# 3.0 ASSESSMENT APPROACH

Chapter 3 reviews the assessment approach in the Project Proposal, focusing on the following items:

- Overview of Approach
- Assessment Framework including Cumulative Effects
- Determining Significance of Residual Effects
- Sources of Information

## 3.1 OVERVIEW OF APPROACH

The Project Proposal has been prepared in accordance with YESAA, the YESAB Guides[1] and standard environmental and socio-economic assessment practice. It sets out the information required from Yukon Energy (the Proponent), for a screening assessment of the Project by the YESAB Executive Committee. In accordance with the matters to be considered under s. 42(1) and 42(2) of YESAA, likely environmental and socio-economic effects of the Project, as well as likely cumulative adverse environmental and socio-economic effects of the Project and their significance are identified after considering the implementation of proposed mitigation, monitoring and follow-up measures. The submission utilizes and integrates available scientific, **traditional knowledge** (TK), local knowledge and other information relevant to the assessment of Project effects.

Following the direction of s. 50(3) of YESAA, the assessment approach has incorporated an extensive consultation and public involvement process which sought views from the First Nation of Nacho Nyak Dun (NND) and residents of Mayo where the Project is to be located or might have significant environmental or socio-economic effects (Chapter 4). Early and meaningful ongoing opportunities have been provided for NND, other local residents, other segments of the public and governments to receive information on, and provide views and information about the Project and the environmental and socio-economic planning and assessment process. These consultations have contributed in a material way to the mitigation of adverse environmental and socio-economic effects that could potentially be associated with the Project as well as a consideration of alternatives to the Project or alternative ways of undertaking or operating the Project that would avoid or minimize any significant adverse environmental or socio-economic effects.[2]

The scoping of the Project, as well as a description of Project activities and components, is provided in Chapter 6. The assessment approach addresses the distinct phases of the Project (i.e., construction,

[1] YESAB Guides refers to the Assessor's Guide to the Assessment of Environmental Effects, v. 2006.01; the Guide to Socio-economic Effects Assessment 2006.06; Assessor's Guide to the Assessment of Cumulative Effects v. 06.01.

[2] These matters are required to be considered under s. 42(1)(e) and 42(1)(f) of YESAA.

operation and maintenance) and their effects on environmental components (e.g., air, land and water environments and associated aquatic and terrestrial life) and socio-economic components (e.g., resource and other land use, economies, and social components including infrastructure and services, cultural/heritage sites and resources, traditional and other lifestyles, culture, human health, and social well being).

The Project Proposal ultimately assesses (see Chapter 7) the effects of a preferred conveyance option, generating station and associated infrastructure; as well as water management options for use of Mayo Lake.

The assessment approach focuses on the effects of Project construction and operation. At this time there is no timetable for decommissioning of the Mayo B facilities, and it is currently not feasible to provide a meaningful assessment of any likely Mayo B decommissioning plans or the anticipated effects of decommissioning. If at a later date it is determined that the Mayo B facilities are no longer required, then Yukon Energy would adhere to the legislation and regulations in place at that time and would review decommissioning plans with regulatory authorities and affected First Nations and other local communities.

## 3.2 ASSESSMENT FRAMEWORK

For the purpose of assessing environmental and socio-economic effects of the Project, current conditions in areas potentially affected by the Project and the projected evolution of these conditions without the Project are considered as the baseline. Potential environmental and socio-economic effects of the Project on this existing baseline are predicted separately in the Project Proposal for each environmental and socio-economic component by comparing:

a) **What would be expected without the Project** (i.e., the "existing conditions" or baseline expected for each environmental and socio-economic component without the Project, including as relevant consideration of other projects or activities that have been or will be carried out without the Project); and

b) **What would be expected with the Project** (i.e., each environmental or socio-economic component as modified or affected by the Project based on direct and indirect effects pathways[3] from the Project to the environmental or socio-economic component, including as relevant consideration of other projects or activities that have been or will be carried out in combination with the Project).

Following from the Project description and determination of the Project scope (Chapter 6), and reflecting the YESAB Guides and standard environmental and socio-economic assessment practice, the assessment

[3] As reviewed in the YESAB Guides, "direct effects" are the initial, immediate effects caused by a specific activity and "indirect effects" are caused by a given action, but occur later in time or further removed in distance.

framework for the Project Proposal (including cumulative effects assessment) to assess effects of the Project includes the following five basic steps:

1. **Scoping of Assessment**: It is critical at the outset to address assessment scope issues, including selecting **valued environmental and socio-economic components (VCs)** for the assessment[4], sources of Project effects for each VC, and scope of geographic and temporal assessment boundaries for each VC. Scoping of the assessment is generally addressed below in Section 3.2.1; however, determination of specific VCs and their respective scoping is addressed in setting the framework for review of relevant environmental and socio-economic baseline conditions (Chapter 7). Overview of other specific methods of assessment approach for specific VCs is reviewed as required in Chapter 7.

2. **Baseline Conditions:** This is a baseline analysis and includes review of current and evolving future VC conditions without the Project, as affected by past, current and other future projects included in the cumulative effects assessment. Each existing VC is described in the baseline analysis only to the extent needed to predict the effect of the Project on that VC as set out in the assessor's guides.

3. **Effects and Mitigation**: This describes quantitatively and qualitatively both positive and adverse effects on VCs likely to result from the Project, after consideration of the baseline conditions without the Project as well as proposed mitigation measures with the Project beyond those already included in the Project description. Further details on approach are provided in Section 3.2.2 below. In accordance with YESAA and the assessor's guides, the scope of this assessment includes an examination of both environmental and socio-economic effects arising from the Project and is described for each VC in Chapter 7.

4. **Cumulative Effects Assessment**: The cumulative effects assessment (CEA) is integral to the assessment approach and examines the likely effects of the project in combination with the likely effects of other past, existing and future projects and activities. Further details on the CEA approach are provided in Section 3.2.3 below. Section 5.4 reviews other projects and activities specifically considered as part of the CEA. To be considered a cumulative effect, the other past, existing and future projects being considered in the assessment must affect a VC that is also being affected by the principal project; in this way the projects act cumulatively upon a valued component. The CEA is provided for each VC in Chapter 7.

5. **Residual Effects and their Significance**: This describes summaries of the nature and extent of any residual environmental effects of the Project after implementation of proposed mitigation, and includes characterization with rationale as to whether adverse residual environmental and socio-economic effects are significant or not significant, as defined in

[4] Valued Environmental and Socio-economic Components (VCs, sometimes referred to in YESAB Guides as VESECs) are elements of the Project Study Region valued for environmental, scientific, social, aesthetic, or cultural reasons. Selecting project-specific VCs (i.e., VCs that could be potentially affected by the Project) is essential in the YESAB Guides for focusing assessments, and for determining the significance of effects.

S. 58 of YESAA (see Section 3.3 below for further explanation of approach). Included as part of mitigation are any plans for responding to any known or predicted residual effects, and procedures for identifying and responding to effects that were not predicted or foreseen. This assessment is included in Chapter 7.

6. **Monitoring and Follow-up**: This is a description of the proposed monitoring and follow-up activities should the Project proceed. This description is included in Chapter 8.

This framework is reviewed in more detail below for the following elements:

- Scoping of the Assessment
- Analysis of Effects (combines baseline conditions with effects and mitigation steps)
- Cumulative Effects Assessment
- Evaluation of Significance and description of Residual Effects
- Monitoring and Follow-Up

### 3.2.1 Scoping of the Assessment

This step includes:

- Identifying issues of concern related to the Project,
- Selecting VCs for further examination,
- Identifying potential sources and pathways of effects from the Project to each VC selected,
- Identifying spatial and temporal boundaries for assessing effects of the Project for each selected VC; and
- Identifying other actions and effects pathways that may act cumulatively with the Project to affect the same VCs.

It is standard practice to focus an assessment on specific environmental and socio-economic components which are determined to be of particular importance. A VC based approach is intended to ensure that potential significant adverse effects to important environmental and social components will be detected and mitigated through the assessment process. Measures designed to mitigate adverse effects on major components should serve to also minimize likelihood of adverse impacts on other environmental and social components.

In considering the existing biophysical environment and existing socio-economic conditions, the scope of study focused on examining components that could be linked to the Project. The Guide to the Assessment of Environmental Effects (YESAB, 2006a) sets out that the assessor should look at both project-specific issues and also identify regional environmental and socio-economic issues relevant to the project, with the goal of delineating valued components and associated project effects on those components through the life of the project. The Guide to Environmental Effects Assessment states in this regard:

> 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 (YESAB, 2006a, p. 13).

Similarly, the Guide to Socio-Economic Effects Assessment states:

> The assessor must bear in mind that, as discussed in Step 2 – Determine Assessment Scope, only those elements of the socio-economic environment within the established study area that are potentially affected by the project need be further identified and characterized (YESAB, 2006b, p.47).

In this assessment VCs were determined after consultation with interested parties and experts, field studies undertaken on the terrestrial and aquatic environments, socio-economic data collection and consideration of TK and local knowledge as well as any plans and policies applicable to the regional area. The selection of VCs helped to focus the analysis on components deemed to be of particular importance or of special interest to residents or to the ecosystem. Well chosen VCs can also provide a representative measure of the Project's effects on the non-selected environmental and socio-economic components.

Based on the YESAB Guides, VCs for this assessment were identified and grouped under one or more of the following headings:

- Focal species and habitat (environmental VC defining landscape attributes required to meet the needs of biota, and also the management regimes that should be applied to them).
- Socio-economic context (socio-economic VC recognized as being important because of its integral connection to, or reflection of, the socio-economic system; its commercial or economic value; and/or its role in maintaining quality of life in a community).
- Representation (seek 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).

- Special elements (may include rare or under-represented ecosystems, rare and/or threatened flora or fauna species, important harvested species, and unique landforms).

- Ecological processes (processes of social or environmental importance).

- First Nation/Resident/Community values or concerns.

The YESAB Guides provided considerable initial guidance as to scoping. Public consultations and further analysis were used to focus assessment of specific environmental and socio-economic components to define effects pathways, and to identify temporal and spatial boundaries for the assessment of Project effects on selected VCs. Section 3.2.4 reviews the overall approach to identify other actions or projects to address cumulative effects assessment requirements.

Temporal and geographic study area boundaries for Project effects were identified separately for each VC based on predicted links with the Project.

The time periods examined include the Project construction, operations and decommissioning periods as required to assess duration and/or timing of specific effects related to the Project. In summary, the following distinct time periods are assessed in which Project related effects accrue:

- **Construction Phase:** This phase generally consists of the estimated two years required to complete the construction of the Project, including commissioning of the facilities.

- **Operation Phase:** The time period following construction, through the life of the relevant components of the project, during which time the project will be used for its primary purpose of power generation.

- **Decommissioning Phase:** For construction-related activities (i.e. work camp and storage areas, etc.), comprises the time period immediately following Construction Phase. For the main facilities associated with the Proposed Project, there is no timetable or plan for final disposition or decommissioning of the facilities. The design life of the facility, before substantial refurbishment, is 50-100 years. When such plans need to be developed, Yukon Energy would submit these plans as then required for regulatory review and approval prior to its implementation. Accordingly, the Project Proposal does not provide any further assessment of the Proposed Project final disposition.

The assessment process commenced with the definition of a general geographic location for the Project and a Project Study Region (Section 2.2) as well as the Construction Footprint Area for the generating

station, conveyance options and associated infrastructure. For assessment purposes the following areas were defined[5]:

- **Construction Footprint Area:** Construction Footprint Area is the geographic area needed for construction and operation of the physical infrastructure associated with the Mayo B Project (e.g., generating station, water conveyance option, powerline, access road, work camp etc.) (See Figure 2-1). Included in the Footprint Area is the lower Mayo River where construction activities occur.

- **Project Study Region**: A broader Project Study Region for examining potential environmental and socio-economic effects is defined as the portion of the Northern Tutchone Planning Region between and including the Village of Mayo and Mayo Lake that is generally in the vicinity of the Mayo River, Mayo Lake and Mayo Lake Access road (See Figure 2-2). The maximum geographic extent of most potential environmental and socio-economic effects is expected to be included in this region, including the effects of changing water levels and flows at Mayo Lake and along the upper Mayo River. The generic nature of the definition adopted for this study region reflects the absence of any specific administrative area available for overall data collection or mapping purposes relevant to this assessment. Within this Project Study Region, the Construction Footprint Area represents the much smaller local region examined to assess potential effects of the project's physical structures on the environment, as well as the potential effects of changing water levels and flows on the lower Mayo River.

Regardless of whether the Mayo B Project is developed, the Mayo facility will return to operating at its full potential as loads grow and new mines go into production, including the full range of Mayo Lake storage. Therefore, the "baseline conditions" for assessment purposes equal full capacity of the plant (near 40 GWh) and use of the full licensed storage range of Mayo Lake (2.59 m). The analysis of baseline conditions is provided in Chapter 7, followed by the effects assessment related to each specific VC.

### 3.2.2 Analysis of Effects & Mitigation

To determine the Project's effects the baseline conditions for the selected VCs were considered. Following the YESAB Guides, the consideration of baseline conditions for VCs may include information on existing project components (including operation of the Mayo system), technologies/approaches, test results, existing environmental and socio-economic conditions and anticipated Project effects. Understanding the past, current and evolving conditions in which each VC exists is considered important for providing a baseline against which present and future effects of the Project may be measured and determinations of significance of Project effects may be made.

[5] It should be noted that field studies undertaken early in the Project do not reflect the above definitions; rather they reflect study-specific requirements, and as such definitions such as "study area" used in the field reports in Appendices 7A, 7B and 7D do not in some cases correspond with the Project Proposal definitions indicated above.

The Project's baseline conditions need to be understood in the context of the operation of the existing Mayo system, including the management of water levels and flows. The Mayo facility supplied the loads of both the United Keno mine and the community of Mayo from 1951 until the mine closed in 1988/89. During this period, the plant typically operated near its then full capacity of approximately 38 GWh, and the licensed storage range at Mayo Lake was largely used each year. After the closure of the mine and up until the Mayo-Dawson line was energized in 2003, the plant generated power only for local loads in Mayo and Keno. The result of this reduced load was that only about one metre of Mayo Lake's licensed storage range was used each year. Since the Mayo-Dawson line went into service, the plant has also provided power to Dawson and Stewart Crossing. The Mayo facility continues today to operate below its current full capacity, typically using approximately 1.5m – 2.0 m of Mayo Lake storage range (depending on inflows). Winter flow levels are driven by the loads on the system at any given time. Further details on the existing Mayo facility can be found in Section 5.4.

Regardless of whether the Mayo B Project is developed, the Mayo facility will return to operating at its full capacity in the near term as loads continue to grow on the Mayo Dawson grid (with connection of the Alexco mine) and on the interconnected system (once the CSTP Stage 2 is completed), including its full storage range at Mayo Lake. For the purposes of assessment as provided in Chapter 7, the "baseline conditions" equal the full capacity of the plant (approximately 38 GWh/year) and use of the full licensed storage range of Mayo Lake (2.59 m).

Once baseline data was collected for each VC the assessment considered the effects of the Project, as well as other actions which may act cumulatively with the Project, on the selected VCs. Effects were examined for the construction, operation and maintenance phases of the Project. Applying standard practice and the YESAB Guides, the assessment of each VC provides a description of the existing baseline environment as scoped, before providing an analysis of Project effects expected to interact with the VC.

The analysis of Project effects considers both the temporal and spatial scope of effects on selected VCs. The temporal scope is VC specific and extends as long as the Project effects are predicted to occur, taking special consideration of the seasonality of effects where necessary. The spatial scope includes all areas of overlap and interaction between Project effects and VCs within either the Construction Footprint Area or Project Study Region (depending on the specific VC) including determinations regarding whether Project activities overlap with one or more VCs seasonally or year round and duration of such effects.

In accordance with standard assessment practice, YESAA and the YESAB Assessor's Guides, the Project Proposal includes identification of mitigation as part of the effects analysis. Mitigation measures considered during the assessment process include measures to reduce, eliminate or control adverse affects. As set out in YESAA and the guides such measures may also include compensation and alternative ways of undertaking or operating a proposed project that would avoid or minimize any significant adverse effects.

### 3.2.3 Cumulative Effects Assessment – YESAA Requirements and Overall Approach

As noted in Section 3.2 above, the cumulative effects assessment (CEA) is integral to the assessment approach and examines the likely effects of the Project in combination with the likely effects of other past, existing and future projects and activities. Section 3.2.3.1 below outlines the YESAA requirements for CEA and Section 3.2.3.2 outlines the overall approach.

#### 3.2.3.1 YESAA Requirements

YESAA requires that an Executive Committee Screening consider the significance of any adverse cumulative environmental or socio-economic effects of a project in combination with the ongoing effects of existing projects or the predicted effects of projects that will occur in the future. In environmental assessment practice the effects pathways from other projects and human activities must overlap with the effects pathways identified for the project being assessed in order to be considered to act cumulatively on identified VCs.

Although YESAA does not require that a project proposal submission to the Executive Committee consider cumulative effects[6], CEA is standard to good environmental assessment practice and has been included as part of this submission. The cumulative effects analysis conducted is designed to assist in determinations regarding whether there will be any significant adverse cumulative environmental or socio-economic effects.[7]

YESAA[8] describes the criteria for projects that must be included in a CEA as:

- Other projects for which proposals have been submitted under Subsection 50(1) of YESAA.
- Other existing or proposed activities in or outside Yukon that are known to the Designated Office, Executive Committee or Panel of the Board from information provided to it or obtained by it under YESAA.

Only those projects whose effects are likely to act in combination with the anticipated effects of the proposed Project must be considered for the purposes of a CEA under YESAA.

#### 3.2.3.2 Overall Approach

The *Assessor's Guide to the Assessment of Cumulative Effects* (YESAB, 2006c) suggests the application of a cumulative effects framework which closely mirrors the process outlined for the assessment of environmental effects and includes:

[6] See, YESAA, s. 50(2)(a).
[7] See, YESAA, s. 42(1)(d).
[8] At, YESAA, s. 42(1)(d).

- The identification of regional VCs,
- The compilation of cumulative effects VC baseline information,
- The determination of spatial boundaries for the assessment,
- Identification of other projects and activities and a determination regarding their residual effects,
- The determination of the temporal boundaries of the assessment,
- Identification of potential cumulative effects, the characterization of such effects and identification of mitigation measures; and
- Determination of significance of identified cumulative effects.

Following the above-noted guidance from YESAB, the assessment approach considered other projects and activities which may potentially act cumulatively with effects of the Project and affect selected VCs. The CEA identified all inputs from other projects that could act in concert with effects of the principal Project and influence the VCs identified, including:

- Past, present and likely future projects and activities in the area that may affect identified VCs
- Other existing or anticipated pressures (direct or indirect) on identified VCs.

In identifying future projects or activities to be included in the cumulative effects analysis the assessment considers:

- Projects or activities that have already been approved;
- Projects or activities that are already in a government approvals process and on the YESAB registry;
- Other eligible projects or activities not subject to (or yet submitted to) a formal government approvals process are included if there is a high degree of certainty they will occur; and
- The environmental effects of uncertain or hypothetical projects were not considered.

Section 5.4.2 describes the existing and likely future projects and activities in the area that may affect identified VCs.

Following standard assessment practice, where adverse cumulative effects were considered probable, mitigation was applied and determinations were made regarding the significance of the residual adverse cumulative effects after the application of those mitigation measures. While the effects of other projects

on selected VCs must be considered, mitigation could only be applied with regard to the Project being proposed.

### 3.2.4 Residual Effects and Evaluation of Significance

This step evaluates the significance of adverse residual effects likely to result from the Project after consideration of recommended mitigation. Evaluation of significance was carried out in accordance with YESAA, and involves (where feasible) comparing such residual effects against thresholds for a VC. Examples of thresholds that may be used include specified goals or targets, standards or guidelines, carrying capacity or limits of acceptable change. Significance may also be measured by land use objectives or trends, as well as a range of other methods.

In the absence of thresholds or other specified guides, YESAB Guides set out criteria such as likelihood, duration, magnitude and extent that can be used to provide a preliminary identification of potentially significant effects (further details on approach are provided in Section 3.3 below).

### 3.2.5 Follow-up & Monitoring

This step sets out recommended monitoring and effects management measures. The need for monitoring environmental and socio-economic effects is required for consideration for screenings by the Executive Committee under YESAA. Effects monitoring may be necessary to ensure the success of any mitigation measures that are to be implemented and to ensure the accuracy of any assumptions made regarding predicted effects and their mitigation.

Follow up monitoring may prove valuable to ensure that the Project does not have any unanticipated adverse significant effects through providing additional information regarding whether predictions were accurate, whether any unanticipated effects occur and whether the Project remains in compliance with any terms and conditions specified in its approval.

## 3.3 DETERMINING SIGNIFICANCE OF RESIDUAL ENVIRONMENTAL EFFECTS

Predicted residual environmental and socio-economic effects of the Project (i.e., effects after implementation of mitigation measures) are set out in Chapter 7 for the identified VCs. Environmental and socio-economic effects, including the potential effects of accidents and malfunctions, are examined at all stages of the Project's life-cycle from construction to operation and maintenance activities. As indicated in Section 3.2.1, there are no plans for decommissioning the Mayo B facilities. The assessment approach looks at both positive and adverse residual effects of the Project and includes full consideration of cumulative effects. As required by YESAA (S. 58), the assessment includes a determination as to whether adverse residual effects are significant, or not significant, and the rationale for this determination.

### 3.3.1 Significance Determination Approach

Environmental and socio-economic effects and their significance are identified and determined using standard assessment practice, the requirements of YESAA, and methodologies set out in the YESAB Assessor's Guides. (YESAB, 2006a; YESAB, 2006b)

Deciding whether a project is likely to cause significant adverse environmental or socio-economic effects is central to the concept and practice of project assessment under YESAA and other assessment legislation. The concept of "significance" in this regard cannot be separated from the concepts of "adverse" and "likely".[9]

Determining "significance" involves scientific (including TK and local knowledge) analysis and interpretation of environmental and socio-economic effects, and consideration of effects of environmental or socio-economic changes caused by the Project on the following (YESAA, s.42):

- The need to protect the rights of Yukon Indian persons under final agreements;
- The special relationship between Indian Yukon persons and the wilderness environment of Yukon; and
- The cultures, traditions, health and lifestyles of Yukon Indian persons and other residents of Yukon.

Mitigation measures and strategies can be important in the assessment of residual effects. Possible mitigation options include (a) integral parts of the Project design and implementation, (b) a specific "no net loss" habitat regeneration measure approved by a specific regulatory authority, and (c) other measures to manage specific risks (including adaptive management strategies that identify and respond in the event of unexpected adverse effects or when mitigation measures may not be effective).

The determination of significance of residual effects may involve comparing such effects against thresholds for environmental components such as specified goals or targets, standards or guidelines, carrying capacity, or limits of acceptable change. Land use objectives and trends may also be utilized to determine significance of residual effects. However, it is recognized in standard assessment practice that the assessment of project effects is often hindered by a lack of specific thresholds.

[9] YESAA S.58, regarding ultimate decisions for an Executive Committee screening assessment of a project. See *Assessor's Guide for the Assessment of Socio-economic Effects*, YESAB, 2006 (sections 11 and 12) on the need to determine significance only for adverse effects. See *Assessor's Guide for the Assessment of Environmental Effects,* YESAB, 2006 (section 2.8) on the relevance of "likely". Also, *Determining Whether a Project is likely to Cause Significant Adverse Environmental Effects: A Reference Guide for the Canadian Environmental Assessment Act (Federal Environmental Assessment Review Office.1994).* The CEAA Guide also notes; "The 'likely' applies to the environmental effects of the project that are both adverse and significant." Notwithstanding differences in wording of YESAA and CEAA on this matter, the ultimate assessment requirement remains to determine significance for effects that are adverse and likely.

Pursuant to standard assessment practice and YESAB Guides, the following criteria were used in the Project Proposal to evaluate the significance of adverse residual environmental and socio-economic effects:

- **Direction or Nature of the Effect:** Positive, neutral, or negative/adverse; in the case of socio-economic effects, as noted in the YESAB Guides, effects may at times be considered to be both positive and negative (see comments below).

- **Magnitude of the Effect** (level of detectability of effect):
  - Low (effect unlikely to be detectable or measurable, or below established thresholds of acceptable change; for some environmental assessments, less than 5% of the VC population or area is affected).
  - Moderate (effect could be detectable within normal range of variation with a well designed monitoring program,[10] or below established thresholds of acceptable change; for some environmental assessments, from 5 to 10% of the VC population is affected).
  - High (effect would be readily detectable without a monitoring program and outside normal range of variation, or exceeds established thresholds of acceptable change; for some environmental assessments, greater than 10% of the VC population or area is affected).

- **Geographic or Socio-Economic Extent of the Effect:**
  - Low (effect extends only within the Construction Footprint Area).
  - Moderate (effect extends beyond footprint and is within the Project Study Region; for socio-economic effects, extends to include the community of Mayo).
  - High (effect extends beyond Project Study Region and is within Yukon, or extends outside Yukon.

- **Duration of the Effect** (how long the effect would last):
  - Low (short-term effects lasting less than one year, or not materially beyond the duration of the construction phase of the Project).
  - Moderate (medium-term effects lasting from 1 to 10 years, or no more that one-generation span of the species affected).
  - High (long-term effect lasting more than 10 years or more than one generation of the species affected; effects lasting throughout a major portion of the operations phase of the Project).

- **Frequency of the Effect** (how often the impact would occur):
  - Low (never, once, seldom).
  - Moderate (occasionally).
  - High (continuously - on a regular basis or at regular intervals).

[10] Implies that effects are statistically significant as determined by such a well-designed monitoring program.

- **Reversibility of the Effect** (is the effect reversible and if so can it be reversed in the short or long term):
  - Complete Reversibility (immediate, or reversible over very short periods i.e., less than one year).
  - High Reversibility (good probability of effect being reversible, periods 1 to 10 years or no more that one-generation span of the species affected).
  - Low Reversibility (Irreversible, or reversible over the period of more than one generation of the species affected).
- **Ecological or Socio-Economic Context** (sensitivity to environmental or socio-economic disturbance, capacity to adapt to change):
  - Low (VC is resilient to imposed change).
  - Moderate (VC has some capacity to adapt to imposed change).
  - High (VC is fragile and has low resilience to imposed change).

The assessment of significance for environmental effects typically can determine a clear overall direction of change (positive, neutral or negative/adverse) for a specific VC, although issues can arise when a specific species or habitat has positive effects in some areas and is harmed in other areas. In contrast, the assessment of significance for socio-economic effects also considers the following:

- The relevance of perceptions in affecting how people view changes;
- Differing perspectives and values among different groups of people about their community and region, as well as their individual and family circumstances; and
- The problems inherent in assessing separately effects on different aspects or components (i.e., different VCs) of people's lives that each contribute to an overall "effect" on any group of people, i.e., effects may be either positive or negative, depending on the people affected, and may be both positive and negative when different groups are affected differently or when different VCs are considered for the same group.

Potential adverse effects that are likely were initially ranked in the Project Proposal based on three of the above criteria: duration, magnitude and geographic or socio-economic extent of the effects. The rating of these likely adverse residual effects used the following definitions:

- **Significant - High Residual Effect:** Effects are long-term (high) duration, large (high) magnitude, and extend beyond the Project Study Region (high geographic or socio-economic extent).
- **Potentially Significant – Moderate Residual Effect:** Effects which fall between "high" and "low" in this list of initial definitions, and thus are "potentially significant" and merit consideration of additional significance criteria. In essence, "moderate" effects are either

- Within the Project Construction Footprint Area (low in extent) and high in both magnitude and duration; or
- Beyond the footprint and into the Project Study Region (moderate in extent) and either high in magnitude (regardless of duration), or moderate in magnitude and high in duration; or
- High in extent (Yukon region or beyond) and either moderate or high in magnitude (regardless of duration).

- **Not Significant or Insignificant - Low Residual Effect:**
  - Low in magnitude (regardless of duration or extent), as the effect cannot be detected; or
  - Low in extent (e.g., footprint of Project) and not high in both magnitude and duration, or
  - Short-term (low) or moderate in duration, and not high in magnitude or extent (i.e., not extend beyond the Project Study Region).
- **Not Significant or Negligible (Insignificant) Residual Effect:** No definable effects at any level or insufficient to be termed a low effect, and generally indistinguishable from project baseline conditions.

**Figure 3-1**
**Potentially Significant and Significant Effects on Environmental or Socio-Economic VCs**[11]

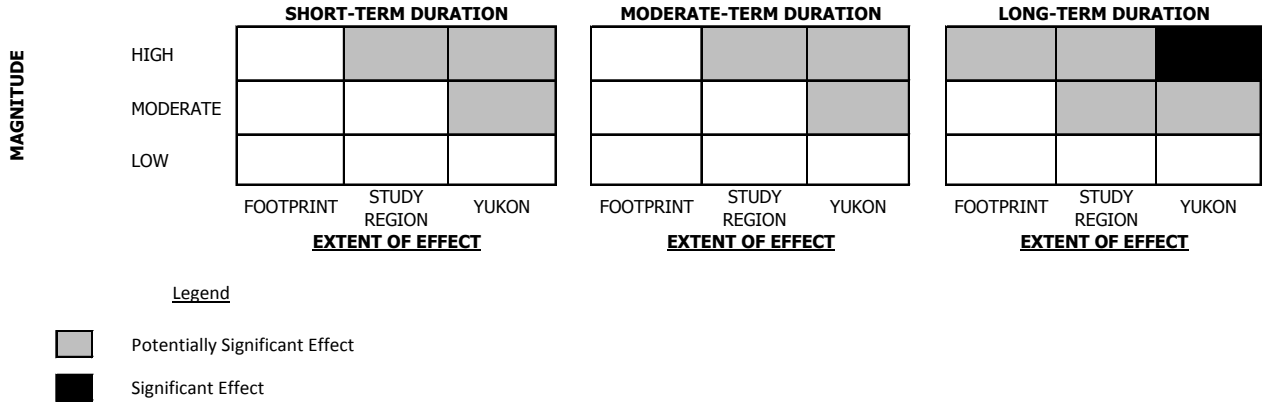


Figure 3-1 above demonstrates that when the criteria of duration, magnitude and geographic extent are applied in order to determine if there are significant or potentially significant effects, there is no practical distinction between effects that are short-term in duration and effects that are moderate-term in duration. Accordingly, to simplify the discussion in Chapter 7, the duration of effects is addressed as being either "short-term" or "long-term".

For "potentially significant" and "significant" effects, initially ranked on the above basis, it is relevant to consider other significance criteria such as frequency, reversibility, and ecological/socio-economic context

[11] In addition to the above criteria, "potentially significant effects" are further assessed in terms of frequency, reversibility, and ecological or socio-economic context (resilience).

or resilience. For example, if an environmental VC is known to be highly resilient (i.e., adaptable and recovers well from disturbance), effects that would otherwise be considered significant could be determined as insignificant, despite magnitude and/or duration or the extent of the effects. Conversely, thresholds or guides may identify highly vulnerable environmental VCs where the loss of even a few individuals may affect the long-term status of the population. For socio-economic VCs, additional factors that may need to be considered include concurrent effects on other socio-economic VCs affecting the same group of people or others in the same community or region, effectiveness of mitigation measures and the degree to which the affected people have any control over mitigation (which may affect "vulnerability" in socio-economic terms), the extent to which the socio-economic component is affected by the Project (magnitude, frequency, reversibility of the effects), and overall confidence in the assessment after consideration of proposed mitigation measures.

In the event that significant adverse effects are predicted for residual effects on VCs, the likelihood is discussed in terms of both the probability of occurrence of the significant adverse effect and the degree of "scientific uncertainty".

Assessment conclusions are supported by technical information, TK and local knowledge based on experience in Yukon and elsewhere. In this regard, TK and local knowledge are addressed on an integrated basis throughout the assessment process.

Deficiencies in the information base about potential effects have been noted and are addressed further in Chapter 8 Follow up Programs.

## 3.4 SOURCES OF INFORMATION

The assessment incorporates original studies commissioned by Yukon Energy specific to the Project, including identification of potential facility design prepared by engineers and scientific and technical reports and papers on topics relevant to the Project, and local knowledge and available experience. Other information sources include meetings with NND resource users, regulatory agencies and existing public and unpublished information.

The assessment process for the Project has emphasized consultation and involvement with potentially affected First Nation of Nacho Nyak Dun, the local community of Mayo, and other interested groups. This consultation and public involvement has provided the Project Proposal with important information with regard to local knowledge, concerns and interests as well as available experience.

Meetings with territorial and federal departments were also held to discuss the status of the environmental and socio-economic studies and provide information to assess ongoing changes to this program.

Detailed literature searches and personal contacts were conducted to identify both published and unpublished information. A list of documents utilized and depended on in this assessment is provided in the reference section in Chapter 10.