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Best Practices:
EIS Guidelines for Large Hydropower Projects

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Best Practices: EIS Guidelines for Large Hydropower Projects

Overview:

This document sets out best practices for drafting Environmental Impact Statement (EIS) guidelines for hydropower projects. It has been prepared to assist interested parties in commenting on the draft EIS guidelines for BC Hydro's Site C Clean Energy Project. This document aims to guide an evaluation of EIS guidelines' quality, comprehensiveness, and robustness, to help ensure that a prospective project receives an appropriate environmental assessment.[1]

Each of the following sections contains EIS guideline best practices, distilled from academic commentary on environmental assessment as well as EIS reviewers' guides. Where possible, examples are provided from past projects. These examples illustrate good EIS drafting and serve as models to compare against the EIS guidelines for new projects, such as Site C.

These best practices are not meant to be an exhaustive guide or checklist to evaluate EIS guidelines. EIS guidelines are created on a case-by-case basis and are specific to the proposed project, the project site, and other contexts, making it very difficult to create a universal EIS guideline model.[2] This document provides general principles and, where possible, specific best practices for EIS guidelines, and cites sections from high quality, sustainability focused, and/or precedent-setting EIS guidelines from previous projects which can then be compared to the Site C EIS guidelines.

This document relies heavily on Tracy Glynn's[3] "Environmental Impact Assessment (EIA): Guide for Reviewers" for many of its best practices. For those assessing the quality of an EIS or EIS guidelines, Glynn's report is well worth reading in full. It also includes a checklist for EIS reviewers that summarizes her recommendations.

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[1] This report focuses on large hydropower dams; however many of its best practices, such as the sections on Strategic Environmental Assessment, Cumulative Effects, and Public Participation, should apply equally to small run-of-river projects as well.

[2] When asked whether a "model" or "best" EIS guideline existed, Richard Lindgren, counsel at CELA, responded as follows: "That is a hard question to answer since EIS Guidelines are usually tailored, on a case-by-case basis, to address the site-specific circumstances of projects subject to CEAA – but ideally, the Guidelines would require consideration of all matters prescribed by s.16 (1) & (2) of CEAA, including "need" and "alternatives to", at a sufficient level of detail. Express requirements dealing with "sustainability assessment" considerations would also be helpful if included in the EIS Guidelines." (per email dated March 13, 2012).

[3] MSc, environmental science instructor at St. Thomas University and global environmental advocate.

Abbreviations:

CEAA = *Canadian Environmental Assessment Act*

CEA Agency = Canadian Environmental Assessment Agency

EA = Environmental Assessment

EIA = Environmental Impact Assessment

EIS = Environmental Impact Statement

GHG = Greenhouse Gas

RA = Responsible Authority

SEA = Strategic (or Sectoral) Environmental Assessment

SIA = Social Impact Assessment

Site C = BC Hydro's Site C Clean Energy Project

TEK = Traditional Ecological Knowledge

VEC = Valued Ecosystem (or Environmental) Component

A Preliminary Note – Strategic vs. Project-Specific EA

This document has been prepared in response to the Site C Joint Panel Review, and since the site for this hydroelectric dam has already been chosen, the focus is on project-specific environmental assessment. EA is project-specific if undertaken after a site has been chosen, and tends to focus on identifying and mitigating the environmental effects of that project in that place.[4] Strategic environmental assessment (SEA), on the other hand, takes a higher-level planning approach at the policy level and "ranks all energy options on the basis of their social and environmental costs" before individual project sites are selected.[5] SEA can be applied sectorally (i.e. to the energy sector), as well as regionally and indirectly (i.e. to fiscal policies).[6] Strategic EA directs RAs and proponents to choose the site that will produce the least socio-environmental impact.

Though the Site C dam location has already been chosen, the benefits of SEA must nonetheless be emphasized. Keith Chapman[7] argues that "convincing as opposed to cosmetic incorporation of environmental values into the decision-making process can only be achieved if they become an integral part of the forward planning of government agencies and private corporations".[8] Dr. Robert Goodland[9] asserts that hydropower SEA is "the most cost-effective way to promote the environmentally, socially and economically least-cost project".[10] It allows "early, overall analysis of the relationships between, and potential effects of, the projects…*before* individual projects are proposed", and therefore "facilitates a planning approach to address the overall, cumulative effects" of any subsequent projects.[11] Often, collective environmental effects can only be identified and appreciated at the strategic level.[12]

Additionally, project-level EA is an "essentially reactive" exercise in identifying and mitigating a project's potential environmental effects after fundamental planning and development decisions have already been made – it therefore "often occur[s] too late in the decision-making process to ensure that alternatives are given adequate consideration".[13] Since SEA's higher-level approach allows more thorough assessment of cumulative effects and identification of the least cost and least impact development, SEA should be emphasized over project-level EA going

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[4] Robert Goodland, "The Environmental Sustainability Challenge for the Hydro Industry" (1996) 1 *Hydropower & Dams* 37 at 40.
[5] *Ibid,* at 40.
[6] Steve Bonnell & Keith Storey, "Addressing Cumulative Effects Through Strategic Environmental Assessment: A Case Study of Small Hydro Development in Newfoundland, Canada" (2000) 2:4 *Journal of Environmental Assessment Policy and Management* 477 at 482.
[7] PhD, Professor Emiritus of geography and the environment at the University of Aberdeen, UK.
[8] Keith Chapman, "Issues in Environmental Impact Assessment" (1981) 5 *Progress in Human Geography* 190 at 201.
[9] PhD, former World Bank ecologist specializing in EA of energy projects, appointed Independent Commissioner to the Quebec Great Whale hydro dam EA.
[10] Goodland, "Challenge", *supra* note 4 at 40.
[11] Bonnell & Storey, *supra* note 6 at 481.
[12] *Ibid.* at 481.
[13] *Ibid.* at 487.

forward. Serious environmental impacts requiring costly mitigation could be avoided by carrying out strategic EA.

The Purpose and Scope of EIS Guidelines

The EIS guidelines determine the content that the proponent's EIS must address. It acts like a checklist to which the final EIS will be compared,[14] and as such it has great substantive bearing on the EA process. The EIS's main purpose is "to identify and communicate potentially significant impacts of a proposed project on the natural environment and how these may be avoided, minimized, or compensated for",[15] and the guidelines should reflect this purpose.

According to Dr. William Ross,[16] EIS guidelines must contain the following core elements:

- A description of the project and its location;
- The need for the project;
- Any alternative methods of achieving the project other than the one proposed;
- A description of the area's existing environment and current patterns of resource use;
- Social factors such as population characteristics, community lifestyle, and the economic base of the area;
- A detailed description of the proposal's potential effect on the area's environment;
- The measures the proponent intends to take to reduce those impacts; and
- Any impacts that might remain after these mitigating measures have been taken.[17]

These elements will be covered in further detail in later sections. Professor Ross also states three general criteria used to determine if an EIS is satisfactory. They are:

- Focus – does it address all of the important issues, i.e. the relevant issues that affect decisions about the project and that can affect the outcome of the EA process?
- Scientific and technical soundness – does it provide credible and useful results?
- Clarity of presentation – is it succinct, well organized and clear?[18]

[14] W.A. Ross, "Evaluating Environmental Impact Statements" (1986) 25 *Journal of Environmental Management* 137 at 140.
[15] Anna Brismar, "Attention to Impact Pathways in EISs of Large Dam Projects" (2004) 24 *Environmental Impact Assessment Review* 59 at 60.
[16] PhD, professor of environmental science at the University of Calgary, former advisor to the CEA Agency and member of several EA review panels, including the Oldman River Dam and the Banff Trans Canada Highway Twinning project.
[17] Ross, *supra* note 14 at 139.

The EIS guidelines should address these three criteria of focus, soundness, and clarity.

Professor Ross also emphasizes the importance of adequate monitoring and management provisions in the EIS guidelines. He points out that "[n]o amount of pre-project assessment will allow all effects of a project to be predicted accurately; thus it is necessary to put in place both a mechanism to determine the effects (monitoring) and a means of responding to these observations in an environmentally appropriate manner (management). The need for the EIS to address these features is clear and should be reflected in the EIS guidelines".[19]

The EIS guidelines should make use of follow-up studies of similar projects, if available, in order to assist the EIS's assessment of the project's environmental and social effects. As Professor Ross states,

> several follow-up studies …have observed and documented the effects of the projects and, as a result, a substantially better understanding of project impacts is now available… There are now enough studies of this kind available that there is no longer any excuse for not using them in the preparation of EISs. Accordingly, one should expect to see guidelines strongly suggesting the use of follow-up studies of earlier related projects, and one should expect EISs to rely on such studies".[20]

The use of follow-up studies is discussed further in the sections on Impact Assessment and Mitigation, below.

When the final EIS deviates from the guidelines in any way, the EIS should provide an explanation and include reasons for this deviation.[21] In this case, the guidelines should require three things:

1) Further investigation leading to a conclusion that the impacts anticipated when the guidelines were developed are no longer as expected;

2) That stakeholders agree with this conclusion; and

3) That the deviation is clearly documented in the EIS, so that the Review Panel may decide if the deviation is appropriate.[22]

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[18] *Ibid.* at 137 & 139.
[19] Ross, *supra* note 14 at 139.
[20] *Ibid.* at 139.
[21] *Ibid.* at 141.
[22] *Ibid.* at 141.

Model Sections:

Kemess North – Appendix 1 – sections 2 and 3

Lower Churchill – Appendix 2 – sections 1.1, 2.1, and 3.1

Mackenzie Gas – Appendix 3 – sections 2 and 6

Voisey's Bay – Appendix 4 – sections 1.1, 2.0, and 4.2

Whites Point – Appendix 5 – sections 2.3 and 4.3

Presentation of the EIS Guidelines

The EIS guidelines should contain a presentation statement setting out how the EIS will be conveyed to its readers. The emphasis must be on clearly communicating the information to a varied audience.[23] The EIS will be read by experts and interested non-experts alike, so all of its sections must convey their information efficiently while remaining intelligible to a reader who lacks in-depth technical knowledge of the subject.[24] In addition, an interactive website, a video for community distribution, and/or press releases can enhance public awareness and understanding of the EIS.[25]

The guidelines should stipulate that the EIS be written systematically, with the various sections well-integrated and cross-referenced – for instance, mitigation measures proposed in one section should be examined to see if they are likely to make impacts identified in another section worse.[26] For ease of reference, the EIS should include indices, page numbers, numbered appendices, a table of contents, list of tables, tables of figures, and an index.[27] Scientific and technical terms should be kept to a minimum, as excessive use of abbreviations and jargon impairs clarity; when used they should always be defined in a glossary or in the text.[28]

In terms of writing style, Glynn recommends that EISs be written in a technical writing style, with words averaging five to six letters each and sentences written in the active voice and averaging 10 to 12 words; paragraphs should be short and contain one main point each.[29] Chapman recommends that EISs not exceed 150 pages – excessive length can indicate that the drafters took an encyclopedic rather than an analytical approach, which can lead to information

[23] Tracy Glynn, "Environmental Impact Assessment (EIA): A Guide for Reviewers" (2004) online: <http://www.cenrce.org/eng/caucuasssessmentdocs/eia-guide for reviewers.pdf> at 15.
[24] Glynn, *supra* note 23 at 15; Ross, *supra* note 14 at 143.
[25] Glynn, *supra* note 23 at 16.
[26] Glynn, *supra* note 23 at 15; Ross, *supra* note 14 at 143.
[27] Glynn, *supra* note 23 at 15-16.
[28] Glynn, *supra* note 23 at 15; Ross, *supra* note 14 at 143.
[29] Glynn, *supra* note 23 at 15.

overload and obfuscation which interferes with "an understanding of the potential environmental effects of the proposed actions".[30] The EIS guidelines should propose this format.

The guidelines should require the EIS to provide the names and qualifications of experts, consultants, and others who contributed to the EIS or whose work is cited in it. This is desirable because it permits credit or blame to accrue to individuals; it incentivizes quality work and honest reporting; and it allows readers to assess the authors' reputations, credentials, or affiliations.[31] However, the proponent should remain clearly responsible for the EIS as a whole, "in order to demonstrate a commitment to its contents".[32]

Frequently, the EIS will not be a single document but several, aimed at different audiences. The executive summary should be directed at the interested public, and briefly provide an "overview of the proposed project, the possible alternatives, and the environmental, social, and economic impacts of the project".[33] The various EIS sections should provide more depth and detail than the executive summary, and any supporting documents should provide supplementary technical information.[34]

Model Sections – EIS Presentation:

Kemess North – Appendix 1 – section 3.2

Lower Churchill – Appendix 2 – sections 3.2 and 4.1

Mackenzie Gas – Appendix 3 – sections 6 and 7

Voisey's Bay – Appendix 4 – section 4.3 and 4.4

Whites Point – Appendix 5 – sections 4 and 5

<u>Project Description</u>

The EIS guidelines should require the proponent to comprehensively describe all project activities. This will assist in determining the significance of a proposed project's environmental impacts.[35] This description should be clearly communicated and concise, and include all information relating to the project's purpose, its technical design, and its spatial and temporal requirements.[36] Should the project's design change, the guidelines should require that the

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[30] Glynn, *supra* note 23 at 15; Chapman, *supra* note 8 at 200 & 201; Peter R. Mulvihill & Douglas C. Baker, "Ambitious and Restrictive Scoping: Case Studies from Northern Canada" (2001) 21 *Environmental Assessment Review* 363 at 366; Ross, *supra* note 14 at 143.
[31] Ross, *supra* note 14 at 142.
[32] *Ibid.* at 142.
[33] Glynn, *supra* note 23 at 15; Ross, *supra* note 14 at 143.
[34] Ross, *supra* note 14 at 143; Glynn, *supra* note 23 at 15.
[35] Glynn, *supra* note 23 at 3.
[36] *Ibid.* at 3.

changed aspects and their associated impacts be promptly assessed in the same manner as all previously defined impacts.[37]

Model Sections – Project Description:

Kemess North – Appendix 1 – section 6

Lower Churchill – Appendix 2 – sections 4.3.3 to 4.3.6

Mackenzie Gas – Appendix 3 – section 9

Voisey's Bay – Appendix 4 – section 7

Whites Point – Appendix 5 – sections 7.3 to 7.10

<u>Sustainable Development</u>

Sustainability is a core element of the environmental assessment process, and the EIS guidelines should reflect this. *CEAA* mandates that every panel review must assess "the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future".[38] Some EIS guidelines issued post-*CEAA* required proponents to explicitly consider sustainability.[39] For instance, the Great Whale hydro dam guidelines stated that "the proposed project must be developed in accordance with the carrying capacities of ecosystem and human societies involved".[40] The Whites Point Quarry review panel noted that "sustainability includes the extent to which the project makes a positive overall contribution towards attaining ecological and community sustainability, both at the local and regional levels…In its conclusions and recommendations, the panel stated that 'the project would make little or no net contribution to sustainability'".[41]

Several touchstones are available to aid in incorporating a sustainability based approach into EIS guidelines. A 2000 CEA Agency study found that the key process design elements are:

- an explicit commitment to sustainability objectives and to application of sustainability based criteria;

- broad definition of "environment", or other means of ensuring attention to social, economic, cultural and cumulative as well as individual biophysical effects, and their systemic interrelations;

[37] *Ibid.* at 4.
[38] *Canadian Environmental Assessment Act*, SC 1992, c. 37, s. 167(2)(d) ["*CEAA*"].
[39] Mulvihill & Baker, *supra* note 30 at 368.
[40] Great Whale ¶112, in Glen Okrainetz, "The EIS Guidelines: Pushing Hydro-Quebec into the 21st Century" (1992) 20:2 *Northern Perspectives* online: <http://carc.org/pubs/v20no2/6.htm>.
[41] Don Mullin, "Power of the People" (2008) 34:4 *Alternatives Journal* 13 at 14.

- mandatory justification of purpose;
- mandatory evaluation of reasonable alternatives;
- attention to all positive as well as negative effects and enhancements as well as mitigations;
- provisions for adaptive design and adaptive implementation of approved undertakings;
- links with other sustainability-defining and applying processes; and
- provisions for transparency and effective public involvement throughout the process.[42]

The "Mackenzie Model Test" was a series of issues that the Mackenzie Gas joint review panel specifically addressed; they identify areas of recognized and potential concern that are "relevant to making determinations about the specific and overall sustainability effects of the proposed project", and include:[43]

- the capacity of natural systems to maintain their structure and functions and to support indigenous biological diversity and productivity;
- the capacity of the social and economic systems of the human environment to achieve, maintain or enhance conditions of self-reliance and diversity;
- the capacity of human environments, including local and regional institutions, to respond to and manage externally induced change;
- the attainment and distribution of lasting and equitable social and economic benefits;
- the rights of future generations to the sustainable use of renewable resources; and
- protection and conservation of wildlife and the environment for present and future generations.

According to Dr. Goodland, environmental sustainability for hydro dams "means environmental and social damage has been prevented or offset such that net residual impacts are insignificant", and that the environmental and social costs, such as climate change, are low and do not increase.[44] Dr. Goodland posits two ratios to broadly determine a dam's sustainability – electricity output per hectare of land flooded (MW/ha), and number of oustees per electricity output (MW/oustee). He also identifies several specific sustainability criteria to assess dam

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[42] Mark Haddock, *Environmental Assessment in British Columbia* (Victoria: Environmental Law Centre, 2010) at 56.
[43] Mackenzie Gas Project Joint Review Panel, "Determination on sufficiency" July 18, 2005, in Mullin, *supra* note 41 at 15.
[44] Goodland, "Challenge", *supra* note 4 at 41. For more information on hydro dams and climate change, see International Rivers' "Greenhouse Gas Emissions from Dams FAQ" online at <http://www.internationalrivers.org/ node/1398>.

projects, including involuntary resettlement, sedimentation, fish and fisheries, biodiversity, land pre-empted, water quality, greenhouse gas production, downstream hydrology, and regional integration. [45] Good EIS guidelines may require the EIS to apply these criteria in its sustainability assessment.

Model Sections – Sustainability:

Kemess North – Appendix 1 – section 9.19

Lower Churchill – Appendix 2 – section 2.4

Mackenzie Gas – Appendix 3 – section 5.1

Voisey's Bay – Appendix 4 – section 3.3

Whites Point – Appendix 5 – section 3.3

Consideration of Alternatives

Considering alternatives to the proposed project is a crucial component of the EIS guidelines. It "lies at the heart of the EIA process and methodology" and "is a critical determinant of effective EIA".[46] Alternatives consideration involves identifying and evaluating "alternative actions that accomplish similar goals and promote sustainable development".[47] The EIS guidelines should tell the proponent to explicitly consider "the main or reasonable alternatives to a proposal", including "alternatives to" (different projects), "alternative methods" (different ways of carrying out the same project), and the "no-go" option (in which the proponent does nothing).[48] The ideal EIS guideline will include all three of these assessments – while merely considering alternative locations for projects or project components is beneficial, this alone is insufficient as it fails to consider the need for the project and alternatives to the project, both of which are required under *CEAA*.[49] If the proposed project is selected, the EIS guidelines should require the EIS to provide clear reasons why this choice was made.[50]

Alternatives considered "should be economically feasible with minimal environmental impacts", and diverse in design and location.[51] A "purpose and need statement" should be included so that the proposed action is not unduly favoured and less damaging alternatives are not dismissed.[52] Alternatives should not be mere "straw men", or purposely less attractive options presented to

[45] Goodland, "Challenge", *supra* note 4 at 41.
[46] UN Environmental Programme, in Haddock, *supra* note 42 at 30.
[47] Glynn*, supra* note 23 at 4.
[48] Haddock*, supra* note 42 at 30.
[49] Haddock*, supra* note 42 at 31; *CEAA* s.16(2) *supra* note 38.
[50] Ross*, supra* note 14 at 140.
[51] Glynn*, supra* note 23 at 4.
[52] *Ibid*. at 4.

artificially enhance the preferred project's viability.[53] The best EIS guidelines will draw on public consultation and participation to generate new alternatives.[54]

Model Sections – Alternatives:

Kemess North – Appendix 1 – section 6.2

Lower Churchill – Appendix 2 – section 4.3.2 (the only one to consider a "no-go" option)

Mackenzie Gas – Appendix 3 – sections 9.9 and 9.10

Voisey's Bay – Appendix 4 – sections 2.0(b), 7.0(a), 7.0(j), and appendix 2 section 4

Whites Point – Appendix 5 – section 7.2

Environmental Description

An environmental description establishes "the present state of the environment, taking into account changes resulting from natural events and from other human activities".[55] A flawed environmental description will interfere with subsequent mitigation measures.[56] The EIS guidelines should specify that the environmental description be comprehensive, describing all relevant biophysical and socio-economic environmental components and their interactions.[57]

The biophysical description should include:[58]

- a description of the topographical and geological features (slope, grade, soil, permeability, mineral content, load bearing capacity, radiological characteristics);
- significant geological and topographical features (land quality, erosion);
- hydrological features (chemical, physical and biological parameters of surface, ground, and ocean water, sources of water supplies, drainage basins, and quantity of water sources);
- air, climate, and weather conditions; and
- flora and fauna (pertinent habitats, endangered species, ecosystems, and relationships among species).

[53] *Ibid.* at 4.
[54] *Ibid.* at 5.
[55] Glynn*, supra* note 23 at 6.
[56] *Ibid.* at 6.
[57] *Ibid.* at 6.
[58] *Ibid.* at 6-7.

Identifying rare and endangered species "is important for impact assessment because project development should not proceed where they occur".[59] Vegetation studies should describe plant successional processes – these are significant since "plant community responses to disturbance are necessary to identify development impacts and make recommendations for approval or proposals for alternative development plans".[60] The EIS should not simply describe current plant communities, since short-term studies do not take into account the dynamic nature of ecosystems and do not fully describe vegetation complexity, and so can be misleading.[61] Sampling should be sufficient "to compensate for both temporal and spatial heterogeneity".[62] Faunal studies should go beyond anecdotal observation and literature reviews and adopt an ecosystem approach, emphasizing animals as "functional entities within ecosystems".[63] From this perspective, insect studies are "particularly important since they are important indicators of ecosystem functioning".[64]

The socio-economic description should include:[65]

- quality of life data (income, employment and business/industry trends, recreational opportunities, and public health status);
- a community profile (resource use, land use, townscape, transportation networks, infrastructure, noise, population density, and demographics); and
- a description of significant sites (Indigenous, historical, spiritual, archaeological, and cultural).

The interactions description should include:[66]

- changes that will happen in the environment regardless of the project;
- an environment defined in temporal and spatial terms;
- a description of the interactions between project effects;
- a description of the interactions with effects of other projects [see Cumulative Effects Assessment, below]; and

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[59] Clint R. Smyth, "A Review of Environmental Impact Statements and their Utility for Surface Coal Mine Reclamation in Alberta and British Columbia" (2005) online: <https://circle. ubc.ca/handle/2429/8857> at 7.
[60] *Ibid.* at 8.
[61] Smyth, *supra* note 59 at 8.
[62] *Ibid.* at 8. Smyth elaborates that "Ecosystem studies should also collect information on phenology, physiognomy, plant strategies, and alpha (habitat), beta (between habitat) and gamma (landscape) diversity."
[63] Smyth, *supra* note 59 at 8.
[64] *Ibid.* at 8.
[65] Glynn, *supra* note 23 at 7.
[66] *Ibid.* at 7.

- a description of the existing health of the ecosystem (productive, carrying, and assimilative capacity).

These descriptions should be inclusive – taking into account historical records, Traditional Ecological Knowledge (TEK), scientific studies, and academic literature.[67] Studies used should be scientifically sound in that appropriate methods were used and correctly applied and any limitations identified.[68]

Model Sections – Environment Description:

Kemess North – Appendix 1 – section 8

Lower Churchill – Appendix 2 – section 4.4

Mackenzie Gas – Appendix 3 – section 11

Voisey's Bay – Appendix 4 – section 8

Whites Point – Appendix 5 – section 9

Public, Stakeholder, and First Nations Participation

It is important for an EA process to involve the interested public. "Closed-door" decision making between politicians and experts is no longer acceptable – citizens should be integrated into the environmental decision-making process.[69] A public participation program's main objective should be "for the public to make a meaningful contribution to the final decision".[70] The public may provide new information or concerns which influence project components such as location or size; decision-makers do not need to implement every stakeholder suggestion, but "should find a reasonable balance between competing values".[71] Best practices for a public participation program include the following:

- A clear statement of the program's goals;
- Early public involvement which is non-reactive, and which gives the public sufficient time to digest information and prepare comments while still keeping to a reasonable time line;
- Use of various public participation methods (such as hearings, polls, meetings, advisory committees, workshops, task forces, and role-plays) to encourage the widest

[67] Glynn, *supra* note 23 at 7.
[68] *Ibid.* at 7.
[69] *Ibid.* at 7.
[70] *Ibid.* at 9.
[71] *Ibid.* at 9.

range of stakeholder participation – collaborative approaches should be emphasized over hearings and polls, as these latter methods are "bureaucratic and alienating";

- A regime that can be modified to suit the situation, including flexible times and locations as well as the option to use less formal participation methods;
- A mechanism to gather and evaluate feedback from public participants and use it to modify the program;
- Broad inclusion of "everyone who could possibly be affected by the decision", with financial assistance provided if necessary to ensure that all stakeholders have adequate representation;
- Transparency throughout the entire process, including clear notice of pending decisions, access to technical information, and assistance in interpreting technical information so that the public may form informed opinions; and,
- Inclusion of "conflict resolution and consensus building mechanisms".[72]

For greater certainty, "clear notice of pending decisions" must be meaningful and accessible to the public and stakeholders. Merely posting information to a government registry, or to a publication which the interested public is unlikely to read or see, does not constitute meaningful public notice.[73]

EIS provisions dealing with First Nations participation deserve special attention. The Supreme Court of Canada held in *Taku River Tlingit* that the scope of the duty to consult with First Nations "will vary with the circumstances, but always requires meaningful, good faith consultation and willingness on the part of the Crown to make changes based on information that emerges during the process".[74] EIS guidelines should strive to integrate Traditional Ecological Knowledge (TEK), which is defined as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationships of living beings (including humans) with one another and with their environment".[75] TEK can, for example, take the form of stories told by community elders, which can be relevant to the EIS guidelines in areas such as environment description and determining Valued Ecosystem Components (VECs).[76]

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[72] Glynn, *supra* note 23 at 7-9.
[73] Richard Bowers, Pacific Coordinator at the Hydropower Reform Coalition (www.hydroreform.org), per email dated April 6, 2012.
[74] *Taku River Tlingit First Nation v. British Columbia*, 2004 SCC 74 at ¶29, in Haddock, *supra* note 42 at 71.
[75] Glynn, *supra* note 23 at 9.
[76] Mulvihill & Baker, *supra* note 30 at 366.

The Great Whale EIS guidelines were precedent-setting in the ways they integrated First Nations participation and TEK into the entire EA process, resulting in a wholly multi-cultural EA which had not been attempted before in Canada.[77] The Great Whale EIS guidelines "anticipated and addressed cultural barriers to consultation…reformulated problems to recognize cultural diversity…and made it clear to the proponent that a new approach to EA was required – one in which a methodology based on a single knowledge system and conception of the environment would be insufficient".[78] The Great Whale guidelines indicate that, when a proposed project touches First Nations communities, it is best practice to take an intercultural approach by incorporating multiple definitions and conceptions of the environment and its aspects, and by integrating TEK alongside scientific studies and assessments when describing the environment and the project's effects on it.

Model Sections – Public & First Nations Consultation:

Kemess North – Appendix 1 – section 5

Lower Churchill – Appendix 2 – sections 2.2 and 2.3 and appendix B (of the EIS guidelines)

Mackenzie Gas – Appendix 3 – sections 5.2, 5.3, 5.4, and 10

Voisey's Bay – Appendix 4 – sections 3.1 and 4.1

Whites Point – Appendix 5 – sections 3.1, 3.2, and 8.2. In addition, Mullin tell us that "In the absence of clear federal or provincial policies on how natural resources in the coastal zone should be managed…the [Whites Point Quarry] panel concluded that local views and visions on how natural resources shall be used can be considered in the environmental assessments".[79]

Further commentary on the Great Whale EIS guidelines regarding intercultural EA and First Nations consultation is reproduced below:[80]

> "Instead of the more common list of issues and valued ecosystem components, the [Great Whale EIS] guidelines featured considerable explanatory text in which the challenge of intercultural EA was described. Where standard lists of study criteria and issues were included, they were often reinterpreted to reflect intercultural concerns".[81]
>
> "Criteria such as "multicultural definition of environment", "social organization and symbol systems", "cultural aspects of diet", "guiding principles for describing

[77] Mulvihill & Baker, *supra* note 30 at 374 & 376; Okrainetz, *supra* note 40.
[78] Mulvihill & Baker, *supra* note 30 at 376.
[79] Mullin, *supra* note 41 at 14.
[80] Also see Mulvihill & Baker, *supra* note 30 at 375 for a chart showing Great Whale EIS guideline excerpts dealing with intercultural EA.
[81] Mulvihill & Baker, *supra* note 30 at 374.

environment", and "cultural relativity of values" amount to an impressive framework that represents a departure from common practice".[82]

The Great Whale EIS guidelines required the proponent to "describe the environment not only in the light of scientific knowledge, but according to the precepts, values and knowledge of aboriginal peoples to whom the North is home." The guidelines also stated that "Local residents' knowledge of their biophysical and social milieu is essential to an adequate assessment of the impacts of a development project" and "The Proponent must be particularly attentive to the conceptual and symbolic systems and knowledge of the population affected".[83]

Environmental & Social Impacts Assessment

The environmental impact analysis's purpose is to measure the future impact of human activities on VECs before a project is implemented.[84] An "impact" is defined as "any change in the physical, natural or cultural environment brought about by development".[85] The main environmental impacts of dam projects include:

- Involuntary resettlement;
- Land losses;
- Health impacts, such as water-related diseases;
- Plant and animal life, including disruption of anadromous fish passage;
- Water weeds;
- Water quality, including methylmercury[86] contamination;
- Anaerobic decomposition of inundated vegetation (releasing CO_2 and methane);
- Erosion (upstream, this leads to sedimentation and impairs storage; dams also increase erosivity downstream – the "hungry waters" effect);
- Downstream hydrology (downstream water releases replace natural flooding regimes), including flow changes and dewatered river segments;

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[82] *Ibid.* at 376.
[83] Great Whale EIS Guidelines at ¶126 in Okrainetz, *supra* note 40.
[84] Glynn, *supra* note 23 at 9.
[85] *Ibid.* at 10.
[86] Inorganic mercury is naturally present in soils. However, bacterial decomposition of inundated soils in dam reservoirs converts it into the neurotoxin methylmercury, which is released into the water and absorbed by fish and other organisms. "Dams and Water Quality" online: <http://www.internationalrivers.org/node/1638>.

- Intact rivers (if there are no dams already present);
- Multiple uses of the reservoir, including recreation (can be beneficial, but these uses often conflict); and
- Cultural property (archaeological or historic.)[87]

EIA is essentially concerned with forecasting, and will incorporate two levels of assessment – first, an analysis of the project's impacts on specific ecological or social attributes, and second, bringing these impacts together to assess their relative significance and create a picture of the project's overall environmental impact.[88] A good impact assessment will incorporate three elements – biophysical impact assessment, social impact assessment, and impact significance. These are each covered in more detail below.

Probability is central to any EIA. No matter how good the forecasting methods, a project's environmental, social, and economic impacts can rarely be predicted with absolute certainty.[89] This probability must be acknowledged, and the guidelines should direct the EIS to "indicate the extent of scientific uncertainty associated with each prediction".[90] According to Professor Ross,

> It is necessary to reject the dichotomy of safe or unsafe…Such a dichotomy implies a false certainty; instead, one must recognize that a range of probabilistic outcomes is the rigorous result of the analysis…However, where sophisticated risk assessment approaches are not justified, simpler, more common notions of probability will suffice (phrases such as "likely", "improbable", or "almost certain").[91]

When impacts are uncertain but potentially serious, the guidelines should direct the EIS to apply the precautionary principle.[92]

Further uncertainty exists when dealing with impacts which cannot be quantifiably measured. Intangible impacts such as to a river's visual and audio quality are often neglected in EIA because they rest upon intangible concepts, and decision-makers generally prefer to base their

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[87] Goodland, "Challenge", *supra* note 4 at 40; Robert Goodland, "Environmental Sustainability in the Hydro Industry – Disaggregating the Debate" in IUCN – The World Conservation Union and the World Bank Group. *Large Dams: Learning from the Past, Looking at the Future. Workshop Proceedings* (Cambridge: IUCN Publications, 1997) online: < http://books.google.ca/booksid=Ug2YrzNl8EUC&printsec=frontcover&source=gbs_ ge_summary_r&cad=0#v=onepage&q&f=false> 69 at 91-92.
[88] Chapman, *supra* note 8 at 194.
[89] Chapman, *supra* note 8 at 196; Smyth, *supra* note 59 at 9.
[90] Ross, *supra* note 14 at 141.
[91] Ross, *supra* note 14 at 142.
[92] The precautionary principle (a.k.a. the precautionary approach) is summed up in the 1992 Rio Declaration (to which Canada is a signatory): "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". Applying the principle requires erring on the side of caution "in circumstances where it is identified that a Project activity could cause serious or irreversible adverse impact on the environment and the cause and effect relationships cannot be clearly established". EIS guidelines should incorporate these statements – see for example Mackenzie Gas section 5.5 and Whites Point section 3.5.

assessments on hard data because it is "more accurate".[93] However, this approach leads to the EIS neglecting crucial impacts such as to the visual and audio benefits of an intact watershed. Guidelines should instruct the EIS to acknowledge "that no convenience calculus exists for the measurement and evaluation of many of the environmental consequences of development which must nevertheless be considered in any EIA".[94] This will ensure that the EIS gives adequate consideration to the full range of impacts, particularly those such as visual and audio quality which are important to the public.

I. Biophysical Impact Assessment

A biophysical impact assessment should involve at least two forecasts: one, "how the biophysical components will change and evolve naturally", and two, "how the components will respond to the proposed project".[95] A good biophysical impact assessment will:

- Clearly identify all methods or tools used to forecast and analyze impacts, so that reviewers can assess whether the appropriate method or model was used – the analysis should be "transparent, explicit and easy to replicate";
- Analyze all impacts to all VECs – including direct, indirect, interactive, cumulative, temporary, permanent, long-term, and short-term impacts [see Cumulative Effects Assessment, below];
- Consider project impacts as well as the region's natural changes, with positive and negative effects of alternative interventions explicitly stated;
- Specify the temporal and spatial distribution of the impacts and their magnitudes, so that decision-makers know when and where certain magnitudes of impact can be expected;
- Acknowledge uncertainties (for example, due to a lack of data) and state their implications on impact forecasting;
- Communicate the information in an easy-to-read manner, with a non-technical summery of forecast results, and distribute the results to the public for comment. This consultation must be meaningful [see Public, Stakeholder & First Nations Participation, above].[96]

[93] Chapman, *supra* note 8 at 195.
[94] Chapman, *supra* note 8 at 195. Furthermore, Richard Bowers points out that the "tangible effect of dewatering a river or inundating a watershed is most often obvious and compelling", and can be accurately observed and measured (per email dated April 6, 2012).
[95] Glynn, *supra* note 23 at 10.
[96] *Ibid.* at 10-11.

The guidelines should require impact forecasters to work with complete baseline data for environmental conditions, rather than relying on "instant" surveys, since "[e]ven with the best of intentions, such surveys cannot be regarded as definitive…not only are environmental systems dynamic but they contain cyclical and random components" which instant surveys may not capture.[97] Follow-up studies of similar projects should also be used to the fullest extent possible, since "[w]hat has happened before in similar or analogous situations can be one of the best guides to what will happen as a result of the proposal".[98]

II. Social Impact Assessment (SIA)

The social impact assessment portion of an EIA "determines probable social, cultural, economic, heritage, and health impacts of a proposed project on affected individuals, groups, and communities".[99] The assessment process should be flexible, and prepared to assess new impacts as they are discovered, for example through public consultation; for this reason "a variables checklist is not advised, because different, yet important variables may be discovered in the SIA process".[100]

A good SIA will:

- Use qualitative and quantitative data, based on variables that are important to the community (and not merely the easiest to quantify);
- Give special attention to vulnerable communities and groups within communities to determine impact equity – impacts may affect different groups in different ways depending on the group's vulnerability, resiliency, and adaptability;
- Require public participation, and mandate efforts to determine which groups to involve and to overcome cultural or linguistic barriers to involvement.[101]

III. Impact Significance

This portion of an EIA will evaluate the significance of each impact, which feeds in to the mitigation and monitoring programs [see Mitigation and Monitoring sections below]. The guidelines should require the EIS to indicate each impact's significance (i.e. its importance to society), and clearly justify why this conclusion on its significance was reached.[102] However,

[97] Chapman, *supra* note 8 at 195.
[98] Ross, *supra* note 14 at 141.
[99] Glynn, *supra* note 23 at 11.
[100] *Ibid.* at 11.
[101] *Ibid.* at 11.
[102] Ross, *supra* note 14 at 142.

there is no uniform accepted definition of “significance”, so the guidelines should require the EIS to clearly define this term as it is used.[103]

A good Impact Significance section will:

- o Clearly define the term “significance”, and define and substantiate the determination thresholds and criteria that are applied to determine significance for each impact;
- o Explicitly describe the significance determination approach, and state whether a subjective or an objective approach was used, so that the impact significance conclusions are traceable and reproducible;
- o Use defensible, logical, analytical, and scientifically sound evaluation methods;
- o Incorporate public participation by allowing the affected and non-affected public an opportunity to highlight areas and impacts that may not have been addressed by traditional forecasting methods [see Public, Stakeholder & First Nations Participation, above]; and
- o Clearly present trade-offs between impacts “as well as the development of low-impact alternatives”.[104]

Model Sections – EIA:

Kemess North – Appendix 1 – sections 3 (precautionary principle) and 9 (EIA)

Lower Churchill – Appendix 2 – sections 2.5 (precautionary principle) and 4.5 (EIA)

Mackenzie Gas – Appendix 3 – sections 5.5 and 12.9 (precautionary principle) and 12 to 16 (EIA)

Voisey’s Bay – Appendix 4 – section 3.4 (precautionary principle) and 9 (EIA)

Whites Point – Appendix 5 – section 3.5 (precautionary principle) and 10 (EIA)

Cumulative Effects Assessment (CEA)

Proper cumulative effects assessment is critical to a fulsome EIS. CEA furthers “a fundamental principle of good EA, which seeks to emphasize proactive identification of impacts and prevention over correction”.[105] According to William Rees, if EA cannot properly take cumulative effects analysis into consideration, “the usefulness and credibility of the whole

[103] Glynn, *supra* note 23 at 12.
[104] Glynn, *supra* note 23 at 12.
[105] Canadian Arctic Resources Committee, in Mulvihill & Baker, *supra* note 30 at 382.

process must be in doubt".[106] In addition, *CEAA* requires an EA panel to consider "the environmental effects of the project, including…any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out".[107]

Glynn proposes four best practices for CEA in an EIS:

- First, CEA should assess the appropriate area – since ecosystem impacts "are not confined by political boundaries", CEA may need to cross jurisdictions in order to fully consider the "maximum range of impacts on VECs".[108]

- Second, an EIS should identify and assess past, present, and future actions and effects, which requires baseline studies compared against observed and/or predicted effects of existing and proposed projects, over a long time scale, in order to catch impacts which occur incrementally over time.[109]

- Third, the EIS should consider the effects of interacting projects, in order to determine the synergistic effects of actions which may be benign by themselves but damaging when combined with other project actions.[110]

- Fourth, cumulative effects should be evaluated based on "the intensity of the action and the importance and sensitivity of the VECs being affected".[111] As Haddock emphasized, CEA "has little practical value unless it is in relation to allowable limits within regional carrying capacity".[112]

In the following excerpt, Bonnell and Storey indicate specifically how CEA should operate in an EIS when there are multiple hydropower developments along the same river, as is the case with Site C:

> Examination of the cumulative effects of several hydropower activities on a common resource requires information on the distribution and timing of effects, the response of the resource system to impacts, the mechanism of cumulative interaction, and a statement of management goals. The last item is important because, although the resource of concern may be composed of distinct biological populations, each affected by only one project

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[106] Rees, in Haddock, *supra* note 42 at 31.
[107] *CEAA* s. 16(1)(a), *supra* note 38.
[108] Glynn 13. This was done in Great Whale, in which the guidelines required the proponent to assess environmental impacts throughout the Hudson's Bay region;[108] on the other hand, the Ekati diamond mine EIS confined their CEA to the direct project area, a much-criticized decision which resulted in the review panel ordering a further five-year field study to remedy this shortcoming. See Mulvihill & Baker, *supra* note 30 at 379.
[109] Glynn, *supra* note 30 at 13.
[110] *Ibid.* at 13.
[111] *Ibid.* at 13.
[112] Haddock, *supra* note 42 at 33.

> (and, therefore, not affected cumulatively by definition), these populations may be managed as a unit. In this case, resource management practices place the populations in interacting roles. The same is true of populations which, although distinct, may be regarded, and valued, as a single resource unit.[113]

These recommendations can be incorporated into the guidelines in both the CEA and Management sections.

As a further note, Anna Brismar[114] advocates a CEA approach which focuses on impact pathways in order to provide superior insight into and analysis of the cumulative effects of hydropower projects. Impact pathways analysis involves tracing a cumulative effect from its root cause, through its lower-order effects (which result directly from root causes), and its higher-order effects (indirect consequences of lower-order effects).[115] The final impacts, defined as "the final net influence of one or several impacting factors on the properties of a defined receptor", are often "generated by multiple impact pathways, generally involving multiple root causes and lower and higher order effects, interlinked by cause–effect relationships".[116] According to Brismar,

> Understanding involved impact pathways is a prerequisite for the identification of effective measures to prevent, minimize, or mitigate undesired cumulative impacts of development projects on the environment. If the root causes of an anticipated impact are not properly identified, precise measures cannot be designed and implemented, and as a result, the impact may not be minimized or prevented to the extent possible. *Thorough analysis of potential impact pathways is of particular importance in EISs of large construction projects, such as large dam projects, which generally involve multiple project activities and produce widespread environmental impacts.*[117]

Brismar recommends structuring an EIS's CEA section to identify root causes and systematically link impacting activities to environmental effects.[118] She also recommends that CEA take a process-oriented perspective, involving "systems analytical approaches such as network analysis and cause–effect diagramming" rather than more empirical, descriptive methods, since systems analysis more effectively shows impact pathways and therefore gives the EIS greater "potential to identify and propose effective preventive measures".[119]

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[113] Bonnell & Storey, *supra* note 6 at 485.
[114] Department of Water and Environmental Studies, Tema Institute, Linköping University.
[115] Brismar, *supra* note 15 at 60-61.
[116] *Ibid.* at 60-61.
[117] Brismar, *supra* note 15 at 61 (my emphasis).
[118] *Ibid.* at 72, 79-80.
[119] Brismar, *supra* note 15 at 81. In her paper, Brismar analyzes the impact pathways of several hydropower projects. The results of her analysis are compiled on pages 67-70 and 73-76, and may be helpful as a precedent. See also Chapman, *supra* note 8 at 198.

Model Sections – Cumulative Effects:

Kemess North – Appendix 1 – section 9.17

Lower Churchill – Appendix 2 – section 4.5.3

Mackenzie Gas – Appendix 3 – sections 17 and 18

Voisey's Bay – Appendix 4 – section 9.4

Whites Point – Appendix 5 – section 11

Great Whale:
The Great Whale EIS guidelines also required the proponent to assess cumulative impacts in the context of other hydroelectric development projects, both planned and built, in Northern Quebec and elsewhere in the Hudson Bay Region. The EIS required the proponent to address potential impacts of the project outside Quebec, specifically the marine environment of Hudson's Bay region. The guidelines stated that: "Some potential impacts of the proposed project have regional and national implications and may effect the entire region of Hudson Bay" and "The Proponent shall evaluate the extent to which the proposed project will alter the ecosystem of Hudson Bay".[120]

Climate Change

Hydropower projects both contribute to climate change and are affected by it, and therefore the EIS guidelines should direct the EIS to consider both the dam's effects on climate change and how climate change will impact the project. Dam reservoirs release methane, carbon dioxide, and nitrous oxide as byproducts of decomposing inundated vegetation and soils – globally the hydro industry's emissions constitute 4% of total human contribution to climate warming and are the single largest anthroponotic source of methane.[121] Hydro projects also indirectly contribute to climate change, for example through the fossil fuels burned during dam constuction, or by trapping sediment which would otherwise flow downstream and fertilize oceanic plankton (which absorb CO_2).[122] The EIS guidelines should require the EIS to assess the project's contributions to climate change, and compare the projects greenhouse gas (GHG) emissions to that of a coal- or gas-fired alternative – for some projects, especially shallow reservoirs in densely forested sites, the hydro project's GHG emissions may be higher than a gas-fired equivalent.[123]

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[120] Great Whale EIS guidelines ¶124 in Okrainetz, *supra* note 40.
[121] International Rivers, *supra* note 44.
[122] *Ibid.*
[123] Goodland, "Disaggregating", *supra* note 87 at 93-94; Goodland, "Challenge", *supra* note 4 at 40.

Dams are also affected by climate change, including changing weather and climate patterns. For example, climate change increases glacial melt, which can increase sediment in rivers which is then trapped behind hydro dams, where it gradually fills in the reservoir and reduces the dam's productive life and economic value.[124] The EIS guidelines should require the EIS to consider these factors when assessing a dam's impacts and its sustainability in a changing climate.

Model Sections – Climate Change

Kemess North – Appendix 1 – sections 9.1 and 9.1.2

Mackenzie Gas – Appendix 3 – section 16.1

Whites Point – Appendix 5 – section 10.1.4

Mitigation of Adverse Environmental Effects

CEAA defines "mitigation" in the project context as "the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment cause by such effects through replacement, restoration, compensation or any other means".[125] The UN Environmental Programme considers the following hierarchy of mitigation:

- First, avoid adverse impacts as far as possible by use of preventative measures;
- Second, minimize or reduce adverse impacts to "as low as practicable" levels; and
- Third, remedy or compensate for adverse residual impacts, which are unavoidable and cannot be reduced further.[126]

EIS guidelines should require the EIS to fully describe mitigation and compensation measures, provide rationales for each, and substantiate their technical viability (whether they will work) – using follow-up studies of other completed projects would be helpful in this assessment.[127] The guidelines should require the EIS's mitigation section to be as specific and committal as possible.[128] The mitigation regime should be results-oriented, and require "measurable and verifiable outcomes". It is acknowledged that not all adverse effects require the same level of

[124] This is one of the issues with the proposed Susitna hydro dam in Alaska, where climate change has sped up glacial melt by 20 to 50 years, reducing the project's life span and the economic value of power generation (per Richard Bowers, email dated April 6, 2012). See also the Coalition for Susitna Dam Alternatives online: <http://susitnadamalternatives.org/? page_id=12>.
[125] *CEAA* s. 2, *supra* note 38.
[126] UN Environment Programme, in Haddock, *supra* note 42 at 51.
[127] Ross, *supra* note 14 at 142.
[128] Haddock, *supra* note 42 at 50. Mark Haddock excerpts several unacceptable mitigation measures from a published EIS. They include: "consideration of forestry values; minimizing vegetation clearance; implementing buffer zones; minimizing the proposed Project footprint in bog and wetland habitat; development of a long-term plan to manage access; encouraging shared access and consistent road construction standards; and consulting with users to restrict motorized access to designated roads and trails to sustain other resource values". These mitigation measures are "too vague and lacking in specific commitments", and should not be present in a good EIS.

detail when describing the mitigation – "the greater the significance of the impact or value, the greater the need to identify concrete measures".[129]

Model Sections – Mitigation:

Kemess North – Appendix 1 – section 9

Lower Churchill – Appendix 2 – sections 4.6.1 to 4.6.3

Mackenzie Gas – Appendix 3 – sections 12.4 to 12.8, 23, and 24

Voisey's Bay – Appendix 4 – sections 9.0.4 and 9.1 to 9.3

Whites Point – Appendix 5 – sections 12.5 and 12.8

<u>Monitoring & Management</u>

Robust monitoring programs are essential for effective environmental management. Monitoring allows a project's actual impacts to be compared to predicted effects and mitigation measures, and for mitigation measures to be assessed.[130] It compensates for the substantial uncertainty inherent in all natural processes, especially when interacting with development.[131] Monitoring mechanisms should not terminate upon project approval – they should include post-approval follow up programs.[132]

The EIS guidelines should require monitoring programs to clearly state their goals, objectives, purpose, and their scientific bases.[133] Most often the goal of monitoring should be "to determine whether, if any, predicted impacts occurred, if they occurred as a result of the project, and the effectiveness of mitigating measures".[134] The goals should also "describe how the monitoring program will feed back into the project, and in turn how the project could be changed if impacts exceed critical levels".[135] Objectives should be directly related to project impacts.[136]

The guidelines should require the EIS to:

- Identify the subject matter to be monitored – important VECs with the largest project impacts (i.e. keystone species, socially valuable landscapes) should receive the

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[129] Haddock, *supra* note 42 at 51.
[130] Glynn, *supra* note 23 at 13; Smyth, *supra* note 59 at 3.
[131] Smyth, *supra* note 59 at 3.
[132] *Ibid.* at 3.
[133] Glynn, *supra* note 23 at 14; Ross, *supra* note 14 at 141.
[134] Glynn, *supra* note 23 at 14.
[135] *Ibid.* at 14.
[136] *Ibid.* at 14.

highest priority, while relatively unimportant or inappropriate VECs need not be monitored at all.[137]

- Identify the monitoring timeline, which at minimum should last "until there is sufficient evidence to conclude that the project is not causing significant impacts".[138]

- Ensure that monitoring methods are sufficiently described and scientifically sound – the guidelines should require the proponent to "describe the techniques for monitoring quantifiable and measurable VECs" as well as those for efficiently collecting and disseminating the monitoring results.[139]

- Consider pre-project data.[140]

- Monitor actual VECs (as opposed to a mere literature review).[141]

- Clearly describe the management structure, including the roles and responsibilities of the proponent, government agencies, and local communities, including Indigenous groups.[142]

- Incorporate a structure for communicating with stakeholders and community members, and incorporating their feedback into the monitoring process. Merely communicating with stakeholders post-project is not enough – the EIS must clearly define the ongoing role of and process for including the public in the monitoring program.[143]

- Clearly break down the costs associated with monitoring.[144]

The Hydropower Reform Coalition advocates taking an adaptive management approach, which is defined as "a structured process of iterative decision-making that includes systematic monitoring".[145] Successful adaptive management sets up a framework to "plan, monitor, evaluate, and adapt project activities" – this requires clear monitoring plans "that outline desired conditions, the indicators and standards that will be used to quantify them, and define when

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[137] *Ibid.* at 14.
[138] *Ibid.* at 14.
[139] Glynn, *supra* note 23 at 14.
[140] Ross, *supra* note 14 at 142; Glynn, *supra* note 23 at 14.
[141] Ross, *supra* note 14 at 142; Glynn, *supra* note 23 at 14.
[142] Glynn, *supra* note 23 at 14; Ross, *supra* note 14 at 141 & 142.
[143] Ross, *supra* note 14 at 141. The HRC advocates creating working groups or coordinating groups, with specific duties and a planned process, in order to involve the public in the monitoring regime (per Richard Bowers, email date April 6, 2012).
[144] Glynn, *supra* note 23 at 15.
[145] Hydropower Reform Coalition, *Hydrokinetic Energy Projects and Recreation: A Guide to Assessing Impacts*. Chapter 7: Protection Strategies and Adaptive Management (2010) online: <http://www.hydroreform.org/sites/www.hydroreform.org/files/Hydrokinetics_and_Recreation_Chapter_7.pdf>.

management actions will be taken".[146] It is also important for adaptive management to consider the cumulative effects of multiple projects in the watershed [see Cumulative Effects Assessment, above].[147] Data gathered from the monitoring should be disseminated widely in order to add to the body of EIA knowledge and facilitate future environmentally sound development.[148] Adaptive management is a valuable approach especially when the full extent of a projects effects are not known, because its iterative process of adapting the project to the results of a rigorous monitoring program allows hydro development to proceed in an environmentally responsible way.[149]

Model Sections – Monitoring & Management:

Kemess North – Appendix 1 – sections 10.3 and 11

Lower Churchill – Appendix 2 – section 4.6.4

Mackenzie Gas – Appendix 3 – section 25

Voisey's Bay – Appendix 4 – section 10

Whites Point – Appendix 5 – sections 12.4 and 12.6

Secondary Sources:

Bonnell, Steve & Keith Storey. "Addressing Cumulative Effects Through Strategic Environmental Assessment: A Case Study of Small Hydro Development in Newfoundland, Canada" (2000) 2:4 *Journal of Environmental Assessment Policy and Management* 477.

Brismar, Anna. "Attention to Impact Pathways in EISs of Large Dam Projects" (2004) 24 *Environmental Impact Assessment Review* 59.

Chapman, Keith. "Issues in Environmental Impact Assessment" (1981) 5 *Progress in Human Geography* 190.

Glynn, Tracy. "Environmental Impact Assessment (EIA): A Guide for Reviewers" (2004)

[146] Hydropower Reform Coalition, *supra* note 145.
[147] *Ibid.*
[148] *Ibid.*
[149] *Ibid.*

online: <http://www.cenrce.org/eng/caucuasssessmentdocs/eia-guide for reviewers. pdf>.[150]

Goodland, Robert. “The Environmental Sustainability Challenge for the Hydro Industry” (1996) 1 *Hydropower & Dams* 37.

———— “Environmental Sustainability in the Hydro Industry – Disaggregating the Debate” in IUCN – The World Conservation Union and the World Bank Group. *Large Dams: Learning from the Past, Looking at the Future. Workshop Proceedings* (Cambridge: IUCN Publications, 1997) online: < http://books.google.ca/books?id=Ug2YrzNl8EUC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false> 69.

Haddock, Mark. *Environmental Assessment in British Columbia.* (Victoria: Environmental Law Centre, 2010).

Mullin, Don. “Power of the People” (2008) 34:4 *Alternatives Journal* 13.

Mulvihill, Peter R. & Douglas C. Baker. “Ambitious and Restrictive Scoping: Case Studies from Northern Canada” (2001) 21 *Environmental Assessment Review* 363.

Okrainetz, Glen. “The EIS Guidelines: Pushing Hydro-Quebec into the 21st Century” (1992) 20:2 *Northern Perspectives* online: <http://carc.org/pubs/v20no2/6.htm>.

Ross, W.A. “Evaluating Environmental Impact Statements” (1986) 25 *Journal of Environmental Management* 137.

Smyth, Clint R. “A Review of Environmental Impact Statements and their Utility for Surface Coal Mine Reclamation in Alberta and British Columbia” (2005) online: <https://circle. ubc.ca/handle/2429/8857>.

[150] n.b. – as of this writing, Glynn’s guide is no longer available online.

Note to the Appendices:

Several EIS documents are appended to this document for reference purposes and to compare to future project EIS Guidelines. These have been compiled under the guidance of Dr. Bob Gibson, a University of Waterloo professor specializing in environmental and sustainability assessment. According to Dr. Gibson, the best Canadian example of a sustainability-based EIS (as opposed to one which emphasizes mere mitigation of significant adverse effects) was the Mackenzie Gas project.[151] All of the other projects included here also took a sustainability-based approach; however, Dr. Gibson noted that the Lower Churchill panel “was not helped in this by the guidelines provided”.[152] Therefore, Lower Churchill may not be the best precedent available, despite the project’s similarity to Site C.

The Great Whale hydroelectric project is another important precedent that has been quoted several times in this document. However, we were unable to acquire a copy of the Great Whale EIS Guidelines. If the Great Whale guidelines can be obtained, they would also serve as a useful precedent, particularly in the areas of sustainable development, cumulative effects assessment, and incorporation of aboriginal peoples’ precepts, values, and knowledge.

Appendix 1: Kemess North Gold-Copper Mine EIA Guidelines

Appendix 2: Lower Churchill Hydroelectric Generation Project EIS Guidelines

Appendix 3: Mackenzie Gas Project Terms of Reference

Appendix 4: Voisey’s Bay Mine and Mill EIS Guidelines

Appendix 5: Whites Point Quarry and Marine Terminal EIS Guidelines

[151] However, Dr. Gibson cautioned that “Referring to [the Mackenzie Gas] case alone may be poor strategy because of the governments' hostile reaction to the substance of the panel's excellent report and the regrettable long time the panel took to prepare it.” Dr. Gibson consulted for the Mackenzie Gas joint review panel (2005-2009).

[152] per email dated March 7, 2012.