Coffee Gold Mine – YESAB Project Proposal
Technical Appendix 24-B – Visual Analysis

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TABLE OF CONTENTS

List of Tables

List of Figures

1.0 INTRODUCTION

This appendix report provides a technical analysis of visual quality for the Mine Site and barge landing sites for the proposed Coffee Gold Mine (Project). Visual quality of a region is represented by the scenic and visual aesthetic components of a landscape. Scenic landscapes are valued by residents and visitors in the Yukon Territory. Scenic viewing is an important component of recreation, trapping and tourism as well as for First Nation cultural activities near the mine and barge loading sites primarily along the Yukon River.

This analysis supports the Land and Resource Valued Component (VC) assessment by examining the potential for the Project to result in adverse changes on visual resources in the Project area and surrounding landscape. Operation of the Mine Site and barge loading sites will likely produce anthropogenic changes to the existing conditions of the sites. As a result, views from locations along the Yukon River and at a camp area for Yukon Wide Adventures may be altered from existing conditions.

The scenic value of the area is important to individuals in the area, tourist companies, trappers, and First Nations that use the area for berry picking, moose hunting, fishing, and medicinal plant collection. Visual quality in the area is a valued resource and maintaining the existing value is of concern.

2.0 SCOPE AND METHODS

The scope and methods used in this analysis are outlined below with details on regulatory context, spatial and temporal boundaries and indicators used to determine potential changes.

2.1 REGULATORY CONTEXT

There are no specific visual quality regulations established in Yukon, thus, this analysis references British Columbia (BC) provincial objectives as outlined in the British Columbia Ministry of Forests, Lands and Natural Resource Operations' (BC MFLNRO) *Visual Impact Assessment Guidebook* (BC MFLNRO 2001) and the United States Department of the Interior (USDI) Bureau of Land Management's Visual Resource Management Manual (USDI 1986). These guidance documents provide methods to compare pre-development existing visual conditions to simulated post-development visual conditions for the assessment of potential effects of a Project.

In BC, visual quality objectives (VQOs) are provided for by the *Government Action Regulation*, B.C. Reg. 582/2004 and established under the *Forest and Range Practices Act*, SBC, 2002, c. 69 (FRPA). Visual quality objectives identify levels of scenic quality based on physical characteristics and social considerations for a given area. With forestry resource development projects, the FRPA requires consideration of VQOs and the BC provincial government encourages other resource sectors to follow the forestry lead. Consequently, mining and recent LNG resource development projects that require environmental assessments have used the guidance established by the MFLNRO. Moreover, to broaden the understanding of the resource development visual impacts, the MFLNRO conducted a recent study (MFLNRO 2015) to assess the impact of wind energy projects on visual quality and to provide guidance in reducing visual effects for future projects.

2.2 INDICATORS OF VISUAL QUALITY CHANGE

Two indicators of visual quality change were selected based on the previously noted visual assessment guidelines (**Table 1**). The first, visibility of Project components from receptor (viewpoint) sites refers to the change in the visible extent of the Project area from the receptor sites. The second is the predicted scenic value of proposed Project and landscape from receptor (viewpoint) sites, that is, the changes to scenic value based on alteration created by Project components visible from receptor sites.

Table 1 Indicators for Visual Quality

Indicator	Rationale for Selection
Visibility of Project Components from receptor (viewpoint) sites	Visual Impact Assessment Guidebook (MFLNRO 2001)
Predicted scenic value of proposed Project and landscape from receptor (viewpoint) sites	Visual Impact Assessment Guidebook (MFLNRO 2001)

2.3 ANALYSIS BOUNDARIES

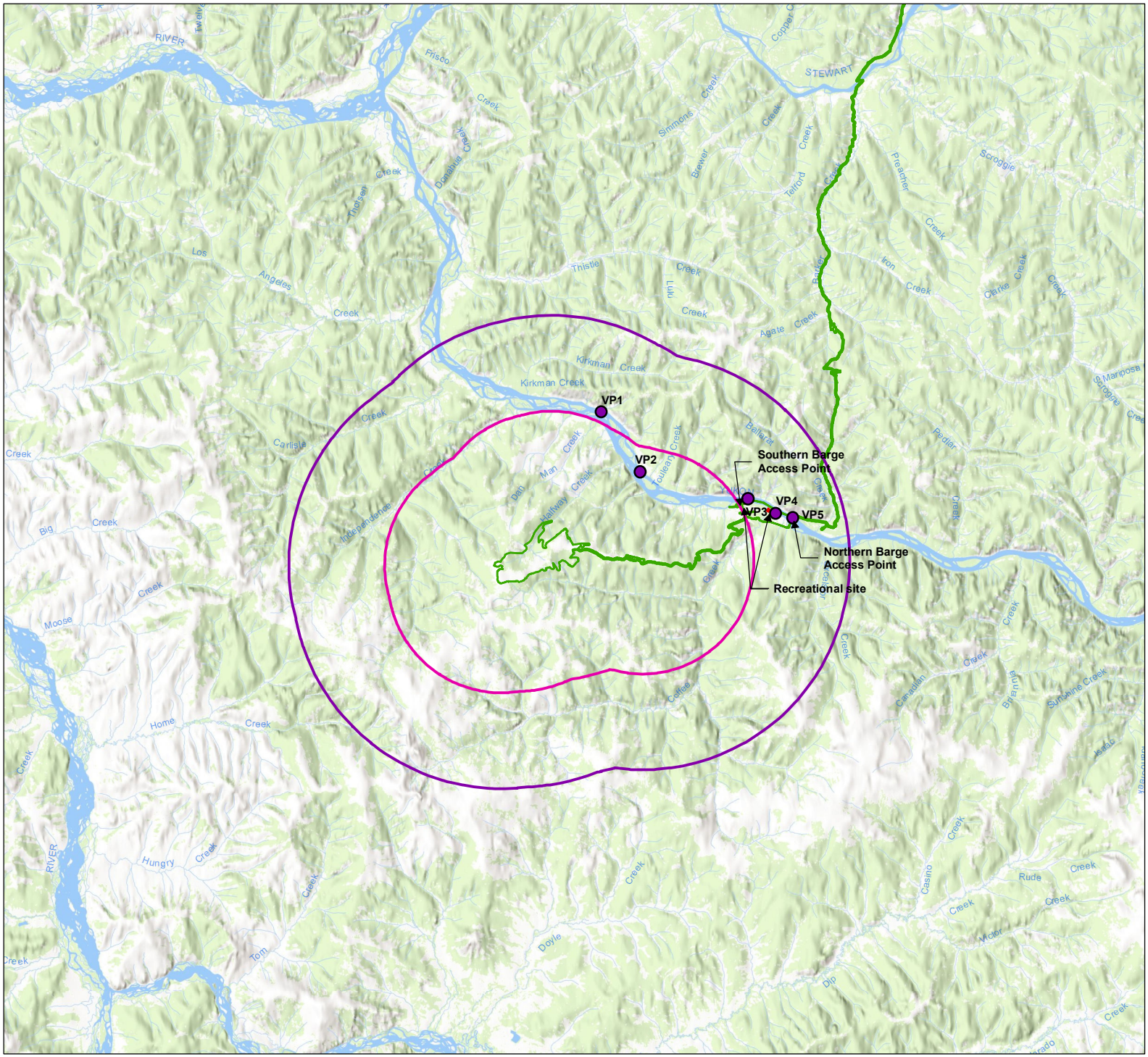
Spatial and temporal boundaries for the analysis of Project-related changes to visual quality and the rationale for selecting these boundaries are discussed in this section.

2.3.1 Spatial Boundaries

The local study area (LSA) and the regional study area (RSA) are defined in **Table 2** and are shown with the viewpoints on **Figure 1.**

Table 2 Spatial Boundary Descriptions for Visual Quality

Spatial Boundary	Description of Study Area
Local Study Area	The LSA boundary includes viewing locations and sensitive receptor areas within 8 km of the Project to account for foreground and middle-ground viewpoints.
Regional Study Area	The RSA boundary includes viewing locations and sensitive receptor areas between 8 km and 15 km from the Project to account for background viewpoints.
Cumulative Changes Study Area	Same as the RSA.



COFFEE GOLD MINE

Visual Resources Spatial Boundaries and Viewpoint Locations

Legend

- Visual Receptor
- Project Footprint
- Visual Resources LAA
- Visual Resources RAA
- Tourism and Recreational Area

Notes

1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

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Figure 1	Date: Mar 25, 2017	Drawn by: JS	Reviewed: DP

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The spatial boundaries of the study area encompass the area within which the Project is expected to interact with and potentially affect visual quality. To determine the LSA and RSA boundaries, consideration was given to the nature and characteristics of the existing visual quality and the potential changes that may result from the mine and barge landing sites. The boundary extents were determined based on viewing distances as defined in the *Visual Landscape Inventory: Procedures and Standards Manual* (MOF 1997) and are described in **Table 3**.

Table 3 Visual Quality Viewing Distance Zones

Zone	Zone Description
Foreground	Up to 1 km the maximum discernment of detail, texture, and contrast of visible components are available.
Middle-Ground	Between 1 km and 8 km from the Project where the emergence of overall shapes and patterns and some texture and colour is still evident.
Background	Beyond 8 km outlines of general shapes and patterns are visible with little discernible texture and colour, and a strong sense of overall perspective. The maximum extent for the background zone that would provide a potential view is 15 km.

2.3.2 Temporal Boundaries

Temporal boundaries for the analysis of Project-related changes on visual quality were established based on the potential for each phase of the Project to interact with and change visual quality. Primarily the Operation Phase of the Project includes components and activities that could interact with and affect visual quality within the LAA and RAA; therefore, the following temporal boundaries were defined for the visual quality analysis:

- Existing conditions
- Project Operation, including maintenance.

3.0 EXISTING CONDITIONS

3.1 INTRODUCTION

This section describes the existing conditions and methods to establish the selection of viewpoints and analysis of potential changes to visual quality within the study areas.

3.2 VISUAL CONDITION

Visual condition is a parameter used to describe the existing level of landscape alteration caused by human activities (MOF 1997). Visual quality class definitions as outlined in **Table 4** are used to classify the existing condition for each viewpoint. The class definitions have a description and a measurable allowable alteration.

Table 4 Visual Quality Class Definitions

Visual Quality Class	Definition	Alteration (%)
Preservation	• Largely natural landscape. • Any human development on the landscape is very small in scale.	0
Retention	• Mostly natural landscape. • Any human development on the landscape is difficult to see and small in scale.	0–1.5
Partial Retention	• Part of the landscape is natural. • Human development is easy to see and is small to medium in scale.	1.5–7
Modification	• The natural landscape is marginally present. • Human development is very easy to see and large in scale.	7–20
Maximum Modification	• Human development dominates the landscape.	>20

3.3 SELECTED VIEWPOINTS

Four viewpoints in the LAA and one in the RAA were chosen to represent sensitive receptor areas with views of the mine and barge loadout sites. A brief description of the location and distance from the mine or barge is provided in **Table 5**.

Table 5 Viewpoint Locations

Viewpoint #	Description	Distance (km)
VP1: Mine view from Yukon River	The most westerly part of the Yukon River where the mine can be seen in the field of view.	Mine: 8.5 km
VP2: Mine view from Yukon River	A section of the Yukon River where the mine is at its closest distance.	Mine: 5.6 km
VP3: South Barge Loadout View from Yukon River	A location on the Yukon River opposite of the south barge loadout.	Barge: 260 m
VP4: Yukon Wide Adventures camp view of North Barge Loadout	A section along the south bank of the Yukon River where a potential camp may be established for Yukon Wide Adventures	Barge: 1.4 km
VP5: North Barge view from Yukon River	A location on the Yukon River opposite of the north barge loadout.	Barge: 185 m

Consideration was given to the potential for changes in views in the Coffee Creek valley. While there will likely be views of bridge within short distances from the bridge, vegetation will likely limit the views from farther distances. No other infrastructure is located in the Coffee Creek valley. Views of the Northern Access Route on the ridgetop to the west, and the Mine Site, will either be not be visible or the dense forest cover will obstruct the view from within the valley. Therefore, a viewpoint within the Coffee Creek valley was not selected.

3.4 EXISTING VISUAL QUALITY

Existing visual quality class (VQC) of the selected viewpoints are presented in **Table 6**. All of the viewpoints have a visual class of Preservation as their view is of the natural landscape except for VP3 which is designated Retention due to its small-scale view of the existing Coffee Creek camp facilities.

Table 6 Viewpoint Existing Visual Quality Class

Viewpoint	Existing Visual Quality Class
VP1: Mine view from Yukon River	Preservation
VP2: Mine view from Yukon River	Preservation
VP3: South Barge Loadout View from Yukon River	Retention
VP4: Yukon Wide Adventures camp view of North Barge Loadout	Preservation
VP5: North Barge view from Yukon River	Preservation

4.0 ANALYSIS OF POTENTIAL CHANGES

The methodology adopted for this analysis comprises approved visual standards and procedures to analyze the nature and degree of potential Project-related changes in visual quality. The analysis includes a qualitative evaluation of the extent to which overall visual quality would change as a result of the Project and has followed four primary steps listed and described herein:

1. Simulate existing and future visual conditions.
2. Comparison existing and future visual conditions.
3. Analyze visual changes.
4. Determination of Significance.

4.1 SIMULATION OF EXISTING AND FUTURE CONDITIONS

Coffee Creek 3D existing and future visualization images were generated by 3D modelling software (Terragen and Maya). Real world GIS data consisting of topography, aerial imagery, and engineering designs were incorporated into the 3D visualization model. Vegetation classification was conducted using a simple technique based on green shade and shape analysis of 0.5 m resolution aerial imagery to produce density and distribution masks for placement of specific 3D model tree species. Topographic information consisting of high resolution Lidar data collected at the mine site and Yukon River and lower resolution online digital elevation model data were processed and loaded into the 3D model for the construction of landscape surfaces. Ground surface textures were applied using functional methods and tailored to match available photos taken at various locations around the mine site and along the Yukon River. Engineered ground surfaces depicting proposed barge landings were modelled based on preliminary plan view CAD outlines and representative detailed drawings for the proposed Stewart River barge crossing. 3D models of structures at the barge landings (barge, flatbed truck, storage shed, and gatehouse) were accessed from various online sources and modified according to the proposed specifications. Photos of the existing Yukon River barge landing and Jacob's Barge at Minto's landing were used as visual aids for modelling the proposed barge landings.

4.2 POTENTIAL CHANGES: COMPARISON OF EXISTING AND FUTURE CONDITIONS

The simulations with the mine and barge landings were used to rate the future VQC from each viewpoint, based on the classifications defined in **Table 4**. The future VQC ratings were compared with the existing VQC ratings to determine potential changes in visual quality as a result of the Project.

The potential change on visual quality is characterised as increased visibility of anthropogenic features at the mine and barge loadout and change in VQC rating as seen in the visual simulations for each future simulated viewpoint. Existing and potential views from each of the viewpoints along with their VQC ratings are presented in **Table 7**.

Table 7 Comparison of Existing and Future Viewpoints Visual Quality Classes

Viewpoint ID	Existing Visual Quality Class	Existing Conditions	Visibility of the Project	Future Visual Quality Class with the Project	Simulated Potential Conditions	Change in Visual Quality Class?
VP1: Mine view from Yukon River	Preservation		This location will have views of the mine site pit location from a distance of 8.5 km.	Retention		Yes
VP2: Mine view from Yukon River	Preservation		This location will have views of the mine site pit location from a distance of 5.6 km	Retention		Yes

Viewpoint ID	Existing Visual Quality Class	Existing Conditions	Visibility of the Project	Future Visual Quality Class with the Project	Simulated Potential Conditions	Change in Visual Quality Class?
VP3: South Barge Loadout View from Yukon River	Retention		This location will have views of the barge loadout and has existing views of the Coffee Creek camp.	Partial Retention		Yes
VP4: Yukon Wide Adventures camp view of North Barge Loadout	Preservation		This location will have a very small sized (less than 1%) view of the south barge loadout.	Retention		Yes

Viewpoint ID	Existing Visual Quality Class	Existing Conditions	Visibility of the Project	Future Visual Quality Class with the Project	Simulated Potential Conditions	Change in Visual Quality Class?
VP5: North Barge view from Yukon River	Preservation		This location is will have a view of the north barge loadout.	Partial Retention		Yes

Four of the five viewpoints have a VQC increase of one class. VP5 which entails a view of the north barge loadout has an increase of two classes from Preservation to Partial Retention due to the increase in Project infrastructure in the field of view to approximately 7 % of the overall area. None of these increases extend the VQC to the Modification class.

4.3 MITIGATION

Potential mitigation measures for the barge loading sites include:

1. Keeping the shoreline area treed as much as possible or planting trees to create a buffer for facility buildings
2. Enhancing the vegetation along the shoreline to buffer the riprap rock retaining walls
3. Designing the facility to be more aesthetically pleasing, e.g. to blend in with the surrounding landscapes, without compromising safety.

4.4 RESIDUAL CHANGES

Residual changes from the Project on visual quality will remain after potential mitigation measures are implemented. These residual changes are characterized in **Table 8** as low in magnitude, local in extent, long-term duration, infrequently observed, and partially reversible.

Table 8 Characterization of Residual Changes

Criteria	Criteria Rating	Rationale for Criteria Rating
Magnitude	Low	It will result in a barely noticeable change for the mine site view locations and a moderate change for the two barge viewpoints. A low change is likely for the Yukon Wide Adventure camp.
Extent	Local	The changes are most evident on the Yukon River at the barge loadouts and limited to the LAA.
Duration	Long-term	The change will be experienced for the duration of time that the barge loadouts are operating.
Frequency	Continuous	The change is continuous as the potential viewscape disturbances will last for the life of the Project.
Reversibility	Partially reversible	The existing visual conditions will not be completely restored since as small part of the hillside (in view) will be removed.

From the criteria summarized in **Table 8** the overall conclusion is that the residual changes will be low. The magnitude is low due to only a very small portion of the mine site being visible and the barge loadout being only visible for short periods while travelling the Yukon River. Although the duration of the change is long-term, for the life of Project operation, it will be infrequent and local in extent, and partially reversible. The confidence in the determination is high based on the simulation of future conditions.

5.0 REFERENCES

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