GUIDELINES FOR AN ENVIRONMENTAL IMPACT ASSESSMENT

MODIFICATIONS TO THE PETITCODIAC RIVER CAUSEWAY

Issued by the Minister of the Department of the Environment and Local Government for the Province of New Brunswick and Fisheries and Oceans Canada

to

The New Brunswick Department of Supply and Services

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1.0 INTRODUCTION

1.1 Background

The Petitcodiac River causeway was built in 1968 as a joint venture between the Province of New Brunswick and the Federal Government. Over time, the causeway has impacted physical processes including tidal exchange and sediment transport, and a variety of ecosystem functions including fish passage in the Petitcodiac River. This is due in part to the design and operation of the existing causeway, unique river conditions in the tailrace of the causeway involving the rise and fall of the tides, and nature of the tidal sediments. Studies conducted in the years following the completion of the structure have identified the need for modifications to the Petitcodiac River causeway. Attempts to date to improve fish passage to an acceptable level through modifications to the fishway and causeway gates have been unsuccessful.

In August 2000, the Minister of Fisheries and Oceans Canada appointed Mr. Eugene Niles as a special advisor to conduct a review of all the issues and existing information, to consult all stakeholders and seek appropriate expert opinion on a course of action to restore fish passage in relation to the Petitcodiac River causeway. In his report, released in February 2001, Mr. Niles provided a synthesis of the issues, and identified a range of options and recommendations. Over and above the status quo, the Niles Report (2001) recommended 4 possible options to resolve fish passage issues:

- Replacing the fishway;
- Gates open during peak migration;
- Gates open permanently; and
- Replace the causeway with a partial bridge.

The modifications to the Petitcodiac River causeway now proposed by the New Brunswick Department of Supply and Services (DSS), are based on the options identified above (Niles, 2001), and are intended to achieve a long term solution to fish passage and other ecosystem issues related to the causeway, including tidal exchange, sediment transport and other physical processes, and biophysical functions (e.g., wetlands, populations of flora and fauna, fish habitat, etc).

The environmental impact assessment (EIA) will examine the 4 options listed above, and the status quo (which will be assessed to provide a baseline condition against which to evaluate the project options). Additional options identified during the environmental assessment process may be considered as appropriate.

1.2 Purpose

These Guidelines are to be used by the proponent (DSS) to guide the preparation of an EIA Report of its proposed modifications to the Petitcodiac River causeway ("the project") between Moncton and Riverview, New Brunswick (NB). The EIA Report (Environmental Impact Statement (EIS)), is

intended to meet the requirements of the NB Clean Environment Act, *Environmental Impact Assessment Regulation (87-83)*, and the Canadian Environmental Assessment Act (CEAA). The Guidelines are also intended to determine the scope of the project, and the factors and scope of those factors to be considered to meet the requirements of a screening level environmental assessment under CEAA. The word "project" is intended to represent "undertaking" and "project" as defined under the two Acts, respectively. The term "environmental effect" is intended to represent "impact" and "environmental effect" as defined under the two Acts, respectively.

1.3 Federal/Provincial Environmental Impact Assessment Processes

Under Regulation 87-83 of the Provincial Clean Environment Act, DSS, as the proponent of the project, was required to register the project as an undertaking for EIA review. The proposal was registered on April 30, 2002, and on the same day, the Minister of the NB Department of the Environment and Local Government announced that completion of an EIA was required to assess the nature and significance of the proposal's potential environmental effects (i.e., both positive and negative).

On May 8, 2002, Fisheries and Oceans Canada (DFO) determined that the project was subject to federal regulatory review under the Fisheries Act and Navigable Waters Protection Act. As a result, an environmental assessment must be completed in accordance with CEAA pursuant to Section 5(1)(d), at the screening level before an authorization and/or approval under either the Fisheries Act or Navigable Waters Protection Act may be issued. There are several steps to the assessment process, including an initial one to establish the scope of the project, determine the factors to be considered in the assessment and the scope of these factors to be assessed.

The federal coordination regulatory process (i.e., as per the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*), in addition to identifying DFO as a Responsible Authority for this project, has identified Environment Canada (EC) and Natural Resources Canada (NRC) as departments in possession of specialist or expert information or knowledge.

The provincial Minister of the Department of the Environment and Local Government (DELG) has appointed a Technical Review Committee (TRC), comprised of technical specialists from various government departments and agencies whose jurisdictions may be affected by the proposed project. These agencies include:

- NB Department of the Environment and Local Government (DELG);
- NB Department of Agriculture, Fisheries and Aquaculture (DAFA);
- NB Department of Natural Resources and Energy (DNRE);
- NB Department of Health and Wellness (DHW);
- NB Department of Transportation (DOT);
- NB Department of Tourism and Parks (DOTP);
- NB Culture and Sport Secretariat (C&S SEC);
- NB Emergency Measures Organization (EMO);

- NB Museum (NBM);
- Greater Moncton Planning District Commission (MDPC);
- Beaubassin Planning Commission (BDPC);
- Royal District Planning Commission (RDPC);
- Tantramar Planning District Commission (TDPC);
- Environment Canada (EC);
- Natural Resources Canada (NRC);
- Fisheries and Oceans Canada (DFO);
- Canadian Coast Guard (CCG); and
- Bedford Institute of Oceanography (BIO).

The TRC includes those listed above, with the addition of the Canadian Environmental Assessment Agency (the Agency). As such, the TRC will provide a federal-provincial harmonized review for the EIA (Environmental Assessment (EA)). The harmonized process was presented to the public for comment through a media release (March 25, 2002), and at two Open-Houses held in Moncton and Riverview, NB, on March 26, and March 27, 2002, respectively. Following consideration of public input received during the Open-Houses and through written comment (AMEC, 2002), the harmonized federal-provincial process for the EIA was finalized on May 29, 2002 (a flow chart of the final harmonized federal-provincial process is provided in Appendix A).

The TRC has reviewed the initial registration document provided by DSS. This screening exercise provided the basis for the Draft Guidelines, which the TRC has also examined. In addition, a technical workshop was held in Moncton, NB, from March 3 to 5, 2002, that focussed specifically on the Petitcodiac River and different modelling approaches that could be employed to facilitate the EIA Study. Recommendations and input resulting from the workshop were also considered during development of the Draft Guidelines.

The Draft Guidelines were released for public comment on May 29, 2002, with the comment period ending on June 27, 2002. During that time a variety of steps were taken to ensure that any issues of concern to the public and other stakeholders not addressed in the Draft Guidelines were identified, including:

- Receipt of written submissions by interested members of the public;
- Meetings to discuss the Draft Guidelines were held with a variety of stakeholder groups and the Fort Folly First Nation (Niles, 2002); and
- Final review of the Draft Guidelines by the TRC.

Following consideration of all comments received to date (AMEC, 2002; Niles, 2002; TRC), these Guidelines constitute the Final EIA Guidelines, and outline the approach the proponent must follow in conducting the EIA study. In addition, the Final Guidelines identify important issues, which must be considered in assessing the environmental effects (i.e., both positive and negative) of the proposed project.

Upon receipt of the Final Guidelines, the proponent (DSS) and/or its consultant(s) must provide the Minister with detailed Terms of Reference, which describe the approach and methodology to be used in the EIA. The Terms of Reference must satisfy the Final Guidelines, and will be evaluated in this context through a consultative process involving the proponent and the TRC.

DELG will be the lead agency for this review and is responsible for ensuring that the federal Responsible Authority is provided with all the documentation and correspondence. It is the intent of this harmonized process to ensure that the public and the proponent are provided with a single process that avoids confusion and duplication. The purpose of the Final Guidelines is to outline the requirements of the *NB EIA Regulation* (87-83) and *CEAA*. One report will be prepared by the proponent, which will meet the requirements of the *NB EIA Regulation* (87-83) and *CEAA*. For convenience, the report will be referred to as the Environmental Impact Statement (EIS) or EIA Report. The EIS will include a clear statement of its regulatory context in respect of both legislative requirements.

The principle objective of the EIS is to predict, and assess the significance of, the environmental effects (both positive and negative) that can be expected should the proposed project proceed. The EIA study, conducted in consultation with the residents from the area of potential environmental effects, shall identify methods of optimizing positive environmental effects and minimizing negative environmental effects resulting from the proposed project.

Information gathered during the study is compiled in a draft EIS. The draft report is evaluated by the TRC to determine whether the study adequately addresses the issues raised in the Final Guidelines. Should the TRC determine that the report does not adequately address the Guidelines, the proponent will make revisions to address any identified deficiencies in order to advance the EIA process.

If, in consideration of the advice of the TRC, the federal Responsible Authority and the provincial Minister (DELG) are satisfied that the EIS is complete, the next step consists of consultation to involve the public in evaluating the potential environmental effects anticipated from the proposed project (i.e., both positive and negative), and their significance.

To facilitate this step, a summary of the final EIS is prepared, on behalf of the federal Responsible Authority and the provincial Minister (DELG), to assist members of the public in becoming familiar with the information. The TRC will prepare a General Review Statement summarizing its comments on the EIS. These documents are released for a period of a minimum of 30 days for public review and comment, after which, the schedule and location(s) of public meeting(s) will be announced.

Public meetings generally take place near the area where the project is being proposed and provide all interested parties with an opportunity to make comments, raise concerns, or ask questions about any matter covered in the EIS. Following the public meeting, a period of fifteen days will be reserved for members of the public to submit written comments to the provincial Minister (DELG). These comments will be shared with the federal government. At the end of this period, a summary of

public participation is made available to the public and presented to the Ministers. At any time after this date, the Cabinet (Lieutenant-Governor in Council) may render a decision to issue or deny an approval for the proposed project.

Also following the public meeting, the Responsible Authority (DFO) will prepare the federal screening report, based on the EIS and any comments received. This draft screening report will be released by DFO for public comment (required by CEAA s. 18(3)), and once finalized will be the document on which the federal Responsible Authority will make its decision. Best efforts will be made to ensure coordination of the announcement of decisions.

Specific procedures to be followed in conducting an EIA may be found in Regulation 87-83, *Environmental Impact Assessment Regulation* - Clean Environment Act. A procedural summary is available in the publication entitled "Environmental Impact Assessment in New Brunswick". Any comments regarding the Final Guidelines or administration of the EIA process may be directed to:

Mr. David Maguire
Project Assessment Branch
NB Department of the Environment and Local Government
P.O. Box 6000
Fredericton, NB
E3B 5H1
e-mail: EIA-EIE@gnb.ca
fax: (506) 453-2627

or to:
Mr. Peter McLaughlin
NB Department of the Environment and Local Government
428 Collishaw Street
Moncton, NB
E1C 8R3
e-mail: EIA-EIE@gnb.ca
Fax: (506) 856-2370

Guidance related to the federal environmental assessment process may be found on the website of the Canadian Environmental Assessment Agency at http://www.ceaa-acee.gc.ca or by contacting the Agency's Atlantic Regional Office at (902) 426-0564.

1.4 Definitions/Glossary

"Agency, the" - The Canadian Environmental Assessment Agency (The Agency).

"All Options (All the Options)" – the use of the term refers to the 4 project options (see definition below) as well as the status quo.

"Alternative means" - The various ways that are technically and economically feasible, that the project can be implemented or carried out (alternatives that are functionally the same). This could include, for example, alternative locations, different structural designs, and methods of development, implementation and mitigation.

"BDPC" - Beaubassin Planning Commission.

"BIO" - Bedford Institute of Oceanography.

"C&S SEC" - NB Culture and Sport Secretariat.

"CCG" - Canadian Coast Guard.

"CEAA" - Canadian Environmental Assessment Act.

"DAFA" - NB Department of Agriculture, Fisheries and Aquaculture.

"DELG" - NB Department of the Environment and Local Government.

"DHW" - NB Department of Health and Wellness.

"DFO" - Fisheries and Oceans Canada.

"DNRE" - NB Department of Natural Resources and Energy.

"DOT" - NB Department of Transportation.

"DOTP" - NB Department of Tourism and Parks.

"DSS" - NB Department of Supply and Services.

"EC" - Environment Canada.

"Ecosystem Issues" – In the context of the modifications to the Petitcodiac River causeway currently proposed, meaning those ecosystem functions that have been affected over time since construction of the causeway and associated operation of the gates, including tidal exchange, sediment transport and other physical processes, and biophysical functions (e.g., wetland and other habitats, populations of flora and fauna, fish habitat, etc). Please note that additional issues (both biophysical/ecosystem, social, and economic may be identified during completion of the EIA Study.

"e.g.," - For example.

"EIA/EA" - Environmental Impact Assessment/Environmental Effects Assessment.

"EIS" - Environmental Impact Statement (Synonymous with EIA Report).

"EMO" – NB Emergency Measures Organization.

"Environment" - Under CEAA, means the components of the earth and includes:

a) air, water and land, including all layers of the atmosphere,
b) all organic and inorganic matter and living organisms,
c) the interacting natural systems that include components referred to in paragraphs (*a*) and (*b*).

"Environment" – Under the Clean Environment Act, "environment" is defined as:

(a) air, water, or soil;
(b) plant and animal life including human life; and
(c) the social, economic, cultural and aesthetic conditions that influence the life of humans or a community as they are related to the matters described in (a) and (b).

"Environmental Effect" - In respect of a project, means:

a) any change that the project may cause in the environment (i.e., both positive and negative changes), including any change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, and
b) any change to the project that may be caused by the environment whether any such change occurs within or outside Canada.

"FCA" - Full-cost accounting (synonymous with cost/benefit analysis)

"Fauna" - Animals.

"Fish" - Under Section 2 of the Fisheries Act, includes fish, shellfish, crustaceans and marine mammals.

"Fish Habitat" – As defined under the Fisheries Act, fish habitat includes the spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

"Fish Passage" – As defined under the Fisheries Act, fish passage relates to the unimpeded and safe movement, upstream or downstream, of fish between aquatic habitats required to complete their life cycle.

"Flora" - Plants.

"i.e.," - That is/In other words.

"MDPC" - Greater Moncton Planning District Commission.

"NB" - The Province of New Brunswick.

"NBM" – The New Brunswick Museum.

"NRC" - Natural Resources Canada.

"Project Options (proposed project options; the project; the proposed project)" - Functionally different ways to meet the project needs and achieve the project purpose. With respect to the proposed Modifications to the Petitcodiac River Causeway, each project option (i.e., replacing the fishway, gates open during peak migration, gates open permanently, and replacement of part of the causeway with a bridge), is basically an "alternative to" the other options.

"Proponent" – Refers to the individual, private firm/company, or government agency/organization proposing a specific project (undertaking).

"RDPC" - Royal District Planning Commission.

"Responsible Authority" - In relation to a project, means a federal authority that is required, pursuant to subsection 11(1) of CEAA, to ensure that an environmental assessment of the project is conducted.

"Status Quo" - the current condition/existing causeway remains unchanged (using present criteria for gate operations).

"TDPC" - Tantramar Planning District Commission.

"TOR" - Terms of Reference.

"TRC" - Technical Review Committee.

"VECs" - Valued Environmental Components (biophysical, social, or economic components).

2.0 METHODOLOGICAL APPROACH TO EIA

2.1 General

The federal and provincial EIA processes result in a detailed study of potential and existing environmental effects (i.e., both positive and negative), the significance of these effects, and identification of procedures that may be used to mitigate these effects. The EIA shall also identify methods of optimizing positive environmental effects and minimizing negative environmental effects. These guidelines outline the scope of all options being assessed, the factors to be considered during the assessment, and the scope of these factors, pursuant to Sections 15 and 16 of CEAA as determined by the Responsible Authority, DFO.

To provide a focus for the EIA, environmental components of principal concern, commonly referred to as Valued Environmental Components (VECs), must be identified early in the assessment process. The method for determining VECs must be clearly stated by the proponent. The proponent shall seek public knowledge for identification of appropriate VECs. The VECs proposed will be reviewed and accepted by the TRC in the early phases of the EIA study. The EIA must clearly indicate the provisions for compliance with relevant regulatory requirements, guidelines and best management practices. The assessment will include consideration of, but is not limited to, the regulations, guidelines and associated documents listed in Appendix B.

Presented in Section 4.0 of these Guidelines are a number of specific issues that must be considered during the EIA Study. However, the study will not be limited to these issues, and should additional issues arise from ongoing discussion with members of the TRC, regulatory agencies, Aboriginal groups/communities, members of the public, or other interested parties, the proponent will incorporate these issues, where applicable to the EIA process, into the assessment of potential environmental effects (i.e., both positive and negative) of all options (i.e., the "project options" plus the status quo).

2.2 Study Boundaries and Scope of Factors

Pursuant to Section 16 of CEAA, the review must consider the potential environmental effects of the proposed project within the spatial and temporal boundaries which encompass the periods and areas during and within which the project may potentially interact with, and have an environmental effect on, components of the environment. Due to the unique nature of this study, a similar review must also be applied to the status quo to allow comparisons of the project options against baseline conditions. The proponent (DSS) must clearly describe the boundaries of the study in time and space used in the evaluation of environmental effects for each VEC. The temporal boundaries of the study (the length of time over which project environmental effects are anticipated to occur) must reflect the construction period, the operating life of the project, and extent of any potentially significant environmental effects that may remain beyond the operating period, including decommissioning and any potential accidents or malfunctions.

Spatial boundaries must reflect the geographical extent to which activities associated with all the options are anticipated to occur in the existing environment and the extent of existing or anticipated environmental effects, including cumulative environmental effects for each VEC (i.e., both positive and negative). Boundaries such as administrative, technical, biophysical, socio-economic and the areas over which activities may occur, must be defined and related to the impact assessment process as appropriate. In determining applicable spatial boundaries, consideration must be given to environmental effects already or potentially resulting from all options on a local, regional and national scale.

2.3 Prediction of Environmental Effects

The main focus of the EIA is to predict environmental effects (i.e., both positive and negative) that have or may result from all options (i.e., proposed project options and the status quo), and their potential significance. Predictions must consider all aspects and phases of all the options, and any indirect environmental effects, cumulative effects, and those effects that may result from accidents or malfunctions. In addition, potential effects of the environment on all the options must be predicted, such as effects that may be caused by extreme weather events (e.g., flood/ice damage; tidal surges), seismic activity, acid rock drainage, and climatic change.

EIA predictions are generally based on a combination of objective and subjective evaluation. The use of objective (measurable) analysis is strongly preferred where it is technically feasible and reasonable to do so. However, in recognition of any factor that may limit the ability to predict or measure environmental responses, predictions may be based on subjective evaluation using professional judgement and experience. In consideration of this, predictive statements must be accompanied by a discussion of the limitations of the analysis, references to supporting documentation and the qualifying credentials of those making the predictions.

Predictions must be made regarding the nature (adverse or positive), magnitude, duration, frequency, geographic extent and reversibility of each option's potential or existing environmental effects. The significance of these effects must also be determined. These predictions must:

- facilitate decision-making with respect to the proposed project;
- clearly specify any degree of uncertainty inherent in the projections;
- clearly identify environmental effects with respect to human health and tolerance levels of organisms in the environment; and
- be amenable to testing where possible through ongoing monitoring initiatives.

To clearly distinguish potentially significant environmental effects from those likely to be insignificant, the proponent must first define "significant." The definition must be based on scientific determinations, social values, public concerns, and economic judgements, and will be developed in consultation with the TRC. In particular, the significance of proposed project options and status quo induced changes on VECs must be clearly stated in the EIS. The thresholds for significant effects on VECs (i.e., both positive and negative), must be related in terms of applicable criteria. Quantifiable reference to the magnitude, geographical extent, duration, frequency,

reversibility and ecological context of the potential environmental effects is required. Significance must be determined in the context of option-specific and cumulative environmental effects and after taking into account the implementation of appropriate mitigation/optimization measures.

Significant effects on species (i.e., tolerance levels related to organisms in the environment), must take into account effects at the population-level. For species designated as endangered, effects on an individual may constitute a population-level effect.

2.4 Cumulative Environmental Effects Assessment

The term cumulative environmental effects refers to those effects, over a defined period of time and distance, resulting or likely to result from the proposed project options or status quo, in combination with other past, present, or likely (imminent) future projects or activities. An assessment of cumulative environmental effects must be conducted as part of the EIA study, in consideration of each identified VEC.

The goal of the cumulative effects assessment will be to place project option and status quo induced impacts, their significance, and approaches to management in the context of the "bigger picture," and must include (but is not limited to):

- identification of regional issues of concern;
- a comprehensive description of how VECs were selected;
- a clear justification for the spatial and temporal boundaries used to address cumulative effects;
- a clear description of the analysis undertaken to assess the cumulative effects on the selected VECs (i.e., both positive and negative), and presentation of the results;
- a clear description of how mitigation measures address the cumulative environmental impacts; and
- the rationale for determining whether residual cumulative effects on VECs are significant.

2.5 Mitigation, Contingency and Compensation

The study must describe general and specific measures that are technically and economically feasible for the proponent (DSS) to implement to optimize any positive environmental effects and mitigate any negative effects resulting or potentially resulting from all options (i.e., maximize positive effects, and eliminate, prevent, avoid or minimize adverse effects). This must include a description of contingency measures (including emergency response plans for construction, operation, and decommissioning) that have been designed to address potential accidents and malfunctions that could result in spills or unplanned releases of contaminants or products to the environment. Specific circumstances under which mitigative measures will be implemented must be clearly defined by the proponent. Mitigation options must be considered in a hierarchical manner with a clear priority placed on proactive measures for impact avoidance and pollution prevention

opportunities. Opportunities to contribute to a regional approach to management of cumulative effects must also be identified (refer to Section 2.4 above).

An outline for contingency plans must be provided for use in the event of:

- an environmental emergency within the spatial boundaries of the study (attributable to each project option); and/or
- significant environmental effects (attributable to each project option), which are detected through monitoring.

Contingency plans must be developed and implemented (as described above), should environmental effects be detected during construction, operation and/or decommissioning.

The study must also consider compensation mechanisms to be used in the event that any unforeseen, accidental, or residual environmental effects occur (including opportunity costs). These compensation mechanisms/plans must be developed through consultation with federal and provincial agencies and other stakeholders, as appropriate. Compensation must be recognized as a last resort, but may be required if deliberate project-related effects cannot be otherwise mitigated.

2.6 Commitment to Monitoring and Follow-up

A well-defined program of monitoring and follow-up initiatives regarding environmental effects resulting or potentially resulting from all options must be outlined in the EIS. DSS must describe all of their proposed monitoring and follow-up programs, including their objectives, content, and implementation and reporting schedules. Monitoring programs will be required to:

- establish baseline conditions;
- determine regulatory compliance (compliance monitoring);
- test the predictions of the EIS (environmental effects monitoring); and
- evaluate the effectiveness of measures used to mitigate environmental effects (environmental effects monitoring).

All options will require ongoing monitoring and evaluation. Monitoring and follow-up programs must include protocols to guide interpretation of monitoring results and timely implementation of appropriate corrective actions.

Monitoring initiatives must be based upon accurate baseline information for the existing physical, biological and socio-economic environments. The proponent is expected to collect the necessary information through existing data sources ("data mining") or through primary research such as fieldwork and laboratory testing, as required.

Where the EIS predictions are not based on objective information, monitoring programs must be designed, where possible, to collect relevant data not previously available.

Documentation from similar projects conducted elsewhere in the world indicating their ability to achieve standards must be provided. The standards must be included for those other projects/facilities, in addition to the standards to which the options were or will be constructed, operated and maintained.

2.7 Public and Other Stakeholder and Aboriginal Consultation

Public and other stakeholder, and Aboriginal consultation must be an essential component of this EIA/EA. The proponent (DSS) must continue to consult with persons and organizations potentially or already affected by the options, and must continue to inform and engage individuals, interest groups, local governments, other stakeholders and Aboriginal groups/communities in this assessment. This will include local governments and specific groups with mandates/initiatives encompassing the Petitcodiac River watershed (e.g., Cities, Towns, Villages, and Local Service Districts, the Petitcodiac Watershed Monitoring Group, RiverKeeper, Lake Petitcodiac Preservation Association, Alma Fisherman's Association, Conservation Council of NB, Fort Folly First Nation, etc). DSS will be expected to hold appropriate public consultation events and to use various media to engage public consultation (e.g., bulletins, study updates, workshops, open-houses, etc). The proponent's stakeholder consultation program is to be reviewed and accepted by the TRC in the early stages of the study.

Various stakeholders, and Aboriginal communities will be consulted throughout the EIA process, including interested members of the general public, neighbouring residents, non-government organizations, and interest groups. The objectives of this consultation must be:

- to ensure that the potentially affected public is engaged in meaningful discussion and is well informed prior to the government's decision, as to the nature and extent of environmental effects attributable to the proposed project options and status quo (i.e., both positive and negative effects);
- to ensure that the values and concerns of the public are incorporated and adequately addressed in the study; and
- to obtain expertise (where applicable) from various stakeholders and Aboriginal communities.

At a minimum, the proponents stakeholder consultation program must incorporate the following:

- initiatives must be undertaken in all the regions of the watershed (i.e., Headwaters - Petitcodiac, Elgin, Salisbury; Lower river west - Hillsborough, Hopewell, Riverside Albert, Alma; Lower river east - Memramcook, Dorchester, Fort Folly; and mid river - Dieppe, Moncton, and Riverview);
- consideration must be given to the issues identified/recommendations made in consultative reports related to the causeway issued to date (e.g., Niles, 2001; AMEC, 2002; Niles, 2002);
- stakeholders, including the public must be informed of the status of the study at regular intervals/at key milestones during the study (the stakeholders are to include, but will not be

limited to, those stakeholders identified in the Niles Report (2001) and Aboriginal groups/communities);

- the proponent must create a dedicated web site for the study, to enable all interested parties to be kept up to date on the process, status of the study, and informed of any scheduled consultation initiatives, such as public Open-Houses; and
- consultation initiatives (e.g., Open-Houses, information sessions) must be initiated early on in the process (i.e., during the scoping phase) to obtain stakeholder input and feedback. Specific workshops must be held to obtain stakeholder and other input to the TOR, scoping and VEC identification (definitions of significance), cost/benefit analysis (full cost accounting), and approaches to modelling.

The EIS must document the dates and formats for public consultation undertaken, the material presented to the public, the opportunity for receiving public input, a summary review of the concerns expressed by the public and how these concerns were addressed. It must be clear how the input from consultations was used in the assessment and what changes to the process or project were made as a result of comments provided.

2.8 Terms of Reference (TOR)

The proponent must submit a detailed Terms of Reference (TOR) in response to the Final EIA Guidelines. The TOR must clearly describe the methods proposed for carrying out the EIA, and the means by which DSS will consult with the public and other stakeholders, and Aboriginal communities during the course of the EIA process. In addition, the TOR must outline the components of any proposed field programs, any anticipated challenges/obstacles to be encountered, proposed modelling approaches, identify key members of the study team, and fully describe all specific tasks to be completed as part of the study. In particular, the TOR should include a detailed description of how the physical environment of the estuary will be assessed by data collection and modelling, and identify the experience of relevant staff with modelling software in doing similar studies.

The proponent is required to provide, as part of the TOR, a cross-referenced index (Concordance Table) showing where the content and issues of the Final Guidelines have been addressed.

The TRC will examine the TOR and comments may be provided to the proponent for inclusion. In addition, a workshop must be held by the proponent to allow interested parties, the public and other stakeholders, and Aboriginal communities to provide input to the TOR prior to finalization.

3.0 CONDUCT OF THE STUDY AND CONTENT OF REPORT

The Environmental Impact Statement (EIS) must be written in the clearest language possible. Where the complexity of the issues addressed requires the use of technical language, a glossary defining technical words and acronyms must be included. The International System of Units (SI) must be used throughout the report and all supporting documents. The study must include consideration of, but is not limited to, the regulations, guidelines and associated documents listed in Appendix B.

The EIS must provide a complete and accurate description of all options (including cost), from planning through construction, operation/maintenance and decommissioning, supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the proposed project, including accidents and malfunctions that have a reasonable probability of occurrence and that could be expected to affect the environment. An identification of how potential environmental and man-made hazards have influenced the design and operation of the project will also be provided.

The following titles may be used as a framework for the development of t he EIS:

- Executive Summary
- Introduction
- Regulatory Framework (Application of CEAA/Regulation 87-83)
- Scope of the Project
- Scope of the Environmental Assessment
- Public, Other Stakeholder, and Aboriginal Consultation
- Purpose and Description of the Project
- Description of the Existing Environment
- Environmental Effects, Including Effects of Malfunctions and Accidents and Cumulative Environmental Effects
- Mitigation Measures
- Significance of Residual Effects
- Monitoring Initiatives and Follow-Up Programs
- Conclusions and Recommendations

3.1 Project Description – Scope of Project

The scope of the project to be assessed pursuant to Section 15(1) of CEAA and Regulation 87-83 will include: the construction, operation, and decommissioning of the Petitcodiac River Causeway Project, plus the status quo (i.e., all options, as listed in the proponents EIA registration package). Table 3-1 summarizes the options that must be included in the assessment, as presented in the proponent's registration package, and recommended in the Niles Report (2001).

Table 3-1 Option Summary

Option	Description
Status quo *	Causeway remains unchanged (using present criteria for gate operations).
Replacing the fishway	This option proposes replacing the current fishway with one that would accommodate all diadromous species and age classes.
Gates open during peak migration	This option proposes that all the gates remain open during peak migration periods in the spring and fall.
Gates open permanently	This option proposes that the gates remain open permanently.
Replace the causeway with a partial bridge	This option proposes to replace part of the existing causeway with a bridge.

*Note: The status quo will be assessed to provide a baseline condition against which to evaluate the proposed project options.

All options to be assessed (Table 3-1) and their description in the EIS must include:

- the history of the Petitcodiac River causeway, and applicable general information on the construction and operation of tidal barriers around the world;
- a detailed description of the design, and construction, operational, and decommissioning phases proposed for each project option (focussing on options/strategies that have been proven elsewhere);
- the regulatory standards to which the components of each option were or will be built and operated;
- any secondary containment systems;
- project use and anticipated future use for each option;
- transportation, handling and storage systems of any hazardous materials, additives and by-products used for each option;
- the layout and detailed description of associated infrastructure for each option (e.g., access/road infrastructure);
- upsets of environmental control equipment from operations, which may change the nature of site runoff, emissions and/or effluent for each option; and
- a detailed description of all health and safety, and environmental protection measures, including emergency response plan for each option (e.g., fire prevention/control equipment, spill response, flooding and tidal surge protection measures, etc.).

As applicable, the description of each option will include all the elements necessary to support the evaluation of existing (for the status quo) and potential environmental effects of all options (Table 3-1), as outlined in Section 4.0 of these Guidelines (i.e., both positive and negative effects).

3.2 Project Rationale

Pursuant to Section 16(1)(e) of CEAA and Regulation 87-83, the purpose of the project must be clearly identified. The report must provide clear justification for the project in order to allow for an evaluation of the relative environmental effects of all options listed in Table 3-1.

3.3 Identification and Analysis of Project Options and the Status Quo

Using the approach indicated below, the study must evaluate all options (Table 3-1), that are technically and economically feasible, and alternative means of carrying out each option. This analysis will contribute to a further understanding of the project rationale and will facilitate decision-making with respect to its acceptability.

(a) Project Options - With respect to the proposed modifications to the Petitcodiac River Causeway (i.e., the " proposed project," including all options listed in Table 3-1, except the status quo, plus any other relevant project options that may be identified during the study), each option will be considered as a functionally different way to meet the project need and achieve the project purpose. The study must examine the implications of all project options with reference to economic, environmental and social factors. The proponent must also conduct a full cost accounting analysis to allow a comparison of the estimated costs and benefits of each of the project options, including all identified environmental externalities or intangibles (refer to Section 3.7).

(b) Status Quo – The status quo, while not considered a "project" option, was added to provide a baseline against which to evaluate the other options. The study must therefore also examine the implications of status quo with reference to economic, environmental and social factors. The proponent must also conduct a full-cost accounting analysis of the status quo to allow a comparison of the costs and benefits with the "project options".

In addition, the analysis must include consideration of alternative means of carrying out the proposed project (i.e., functionally the same) that are technically and economically feasible, and the environmental effects of any such alternative means. The analysis must include, but is not limited to:

- Identification of alternative means to carry out each project option;
- Identification of criteria to determine technical and economic feasibility of the alternative means;
- Description of the alternative preliminary designs for each of the alternative means (e.g., alternative fishway or bridge designs, alternative methods of implementation);
- Identification of those alternative means that are technically and economically feasible;
- Identification of the environmental effects of each of the alternative means;
- Identification of those elements of each alternative means that could produce environmental effects;
- Identification of the preferred means based on a comparative analysis, including a relative consideration of environmental effects, and of technical and economic feasibility;

- Determination and application of criteria that identify alternative means as unacceptable on the basis of significant adverse environmental effects; and
- Examination of the environmental effects of each remaining alternative means to identify a preferred alternative.

3.4 Description of the Existing Environment

The EIS must describe the existing environment focusing on identified Valued Environmental Components within the study boundaries. This description must reflect the dynamics of environmental components (biophysical, social, and economic), and identify trends in the context of predicted changes over time.

A description of the existing environment in the study area must consider, but is not limited to, the following:

- Atmospheric environmental components, including climatic and ambient air quality data;
- Terrestrial physical environmental components, including topography, geology, watershed hydrology/geohydrology, groundwater resources, and seismic activity;
- Terrestrial biological environmental components, including species at risk and their habitats (flora and fauna), species migratory patterns, ecologically sensitive or significant areas, and protected areas/critical habitat features. Migratory bird descriptions (terrestrial and aquatic biological environmental components) must include when each species is likely to be present in the study area and areas typically used for nesting, foraging, and/or staging;
- Wetlands;
- Aquatic physical environmental components (freshwater, estuarine, and marine), including bathymetric/geomorphologic, hydrodynamic, water quality, sediment and ice regime, and coastal and oceanographic data;
- Aquatic biological environmental components (freshwater, estuarine, and marine), including fish, fish habitat, fishery resources, species at risk and their habitats, species migratory patterns, ecologically sensitive or significant areas, and protected areas/critical habitat features;
- Socio-economic environmental components, including demographic data (e.g., population and labour force), local economy, past, current and foreseeable land use (including agriculture), zoning restrictions, the geographical location of regional fishing operations, the seasonal variations of fishing activities, archaeological and heritage resources, transportation and associated infrastructure, existing public health and safety concerns, and ambient noise levels (near potentially affected habitation). With specific reference to fisheries, the description must include a socio-economic profile of each identified fishery);
- Current use of land and resources for traditional purposes by Aboriginal persons;
- Current emission and effluent volumes and characteristics, including any points of discharge from stormwater and sewer collection systems (both routine and upset/ emergency scenarios);

- The potential for encountering contaminated soils/materials (including mobilization of naturally occurring contaminants, e.g., uranium and fluorine-rich material associated with the Indian Mountain Uplift Geological Unit); and
- The integrity of the existing causeway and related infrastructure as assessed by a professional engineer licensed to practise in the Province of New Brunswick pursuant to the *Engineering and Geoscience Professions Act* (1999).

In developing the description of the existing environmental setting, well-defined field studies/experiments shall be required to address information deficiencies and facilitate the assessment.

In addition, due to the unique nature of this EIA study, a similar description of pre-causeway conditions (i.e., pre-1967) must be developed to support the assessment and facilitate the full cost accounting analysis (refer to Section 3.7).

3.5 Evaluation of Physical Processes

An understanding of the physical processes and seasonal variations throughout the year is critical to the assessment of environmental conditions that existed, presently exist or would exist if changes were made to the causeway and/or its gates, and/or gate operation. The combination of very large tides, winter processes/conditions, and the high concentration of sediments presents unique challenges to understanding the physical processes and associated ecosystems. Regardless of the type and scope of any analysis or modelling efforts, additional data will be required to compensate for gaps in the information presently available and to adequately assess the existing impacts of the status quo and the potential environmental implications of any proposed modifications to the Petitcodiac River causeway and the status quo condition.

The proponent must collect additional data on tides, currents, and sediment properties, the ice regime, and characteristics of the water column. In addition, expertise and resources must be dedicated to synthesize existing information.

The proponent must develop mass balance equations of the flow and sediment characteristics of the estuary. A mass balance type approach must be used to acquire a basic understanding of the estuary system before considering more complex analyses or methodologies. An inter-disciplinary team consisting of independent engineering and scientific experts will be needed to effectively understand the unique Petitcodiac River/Estuary system.

When based upon scientifically valid objectives and test criteria, experimental openings of the existing gates will provide opportunities for acquisition of additional data for analysis purposes. The experiments must only be carried out following public notification and consultation and only after adequate arrangements for substantial data collection have been established. All experimental openings shall be approved in advance by the TRC, based on relevant regulatory requirements and criteria.

Since data related to physical processes will be relevant to the development of a better understanding of ecosystem processes, it must be incorporated into the knowledge base as it is collected. It is suggested that the knowledge base about macrotidal estuarine systems be increased by the publication of data and study results, preferably in Canadian scientific and engineering journals or in the proceedings of conferences and workshops held in Atlantic Canada.

3.6 Application of Modelling Techniques/Approaches

The proponent must examine the applicability/usefulness of a variety of modelling techniques for prediction of the future physical characteristics (e.g., hydrodynamic and sediment processes) of the Petitcodiac River and estuary under all options outlined in the proponents EIA registration package (Table 3-1). A strategic plan (including decision tree) describing the overall information gathering and selected modelling approaches must be prepared and adopted, including an incremental data collection and modelling approach. A step-wise approach involving data collection and modelling, such that data can be used to modify and improve subsequent modelling efforts, must be formulated. The strategic plan must take into consideration the conclusions and recommendations resulting from the technical workshop held in Moncton, NB, from March 3 to 5, 2002 (LeBlanc, et. al., 2002), and be approved by the TRC prior to implementation.

Numerical modelling of the tidal processes of the Bay of Fundy, and the hydrodynamics and water quality of the Petitcodiac River will be required, if feasible. Mathematical modelling must also be considered for assessment of the sediment movement and deposition, erosion and scour (different seasonal processes), river ice runs and jamming, the tidal bore, and long-term geomorphology of the Petitcodiac River/Estuary. However, it is suggested that a one-dimensional hydrodynamic model extending seaward from Salisbury to Hopewell Cape be developed and utilized prior to application of more detailed hydrodynamic, sediment, water quality, or geomorphologic modelling. Physical modelling and numerical modelling may also be considered with respect to assessment of gate flow conditions, as may be required to acquire information to input into other models. All models shall be calibrated and verified based on collected field data, and be of reasonable accuracy (for the purposes of environmental impact assessment).

Different models with appropriate levels of complexity may be used depending on the process being evaluated. Several hydrodynamic and morphologic models and modelling approaches may be used to assess the physical processes. Modelling approaches must progress from simple to more complex as required/feasible. Boundary conditions must be well defined and will likely be different for models developed to address specific issues. An incremental approach involving data collection and interpretation to modify and improve subsequent modelling efforts must be considered.

3.7 Cost/Benefit Analysis (Full Cost Accounting)

The proponent must conduct a full cost accounting analysis (cost/benefit analysis) to allow a comparison of the estimated costs and benefits of all the options (Table 3-1), including all identified environmental externalities or intangibles.

Full-cost accounting (FCA), also known as "total cost accounting," aims to improve economic analysis by adding important information into economic equations that tend to neglect unsustainable impacts on natural resources and social well-being. By including benefits, impacts and costs external to economic transactions as part of the full cost of a transaction, the sustainability of different project options can be evaluated. The analysis must attempt to quantify benefits and costs not included in traditional costing techniques (e.g., opportunity benefits/costs associated with changes to current or historical fisheries, current or historical habitats, current or historical land-uses, current or historical Aboriginal resource use, etc.).

The proponent (DSS) may consider alternate means of full cost-accounting (including contingent evaluation, hedonic pricing, and avoidance cost techniques) to assign values to impacts on environmental amenities and resources otherwise overlooked in traditional economic decision-making. Opportunities for stakeholder input to the FCA analysis (e.g., workshops, etc) is a requirement of the study (input obtained may also facilitate VEC identification and definition). In addition, the rationale and limitations of each technique used for full cost accounting must be described (summarized in a decision tree).

To facilitate the full cost accounting analysis, a description of pre-causeway environmental conditions (i.e., pre-1967) must also be developed.

3.8 Review of Existing Information

As part of the review of all pertinent available information and the overall scoping for the study, resources must be directed towards “data mining,” to obtain directly relevant information (e.g., traditional ecological knowledge, local resident knowledge, mapping, historical surveys, and obscure film footage and other photographic records, etc).

3.9 Cross-Referenced Index

To assist the readers, a cross-referenced index (i.e., Concordance Table), which shows where the content and issues outlined in the Final Guidelines are addressed in the report, is required. This index must be submitted with the Draft EIS.

4.0 POTENTIAL ENVIRONMENTAL EFFECTS

Presented here are a number of specific issues for study. The scope of the factors that need to be considered in addition to those described in Section 3.0 for this assessment pursuant to Section 16(3) of CEAA and Regulation 87-83 are described in this section. However, this framework does not limit the assessment. Should additional relevant issues, concerns, or potentially significant environmental effects be identified through discussion with members of the TRC, regulatory agencies, the public, or other stakeholders or through Aboriginal consultation, DSS must incorporate these issues into the assessment of the proposed project's potential environmental effects. The assessment must include consideration of, but is not limited to, the regulations, guidelines and associated documents listed in Appendix B.

The specific issues identified must be considered for all options as outlined in Section 3.0 (Table 3-1). To help facilitate the assessment, the proponent must examine the applicability of a variety of modelling techniques for prediction of the future physical characteristics (e.g., hydrodynamic and sediment processes) of the Petitcodiac River and estuary under all options outlined in the proponent's EIA registration package (Table 3-1).

All potential project-related environmental effects (i.e., both positive and negative), resulting from construction, operation and/or decommissioning (including potential effects resulting from accidents or malfunctions) must be included in the assessment.

In addition, all options (Table 3-1) must be assessed for their relative potential for:

- introduction and spread of invasive species (including the potential effects on native species of flora and fauna); and
- re-establishment of native species and designated species at risk (e.g., the dwarf wedge mussel; Atlantic salmon, etc) .

4.1 Effects on the Marine Environment

VECs to be considered in the marine environment (including Shepody Bay, Chignecto Bay, etc) will include (but are not to be limited to) fish and fish habitat, and fisheries resources in areas potentially affected by the project.

The impact of construction, operation/maintenance, and decommissioning activities on marine water quality and the benthic environment will be assessed. Predict the environmental effect of any potential deterioration in water quality on marine environment VECs.

Evaluate the risk to VECs in the marine environment (including Shepody Bay, Chignecto Bay, etc) from the release of any deleterious substances (including sediment) during construction, operation/maintenance and decommissioning. The implications of potential water quality improvements must also be considered.

Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan, including spill prevention, and spill response contingency planning.

4.2 Effects on the Estuarine Environment

Assess the environmental effects of all options on the estuarine environment, including (but not limited to) characteristics of the tidal regime and saltwater-freshwater interface, channel dimensions and shape, ice and sediment movement, water quality, fish and fish habitat within the environmental assessment boundaries. Identify major variables affecting erosion and scour (i.e., of banks, sand-flats and mud-flats), and channel deposition and comment on the likely severity/amount, timing (seasonal, tidal), and frequency of these effects.

The impact of construction, operation/maintenance, and decommissioning activities on estuarine water quality and the benthic environment will be assessed. Predict the environmental effect of any potential deterioration/improvement in water quality on estuarine environment VECs.

4.3 Effects on the Freshwater Environment

Assess the environmental effects of all options on the freshwater environment (including headpond), including (but not limited to) water quality, freshwater input/supply to the Bay of Fundy, fish and fish habitat within the environmental assessment boundaries. Identify major variables affecting erosion and scour (i.e., of banks, sand-flats and mud-flats), and channel deposition and comment on the likely frequency of these effects.

The impact of construction, operation/maintenance, and decommissioning activities on freshwater water quality and the benthic environment will be assessed. Predict the environmental effect of any potential deterioration/improvement in water quality on freshwater environment VECs

4.4 Effects on Species at Risk (Flora & Fauna)

Assess the environmental effects of all options on species considered to be at risk under national, provincial and regional classification systems (i.e., endangered, threatened, species of special conservation status, and rare species). Include consideration of any species at risk (flora and fauna) known to occur within the zones of influence of the proposed project and for which there are potential project-VEC interactions anticipated that could result in significant environmental effects.

The following information sources on species at risk in the general project area must be consulted:

- Atlantic Canada Conservation Data Centre (AC CDC);
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC; List updated in May, 2002, or the most recent update available);
- New Brunswick Museum;
- NBDNRE;

- Canadian Wildlife Service (CWS); and
- Local naturalist and interest groups.

In addition, all options must be assessed for the relative potential for re-establishment of species designated as at risk (e.g., the dwarf wedge mussel, Atlantic salmon, etc.).

4.5 Effects on Terrestrial and Wetland Environments

Assess the potential environmental effects of construction, operation/maintenance and decommissioning of all options on terrestrial and wetland environments (i.e., where there is potential for significant project/VEC interaction). Predict the potential effects on wetland VECs resulting from any deterioration/improvement in water quality.

4.6 Effects on Migratory Birds

Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases of all options on migratory birds and migratory bird habitat. Predict effects to the VECs in areas used by migratory birds potentially resulting from each project option. Include consideration of migratory birds that occur within the zones of influence of the project and for which there are potential project-VEC interactions that could result in significant environmental effects (e.g., the importance of *Corophium sp.* to staging shorebirds)

4.7 Effects on Air Quality and Climate

Assess the environmental effects of the construction, operational/maintenance and decommissioning phases of all options on air quality. Any substantive emissions will first be quantified. This will be done on a local (Moncton/Riverview airshed) and regional (Southeastern NB) basis. This will include an analysis of routine air emissions and upset conditions, including accidents and malfunctions. The effects of transportation related emissions for all options will be considered including impacts on air quality, and human health (e.g., emissions resulting from any change in traffic patterns, etc.).

The generation of odour (e.g., from decomposition of previously submerged vegetation, etc), and the generation of wind-borne dust from the exposure and drying of mudflats must be evaluated. The need (if any) for dust monitoring must be considered.

Emissions associated with site preparation, construction, and maintenance phases that will contribute to the atmospheric load of Greenhouse Gas (GHG) emissions must be assessed. Also, the potential loss or enhancement of carbon dioxide sinks will be discussed.

A discussion of any anticipated impacts of all options on the local climate must be included (e.g., small-scale meteorological changes potentially resulting from effects to the headpond/river - a heat source/sink). The assessment will address:

- What small-scale or local changes in climate are anticipated as a result of the construction, operation, and/or decommissioning of all options?
- What would be the likely impacts on local activities such as agriculture, fisheries, forestry, and marine transportation, etc (cumulative effects approach)?
- How would these impacts be mitigated?

4.8 Effects on Ambient Noise Levels

Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases of all options on ambient noise levels.

4.9 Effects on Groundwater Resources

Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases of all options on groundwater/drinking water supply resources .

4.10 Effects on Vessel Traffic/Navigation

Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases of all options on vessel traffic/navigation (i.e., recreational, commercial, and other). This assessment must take into consideration existing and any predicted changes to vessel traffic resulting or potentially resulting from all options.

4.11 Effects on Traffic Patterns/Road Infrastructure

Assess the environmental effects of the construction, operational/maintenance and decommissioning phases of all options on traffic flows, level of service, and accident rates (including a prediction with respect to current/future road infrastructure).

4.12 Effects on Infrastructure

The effects of the construction, operational/maintenance and decommissioning phases of all options on water supply conduits, drainage works, pipelines, dykeland infrastructure (and associated farm land), landfills, and other public infrastructures must be examined. This includes the potential for leakage/spillage or mobilization of hazardous materials.

4.13 Effects on Public Health and Safety

The effects of the construction, operational/maintenance and decommissioning phases of all options on public health and safety must be assessed (e.g., potential health and safety effects resulting from vehicle traffic/transportation changes, potential effects to existing infrastructure such as landfills, outfalls, dykeland infrastructure, drainage systems, potential effects from an increase in human pests (e.g., mosquitoes), and potential effects due to changes in flood risk, etc).

Describe the key components relevant to safety during all project phases, including identification of sources and characteristics of any potential risks to workers.

Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan for construction, operation and decommissioning, including spill prevention, and spill response contingency planning.

Identify how all options affect the potential ice jamming and flooding upstream and seaward of the existing causeway. Relate any changes to measures that could be taken to lessen any potential risks created with respect to public safety.

Provide a commentary on how changes in the marine, estuarine, freshwater, wetland or terrestrial environments could affect ecosystems and populations of flora or fauna, including insect pests and rodents, and any potential implications related to human health and safety.

4.14 Effects on Aboriginal Land and Resource Use

Assess the effects of all options on the current use of lands and resources for traditional purposes by Aboriginal persons.

4.15 Effects on Private/Public Land and Resource Use

Assess the effects of all options on the current use of lands and resources by the public and private sectors.

4.16 Other Social & Economic Effects

The social and economic benefits potentially resulting from all options must be predicted (e.g., labour and economy within the greater Moncton/Riverview area, upper Bay of Fundy watershed, and the Province of NB). Evaluate the environmental effects of all options on land use, including resource harvesting (i.e., within the defined environmental assessment boundaries of the project), and how any change in flood risk could affect land use.

Discuss any aesthetic/potential visual impacts of the proposed project on the Petitcodiac River and estuary. This must include identification of features recognized by the local public as being aesthetically preferred, and consideration of professional input related to aesthetics, urban design and landscape architecture.

The effect of all options on existing tourism and recreational activities must also be included.

The effect of all options on local property values and insurance rates in the watershed must also be included.

The effect of all options on industries, including the fishing industry (lobster and scallop industries, etc) must also be included.

The potential effect of all options on business operations, including potential gains or losses in production or sales must also be taken into account.

4.17 Effects of the Existing Environment on the Project

The assessment must take into account how the existing environment/natural and man-made hazards could adversely affect all options (e.g., acid rock drainage, severe meteorological conditions, seismic events, tidal influences, etc.).

Sensitivity of all options to variations in meteorological conditions, including extreme events, must be fully investigated. Among the parameters to be considered are the effect of extreme precipitation events on site water management and the influence of wind, waves, ice, and flooding on infrastructure. Consideration of applicable climate elements must include:

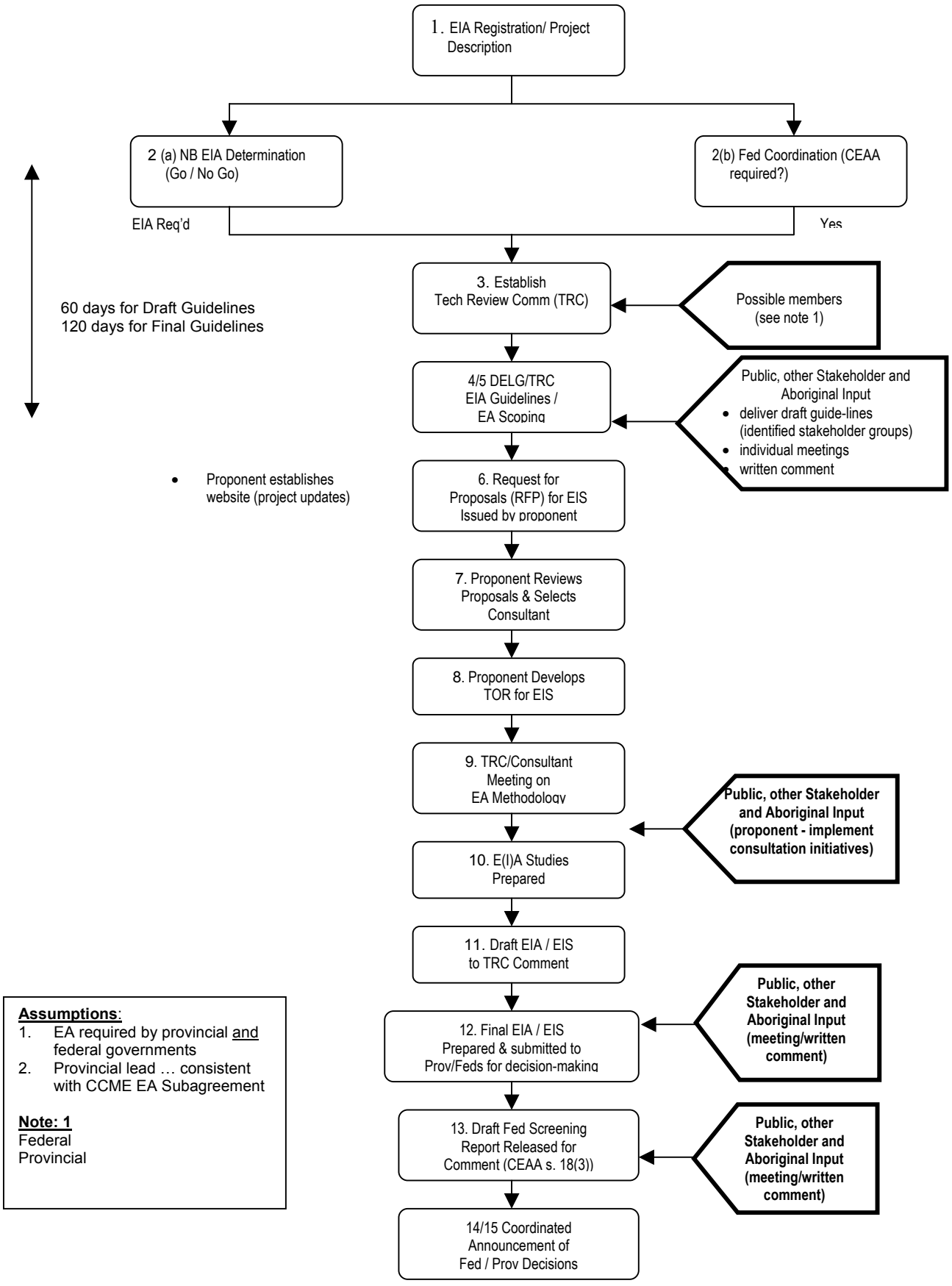
- an estimate of its importance to all options;
- an estimate of how sensitive all options are to variations of this element;
- a discussion of climate data used including quality and record length, how representative these data are of the project area (in space and time), and how these factors affect the accuracy of the information derived; and
- change in sea level.

The sensitivity of all options to climate variability and climate change must be identified and discussed. Not only will the assessment look at the current climatic setting in the area, but must also include a consideration of the potential future climatic conditions due to climate changes in the foreseeable and long-term future (e.g., global warming, changes in sea levels, etc., over a minimum 50 and 100 year period).

Appendix A

Harmonized Federal-Provincial EIA Process Flow Chart – Proposed Modifications to the Petitcodiac River Causeway

PETITCODIAC CAUSEWAY
FED/PROV EA PROCESS



Assumptions:
1. EA required by provincial and federal governments
2. Provincial lead … consistent with CCME EA Subagreement

Note: 1
Federal
Provincial

Appendix B

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