Assessor's Guide to the Assessment of

Environmental Effects

YESAB
Yukon Environmental and Socio-economic Assessment Board

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PREFACE

The *Yukon Environmental and Socio-Economic Assessment Act* establishes a Yukon-specific process for assessing the environmental and socio-economic effects of activities in Yukon.

This guideline is intended primarily for assessors of the *Yukon Environmental and Socio-economic Assessment Board* (YESAB) who are tasked with completing assessments of Executive Committee-level projects, and for Designated Office (DO) assessors, responsible for the assessment of DO-level projects.

These guidelines lay out a systematic 11-step process for assessing potential environmental effects of projects in Yukon. The nature of these steps in practice is such that answers from one question may require the assessor to revisit a previous step. This is the dynamic nature of assessment, and it is not the intention of this guideline to provide direction to assessors that certain steps cannot be initiated until previous steps are completed. The assessor should tailor these guidelines to individual projects as necessary. Any process changes made by assessors in the assessment of project effects should maintain consistency with the spirit and intent of the *Act*.

The principal intent of these guidelines is to provide a methodology through which assessors of Executive Committee-level assessments will meet the requirements of Section 42 (Matters to be Considered) of the *Act*, and complete consistent environmental assessments throughout Yukon.

Separate guidance has been developed for the assessment of socio-economic effects of projects in the *Guidelines for the Assessment of Socio-economic Effects under YESAA.*

1.0 ENVIRONMENTAL EFFECTS ASSESSMENT FRAMEWORK

1.1 ALL PROJECTS

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2.0 SECTION 1 – ASSESSMENT PROCEDURES FOR ALL PROJECTS

2.1 STEP 1: DESCRIBE THE PURPOSE OF THE PROJECT

In most cases, the proponent will identify the *Purpose of the Project* in the project proposal by providing a concise statement regarding the rationale (i.e. what is to be achieved by carrying out the project), and/or perceived need for undertaking the proposed activities. An example of a purpose statement is provided below.

> Example 1:
> Due to increases in gold and copper prices, the milling of previously non-economical ore which was segregated on site during previous mining activities, has become a viable undertaking expected to employ eight people full-time for the next three years. This project will help address the current and future demand for these base metals.

Section 42(1)(a) of the *Act* requires that the assessor (Designated Office or Executive Committee) take into consideration the purpose of the project or existing project. It is important for the assessor to understand the purpose/rationale for the project, including the proposed outcomes, and the extent to which the purpose/outcomes are consistent with the relevant purposes of the *Act*.

Through the comparison of the purpose of the project with the relevant purposes of the *Act*, the assessor can flag, at a high level, potential issues with the proposed project that should be tracked through the assessment process.

The intention of this step is for the assessor to consider the purpose(s) and proposed outcomes of the project as proposed. It is not necessary that the purposes/outcomes of the project be consistent with all the purposes of the *Act*; instead the important result of this exercise is to identify those purposes of the *Act* that are in conflict with the proposed project.

If the purposes of the project are not consistent with one or more of the applicable purposes of the *Act,* this should be an initial indication to assessors that there may be a

higher likelihood of contentiousness associated with the project, and to keep this in mind when establishing timelines (or extensions thereof) for participation. Any project purposes or proposed outcomes of a project that are found to be inconsistent with the spirit of the *Act* should be taken into consideration by the assessor in the identification of effects, establishment of mitigative measures, and the development of recommendations, as appropriate.

Table 1a Description of the Purpose of the Project

Purpose of, and Perceived Need for, the Project

Table 1b Relationship of Purpose of project to Purpose of YESAA

Does the proposed project:	Inconsistent with the *Act* (X)[1]?
protect and maintain environmental quality and heritage resources?	
protect and promote the well-being of Yukon Indian persons and their societies, as well as Yukon residents and the interests of Canadians?	
intend to be undertaken in accordance with principles that foster beneficial socio-economic change without undermining the ecological and social systems on which communities/residents/societies depend?	
recognize and, to the extent practicable, enhance the traditional economy of Yukon Indian persons and their special relationship with the wilderness environment?	

[1] It is not mandatory that project purposes be consistent with the purposes of the *Act* –certain purposes of the *Act* may not be applicable to a particular project. However, it should be noted if and when the given purpose of a project is inconsistent with a purpose of the *Act*, i.e. when the purpose of a project conflicts with a purpose of the *Act*, this may be the first flag to an assessor of a potential issue.

2.2 STEP 2: ESTABLISH THE SCOPE OF THE PROJECT

A starting point in the assessment is to describe the components and related activities of the project for all stages of the undertaking. This is referred to as the scope of the project. A thorough understanding of the project components will provide the assessor with an understanding of the direct pathways of potential effects. Clearly outlining those activities that are to be considered in the assessment is important for clarity. The assessor should consider activities associated with all stages of the project, from construction to closure.

The Rules[2] require that the following components be included in the assessment:

1. Any activity identified in the project proposal; and,
2. Any accessory activity that is likely to be undertaken in relation to an activity identified in the project proposal that the assessor considers sufficiently related to be included in the project.

   In practice, the assessor should identify the principal project and any accessory activities that are to be undertaken in relation to the principal project.

   The principal project is the activity for which the assessment is being undertaken (i.e. an activity that meets the criteria under s.47(2) of the Act). The principal project must always be included in the scope of the project.

   In addition to the principal project, the assessor should include any accessory activities that are related to the principal project. The following criteria should be used by the assessor to identify accessory activities:

   - **Interdependence:** If the principal project could not proceed without the undertaking of another physical work or activity, then that other physical work or activity should be considered as a component of the scoped project (e.g. a bridge that must be built in order to access a timber block).

[2] Section 48 (Designated Office Rules), Section 37 (Executive Committee Screening Rules)

- **Linkage:** If the decision to undertake a principal project makes the decision to undertake another activity inevitable, then that other activity should be considered as a component of the scoped project (e.g. the construction of a hydro-electric dam makes the construction of transmission lines inevitable).

- **Proximity:** If the geographic study areas developed in relation to the scope of the assessment for the individual projects overlap, the two may be considered to form a single project (see below), or, if the accessory project is sufficiently removed from the principal project, it may be excluded (e.g. a dock in Skagway must be upgraded to ship ore that was mined from central Yukon).

Under the *Act*, the assessor can also combine two or more triggered projects into the same assessment if it is determined that the projects are so closely related so as to be considered to form a single project:

"A designated office or the executive committee shall assess as a single project two or more projects for which it has received proposals where it considers that the projects are so closely related as to be part of the same activity or where all the decision bodies for each of the projects have advised it that they consider the projects to be so related." [3]

Typically, the use of proximity criteria to scope in other (unrelated) projects and activities into the scope of the project, is relegated to cumulative effects assessments. Guidance from the *Canadian Environmental Assessment Act* (CEAA), relevant to the grouping of projects, states that the proximity criterion on its own is rarely sufficient cause for the assessor to combine two or more projects into the same assessment.

The following is an example of where two projects could be combined:

➢ A proponent is proposing two common projects, to occur directly adjacent to each

[3] Section 52, *YESAA*

- other. The projects propose to use the same routes for access and hauling. Upon the discretion of the assessor, these two projects may be considered to form a single project.

For activities determined to be within the scope of the project, the assessor must consider all stages of the project, including construction, operation, abandonment and/or decommissioning.

Table 2 Identification Of Project Components (Scope Of The Project)

Principal Project	**Components**
	➢ ➢ ➢ ➢ ➢
Accessory *Act*ivities	**Components**
1. (Description of Accessory *Act*ivity) Reason for inclusion: □ Interdependence □ Linkage □ Proximity	➢ ➢ ➢ ➢ ➢ ➢
2. (Description of Accessory *Act*ivity) Reason for inclusion: □ Interdependence □ Linkage □ Proximity	➢ ➢ ➢ ➢ ➢
3. (Description of Accessory *Act*ivity) Reason for inclusion: □ Interdependence □ Linkage □ Proximity	➢ ➢ ➢ ➢ ➢
4. (Description of Accessory *Act*ivity) Reason for inclusion: □ Interdependence □ Linkage □ Proximity	➢ ➢ ➢ ➢ ➢

2.3 STEP 3: IDENTIFY REGIONAL ENVIRONMENTAL ISSUES RELEVANT TO THE ASSESSMENT

In the initial stages of the assessment, the assessor should attempt to identify regional environmental issues that are relevant to the proposed project. Regional issues are different from project-specific issues in that they encompass topics of concern that are applicable to a greater spatial area, typically on a landscape level. Often these regional issues are spoken to, and at times even dealt with, within regional plans or strategies (e.g. regional land use plans). In other instances, no planning exercises may have been completed, however the specific issue(s) are prevalent and commonly raised in response to proposed developments within a particular region (e.g. southern lakes caribou in the Marsh Lake area). In general, regional issues can be identified through existing plans (e.g. regional land use plans, fish and wildlife management plans) and policies (e.g. no-hunting corridors for herd re-establishment) applicable to the area in question, through interested persons and experts familiar with the issue at hand, by referencing existing information sources, and through experience by the assessor with similar projects in the area. Ultimately, the goal of identifying regional issues is to contribute to the delineation and/or characterization of VESECs (step 4) and associated project effects. Additionally, information collected at this stage may also serve in the identification and compilation of baseline information and/or characterization of effects on VESECs in steps 5 and 7.

Regional Land Use Plans

The *Act* describes how assessments will relate with existing and pending Regional Land Use Plans (RLUPs). Although there is no requirement for projects to conform to land use plans, the *Act* does require that if a project is recommended to proceed that is not in conformity with a RLUP, the recommended terms and conditions must bring the project into conformity with the RLUP to the extent possible.[4]

[4] Section 44(3), *YESAA*

Other Plans

Although the *Act* does not speak to other types of management plans (e.g. forest management plans), it is responsible practice for assessors to become informed of policies or recommendations that are born out of management plans within the region of the proposed project, especially if these relate to concerns or values that are frequently raised in the local region.

Certain management plans can provide guidance regarding thresholds that are applicable to VESECs selected for the purposes of the assessment. Within the context of assessing environmental impacts from land use developments, a threshold is considered to be the limit to which an important resource can tolerate land use effects before experiencing an unacceptable adverse effect, and is useful for the assessor in determining likely effects of the project.

Policies and Legislation

Policies and legislation may also contribute to the identification of regional issues of concern or interest. For example, any species identified in the federal *Species at Risk Act* as being at risk or of concern, and existing in the project area, will almost certainly be flagged as a regional issue of concern and likely be established as a VESEC in step 4.

If policy decisions have been made respecting the use of particular resources in an area, this may provide an indication to assessors that a regional issue exists. For example:

1. If the department of Environment has established no-hunting zones within or adjacent to the project area, this may indicate that potential issues exist in relation to access proliferation or wildlife population concerns. The assessor should follow up with the appropriate authorities to confirm such indications, and subsequently make the appropriate conclusions regarding issues to carry forward in the assessment

2. Species at risk are required to have recovery plans for endangered and threatened species and management plans for species of special concerns. Those plans are to be developed by the provinces and territories for regional species and in conjunction

the federal government for international species. Mitigation for projects within SARA species range should conform to those plans.

Interested Persons/ Experts

Regional issues of concern will commonly be raised by local stakeholders, and by experts whose knowledge applies to the issue at hand, to the spatial area of interest, or to a combination of both the issue and area of relevance. Before submitting a proposal to the Executive Committee, the proponent of a project is required to consult any First Nation in whose territory, or the residents of any community in which, the project will be located or might have significant effects[5]. Interested persons are also provided the opportunity to participate in all assessments carried out by Designated Offices and the Executive Committee through the applicable Rules. Assessors can seek advice and/or guidance, as necessary, from any person or body considered by the assessor to be an expert. Experts will typically include government departments/employees with specialized knowledge (e.g. regional biologists for wildlife-related concerns), First Nations for traditional knowledge with respect to the region and issues of concern, and other recognized specialists with information to contribute further to current levels of understanding on issues of concern.

Other Existing Sources of Information

The assessor should draw upon any studies, surveys, analysis, or research relevant to the project or local region. Vegetation surveys, wildlife population assessments, status reports, issue-specific discussion papers, and community visioning exercises are examples of information that can raise or contribute further to an understanding of local issues.

Table 3 provides a suggested framework for identifying regional issues relevant to the assessment.

[5] *YESAA*, Section 50(3)

Table 3 Summary of Regional Environmental Issues relevant to the Assessment

	EXISTING THRESHOLDS / PLANS?		DESCRIPTION (INCLUDING AUTHORS, IF APPLICABLE)	DOES THE PROJECT PROPOSAL CONFORM TO PLAN/ THRESHOLDS ?	
	Yes (✓)	No (✓)		Yes (✓)	No (✓)
LAND USE INITIATIVES IN REGION					
Regional Land Use Plan					
Wildlife Management Plan					
Fish Management Plan					
Forest Management Plan					
THRESHOLDS					
Flora/Habitat Harvesting Thresholds					
Fauna Harvesting Thresholds					
MISC.					
Status reports					
Concern					

2.4 STEP 4: IDENTIFY THE VALUED ENVIRONMENTAL AND SOCIO-ECONOMIC COMPONENTS

A considerable number of environmental and socio-economic components are available to be measured and included in the assessment of potential environmental and socio-economic effects of a proposed project. It is not possible for an assessment to consider all possible ecological and socio-economic interactions with respect to a project; an ecosystem alone may contain thousands, or perhaps millions, of variables. A pragmatic and widely accepted method for overcoming this challenge and focusing the assessment is to delineate priorities - valued environmental and socio-economic components (VESECs). While VESECs include both environmental and socio-economic components, the purpose of this document is to focus solely on the environmental components.

The objective behind a VESECs-based approach is to ensure that, at a minimum, no significant adverse effects will occur with respect to the major values identified on the landscape and that, if chosen properly, appropriate mitigation of potential effects on these components may also mitigate impacts on other ecological or social components of concern, thereby minimizing the likelihood of significant adverse effects.

VESECs can typically be grouped under one of the following headings:

1. Focal Species and Habitat
2. Representation
3. Special Elements
4. Ecological Processes
5. First Nation/ Resident/Community Values or Concerns

<u>Focal Species and Habitat</u>

Focal Species and their habitat requirements are used to define the landscape attributes required to meet the needs of biota, and also the management regimes that should be applied to them. A typical focal species approach may involve the identification of a collection of fauna, existing in the project area. These species are used to define the composition and configuration of habitats that must be present on the landscape in for the identified population to continue to prosper. The species identified as being the most

sensitive to change in a particular variable is designated as a 'focal' species. The requirements of these identified species are used to delineate the base condition to be maintained on the landscape. For example, the local fish species that is most sensitive to a particular element common in effluent that is expected to be released from the project (e.g. selenium) may be used to define the maximum acceptable concentration, to maintain the viability of the downstream environment. The most area-limited species may be used to define the minimum area required for certain habitat patches. From an operational sense, population changes in the higher-trophic-level species to which society can relate can be difficult to predict with a high degree of accuracy. The assessor should be open to studying species at lower levels in the trophic hierarchy and extrapolate upwards and/or rely on professional judgement equally, and at times more so, than on quantitative analysis.

Representation

The concept of representation is common in ecosystem-based management and other land-management systems that seek to protect viable populations of native species, perpetuate or mimic natural-disturbance regimes on a regional scale, adopt a long-term planning timeline, and allow human use at levels that do not result in long-term ecological degradation. A common goal is to maintain an appropriate representation of ecosystem networks and populations on the landscape over time, while recognizing and managing for natural temporal fluctuations in composition that occur within these populations and ecosystems.

Special Elements

Special elements that occur on the landscape may also be chosen as VESECs. These elements may include rare or under-represented ecosystems, rare and/or threatened flora or fauna species, important harvested species, and unique landforms. Special elements chosen as VESECs will have commonly been identified as harbouring some unique ecological and/or social value that may be at risk, directly or indirectly, in whole or in part, as a consequence of the project.

Ecological Processes

Ecological processes of social or environmental importance may be incorporated into an assessment as VESECs. Project impacts to ecological processes may include disruptions to food webs, alteration of downstream ecologies resulting from pH imbalances and/or effluent inputs into the water system, and interruptions to groundwater or stream channel hydrology, as examples.

First Nation/ Resident/Community Values and Concerns

Soliciting First Nation, local area resident, and community values and concerns can be an important tool that assists assessors in identifying the potential environmental effects of a project. This approach provides an insight into the major (and sometimes minor) social and environmental concerns of these groups as they are reflected by the project proposal. Using this input in the establishment of VESECs is useful for establishing the environmental components of value to the community and community groups at hand (e.g. important furbearers, food providers, and aesthetics).

It is important when choosing VESECs that the appropriate components or indicators of VESEC health are chosen for the purposes of the assessment. In this context, the term "health" refers to the desired VESEC condition that will occur subsequent to the project, and all applicable mitigation, being implemented. With input from stakeholders, decision bodies, and experts, the responsibility will ultimately be that of the assessor's to determine the desired future condition for the purposes of the assessment. Land use plans, community vision documents, and models are examples of tools that may be used to help determine the desired future condition.

Table 4 provides a suggested framework for summarizing the VESECs for the assessment.

Studying the direct effects of a project on a particular VESEC can be difficult unless the effects of a project are expected to contribute directly to VESEC injury or mortality. In cases where a VESEC has been identified, and direct effects are not anticipated, it may be appropriate to instead study the indirect effects of the project on the VESEC. Figure 1 provides a suggested framework for selecting appropriate VESEC's and/or indicators of VESEC condition or change.

Figure 1 Framework for Selecting VESECs or VESEC Indicators

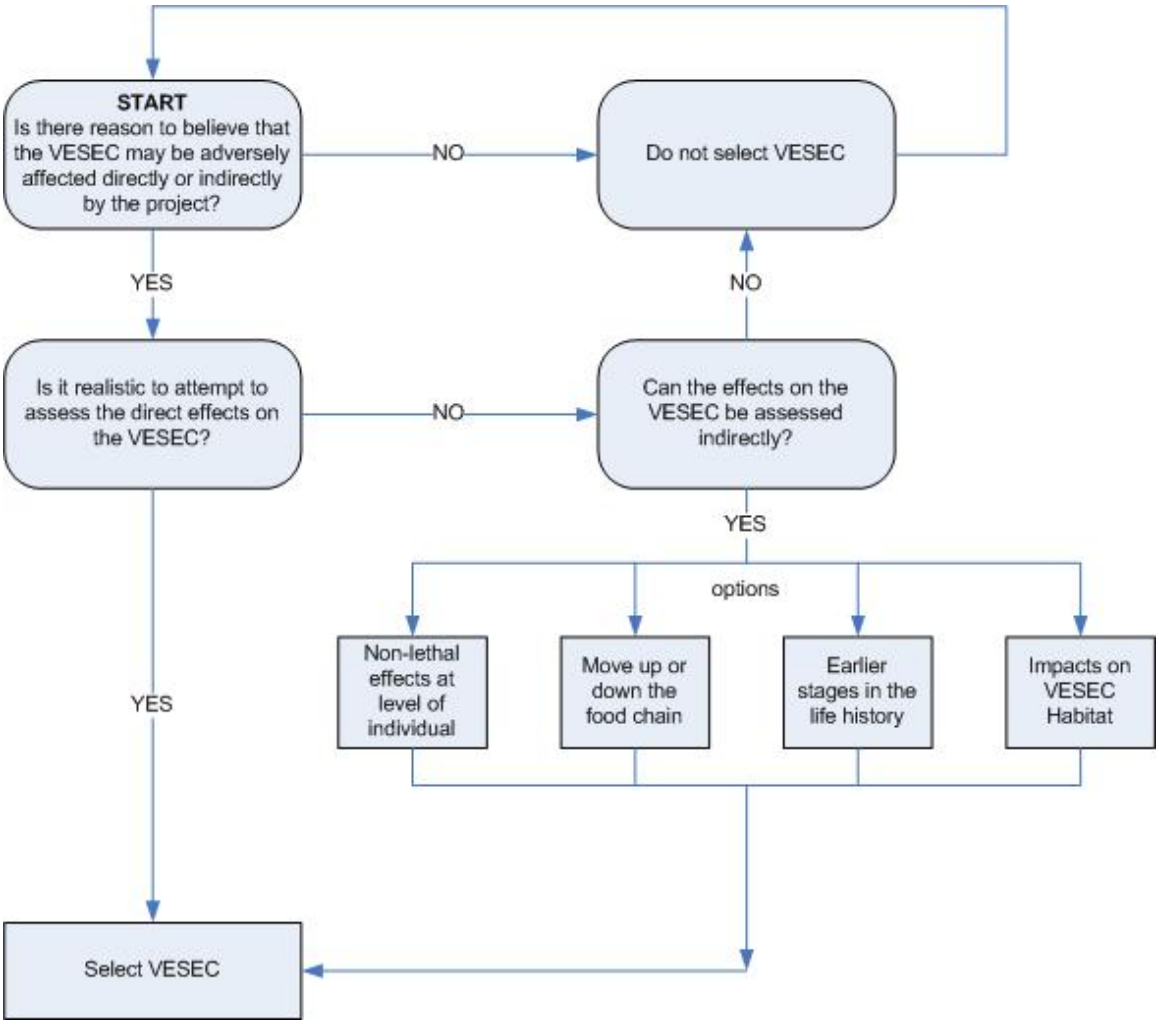

Table 4 Summary Of Selected Valued Environmental And Socio-Economic Components

VESEC	REASON FOR CHOICE	INDICATOR	TYPE (✓)				
			Focal Species	Repre-sentation	Special Elements	Ecological Process	Community Concern

2.5 STEP 5: IDENTIFY AND COMPILE AVAILABLE BASELINE INFORMATION

Once the appropriate VESECs have been established for the purposes of the assessment, the assessor should determine if, and to what degree, the proposed project may affect those VESECs. To understand the potential effects of a project on a VESEC, it is first necessary to understand the past and current conditions within which the VESEC exists or has existed. This may include, but is not limited to, information on:

- Description of the project area (terrain, biological settings)
- GIS data/maps of local environment (vegetation cover, hydrology);
- Terrestrial/Aquatic Wildlife VESEC habitats (critical, calving/spawning, species extents and ranges)
- Terrestrial Wildlife VESEC migration corridors
- Wildlife VESEC population information (total numbers, reproductive success, and other ecological relationships that may play a role in the health of the VESEC population)

Understanding pre-development baseline conditions is an important step towards comprehending the possible present and future effects on a VESEC, and is a logical starting point from which the determination of significance is made.

Proponents are responsible for submitting the majority of required project-related baseline information. This would include information on project components, technologies/approaches, test results, existing environmental conditions, anticipated effects, etc. This information will typically be provided in the project proposal[6] or in response to a subsequent information request by the assessor to the proponent. In preparing information requests, assessors should consult regulatory and expert agencies to cover a wide range of potential concerns.

The assessor may also collect relevant baseline information relevant to the project and assessment. Typically, the assessor will begin the baseline information identification and collection stage by contacting the appropriate experts relevant to the VESECs identified in step 4. Examples may include: Regional biologists for wildlife and habitat-related issues, Department of Fisheries and Oceans Canada and Yukon Government's Department of Environment (Fisheries) for fish issues, and the local First Nation for concerns and traditional knowledge for a variety of environmental or socio-economic components. These experts will generally be able to provide the assessor with relevant information with respect to identified issues and selected VESECs, or direct the assessor to where the information can be found. These experts are also important resources for identifying potential effects relevant to their area of expertise.

Table 5 provides a suggested framework for summarizing relevant baseline information.

[6] Form 1 describes the necessary information to be submitted for DO projects; *Information Requirements for Executive Committee Project Proposals* details the necessary information to be submitted for Executive Committee projects.

Table 5 Summary of Identified and Compiled Baseline Information

VESEC	DATA TYPE (e.g. spatial, habitat, wildlife, NTDB, vegetation, traditional)	Condition			DATE COMPILED	SOURCE
		Past	Current	Future		

2.6 Step 6: Determine Spatial and Temporal Overlaps between VESECs and the Project Activities/Effects

With the information collected in steps 2, 4, and 5, the assessor should be able to establish the temporal and spatial scope of the assessment. The temporal scope should be VESEC-specific, and extend as long as the identified project effects are anticipated to occur. The temporal scope should also establish the seasonality of effects where applicable. The spatial scope should include all areas of overlap and interaction between project effects and the VESECs.

The assessment should also determine if effects from the project activities that overlap in space and/or time with one or more VESECs are periodic (e.g. seasonal), or continuous (year-round) in nature, as well as the duration of effects. This step should provide assessors with an enhanced understanding of specific project effects on specific VESECs.

In filling out Table 6, the assessor should only pick the activities that are relevant to the project being assessed. Each relevant project activity listed in Table 6 will have a spatial and temporal scope associated with its effects. Each identified activity may also have more than one effect associated with it, with different effects likely having different spatial and temporal bounds.

Table 6 provides a suggested framework for summarizing the spatial and temporal overlap assumptions used for the purposes of the assessment. To fill out Table 6, it is intended that the assessor enter the number of years the effect is anticipated to continue into the month/effect overlap section.

Table 6 Determine Spatial And Temporal Overlaps Between Vesecs And The Project (Complete 1 Table Per VESEC)

	MONTH (✓)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
VESEC (From step 4) – Temporal Occurrence in Project Area												
Project *Act*ivities that may Impact VESEC listed above[7]												
Alteration of surficial geology												
Disturbance of soils												
Removal of vegetation												
Controlled burns												
Contaminant discharge												
Solid waste disposal												
Water consumption												
Water diversion												
Facility construction												
Human presence												
Motorized vehicle use												
Aircraft use												
Boat use												
Resource extraction												
Facility operation												
Other:												

[7] Column 1 of tables 6, 7, 8b, and 9b is intended to describe all the *possible* high-level activities associated with a project. Not all activities will be relevant to all projects. The corresponding rows should be filled in only for those activities that pertain to the project being assessed.

2.7 Step 7: Identify and Characterize Potential Environmental Effects and their Mitigation

The purpose of this step in the assessment of environmental effects is to determine the likely adverse environmental effects, appropriate actions to mitigate those effects, and the resultant residual effects of the project on the VESECs. Residual effects are the effects of the project that occur subsequent to the application of mitigation.

This step involves the consideration of the potential direct and indirect effects of the project, mitigation measures to reduce or eliminate the likely potential effects of the project, and the likely success of the proposed mitigation measures.

Direct effects are the initial, immediate effects caused by a specific activity. For example, the direct effect of fishing may be fish injury or mortality. These are effects caused by a given action and occurring at the same time and place. Indirect effects are caused by a given action, occurring later in time or further removed in distance, but which are reasonably foreseeable. For example, the indirect effect of harvesting a mature pine forest may be a reduced carrying capacity of the ecosystem to sustain the local marten population.

The *Act* requires assessors to consider any matter that a Decision Body has asked them to take into consideration.[8] Notification of the Decision Body at the beginning of an assessment facilitates this process. However, the assessor may choose to more actively seek input from the Decision Bodies with respect to any concerns and issues related to the project. Ongoing communication is essential to fulfilling this requirement.

The degree to which an assessor will characterize environmental effects, and instructions on how to do so, is beyond the scope of this guideline given the vast number of potential effects that may impact an equally vast number of potential VESECs. There are however some methods that are commonly used in the characterization of effects, including:

[8] *YESAA* 42(1)(i)

Spatial Analysis: Spatial analysis is a way of analyzing data that explicitly incorporates information about location as well as attributes of the data set. This approach is commonly undertaken through the use of GIS. Spatial analysis has a large number of applications, including (but not limited to) evaluating habitat suitability and capability, estimating and predicting project/VESEC overlaps and effects, and for interpreting and understanding natural succession of vegetation.

Landscape Indicators: The use of landscape indicators involves the measurement of specific variables that track over time the state of air, water, and land resources, pressures on those resources, and resulting effects on ecological condition. This approach is useful for objectifying inherently subjective values. For example, forest health may be a difficult concept to measure, however select indicators have been chosen by forest scientists to describe forest health, including: Crown condition, ozone injury, tree damage, tree mortality, lichen communities, down woody material, vegetation diversity and structure, and soil condition.

Thresholds: Threshold measurements enable both project proponents and regulators to evaluate the acceptability of project-related effects on a specific component of the environment by comparing the effects of the project against a pre-determined limit of acceptable change. If project effects, either independently or in combination with other land-use pressures, force a VESEC into an unacceptable condition or level, then the project effects will likely be deemed significant. If the effects of the project do not force the VESEC into an unacceptable condition or level (locally or cumulatively), then project effects are typically viewed as not significant, and the project may be recommended to proceed. Naturally, reliable pre-development baseline information (step 5) is vital where planning is based upon thresholds which have been developed for particular VESECs, e.g. the level at which development within a caribou herd's winter range becomes a significant effect. Thresholds are often refined through time, as understandings of populations and ecological interactions evolve, therefore the assessor should seek the most up-to-date and applicable thresholds when and where available.

Where objective threshold information is available, this is a recommended methodology for use in assessments. This approach, however, is typically limited by the availability of such information.

Computer Models: Computer modeling is a technique for predicting effects in space and/or time. Models rely upon information about the source of an effect (either assumed or measured), and assumptions that this effect is dispersed in a particular way that can be described mathematically. Models can be reasonably accurate when describing the dispersion of a single effect from a single point source. However, the greater number of assumptions equate to greater probability of error. Many models, even sophisticated ones, can have large margins of error (± 100% or worse). Results from computer models are only as good as the information and assumptions being used. Where quality information and proven models are unavailable, this approach is not recommended as a primary means of identifying and characterizing effects.

In practice, the assessor should seek out professional expertise and relevant examples of effects assessment carried out previously, when and where possible, specific to the VESEC and/or effect at hand.

Mitigation may take the form of measures to reduce, eliminate, or control adverse effects related to the proposed project activities (e.g. the use of high flotation tires on forestry equipment to reduce rutting and soil damage), compensation, or alternative ways of undertaking or operating the project that would avoid or minimize any significant adverse effects (e.g. requiring winter-only timber harvesting in sensitive areas) as per Section 42(1) (e) of the *Act*. Mitigation measures may also need to occur in relation to an adaptive management plan (step 10).

In addition to issues identified by the assessor during the course of conducting an evaluation or screening, the assessor will also typically rely upon input of the public, experts, regulators, and decision bodies to identify pertinent issues, and will determine on a case-by-case basis the appropriate merit given to each issue raised.

It is often important that experts are included in the exercise of identifying environmental effects and appropriate mitigations. Individuals or organizations with in-depth knowledge on a particular aspect of a proposed project or effect can support an assessor in areas where they do not have as much experience. Experts may provide a perspective that is both relevant and helpful to effective and responsible environmental and socio-economic assessment. In practice, assessors should give additional merit to pertinent experts with a relevant background and knowledge of the local environment, and/or community

affected by the project. In instances where this local expertise is unavailable, the assessor may use a combination of topic experts, and the extrapolation of likely project effects from issue- or VESEC-specific scientific, local and/or traditional information that is available.

The Designated Office and Executive Committee Rules establish the process through which the public can participate in assessments. Further guidance can be found in the Board document *Assessor's Guide to Public Participation Opportunities*. All relevant comments received in a manner consistent with the Rules must be given full and fair consideration in the assessment.

Table 7 provides a suggested framework for the identification of potential environmental effects and their mitigation.

Table 7 Summary of Environmental Effects and Their Mitigations

Project Components	VESEC(s) Affected	Direct Effect Description	Indirect Effect Description	Mitigation/ Alternatives	Anticipated Mitigation Success		
					None	Partial	Complete
Alteration of surficial geology							
Disturbance of soils							
Removal of/ Change in vegetation							
Controlled burns							
Contaminant discharge							
Solid waste disposal							
Water consumption							
Water diversion							
Facility construction							
Human presence							
Motorized vehicle use							
Aircraft use							
Boat use							
Resource extraction							
Facility operation							
Accidents/ Malfunctions							
Other:							

2.8 Step 8: Assess Likelihood, Duration, Magnitude, and Extent Interactions for Residual Effects

This step is a 'red-flag' exercise, whereby the assessor establishes which project/VESEC interactions require further investigation in step 9 (interactions ranked as moderate or high) and which ones do not (interactions ranked as low).

If all effects are ranked as Low, the project effects are not likely significant, and the project may be recommended to proceed. The assessor may, however, decide to proceed to step 9 to further support these conclusions. This is commonly done to address contentious issues.

If any effects are ranked Moderate or High, there is a potential that these effects are significant. For these effects, the assessor should proceed to step 9 to further refine any significance determinations.

Ranking potential adverse effects with the criteria of likelihood, duration (the period of time during which an activity may cause a disturbance to a VESEC), magnitude (the portion of the VESEC that may be affected by the project activities), and extent (the area that may be affected by the activity) provides the assessor with the ability to perform a preliminary identification of potentially significant effects.

It is the task of the assessor to identify effects that are reasonably likely to occur within the spatial and temporal scopes of the assessment. Two concepts that are fundamental to the likelihood determination are:

Probability: The chance or possibility that a specific event will occur.
Uncertainty: The possible error or range of error which may exist within assumptions.

Likelihood determinations consider the application of mitigation measures. The example below illustrates how likelihood criteria integrate within the determination of significance.

Example Project:

A hydro-electric dam is proposed to be constructed upstream of a large subdivision. If a breach in the dam were to occur, the volume of water released could result in a high degree of devastation to the property and lives of residents living within a 1 km radius of the downstream channel; an obvious significant effect, were it to occur. The dam has been designed to withstand a 1:10,000 year flood, has integrated overflow mechanisms, and a number of other modern design considerations, and monitoring devices that would provide suitable warning of any structural issues. The municipality (proponent in this case) has also developed an adaptive management plan to deal with any emergency situations. Assuming the assessor is comfortable with the characterization of likelihood, the remoteness of the possibility of a catastrophic breach, and the ability of the proponent to maintain the structure for the life of the project, the assessor can conclude (and note in the assessment report) that although a breach (if it occurred) would represent a significant effect, the likelihood of such an event occurring is extremely unlikely given the extensive design and mitigation measures, and does not in and of itself represent a potential effect that warrants rejecting the project.

Tables 8a and 8b provide a framework for characterizing duration, extent, and magnitude criteria.

Table 8a Reference Table For Ranking Duration, Magnitude And Extent of Project-VESEC Interactions For Environmental Effects
(Where There Is A Reasonable Likelihood of the Effect Occurring)

DURATION/ MAGNITUDE	EXTENT			
	Local	**Regional**	**Territorial**	**National/ International**
Short-term / Low	L	L	M	M
Short-term / Moderate or High	L	M	M	M
Medium-term / Low	M	M	M	M
Medium-term / Moderate or High	M	M	M	H
Long-term / Low	M	M	H	H
Long-term / Moderate or High	M	H	H	H

(adapted from Hegmann et.al.,1997)

Guidance for completing Table 8a

Term	Rankings
Duration: The period of time during which an activity (or results thereof) may cause a disturbance to a VESEC	**Short-term**: Less than 1 year **Medium-term**: 1 to 10 years **Long-term**: More than 10 years
Magnitude: The portion of the VESEC that may be affected by the activity (or results thereof)	**Low**: Less than 5% **Moderate**: 5-10% **High:** More than 10%
Extent: The area that may be affected by the activity	**Local**: Within the immediate project "footprint" **Regional**: Within the larger region surrounding the project (e.g., a watershed) **Territorial**: Throughout Yukon **National/International**: Across Canada or the U.S./Canada border

If all interactions are ranked as Low, the Project may be recommended to proceed.

For those interactions ranked as Moderate or High (or to further support a Low finding), proceed to step 9.

Table 8b: Ranking of Interactions for Environmental Effects

PROJECT COMPONENTS	VESEC/EFFECT	RANKING (from Table 8a)
Environmental		
Alteration of surficial geology		
Disturbance of soils		
Removal of vegetation		
Controlled burns		
Contaminant discharge		
Solid waste disposal		
Water consumption		
Water diversion		
Facility construction		
Human presence		
Motorized vehicle use		
Aircraft use		
Boat use		
Resource extraction		
Facility operation		
Other:		

2.9 STEP 9: RANK SIGNIFICANCE FOR RESIDUAL EFFECTS

Any conclusions and recommendations from assessors to Decision Bodies are based upon the determination of significance of likely effects. All recommended mitigation measures are taken into account prior to determining significance. The assessor can draw one of three conclusions with respect to the residual (i.e. after mitigation) effects of the project: the effects are not significant, the effects are significant, or the significance cannot be adequately determined. The third conclusion, where significance cannot be adequately determined, is usually due to a lack of information or divergent interpretation of potential effects by experts.

Table 9 provides a suggested framework for determining the significance of a project.

In determining significance, the assessor should also take into account general direction in the "purposes" of the *Act* to consider potential effects on:

- The special relationship between Yukon Indian persons and the wilderness environment of Yukon
- The cultures, traditions, health and lifestyles of Yukon Indian persons
- The cultures, traditions, health and lifestyles of other residents of Yukon
- The interests of residents of Yukon and of Canadian residents outside Yukon

This step, as directed by the *Act*, should also consider the significance of accidents and malfunctions associated with project activities that could result in significant effects.

Table 9a Reference Table for Ranking Significance for Environmental Effects

Questions for each Environmental Effect	Significance Rankings			Significance Conclusion
	Low (L)	Moderate (M)	High (H)	
Effects on Biological Species				
1. How much of the population may have their reproductive capacity and/or survival and/or livelihood affected? Or, for habitat, how much of its productive capacity may be affected?	<1%	1-10%	>10%	L if Low. If M or H, go to question 2.
2. How much recovery of the population or habitat could occur, even with mitigation?	Complete	Partial	None	L if Low. If M or H, go to question3.
3. How soon could restoration occur to acceptable conditions?	<1 year or 1 VESEC generation	1-10 yrs or 1 generation	>10yrs or >1 generation	L, M, H
Effects on Physical/Chemical Environment				
1. How much could changes in the VESEC exceed that associated with natural variability in the region?	< 1%	1-10%	>10%	L if Low. If M or H, go to question 2.
2. How much recovery of the VESEC could occur, with recommended mitigation?	Complete	Partial	None	L if Low. If M or H, go to question 3
3. How soon could restoration occur to acceptable conditions?	<1 year	1-10 yrs	>10 yrs	L, M, or H

(adapted from Hegmann et.al.,1997)

Table 9b Ranking Significance of Environmental Effects

Project Components	VESECs											
Environmental												
Alteration of surficial geology												
Disturbance of soils												
Removal of vegetation												
Controlled burns												
Contaminant discharge												
Solid waste disposal												
Water consumption												
Water diversion												
Facility construction												
Human presence												
Motorized vehicle use												
Aircraft use												
Boat use												
Resource extraction												
Facility operation												
Other:												

If all effects are ranked as low, the project effects are not likely significant, and the project may be recommended to proceed.

If any effects are ranked moderate, there is a moderate likelihood for significant effects. Mitigation approaches should be reviewed with the intention of increasing mitigation success. Based upon information received in the assessment, the Designated Office or

Executive Committee (as determined by the *Regulations*) will determine and accordingly recommend to Decision Bodies on a case-by-case basis, whether:[9]

1. The project be allowed to proceed, if it determines that the project will not have significant adverse environmental or socio-economic effects in or outside Yukon;
2. The project be allowed to proceed, subject to specified terms and conditions, if it determines that the project will have significant adverse environmental or socio-economic effects in or outside Yukon that can be mitigated by those terms and conditions;
3. The project not be allowed to proceed if it determines that the project will have significant adverse environmental or socio-economic effects in or outside Yukon that cannot be mitigated;
4. The project be referred to the Executive Committee (if the assessment was completed by a DO) if, after taking into account any mitigative measures included in the project proposal, it cannot determine whether the project will have significant adverse environmental or socio-economic effects;
5. A review of the project is required (if the assessment was completed by the Executive Committee), if, after taking into account any mitigative measures included in the project proposal, it cannot determine whether the project will have significant adverse environmental or socio-economic effects.

If any effects are ranked high, there is a high likelihood for significant effects, and the project should not be recommended to proceed without further mitigation or changes to project activities.

For moderate and high rankings, the assessor should consider the criteria in Table 9c, and the means through which they may be affected, so as to reduce the potential for significant adverse effects.

[9] Sections 56(1) (Designated Office Evaluations), 58(1) (Executive Committee Screenings), *YESAA*

Table 9c Criteria for Evaluating Effects Considered Moderate Or High

Magnitude	The probable severity of each potential adverse effect (degree, extensiveness, or scale). How serious is the impact? Does it cause a large change over baseline conditions? Does it cause a rapid rate of change – large changes over a short time period? Will these changes exceed local capacity to address or incorporate change? Does it create a change which is unacceptable? Does it exceed a recognized threshold value?
Geographical Limits	The extent to which the potential effect may eventually extend (e.g. local, regional, national, global), as well as, to geographical location (e.g. far north, isolated location)
Duration and Frequency	The length of time (day, year, decade) for which an effect may be discernible, and the nature of that impact over time (is it intermittent and/or repetitive). If repetitive, then how often?
Risk	The probability/predictability of an effect occurring.
People Affected	How pervasive will the impact be across the population? Should include the opportunity cost of the allowing the project to proceed.
Reversibility	How long will it take to mitigate the effect by natural or man-induced means? Is it reversible, and if so, can it be reversed in the short or long term?

3.0 SECTION 2 ADDITIONAL ASSESSMENT PROCEDURES FOR EXECUTIVE COMMITTEE SCREENINGS AND REVIEWS BY PANELS OF THE BOARD

3.1 STEP 10: DETERMINE THE NEED FOR EFFECTS MONITORING

The need for monitoring environmental and/or socio-economic effects is a required consideration of screenings by the Executive Committee under *YESAA*.[10] Effects monitoring may be recommended during the implementation of the project, to help ensure that mitigation measures are carried out and successful, or to confirm that assumptions made in the assessment of the project are accurate. After the completion of a project, follow-up monitoring may provide valuable information regarding whether predictions were correct, whether any unanticipated effects are occurring, and whether the proponent is remaining in compliance. The assessor should identify which monitoring measures may be conducted by the proponent, as well as the frequency that monitoring activities should take place.

To the extent possible, the assessor should identify monitoring programs that are as practical as possible, while fulfilling the identified need for the program. In practice, the assessor should dialogue with Decision Bodies and regulators to establish realistic recommendations with respect to the need for effects monitoring, including precedents and examples of existing requirements for similar projects.

Adaptive management plans are becoming more frequently used in major projects to address uncertainties. Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Its most effective form – "active" adaptive management - employs management programs that are designed to experimentally compare selected policies or practices, by evaluating alternative hypotheses about the system being managed.

Adaptive management plans allow conservation measures to be adjusted over time based upon results of monitoring and research. This approach can provide greater certainty that goals and objectives for identified VESECs will be achieved. If an adaptive

[10] Section 42(2)(a)

management plan forms part of a recommendation to a Decision Body, the assessor may recommend the location and frequency of monitoring efforts, the variables to be measured, and the suitable management responses and reactions to given results.

Table 10: Summary of Recommendations for Monitoring

Type of Monitoring Required	Rationale	Location	Frequency	Adaptive Management Plan (if applicable)	
				Thresholds	Response

3.2 Step 11: Determine Capacity of Renewable Resources to Meet Present and Future Needs

Renewable Resources are resources that are capable of being regenerated or replaced by ecological processes on a time scale relevant to their use, despite being harvested (e.g. forests, fish) or used (e.g. water), in contrast to non-renewable resources such as fossil fuels and mined products.

The *Act* requires that any Executive Committee Screening or Panel Review consider:

"The capacity of any renewable resources that are likely to be significantly affected by the project or existing project to meet present and future needs."[11]

The language of this clause suggests that this consideration of sustainability is to be made for effects of the project that have been determined to be significant in step 9.

The *Act* does not provide direction as to how the findings associated with this requirement of the *Act* are to be used in the assessment. However, it can be inferred that this will be information taken into account by the appropriate Decision Bodies in the rendering of a decision.

Various gauges of sustainability may be employed by the assessor, including Timber Supply Analyses (forests), anticipated changes to birth/mortality rates (fauna), and anticipated effects to critical habitats (fauna), as examples. The assessor should determine the appropriate tools and descriptors to use, on a case by case basis. In general, the assessor will make use of information on the present state of the renewable resource, the rate at which it reproduces/replenishes, the current uses of the resource and rates at which each use consumes resources, and also if there are any thresholds above or below which the resource would cease to be able to replenish itself.

[11] Section 42(2)b, *YESAA*

Generally, information and gauges of sustainability will be acquired through experts locally and in governments (First Nation, federal and territorial agencies/departments), or developed by the assessor through the consideration of comments by interested persons.

Table 11: Determine Capacity of Renewable Resources to Meet Present and Future Needs

Category of Renewable Resource	Type (ex.alluvial spruce, moose)	Significantly Affected by Project?		Present Sustainability Description	Future Sustainability Description
		Yes	No		
Vegetation					
Soils					
Wildlife					
Water					
Air					

APPENDIX 1: COMMENTS RECEIVED FROM INTERESTED PARTIES

VESEC 1					
From	Organization	Date	Comment	Consideration of Issue	Decision Body (✓)

VESEC 2					
From	Organization	Date	Comment	Consideration of Issue	Decision Body (✓)

VESEC 3					
From	Organization	Date	Comment	Consideration of Issue	Decision Body (✓)

VESEC 4					
From	Organization	Date	Comment	Consideration of Issue	Decision Body (✓)

Miscellaneous					
From	Organization	Date	Comment	Consideration of Issue	Decision Body (✓)