A GUIDING PRINCIPLES DOCUMENT TO ASSESS CUMULATIVE EFFECTS IN THE SHEDIAC BAY AREA

FINAL REPORT

This protocol reflects guidance for cumulative effects assessment (CEA) under the Canadian Environmental Assessment Act, 2012, and recent CEA experience in Canada.

Submitted to:

Steering Committee

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1.0 INTRODUCTION

Parlee Beach is a major tourism draw for New Brunswick and one of North America's finest beaches. Government is committed to ensuring the safety of New Brunswick residents and visitors by enhancing public communication about water quality results as well as addressing the ongoing water quality issues at Parlee Beach and in the Shediac Bay watershed, as a whole. A Steering Committee was formed, lead by Department of Health, to develop a scientific program to identify sources of contamination, and possible remedial actions for consideration by government. As part of the scientific program, the Committee has identified a number of technical plans to protect and improve water quality and public health over the long and short term. One required study is the cumulative effects assessment (CEA) of the combined interaction of point and non-point sources of water quality contamination in the region around Parlee Beach both at present and due to future development.

This Guiding Principles document presents recommendations for developing terms of reference of the CEA, including issues of concern, the questions that need to be answered, and the possible role of CEA in local and regional planning.

1.1 Purpose

This Guiding Principles document will provide:

- a brief overview of CEA methodology and recent experience in Canada;
- recommended principles to consider in the development of an effective CEA program for understanding current and possible future impacts on water quality at Parlee Beach;
- a high-level identification of issues and potentially interacting activities and land uses which should be the initial focus of the CEA;
- a review of information required to conduct the CEA, with reference to the existing studies and components of the scientific program for Parlee Beach;
- the role of CEA in monitoring the accumulated state of municipal waste water and storm water treatment infrastructure and predicting changes associated with system improvements and additional future development; and
- the possible role of CEA in local and regional planning and how development/building permits and municipal bylaws may be used to mitigate cumulative environmental effects within the Shediac Bay watershed.

2.0 OVERVIEW OF CEA METHODOLOGY

Cumulative effects assessment is broadly the same as direct impacts assessment but is distinct in two ways; CEA considers the combined impacts of multiple separate activities which have an effect or effects on the same environmental component, and considers impacts in the past, present and the reasonably foreseeable future. Typically, CEA is conducted in the context of a single project approval process, in which the predicted *residual* impacts (i.e., following the implementation of standard mitigation) of the project are considered in combination with other known and future projects. The effects of past projects are usually assumed to be implicitly part of the present environmental condition.

The standard methodology for this kind of assessment in Canada is described in the *Cumulative Effects Assessment Practitioners Guide*, by the Canadian Environmental Assessment Agency (CEAA; the Agency)(1999). There are also a number of operational policy documents associated with the Guide on interpreting certain terms like "significance" and "Aboriginal current use of lands for traditional purposes", in the context of CEA. The Agency released a more recent draft manual in 2014 titled *Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*. The manual is a useful summary of the Guide and has practical examples to help with interpretation.

According to Agency guidance, CEA has five steps:

- **Scoping** – identify the issues (predicted residual impacts on environmental components);
- **Analysis** – predict cumulative effects (collect local data and/or refer to experience from other similar projects, use professional judgement to predict project related cumulative interaction and/or apply modelling if suitable data is available);
- **Mitigation** – Mitigate significant cumulative effects (eliminate, reduce, compensate);
- **Significance** – assess significance of cumulative effects (after mitigation) in terms of magnitude, area, frequency, reversibility; and
- **Follow-up** – address project specific effects and cumulative effects.

This guidance is supported by numerous examples, but no more detailed protocols are prescribed because the nature of projects is so diverse and site specific.

The Province of New Brunswick does not explicitly identify CEA as a requirement in its regulations or EIA guidelines (NBDELG, 2012). NBDELG may identify CEA as a requirement on a project specific basis (if applicable) during the scoping process, and has referred to the federal guidance documents in the past. Any proposed new development in the Shediac / Parlee Beach region would be required to register under the NB *Environmental Assessment Regulation* and could be required to conduct a project specific CEA, as described above.

Recent experience in Canada has revealed a weakness of the "single project" CEA format for use in regional systems that leads to poorly supported conclusions and failure in the follow-up phase (BCBC, 2012; UNB, 2015), primarily:

- **Low data quality** – individual proponents cannot reasonably be asked to pay for regional data collection; and
- **Lack of clarity or commitment in follow-up programs** – vague objectives often lead to inadequate monitoring and uncertain (or wrong) conclusions; regulators and proponents sometimes do not properly manage follow-up requirements.

To address these shortcomings, several specific recommendations have been made based on successful implementation of CEA in recent years (BCBC, 2012; UNB, 2015), including:

- **Regional data collection** – More and better data are required for effective use of CEA in regions of predicted significant future development. The data collection should be sponsored by government with collaborative relationships between regulatory agencies, local governments, and industry and non-government stakeholder groups.
- **Geographic Information System (GIS) Data Management** – Since CEA focusses both on regional scale and site specific environmental impacts, the use of GIS to assemble, analyze, and present complex overlays of mapping and data is essential.
- **Clear measurable objectives** – The CEA must have explicit objectives and thresholds to provide reference points so that success or failure can be measured.
- **Long Term Sponsor(s) and Plan to Follow-up** – A leading agency or committee should be responsible for the execution of a long-term plan that includes scheduled follow-up monitoring of clearly identified outcomes and adaptive management for changing conditions. The sponsor will own and manage the GIS database and make information available to decision makers and stakeholder agencies for use in regional development planning.

Another common observation from recent experience is that CEA should not be misunderstood as a one-time study that produces final conclusions, but rather it is "***an iterative process of incremental learning and adaptation***" that leads to better decision making.

CEA is similar to traditional risk analysis where predictive modelling is used to plan for possible future conditions, and depends on continuous feed back.

2.1 Principles for Conducting a CEA for the Shediac Region

The first requirement of a CEA program for the Shediac Bay area is to establish the context of the assessment. This CEA is intended to specifically address the issues related to water quality at Parlee Beach that may impact human health and result in beach closures, both in the present and due to future development. Other issues not related to water quality are beyond the scope of these proposed guidelines.

The Canadian Council of Ministers of the Environment (CCME) identified several good practices in "*Principles for Cumulative Effects Management*" (CCME, 2014), that support the conclusions and recommendations of the previous section and are applicable to any CEA study. An *effective* CEA program should be:

- **Knowledge-based** – effective science and monitoring systems and networks provide the information needed to measure performance and support the development of outcomes and objectives.
- **Outcomes and environmental objectives-based** – cumulative effects management is driven by defined outcomes or objectives for the desired quality or state of air, water, land and biodiversity now and in the future.
- **Future-focused** – cumulative effects denote the combined impacts of past, present, and reasonably foreseeable future human activities on the region's environmental objectives. It requires a broader, forward looking approach to planning and management that balances environmental factors with economic and social (may include cultural and spiritual) considerations.
- **Place-based** – cumulative effects management is place-based or site-specific and intended to bring people and their activities together and build relationships among stakeholders to support shared stewardship within an area. Any outcomes must support and reflect the interests of the area being considered and it's people.
- **Collaborative** – collaboration is a significant and challenging component of a cumulative effects management approach.
- **Adaptive** – cumulative effects management includes a shared responsibility to adapt and take corrective actions if outcomes or objectives are not being achieved.
- **Comprehensive** – uses both regulatory and non-regulatory approaches.

3.0 PRELIMINARY ISSUES AND ACTIVITIES FOR FOCUS OF THE CEA

It is understood that several current land uses and activities in the Shediac region collectively contribute fluid discharges and runoff that affects water quality of Shediac Bay, including Parlee Beach. Changes in land use and the addition of future developments could increase negative effects without appropriate management; however, the nature and magnitude of cumulative effects by individual activities and sites is poorly defined.

Table 1, below, presents an initial scoping of issues and potentially contributing activities and land uses as the focus of the CEA. The table was developed using input from the Steering Committee, and reflects previous knowledge from Ontario (*Beach Guidance Management Document*, Ontario Ministry of Health and Long-Term Care, 2014) and Government of Canada (*Guidelines for Canadian Recreational Water Quality*, third edition. Health Canada, 2012), inferred relationships in local water quality reports (such as produced by the Shediac Bay Watershed Association), and anecdotal accounts by local operators of the Parlee Beach Park, municipal infrastructure, and private watercraft services.

3.1 Information Requirements of the CEA

The Shediac Bay Water Quality CEA will require baseline data for the region of influence. This information will be needed to understand the existing condition overall and at specific locations, and will be compared to future measurements to detect if changes have occurred and to assess the effectiveness of mitigation measures and impacts of new development.

It can be seen in Table 1 that the current knowledge of each contributing activity is variable. Regional or site specific studies are required to provide better information for each of the identified issues. A review of studies already identified in the Scientific Program is presented in Table 2. It can be seen that the current range of studies address most of the information requirements for baseline environment and activities. However, a major focus of the CEA is the possible future condition; which will require some predictive modelling. In Table 2, three additional subjects are proposed for study that will provide necessary information about the future regional condition, including:

- **Future Regional Development Profile** – predict direction of future development (population, demand for services, land use trends - residential, commercial, infrastructure, agricultural);
- **Municipal Planning Strategies** – engage municipalities to assess awareness of regional water quality in planning strategies, and incorporate Municipal Planning Strategies controls in CEA (this may involve creating new planning strategies in some communities);
- **Describe Foreseeable Projects** – identify major projects (or project types) likely to occur.

Table 1 Preliminary Issues Scoping Summary

Activity	Potential Effects
Public Sewage Collection System	Infiltration
	Lift station overflow
	Illegal sewage connections
	UV disinfection seasonal only
	Treatment sys. capacity outpaced by development
	Hydraulic capacity exceeded at times
Private Septic Systems	Aging septic infrastructure – which does not function as effectively as it did initially or is undersized for the current # of people
	Inadequate maintenance
Storm Water Runoff	Unmanaged storm water runoff contains multiple contaminants incl. lawn fertilizer, driveway residue, pet faeces, automotive products, etc.
Recreational and Commercial Watercraft	Disposal at sea, inadequate holding tanks
	Inadequate wharf pump out facilities
	Rafting related dumping very close to the beach
Parlee Beach Operation and Maintenance	Sand refurbishment stirs up noxious substances
	Seaweed/ eel grass removal and disposal could reduce water quality
	Garbage and litter may contribute to reduced water quality
	Parking lots and site storm water runoff to Parlee Beach “Creek”
	Off-site parking contributes to unmanaged storm water runoff.
	Swimmer numbers above threshold may cause water quality issues
Dogs	Dog feces may contain E. coli, and faecal coliform bacteria, salmonella and giardia. Dog waste is high in nitrogen.
Development in Wetlands	Infilling, structures, shoreline facilities reduce wetland functions.
Birds and Waterfowl	Bird waste has been linked to gastrointestinal illness or diarrhea.
Agriculture	Runoff of agricultural fertilizers and products may affect water quality.

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Table 2 Information Required for the Cumulative Effects Assessment

Activity	Required for Assessment	Scientific Program Components / Studies
ALL ASPECTS	1, 2, 3 ,5, 6, 7, 13, 14, 20, 21, 22, 23	1. Establish Beach Water Monitoring Protocol 2. Install rain gauge and real-time data logger 3. Develop Coastal Hydrodynamic Model 4. Study beach sand bacteria & shallow ground water flow 5. Review historical bacteriological data and verification 6. Cumulative effects assessment 7. Watershed reconnaissance & water sampling program 8. Investigate/adopt best management practices for beaches 9. Inventory private septic systems 10. GSSC infrastructure assessment 11. Parlee Beach infrastructure assessment 12. GSSC UV system upgrade assessment 13. Review Coastal Flood Mapping / Geomorphology Studies 14. Compile previous studies (water quality, environmental) 15. Education for watercraft community / wharf operators 16. Review bather density information 17. Wetland Delineation 18. Storm water runoff investigation 19. Agricultural operations investigation 20. Shediac Bay Report (SBWA) 21. Engage microbiology specialist to advise committee 22. Develop federal-provincial government partnerships 23. Identify all variables and develop consistent management approach
Public Sewage Collection System	10, 11, 12, 18	
Private Septic Systems	9	
Storm Water Runoff	10, 11, 18	
Recreational and Commercial Watercraft	15	
Parlee Beach Operation and Maintenance	1, 2, 4, 8, 11, 16, 17, 18	
Dogs	8	
Development in Wetlands	17	
Birds and Waterfowl	8	
Agriculture	19	
Future Regional Development Profile	Study Required	
Municipal Planning Strategies	Study Required	
Describe Foreseeable Projects	Study Required	

3.2 Objectives

Clear and measurable objectives are also required for the CEA. The Parlee Beach Water Quality Monitoring Protocol establishes some specific parameters in accordance with Health Canada's *Guidelines for Canadian Recreational Water Quality* (2012), including maximum concentrations of faecal bacteria. Other standard water quality guidelines may be relevant, such as discharge limits in wastewater and storm water system operating approvals. Indicators may also be used to assess program effectiveness, such as the number of storm water overflow events per year, or the number of beach closure days under the new protocol.

Objectives may also change over time as the program evolves in response to better information and the changing environment.

4.0 ROLE OF CEA IN MUNICIPAL WASTEWATER AND STORM WATER MANAGEMENT AND REGIONAL LAND USE PLANNING

Currently, the "accumulated state" of regional water quality in the Shediac Bay area is monitored and managed by piecemeal uncoordinated programs. Surface water quality is regulated by the *Water Quality Regulation* under the *Clean Environment Act*. The Province has established a surface water monitoring network for the major river systems of NB but there are no monitoring sites in the Shediac Bay watershed. Instead, the Province funds local NGOs to monitor, like the Shediac Bay Watershed Association (SBWA). Federal government programs may collect data in the area (e.g. Canadian Shellfish Sanitation Program) but there is currently no coordination between programs. Discharges by municipal infrastructure and other industrial facilities is permitted and monitored for compliance (*Water Quality Regulation*, Request Approval of a Source), but there are other unregulated (or sometimes illegal) sources of contamination; which are currently only identified by third-party reports. The DELG responds to such reports and enforces compliance if applicable. The Province has developed public awareness brochures for shoreline residents about water quality issues and advice on best yard maintenance / sanitation, like Green Home and Cottage (http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Water-Eau/GreenHomeandCottage.pdf).

At present, the potential cumulative effects of existing and future land use or developments is only explicitly addressed by individual project Environmental Impact Assessments (if required). Municipal planning does not appear to consider regional effects on local water quality in land use zoning, development permits, or community planning strategies in the region. Some other regulations and policies may influence municipal planning, such as the Well Field Protection Program (in Shediac), or the Coastal Areas Protection Policy (DELG, 2002). Municipal development permits generically require compliance with "other approvals" but the responsibility for identifying such lies with the proponent.

Communities have some ability to add protection of regional water quality to municipal/rural planning. The *Community Planning Act* authorizes community Councils to develop a Municipal or Rural Plan, and *Zoning By-laws*. The Municipal/Rural Plans may establish community policies (actions that will be done) and objectives (desired outcomes to strive for, but may not be accomplished). Under the Act, a zoning by-law may contain regulations regarding:

- sizes and dimensions of lots;
- density;
- buildings and structures;
- access to lots;
- parking;
- signage;
- the environment; and
- uses that are permitted and prohibited.

Many of these aspects can be used to address water quality issues identified in the preliminary scoping exercise (Table 1, above). Zoning by-laws may undergo review periodically to ensure they remain consistent with the community's objectives and the Plan. Zoning by-laws are carefully considered since "modifications could change the nature of the zone and have a negative impact on surrounding properties".

A building permit is required for all new homes, additions, renovations, mobile or mini homes, enlargement of windows, fences, garages, swimming pools, garden sheds, or any other structural additions/changes to a property. The purpose of the building permit is to protect both the property owner and the community by ensuring that the proposed development conforms to all necessary regulations, i.e. by-laws, National Building Code, etc., and can meet the acceptable standards for health and safety. When a building permit is obtained, the building inspector will conduct various site inspections to ensure that all criteria have been met. Including set-backs required by DTI (road access) and Department of Public Safety (septic system).

The key decision makers regarding municipal/rural planning, collectively and sometimes individually, are the:

- Council;
- Regional Service Commission;
- Planning Review and Adjustment Committee (PRAC); and
- Building Inspector.

Many municipal planning processes (especially zoning by-law changes) are subject to public review and are open to input from potential stakeholders.

Communities also can access funding resources for developing plans and required studies, and to partner with government and environmental NGOs to coordinate and direct data gathering in the watershed for maximized planning value.

It appears that communities have several potential tools at hand to develop objectives and strategies for protection of local water quality, make regulatory controls in land use zoning and by-laws, and access resources for studies and data collection. What is missing is a clear mandate or desire to do so and coordination with the associated government agencies. The availability of resources at the community level (staff workload and qualifications) to commit to regional water quality issues is unknown.

4.1 CEA for Municipal Wastewater/Storm Water Management

The CEA will help to establish a better picture of the current accumulated state of water quality in the region and can provide a predictive model of future water quality under expected or worst case scenarios that will provide context for decision makers, such as:

- Verify performance of system modifications in addressing ongoing contamination as the Parlee Beach Scientific Program develops;
- Evolving objectives (better understanding of current/new issues);
- Priorities (short/long-term) for mitigation measures and future studies;
- The probable future requirements of municipal wastewater and storm water systems at specific locations and communities; and
- Land use restrictions at specific areas and locations to protect future water quality (policy, by-laws, approvals, special zoning).

4.2 CEA for Regional Land Use Planning

A Shediac Bay area CEA Program can provide a predictive model of future water quality in the context of proposed land use zoning / developments (sub-divisions, campgrounds, infrastructure, residential, commercial & recreation projects, etc.) for decision makers, such as:

- Integrating the CEA program as an element of existing approvals for the Shediac Bay region (or Parlee Beach "Special Feature Area"); and
- Working with regional/local agents (Councils, RSCs, PRACs, building inspectors, etc.) to develop policy and perhaps by-laws that address potential cumulative impacts of future developments.

5.0 CONCLUSIONS & RECOMMENDATIONS

In summary, this guiding principles document to assess cumulative effects of regional water quality (primarily faecal bacteria) in the Shediac Bay area (including Parlee Beach) presents the following conclusions and recommendations:

- The Parlee Beach Scientific Program already meets most requirements for a CEA, including regional approach, collaborative relationships, scoping of issues and collection of required data;
- Two additional program needs for an *effective* CEA are:
  - GIS Data Management System to integrate all the program data and enhance analysis (complex overlays and/or modelling) and presentation of results; and
  - A long-term sponsor and plan of execution;
- Aspects of future development should also be included in the data collection, including:
  - Future Regional Development Profile;
  - Municipal Planning Strategies; and
  - Describe Foreseeable Projects;
- Integrate the CEA program into regional water quality management and municipal planning by making the data/results accessible to decision makers and stakeholders; and
- Work with regional/local agents (Councils, RSCs, PRACs, building inspectors, etc.) to develop policy and perhaps by-laws that address potential cumulative impacts of future developments.

This document also contains a number of “good practice” principles for management of regional cumulative effects in the Shediac Bay area, and preliminary observations on the context of such a program and reasonable expectations. This may be used by the Steering Committee to develop an effective CEA program which has a regional approach, clear measurable objectives, is future focussed, and will provide a collaborative system (with all stakeholders) for incremental learning that leads to better decision making.

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