5.0 ENVIRONMENTAL ASSESSMENT METHODS

The following Chapter identifies and describes:

- The methods used to scope the environmental assessment and describe baseline conditions,
- The methods used to identify and evaluate potential effects that may result from the proposed ILM Project, and,
- The methods used to identify measures to avoid, reduce or otherwise mitigate or manage those potential effects.

5.1 Scope of Environmental Assessment

The ILM Project EAC Application has been prepared to meet the requirements of the approved May 23rd, 2008 TOR (Section 1.2.2) established through the environmental assessment regulatory process specified by BCEAA. A federal environmental review under CEAA has not been triggered for the Project; however, the methods used and outlined here address the requirements of an environmental screening level review under section 16(1) of CEAA.

The ILM Project environmental assessment considers the potential for:

- Project-related environmental, social, economic, health and heritage effects, and,
- Cumulative effects.

Project-related effects are changes to the biophysical or human environment that are caused by a project and its activities as defined by the scope of the project. Cumulative effects are changes to the biophysical or human environment that are likely to result from the project in combination with other past, present and future projects or activities that have or are likely to occur. The ILM Project EAC Application also considers potential effects on First Nations' interests. The assessment takes into account practical means to avoid or minimize potential effects of the Project through mitigation measures.

Potential issues and effects associated with the Project were identified and scoped through the following methods:

- Development of the Project EAC Application TOR. Draft versions of the TOR were circulated to the TWG comprised of First Nations and regulatory agencies on several occasions for review and comment. The May 31st, 2007 draft version of the TOR also underwent a 30-day public comment period from June 1, 2007 to July 1, 2007. Where warranted, potential issues identified during review and comment on the TOR were incorporated into the scope of the assessment. All written comments on the draft TOR were formally recorded in tabular "Issues Tracking" documents, representative of comments provided by regulatory agencies, First Nations and the public, and including BCTC's responses. BCTC provided rationalization for where comments provided by the various stakeholders did not result in changes to the TOR.

- Development of discipline-specific workplans describing the proposed scope and methodology of each component assessment. The draft workplans were circulated to the TWG for review and comment during its February 21, 2007 meeting. Where warranted, potential issues identified during review and comment on the discipline-specific workplans were incorporated into the scope of the assessment. Comments on discipline-specific workplans received from the TWG were tracked similarly to those for the TOR, although amendments were made internally and subsequent revisions were not circulated to the TWG;

- Ongoing consultation with First Nations, the public and regulatory agencies (Chapter 2.0). Potential issues or concerns were identified throughout the development of the EAC Application and were incorporated, where warranted, into the scope of the assessment; and

- Interviews with First Nations in the local study area and regional and municipal government representatives to identify perceived potential Project-related socioeconomic effects and gather baseline information.

Potential effects of the Project were considered and evaluated through completion of the following component assessments, including:

- Fisheries and Aquatic Habitat;
- Terrestrial Wildlife and Vegetation;
- Geotechnical and Natural Hazards;
- Surface Water Hydrology and Groundwater;
- Urban Land Use;
- Agriculture Land and Resource Use;
- Forest Land Use;
- Land and Resource Use;
- Visual Quality;

- Contaminate Sites;
- Socioeconomics;
- Air Quality;
- Noise;
- Radio Interference (RI);
- Electric and Magnetic Fields (EMF);
- Heritage Resources; and,
- Public Health.

The scope, potential issues identified and methodologies for the assessments and reports are specifically defined in discipline-specific technical reports appended to this Application as Appendices C through T. Issues raised by First Nations, the public, and regulatory agencies during consultation activities associated with the Project are summarized in Chapter 2.0.

Navigation and First Nations Interests were also considered during the environmental assessment process. However, discipline-specific reports were not prepared for these components. The First Nations Interests section (Section 6.17) was based on results of the HROA, other discipline-specific assessments, and consultation with First Nations. Potential effects of the Project on navigation are described and evaluated in Section 6.5 of the Application. Due to limited interactions anticipated between navigation and the proposed Project, no discipline-specific report was prepared.

The Project-specific biophysical and human environmental effects assessments for the ILM Project involved procedures to:

- Scope the overall assessment through development of the TOR;
- Define the parameters used to characterize the Project-related effects and cumulative effects for each biophysical and human environmental effects assessment;
- Evaluate the existing environment that may be affected by the ILM Project (baseline conditions);
- Identify the potential Project-related environment interactions and the potential effects of those interactions;
- Determine practical mitigation measures to avoid, reduce, mitigate or otherwise manage identified potential effects;

- Evaluate and characterize the potential residual Project-related effects of the ILM Project (*i.e.*, effects remaining after application of mitigation measures) on each of the biophysical and human environmental effects for each Project development phase (construction, operations / maintenance);

- Scope, evaluate and characterize potential cumulative effects in terms of other projects and activities with corresponding residual effects that overlap in space and time with the predicted residual effects of the ILM Project, while taking into account proposed mitigation measures;

- Determine the significance of Project-related and cumulative residual effects; and,

- Identify monitoring and follow-up programs required to assess mitigation effectiveness and implement adaptive management measures, as required.

The Project-specific effects assessment focused on Valued Ecosystem Components (VECs) and Valued Social Components (VSCs) scoped by biophysical and human environment discipline leads, respectively, and are incorporated in the TOR (Table 5.1).

VEC / VSC were scoped and identified based on:

- Focus and identification of the issues of greatest concern and relevance to the Project associated with the biophysical conditions and cultural/socioeconomic (human) resources of the Project area;

- Identification of measurable parameters to assess Project-related effects and cumulative effects for each VEC / VSC;

- Regulatory requirements and issues raised by First Nations, the public and interested stakeholders;

- Assessment of spatial and temporal boundaries; and,

- Integration of the cumulative effects assessment into the overall assessment of Project-related residual environmental effects.

VECs (*e.g*. climate, extreme floods, fisheries and wildlife habitats, etc.) and VSCs (*e.g*. existing urban land use, employment and business opportunities, etc.) for the ILM Project were identified based on a combination of the above factors. The rationale for identification and selection of social and ecosystem components are discussed in the biophysical, social and cultural environment discipline reports appended to this Application (Appendices C through T).

TABLE 5-1: Valued Ecosystem Components (VECs) and General Methods of the Assessment Study Disciplines

	Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
1	Fisheries and Aquatic Habitat (Appendix C)	Coho salmon; Chinook salmon; Pink salmon ; Kokanee/sockeye salmon; Steelhead; Chum salmon; Coastal cutthroat trout; Bull trout; Rainbow trout Dolly Varden; and Salish sucker.	Fish species are appropriate "sentinels" for the overall aquatic system. A total of 37 fish species were identified that may be present within the Project area. It is not practical to identify and evaluate all fish species as VECs (Hill et al. 2006). A sub-set of VECs was selected that ranked the highest through screening by the following attributes: – Distribution within the Project area; – Regulatory status; – Selectivity of habitat requirements; – Position in the food chain; – Commercial and economic importance; – Recreational importance; and – Availability of information.	Information collected during a review of background data and reports and a field sampling program were used to assess potential adverse effects of the Project on VECs. It is difficult in most cases to directly measure changes in total populations of individual fish species because it is rarely possible to acquire sufficient data to assess the effects on each VEC separately. Instead, Project effects are typically measured on key indicators known to affect fish populations (Treweek 1999). For the purpose of this assessment, potential changes in the availability, quality, and quantity of fish habitat are used as the key VEC indicators.
2	Terrestrial Wildlife and Vegetation (Appendix D)	Terrestrial wildlife species/ subspecies, vegetation species/ subspecies, and rare ecological communities. Previously defined spatially constrained boundaries (e.g., Wildlife Habitat Areas [WHAs], Special Resource Management Zones [SRMZs] etc.) were also considered VECs.	• Provincially Red- (endangered or threatened) or Blue-listed (special concern) taxa; • Taxa listed under the provincial Integrated Wildlife Management Strategy (IWMS); • Taxa listed under the federal *Species at Risk Act* (SARA); • Regionally Important Wildlife; and • Migratory birds whose known range overlaps the Project study area.	The VEC list was refined based on a detailed analysis of the habitats present (according to the Project habitat mapping) and based on input from First Nations and from regional, provincial, and federal government agencies. A combination of literature review, habitat mapping, and directed field observations were used to determine the expected occurrence of VECs within the Project study area, as well as to assess the amount and spatial distribution of suitable habitat for those VECs.

Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
Geotechnical and Natural Hazards (Appendix E)	Slope Stability	Access road construction and ROW clearing can increase the chances of landslides.	The natural hazards analysis relied largely on stereoscopic analysis of current and historical air photos of the proposed transmission line corridor. Besides air photo interpretation, a helicopter overflight and selected ground traverses were used to evaluate and validate natural hazard conditions along the transmission corridor. Geotechnical assessments included review of the information collected during the air photo analysis and field traverses. Limited ground-based field checking (visual inspections) was undertaken at select locations to examine the foundation ground conditions in weak and / or compressible soil areas.
	Anchors and Foundations (Soil and Rock)	Inappropriate design and construction may result in tower movements.	
	Acid Rock Drainage (ARD) and Metal Leaching (ML)	Weathering and oxidation of certain bedrock may affect aquatic resources.	
	Earthquakes	Could induce liquefaction, and fault ruptures.	
	Snow Avalanches	Clearing may create new trigger zones.	
	Climate	May increase storm event frequency.	
Surface Water Hydrology and Groundwater (Appendix F)	Annual Hydrograph	Clearing may alter runoff rates.	The surface water hydrology component of the water resources assessment consisted of identification and mapping of watersheds, water licenses, and Points of Evaluation (PoE) along the Project corridor, a representative field sampling program, and a regional analysis to quantify potential changes to the surface water regime anticipated as a result of the Project. The groundwater component of the water resources assessment was based on existing information pertaining to the groundwater PoEs (i.e., water supply wells and aquifers). Due to the availability of existing data, a concurrent field program was not required for the groundwater component of the study.
	Base Flow and Extreme High Flow	Clearing may alter contribution of base flows and extreme event runoff to watercourses.	
	Water Quality (Suspended Sediments)	Construction activities may increase the in Total Suspended Solids (TSS) in receiving waters, reducing the clarity and quality.	
	Water Quality (Chemical Spills)	Accidental release of chemicals may alter clarity and quality of runoff and base flow.	
	Groundwater Hydraulic Regime	Construction may alter infiltration rates and local groundwater.	
Navigation (Chapter 6.5)	Navigation	Construction and/or presence of transmission infrastructure and/or access road bridges may interfere with waterway and/or aircraft navigation.	Watercourses were initially deemed potentially navigable if the gradient was ≤ 10%, width was ≥ 3 m, and the watercourse was mapped on 1:20 000 TRIM. Classifications were confirmed through a helicopter overflight with J. Mackie, Transport Canada.

	Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
15	Urban Land Use (Appendix G)	Existing urban land uses	Project components may cause a disruption of, or change in, existing land use activities within the Study Area.	Relevant issues identified within each Project component were identified and grouped into three VSCs, selected because they represent the urban land use elements that have the clearest potential to be affected by the Project. Each VSC was reviewed by BCTC's ILM Project Team and validated by potentially affected local governments within the Study Area. Urban land uses along the Project corridor were identified based on information and data provided by BCTC's ILM Project Team, a review of relevant literature (i.e. Official Community Plans [OCPs], zoning bylaws), interviews with each of the potentially affected local governments, professional judgement, and field studies.
16		Future urban land uses	Project components may cause a disruption of, or change in, potential future land use activities within the Study Area and/or may affect a local government's ability to implement its future land use plans within the Study Area.	
17		Access to urban land uses	Project components may result in changed access to land.	
18	Agricultural (Appendix H)	Agricultural production	Construction and operations phases could result in losses of agricultural production.	Base mapping, literature review, consultations and field surveys were conducted to identify agricultural VECs potentially affected by Project construction and operation.
19		Soil disturbance and compaction	Possible long-term effects on crop production and/or range productivity.	
20		Drainage and irrigation works	Possible long-term effects on crop production.	
21		Livestock movement and watering facilities	Altering livestock movement patterns and watering facilities may compromise the effective use of range resources.	
22		Invasive plant species	Possible introduction or proliferation of invasive plant species.	
23		Biosecurity and livestock health	Possibly jeopardize biosecurity (i.e., control of plant and animal pests and diseases, etc.)	
24		Farm worker safety	Increased traffic during construction and an increased risk of stray voltages.	

	Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
25	Forestry Land Use (Appendix I)	Timber Harvesting Land Base (THLB), total forested area, old forests, Old Growth Management Areas (OGMAs), Spotted Owl SRMZs, WHAs and other designated reserves.	Removal of productive forest land has a quantifiable effect on the regional and provincial annual timber harvest. Project-related removals from constrained areas may result in corresponding removals or alienation of the THLB for management reserves in other parts of the Timber Supply Areas.	The Vegetative Resource Inventory (VRI) was used to identify areas of concern along the Project corridor. Spot field surveys were also conducted to verify the data within the VRI. MoFR District, Regional and Provincial level planning documents related to the study area were collected during consultation meetings and reviewed. Relevant agencies and industry associations were consulted in the course of the Assessment to validate the selected VECs, discuss the assessment parameters described above, and generally to solicit their input.
26	Land and Resource Use (Appendix J)	Parks and protected areas	Provincial parks, ecological reserves, regional parks, and designated greenways.	Baseline conditions were established through review of information provided by the client, through sourcing and reviewing other pertinent data and literature, and through limited field reconnaissance. Field surveys enabled ground-truthing of the initial results of the desktop investigations and targeted VECs in locations where desktop investigation indicated there was a likely interaction with the Project. A variety of base mapping products and other documentation was collected and reviewed to determine potential interactions between the Project and land and resources uses along the Project corridor.
27		Designated forest recreation sites	Campground and day use areas, interpretive sites, and other features.	
28		Other public recreation areas	Trail systems and associated staging areas for public access to Crown land and water resources used for recreation.	
29		Other Crown land having tenure	Commercial recreation activity (e.g. guided tours); hunting guide-outfitting; trapping; and mineral development.	
30	Visual Quality (Appendix K)	Visual Quality	Visual quality could potentially be adversely affected by the presence of transmission infrastructure and cleared ROW.	Visual quality was assessed based on the line of sight of the Project corridor from local infrastructure within the viewshed. A photo survey was conducted at key viewpoints and from other viewpoints of potential importance. Perspective images were rendered from a landscape model for key viewpoints. The rendered images were assessed based on the Visual Impact Assessment Guidebook (MoFR 2001).

Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
Contaminated Sites (Appendix L)	Soil	The quality of these VECs may be affected by historical or current operations and activities, and/or future activities or operations associated with Project development.	Areas of Potential Environmental Concern (APECs) along the Project corridor and immediate surroundings were identified based on a literature review and plotted on a series of maps to facilitate the identification of applicable land use guidelines and standards for these locations. Site visits were conducted to visually corroborate indications of possible contaminated materials. Soil sampling was also undertaken at select locations.
	Groundwater		
	Surface Water		
	Sediment Quality		
Socioeconomics (Appendix M)	Employment Opportunities	Creation of jobs during the construction phase.	The socioeconomic assessment included the development of baseline maps, a literature review, and the collection and analysis of secondary and primary data from key sources and from informant interviews. Discussions were conducted with BCTC, BC Hydro, regional and municipal governments and First Nations' representatives. An input output model was run to calculate direct and indirect economic benefits.
	Business Opportunities	Procurement of local suppliers required for construction of the Project.	
	Revenue generation	For local Governments from income, property, and sales taxes and for First Nations from Benefits Agreements.	
	Local Housing / Accommodation	Increased demand for accommodations has the potential to generate revenue for local accommodation businesses. Temporary influx of construction workers can lead to temporary pressures on accommodation availability and cost.	
	Health and Emergency Services	Construction can affect the capacity and cost of local services and facilities.	
	Income	Short term income generating opportunities could contribute to the general well-being of individuals, families and communities.	
	Transportation and Traffic	Construction/operations/maintenance activities cause temporary road closures, and detours, disrupt transportation patterns and property and land access.	
	First Nations Way-of-Life	First Nations are concerned about potential effects of the Project on their way of life.	

	Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
43	Property Valuation (Appendix T)	Property Values	Presence of transmission infrastructure and/or cleared ROWs may adversely affect property values	A literature review and analysis of previous studies on the effects of transmission lines on property values was conducted.
44	Air Quality (Appendix N)	Acceptable air quality	Emissions from fuel combustion and fugitive dust caused by construction activities could affect air quality.	Analysis of baseline conditions was based on existing regional air emission sources from the Emission Inventory for the Lower Fraser Valley Airshed (Metro Vancouver 2007) and the Province of British Columbia provincial emissions database (MWLAP 2005). Air emissions from the Project construction phase were quantified and compared to existing baseline emissions.
45	Noise (Appendix O)	Public annoyance from Project related noise.	Construction activities such as equipment operations, blasting and use of helicopters could potentially result in increased noise levels that may lead to public annoyance.	The assessment of potential changes in noise levels associated with the Project was accomplished by identifying potential noise receivers along the Project corridor, establishing baseline noise levels at potential receptors, determining the amount of sound generated by Project activities, and calculating the distance from Project-related noise within which receivers would experience annoyance noise levels over relevant baseline or criteria noise levels.
46	Radio Interference (RI) (Appendix P)	AM radio and television transmitters and receivers, hospitals, rail lines, private dwellings, pipelines and communication installations.	RI levels associated with the Project may affect one or more of the VECs along the Project corridor.	Extensive research, field measurements and calculations were conducted to identify and evaluate the Project's potential effects on RI levels.
47	Electric & Magnetic Fields (EMF) (Appendix Q)	EMF	EMF levels are a considerable concern associated with high voltage transmission lines, mostly related to potential effects on human health (see below).	EMF baseline levels and levels with the addition of the proposed Project were assessed through the results of measurement, modeling and simulation. A literature review of potential health effects related to EMF was conducted as part of the Public Health assessment (see below).

	Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
48	Heritage Resources (Appendix R)	Heritage Resource Values	Construction and operation of the Project could directly or indirectly affect archaeological, historical or palaeontological resources along the corridor.	An HROA was completed that summarized the results of background and archival research, discussions with First Nations, GIS archaeological predictive modelling, and preliminary field reconnaissance to identify locations in the Project area where previously recorded archaeological resources have been identified and to assess the potential of the Project area to contain unidentified archaeological resources. Archaeological predictive models from the Stó:lō Research and Resource Management Centre (representing Stó:lō Nation), Nicola Tribal Association Research (representing Nooaitch, Nicomen, Shackan First Nations) and Esh-Kn-Am (representing Coldwater, Cooks Ferry and Siska First Nations) were eventually incorporated into the Project archaeological modeling results. An AIA of the transmission line ROW and the RYC capacitor station site was undertaken under a HCA permit with First Nation participation in areas identified in the HROA as having high to moderate potential to contain archaeological resources that could potentially be affected by the proposed Project.
49	First Nations Interests	Disruption of community way of life	Concern that the ILM Project would adversely affect the community's overall quality and way of life, culture and traditional practices	The First Nations Interests assessment was based on results of the HROA, the AIA, other discipline-specific assessments, and consultation with First Nations.
50		Disruption or disturbance to archaeological sites	Potential loss and/or alteration of traditional lands and resources.	
51		Disruption of watercourses and fish bearing streams	Potential loss and/or alteration of traditional lands and resources.	
52		Loss of vegetation, habitat and wildlife	Potential loss and/or alteration of traditional lands and resources; disruption of berry gathering areas.	

	Discipline	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
53		Erosion and run-off	Potential loss and/or alteration of traditional lands and resources (fish, wildlife, plant resources).	
54		Landslides	Potential loss and/or alteration of traditional lands and resources (fish, wildlife, plant resources).	
55		Noise	Concern over blasting around traditional use and cultural sites during construction.	
56		Transportation and traffic disruption	Concern that construction traffic and other related activities may cause disruption.	
57		Public health	Concern that reduced consumption of medicinal and food resources, and perceived effects of EMF may have negative impacts on health.	
58		Employment and business opportunities	Local employment opportunities that would enable First Nations members to continue to live on or close to the Reserve; training opportunities; joint-venture/partnership opportunities.	
59	Public Health (Appendix S)	Public Health	Comments brought forward in the evaluation of the Draft TOR by regulatory agencies, the general public and First Nations indicated a preference for Public Health issues to be addressed holistically in a single report rather than individually within discipline-specific reports.	Existing conditions were characterized based on data collected and assembled by the audible noise and RI, air quality, contaminated sites and water quality and supply technical disciplines. The potential affects of construction and operation on existing conditions, which could affect public health, were then assessed. A literature review of potential health effects related to EMF was also conducted as part of the Public Health assessment.

Potential Project-related effects and cumulative effects were considered relative to the sequence of Project development activities, including construction (2009 to 2014) and operation/maintenance (> 50 years) of the proposed ILM Project transmission infrastructure. Changes to any potential environmental effect as a result of implementation of practical mitigation measures and environmental management programs were incorporated into the assessment. The long-term nature (> 50 years) of the operation / maintenance phase of the ILM Project precludes the evaluation of the decommissioning phase during this environmental assessment.

Potential residual Project-related effects were characterized using VEC / VSC ratings, including the following factors as determined for each biophysical and human environmental assessment discipline (Section 5.4):

- Magnitude;
- Geographic extent;
- Duration;
- Frequency;
- Reversibility; and,
- Significance of the effect, *etc*.

Potential cumulative effects between the ILM Project and other projects and activities were assessed based on whether:

- A potential Project-related residual effect was moderate or high;
- The other project or activities have a spatial and temporal overlap with the ILM Project;
- A potential Project-related residual effect is likely to act in a cumulative manner with other past, present and likely projects or activities (cumulative effect); and,
- A cumulative effect has the potential to negatively affect a given VEC / VSC.

5.2 Assessment Area Boundaries

Environmental assessment boundaries were established both spatially (geographic) and temporally (time frame) for each technical discipline (Table 5-2).

Administrative boundaries for the ILM Project were established by scientific and social information limitations for biophysical and human environment resources, as well as provincial and federal regulatory requirements. These boundaries are specific to each technical discipline and are defined within the individual discipline specific technical reports appended to this Application (Appendices C through T).

5.2.1 Spatial Boundaries

Spatial boundaries were established based on the zone of Project influence, beyond which the potential environmental, human, cultural and socio-economic effects of the Project are expected to have no significant affect on each VEC and VSC (Table 5.2).

Study areas of an appropriate size to determine potential effects of the Project were established for each of the biophysical and human environment assessment disciplines, based on:

- The potential zone of influence for Project-related activities, environmental features and characteristics in the vicinity of the Project, and,
- The anticipated interactions between the social and ecosystem component values and the Project activities.

Study areas for the biophysical components of the environmental assessment were designated within the immediate freshwater and terrestrial Project footprint and adjacent areas. This is the area where potential Project-related disturbances would occur during the construction and operation phases. Spatial areas for several of the human / social environmental assessment disciplines are larger in scope, encompassing an area broader than the immediate footprint of the Project in order to consider potential effects of the Project on factors such as existing land uses (residential, agricultural, institutional, commercial, parkland), employment, visual quality and viewsheds, and public health.

Maps of spatial boundaries are included in the discipline-specific technical reports appended to this Application, as indicated in Table 5.2.

5.2.2 Temporal Boundaries

Temporal boundaries for the effects assessment were established for:

- Baseline or existing conditions prior to the ILM Project construction;
- Project construction conditions (2009 to 2014); and,
- Project operation and maintenance conditions (> 50 years).

BCTC's proposed tendering and construction schedule for the Project is included in Chapter 4.0 of this Application, with construction anticipated to commence in 2009 and be completed in 2014. The construction process for the entire Project may be longer than 5 years, although it is anticipated that the maximum duration of construction disturbance at any specific location would be four years. Consequently, several of the individual discipline-specific assessments have assumed a four year time period for construction. Based on a minimum 50 year lifespan of the infrastructure, the Project would terminate at the earliest in 2064. Therefore, the temporal scope of the ILM Project is from 2009 to 2064. Many transmission lines with proper maintenance exceed the minimum lifespan.

TABLE 5-2: Spatial and Temporal Environmental Assessment Boundaries for the ILM Project

	Discipline	Spatial Boundaries	Temporal Boundaries
1	Fisheries and Aquatic Habitat (Appendix C)	100 m of watercourse length within the Project corridor Based on site conditions, habitat assessments were extended up to 100 m upstream and 500 m downstream from the corridor.	Construction Phase: 5 years (2009-2014) Operation Phase: 50 years
2	Terrestrial Wildlife and Vegetation (Appendix D)	1,000 m on either side of the ILM Project corridor.	Construction Phase: 4 years Operation Phase: 50 years
3	Geotechnical and Natural Hazards (Appendix E)	On moderately to steeply sloping hillsides, the natural hazards assessment included the terrain from the height of land above to the valley floor below the alignment. On gently sloping upland surfaces, the assessments were limited to a zone 200 to 300 metres wide on either side of the alignment.	Construction Phase: 5 years (2009-2014) Operation Phase: 50 years
4	Surface Water Hydrology and Groundwater (Appendix F)	The physical extent of the study area for the assessment of surface water and groundwater included the entire watershed and aquifer areas up-gradient and approximately 9 km down-gradient of the Project footprint.	Construction Phase: 4 years Operation Phase: 50 years
5	Navigation (Section 6.5)	Transmission line or access road crossings of navigable watercourses along the Project corridor.	Construction Phase: 5 years (2009-2014) Operation Phase: 50 years
6	Urban Land Use (Appendix G)	500 m on either side of the ROW or Project corridor.	Construction Phase: 5 years (2009-2014) Operation Phase: A 20-year time horizon was chosen to reflect the typical scope of local government long range planning, including documents such as OCPs.
7	Agricultural Land and Resource Use (Appendix H)	Individual properties that are within the ALR or zoned for agricultural use and range tenure areas which are crossed by the Project corridor, and other properties or range tenure areas which may be affected by access during construction.	Construction Phase: 4 years Operation Phase: 50 years

	Discipline	Spatial Boundaries	Temporal Boundaries
8	Forestry Land Use (Appendix I)	The area of Crown forest land within the Project corridor.	Construction Phase: 5 years (2009-2014) Operation Phase: 50 years
9	Land and Resource Use (Appendix J)	Crown land within the Project corridor and other Crown lands within 200 m of the Project corridor.	Construction Phase: 4 years Operation Phase: 50 years
10	Visual Quality (Appendix K)	All areas within 8 km of the Project corridor that may have a foreground or middle ground view of the ROW clearing, transmission line and associated transmission structures.	Construction Phase: 4 years Operation Phase: 100 years
11	Contaminated Sites (Appendix L)	500 metres on each side of the centre line of the Project corridor.	Baseline: Review of historical information for the last 50 to 75 years Construction Phase: 5 years (2009-2014) Operation Phase: 50 years
12	Socioeconomic (Appendix M)	Defined by provincial, regional, and local government administrative areas and First Nations territorial boundaries. Regional study area comprises the TNRD, the FVRD and Metro Vancouver. The local study area comprises six municipalities and one unincorporated community along the Project corridor. The First Nations study area includes the 67 First Nations listed in the EAO Section 11 Order, with emphasis placed on core First Nations. A sub-set of First Nations was selected where one of their reserves was within 1 km of the Project corridor, and/or a proposed access road passes through one or more of the First Nation's reserves[1].	Construction Phase: 7 years (2009-2016), including design and materials acquisition Operation Phase: 50 years
13	Property Valuation (Appendix T)	Properties encumbered by the existing and proposed ROWs along the ILM Project corridor, and those sufficiently close to be affected by their presence.	Construction Phase: 5 years (2009-2014) Operation Phase: 50 years

[1] Although considered within the spatial boundaries of the assessment, the preferred alignment was designed to avoid any use of access roads through First Nations Reserves.

	Discipline	Spatial Boundaries	Temporal Boundaries
14	Air Quality (Appendix N)	5 km on either side of the Project corridor.	Construction Phase: 4 years (2010-2014) based on activities that could potentially result in air emissions Operation Phase: 50 years
15	Noise (Appendix O)	A regional study area 3 km on either side of the Project corridor was used to identify potential receivers. A local study area 500 m on either side of the Project corridor was established based on the location of the receivers nearest the ROW.	Construction Phase: 4 years Operation Phase: 50 years The temporal study boundary for the assessment of construction noise focused on the expected duration of specific activities within 3 km of a receiver. In most cases, activity along the ROW would not be expected to last for more than a few weeks during any particular construction stage. Contrary to specific construction activities, marshalling yards would generate noise which would be expected to last for much of the construction period.
16	Radio Interference (Appendix P)	The area covered by two transmission towers and up to 200 m on either side of the transmission line.	Regular transmission system operation and maintenance scenarios were considered.
17	Electric and Magnetic Fields (Appendix Q)	ROW limits of selected cross-sections based on the guidelines provided by national and international standards.	Regular transmission system operation and maintenance scenarios were considered.
18	Heritage Resources (Appendix R)	For the HROA, a regional study area 500 m on either side of the centre line of the proposed Project corridor was used. For the AIA, a 100 m width was assessed where the new transmission line parallels the existing transmission line, and a 150 m width was assessed where new transmission line ROW is proposed. One proposed capacitor station location was assessed: RYC.	Regular transmission system construction, operation and maintenance scenarios were considered. Construction Phase: 5 years (2009-2014) Operation Phase: 50 years

	Discipline	Spatial Boundaries	Temporal Boundaries
19	First Nations Interests	The First Nations consulted in respect of the ILM Project included 60 First Nations and 7 Tribal Councils or Associations, as identified in Schedule B of the Section 11 Order. Some First Nations have communities or Reserves in close proximity to the ILM Project, while for other First Nations, the main community or closest Reserve is over 100 km away from the ILM Project. The assessment spatial boundaries vary by discipline considered within the context of specific potential effects to First Nations.	Based on disciplines considered within the assessment of potential effects of the Project on First Nations Interests, typically: Construction Phase: 4 years Operations Phase: 50 years
20	Public Health (Appendix S)	Residents and recreational users (human receptors) within the Project corridor. The assessment boundaries vary by discipline considered within the public health assessment and are addressed individually (i.e. air quality, noise, contaminated sites, hydrology, and EMF).	Based on disciplines considered within the public health assessment, typically: Construction Phase: 4 years Operation Phase: 50 years

5.3 Identification of Project – Environment Interactions

An issues and Project-environment interactions table was developed to help identify areas of potential interaction between Project components or activities and the biophysical and human environment. The table - matrix considers potential effects that may arise during construction, and operation / maintenance activities, as well as accidental events consistent with the requirements under CEAA. A detailed evaluation of the potential effects of decommissioning was not undertaken as part of this assessment due to the long-term nature of the operational phase of the ILM Project (>50 years). It is anticipated that a separate environmental assessment would be required prior to any eventual dismantling or decommisioning to evaluate potential effects, based on resource values, public interests and legislative requirements at that time. Potential interactions associated with decommissioning of the Project are generally expected to be similar to those during the construction phase of the Project, although newly-disturbed areas would not likely be associated with the decommissioning phase.

For each major Project component or activity during the construction and operations / maintenance phases, potential Project-environment interactions between each activity and each component of the biophysical, social or cultural environment were ranked as:

- ● Likely interaction, potential effects to be assessed,
- ○ Limited interaction, no potential effects anticipated, or
- n/a No interaction, no potential effects.

The Project-environment interaction matrix (Table 5.3) was used by each biophysical and human environment discipline to identify the Project components and activities that would most likely affect VECs / VSCs. Professional judgment of the assessment team, information from relevant literature and other environmental assessments, information provided by the BCTC and BC Hydro Project team and comments from First Nations, regulatory agencies and interested stakeholders were used to identify the extent of the potential effects and anticipated interactions between Project activities and technical disciplines and issues of concern. Where existing knowledge indicated that an interaction was likely to result in no effect or a minimal effect, the issue would usually not warrant further assessment. Issues ranked as a “likely interaction” were evaluated for potential effects in the context of the Project activity. A complete set of Project-environment interaction matrices is provided within the individual discipline specific technical reports appended to this Application (Appendix C through T).

TABLE 5-3: ILM Project-Environment Interaction Matrix

	Project Activities and Physical Works	Fisheries and Aquatic Habitat	Wildlife and Vegetation	Geotechnical / Natural Hazards	Water Resources	Navigation	Urban Land Use	Agriculture	Forestry	Land and Resource Use					Visual Quality	Contaminated Sites	Socioeconomics	Property Valuation	Air Quality	Noise	Radio Interference	EMF	Heritage Resources	First Nations Interests	Public Health
										Public Recreation	Commercial Recreation	Hunting Guide	Registered Traplines	Mineral Tenure											
1	**Construction**																								
2	Access road improvements/ construction	●	●	●	●	n/a	●	●	●	●	○	●	●	●	●	●	●	n/a	●	●	n/a	n/a	●	●	●
3	Surveying and siting operations	○	●	n/a	●	n/a	●	●	●	●	○	○	n/a	n/a	n/a	○	●	n/a	●	○	n/a	n/a	●	●	○
4	Watercourse crossing improvements/construction	●	●	●	●	●	●	●	●	●	●	○	○	○	●	●	●	n/a	n/a	○	n/a	n/a	●	●	●
5	Right-of-way clearing and preparation	●	●	●	●	n/a	●	●	●	●	○	●	●	○	●	●	●	n/a	●	●	n/a	n/a	●	●	●
6	Foundation construction and anchor installation, including site preparation	●	●	●	●	n/a	●	●	●	●	○	●	○	○	○	●	●	n/a	●	●	n/a	n/a	●	●	●
7	Concrete production and placement	●	●	○	●	n/a	●	●	○	●	○	○	○	○	○	●	●	n/a	●	●	n/a	n/a	n/a	●	●
8	Overhead structure assembly and placement	○	●	n/a	○	n/a	●	●	●	●	○	○	○	○	●	○	●	n/a	●	●	n/a	n/a	n/a	●	○
9	Substation improvements	○	●	○	○	n/a	●	n/a	●	○	n/a	○	○	○	●	●	●	n/a	●	○	n/a	n/a	●	●	○
10	Series capacitor station construction, site preparation and access	●	●	○	○	n/a	●	n/a	●	●	○	●	●	○	●	●	●	n/a	●	●	n/a	n/a	●	●	●
11	Stringing of 500 kV conductors	○	●	n/a	○	●	●	●	●	●	●	○	○	○	○	○	●	n/a	●	●	n/a	n/a	n/a	●	○
12	Construction waste management	n/a	●	n/a	n/a	n/a	●	●	●	●	○	●	●	○	○	●	●	n/a	●	○	n/a	n/a	n/a	●	●
13	Right-of-way restoration	n/a	●	●	●	n/a	●	●	●	●	○	●	●	●	●	○	●	n/a	●	○	n/a	n/a	●	●	○
14	Deactivation of temporary access	●	●	●	●	n/a	○	●	●	●	○	●	●	●	○	○	●	n/a	●	n/a	n/a	n/a	n/a	●	●
15	Vehicle traffic	○	●	n/a	○	n/a	○	●	●	●	○	●	○	○	○	○	●	n/a	●	●	n/a	n/a	○	●	○
16	Construction and equipment servicing	○	●	n/a	●	n/a	○	●	●	○	○	○	○	○	○	●	●	n/a	●	○	n/a	n/a	○	●	●
17	Testing and commissioning	○	○	n/a	n/a	n/a	●	○	○	n/a	n/a	n/a	n/a	n/a	○	○	●	○	n/a	n/a	n/a	n/a	n/a	●	n/a
18	**Operations / Maintenance**																								
19	500 kV transmission system operation	○	●	n/a	n/a	●	●	○	●	●	○	○	○	○	●	○	●	●	○	●	●	●	○	●	○
20	Vegetation maintenance	●	●	○	●	n/a	●	●	●	●	○	○	○	○	○	●	●	●	○	○	n/a	n/a	○	●	○
21	Overhead structure maintenance	○	●	n/a	n/a	n/a	●	●	●	○	n/a	n/a	n/a	n/a	○	○	●	n/a	○	○	n/a	n/a	○	●	○
22	Substation/ capacitor station maintenance	○	●	n/a	n/a	n/a	●	n/a	●	n/a	n/a	n/a	n/a	n/a	○	●	●	n/a	○	○	n/a	n/a	○	●	○
23	Access road maintenance	●	●	●	○	○	●	●	●	●	○	●	●	●	○	○	●	n/a	○	○	n/a	n/a	●	●	○
24	Equipment and materials storage at stations facilities	●	●	n/a	n/a	n/a	○	n/a	○	n/a	n/a	n/a	n/a	n/a	○	●	●	n/a	n/a	n/a	n/a	n/a	○	●	n/a

n/a= No Interaction ○=Limited Interaction, not considered further in EA ●=Interaction, considered in EA

5.4 Assessment of Environmental Effects

Project-environment interactions and potential effects are based on a prediction and evaluation of potential changes (effects) to identified VECs and VSCs directly associated with construction and operation / maintenance of the ILM Project as described in Chapter 4. Potential effects arising from the ILM Project combined with other past, present and likely projects or activities (cumulative effects) are also assessed in the cumulative effects assessment (Chapter 10).

Potential effects of Project-environment interactions are summarized and discussed in Chapter 6 and are described in each of the effect assessment studies found within the individual discipline specific technical reports appended to this Application (Appendices C through T). The discipline specific technical studies use a variety of methods to identify potential Project-related effects including, but not limited to, literature and background data-information reviews, inventory mapping through remote sensing and field assessments, and computer modelling.

Potential Project-environment effects were identified related to Project planning and route selection (Chapter 3) in order to avoid impacts on the specific VECs and VSCs being considered. If potential Project-environment effects could not be avoided through planning and design, measures were developed to mitigate potential effects on VECs and VSCs during construction, operation and maintenance as discussed in Section 5.5 below, and described within the individual discipline specific technical reports appended to this Application (Appendices C through T). Mitigation measures considered include: environmental protection measures, BMPs and protocols; site-specific measures (*i.e.*, timing of Project activities to avoid sensitive periods (biological); and contingency measures to address accidents and malfunctions that could affect the environment).

Potential residual effects were identified and determined for biophysical and human environment components by reviewing potential effects that remain after applying mitigation and compensation measures for each Project development phase (construction, operations / maintenance). The importance (significance and likelihood) of residual effects after mitigation were determined based on the assessment of environmental effects relative to clearly established thresholds and standards. The methods used to determine the significance of environmental residual effects are described below in Section 5.6 and within the individual discipline specific technical reports appended to this Application (Appendices C through T).

The potential for these Project-environmental residual effects to combine and act cumulatively with similar effects from other past, present and likely projects or activities was determined as a final stage of the assessment. This component assessment involved determining if other projects and activities were or are being developed in the vicinity of

the ILM Project and whether these projects could potentially act in a cumulative manner with the residual Project effects to alter the overall level of effect on a specific VEC and/or VSC. If the residual effects of the Project were found to not combine with similar effects from other past, present and likely projects or activities, then it was concluded that there were no cumulative effects and the assessment is based solely on potential Project-environmental residual effects. If potential residual Project-environment effects overlapped with similar effects from other projects, a cumulative effects assessment was completed. The main goal of the cumulative effects assessment was to determine if "the project contributions to regional cumulative environmental effects have the potential to measurably change the health or sustainability of the resource in question" (CEA Agency 1999).

5.5 Development of Mitigation and Environmental Management Strategies

Potential Project-environment effects are identified in the discipline-specific technical assessments and used as a basis to identify measures to avoid, reduce or otherwise mitigate, manage or compensate for those potential effects. Measures were developed based on the type of potential effects and their utility to address Project related activities and concerns. Avoiding potential Project-related impacts is a priority during the environmental assessment process; avoidance measures include refining the proposed alignment and a selection of the most appropriate construction methods, equipment, material and timing of activities. Where feasible, mitigation measures were also developed and outlined based on consultation with interested First Nations, the public and regulatory agencies having jurisdiction.

Impact mitigation refers to the elimination, reduction or control of adverse Project-environmental effects, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means (CEA Agency 1994).

The environmental assessments undertaken for the ILM Project EAC Application propose technical mitigation measures to address potential discipline-specific Project effects during construction and operations and maintenance. Appropriate mitigation measures were determined based on the principle of *no net loss* and include use and implementation of appropriate construction guidelines, BMPs, engineering planning, good design and structural standards. Where potential adverse effects of the Project could not be avoided or mitigated, potential compensation measures and opportunities were identified and described. Where appropriate, the feasibility and limitations of mitigation and compensation measures are described in the discipline-specific reports appended to this application (Appendices C through T).

5.6 Determination of Significance of Residual Effects

The main component in the assessment of potential environmental impacts of a project under BCEAA and CEAA is to identify and determine the likelihood of significant adverse environmental impacts/effects. The approach most commonly used involves establishing defined thresholds or standards beyond which residual environmental effects (*i.e.*, effects predicted to occur after all mitigation is considered) are considered significant.

Either specific or general evaluation criteria were used to determine the likelihood of significant adverse environmental impacts/effects on specific VECs / VSCs resulting from the ILM Project. For some biophysical and human environmental components (e.g., landslide hazard), specific standards, guidelines or objectives existed to determine the significance of adverse environmental effects. Standards used during a determination of significance are recognized government or industry regulations or objectives above which an effect would be predicted to occur. For other environmental components, risk assessment thresholds have been developed to identify an acceptable level of risk. A threshold is the level above which the risk is likely to materialize in an event with adverse consequences. Thresholds reflect the limits of an acceptable state for an environmental component based on resource management objectives, community standards, scientific literature or ecological processes (*e.g.*, population and habitat conditions / state for fish, plants or wildlife). Where available, standards, guidelines or recognized thresholds were used to evaluate the potential changes in a measurable parameter or VEC / VSC based on potential ILM Project-related effects and/or cumulative effects. For the biophysical and human environmental components that could not be assessed with reference to specific criteria, a set of general criteria was considered in order to determine significance (CEA Agency 1994).

Evaluation criteria were used to assess the significance of potential Project-related adverse effects for each VEC and VSC. Five general evaluation criteria were used to determine the significance of Project-environmental effects as adopted from definitions provided in the Canadian Environmental Assessment Agency's "*Reference Guide – Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*" (FEARO 1994):

- **Magnitude**: this refers to the magnitude, or severity, of the effect. The greater the magnitude, the greater the effect.

- **Geographic Extent**: this refers to the extent of change over the geographic area of the Project. The geographic extent of effects can be local or regional. Local effects may be less significant than regional effects.

- **Duration**: this refers to the length of time the effect lasts. The duration of an effect can be short-term (<1 year), medium (1-10 years) or long-term (>10 years). Short term effects may not be as significant as long term effects.

- **Frequency**: this refers to how often the effect occurs. The frequency of an effect can be either once, continuous (occurs regularly) or sporadic (occurs >1 time at irregular intervals). Rare or infrequent effects may not be significant, whereas frequent or continuous effects may have a greater effect.

- **Reversibility**: this refers to the degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may be less significant than irreversible, or permanent, effects.

Within the general framework of the criteria specified above, specific definitions and applicability varied between technical disciplines. Specific significance criteria used for each technical discipline and VEC / VSC are provided within the discipline specific technical reports appended to this application (Appendices C through T). Each potential residual effect was rated for significance using these evaluation criteria. A potential effect was considered significant if it either had a magnitude of moderate or high, the effect would extend beyond the spatial and temporal extent of the Project, and the effect would occur over the long-term and on a regular or continuous basis. In addition, if an effect with a magnitude of high would occur locally over the long-term on a regular or continuous basis, then it too was rated as significant. A level of confidence was also provided that indicates the degree of certainty associated with the significance rating.