Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the *Canadian Environmental Assessment Act, 2012*

Interim Technical Guidance

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Canada

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Document Information

Disclaimer

Please be advised that this draft guidance piece is an interim document. The Agency is currently reviewing the Environmental Assessment process and as a result of the review, EA practice, policies and procedures may change. This draft guidance document reflects current practice under the Canadian Environmental Assessment Act, 2012 (CEAA 2012).

This Technical Guidance is for information purposes only. It is not a substitute for the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) or its regulations. In the event of an inconsistency between this document and CEAA 2012 or its regulations, CEAA 2012 or its regulations would prevail.

For the most up-to-date versions of CEAA 2012 and regulations, please consult the Department of Justice website.

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LIST OF ABBREVIATIONS AND ACRONYMS

Agency	The Canadian Environmental Assessment Agency
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
EA	Environmental Assessment
EIS	Environmental Impact Statement
Minister	Minister of the Environment
OPS	Operational Policy Statement
Project	A designated project under CEAA 2012 for which the Agency is the responsible authority
Project EA	EA of designated projects conducted under CEAA 2012 for which the Agency is the responsible authority
VC	Valued Component

INTRODUCTION

Context

The *Canadian Environmental Assessment Act, 2012* (CEAA 2012) aims to protect components of the environment that are within federal legislative authority from significant adverse environmental effects caused by a project, including cumulative environmental effects.

In addition, CEAA 2012 ensures that a project is considered in a careful and precautionary manner to avoid significant adverse environmental effects, when the exercise of a power or performance of a duty or function by a federal authority under any Act of Parliament is required for the project to be carried out.

Throughout this guidance, the term "environmental effects" refers to environmental effects in areas of federal jurisdiction as described in section 5 of CEAA 2012, which are:

- effects on fish and fish habitat, shellfish and their habitat, crustaceans and their habitat, marine animals and their habitat, marine plants, and migratory birds;
- effects on federal lands;
- effects that cross provincial or international boundaries;
- effects of any changes to the environment that affect Aboriginal peoples, such as their use of lands and resources for traditional purposes; and
- changes to the environment that might result from federal decisions as well as any associated effects on health, socio-economic conditions, matters of historical, archaeological, paleontological or architectural interest, or other matters of physical or cultural heritage.

Please refer to Basics of Environmental Assessment and the Practitioners Glossary for Environmental Assessment of Designated Projects under the *Canadian Environmental Assessment Act, 2012* for additional information on the environmental assessment (EA) process and key terms under CEAA 2012.

Purpose

This technical guidance provides methodological options and considerations to support the implementation of CEAA 2012 and the approach outlined in the *Operational Policy Statement on Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012* (OPS), in a way that achieves high quality EA.

The OPS provides core guidance on CEAA 2012 requirements related to the determination of significance for a designated project to ensure that these requirements are met in all project EAs.

This document informs the preparation of Canadian Environmental Assessment Agency (the Agency) documents such as the Environmental Impact Statement (EIS) Guidelines and the EA report. It is intended to support proponents of designated projects in the preparation of an EIS, in conjunction with other Agency policy and guidance instruments. It also provides guidance to Agency employees throughout the EA of a designated project in their interactions with those engaged in federal EAs, such as proponents, review panel members, federal authorities, other jurisdictions, Indigenous groups and the public.

This Technical Guidance is based on a collection of examples from past EAs; it is not exhaustive. This document will be reviewed periodically to integrate updated information on the best available approaches to determination of significance.

Application

This technical guidance is intended for use in the EA of a designated project when the Agency is the responsible authority or supports an EA conducted by a review panel. It should be used in conjunction with

other Agency policy and guidance instruments. For an EA by a review panel, additional guidance and direction may be provided in the Terms of Reference and/or Joint Review Panel Agreement.

When the National Energy Board is the responsible authority, direction and guidance can be found in their filing manual. Applicants seeking guidance on nuclear projects should refer to the Canadian Nuclear Safety Commission's regulatory framework.

The term "project" refers to designated projects under CEAA 2012 for which the Agency is the responsible authority, and "project EA" refers to the EA of designated projects conducted under CEAA 2012 for which the Agency is the responsible authority. Environmental effects refer to those identified in section 5 of CEAA 2012, including cumulative environmental effects.

This guidance replaces the Agency's 1994 *Reference Guide: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* and is for application under CEAA 2012. The 1994 reference guide will continue to apply for project EAs initiated under the former *Canadian Environmental Assessment Act* and are being completed under the transitional provisions of CEAA 2012.

For further guidance on the assessment of cumulative environmental effects, please see the Agency's *Operational Policy Statement Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* and *Technical Guidance on Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012.*

SUMMARY OF THE CORE GUIDANCE

Determining whether a project is likely to cause significant adverse environmental effects is central to the concept and practice of EA under CEAA 2012. Whatever adverse environmental effects are predicted and whatever methods are used to assess them, the focus of an EA under CEAA 2012 is always whether the project is likely to cause significant adverse environmental effects, after taking into account the implementation of mitigation measures.

The approach for determining significance is nested within the EA framework (see Annex 1 of the OPS).

The OPS provides the following approach for determining whether a project is **likely** to cause **significant adverse** environmental effects:

- Stage 1: Determining whether the environmental effects are adverse
- Stage 2: Determining whether the adverse environmental effects are significant
- Stage 3: Determining whether the significant adverse environmental effects are likely

The OPS provides core guidance on the three stages as well as on information requirements, documentation, and decision-making. Notably, conclusions on the significance and likelihood of environmental effects by the Agency or the review panel are presented in the EA report (or review panel report).

The OPS describes the following key criteria to be used for stage 2: determining if a residual adverse environmental effect is significant:

- Ecological and Social Context,
    - This criterion should be taken into account when considering the key criteria below in relation to a particular valued component (VC), as the context may help better characterize whether adverse effects are significant (see Technical Concepts and Considerations section);
- Magnitude;
- Geographic Extent;
- Timing;
- Frequency;
- Duration; and
- Reversibility.

Example 1: Ecological and Social Context

A proposed project would affect a burial site and a cremation site identified by an Indigenous group. The sites would be buried under mine tailings. The Indigenous group has stated that the site is of great cultural and historical importance to them. The effects are therefore deemed to be of high magnitude and permanent.

TECHNICAL CONCEPTS AND CONSIDERATIONS

The following key concepts inform the determination of significance under CEAA 2012:

- Valued components (VCs) refer to environmental features that may be affected by a project and that have been identified to be of concern by the proponent, government agencies, Indigenous peoples or the public. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it. For example, it may have been identified as having scientific, social, cultural,

economic, historical, archaeological or aesthetic importance. For the purposes of CEAA 2012, VCs are selected in relation to section 5 of CEAA 2012 and taking into account direction provided by the responsible authority, or in the case of an EA by review panel, by the Agency or the Minister of the Environment (the Minister).

- Mitigation measures are for the elimination, reduction or control of the adverse environmental effects of a project, and include restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means. Under CEAA 2012, these measures must also be technically and economically feasible.
- A residual environmental effect is an environmental effect of a project that remains, or is predicted to remain, after mitigation measures have been implemented. The determination of whether a project is likely to cause significant adverse environmental effects relates to the residual environmental effects.

Key technical considerations in determining significance include the following:

- Information and documentation;
- Addressing cumulative effects;
- Using benchmarks;
- Addressing likelihood; and
- Addressing uncertainty.

1. Information and Documentation

The Agency issues EIS Guidelines to proponents, which specify the nature, scope and extent of the information required for the preparation of the EIS. Following the review of the EIS, the Agency, the review panel or the Minister may also issue information requests to a proponent seeking additional clarification and information if necessary.

A proponent, the Agency or a review panel may make a determination of significance in the course of a project EA. Such determinations are separate from, but may inform, the decisions made by the Minister under subsection 52(1) of *CEAA 2012.*

Community knowledge and Aboriginal traditional knowledge can contribute to the determination of significance. The public and Indigenous groups can provide new information, offer a different interpretation of the facts or question the conclusions put forward by the proponent or the Agency.

The EIS will identify and define the criteria used to assign significance ratings to any predicted adverse effects and justify the methods selected to determine significance. It will contain clear and sufficient information to enable the Agency, technical and regulatory agencies, Indigenous groups and the public to review the proponent's analysis of the significance of effects. If any deficiencies are identified by the Agency, the proponent will be directed to address them.

The degree of uncertainty in outcomes of the EA should be described in the documents produced throughout the project EA as appropriate. The sources and nature of uncertainty should be clearly described to provide the basis for the stated level of confidence as well as how any identified uncertainty may affect the steps in the methodologies discussed in this document.

Example 2: Information from Indigenous Groups

Construction of a proposed project would eliminate access to sites used by a nearby Indigenous group to gather medicinal plants for traditional purposes. The plants are present at other sites within the Regional Study Area. During the EA, members of the Indigenous group noted that alternative plant sites would not be suitable because the community elders could not easily access them. The original sites were important for maintaining the practice of plant gathering for medicine and for the cultural transmission of knowledge of these sites and plants to younger members of the Indigenous group. Through the EA process, the consideration of significance was greatly informed by engagement with the affected Indigenous group.

2. Addressing cumulative effects

Determinations of significance must be made for both project-specific effects, and for any cumulative environmental effects. Both determinations of significance, documented in the EA report, will be taken into account in the Minister's decisions under subsection 52(1) of CEAA 2012.

The assessment of both project-specific and cumulative environmental effects includes the consideration of the implementation of mitigation measures. This is done prior to determining the significance of the environmental effects. Any uncertainty regarding the predicted effectiveness of proposed mitigation measures should be considered in the assessment.

The cumulative environmental effects assessment should consider all VCs for which residual environmental effects are predicted, regardless of whether those residual environmental effects are predicted to be significant.

3. Using benchmarks

Benchmarks help define what would be considered a significant adverse environmental effect on a VC. In some cases, it may be possible to identify established or generally accepted benchmarks. These may be in the form of standards, guidelines, targets, or objectives. Benchmarks are used to:

- aid in understanding whether and how much a VC's state (health, status, or condition) is affected by specific or multiple activities and stressors (Stage 1);
- provide information on potential effects levels for a VC (i.e. thresholds for negative consequences of a stressor on a VC), which can assist in the application of the criteria set for significance (Stage 2); and
- provide an indication of which VCs are of regional concern (i.e. if a benchmark for a VC has been established at a regional level), which may assist with all stages.

4. Addressing likelihood

Likelihood is defined as the probability that an event or incident, such as a significant adverse environmental effect, will occur as a result of a project. The likelihood of the predicted significant adverse environmental effects should be supported with sufficient detail, using an appropriate quantitative or qualitative approach, to understand and substantiate how conclusions were reached.

Different methodologies, such as professional judgment, reasoned argumentation, collaboration and risk assessment, (see Methodologies section) may be used to determine the likelihood of a predicted significant adverse environmental effect. The selection of the methodology used for assessing likelihood is linked, among other things, to measurability of the effect, which in turn is influenced by the nature of the VC and the nature of the environmental effect.

Where possible, practitioners should use a quantitative assessment to characterize the likelihood of occurrence. Any assumptions and limitations should be described and be transparent.

Where quantitative assessment is not possible, the probability of occurrence is often determined based on a qualitative approach using terms such as “low”, “moderate” and “high” probability or “unlikely”, “probable” and “very likely”.

It is important that qualitative terms be defined (e.g. using a defined percentage), applied in a transparent manner and supported by explanation and discussion to avoid variability in different interpretation by reviewers.

Uncertainty often influences the prediction of the likelihood of a significant adverse environmental effect.

Example 3: Likelihood and Uncertainty

Stage 3: Determining whether the significant adverse environmental effects are likely

A proposed project could affect a herd of woodland caribou. An Indigenous group has stated that this herd is critically important to them as a source of food and for a variety of products such as snowshoe panels (current use of lands and resources for traditional purposes).

Uncertainties exist in the conclusions related to:

- the critical ecological pathways to the effects on current use;
- the effectiveness of proposed mitigation measures; and
- the interaction of various effects.

Given these scientific uncertainties and the importance placed on the availability of woodland caribou by the affected Indigenous group, a conservative approach is used. It is assumed to be 100% likely that the hunting success rate of caribou by the Indigenous groups will be significantly affected. Therefore a significant adverse effect to the current use of lands and resources for traditional purposes by the Indigenous group is likely.

5. Addressing uncertainty

Scientific uncertainty associated with information and methods may be introduced at many points in the EA process, including, for example, in the evaluation of the accuracy and availability of baseline information, accuracy of environmental effects predictions, and the expected level of effectiveness of mitigation measures.

All project EAs involve some level of uncertainty and observed results can be expected to deviate, to some degree, from predictions made in the EA. The confidence limits, confidence interval or the confidence level provides information about the range in which the true value lies within a stated degree of probability. This information can be assessed with a quantitative or qualitative approach by qualified professionals.

When data are generated, the application of statistical methods may allow for quantitative determination of confidence limits. When statistical methods are used, the nature and quality of the data used, the scientific validity of the hypotheses, and “statistical significance”, have to be taken into account. Statistical significance is characterized by a low probability of error and a high confidence level. (Note that statistical significance is a different concept from that of significance of adverse environmental effects under CEAA 2012.)

As an alternate to statistical methods, professional judgment (see Methodologies section) is often applied to characterize the level of confidence of each prediction of significance and likelihood with qualitative terms such as “low”, “medium” and “high”. The criteria for determination of the level of confidence should be defined and documented to enable consistent interpretations by reviewers.

It may be appropriate to perform an additional risk analysis to characterize potential risks, particularly if:

- there is a high level of uncertainty in the prediction of the environmental effect;

- a significant environmental effect is possible among the range of potential effects; or
- specific adaptive management commitments would not adequately mitigate the uncertainty or potential for significant environmental effects.

The risk assessment would allow for the description of the range of likely, plausible, and possible outcomes with respect to both potential significance and likelihood.

Regardless of the approach taken to consider uncertainty (quantitative or qualitative), the sources and nature of uncertainty should be clearly described to provide the basis for the stated level of confidence as well as how any identified uncertainty may affect any of the steps in the methodologies discussed in the document.

Adaptive management may be used to address uncertainty. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project. However, a commitment to implementing adaptive management measures does not eliminate the need for sufficient information regarding the environmental effects of the project, the significance of those environmental effects and the appropriate mitigation measures required to eliminate, reduce or control those environmental effects. Adaptive management requires appropriate predictions, monitoring and triggers for when action will be taken. For further information on adaptive management, please see the Agency's Operational Policy Statement: Adaptive Management Measures under the *Canadian Environmental Assessment Act* or any future updates of this document.

METHODOLOGIES

Several methodologies that can be used to determine whether an adverse environmental effect is significant are described in this section. A methodology generally frames the implementation of various methods.

The methodologies described below are often interrelated and can be used in combination, as appropriate, to determine whether a project is likely to cause significant adverse environmental effects. For example, professional judgment and reasoned argumentation may be used to adapt broad standards, guidelines and objectives to establish a definition or limit of significance for a specific environmental effect. Collaboration can support and inform a variety of methods.

1. Collaboration

Collaborative interactions among experts and other stakeholders can inform the consideration of significance and the scaling or defining of the key criteria. Collaboration generally involves identification of stakeholder representatives who can participate in forums that may require multiple sessions and an investment of time. These forums are typically distinct from general public participation opportunities provided by the proponent, the Agency or a review panel.

Considerations for applying this methodology include the following:

- the objectives of interactions with stakeholders (e.g., seek advice, achieve consensus) should be clear to all participants;
- the reasoning for the determination of significance must be clear for all participants to enable clear conclusions in the EIS;
- this methodology is conducive to the integration of scientific, Aboriginal and community knowledge, mutual learning, creative interpretations and problem solving; and
- this methodology is highly dependent on effective participation methods.

Consideration should be given to using multiple forms of participation (e.g., public meetings, site tours, focus groups), considering the needs and characteristics of the collaborating parties, making use of specialists with the appropriate background and experience, as well as specialists with facilitation and mediation skills.

Example 4: Collaboration

Stage 2: Determining whether the adverse environmental effects are significant

A proposed project may affect the current use of lands and resources for traditional purposes by an Indigenous group. Due to the importance of Indigenous perspectives in the understanding and interpretation of effects on this VC, a collaborative method is used to inform the consideration of significance.

Traditional knowledge holders and leaders from the potentially affected Indigenous group, as well as the proponent's technical experts in biology and archaeology, participated in a three-day workshop to discuss the evaluation of significance of adverse environmental effects. The objectives of the workshop were clearly defined:

- share and understand the rationale behind the residual adverse environmental effects identified;
- define and discuss the key criteria (i.e., ecological and social context, magnitude, geographic extent, timing and duration, frequency, and reversibility) that are typically used to determine the significance of residual adverse environmental effects; and
- achieve consensus on the key criteria to be considered for this VC and the process that will be used to apply these key criteria.

Concerns raised at the workshop were used to inform the design of the project and application of mitigation measures. Questionnaires and interviews with members of the Indigenous group resulted in additional baseline information and greater understanding of their ranking of issues related to current use of lands and resources for traditional purposes.

2. Risk Assessment

Significance can be determined on the basis of an "acceptable level" of a specified risk, using quantitative or qualitative ecological or human health risk assessment. This methodology considers a combination of likelihood and the consequences of the adverse environmental effect.

Risk assessment may also be used to describe the range of likely, plausible, and possible outcomes with respect to both potential significance and likelihood. This may be a useful aid for addressing uncertainty.

Considerations for applying this methodology include the following:

- quantitative risk assessment is often used to determine the significance of the risks to human or ecological health from, for example, carcinogenic chemicals. Its use is restricted to agents that have predictable dose-response or exposure-effect relationships. The response, effect, or risk is often measured in terms of increased incidence of a particular health outcome per million people exposed. By using the dose-response relationship, it can be determined whether or not the dose or exposure would result in an unacceptable level of risk;
- ecological risk assessments are used to assess risks to ecosystem processes, habitats and biotic resources;
- information on who has set the risk levels and how acceptable risk levels are determined should be presented. The views of Indigenous groups should be considered regarding acceptable risk levels for environmental effects that may affect them; and
- risk assessments may use generally available and tested models, models that have been adapted to better address the circumstances of the project or models developed specifically for the project.

Example 5: Quantitative Risk Assessment

Stage 1: Determining whether the environmental effects are adverse,
Stage 2: Determining whether the adverse environmental effects are significant, and
Stage 3: Determining whether the significant adverse environmental effects are likely

The health of an Indigenous group could be affected by air emissions from a proposed project.

A quantitative risk assessment method is appropriate due to the availability of a risk assessment framework and guidance endorsed by federal regulatory agencies.

Future concentrations of air contaminants are modelled and compared to available site-specific and/or published background levels, as well as health-based environmental guidelines set by regulatory agencies.

The risks to the health of Indigenous peoples are evaluated using professional judgement and by comparison to risk levels that consider both the probability of occurrence and the consequences of an adverse environmental effect.

3. Aggregation

Qualitative or quantitative aggregation methods involve attributing a scale ranking to each key criterion and applying a decision rule to inform the determination of significance. Examples of this methodology include multi-criteria analysis and decision trees.

The influence of the key criteria on a determination of significance will vary between VCs. In most cases, reliance on a standardized ranking system or standardized decision rules across all VCs will not give adequate consideration to VC-specific circumstances. It is important to explain rankings and give a clear rationale for the determination of significance on a VC-specific basis.

Example 6: Qualitative Aggregation

Stage 2: Determining whether the adverse environmental effects are significant

A proposed project may affect air quality on a nearby national park (federal lands) and also across a provincial boundary. A method based on qualitative aggregation and professional judgement is appropriate in this case, because the most relevant key criteria for measuring air quality are magnitude, geographic extent and frequency.

Thresholds for magnitude of air quality effects, available as established standards, are best understood in relation to the geographic extent and frequency criteria. Established air quality criteria are developed to apply in the environment, which means beyond the geographic extent of the project itself. The geographic extent of the effect can be tied to the predicted magnitude. For an effect on air quality on federal lands or in another jurisdiction (i.e. transboundary) to be significant, the predicted air quality would need to exceed the relevant criteria and would need to exceed the criteria more frequently than under baseline conditions.

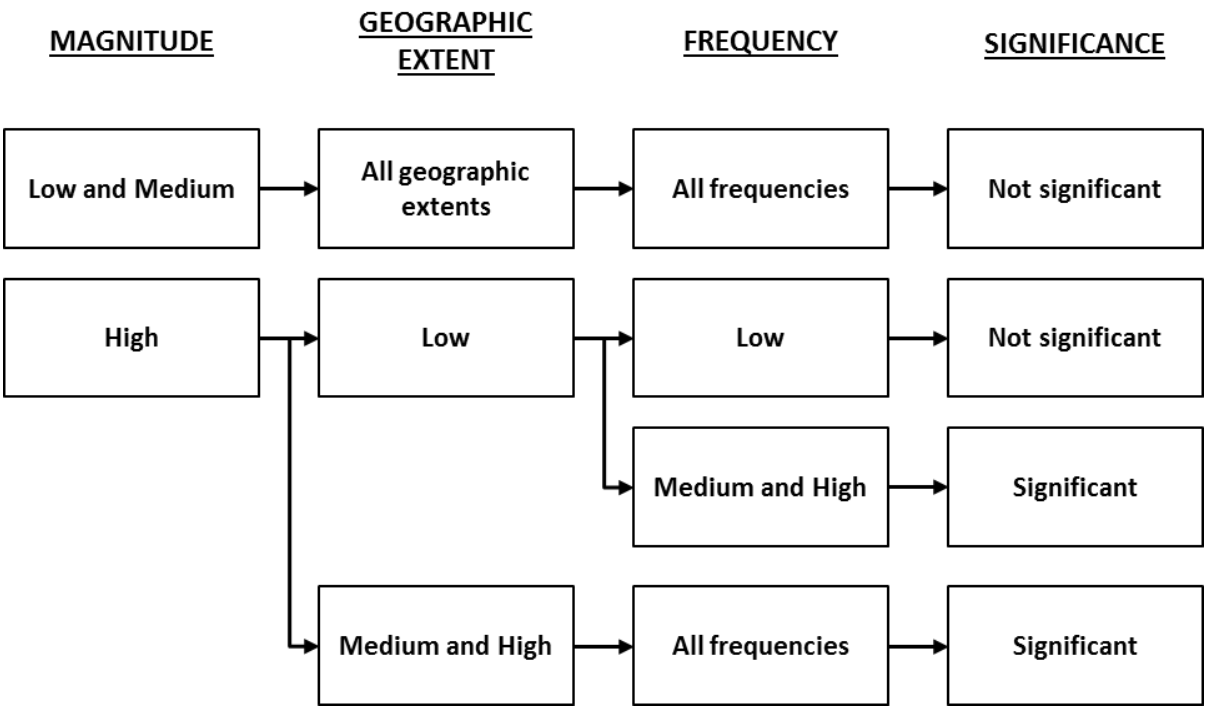
The definitions of the most relevant criteria are as follows:

- Magnitude: degree of the change in concentration of indicator compounds (airborne particulate matter, combustion by-products; and airborne metals) relative to applicable standards
- Geographic extent: the spatial area over which the effect occurs, categorized by comparison to the established study areas for the VC (e.g., Local Study Area, Regional Study Area, beyond the Regional Study Area); and,
- Frequency: how often the residual adverse environmental effect occurs within a given time period.

The decision making process for this example is outlined in Figure 1 below.

Figure 1. Example Decision Tree for Determination of Significance

Note: This diagram provides a decision tree for determination of significance (not significant or significant) based on the sequential interaction between the magnitude, geographic extent, and frequency criteria for effects (defined as low, medium or high).



Example 7: Quantitative Aggregation

Stage 2: Determining whether the adverse environmental effects are significant

A proposed project may affect fish and fish habitat as defined in the *Fisheries Act*. A quantitative aggregation method is appropriate due to the considerable variation in the importance of the key criteria to the determination of significance. Each of the key criteria is assigned effects-level definitions and related scores (see Classification and Score columns in Table 1 below) based on degree of adverse effect, e.g.:

Magnitude and Geographic Extent

- Low (Score 0): Under 20% alteration of important fish habitat in the Local Study Area
- Medium (Score 5): 20% to 40% alteration of important fish habitat in the Local Study Area
- High (Score 10): Greater than 40% alteration of important fish habitat in the Local Study Area

Magnitude and geographic extent, timing and reversibility are given greater weight in the scoring system to reflect their relative importance, i.e. any effects to these criteria could cause fundamental changes to the current state of fish populations.

In Table 1 below, the predicted effects of the project are compared to the significance key criteria using the corresponding scores. The key criteria scores are then aggregated to provide an overall determination of significance as follows:

- Negligible (not significant): 0-5
- Low (not significant): 6-10
- Moderate (not significant): 11-15
- High (significant): 16 or greater

The aggregated score of the effects is 10 corresponding to low, not significant, effects. Therefore, no significant adverse environmental effects on fish and fish habitat are anticipated as a result of the project.

Table 1. Application of Key Criteria

Note: This table illustrates the determination of significance by using quantitative aggregation, based on a comparison among the predicted effect of the project and the corresponding scores for each key criteria.

Key Criteria	Application of Key Criteria	Classification	Score
Ecological and Social Context	Species not identified as commercially or recreationally important or important to Indigenous groups.	Low	0
Magnitude and Geographic Extent	Approximately 25% of important fish habitat is likely to be altered in the Local Study Area.	Medium	5
Timing	The effect extends to sensitive periods (e.g. spawning).	Sensitive	3
Duration	The effect extends from the Construction Phase through the Closure Phase.	Long-term	2
Frequency	Conditions or phenomena causing the effect are anticipated to occur once.	Low	0
Reversibility	The effects are anticipated to be reversible following Project closure.	Reversible	0
Aggregated Score:			**10 (Low)**

4. Reasoned Argumentation

Reasoned argumentation involves presenting a clear, well-reasoned, substantiated and organized argument in support of a conclusion. A reasoned argument allows a wide audience to reasonably draw the same conclusions as the author. The argument should fully utilize relevant information, be based on a comparison of the predicted effect to a benchmark, where appropriate, and consider the most relevant key criteria.

Example 8: Reasoned Argumentation

Stage 2: Determining whether the adverse environmental effects are significant

A proposed project could affect habitat quality and quantity for a migratory bird species on federal lands, and disrupt breeding and nesting periods. Professional judgment and reasoned argumentation are used to identify benchmarks to determine what would be a significant effect for this VC. Scientific literature, species life history traits, predicted changes in measurement indicators and experience from past EAs, monitoring programs and regional studies informed this work.

A significant adverse environmental effect to this VC could be when one or more of the following population outcomes are reached:

- habitat loss or reduced habitat quality causes permanent adverse changes to survival or reproduction at the population level;
- habitat loss and fragmentation that reduces population connectivity to the point that it disrupts demographic rescue between source and sink habitats (or areas); or
- effects on abundance and distribution would be measurable at the population level and likely to decrease resilience and increase the risk to maintaining self-sustaining and ecologically effective populations.

5. Professional Judgment

Professional judgement involves developing interpretations informed by an understanding of project characteristics, predicted environmental effects, and general EA and sustainability principles, to establish a rational basis for a conclusion. The factors and logic leading to the conclusion must be clearly presented. Professional judgment should be applied by individuals that have the appropriate background and experience to make the judgment. Professional judgement is often used in combination with other methodologies (see Aggregation and Reasoned Argumentation sections above).

Considerations for applying professional judgment as the main or single methodology when determining significance include the following:

- a variety of factors should be taken into account, such as the status, size and range of a population unit, broad-scale habitat conditions, established thresholds or standards for closely related species, area-specific policies for land use and species management;
- information from a variety of sources including scientific analysis, community knowledge and Aboriginal traditional knowledge of environmental effects and their significance; and
- comparison to a benchmark should be used, where possible.

Example 9: Professional Judgement

Stage 1: Determining whether the environmental effects are adverse

After the implementation of mitigation measures, it is predicted that a project will result in the direct loss and fragmentation of migratory bird habitat on federal lands due to clearing and grubbing, watercourse alterations, and development of site access roads. Changes in habitat quality from noise, lights, people and vibrations from the project also have the potential to alter the movement and behaviour of individual birds and decrease occupancy of habitat near the project. Since no further mitigation measures are proposed, these effects are deemed residual adverse environmental effects and are advanced for consideration of significance.

Example 10: Professional Judgement

Stage 3: Determining whether the significant adverse environmental effects are likely

The migratory behaviour of marine mammals could be affected by the cumulative effects on habitat quality from a proposed project in combination with the environmental effects of other physical activities that have been or will be carried out. However, the likelihood is considered low given the distances over which the various physical activities are taking place, as well as the localized nature of potential project effects.