, we feel that overall in this project a precautionary approach needs to be taken in all aspects of it and that using a precautionary approach, using sound mitigation, using thorough and effective adaptive management program, the appropriate monitoring terms and conditions, and so on and so on, that a project like this can be built, but it will rely on the implementation of all those measures and recommendations that have been put forward to the Panel to date to make it so. (Livingstone, HT V104, p. 10337)

INAC emphasized during hearings that robust adaptive management is essential given the changing environment. It noted the importance of monitoring the adaptive management practices applied to the Project to determine their effectiveness. INAC recommended that the Proponents develop monitoring follow-up and adaptive management plans and programs prior to regulatory approvals. INAC noted that, in addition to adaptive management of the monitoring and project implementation, plans and programs will also need to be adjusted periodically based on new information. INAC also noted that without tiered thresholds, no monitoring program is particularly useful in an adaptive management context.

Asked to comment on the Proponents' statement that their adaptive management process would follow industry standards and protocols, DFO, Environment Canada, the GNWT and INAC responded that they were not aware of any industry-wide standards, other than ISO guidelines.

The World Wildlife Fund stated that:

[p]erhaps the greatest fallacy that is perpetrated by proponents and governments alike, when they are eager to get on with the development, is that deficiencies in impact assessments, that is, gaps in our understanding, and deficiencies in plans to mitigate adverse effects, that is, gaps in preparedness, can be fixed sometime later through subsequent regulatory processes or adaptive management. (Dr. Robert Powell, HT V113, p. 11326)

The World Wildlife Fund further stated that:

real programs on the ground simply do not live up to the abundance of rhetoric about adaptive management. (J-WWF-00144)

The Alternatives North Coalition stated its concerns regarding thresholds and adaptive management:

I think one of the biggest problems here is the notion of adaptive management as the feedback loop both on the ecological environmental side and the socio-economic side. And in the absence of being able to identify clear thresholds and triggers for feedback, it's not clear that adaptive management is going to work. (Kevin O'Reilly, HT V92, p. 9216)

Several participants expressed the view that the Proponents' approach placed a heavy reliance on their proposed monitoring programs to determine the accuracy of impact predictions and the effectiveness of mitigation, when the monitoring programs themselves were ill-defined, highly conceptual and process-driven. These participants suggested that the result was to effectively defer the uncertainties associated with impact mitigation, management and monitoring to be addressed through adaptive management. The meaning and application of adaptive management, in turn, emerged as an area of disagreement as well.

The Panel understands adaptive management to be, essentially, management in the face of uncertainty. Adaptive management is meant to address the unavoidable limitations of impact assessment and mitigation/enhancement design, and to integrate means of responding to change and surprise. It is not an acceptance of trial and error or react and repair approaches to environmental responsibility. Ideally it is anticipatory and seeks to identify problems as they emerge based on well-grounded hypotheses and careful observation. Adaptive management complements best practice impact prediction, mitigation and enhancement, recognizing that avoidance of damage is typically cheaper than retroactive correction, that negative impacts

may not be correctable and that lost opportunities may never be recovered. Also, effective adaptive management is not a consideration to be left to the project implementation stage. It requires considerable pre-approval preparation and is therefore necessarily a subject for attention in the Panel's review.

The Panel identifies four key elements of adaptive management:

- establishing appropriate plans, methods, thresholds, capacities and resources for impacts monitoring and adaptive response;
- using monitoring findings to inform judgments about the effectiveness of mitigation and enhancement strategies and to identify emerging problems and opportunities;
- determining what identified problems and opportunities deserve response through adjustment or repair during project implementation; and
- ensuring that appropriate responses are undertaken, that their impacts are monitored, and that needs for further response are identified and acted upon.

Uncertainties in impact assessment and project planning arise at many levels and from a diversity of sources. These include the complexity of technical and economic aspects of project selection and design, the interrelated biophysical and socio-economic systems that provide the immediate and larger context for project assessment, and the nature of future changes that may influence project implementation and the cumulative impacts to which it contributes.

In the case of the MGP, the unavoidable uncertainties and the likelihood of important surprises are especially significant. The Project as Filed involves a huge and diverse region with different ecologies and communities, and it will have impacts beyond the geographic extent of its physical footprint. Even greater complexities and uncertainties are introduced by the less well-defined characteristics of the Project at its full design and expansion capacity in combination with the larger set of associated, induced and other developments.

Adaptive management has been widely advocated as an appropriate, even necessary, response to such uncertainties in the implementation of plans and projects. Proposals for its use in the MGP have been submitted by the Proponents and many other participants in the hearings. The Panel notes, however, that the advocacy and critiques of adaptive management reflect different definitions of and approaches to adaptive management. Many of the questions about its effectiveness were dependent on how it was understood.

ADAPTIVE MANAGEMENT IN RESPONSE TO IMPACT PREDICTION UNCERTAINTIES

Some of the submissions and comments on adaptive management in the Panel hearings focused on impact prediction uncertainties and consequent needs for follow-up monitoring of Project implementation to check the accuracy of

impact predictions, especially about mitigation initiatives, and to make adjustments in Project implementation as needed. This approach to adaptive management requires monitoring focused on particular predicted impacts, identification of discrepancies between predicted and actual impacts, and use of this information in determining needs for additional or adjusted mitigation efforts. For this, advocates underline the importance of specific initial predictions (against which actual impacts can be compared) and early determination of impact thresholds for determining when unexpected impact findings must trigger adaptive response. The underlying model here is that of a scientific test, though the monitoring might engage community as well as specialist monitors.

For this kind of adaptive management, the key preparatory steps include ensuring that impact predictions are specific enough to be testable (hypotheses), establishing clearly defined impact thresholds to clarify where and when adaptive responses will be necessary, and preparing contingency plans, resources and capacities for responsive action especially in areas where impact predictions may be uncertain and where predictive errors may have serious consequences.

ADAPTIVE MANAGEMENT IN RESPONSE TO ILL-DEFINED POSSIBILITIES AND SURPRISE

Some discussion of adaptive management focused on broader uncertainties and surprises arising from the complexity of ecological and socio-economic systems, changes in the regional context (especially due to the expansion capacity design inherent in the Project) and changes in the global context (e.g. due to climate change). The consequence is the possibility of unexpected impacts or impacts of unexpected significance or in unexpected locations. Because the associated concerns here are unanticipated, they may not be noticed in ordinary monitoring of predicted impacts and planned mitigation and enhancement initiatives. Broader and more comprehensive monitoring is needed to identify such emerging problems and opportunities. This monitoring could be concentrated on areas of pre-identified importance — valued ecosystem and community components — and informed by pre-identified impacts thresholds. But the significance of identified changes and the nature of the responses needed would be tested against broader objectives and progress towards desired ends. Delineating such ends could involve efforts to describe plausible and desirable future scenarios. The underlying model here is closer to iterative planning than to scientific experiment.

For adaptive management focused on broader uncertainties and surprise, the key preparatory steps centre on adaptive design and adaptive governance capacity. The Project, associated undertakings and induced development initiatives, and the planning and regulatory regime governing these activities would all need to be designed in ways that provide options for adaptive adjustment (e.g. design with an emphasis on flexibility, reversibility, fall-back options). But the desirable preparations also involve establishing and strengthening the capacity of all

stakeholders — responsible government authorities and affected communities, as well as implementing companies and their contractors — to identify unexpected changes, to collaborate in analysis of their significance and to determine appropriate responses.

The Panel accepts that appropriate adaptive management preparations and plans for the MGP must be capable of addressing both of these forms of adaptive management — one focusing on predicted impacts and the other focusing on broader uncertainties — and the methodologies suitable to them. This means that adaptive management cannot be a consideration only for the Project as Filed or expanded, and it cannot be a responsibility only for the Proponents. Inevitably, the major concerns in this case are the cumulative impacts, positive and negative. These involve, in various ways, all of the participants in the review, most notably, the Proponents, the territorial and federal governments, Aboriginal authorities and organizations, and wildlife management bodies and regulators.

These matters are discussed further in Chapter 18, “Monitoring, Follow-up and Management Plans.”

The Panel notes that the definition of “impact on the environment” in the Panel’s Mandate includes not just the impact the Project could have on the environment but also “any change to the project that may be caused by the environment.” The Proponents’ prediction of changes the environment might cause on the Project as well as their proposed measures to avoid or mitigate such changes are addressed in Chapter 6, “Project Design, Construction and Operations.”

5.4.5 CUMULATIVE IMPACT ASSESSMENT

Two central concerns raised by participants during the Panel hearings were the temporal and spatial scope of the Proponents’ cumulative impact assessment (especially with respect to future developments that may be induced by the Project) and the application of cumulative impacts significance criteria.

In their cumulative impact assessment, the Proponents focused on identifying Project-specific cumulative impacts. This approach examined how specific types of Project impacts could combine spatially and temporally with similar impacts caused by other projects to create a cumulative effect (e.g. cumulative impacts on direct mortality, cumulative impacts on habitat). The analysis was conducted and reported at the level of direct Project effects on valued ecosystem components; estimates of such direct cumulative effects were not integrated into an overall assessment of valued component sustainability.

The Proponents considered the impacts of possible future expansion of the Project. Their expansion case considered the likely effects of increasing the throughput of gas by adding more compressor stations and other gas sources. They stated that:

Future gas projects in the Mackenzie Delta region that might be induced by the project are also included in the cumulative effects assessment. A gas project is considered induced if its development is contingent on the development of the Mackenzie Gas Project. **A project is included in the cumulative effects assessment if a precedent agreement exists for that project to ship gas on Mackenzie Gas Project pipelines.** [emphasis added] (EIS, V1, Section 2, p. 35)

This qualifier, emphasized above, is important. The Proponents identified only the following developments as reasonably foreseeable in preparing their cumulative impacts assessment:

- the Devon Canada Corporation's Beaufort Sea exploration drilling program;
- the Deh Cho Corporation Mackenzie River bridge at Fort Providence;
- the De Beers Snap Lake diamond mine; and
- the GNWT Mackenzie River winter bridges.

In response to a Panel request, the Proponents described a future scenario of induced development which they considered hypothetical. The Proponents concluded that including the induced development in the cumulative impact assessment would not result in a Class I significance designation (i.e. potentially threatened sustainability of a valued component) for any of the cumulative effects assessed.

The Proponents stated that the list of reasonably foreseeable projects was complete and appropriate at the time. They stated that an assessment of hypothetical land uses had been performed that included the seismic and drilling activity associated with potential future exploration activity. They also noted that a conservative precautionary approach was used in conducting the assessment of the potential impacts of reasonably foreseeable projects. The Proponents therefore disagreed with statements by INAC and Environment Canada that the predicted cumulative effects had been underestimated in the assessment.

Many participants were of the view that potential cumulative effects of the MGP are of great concern and that the cumulative impact assessment done by the Proponents was insufficient. The SCC argued that by not including potential future induced development in their analysis, the Proponents had failed to meet the EIS Terms of Reference provisions, which required that they employ best practices.

Participants advocated that the Panel should recommend that a scenario-based cumulative impact assessment be done to gain insight into the implications for impacts of future induced development on the sustainability of valued components. This issue is addressed in Chapter 18, "Monitoring, Follow-up and Management Plans."

Environment Canada asserted that the Proponents had not used best practices in the cumulative impact assessment. The view of the department was that there were some likely projects that were not addressed in the cumulative impact assessment and should have been, and that the cumulative impact assessment analysis did not address all valued components that should have been included, specifically the Kendall Island Bird Sanctuary.

The Panel notes that the Proponents' focus on Project-specific cumulative effects resulted in a narrow scoping in regard to the spatial extent of the analysis and the identification of reasonably foreseeable future developments. The spatial extent of the cumulative impact assessment is the same as that employed for the EIS. An approach that focused on the conditions of valued components and the impact of the Project on those conditions would have resulted in spatial boundaries broader than those considered by the Proponents. The Proponents' criteria for identifying "reasonably foreseeable" developments likewise served to limit the scope of its cumulative impact assessment.

The Panel accepts that the Proponents' approach to considering induced developments in the cumulative impact assessment was consistent with the 1994 *Reference Guide for the Canadian Environmental Assessment Act — Addressing Cumulative Environmental Effects*, which states that in most cases induced development will not be considered as part of a cumulative impact assessment.

However, the Panel also notes that other, more recent guidance advocates the consideration of induced developments in a cumulative impact assessment, specifically the 1999 *Operational Policy Statement — Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act*, the 1999 *Cumulative Effects Assessment Practitioners Guide*, and the guidance prepared for assessments conducted under the requirements of the *Alberta Environmental Protection and Enhancement Act* and that for the *Mackenzie Valley Resource Management Act* (MVRMA).

The 2004 *Environmental Impact Assessment Guidelines* issued by the MVEIRB for preparation of environmental impact assessments under the MVRMA indicates that "[i]dentifying reasonably foreseeable future developments involves a broad prediction for which less detail is expected than when identifying present or past human activities."

The 2004 Guidelines direct Proponents to include as reasonably foreseeable "other developments that have not been formally proposed but can be reasonably foreseen" and, in discussing an example of a proposed pipeline through a previously inaccessible area with little existing development, asserts that:

if looking at similar cases indicated that a certain type and intensity of induced development routinely followed, then these types of induced developments should be considered reasonably foreseeable for the proposed development, even though no applications for them have been submitted. (MVEIRB EIA Guidelines, March 2004, pp. 81–82)

The EIS Terms of Reference indicate that “a degree of certainty” about a future project or activity is needed for it to be considered in the MGP cumulative impact assessment (EIS Terms of Reference, p. 62) and also that the environmental assessment, to the extent possible, “use current, accepted methods of practice in the Northwest Territories and Alberta or relevant to the Project area.” (EIS Terms of Reference, p. 40)

In the Panel’s view, the Proponents’ focus on Project-specific cumulative effects unduly narrows the spatial and temporal scope of the assessment. This approach serves to justify the Proponents’ view that future developments to support the Expansion Capacity Scenario are a “hypothetical land use.” The Panel has adopted the more recent (1999) CEA Act guidance and the (2004) MVEIRB guidance in reviewing the cumulative impacts of the MGP. On this basis, and for the reasons cited in Chapter 3, “Potential Future Developments,” the Expansion Capacity Scenario described in that chapter is considered to include a range of reasonably foreseeable developments and the Panel has approached the review of the Project’s cumulative impacts resulting from future induced developments with this in mind.

To summarize, and as elaborated in Chapter 3, “Potential Future Developments,” the Panel has approached its overall review of the Project’s cumulative impacts assessment according to what it refers throughout the Report as:

- the Project as Filed;
- the Expansion Capacity Scenario (considered by the Panel to be inclusive of a range of reasonably foreseeable developments induced by the Project); and
- Other Future Scenarios (considered by the Panel to include future hypothetical developments in addition to those induced by the Project).

The Proponents used the same criteria to determine the significance of cumulative socio-economic impacts as they did for Project-specific impacts. However, the Proponents used different criteria to determine the significance of cumulative biophysical impacts than the ones they used to determine Project-specific biophysical impacts. In determining the significance of cumulative biophysical impacts, the Proponents used the following classification system:

Class I effects represent those that are of most concern. In this class, the predicted trend in the value component could threaten its sustainability in the regional study area and should be considered a management concern. Research, monitoring and recovery initiatives should be considered under an integrated resource management framework. A Class I effect would be considered to be significant. ...

Class II effects are those where the predicted trend, in the valued component, will likely result in its decline to lower than baseline but stable levels or quality in the regional study area. Regional management actions, such as research, monitoring and recovery strategies might be required. ...

Class III effects are considered to be the least concern and would result in no change or could decline in the regional study area during the life of the Mackenzie Gas Project but should recover to baseline after decommissioning and abandonment. No immediate management initiatives other than adherence to responsible industrial practices are required. (Kerr, HT V102, pp. 10098–99)

The EIS states that these three classes are adopted from the guidance provided by MVEIRB, and the class designations were based on professional judgment.

The Proponents determined that none of the cumulative impacts would be of Class I significance (the only class that leads to a conclusion of significant effect). The Panel does not agree with this judgment and acknowledges the concerns that a number of participants expressed about it.

The Panel notes that, although the significance classification employed by the Proponents is based on the MVEIRB guidance, there is a critical difference. The significance classes recommended by the MVEIRB guidance specify levels of population decline that would be associated with each class (Class III: less than 1%, Class II: 1% to 10%, Class I: greater than 10%). The significance classes employed by the Proponents do not specify levels and are focused principally on habitat loss and not on population status and levels.

Additional discussion and recommendations on topic-specific cumulative impacts can be found in the relevant chapters of this Report. The implications and deficiencies of the Proponents’ approach to cumulative impact assessment and Panel recommendations to address them are dealt with in Chapter 18, “Monitoring, Follow-up and Management Plans.”

5.4.6 SIGNIFICANCE OF PROJECT IMPACTS

The concept of “significance” is central to the Mandate of the Panel. The Preamble to the JRPA recites that the Parties to the JRPA “agree that development should occur in a manner that protects the environment from **significant** adverse environmental impacts unless justified...” [emphasis added] Section 2 of the Schedule to the JRPA, setting out the Panel’s Mandate, requires that the Panel’s review “have regard to the protection of the environment from the **significant** adverse impacts of proposed developments...” [emphasis added] Section 4.8 requires that the Panel’s Report include “a rationale, conclusions and recommendations regarding the nature and **significance** of impacts on the environment...” [emphasis added] Finally, the list of factors to be considered by the Panel includes the “significance” of impacts of the Project.

Notwithstanding the fundamental role of “significance” that follows from these provisions, neither the JRPA nor the relevant legislative framework explicitly defines the term or provides specific criteria to be applied in making individual determinations

of significance. Nor is there a generally accepted meaning of the term that is helpful in coming to a finding on the significance of any specific impact.

Dr. Chris Burn, appearing before the Panel on behalf of INAC, stated:

environmental significance is actually a question of what humans believe is environmentally significant. In other words, it's our determination of what is significant.

What is environmental significance? And I think that's the question that you, as a panel, have been asked to determine. We've told you what can happen. And I think really it's the Panel's charge to determine if the things that we have identified for you are things that you can, if you like, live with or whether the risk that you've identified in association with our testimony is a risk that you [the Panel] believe requires further mitigation. (HT V34, p. 3065)

This view is helpful in emphasizing that significance is ultimately a matter of human judgment, to be made in this case by the collective judgment of the members of the Panel. However, it begs the question of **how** the Panel should go about that task and the approach it should adopt in reaching its conclusions on the significance of the impacts of the Project.

The Proponents set out four steps for systematically determining the likelihood of significant adverse environmental effects:

ONE: Is there an "effect" in the environment that is caused by the Project? (an effect must be a change in the environment caused by the Project as defined in the TOR). If the answer to that question is "yes," proceed to Step Two; if the answer is "no," no further consideration is required.

TWO: Is the effect "adverse"? If the answer is "yes," proceed to Step Three. If the answer is "no," the potential beneficial effects can be considered in respect of their overall contribution to sustainability.

THREE: Is the effect, after considering all proposed mitigation measures, "significant"? If the answer is "yes" proceed to Step Four; if the answer is "no," then the effect is not significant and further analysis may only be required in the context of cumulative effects.

FOUR: Is the significant effect "likely" to occur? This step requires the Panel to consider whether the predicted effect, based on the evidence before it, is likely to occur. It is important to remember that mitigation and adaptive management measures are important considerations in that they may render a potentially significant impact "not likely."

In order for there to be a "likely significant adverse environmental effect" the answers to all four parts of the Four Step Test must be "yes." (J-IORVL-01050, pp. 53–54)

The characteristics of the residual effects of the Project (Step Three) were described in terms of the effect's attributes:

direction, magnitude, geographic extent and duration. The Proponents defined these generally as four basic questions:

- Is the effect good or bad? This is the direction of an effect.
- How intense is the effect? This is the magnitude of an effect.
- How large an area will be affected? How far will the effect reach? This is the geographic extent of an effect.
- How long will the effect last? This is the duration of an effect. (EIS, V1, p. 26)

The Proponents considered a biophysical effect significant if the effect would be either:

- moderate or high magnitude and extend into the far future, i.e., more than 30 years after project decommissioning; [or]
- high magnitude and occur outside the LSA at any time. (EIS, V1, p. 31)

The Proponents considered a socio-economic effect significant if the effect would be either:

- high magnitude, short term, and regional, beyond regional or national in extent;
- high magnitude, long term and any geographic extent; or
- moderate magnitude, long term and beyond regional or national in extent. (EIS, V1, p. 31)

The Proponents stated that no numerical guidelines were established for socio-economic valued components to define low, medium or high magnitude of impact. The Proponents used the following qualitative measures:

- High magnitude is a large change from existing conditions;
- Medium magnitude is a noticeable change from existing conditions; and
- Low magnitude is within normal variation.

The Proponents repeatedly stated in submissions and in hearings that they wanted to ground significance determination in the context of sustainability as an approach appropriate to the MGP. In describing their approach to significance the Proponents stated:

The final step in describing the project effects was to make a determination of significance. As discussed earlier in the presentation, the basis for determining significance was sustainability. To help link the attributes of an effect, meaning its magnitude, geographic extent, and duration, to its significance we used decision trees that combine these attributes. The decision trees apply to both positive and adverse effects and can provide an outcome related to both significant positive effects and significant adverse effects. (Beswick, HT V6, p. 498)

The Proponents also stated that in the determination of significance, it is implicit that mitigation and management measures will be followed and monitoring programs will be conducted to test their predictions and follow the compliance required by regulators.

During the hearings and through Information Requests made to the Proponents there were numerous exchanges between participants (including DFO, INAC and GNWT) and the Proponents regarding the clarification of terms and process for determination of significance. However, no alternative methods for determining significance were presented or proposed.

A number of participants expressed a lack of confidence in the Proponents' significance judgments and the underlying assumptions that proposed mitigation measures as applied to the Project Review Area would be effective based on industry expertise and practices. For instance, Eugene Yaremko appearing on behalf of INAC stated:

I think the position of the proponent is to say that with good engineering practices and with good construction practices, you will have a project that minimizes construction impacts and minimizes the long-term maintenance impacts of the project. And basically what this says is that they will — or you should trust them to do good engineering and good construction and there shouldn't be a problem in the long run in terms of environmental impacts. (HT V33, p. 3007)

Participants expressed concern that many proposed mitigation measures were highly conceptual and of uncertain effectiveness in northern conditions, particularly with regard to conditions of continuous and discontinuous permafrost. They expressed concerns that the Proponents' assumptions about potential impacts were not conservative enough and that there was an overreliance on contingency and emergency response plans and ongoing Project-impacts monitoring that was vague and uncertain, largely because these plans were either extremely conceptual or to be developed in the future through generally described planning processes. Others expressed concern that the Proponents' judgments regarding the significance of cumulative impacts relied heavily on the uncertain assumption that government measures for managing and monitoring cumulative impacts at a regional scale would be in place and effective.

Throughout the course of the community hearings, participants questioned and disputed the significance judgments made by the Proponents for specific impacts and valued components, as well as general concerns about unassessed or uncertain future cumulative impacts. Quite apart from the technical explanations provided by the Proponents, many participants indicated that there was something fundamentally wrong that a project of the scope and magnitude of the MGP could have no significant adverse impacts. Illustrative of these general concerns are the following comments:

To my mind, it is the height of ignorance when a company submits an environmental assessment for a major project

such as a road, a mine or a pipeline and says that no significant impact is expected. Every project has significant impacts even if sometimes the results do not show until later. Caribou, polar bears, bull trout, First Nations communities, forests, air, water, you name it; there is a news story. I've got a stack of them here. And also, stacks of scientific studies on the negative impacts that industrial development is having. Every project, as I said also, adds up to a sum that is greater than its parts. (Karley Ziegler, HT V69, p. 7040)

On your presentation you made earlier, you said that there won't be no significant effects in the Colville Lake area because of the distance from the pipeline. I'm just wondering: How do you figure that since once you build a pipeline, you open the door to all the oil and gas companies that have interest in our land to increase exploration and then develop and then build a pipeline to tie into the existing pipeline? That's going to create a lot of effects on here. To say that there's going to be no effects in the Colville Lake region is not true. It's not only going to affect the Colville Lake region, it's going to affect the whole Sahtu as a whole. (Alvin Orlas, HT V21, p. 1976)

These and other issue-specific views are discussed at length in the relevant chapters of this Report.

To assist in developing its approach to determining significance, the Panel commissioned a report from a specialist adviser, Dr. David Lawrence, on *Significance Criteria and Determination in Sustainability-Based Environmental Impact Assessment* (the "Lawrence Report"). This report was placed on the Panel's Public Registry and was commented upon by the Proponents and Interveners at the Panel's Technical Hearing on Methodology soon after the commencement of the public hearings. Dr. Lawrence responded orally to questions from the Proponents, Interveners and the Panel.

The Lawrence Report identified certain inherent properties associated with impact significance judgments in environmental impact assessment practice. Significance determinations:

- are subjective, normative and value-dependent;
- are imprecise;
- vary among environmental impact assessment activities;
- vary for different types of effects and environments;
- are context-dependent;
- are political and often controversial;
- are not the same as magnitude of change;
- involve a process;
- are collective; and
- are complex and difficult.

The report also indicated that significance determinations are altered when sustainability is a primary consideration in environmental assessments:

- alternatives are screened for sustainability and compared for their relative contribution to sustainability;
- the focus shifts from minimizing damage (i.e. reducing the negative) to maximizing long-term gains and opportunities for multiple parties;
- time horizons are extended to consider significance for future generations;
- more attention is devoted to cumulative impacts (e.g. lasting, net environmental and human benefits), and to systems-level, collective impact significance (e.g. net contribution of social, economic, physical and ecological changes to sustainability);
- an impact from a proposed action is considered negatively significant if it inhibits sustainability; and
- sustainability can be a significance criterion (i.e. a factor for evaluating impact significance).

The Lawrence Report identified and described three approaches to and methods for determining impact significance: the technical approach, the collaborative approach and the reasoned argumentation approach. In his oral evidence before the Panel, Dr. Lawrence expressed his opinion that the Panel could apply the reasoned argumentation approach, building upon the technical approaches and the collaborative approaches through the EIS consultation and Panel hearing processes.

Neither the Proponents nor any other Party explicitly disagreed with the views expressed in the Lawrence Report, nor did any Party propose any different methodology that should be adopted by the Panel in making its significance determinations.

PANEL VIEWS

Section 4.8 of the Panel Mandate (JRPA) requires the Panel to prepare a report “including...a rationale, conclusions and recommendations regarding the nature and significance of impacts on the environment.” The Report is that of the Panel and therefore it is the Panel’s own conclusions on significance and its rationale on which it must report.

The JRPA does not provide explicit guidance on any particular methodology that the Panel should apply in reaching its conclusions. In the Panel’s view, however, the process itself that is set in motion by the JRPA constitutes some guidance. That process provides for an EIS to be prepared by the Proponents and submitted to the Panel. The Panel is to undertake a technical analysis of the EIS. After determining that there is sufficient information to proceed, the Panel is to hold public hearings, including community hearings, “in a manner that ensures a thorough examination of matters relevant to its mandate.” The hearings are to “afford an opportunity for the communities

and people in the project area to present their views about the potential impacts of the Project on the environment.”

The JRPA thus prescribes the means by which the Panel is to assemble the information and views on which it is to then come to its significance determinations — such determinations are to be based on the information and views as gathered and examined through the Panel process. In addition, the Panel members contribute their individual expertise, values and experience to the review of that information and assessment of the views they have heard.

The Panel has found further guidance in the requirement that its Report include a “rationale” for its conclusions on significance. This implicitly acknowledges that the Panel’s conclusions will be based on judgment, rather than on a technical or mechanistic application of “rules” or the development of a consensus through collaboration. Judgment, in order to avoid arbitrariness, must be disciplined and supported by reasons — hence the requirement that the Panel not just report on its conclusions on significance but that it also provide a rationale for those conclusions.

The Panel has concluded that, for the purpose of fulfilling its Mandate, “significance” means the collective judgment of the seven members of the Panel, based fundamentally on the information and views provided to it through the process mandated by the JRPA, supported by a rationale for each significance determination. The Panel’s individual significance determinations are its answers — after having completed the review process, evaluated the information collected through that process and considered the views that it heard, all shaped by the expertise and values of the Panel’s individual members — to the question of whether society, as represented by the Panel, can or cannot accept, or “live with,” the impacts of the Project. Essentially, both the meaning of “significance” and the method by which the Panel is to make its significance determinations are defined by the review process itself, as laid out in the JRPA and in the context of the relevant legislation. “Significance” is a convenient label to describe key conclusions that are reached by the Panel as an outcome of the review process.

This view is consistent with what the Panel understands by Dr. Lawrence’s “reasoned argumentation approach” and, it believes, with the Panel’s role as described by Dr. Burn. It is not a technical approach, although it takes into account approaches that might be described as technical. Nor is it a collaborative approach as such, although it does take into account, and weighs, the views of all participants and interests reflected throughout the hearing process. At the end of the day, it is the Panel’s own collective judgment that prevails and not whether collaboration has produced a widespread view or even a consensus among others, although the existence of a consensus on a particular issue might be relevant in assisting the Panel in coming to its own conclusion. There may well be impacts on regions or communities that would be significant to those regions or communities but which the Panel, in its collective judgment, has concluded are not significant in the context of its overall

Mandate. There may well be impacts on individuals that, from an individual perspective, would be significant but which, again, the Panel might conclude would not be significant in the broader context.

The reasoned argumentation approach to significance determinations does not provide a single formula to be applied to each impact. Rather, each determination must be made on its own merits, supported by reasons that are articulated and clear, and grounded in the record of the Panel's review process. No single list of criteria applies. At the same time, the Panel's judgements must not be arbitrary, which means that they should generally be consistent. It is, however, inherent to the process of making judgments that not all outcomes will be seen by others as being consistent. The essential requirement is that others be able to see and understand how the Panel arrived at its conclusions, whether they agree with those conclusions or not.

The Lawrence Report identified a number of inherent properties associated with significance judgments in the context of environmental impact assessment and sustainability. The Panel does not disagree with any of these inherent properties but would note that, in the context of the task it must perform, it is particularly important to recognize that significance determinations:

- vary for different types of effects and environments;
- are context-dependent;
- are collective;
- are not the same as magnitude of change;
- devote attention to cumulative impacts and net contributions of social, economic, physical and ecological changes; and
- consider measures for minimizing damage and those, in particular, which maximize long-term gains and opportunities.

With respect to the Proponents' four elements of significance determination (direction, magnitude, geographic extent and duration of residual effects), the Panel has considered all of these in its own determinations, along with the additional attribute of reversibility.

5.4.7 THE PANEL'S SUSTAINABILITY ASSESSMENT FRAMEWORK

The Panel understands the principle of sustainability to be a fundamental basis for the assessment and review of the MGP. The grounds for this approach are found in section 2 of the Schedule to the JRPA, the "Scope of the Environmental Impact Review," and in Annex 2 to the Schedule, "Factors to be Considered During Review." They are also found in section 5.1 of the EIS Terms of Reference, which references the oft-quoted World Commission on Environment and Development's definition of sustainable development, which was subsequently included in the CEA Act as "development that meets the needs of the

present, without compromising the ability of future generations to meet their own needs." This definition is consistent with the meaning of section 2 of the JRPA, although the terms "sustainable development" or "sustainability" are not used there. Sustainable development is considered in the Panel's Report to be development that does not compromise sustainability.

The EIS Terms of Reference expand on the direction for treatment of sustainability in several important ways. First, the EIS Terms of Reference suggest that the guiding goals and principles of the MVRMA and the Inuvialuit Final Agreement are consistent with the fundamentals of sustainable development. This linkage is an important one: it implies that in considering and meeting the conditions of sustainable development in the review process, progress towards the goals of the land claim agreements can also be accomplished.

Second, they state that "reconciling economic development, social equity and environmental quality is at the core of sustainable development." (EIS Terms of Reference, p. 8) This suggests to the Panel that the treatment of trade-offs between these fundamental features of sustainable development requires special attention, and that what is desirable are project design, alternatives and outcomes that deliver mutually reinforcing benefits and multiple lasting gains. The EIS Terms of Reference expand on these core features and require the review to consider the following:

- the potential impacts of the Project in relation to the social, economic, cultural and environmental goals and values of affected communities, the North and the rest of Canada;
- the capacity of natural systems to maintain their structure and functions and to support indigenous biological diversity and productivity;
- the capacity of the social and economic systems of the human environment to achieve, maintain or enhance conditions of self-reliance and diversity;
- the capacity of human environments, including local and regional institutions, to respond to and manage externally induced change;
- the attainment and distribution of lasting and equitable social and economic benefits from projects;
- the rights of future generations to the sustainable use of renewable resources; and
- protection and conservation of wildlife and the environment for present and future generations.

The Panel has assumed that the principle of achieving mutually reinforcing benefits and multiple lasting gains applies to all of these considerations taken together and integrated as attributes of sustainable development.

Third, the EIS Terms of Reference suggest a basis for the evaluation of a project's contribution to sustainability:

- the extent to which a project makes a positive overall contribution towards environmental, social, cultural and economic sustainability;
- how the planning and design of a project have considered how it affects achieving sustainable development;
- how monitoring, management and reporting systems have incorporated indicators of sustainability; and
- the views of stakeholders and participants in the environmental impact review process.

The first of these broad criteria, “the extent to which a project makes a positive overall contribution,” is particularly important because it has the effect of applying a higher standard or “test” to the evaluation of project outcomes in the environmental impact review process than was typically the case in environmental assessment prior to the application of the principle of sustainability. The implied consequence is that in addition to avoiding or minimizing adverse impacts, the larger purpose is to evaluate the positive net contribution of a project and seek the reasons for confidence that the project, with whatever conditions that are recommended, at minimum, will make a positive overall contribution to sustainability, that is, a lasting positive contribution taking into account all of the key requirements for maintaining and enhancing human and ecological well-being.

The Panel’s understanding of its Mandate with regard to sustainability informed its approach to adopting a sustainability framework for assessing the Project’s contribution to sustainability, which is described below and in Chapter 19, “Sustainability and Net Contribution.”

The general guidance provided by the EIS Terms of Reference with respect to the application of the principle of sustainability is important because it applies not just to the Proponents’ EIS, but also to expectations for other participants including relevant government authorities, and to the Panel’s conduct of the environmental impact review process. In its initial review of the EIS, the Panel first identified the importance that it attached to this guidance in the assessment of Project impacts in the EIS, and requested that the Proponents address these matters explicitly. The Proponents responded to this request in their Additional Information Report.

Subsequently, in the Panel’s Statement of Determination on Sufficiency, the Panel announced that throughout the public hearings the Panel would evaluate the specific and overall sustainability impacts of the proposed Project and whether the proposed Project would bring lasting net gains and whether the trade-offs made to ensure these gains were acceptable in the circumstances. The Panel specifically referenced the key considerations for assessing potential contribution to sustainability listed in the EIS Terms of Reference.

The Panel’s Hearing Guidance document provided a list of select questions and issues it expected the hearings to consider with

respect to these matters. The Panel held an early session in the hearings to consider methodological issues including design and application of sustainability-based assessment criteria, and the Panel convened a hearing session near the end of its proceedings specifically to address the Project’s overall contribution to sustainability.

Pursuant to the general guidance provided by the JRPA and the EIS Terms of Reference on the application of the principle of sustainability, the Panel commissioned a report from a specialist advisor, Dr. Robert Gibson, entitled *Sustainability-based Assessment Criteria and Associated Frameworks for Evaluation and Decisions: Theory, Practice and Implications for the Mackenzie Gas Project Review* (the “Gibson Report”). The Gibson Report described recent advances in approaches and practice of sustainability-based impact assessment. It introduced a suite of criteria, trade-off rules and procedures that could be used as a basic conceptual framework for assessing and evaluating Project impacts on sustainability. The report explained, clarified and expanded on the core conditions of sustainability and guidance outlined in the EIS Terms of Reference.

The Gibson Report recognized the need to specify the generic sustainability-based criteria for application to the particular case and context. No detailed specification was attempted, since the report was prepared before the hearings began and the nature of participants’ concerns was only generally known. But the report was informed by available information from previous proposals and public discussion concerning the construction of pipelines in the Mackenzie Valley. Accordingly, the author identified the main evident considerations particular to the case and context, and integrated attention to these with the generic sustainability-based considerations to provide an initial framework for sustainability-based assessment in the MGP case. The report discussed:

- various approaches to conducting sustainability-based environmental impact assessments;
- broadly evident major sustainability issues for the MGP assessment;
- a generic framework or model for consideration in evaluating the MGP’s contribution to sustainability, including a matrix of integrated evaluation criteria, which could be applied in the assessment and review of projects of this type and scale; and
- a set of “trade-off rules” to apply in weighing a project’s positive and negative impacts in order to evaluate a project’s overall contribution to sustainability, and to achieve mutually reinforcing gains.

No points of disagreement with respect to the Gibson Report’s treatment of its subject matter were expressed by participants. Further, participants broadly agreed with the appropriateness of a sustainability-based process, although some differed on important specifics.

The Proponents stated that they embraced the principle of sustainability and that they used a sustainability framework in their assessment. The Proponents have referred particularly to:

- the MVEIRB's sustainable development goals; and
- the National Round Table on the Environment and the Economy's (NRTEE's) list of key sustainability indicators for progress towards sustainable Aboriginal communities, presented under five categories:
 - economic vitality;
 - environmental integrity;
 - social and cultural well-being;
 - equity; and
 - control over natural resources.

Moreover, the Proponents stated that they consider their views and assessment work to be at least broadly consistent with the approach set out in the Gibson Report. In particular they identified four key points of alignment:

Number 1, basic principles: We agree with the basic principles of sustainability assessment that Dr. Gibson outlined. For example, the use of positive contribution to sustainability as a basic criterion for evaluations and decisions, giving integrated attention to core issues, focusing on identifying the best option and achieving mutually reinforced — achieving mutually reinforcing and lasting goals and avoiding lasting damage and explicitly addressing trade-offs.

Point 2, sustainability assessment criteria: The Mackenzie Gas Project EIS is consistent with the basic sustainability criteria suggested by Dr. Gibson, tailoring them to the context of the project study area in the Northwest Territories and northern Alberta. Regarding socio-ecological system integrity, livelihood, sufficiency and opportunity and equity, we have paid particular attention to the key issues raised by the communities affected by our project and will continue to work with them to find common solutions.

Point 3, sustainability rules: In particular, the Mackenzie Gas Project EIS focuses on seeking maximum net gains, avoiding significant adverse effects, protecting the future and using an open process.

Point 4, bridging: We agree that bridging is one of the most important aspects of sustainability. The Mackenzie Gas Project is based on development of non-renewable resources; however, it can contribute positively to current sustainability goals and it can also build capacity for communities to create other opportunities for future generations. (Dr. Alan Kennedy, HT V8, pp. 671–72)

Nonetheless, over the course of the hearings, differences emerged in the interpretation and application of a number of

ideas and methods discussed in the Gibson Report that are central to the evaluation of the Project's positive net contribution to sustainability. Concerns expressed by participants include the treatment of:

- Project alternatives and options, including how they should be defined, evaluated and compared;
- the temporal and spatial scope of the Project's assessment;
- the basic rules and priorities for dealing with trade-offs (where attaining one desired result seems likely to entail compromising or sacrificing another);
- particular factors and issues that are especially important in the MGP case and/or context and should be addressed in this assessment;
- the resiliency of communities and ecological systems;
- broader contributions, cumulative effects and implications of the Project and its associated and induced activities for the Mackenzie Valley region, the NWT, Canada and the world;
- the risk of "boom and bust" effects and the nature and potential adequacy of planned efforts of the Proponents and local, regional and national authorities to ensure this non-renewable resource Project serves as a bridge to more sustainable livelihoods;
- the grounds for confidence in impact prediction and significance judgments; and
- the grounds for confidence in commitments and anticipated requirements concerning Project implementation, monitoring and enforcement, adaptive management, and approaches to the review and management of future associated and/or induced activities.

Based on these differences, some participants did not accept the Proponents' conclusion that the Project would result in an overall positive contribution to sustainability. Specific differences of views are considered in other chapters of this Report.

Consistent with the EIS Terms of Reference and its intentions as stated, for example in the "Determination on Sufficiency" and its "Guidance for Hearings," the Panel has adopted and applied a sustainability-based assessment framework in its review. The Panel's approach to sustainability assessment recognizes that economic, social, ecological and cultural factors are deeply intertwined. The objective of the Panel's sustainability approach is the achievement of multiple, mutually reinforcing and lasting net gains in ways that avoid risks of significant adverse impacts, especially ones that undermine prospects for future generations. The approach also holds that any proposed trade-offs must be justified in the circumstances.

The Panel adapted the initial Gibson framework to the specifics of the Project and the receiving environment, as these emerged during the hearings.

The framework in the form of major issues tables is applied in Chapter 19, "Sustainability and Net Contribution," of this Report. Major issues are grouped under five categories:

- cumulative impacts on the biophysical environment;
- cumulative impacts on the human environment;
- equity impacts;
- legacy and bridging; and
- cumulative impacts management and preparedness.

The categories cover, but integrate, consideration of the usual economic, social, cultural and ecological "pillars" of sustainability, and emphasize attention to long- as well as short-term impacts. The issues addressed in each category are meant to capture the main broad concerns relevant to the MGP and its context.

The framework was designed and used chiefly to ensure comprehensive and integrated attention to all overall key issues and their interconnections. The framework also served to bring consistent attention to both positive and adverse impacts, enhancement and mitigation measures, remaining uncertainties and implications for net contributions and trade-offs. Recognizing the sustainability concerns inevitably raised by limited-time, non-renewable resource exploitation projects, the framework gives particular emphasis to matters of sustainable livelihoods, long-term socio-ecological system integrity, bridging and legacy impacts, uncertainties and precautionary needs.

In the Panel's review, the framework has informed the full suite of assessment deliberations including judgments about the significance of particular and cumulative impacts, the desirability of enhancement and mitigation options, the attractions and perils of future associated and induced development scenarios, the options for responding to information inadequacies, the comparative prospects for net lasting gains from various proposed and possible pipeline throughputs and associated developments, the acceptability of proposed or implicit trade-offs, and the potential adequacy of possible recommendations about approval conditions and actions. The framework described in Chapter 19, "Sustainability and Net Contribution," however, was designed particularly to provide an initial basis for comparative analysis of the cumulative impacts of the Project as Filed and of the potential cumulative impacts of possible developments under the Expansion Capacity Scenario as discussed in Chapter 3, "Potential Future Developments."

In applying this general framework, the Panel has recognized that sustainability priorities and specifics vary through the local, regional, national and global scales relevant to the Project. The Panel has also been aware that conditions, concerns and opportunities differ somewhat throughout the communities and lands potentially affected by the Project, and that contributions to sustainability may well also differ. Finally, the Panel has needed to go well beyond the broad categories and issues identified in the framework to address the many more specific considerations

related to particular locations and particular aspects of the Project and Project scenarios. Throughout the review, however, the Panel has consistently focused on contribution to sustainability impacts. This focus has influenced its work in:

- identifying and evaluating potential impacts and their significance;
- considering options for enhancing positive impacts and mitigating or avoiding adverse ones;
- comparing options and alternatives at all levels (from responses to impacts to different project scenarios);
- evaluating possible trade-offs; and
- drafting and specifying recommendations.

The Panel's sustainability assessment framework was broader than the Proponents' for several reasons. First, the Proponents' application of sustainability-based criteria was focused mostly on significance judgments and on the Project as Filed (though at some points also assuming additional components and revenues to provide for benefits through the Aboriginal Pipeline Group's involvement). The EIS and other Proponents' submissions include little application of sustainability-based criteria to the implications of future scenarios, impacts beyond the life of the Project or trade-offs.

Second, the Panel's responsibility is a broader one. Unlike the Proponents, and other participants with particular focused interests or limited mandates, the Panel's Mandate requires it to consider, not only the Project as Filed, but also its surrounding context, implications for expansion and related future developments, and associated needs for capacities of and actions by government authorities and other bodies.

The Panel observes that the broad sets of indicators and goals the Proponents cited, based on principles of the NRTEE and the MVEIRB, are consistent with the Panel's approach. However, they differ from the Panel's more detailed and case-specific framework in that they give relatively little attention to the interrelations among the indicators and goals.

Some participants have expressed doubts about the consistency of the Proponents' application of their sustainability-based criteria even within their areas of most immediate concern, and have raised consequential doubts about the reliability of the Proponents' conclusions on certain matters. These are addressed on a chapter by chapter basis throughout the Report.

The Panel is satisfied that its sustainability assessment framework is consistent with the EIS Terms of Reference, suitable to the assessment of the MGP and broadly accepted by the participants to the assessment review. The framework outlined here informs the discussion of particular topics in the following chapters and the Panel's overall evaluation of the Project.