5. EFFECTS ASSESSMENT METHODOLOGY

5.1 INTRODUCTION AND APPROACH

5.1.1 Introduction

Environmental assessment (EA) in BC and Canada is an information-gathering and planning process that integrates environmental, social, economic, heritage, and health considerations into project design and approvals decisions. Through the early identification and evaluation of all potential consequences of a proposed undertaking, objective decisions can be made which reconcile development and environmental protection to the extent possible.

This chapter of the Application for an Environmental Assessment Certificate/Environmental Impact Statement (Application/EIS) describes the effects assessment methodology that was used to identify and assess potential effects of the Ajax Project (the Project), including any cumulative effects. The methodology described in this chapter is consistent with the requirements of the Application Information Requirements/EIS Guidelines (AIR/EISG; BC EAO 2015) for the Project.

An EA has the following objectives:

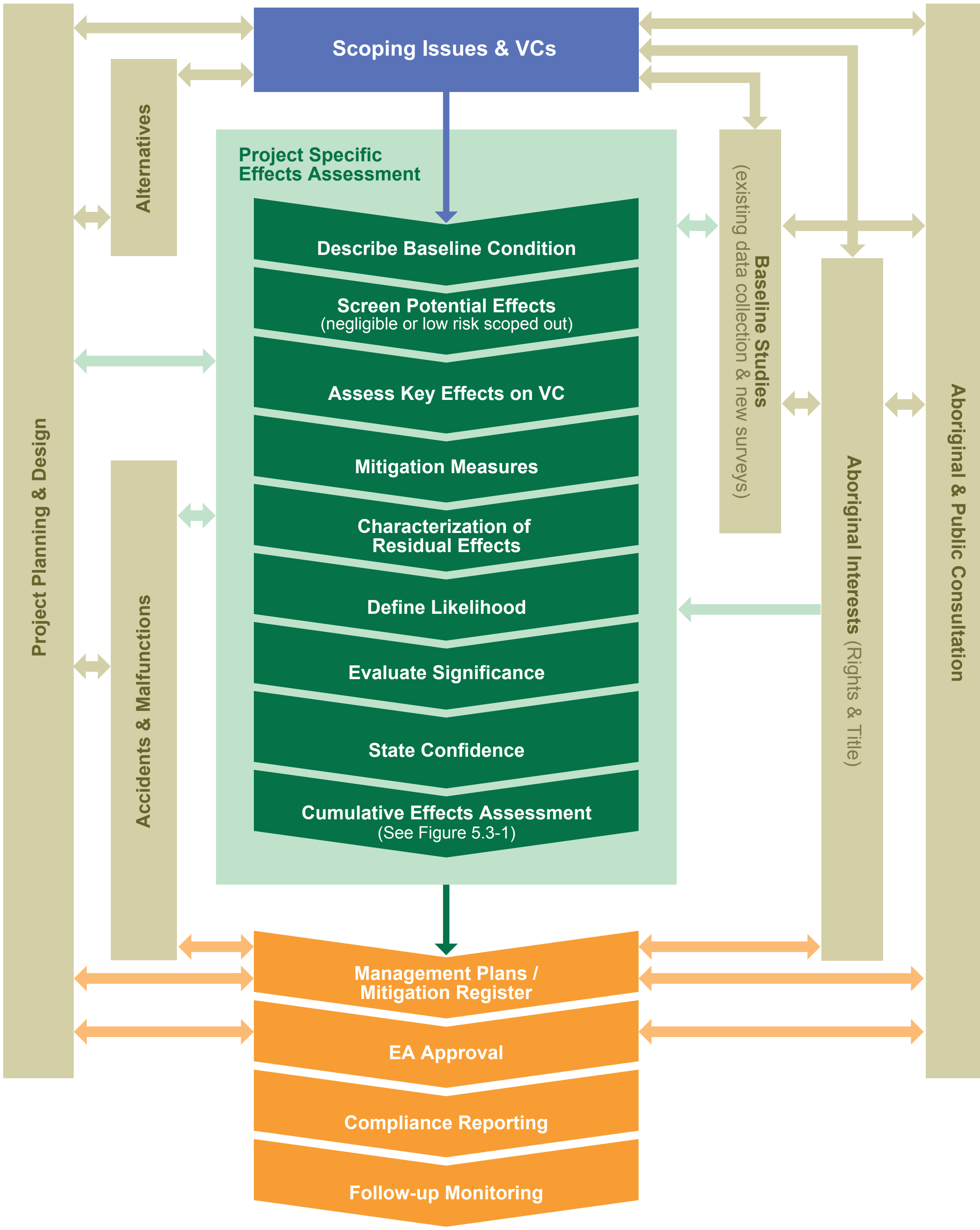
- to identify potential interactions among Project components and the surrounding biophysical and socio-economic environments;
- to identify any potential effects on Valued Components (VCs) resulting from the Project;
- to propose mitigation measures to minimize adverse potential effects;
- to identify any residual effects which will not be mitigated;
- to determine the significance of residual effects, their likelihood of occurrence, and level of confidence;
- to assess potential cumulative effects that could result from interaction between the Project and other past, present, or reasonably foreseeable projects and human activities;
- to identify mitigation measures for potential cumulative effects and identify cumulative residual effects that cannot be mitigated; and
- to determine both the significance of these residual cumulative effects and their likelihood of occurrence.

Figure 5.1-1 provides an overview of the EA process followed to develop the Application/EIS. The EA process was iterative: analysis of baseline studies, stakeholder feedback (inclusive of Aboriginal groups), and re-evaluation of Project design (including evaluation of alternatives and improved mitigation measures) all contributed to the refinement of EA scoping, as well as the avoidance of effects and design of mitigation measures to reduce the scale of residual effects. The following guidance documents were used in the development of this methodology:

- *Addressing Cumulative Effects under the Canadian Environmental Assessment Act* (CEA Agency 2007);

Figure 5.1-1
Overview of the EA Process

ERM



- *An Ecological Framework for Environmental Impact Assessment in Canada* (Beanlands and Duinker 1983); and
- *Application Information Requirements* (British Columbia Environmental Assessment Office 2015).

The effects assessment methodology applied in the EA is intended to provide a consistent framework to the effects assessment presented in Sections 6 (Environmental), 7 (Economic), 8 (Social), 9 (Heritage), and 10 (Health).

The content included in this chapter is intended to:

- identify the objectives of the effects assessment process;
- describe the scoping process used to identify and categorize valued components (VCs);
- provide a general description of how baseline information was integrated into the Application/ EIS (both through the collection of new baseline data, and a review of existing information);
- identify the approach used to select assessment boundaries;
- present the method used to predict and assess effects;
- provide an overview of the types of mitigation used to reduce the potential for significant adverse effects;
- identify the criteria and process used to determine the significance of residual effects on VCs; and
- describe the methodology used to assess cumulative effects.

The detailed methods used in the assessments for each selected valued component are provided in each VC chapter within this Application/EIS. Information gleaned from public consultation and Traditional Knowledge/Traditional Use (TK/TU) information is integrated into multiple areas of the overall assessment methodology.

EA and project design activities are integrated and synergistic processes. Project design and an EA are mutually informed by, and optimized in response to economic, environmental, social, and Aboriginal considerations that progress over time. These are iterative processes in the development of any Project. The current design of the Ajax Project will continue to evolve in response to the review of the Application/EIS. To ensure that the EA encompasses a range of possible final design outcomes, a conservative basis for assessment has been established. In some cases, the actual values used in an environmental assessment for a given VC differ from those presented in the Project Description in order to provide sufficient conservatism. Where these differences occur, they are appropriately rationalized within the individual assessment sections. For instance, the Project Description presents an average Operations workforce of 500 employees whereas the economic modelling used a conservative employment number of 453, which was considered conservative for the purposes of assessing estimated Project benefits. Alternatively, a higher number of employees (580) were used in the Traffic Impact Assessments to evaluate effects due to increased traffic.

5.1.2 Approach and Presentation

This chapter also outlines how each assessment is presented within the Application/EIS. The assessment of each valued component assessment follows the same approach and, for continuity and clarity, the assessment for each VC follows the layout and format as presented in the following section.

5.2 ASSESSMENT METHODOLOGY

5.2.1 Rationale

Each chapter outlines the valued components (VCs) included in the assessment and the rationale for their inclusion.

Valued components (VCs) are components of the natural and human environment that are considered to be of scientific, ecological, economic, social, cultural, or heritage importance (CEA Agency 2006; BC EAO 2013). To be included in the EA, there must be a perceived likelihood that the VC will be affected by the proposed Project. Valued components were screened and potentially scoped into the environmental assessment, based on issues raised during consultation on the Draft AIR (dAIR) and EIS Guidelines, with Aboriginal communities, government agencies, the public and stakeholders. Consideration of certain VCs may also be a legislated requirement, or known to be a concern because of previous project experience.

The following criteria and information was considered during the VC screening and selection process:

- baseline studies;
- project footprint data;
- technical studies and engineering documents;
- impact matrix table;
- legislative requirements (e.g., AIR and EIS Guidelines, *Fisheries Act* (1985) updated in 2012);
- established Operational Procedures and Best Practises;
- policy guidance;
- Official Community Plans, TNRD regional plans;
- issues raised to date by potentially affected Aboriginal groups;
- resilience of a component to change;
- potential interaction with another project/activity to create a cumulative effect(s);
- a review of available information (including past, proposed, and current mining EA projects);
- feedback from the EA Working Group, including Aboriginal groups;
- feedback from key stakeholders, including tenure holders, community and interest groups; the Community Advisory Group (CAG); and

- professional judgement.

When selecting candidate VCs, the following questions were considered:

- Is the VC present in the local or regional area?
- Does the Project have the potential to interact with or adversely affect the VC?
- Does a legally binding government requirement exist to protect the VC?
- Does the VC reflect a legislative or regulatory requirement or government management priority?
- Does the VC pertain to Aboriginal interests, including claimed or proven Aboriginal rights?
- Is there a potential for significant adverse cumulative effects? What known stressors are already occurring on the land base?
- Is the VC itself or the potential adverse effect, of particular concern to the public, Aboriginal groups, or government?
- Is the VC particularly sensitive or vulnerable to disturbance?

To further refine the assessment, consideration was given to identifying indicators. For example, concentrations of individual criteria air contaminants (e.g., particulate matter, carbon monoxide) are indicators used to assess air quality; direct, indirect or induced economic effects are indicators used to assess growth, income and business opportunities. The following questions were considered when selecting VC defining indicators to measure effects:

- Could the potential effects of the project on the VC be measured and monitored?
- Is the candidate VC better represented/evaluated by using a different indicator?
- Could the potential effect on a VC be effectively considered within the assessment of another?
- Is the information about the VC needed to support the assessment of potential effects on another?

Identified VCs are summarized in Table 5.2-1. Through the environmental assessment process, including development and review of the draft AIR/EISG, KAM has consulted with Aboriginal groups, the public, and government to ensure that all appropriate VCs were identified for inclusion in the final and approved AIR/EISG. The selected VCs identified for the Project can be grouped into the following assessment themes: environment, economic, social, heritage, and human health.

Table 5.2-1. Summary of Selected Valued Components for the Ajax Project

Assessment Category	Valued Components
Environment	• Greenhouse gas management • Geology, Landforms and Soils • Surface water quality • Surface water quantity • Groundwater quality • Groundwater quantity • Fish populations and fish habitat • Rare plants • Rare and Sensitive Ecological Communities • Grasslands • Terrestrial Invertebrates • Amphibians • Reptiles • Migratory Birds • Raptors • Non-migratory Gamebirds • Mammals
Economic	• Economic Growth • Labour Force, Employment and Training • Income • Business • Property Values • Economic Diversification
Social	• Infrastructure, Public Facilities and Services • Dark Sky • Visual Impact/Aesthetic Features (including Shading) • Land and Resource Use • Current Use of Lands and Resources for Traditional Purposes • Outdoor Recreation • Supporting Topic – Jacko Lake*
Heritage	• Archaeological Sites • Heritage Sites
Human Health	• Air Quality • Domestic Water Quality • Country Foods • Human Health • Noise and Vibration • Healthy Living and Health Education • Community Health and Well-being

** Jacko Lake is not technically a VC; but as a supporting topic, discussion of all issues related to Jacko Lake, including environmental, will be summarized in a single section.*

Specific rationale for why each subject area and VC was selected is included in the relevant assessment chapter of this Application/EIS and will be summarized using the table formats below (Table 5.2-2). Where appropriate, rationale for the exclusion of potential VCs will also be discussed.

Table 5.2-2. Valued Components Included in the Application/EIS

Valued Components	Identified by*				Rationale for Inclusion
	AG	G	P/S	SK	

**AG = Aboriginal Group; G = Guideline requirement; P/S = Public/Stakeholder; SK = Scientific/professional knowledge*

5.2.2 Background

Each chapter for the individual assessments will include a discussion of the overall region, historical activities and baseline studies.

5.2.2.1 Regional Overview

Each assessment chapter provides a regional overview of the relevant environmental, social, economic, heritage, and human health conditions surrounding the Project. The regional data was used to determine the framework for the assessment and to characterize Project effects. The regional overview also describes processes relevant to the environmental, social, economic, heritage and health regional settings, and considers current conditions, trends and variability over time. Information described in each assessment chapter includes:

- available scientific studies, supplemented by Aboriginal traditional knowledge and community knowledge; and
- references to supporting documents, maps, and engineering and technical reports, which are included in the appendices to the Application/EIS.

5.2.2.2 Historical Activities

Each assessment chapter provides a brief description of historical activities that influence the current baseline condition of the Project footprint, such as: mineral exploration and production, agriculture, forestry, tourism/recreation and hunting/trapping. Other projects and activities that are currently in the regulatory process (e.g., construction activities have not commenced), or that are planned or proposed but are not yet committed or certain (i.e., they are less advanced than the Ajax Project in the planning cycle) may be considered in the assessment of cumulative effects, although not as part of the baseline.

5.2.2.3 Baseline Studies

Each assessment chapter describes any baseline studies undertaken to support each of the effects assessments, including a description of: the information sources that were reviewed to obtain existing data, data collection and analytical methodologies, and a summary of results. Detailed baseline study results are provided in an appendix to the Application/EIS for each assessment topic.

Detailed baseline information improves the ability of the EA to predict how the proposed Project would affect local environmental, social, economic, heritage and health current conditions, and how these components may respond to changes. Baseline studies also help to identify issues, concerns, and sensitivities in relation to the surrounding environment of the Project. Thus, baseline studies for the Project were conducted to:

- identify the key environmental, social, economic, health, and heritage conditions that may be affected by the Project components and activities;
- describe and where possible quantify characteristics of the existing conditions (nature, condition, quality, extent, etc.), both now and in the future in absence of the Project;
- provide data to aid the prediction and modelling of effects;
- to inform judgments about the sensitivity, vulnerability and/or importance of resources/ receptors; and
- characterize pre-disturbance conditions for the purpose of future monitoring and reclamation activities.

Data Sources

The existing conditions in the baseline monitoring study areas, as they pertain to the selected components, are discussed in each assessment chapter. This information includes:

- information from scientific studies, supplemented by Aboriginal traditional knowledge and community knowledge where available;
- references to supporting documents, including baseline data reports, engineering, and technical reports which are included in the appendices to the Application/EIS;
- desktop research, other mine assessment reports, regional studies, etc.; and
- methodology guidance documents and/or operating statements specifying how baseline data should be collected (e.g., Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators; BC MOE 2011).

Methods

Baseline studies were conducted using a tiered approach beginning with a desk-based review of information available from government sources, engineering and technical reports, scientific studies, and peer-reviewed articles. The description of the baseline provides a high-level overview of methods used to collect baseline information, including a description of standards and methodologies used, and data collection and analytical methodologies, and any limitations encountered and assumptions made.

Characterization of Baseline Conditions

Characterization of the baseline condition was undertaken to describe and where possible quantify characteristics of the existing conditions (nature, condition, quality, extent, etc.). As noted, the baseline considers current conditions, as well as those changing conditions (i.e., trends) apparent in the baseline (e.g., depletion of wildlife populations). Each assessment chapter includes summaries of baseline data results with references to relevant appendices, as applicable.

5.2.3 Assessment Boundaries

Assessment boundaries define the maximum limit within which the effects assessment is conducted. They encompass the areas within, and times during which, the Project is expected to interact with the VCs, as well as the constraints that may be placed on the assessment of those interactions due to political, social, and economic realities (administrative boundaries), and limitations in predicting or measuring changes (technical boundaries). The definition of these assessment boundaries is an integral part in VC scoping, and encompasses possible direct, indirect, and induced effects of the Project on VCs, as well as the trends in processes that may be relevant.

Each assessment chapter of the Application/EIS provides and describes the spatial, temporal, administrative, and technical assessment boundaries (if applicable).

5.2.3.1 Spatial Boundaries

Spatial boundaries are determined based on the location and distribution of VCs, and the spatial extent of Project effects. The spatial scale of an assessment may encompass the Project footprint, a local study area (LSA), and a regional study area (RSA). Beyond the spatial boundaries, the Project is expected to have negligible potential effects.

Spatial boundaries for each subject area are based on the following criteria:

- the scope of the EA (i.e., the biophysical or socio-economic extent of the Project activities and components, and associated effects);
- the location and distribution of VCs;
- the extent to which traditional and contemporary land and resource use could potentially be affected by the Project; and
- feedback and input received during consultation activities.

To define and describe the spatial boundaries for each effects assessment, each assessment chapter of the Application/EIS includes the following information:

- criteria used to determine the extent of spatial boundaries for each VC;
- a description of the local and regional spatial extent of the assessment relative to each VC; and
- maps outlining the spatial extent of the local and regional study areas.

For the purpose of the Application/EIS, the following definitions are used to define the study areas:

- the Local Study Area (LSA) is defined as the Project footprint and surrounding area within which there is a reasonable potential for immediate direct and indirect effects on a specific VC due to an interaction with a Project component(s) or activities; and

- the Regional Study Area (RSA) is defined as the spatial area within which direct and indirect effects are anticipated to occur.

5.2.3.2 *Temporal Boundaries*

The potential effects of the Project will change over time, depending on the activities that occur during each phase of the Project. Temporal boundaries are the time periods considered in the assessment. Each assessment chapter of the Application/EIS presents the temporal boundaries for each VC, as well as the rationale for boundary selection. Potential effects will be considered for each phase of the Project (where relevant), which are:

- **Construction:** 2 years;
- **Operation:** 23 years;
- **Decommissioning and Closure:** 2-5 years (includes project decommissioning, abandonment and reclamation activities as well as temporary closure and care and maintenance); and
- **Post Closure:** 5+years (includes ongoing reclamation activities and post-closure monitoring).

For the purposes of the assessment, unless otherwise defined for a specific VC, Post Closure is defined as five years; however, Post Closure is predicted to be ongoing until a stable state is achieved on site.

Magnitude, frequency, and trends in any natural variation (annual or seasonal) of a population or component, or biophysical constraints on the VC (e.g., migration patterns, breeding patterns, freeze-thaw cycles) will be considered.

The temporal boundaries will be refined, where appropriate, in relation to planned activities over the lifetime of the Project, within which a reasonable expectation of interaction with a VC can be predicted. These boundaries will be adjusted as appropriate to reflect seasonal variations or life-cycle requirements of biological receptors, or forecasted trends in social, economic, health or heritage receptors. In some cases, effects will be assessed or predictions modelled only for those phases of the Project where predicted effects would be expected to peak (e.g., the majority of effects to visual quality and shading occurring during Operation phase).

The temporal boundaries have been developed in order to incorporate potential effects from the Project, beyond these temporal boundaries the Project is expected to have negligible potential effects.

5.2.3.3 *Administrative Boundaries*

Administrative boundaries arise when jurisdictional (i.e., political) issues, or time and money constraints impact the scientific process of identifying Project effects. These boundaries may include existing datasets collected on the basis of regional or provincial boundaries that are not the same as the spatial boundaries of the selected VCs. Other examples of administrative boundaries include confidentiality associated with sensitive cultural sites or archaeological remains, or newly imposed policy requirements on the EA process itself (e.g., timelines).

Administrative boundaries may not apply to every VC. However, where administrative boundaries may affect the identification and/or assessment of potential effects, the nature of the administrative boundaries and their effect on the assessment are included and described in the relevant assessment chapter.

5.2.3.4 Technical Boundaries

Technical boundaries limit the ability to sample the environment (e.g., a legal restriction prohibiting the sampling of species listed under the *Species at Risk Act* (2002)), and thereby limit the ability to predict or measure change. Sampling may be compromised when dealing with large geographical settings, or widely dispersed species. Elusive or sensitive species may only practically be sampled by proxy (i.e., the existence of suitable and/or potential habitat), rather than by actual measurement. Each assessment chapter documents technical boundaries, and how they affect the EA process and ability to identify Project effects.

Technical boundaries may not apply to every VC. However, where technical boundaries may affect the identification and/or assessment of potential effects, the nature of the technical boundaries and their effect on the assessment are included in the relevant assessment chapter.

5.2.4 Potential Effects and Proposed Mitigation Measures

An important step in the assessment process is to determine how the selected VCs may be affected by the Project. An evaluation by Project phase (i.e., Construction, Operation, Decommissioning and Closure, and Post Closure) is completed in each assessment chapter that addresses the following questions:

- What are the types of effects that result from the interaction of the Project's components and activities with VCs?
- Over what assessment boundaries (spatial and temporal) are these effects anticipated to occur?

5.2.4.1 Identify Potential Effects

Each potential effect on a VC is determined by comparing the characteristics of the VC with the identified Project components or activities and determining how interactions may occur. The assessment of effects on VCs includes consideration of direct effects from Project components or activities, and effects arising from direct effects to other VCs that may impact the selected VC (indirect effects) for each Project phase.

The initial step is to identify Project components and activities. These are listed in Table 5.2-3 for the Ajax Project.

Table 5.2-3. Project Components and Activities

Phase	Project Activities
Construction	Clearing and Grubbing
	Earthworks
	Overburden/ Topsoil Stockpile
	Laydown Areas and Storage Yards
	Project Lighting
	Site Access, Security and Fencing
	Fuel Storage and Filling Area
	Hazardous Wastes Transport, Storage, and Disposal
	Construction Wastes Transport, Storage, and Disposal
	Sewage Infrastructure and Disposal
	Public Road Realignment, Use and Maintenance
	Site Road Construction, Use and Maintenance
	Peterson Creek Bridge Construction, Use, and Maintenance
	Site Buildings and Process Plant
	Explosives Magazine and Storage Facilities
	Open Pit Development
	Drilling and Blasting
	Crushing Waste Rock
	Loading, Hauling, and Deposition of Waste Rock
	Temporary Ore Stockpile
	Tailing Storage Facility Development
	Power Transmission, Distribution
	Natural Gas Line
	Pipeline Utility Corridor (Potable Water, Sewage, and Site Water)
	Water Intake from Kamloops Lake
	Fire Suppression Infrastructure
	Contact Water
	Non-contact Water
	Peterson Creek Diversion
	Water Management Dams
	Mine Staffing (Direct Employment)
	Contracted Employment
	Taxation
Operation	Open Pit Development
	Drilling and Blasting
	Hauling Waste Rock and Ore from Pit
	Crushing and Conveying Ore
	Temporary Ore Stockpile

Phase	Project Activities
Operation *(cont'd)*	Development of Waste Rock Management Facilities
	Stripping, Loading, Hauling, Deposition, and Contouring of Topsoil and Overburden
	Revegetation through progressive reclamation
	Process Plant Operations
	Deposition to Tailing Storage Facility
	Site Road Use and Maintenance (Materials, Personnel, Supplies)
	Concentrate Transport and Storage
	Explosives Magazine and Storage Facilities
	Fire Suppression Infrastructure
	Fuel Storage and Filling Area
	Hazardous Wastes Transport, Storage, and Disposal
	General Wastes Transport, Storage, and Disposal
	Sewage Infrastructure and Disposal
	Laydown Areas and Storage Yards
	Power Transmission, Distribution
	Project Lighting
	Site Access, Security and Fencing
	Water Intake from Kamloops Lake
	Contact Water
	Non-contact Water
	Potable Water Treatment and Use
	Peterson Creek Diversion
	Mine Staffing (Direct Employment)
	Contracted Employment
	Taxation
Decommissioning and Closure	Dismantling of Ancillary Buildings
	Pit Lake Development
	Site Road/Bridge Decommissioning
	Tailing Storage Facility Decommissioning and Reclamation
	Waste Rock Management Facilities Reclamation
	Fuel Storage and Filling Area
	Hazardous Wastes Transport, Storage, and Disposal
	General Wastes Transport, Storage, and Disposal
	Sewage Infrastructure and Disposal
	Laydown Areas and Storage Yards
	Power Transmission, Distribution
	Project Lighting
	Site Access, Security and Fencing
	Contact Water

Phase	Project Activities
Decommissioning and Closure ***(cont'd)***	Non-contact Water
	Potable Water Treatment and Use
	Peterson Creek Diversion
	Road use to the Project (Materials, Personnel, Supplies)
	Mine Staffing (Direct Employment)
	Contracted Employment
	Taxation
Post-Closure	General Site Inspections and Maintenance
	Contact Water
	Non-contact Water
	Road use to the Project (Materials, Personnel, Supplies)
	Mine Staffing (Direct Employment)
	Contracted Employment

The description of the potential effects will include, where relevant, direct, indirect, and induced effects. A direct effect is an effect that results from a direct interaction between the Project and an environmental, social, economic, heritage, or health component. Direct effects result from specific Project interactions with VCs throughout the project footprint and LSA, including the mine site (i.e., impacts to grasslands from Project structures). Indirect effects are the result of direct effects of the Project leading to additional effects (i.e., increase stress to existing local infrastructure and services as a result of increases to local employment). Induced effects are the effects that result from other activities (which are not part of the Project) that happen as a consequence of the Project, such as an increase in household income leading to altered spending habits which result in changes to retail sales. Depending on the nature of the effect, potential effects may be experienced at multiple spatial scales.

The evaluation of the strength of interaction considers any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the EA Process). An example of an embedded control is a standard acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an effect is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

To focus the assessment and reveal key interactions that have greater potential to result in significant adverse residual effects, or to be of particular concern to government, Aboriginal groups, or the public, an impact matrix approach was used. In the case of some subject areas a visual graphic was considered useful to further identify and rank Project-Component interactions. To populate the impact matrix the following questions or criteria were screened for each VC:

- Based on the information available, is there potential for a serious adverse residual effect, even with available mitigation?
- Does the component pertain to Aboriginal interests, including claimed or proven rights and title?

- Does the component reflect a legislative or regulatory requirement or government management priority (e.g., species of conservation concern)?
- Is there potential for serious adverse cumulative effects?
- Is the component itself, or the potential effect, of particular concern to the public, Aboriginal groups, or the government?
- Is the component particularly sensitive or vulnerable to disturbance?

The interactions were then ranked as follows:

- Grey — no interaction anticipated.
- Green — negligible to minor adverse effect expected; implementation of best practices, standard mitigation and management measures; these effects have been assessed as well-understood and well-regulated, and may be managed under another government process; no monitoring required, no further consideration warranted. Effects ranked as such may be readily addressed through the implementation of proven effective mitigation measures or Best Management Practises (BMPs). Effects assessed as negligible to minor and the mitigation measures to address these effects will be briefly discussed, but **will not be carried forward for further assessment**.
- Yellow — potential for moderate adverse effect requiring unique active management/ monitoring/mitigation; warrants further consideration and **will be carried forward for further assessment**.
- Red — key interaction resulting in potential major adverse effect or significant concern; warrants further consideration and **will be carried forward for further assessment**.

This is a screening level assessment; it is generally not quantitative, and relies on the judgement of technical expert. Supporting rationale for assigned rankings is provided in each assessment chapter. Where there is potential for uncertainty, a conservative approach is taken, and potential effects are carried forward for further assessment.

For those interactions marked yellow or red in Table 5.2-4 (i.e., are being carried forward in the assessment), the effects assessment applies best practice methods to predict the nature and extent of effects that may result from the Project. For subject areas that did not utilize the above approach to determine key potential interactions, the justification for this decision is provided within the individual chapter text as well as a description of the methodology used to determine these key interactions.

Only effects on a VC related to planned project components and activities are discussed here; effects related to unplanned events or activities (e.g., spills, traffic accidents etc.) are discussed in "Accidents and Malfunctions". Resulting management plans take into consideration the mitigations related to planned activities and those related to preventing unplanned events (Figure 5.1-1).

Table 5.2-4. Example of Ranking Potential Effects on Valued Components

Project Component/Physical Activity		Potential Effects on <Subject Area> and/or <Valued Components>						
		Effect 1	Effect 2	Effect 3	Effect 4	Effect 5	Effect 6	Effect 7
Construction	Project component/activity 1	L	M	H	O	L	L	L
	Project component/activity 2	L	L	L	L	L	L	L
Operation	Project component/activity 3	L	L	L	L	L	L	L
	Project component/activity 4	L	L	L	L	L	L	L
Decommissioning and Closure	Project component/activity 5	L	L	L	L	L	L	L
	Project component/activity 6	L	L	L	L	L	L	L
Post Closure	Project component/activity 7	L	L	L	L	L	L	L
	Project component/activity 8	L	L	L	L	L	L	L

Notes:

O	*No interaction is anticipated, no further consideration warranted.*
L	*Negligible to minor interaction expected; implementation of best practices, standard mitigation and management measures; no monitoring required, no further consideration warranted.*
M	*Potential moderate interaction requiring unique active management/monitoring/mitigation; warrants further consideration.*
H	*Key interaction; warrants further consideration.*

5.2.4.2 Discuss Potential Effects

The assessment chapters of the Application/EIS discuss the key effects of Project components and activities on selected VCs. The key effects identified (i.e., those with potential for a moderate to major impact on the receptor VC/indicator) are further described in this section of each VC assessment, with any relevant mitigation measures. This process is iterative in nature; and key effects and relevant mitigation may be refined and identified multiple times. Any effects remaining after all feasible mitigation measures are identified are considered to be the Project's residual effects.

A range of characterization and prediction methods are used, including quantitative, semi-quantitative and qualitative techniques. The specific methods used for each VC are described in the assessment chapter or supporting appendices. For some VCs, modelling is used to predict and characterize aspects of the interactions. These include but are not limited to the following predictive models:

- groundwater model;
- hydrological model, including a water balance;
- surface water quality model;
- habitat suitability model;
- economic model;
- air quality dispersion model;
- noise model; and

- human health ecological risk model.

For each assessment topic and subject area, relevant references, analyses, and explanations are included, that define:

- how scientific, engineering, community and Aboriginal traditional knowledge is used in the assessment;
- which studies include the assistance of communities and individuals, who was involved (if the information can be made public), and how contributors were selected;
- any limitation on data collection, model assumptions and study methodologies (detailed results and methodologies are provided in the appendices to each assessment chapter); and
- study and model outputs, calculations, supporting analyses, and an explanation of results.

Baseline data, modelling results and professional judgement are used, to the extent possible, to predict the effect of the Project on VCs. A discussion of any shortcomings, limitations or uncertainty in the methodologies or results is also included.

5.2.4.3 Mitigation Measures

Each assessment chapter of the Application/EIS discusses the availability and implementation of mitigation measures to avoid, minimize, control, restore on-site, compensate, or offset adverse effects to VCs. A mitigation hierarchy is followed as described in the BC EAO's *Guidelines for the Selection of Valued Components and Assessment of Potential Effects* (BC EAO 2013). Note that decisions regarding the need for and scope of mitigation, including compensation and offset, does not pre-suppose the outcome of the effects assessment. Where mitigation measures have been identified in relation to species and/or critical habitat listed under the *Species at Risk Act* (2002), the mitigation measures should be consistent with any applicable recovery strategy and action plans.

Key approaches to applying the hierarchy to mitigate potential effects include:

- **Optimizing Alternatives**: Preventing or reducing adverse effects by changing an aspect of the Project.
- **Design Changes**: Preventing or reducing adverse effects by redesigning aspects of the Project, or changing the timing of an activity.
- **Best Achievable Control Technology (BACT):** Eliminating, minimizing, controlling, or reducing adverse effects through the use of technological applications.
- **Management Practices**: Eliminating, minimizing, controlling, or reducing adverse effects on VCs through management practices.
- **Restoration**: Restoration focuses on establishing appropriate composition, structure, pattern, and ecological processes necessary to make systems sustainable, resilient, and healthy under current and future conditions. Restoration is different from avoiding and minimizing residual effects because it can be implemented at a later date.

- **Compensation**: Offsetting remaining effects that cannot be prevented or reduced through remedial or compensatory actions, so that the net effect on the community or ecosystem is neutral or beneficial.

Proposed mitigation and monitoring activities for each assessment subject area are described in the applicable sections of the Application/EIS, and compiled into discrete subject area Environmental Management Plans (EMPs). Each EMP applies a systematic approach for integrating Project-specific mitigation and monitoring activities throughout the life cycle of the Project (i.e., into each Project phase). Environmental management and effects monitoring plans are provided in Chapter 11.

If the proposed implementation controls and mitigation measure(s) are not sufficient to eliminate a key Project-Component effect, a residual effect is identified. Residual effects on VCs will be carried through to a significance determination (Figure 5.1-1).

5.2.5 Residual Project Effects and their Significance

5.2.5.1 Summary of Residual Effects

Predicted changes or residual effects are those adverse effects remaining after the implementation of all mitigation measures, and are therefore the potential consequences of the Project on the VCs. Each assessment chapter of the Application/EIS describes direct, indirect and/or induced residual effects of the Project as applicable.

A summary of residual effects or predicted changes is provided for each assessment category using the format shown in Table 5.2-5.

Table 5.2-5. Example of Summary of Residual Effects/Predicted Changes after Mitigation

Valued Component	Project Phase[1]	Project Component/ Physical Activity	Description of Cause-Effect	Description of Mitigation Measure(s)	Description of Residual Effect

[1] *Project phases are Construction, Operation, Decommissioning and Closure, and Post Closure.*

5.2.5.2 Criteria for Characterization of Residual Effects

Residual effects to VCs are described using the attributes defined below. Where appropriate, the effects assessment for each VC will further define the criteria prior to initiating the effects assessment. The definition for each criterion will be clearly defined and explained for each VC in Sections 6 through 10. For example, within the Economic, Social, Heritage, or Health assessments, it may be necessary to revise some of the criteria and definitions to better characterize the VC. In these cases the revised criteria and definitions will be presented in the relevant VC section. Any modifications to these characterization criteria are discussed in the relevant Application/EIS chapter.

- **Magnitude:** This refers to the expected magnitude or severity of the residual effect. The corresponding levels are defined as:
  - *Negligible*: no or very little detectable change from baseline conditions;

  - *Low*: differing from the average value for baseline conditions to a small degree, but within the range of natural variation and well below a guideline or threshold value;
  - *Medium*: differing from the average value for baseline conditions and approaching the limits of natural variation, but below or equal to a guideline or threshold value; or
  - *High*: differing from baseline conditions and exceeding guideline or threshold values so that there will be a detectable change beyond the range of natural variation (i.e., change of state from baseline conditions).
- **Duration:** This refers to the length of time the effect lasts; the duration of an effect can be (provided as guide; rationale to best characterize VC described in VC section):
  - *Short-term*: an effect that lasts approximately 1 to 5 years;
  - *Medium-term*: an effect that lasts between 6 to 25 years;
  - *Long-term*: an effect that lasts between 26 and 50 years; or
  - *Far Future*: an effect that lasts more than 50 years.
- **Frequency:** This refers to how often the effect occurs; the frequency of an effect is defined as:
  - *Once*: an effect that occurs once during any phase of the Project;
  - *Sporadic*: an effect that occurs at sporadic or intermittent intervals during any phase of the Project;
  - *Regular*: an effect that occurs regularly during any phase of the Project; or
  - *Continuous*: an effect that occurs constantly during any phase of the Project.
- **Geographic Extent:** This refers to the spatial scale over which the residual effect is expected to occur, and includes:
  - *Local*: an effect is limited to the Project footprint less than 500m from infrastructure or activity;
  - *Landscape/Watershed*: an effect extends beyond the Project footprint limited to the local study area or one watershed (i.e., sub-area);
  - *Regional*: an effect extends across the regional study area or multiple watersheds; or
  - *Beyond Regional*: an effect that extends possibly across or beyond the province of BC.
- **Reversibility:** This refers to the degree to which the effect is reversible and is classified as:
  - *Reversible Short-term*: an effect that can be reversed relatively quickly;
  - *Reversible Long-term*: an effect that can be reversed within 20 years of Post Closure; or
  - *Irreversible*: an effect cannot be reversed (i.e., is permanent).
- **Resiliency:** This refers to the level of resiliency of the receiving environment and is classified as:
  - *Low*: the receiving environment or population has a low resilience to imposed stresses, and will not easily adapt to the effect;
  - *Neutral*: the receiving environment or population has a neutral resilience to imposed stresses and may be able to respond and adapt to the effect; or

  - *High*: the receiving environment or population has a high natural resilience to imposed stresses, and can respond and adapt to the effect.
- **Ecological Context:** This refers to the current condition of the VC and its sensitivity. The corresponding levels are defined as:
  - *Low*: the receptor is considered to have little to no unique attributes or provision of functions is severely degraded;
  - *Neutral*: the receiving environment is considered to have some unique attributes and provides most functions that an undisturbed environment would provide; or
  - *High*: the receiving environment or population is uncommon and occurs in a natural state and provides functions at a maximum capacity.
- **Social Value:** This refers to the current condition of the social VCs and its sensitivity. The corresponding levels are defined as:
  - *Low*: the effect has limited ability to alter the economic base, social structure, community stability or the well-being of people in the study area;
  - *Medium:* the effect has some ability to alter the economic base, social structure, community stability or the well-being of people in the study area; or
  - *High:* the effect has moderate ability to alter the economic base, social structure, community stability or the well-being of people in the study area.

5.2.5.3 Characterization of Residual Effects

Each residual effect identified is characterized according to the above assessment criteria, including supporting rationale. Following the BC EAO's *Guideline for the Selection of Valued Components and Assessment of Potential Effects* (BC EAO 2013), rationale are supported by quantitative analyses wherever possible. Residual effects will only be assessed qualitatively if a quantitative assessment is not possible. Where quantitative analyses are not possible, a rationale will be provided.

For each VC, the assessment chapter includes any relevant references, analyses, and explanations that define:

- how scientific, engineering, community and Aboriginal knowledge were used in the assessment;
- which studies included the assistance of communities and individuals and who was involved (if the information can be made public);
- data collection methods and limitations;
- model assumptions and study methodologies, including statistical analysis or mathematical modelling;
- study and model outputs, calculations, supporting analyses, and an explanation of results; and
- reference literature or other information sources for any contributions, including traditional knowledge.

The resulting residual effects characterization is summarized in a table using the format shown in Table 5.2-6.

5.2.5.4 Significance of Residual Project Effects

The Agency's *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* (CEA Agency 1994) was used as guidance in evaluating the significance of the adverse residual effects for the Project. The significance of residual effects of the Project is founded on a comparison of the current VC if the Project does not proceed, with the predicted state of the VC if the Project proceeds, after mitigation measures are applied.

To assess the significance of a residual effect, the Application/EIS relies on detailed information including, but not limited to, statistical analysis or mathematical modelling. Where data is lacking, professional judgment has been used to support the assessment.

When defining and evaluating the ultimate significance of a residual effect, each assessment chapter in the Application/EIS defines how significance is determined. Where available, thresholds are used (e.g., aquatic life receiving environment criteria, ambient air criteria, or land and resource management planning objectives) to assist with the determination of significance. Each assessment chapter defines thresholds of significance as well as the source literature for those thresholds.

The significance of effects is ranked according to the three categories described below. Each assessment chapter clearly defines how the term "significant" was considered in relation to each VC, and provides a detailed rationale for the significance determination.

- **Not Significant (Minor):** Residual effects have no or low magnitude, local geographic extent, short- or medium-term duration, and occur sporadically if at all. The effects on the VC (e.g., at a species or population level) are indistinguishable from background conditions (i.e., occur within the range of natural variation as influenced by physical, chemical, and biological processes). Land and resource management plan objectives will be met.
- **Not Significant (Moderate):** Residual effects have medium magnitude; have local, watershed, or regional geographic extent; are short-term to chronic (i.e., may persist into the far future); and occur at all frequencies. Residual effects on the VC may be distinguishable at the population, community, and/or ecosystem level. The ability to meet land and resource management plan objectives may be impaired.
- **Significant (Major):** Residual effects have high magnitude; have regional or beyond regional geographic extent; are chronic (i.e., persist into the far future); and occur at all frequencies. Residual effects on the VC are consequential (i.e., structural and functional changes in populations, communities, and ecosystems are predicted). The ability to meet land and resource management plan objectives is impaired.

Table 5.2-6. Example of Characterization of Residual Effects, Significance, Likelihood, and Confidence

Residual Effect	Residual Effects Characterization Criteria							Significance of Adverse Residual Effects	Likelihood and Confidence	
	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Resiliency	Context		Probability	Confidence
Effect 1										
Effect 2										
Effect 3										
Effect 4										

5.2.5.5 Characterization of Likelihood and Confidence

The likelihood of a residual effect occurring is expressed as a probability, to determine the potential for the Project to cause a residual effect. Probability is determined according to the attributes identified below:

- **Probability:** This refers to the likelihood that an adverse effect will occur in circumstances where it is not certain that the effect will materialize and is classified as:
  - *Low*: an effect that is unlikely, but could occur;
  - *Medium*: an effect that is likely, but may not occur; or
  - *High*: an effect that is highly likely to occur.

  Narrative descriptions and justifications for the likelihood (probability) assessment are provided along with the valuation of these attributes in each of the chapters within the Application/EIS.
- **Confidence:** This can be thought of as scientific uncertainty, and is a measure of how well residual effects are understood, which includes a consideration of the acceptability of the data inputs and analytical methods used to predict and assess Project effects. It depends on the certainty of the predicted outcome, and it allows the decision-maker to evaluate risk associated with the Project. Confidence is defined as:
  - *Low* (< 50% confidence): the cause-effect relationships are poorly understood, there are a number of unknown external variables, and data for the Project area are incomplete. High degree of uncertainty and final results may vary considerably;
  - *Medium* (50 to 80% confidence): the cause-effect relationships are not fully understood, there are a number of unknown external variables, or data for the Project area are incomplete. There is a moderate degree of uncertainty; while results may vary, predictions are relatively confident; or
  - *High* (> 80% confidence): there is a good understanding of the cause-effect relationship and all necessary data are available for the Project area. There is a low degree of uncertainty and variation from the predicted effect is expected to be low.

5.2.5.6 Summary of Residual Effects Assessment and Significance

A summary of residual effects or predicted changes is provided in each assessment chapter (Chapters 6 through 10), using the format shown in Table 5.2-6.

5.3 CUMULATIVE EFFECTS

Cumulative effects are the result of a project-related effect interacting with the effects of other human actions (i.e., anthropogenic developments, projects, or activities) to produce a combined effect. This section describes the method used for the Ajax Project Cumulative Effects Assessment (CEA).

The scope and methodology of the CEA are designed to satisfy regulatory requirements set forth by both the BC EAO and the Canadian Environmental Assessment Agency (CEA Agency 1999) as follows:

- determine if the Project will have a residual effect on a VC;
- if such an effect can be demonstrated, determine if the incremental effect acts cumulatively with the effects of other actions, either past, existing or future; and
- determine if the effect of the Project, in combination with the other effects, may cause a significant change now or in the future to the characteristics of the VC after the application of mitigation for that project.

The CEA identifies the residual effects of the Project with the potential to interact with the residual effects of other projects or activities, and assess whether this interaction is likely to result in a greater impact to the identified VC, as illustrated in Figure 5.3-1.

Cumulative effects are assessed in each of the assessment chapters (Chapters 6 through 10), as required by the BC EAO (2013).

The method for assessing cumulative effects follows the same steps as the Project-specific effects assessment, as described in Section 5.2:

1. Scoping and identification of potential effects.
2. Description of potential effects and mitigation measures, with subsequent identification of residual cumulative effects.
3. Identification and characterization of residual cumulative effects.

However, because of the broader scope and greater uncertainties inherent in CEA (e.g., data limitations associated with some human actions, particularly future actions) there is greater dependency on qualitative methods and expert judgement. The assessment methodology applied for the two levels of assessment (project-specific and CEA) is flexible and tailored to how much information is available. The following sections outline the assessment methodology for CEA that is presented in each assessment chapter.

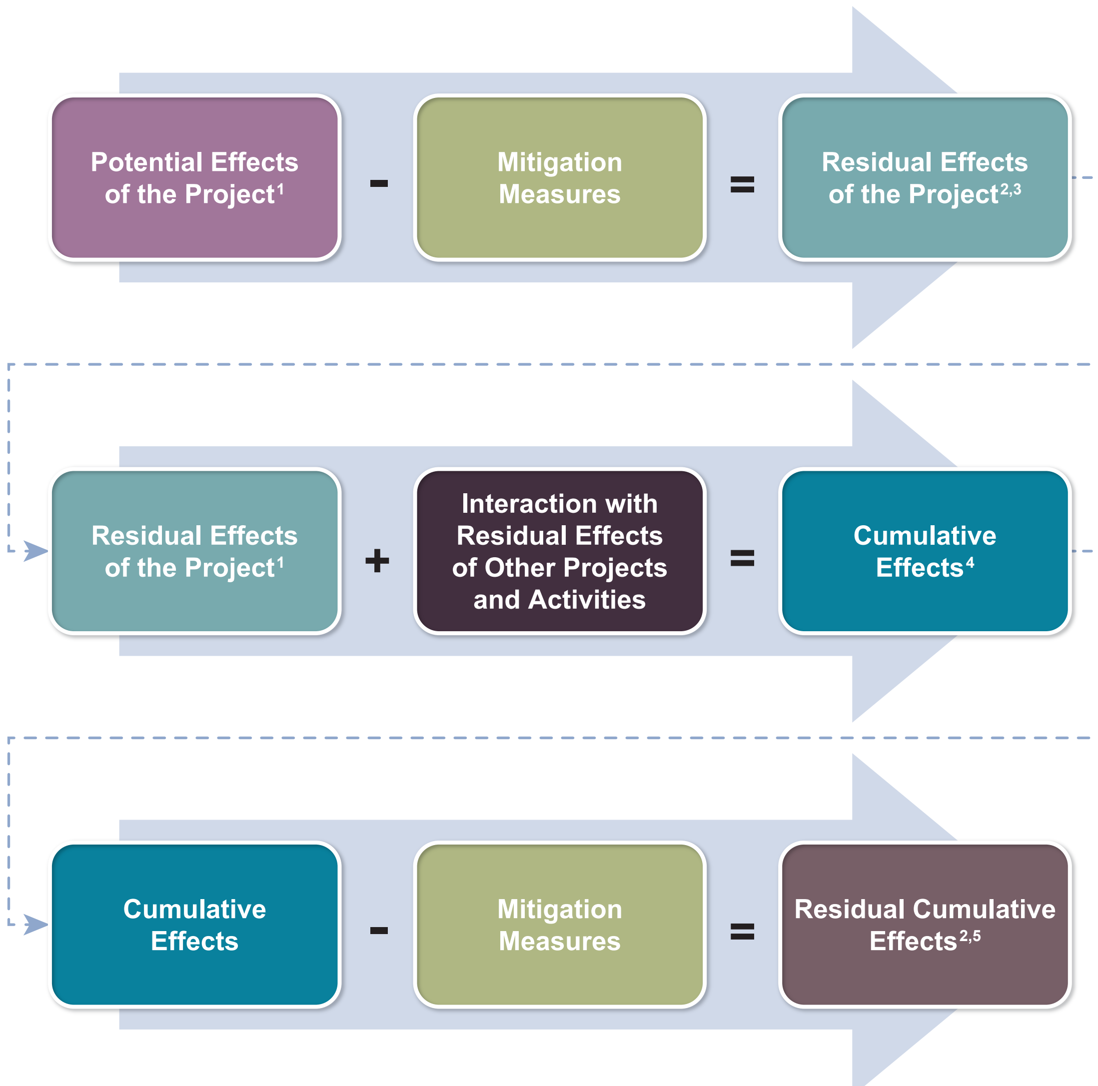
5.3.1 Identification of Other Actions that May Affect Project Valued Components

For each VC, the CEA identifies other past, present, and reasonably foreseeable future projects and human activities that have caused or may cause effects and that could interact with the residual effects of the Project on each VC being assessed. In accordance with Canadian Environmental Assessment Agency guide (1999), the terms actions, activities, or projects will be used to represent other projects and activities being considered in the cumulative effects assessment; the term "Project" is used only in reference to the project under assessment (i.e., the Ajax Project). In general, other actions:

- are past, present, and reasonably foreseeable future actions that have entered into a formal project approval or permitting process;
- have been specified through discussion with regulators, Aboriginal groups, and/or other stakeholders; and
- possess sufficient project information to inform a cumulative effects assessment.

Figure 5.3-1

Overview of the Cumulative Effects Assessment (CEA) Process



Notes: [1] *Potential effects of the Project are potential changes to the existing baseline conditions for each VC resulting from the Ajax Project.*
[2] *If residual effects are predicted, significance of the predicted effect is characterized.*
[3] *If there are no residual effects, no further steps are required.*
[4] *If there are no cumulative effects, no further steps are required.*
[5] *If there are no residual cumulative effects, no further steps are required.*

For the purpose of the Ajax Project effects assessment, effects from historical projects or activities is included in the baseline conditions. While effects from current (present) actions may also be influencing baseline conditions, they are considered in the CEA on a VC-specific basis, since effects may continue into the future.

The following information sources were reviewed to identify all actions within the largest RSA to be considered in the CEA:

- Official Community Plans (including KAMPLAN and the Aberdeen Neighbourhood Plan), TNRD regional plans;
- registered active projects listed on the BCEAO e-Pic website;
- British Columbia Oil and Gas Commission and National Energy Board websites;
- registered water licence applications listed on the Ministry of Environment Water Stewardship Division Water Licences Report website;
- registered land tenure applications listed on the Geo BC website (agriculture, commercial, commercial recreation, communication, industrial, institutional, quarrying, residential, utility, waterpower; windpower);
- current harvest plans associated with tenured forest operations and timber sales; and
- National Pollutant Release Inventory website (discharges to air and water).

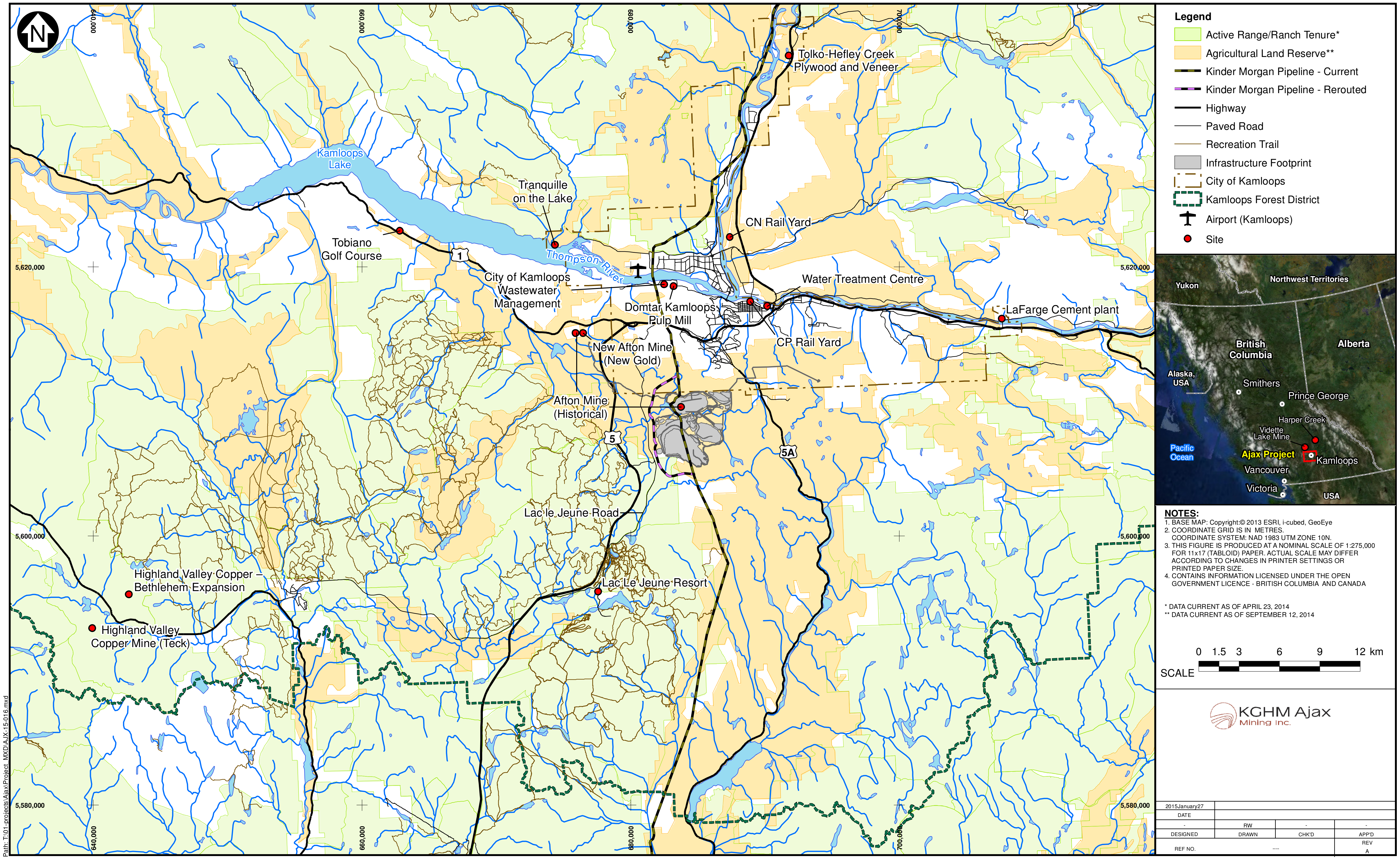
A list of project/activities for consideration in the CEA is summarized in Table 5.3-1, and the spatial locations for most (represented where possible) are presented in Figure 5.3-2.

It is important to note that the CEA projects and activities inclusion list for one VC may differ from the inclusion list for another VC due to different mechanisms of interaction. Due to the complex nature of assessing cumulative effects, the scoping of other projects and activities must be strictly applied to avoid assessing more than is necessary (CEA Agency 1999). Each action must be described in sufficient detail to allow effects to be characterized. The information is obtained from land use maps and aerial photos; environmental databases; interviews and consultation with regulators or stakeholders; development plans; other environmental assessments; or professional judgement. Information is qualitative or quantitative. Where there are numerous actions in the same category (sector, industry type, etc.) that may cause similar types of effects, the effects of the actions on the VC is assessed collectively (CEA Agency 1999). Projects and activities that do not possess sufficient information to inform a CEA will not be carried forward in the assessment. As outlined in the CEA Agency guide (1999), some or all of the following information may be required to adequately assess an action's effects:

- location, physical size, and spatial distribution of components;
- components (e.g., main plant, access roads, waste disposal site) and supporting infrastructure (e.g., waste treatment, transmission line);
- expected life or period of activity (including start date) and phasing involved (e.g., exploration, construction, decommissioning and abandonment);
- variations in seasonal operation (e.g., winter closures);
- number of permanent and temporary employees;

Figure 5.3-2
Other Human Activities and Projects near the Ajax Project

ERM



- frequency of use (for intermittent activities, e.g., helicopter use);
- transportation routes and mode of transport (e.g., roads, railways, shipping lanes);
- processes used; and
- approvals received (e.g., permit and license conditions in effect).

Table 5.3-1. Past, Present, and Reasonably Foreseeable Actions Considered for the CEA

Description	Status or Likelihood	Geographic Boundaries (proximity to Project)
Industry		
Vidette Lake Mine	Decommissioned 1939	34 km northwest
Afton Mine (Historical)	Decommissioned 1997	Within Project site
Iron Mask Mine	Inactive	10 km west
Bonaparte Mine	Active and Future	45 km north
New Afton Mine (New Gold)	Active	9 km northwest
Highland Valley Copper Mine (Teck)	Active	31 km southwest
Domtar Kamloops Pulp Mill	Active	9 km north
Tolko-Hefley Creek Plywood and Veneer	Active	19 km north
LaFarge Cement plant	Active	14 km northeast
Trans Mountain Pipeline System (Kinder Morgan)	Active	Within Project site
Trans Mountain Pipeline System - Expansion (Kinder Morgan)	Future - Certain	Within Project site
Harper Creek	Future	110 km northeast
Highland Valley Copper –Bethlehem Expansion	Future	31 km southwest
Natural Resources and Land Use		
Kamloops Forest District	Active	Within 4 km
Agriculture	Active	Immediately adjacent
Ranching	Active	Within Project site
Tourism and Commercial Recreation Activities		
Tranquille on the Lake	Future (multi-phase)	15 km northwest
Lac Le Jeune Resort	Active	19 km south
Tobiano Golf Course	Active	22 km northwest
Recreational Hunting, Fishing, Foraging	Active	Immediately adjacent
Recreational Trails	Active and Future	Immediately adjacent
Community Infrastructure		
City of Kamloops Wastewater Management	Active	9 km north
Water Treatment Centre	Active	9 km northeast
City expansion and growth	Active and Future	<1 to 4 km north
Transportation		
Lac le Jeune Road	Active	3 km west
Highway 1	Active	6 km north
Highway 5A	Active	5 km east
Highway 5 (Coquihalla Highway)	Active	5 km west
Kamloops airport	Active	10 km north
Rail yards and lines (CP and CN)	Active	9 and 14 km north

Available information related to exercise of Aboriginal rights and title and to climate change is also considered where relevant to the cumulative effects discussion for each VC.

The level of detail for each action will differ for the CEA of each VC (e.g., the CEA for an economic VC may not require detailed information about project components and infrastructure). The source of the information will be provided in each VC section. All reasonable attempts to collect information will be documented.

The following sections provide high-level descriptions of each human action in the area of the Ajax Project. For the purposes of the CEA, where relevant data on these actions are not available, professional judgement and data from comparable projects are used to predict trends. The assumptions made as well as the data sources used are documented in each assessment category chapter.

5.3.1.1 Past Industrial Actions

Mining has an extensive history in and around the RSA. Several past mine locations are shown in Figure 5.3-2 and their activities are summarized below.

<u>Vidette Lake Mine</u>

From 1933 to 1939, the Vidette Lake Mine operated on the east side of Vidette Lake, producing 28,869 oz of gold, 46,573 oz of silver and 48 tons of copper. In the years since operation there has been further exploration.

Location: 51.15°N 120.9°W (not shown in Figure 5.3-2)

Production: 28,869 oz. of gold, 46,573 oz. of silver and 48 tons of copper from 1933 to 1939.

Facilities: Decommissioned tunnels.

Project Lifespan: 6 years.

Footprint: Mine access road and underground tunnels. The exact footprint of the other mine facilities is unknown.

Access: From Kamloops travel west on Hwy 97. After 50 km, turn right on Deadman Creek Road, and follow the road for 50 km to Vidette Lake.

<u>Afton Mine (Historical)</u>

The Afton Mine was actively mined from 1989 to 1991, and then again from 1994 to 1997. In total during these periods, approximately 17 MT of ore was extracted from both the Afton Pit, and the Ajax pits (the proposed Ajax Project will encompass the former Ajax west and east pits). Ore from the Ajax pits was hauled by truck to the main Afton site, west of Kamloops and approximately 8 km northwest of the Project site. KAM's on-going responsibilities include the tailings facilities at the Afton site, where New Gold's production facilities are currently in operation for the New Afton Mine (see below).

The historical Ajax/site is located east of Jacko Lake, approximately 3.2 km from the nearest home, and encompassed a total of 161 ha.

Location: 50°36′33″ N 120°24′10″ W

Production: 17 MT of ore extracted between 1989 and 1997.

Facilities: Decommissioned pits and access roads.

Project Lifespan: approximately 7 years active.

Footprint: Mine site, including pits, reported to have been approximately 161 ha.

Access: Via Lac Le Jeune Road (to west) or Goose Lake Road (to east).

<u>Iron Mask Mine</u>

The Iron Mask shaft is located on the north side of Iron Mask hill, about 8 kilometres west of Kamloops; the Erin shaft lies about 396 metres to the northeast and the Norma shaft about 548 metres to the north. The Iron Mask was bonded to The B.C. Exploring Syndicate, Limited, of London, England, and subsequently to the Cole Hill Gold, Silver and Copper Mining Company, Limited. Shaft sinking and drifting were in progress and in 1903 a 100 ton-per-day concentrator was completed. The company was reorganized in 1904 under the name Kamloops Mines, Limited. The concentrator was expanded to 200 tons-per-day and operations continued into 1908. The property, comprising some 16 claims and fractions, was purchased in 1909 and incorporated as the Kamloops Copper Company. A new 150 ton-per-day mill was built in 1917 and expanded to 300 tons-per-day in 1918.

The operation became unprofitable and the mine operated sporadically over the 1920s. Ownership of options changed several hands and various methods of exploration (i.e. electromagnetic surveys; diamond drilling; percussion drilling) continued from the late 1940s until the late 1980s. In 1987, Teck Corporation and Metall Mining Corporation, through Afton Operating Corporation, obtained a 10 year exploration option (to earn a 75 per cent interest if production is achieved) on the Iron Mask and adjacent properties.

Location: 50°39′17″ N 120°26′15″W (not shown in Figure 5.3-2)

Production: 3,794 oz. of gold, 14,843 oz. of silver and 2.3 kilograms of copper from 1901 to 1928.

Facilities: Decommissioned shafts and underground workings.

Project Lifespan: Sporadic production over 27 years; various exploration activities until the 1990s.

Footprint: N/A

Access: N/A

<u>Bonaparte Mine</u>

Bonaparte is a copper-gold property currently managed by WestKam Gold Corp. (previously Encore Renaissance Resources Corporation) as of 2012. In 1994 a 3,700 metric ton bulk sample was processed, and in 2010 a small 364 short ton bulk sample was processed. Exploration surveys and diamond drilling under the bulk sample pits continued in 2013 and 2014 with the goal of better defining the resource.

Location: 51°0′24″N 120°26′44″W (not shown in Figure 5.3-2)

Production: Two previous bulk samples resulted in 26.5 g/t gold and 16.28 g/t gold, respectively.

Facilities: Bulk sample pits and small exploration camp.

Project Lifespan: Still in exploration phase.

Footprint: The property area includes 2,216 hectares.

Access: The property is located 35 km north of Kamloops and is accessed via gravel roads from Westsyde Rd.

5.3.1.2 *Ongoing Industrial Actions*

Several mining and other large industry activities are ongoing within the RSA. Most of the ongoing industrial actions are shown in Figure 5.3-2 and summarized below.

<u>New Afton Mine (New Gold)</u>

The New Afton Mine is an operational copper-gold mine located approximately 350 km northeast of Vancouver in the south-central interior of British Columbia, 10 km west of Kamloops. The New Afton Mine occupies the site of the historic Afton Mine infrastructure, a previous operation of Teck Resources Limited (Teck). The New Afton deposit extends to the southwest from immediately beneath the Afton Mine open pit. New Afton began production in June 2012.

Location: 50°39'38.96"N 120°30'11.82"W

Production: Underground operation is expected to produce, on average, 85,000 ounces of gold and 75 million pounds of copper per year.

Facilities: Open pit, underground workings, historic support facilities, a new concentrator and recently constructed tailings facility.

Project Lifespan: 12 years.

Footprint: The Company's holdings in the area comprise the Afton Group and the Ajax Group. The New Afton deposit lies within the Afton Group. The Afton Group consists of 61 mineral claims included in a mining lease issued by the Ministry of Energy, Mines and Petroleum Resources on November 29, 2006 (the "Afton Mining Lease"). The total area of the Afton Mining Lease and all other claims is 12,450.4 hectares.

Access: The property is located 10 km west of Kamloops, immediately south of Highway 1 (TransCanada Highway).

<u>Highland Valley Copper Mine (Teck)</u>

The Highland Valley Copper Mine is located in south central British Columbia, approximately 15 km west of Logan Lake. This large, operational mine produces copper and molybdenum concentrates. A new life of mine plan has recently been developed, which has extended the mine life to 2027. Highland Valley Copper is an open pit operation. The processing plant uses autogenous and semi-autogenous grinding and flotation to produce metal in concentrate from the ore. Concentrates are transported first by truck to Ashcroft, BC, then by rail and to a port in Vancouver for export overseas.

Location: 50°28'24.59"N 121° 1'40.01"W

Production: 113,200 tonnes of copper and 6.1 million pounds of molybdenum.

Facilities: Multiple open pits, processing plant and concentrators, and tailings facility.

Project Lifespan: extended to 13 years.

Footprint: Multiple open pits, processing plant and concentrators, and tailings facility.

Access: The property is located 15 km west of Logan Lake, immediately west of Highway 97C (Highland Valley Road).

Domtar Kamloops Pulp Mill

The Domtar Pulp Mill is located immediately west of Kamloops on the Thompson River. This operational pulp mill was originally built by Weyerhaeuser in 1972. Since 1994, $450 million in capital improvements have been invested. A third turbo-generator was installed in 2003. The mill became part of Domtar in 2007.

One of the pulp lines was closed in 2013; Domtar reports that this closure has corresponded with a significant reduction in odour complaints, a 43% reduction in particulate emissions, and the lowest sulphur emissions since Domtar acquired the facility in 2007 (Domtar 2014a). Domtar also reported a reduction in consolidated sales by approximately 2% from 2012 to 2013 (Domtar 2014b).

Location: 50°41'23.74"N 120°24'23.52"W

Production: Annual pulp production capacity of 375,000 tonnes. Cellulose fibers: Paper grade bleached softwood kraft (NBSK) and specialty pulp grades.

Facilities: mill infrastructure includes 1 active pulp line, 3 boilers, 1 high stack (emissions from chemical recovery boiler), 2 mill-level stacks (emissions from power boilers), lime kiln, and a concentrated non-condensable gas incinerator.

Project Lifespan: Ongoing.

Footprint: estimated 100 ha for main facilities; emissions stack is located on Mount Dufferin approximately 500 m south of the facility (approximately 550 masl [i.e., 200 m above facility]).

Access: Site is located west of Kamloops on the south bank of the Thompson River, and accessed by Mission Flats Road.

Tolko-Hefley Creek Plywood and Veneer

Tolko Industries Ltd. is a private, Canadian-owned forest products company based in Vernon, British Columbia. Tolko is a major producer and marketer of lumber, veneer, plywood, oriented strand board, kraft papers, and biomass power with manufacturing operations across Western Canada. Tolko-Hefley Creek Plywood and Veneer is located approximately 18 km north of Kamloops on the North Thompson River.

Location: 50°50'27.32"N 120°16'33.10"W

Production: Mill produces wood sheathing (select, select tight-face, standard, CC exterior, CD exterior), and underlayment (square-edged, tongue-and-groove).

Facilities: Mill, Landing areas and work yard.

Project Lifespan: Ongoing.

Footprint: estimated 30 ha including open laydown areas, equipment and some covered buildings.

Access: Site is accessed by the Yellowhead Highway (Old Hwy 5), 18 km north of Kamloops on the east bank of the North Thompson River.

Lafarge Cement plant

The Lafarge Kamloops Cement Plant has been producing cement for the construction industry since 1970.

Location: 50°39'36.68"N 120° 3'44.00"W

Production: Cement capacity of 0.2 Mta. Plant produces masonry cements Type 10, Type 20, and Type 30.

Facilities: 2 mills, dry process kiln.

Project Lifespan: Ongoing.

Footprint: Cement plant, aggregate pit

Access: Site is accessed by Lafarge Road off the TransCanada Highway (Hwy 1), 19 km east of Kamloops on the north bank of the South Thompson River.

Trans Mountain Pipeline System (Kinder Morgan)

In operation since 1953, the Trans Mountain pipeline system (TMPL) transports both crude oil and refined petroleum products to the west coast. TMPL moves product from Edmonton, Alberta, to marketing terminals and refineries in the central British Columbia region, the Greater Vancouver area and the Puget Sound area in Washington state, as well as to other markets such as California, the U.S. Gulf Coast and overseas through the Westridge marine terminal located in Burnaby, British Columbia.

Refined products from Alberta are routed to Kamloops for local distribution. Kamloops is also a receiving site for products from northeastern British Columbia that are bound for the west coast.

Location: the pipeline corridor passes east of Jacko Lake and west of the existing Ajax open pit, approximate location: 50°36'33.59"N, 120°24'34.06"W

Production: volume of 23,000 m^3 (144,000 bbl).

Facilities: receiving site has two large storage tanks, linear pipeline infrastructure.

Project Lifespan: Ongoing.

Footprint: N/A

Access: the pipeline corridor can be accessed immediately within the Ajax mine site.

5.3.1.3 Future Industrial Actions

Trans Mountain Pipeline System (Kinder Morgan) – Expansion

Trans Mountain filed a comprehensive application with the National Energy Board (NEB) on December 16, 2013, initiating a regulatory review of the proposed expansion facilities.

Location: the pipeline corridor passes east of Jacko Lake and west of the existing Ajax open pit, approximate location: 50°36'33.59"N, 120°24'34.06"W

Production: The proposed expansion, if approved, would create a twinned pipeline that would increase the nominal capacity of the system from 300,000 barrels per day, to 890,000 barrels per day.

Facilities: Approximately 994 km of new pipeline, reactivation of 193 km of pipeline, 12 new pump stations to be built, 20 new tanks to be added to existing storage terminals in Burnaby (14), Sumas (1) and Edmonton (5), Westridge Marine Terminal in Burnaby to be expanded with three new berths.

Project Lifespan: 20 years of operation.

Footprint: twinning of existing pipeline corridor.

Access: the expanded pipeline corridor may be located immediately adjacent to the Ajax mine site.

If the regulatory application process is successful, construction of the new pipeline could begin as early as 2015/2016. The expanded pipeline would be operational in late 2017.

Harper Creek

Yellowhead Mining and the Harper Creek Mining Corporation propose to develop the Harper Creek copper-gold-silver mining project near Vavenby, BC (approximately 150 km north of Kamloops along Highway 5). Ore will be processed on-site, through a conventional crushing, grinding, and flotation process to produce a copper concentrate, with gold and silver by-products, which will be trucked from the Project Site along approximately 24 kilometres (km) of existing access roads to a rail load-out facility located at Vavenby. The concentrate will be transported via the Canadian National Railway network to the Vancouver Wharves storage, handling, and loading facilities at Port Metro Vancouver, for shipment to overseas smelters.

Location: approximately 25 km southeast of Clearwater, 10 km southwest of Vavenby, BC. (not shown in Figure 5.3-2)

Production: 70,000 tpd

Facilities: open pit mine, mill, tailings facility

Project Lifespan: 28 years

Footprint: N/A

Access: Jones Creek FSR off Highway 5

Highland Valley Copper (HVC) – Bethlehem Expansion

Teck is currently considering the potential expansion of activities at Highland Valley Copper through the extension of the Bethlehem mine site which is situated on the east side of HVC. The Bethlehem mine site was part of the historic mining activities in the Highland Valley area, and was operational between 1962 and 1982. If approved, mining would commence in the former open pits and pushback of the existing pit walls is planned to begin in 2017.

Location: immediately east of the existing Valley pit at Highland Valley Copper, approximate location: 50°29'43.88"N, 120°59'19.16"W

Production: 160 Mt of ore and 276 Mt of waste rock over the life of mine. Overall rates of production for HVC will remain the same.

Facilities: N/A (expected to use many of the existing HVC facilities)

Project Lifespan: 2017-2029

Footprint: extension of previously excavated Bethlehem pits east of HVC, approximately 1.5 km east of Highland Valley Rd.

Access: Highland Valley Road (Highway 97C).

5.3.1.4 Other Land Use Activities

<u>Aboriginal Harvest (Fish, Animals, and Plants)</u>

Current Aboriginal harvests—including fishing, hunting, trapping, and gathering of plants and berries—are described in Part C Aboriginal Groups information Requirements. For the purposes of the cumulative effects assessment, it is assumed that Aboriginal harvests, including species and quantities, will remain consistent with current practices.

<u>Forestry</u>

The Southern Interior Forest Region comprises the former (prior to 2003) Cariboo, Kamloops and Nelson forest regions. The Regional Office is located in Kamloops with approximately 560 full-time employees. The Southern Interior Forest Region covers 25 million hectares, approximately 60% of which is productive forest land.

The Ajax Project is located within the Kamloops Forest District, which is part of the Kamloops Timber Supply Area (TSA). The Forest Stewardship Plan for the Kamloops TSA was prepared in 2007 and in 2011; its use was extended until 2016. A Forest Health Strategy for the TSA (2009) notes that tree-killing bark beetles (including mountain pine beetle, spruce beetle, and Douglas fir beetle) continue to pose a threat to forests. At this time, small-scale salvage formed the primary response to forest damage. The Ajax Project is located in the Greenstone Beetle Management Unit, where more than 30% of the unit's 66,000 ha were identified as susceptible to the mountain pine beetle. In 2008, the Annual Allowable Cut for the TSA was determined to be 4 million cubic metres; this represents an increase in response to the mountain pine beetle epidemic, and this harvest level (and priority for beetle management) will remain in place until 2018 unless otherwise altered.

Existing forest tenures and harvest activities/areas are described in Section 8.5 Land Use. For the purpose of the CEA, it is assumed that current conditions will persist.

<u>Agriculture and Ranching</u>

Agriculture is historically significant in the City of Kamloops, shaping both its development pattern and its economy. An "Agriculture Area Plan" was developed by the City of Kamloops in 2013, and applies to agricultural lands within city boundaries. The objectives of this plan are to protect and promote local agriculture, and encourage sustainable agricultural practices.

The Agricultural Land Reserve (ALR) is a provincially designated zone in which agriculture is the priority use, and non-agricultural uses are controlled. Considering the principles of the ALR and the approvals required to deter from this priority use, it is expected that much of the area will remain within the ALR for the foreseeable future.

Ranching (including cattle grazing) is currently ongoing immediately within and adjacent to the Ajax mine site. Existing grazing tenures and activities are described in Section 8.5 Land Use. For the purpose of the CEA, it is assumed that current conditions will persist.

Industrial Roads

With the exception of roads accessing the Ajax site and planned haul roads at the site, no planned industrial roads are identified in the vicinity of the Project.

Recreation and Tourism

Tranquille on the Lake

Tranquille on the Lake is a residential, recreational and agricultural development planned at the confluence of the Tranquille River and Kamloops Lake, on the western edge of the Kamloops city limits. Recreational facilities include boating, fishing, beaches and trails.

Location: 50°43'12.27"N, 120°31'46.98"W

Facilities: Development plans include urban village-style community combined with an urban farm, community gardens and outdoor recreation opportunities.

Project Lifespan: Proposed for permanent development, with an amendment to the Official Community Plan approved by City of Kamloops in 2009. Multi-year phased development, but schedule is unknown.

Footprint: 190 ha on north shore of Kamloops Lake, including agriculture (60%), natural open space (14%) and mixed-use village development (26%).

Access: Development area can be accessed at the west end of Tranquille Road.

Lac Le Jeune Resort (and similar)

Lac Le Jeune Resort is one of a few outdoor/wilderness resorts in the vicinity of Lac Le Jeune. It has approximately 30 cabins and a main lodge. Nearby, camping is available in the Lac Le Jeune Provincial Park, and additional cabins are available at the Lac Le Jeune Wilderness Resort.

No future changes or developments have been identified in relation to the Lac Le Jeune Resort or other accommodation options in the vicinity of Lac Le Jeune. For the purpose of the CEA, it is assumed that current conditions will persist.

Location: 50°29'16.44"N, 120°29'47.58"W, approximately 19 km south of Ajax site

Facilities: Cabins, chalets, main resort building.

Project Lifespan: Ongoing.

Footprint: N/A

Access: Resort can be accessed via the Trans Canada (Hwy 1) at exit #336, and traveling east along Lac le Jeune Road; or via the Coquihalla (Hwy 5), at the Logan Lake exit.

Tobiano Golf Course Residential Resort, and Marina

Tobiano Golf Course is situated on the south shore of Kamloops Lake, west of the city. The 110-slip Bruker Marina also recently opened on site, providing boat access to Kamloops Lake. A potential future expansion to the marina (100 additional slips) is identified but no schedule is available. A lakeside residential development is also underway; some units were constructed before the property went into receivership, but a new developer is anticipating starting construction on 67 new units in 2014, with plans to construct up to 700 units over the coming years.

Location: 50°43'58.85"N, 120°41'34.30"W, approximately 22 km northwest of the Ajax site.

Production: N/A

Facilities: golf course, club house, dining facility and marina.

Project Lifespan: Ongoing with plans for future expansion of residential areas.

Footprint: N/A

Access: located on the southern shore of Kamloops Lake, immediately north of the TransCanada Highway (Hwy 1), west of Kamloops.

Recreational Hunting, Fishing and Foraging

Existing land use activities and characteristics in the vicinity of the Project – including hunting, fishing and foraging – are described in Section 8.5 Land Use. This includes the role of nearby lakes (e.g., Jacko Lake) as destinations for fishing and boating, and nearby roads and trails (e.g., Goose Lake Road, Skyline Trail) for hiking, mountain biking, and quad biking. For the purpose of the CEA, it is assumed that current conditions will persist.

Recreational Trails

The city's Trails Master Plan indicates that trails in and around the city will continue to be developed, improved and maintained. In the vicinity of the Project, this includes the Skyline Trail, which is planned along what is currently the southern border of the Aberdeen neighbourhood. The Skyline Trail would run from the eastern end of Aberdeen Drive (at Highway 5A), and travel roughly east-west, south of Willowbrae Drive and Pacific Way, across Guerin Creek to connect with the Coal Hill trail network, which would run roughly south and west of the proposed future Aberdeen Highlands development.

5.3.1.5 Community Infrastructure

City of Kamloops Wastewater Management

The majority of municipal wastewater is disposed of via the community's wastewater management system. This system serves over 95% of the City's population, as well as a portion of the Tk'emlúps Indian Band lands. Facilities were upgraded between 2012 and 2014 to increase treatment capacity from 37,000 m^3/day to 60,000 m^3/day, and upgrade treatment techniques to provide tertiary treatment. This included installation of a UV disinfection system, and a gas collection cover.

Location: 50°41'28.98"N, 120°24'58.89"W

Production: Disposal system for treated wastewater, including direct outfall to the Thompson River accounts for approximately 80% of total discharge.

Facilities: Wastewater treatment facilities comprise a series of anaerobic (oxygen-free) and aerated ponds coupled with phosphorus removal, chlorination/de-chlorination and sludge disposal facilities.

Project Lifespan: Ongoing.

Footprint: Wastewater Treatment Plant located on Mission Flats Road

Access: Site is located west of Kamloops on the south bank of the Thompson River, and accessed by Mission Flats Road, immediately west of the Domtar Pulp Mill.

City of Kamloops Water Treatment Centre (Potable Water)

The majority of potable water for domestic use is obtained from the South Thompson River and treated at the Kamloops Water Treatment Centre, a relatively new treatment plant that began operations in 2005. Specific neighbourhoods on the outskirts of the city receive water from distinct water systems. This includes the Campbell Creek system to the east (operated by the City of Kamloops) and the Rayleigh and Heffley systems to the north (both operated by private utilities).

The treatment centre uses a membrane filtration system, along with disinfection through chlorination. The construction of the new facility was part of a broader program to improve the municipal water supply and water quality (including reducing turbidity, remove total organic carbon, and eliminate water-borne organisms). Prior to the installation of the membrane filtration system, water was filtered at intake (3 mm screen) and chlorinated; concerns associated with this approach included visible turbidity and the persistence of organisms such as *Cryptosporidium* and *Giardia*.

To address the risk of potential water contamination affecting the existing water intake (located near River Street on the South Thompson River), the city is also planning to develop an emergency water intake on the North Thompson River (Yates Road). This facility would only operate under an emergency shut-down of the primary water supply system. No other anticipated changes are identified.

Location: 50°40'27.86"N, 120°18'29.64"W (Treatment Centre)

Production: Collection and treatment of water from South Thompson River. The current throughput of the centre is 160,000 m^3/day, though the system has the capacity to process up to 200,000 m^3/day.

Facilities: Treatment using coagulants, membrane filtration, and chlorination. Facility is designed to accommodate UV disinfection in future.

Project Lifespan: Ongoing.

Footprint: Aboveground treatment facility approximately 250 m^2, located on River Street at 13th Avenue.

Access: Site is located adjacent to downtown Kamloops on the south bank of the Thompson River, and accessed from River Street.

Stormwater Management

Stormwater in most areas of southern Kamloops is collected by drainage catch basins and storm sewers and discharged directly to the Thompson River or local creeks (including Peterson and Guerin creeks). Stormwater management is a focus for the Aberdeen community as it directly relates to maintaining slope stability. There are a number of outfalls to the Thompson River system. In North Kamloops and rural areas, stormwater infrastructure is limited and water drains to nearby porous surfaces.

As of 2008, the City was looking to improve stormwater control, including limiting discharges of suspended solids and oil/grease accumulated during runoff. However, no further (or more recent) details are available.

City Expansion and Growth

Kamloops' official community plan (KAMPLAN; 2014) and associated neighbourhood plans (specifically the Aberdeen Area Plan; 2008) describe the expected community development, population growth, and associated changes in land use. These plans have been developed based on forecasts that the Kamloops population will grow to 120,000 by 2036, with an associated increase of up to 10,000 new residents in the Aberdeen neighbourhood. Thus, a total of 4,000 new residential units are planned in Aberdeen, including both single- and multi-family dwellings.

Ongoing Residential Developments: West Highlands

At the existing southwest edge of the developed urban area, the West Highlands residential community is one of the city's largest master planned communities. With 60 ha of development land, the developer plans for 1,300 housing units (a mix of single- and multi-family dwellings) with views over broader Kamloops, plus associated recreation space including a 20 ha district park. To date, over 100 serviced single family lots have been established, in addition to four lots zoned for low-density multi-family developments, a site for a municipal firehall, and site for a large commercial daycare facility.

Future Residential Developments

Planning documents support the development of future residential areas along the south edge of the Aberdeen neighbourhood. This includes the Edinburgh Heights subdivision (zoned for 1,600 new units), which at its closest edge could be approximately 850 m north of the northern boundary of the Project (in relation to the Overburden and Topsoil stockpiles). Adjacent to and east of this subdivision, the proposed Aberdeen Highlands subdivision plans for 1,700 units. Additionally, an area adjacent to and south of the Pacific Way Elementary School (on the south edge of the existing neighbourhood) is zoned for development as a seniors' residence.

5.3.1.6 Transportation Infrastructure

Lac le Jeune Road

West of the Ajax site and east of Highway 5, Lac Le Jeune Road roughly parallels to Highway 5 and provides access to Lac le Jeune and numerous other lakes and wilderness areas. Many of these areas are known destinations for outdoor activities including fishing and boating, mountain biking, camping, and cross country skiing (e.g., the Stake Lake Nordic Centre and trails).

Location: 50°36'58.40"N, 120°26'36.47"W

Production: N/A

Facilities: Two-lane road.

Project Lifespan: Ongoing.

Footprint: N/A

Access: From Frontage Rd. to the north and Highway 5 to the south.

HWY 1 (Trans-Canada Highway)

Highway 1 (known as the Trans-Canada Highway) is the primary east-west connection through British Columbia and is a vital route for travel, tourism and trade. Construction began after World War II and was completed with the last section at Rogers Pass, in the Selkirk mountain range, connecting the route from Kamloops to the Alberta border. The provincial government has made substantial investments towards improving HWY 1 between Kamloops and the Alberta border, including an initiative to make all remaining sections along that stretch four-lane; initiated in 2001 and planned to be complete by 2022 (BC MOTI 2014) .

Location: 50°39'56.77"N, 120°27'23.8"W (in Kamloops, at HWY 5 intersection)

Production: N/A

Facilities: Existing four-lane highway.

Project Lifespan: Ongoing.

Footprint: N/A

Access: N/A

Highway 5A

Highway 5A originates south of Kamloops at the Highway 3 intersection in Princeton, continues north for 86 km to Merritt, and then travels a further 88 km north to Kamloops. Highway 5A is a key link in the transportation network for the Southern Interior Region and also serves as an alternate low elevation route when Highway 5 is closed.

Location: 50°37'67.56"N, 120°19'8.72"W (just south of Kamloops)

Production: N/A

Facilities: Existing two-lane highway.

Project Lifespan: Ongoing.

Footprint: N/A

Access: N/A

Highway 5

South of Kamloops, Highway 5 (known as the Coquihalla Highway) opened in 1987 and connects Kamloops to the Lower Mainland. The road was previously a toll road (between Hope and Merritt) though the tolls were lifted in 2008. The speed limit was increased from 110 km/h to 120 km/h in 2014. No notable upgrades or other highway projects are identified for this stretch of road, based on the Ministry of Transportation and Infrastructure's current service plan (2014-2017).

Location: 50°36'36.09"N, 120°28'25.48"W

Production: N/A

Facilities: Existing four-lane highway.

Project Lifespan: Ongoing.

Footprint: N/A

Access: N/A

Kamloops Airport

The existing Kamloops Airport is located on the north shore of the South Thompson River. The airport is also home to a forest fire control centre. Terminal renovations and a 2,000-foot runway extension were completed in 2009.

Location: 50°42'18.40"N, 120°26'29.90"W

Production: $38.9 million to Gross Domestic Product, 610 person-years employment generating $27.8 million in household income, $8.3 million in taxes to all levels of government

Facilities: Airport terminal, airfield and associated infrastructure.

Project Lifespan: Ongoing.

Footprint: N/A

Access: immediately west of Kamloops on the north shore of the South Thompson River, travel along Tranquille Road west to Airport Road.

Rail Yards and Lines (CP and CN)

Rail lines follow along the North Thompson and South Thompson river valleys and pass through the centre of Kamloops. In addition to cargo service, passenger rail services are provided by VIA Rail and Rocky Mountaineer.

Location: CP yard: 50°40'39.68"N, 120°19'33.73"W; CN yard: 50°43'17.13"N, 120°20'43.09"W.

Production: N/A

Facilities: Rail yards and numerous rail lines.

Project Lifespan: Ongoing.

Footprint: N/A

Access: The CP yard is accessed at various locations in the Kamloops city centre. The CN yard is accessed by the Yellowhead Highway (Hwy 5 North), and traveling west on CN Road.

5.3.2 Interaction between Residual Project and Other Project Effects

Residual effects carried forward from the Project-specific assessment are considered in combination with the residual effects of past, present, and future human actions, where some spatial and temporal overlap occurs. Unless there is a spatial overlap, temporal overlap is considered irrelevant.

The results are presented in an impact matrix, as shown in Table 5.3-2. If there is no spatial and temporal overlap between the residual effects of the Project and those of another human action, the relevant cell is marked with a dash (-). Where there is spatial and temporal overlap, but no interaction is anticipated, the cell is marked grey (●), and a rationale as to why no interaction is predicted is given in the accompanying text. If there is overlap, and an interaction is anticipated, the cell is marked with a green (●), yellow (●), or red (●) and summarized in the footnotes to Table 5.3-2. Supporting rationale for the rankings assigned to interactions is then provided in the text.

Table 5.3-2. Example of Ranking Potential for Residual Effects to Interact Cumulatively with Effects of Other Human Actions on a Valued Component

Ajax Project Residual Effect	Potential for Cumulative Effect with Other Human Actions						
	Human Action 1	Human Action 2	Human Action 3	Human Action 4	Human Action 5	Human Action 6	Human Action 7
Residual Effect 1	L	L	O	L	M	-	-
Residual Effect 2	H	-	M	H	-	M	-
Residual Effect 3	-	H	H	H	M	M	-
Residual Effect 4	-	M	M	M	-	-	-
Residual Effect 5	L	L	-	L	-	-	-
Residual Effect 6	M	-	M	M	-	M	-
Residual Effect 7	L	L	-	L	-	-	-
Residual Effect 8	-	-	-	-	-	-	-

Notes:

(-) *No spatial or temporal overlap.*

O *Spatial and temporal overlap, but no interaction is anticipated, no further consideration warranted.*

L *Negligible to minor interaction expected; implementation of best practices, standard mitigation and management measures; no monitoring required, no further consideration warranted.*

M *Potential moderate interaction requiring unique active management/monitoring/mitigation; warrants further consideration.*

H *Key interaction; warrants further consideration.*

As in the Project-specific effects assessment, only potential adverse effects ranked as moderate or major (yellow or red) before active application of mitigation measures will be carried forward in the CEA.

5.3.3 Proposed Mitigation Measures

The potential effects identified as yellow or red are next described in detail in each chapter of the Application/EIS. Where data are lacking, assessors employ best professional judgement, and document the specific data limitations encountered and assumptions made.

After describing each potential effect, any additional measures proposed as mitigation are identified and summarized. Quantitative, semi-quantitative, and qualitative techniques are used to assess the anticipated results of this mitigation, and the specific methods and assumptions used are documented.

Potential cumulative effects that are expected to persist after mitigation measures are applied are called **residual cumulative effects**. In light of the relevant mitigation measures proposed, anticipated residual effects are also described. This step of the assessment is summarized in a format similar to the one presented in Table 5.3-3.

Table 5.3-3. Example of Summary of Residual Cumulative Effects

Ajax Project Activity	Other Human Action Activity	Description of Potential Cumulative Effect	Description of Mitigation Measure(s)	Description of Residual Cumulative Effect

If a potential effect is judged to be fully mitigated, it is not considered further in the CEA; only residual cumulative effects are carried forward and characterized.

5.3.4 Evaluation of Significance of Residual Cumulative Effects

The residual cumulative effects to VCs are next characterized using the same criteria described in Section 5.2 (e.g., Magnitude, Geographic Extent, Duration, Frequency, Reversibility, and Context). Each assessment chapter documents if and how these generic criteria have been tailored to the specific assessment category. Narrative descriptions and justifications for the application of each descriptor are provided in the accompanying text.

Significance, probability, and confidence are also assessed using the same criteria described in Section 5.2. A summary of the assessment of residual cumulative effects is provided at the conclusion of each assessment chapter in a format similar to that presented in Table 5.3-4.

Table 5.3-4. Example of Characterization of Residual Cumulative Effects, Significance, Likelihood, and Confidence

Residual Cumulative Effect	Effect Characterization						Significance	Likelihood	Confidence
	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Context			
Effect 1									
Effect 2									
Effect 3									
Effect 4									

5.4 CONCLUSION

The Application/EIS will provide a summary description of the key residual and cumulative residual effects and the Proponent's conclusion on the potential for significant adverse environmental effects resulting from the Project.

A summary of the residual Project and cumulative effects is provided at the conclusion of each assessment chapter in a format similar to that presented in Table 5.4-1.

Table 5.4-1. Example of Summary of Residual Effects, Mitigation, and Significance

Residual Effects	Project Phase	Mitigation Measures	Residual Effect Significance	Residual Cumulative Effect Significance
Description of Residual Effect 1				
Description of Residual Effect 2				
Description of Residual Effect 3				

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