EAGLE GOLD PROJECT

Supplementary Information Report (SIR)

YUKON ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENT BOARD PROJECT NO. 2010-0267

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1 INTRODUCTION

1.1 BACKGROUND

On December 20, 2010, Victoria Gold Corp. (VIT) filed its initial application for the Eagle Gold Project (the Project) pursuant to the *Yukon Environmental and Socio-economic Assessment Act* (YESAA) with the Yukon Environmental and Socio-economic Assessment Board (YESAB). In June 2011, VIT filed the Eagle Gold Project Proposal for Executive Committee Review (the Project Proposal) that was revised to incorporate additional information as requested by YESAB during the adequacy review stage of the screening assessment. On July 22, 2011, the Executive Committee commenced its review of the Project Proposal for adequacy which included an opportunity for the public, government, and regulatory authorities to assess and ask questions in relation to the Project Proposal. After review of the supplementary information, the Executive Committee notified VIT that it had determined the supplementary information was sufficient to commence completion of the Draft Screening Report.

The following Table 1.1-1 is a summary of YESAA review milestones for the Eagle Gold Mine Project Proposal as of March 2012.

Table 1.1-1: Eagle Gold Mine Project Proposal Review Timeline Milestones

Date	Milestone
December 20, 2010	VIT submits Eagle Gold Mine Project Proposal to the YESAB.
January 21, 2011	YESAB Executive Committee determines that VIT met the statutory requirement under Section 50(3) of the YESAA relating to consultation.
January 21, 2011	YESAB begins Adequacy Review period to review Project Proposal.
March 23, 2011	YESAB extends Adequacy Review period.
March 29, 2011	YESAB provides Adequacy Review Report to VIT to request supplementary information.
May 24, 2011	VIT submits supplementary information to YESAB.
June 23, 2011	YESAB extends Adequacy Review period to review supplementary information.
July 15, 2011	VIT submits revised Project Proposal including supplementary information.
July 18, 2011	YESAB completes and Publishes Notice of Screening.
July 22, 2011	YESAB issues Preliminary Statement of Scope of Project.
July 22, 2011	YESAB's Screening Review / Public Comment Period begins.
August 12, 2011	YESAB extends Public Comment Period to August 31, 2011.

August 24, 2011	YESAB sponsors public meeting in Village of Mayo.
August 31, 2011	YESAB's Public Comment Period ends.
September 1, 2011	YESAB's Screening Review / Considering Comments Stage begins.
September 14, 2011	YESAB issues revised Preliminary Statement of Scope of Project.
September 16, 2011	YESAB issues VIT a request for supplementary information as a result of public comments.
December 2, 2011	VIT submits a response to YESAB's request for supplementary information.
December 16, 2011	YESAB notifies VIT that supplementary information is sufficient to commence with completion of the Draft Screening Report.
February 27, 2012	VIT notifies YESAB of release of Feasibility Study and a number of project refinements that optimize engineering design and mitigation measures presented in the Project Proposal.
March 23, 2012	YESAB states that the project refinements are material to the screening of the Eagle Gold Mine Project Proposal and requests supplementary information to complete the Draft Screening Report.

1.2 REPORT SUMMARY

During the time VIT filed its original application for the Project and the Executive Committee deemed the Project Proposal and supplementary information sufficient to commence with completion of the Draft Screening Report, VIT undertook additional engineering work to optimize both the technical and economic feasibility of the Project.

To enable further development of the Project, VIT recently completed a Feasibility Study (Tetra Tech 2012) that conforms to the *NI-43-101 Standards of Disclosure for Mineral Projects*. As background, a Pre-feasibility Study defines the Project, including selection of configuration and mining methods, and establishes the project's technical and economic viability; whereas, a Feasibility Study refines that information and advances engineering studies to a level of detail that provides the basis for engineering, financing, and commercial production. A Feasibility Study is a fundamental part of the planning process for development of mining projects.

The Project Proposal submitted to YESAB in June 2011 was, in part, based upon a Pre-feasibility Study completed in 2010 (Scott Wilson Mining). The 2012 Feasibility Study optimizes the mine design to take into account new information from: continued engineering investigations, updated geologic modeling, changed market conditions, and input from the environmental assessment process. As such, the Tetra Tech 2012 Feasibility Study refines certain Project components currently under assessment by YESAB.

This Supplementary Information Report (SIR) describes refinements to the Project that respond to continued engineering investigations, geology, market conditions, and input from the assessment process. The Project refinements encompass design improvements to the Project. However, it is important to note that these Project refinements do not fundamentally change the scope or nature of the Project; rather, they confirm the Project is both technically and economically feasible. In our view, the refinements provide enhanced design, mitigation, and overall sustainability of the Project. In addition, the refinements result from optimized engineering analysis, improvements to predictive models, and geotechnical assessment completed in support of the Feasibility Study.

1.2.1 Summary of Project Refinements

There are two primary types of Project refinements to the proposed Eagle Gold Project: those associated with current market conditions (i.e., increased gold price which allows for increased ore production) and those that are design improvements that in many cases result in increased environmental protection. The following is a summary of the Project refinements – a more detailed description of each refinement is presented per project phase and component that is consistent with the presentation in Section 5.0: Project Description of the Project Proposal (Stantec 2010).

Project refinements associated with increased ore production include:

- Total ore production and volume of the heap leach facility (HLF) increased from 66 million tonnes to 92 million tonnes.
- Area of the open pit footprint increased from 65 hectares to 85 hectares.
- Total tonnage of waste rock produced increased from 66 million tonnes to 132 million tonnes and combined waste rock storage area footprints from 113 hectares to 139 hectares.
- Operations phase of the Project increased from 7.3 years to 9.2 years.

Project refinements associated with improvements to design and mitigation measures include:

- Increased ore production rate from 26,000 tonnes per day to 29,500 tonnes per day.
- Enhanced the site-wide comprehensive Water Management Plan based on an optimized surface water balance model and an integrated water quality model using GoldSim software.
- Use of conventional crushing method versus High Pressure Grinding Rolls for the tertiary crushing stage.
- Improved HLF liner system that includes the use of linear low density polyethylene (LLDPE) and geosynthetic clay liners as opposed to polyvinyl chloride (PVC) and natural material. Consistent with the previously proposed system, the refined system includes a “double” liner in the upper sections of the HLF and a “triple” liner in the lower sections of the HLF that incorporates a leak detection and recovery system and a leachate collection and recovery system.

- Refined the Dublin Gulch Diversion Channel design and embankment structures.
- Stacked crushed ore in a 100-day temporary ore storage area during winter versus winter stacking directly on the HLF.
- Reduced grid energy requirements during winter operations. Ore destined for the 100-day temporary ore storage area will only undergo primary crushing prior to being stockpiled. During non-winter operations, the stockpiled ore will be fed back into the crushing circuit for secondary and tertiary crushing.
- Connection to the Yukon energy grid to supply power for the Project during the construction phase.
- Included progressive reclamation of waste rock storage areas (WRSA) for Platinum Gulch WRSA and Eagle Pup WRSA. The Eagle Pup WRSA was not originally included for progressive reclamation. Lower areas will be progressively reclaimed as the stacking plan for the Eagle Pup WRSA includes a 'bottom up' approach.
- Expansion and use of the existing exploration camp for the construction and operations phases (temporary accommodations will be added for construction as needed; permanent facilities will be located where the current exploration camp is located).
- Proposed a new location for explosives facilities outside of the existing footprint and within the Haggart Creek watershed.
- Proposed a new HLF access road outside of existing footprint and within the Haggart Creek watershed.
- Removed the need for a low grade ore stock pile.
- Proposed treatment of sewage entirely on-site removing the need for transportation to and disposal of sewage sludge at the Mayo Sewage Treatment Facility.

1.2.2 Scope of Project

The overall scope of the Eagle Gold Project remains unchanged. The purpose of the Eagle Gold Project is to design, construct, operate, close, and reclaim a gold mine in central Yukon.

Key components of the Project include:

- Open pit mining of a primary gold deposit using conventional blast, truck, and shovel methods.
- Two waste rock storage areas.
- One heap leach facility.
- Gold extraction using a three stage crushing process, heap leaching, and a carbon adsorption, desorption, and recovery system.
- A heap leaching process using irrigation of sodium cyanide solution.

- A fully self-contained, on-site camp for mine personnel, with road and air transportation of employees to and from the site.
- Access to the site via the existing highway and unpaved roads.
- Power supplied for operations by the Yukon Energy Corporation (YEC) transmission grid

The Project refinements do not result in any:

- New or unproven technologies.
- Additional major facilities (i.e., no new HLF, WRSAs or pits).
- New processing methods (e.g. no new mill or tailings facility, no new gold extraction method, etc.).

1.2.3 Eagle Gold Project – Updated Summary Schedule

The schedule for the Eagle Gold Project has been updated to reflect the current outlook for the Environmental and Socio-economic Assessment by YESAB and the subsequent regulatory review processes for major permits and authorizations.

The Project will occur over a 27-year period in four phases: a 25-month construction phase, a 10 year operations mining phase, and a 10-year closure and reclamation phase, followed by a 5-year post-closure monitoring phase. This schedule is provided in Table 1.2-1. Section 5.4 provides additional details of the construction phase of the Project and Section 5.5 provides details for the operations phase of the Project. Section 5.6 further explains the closure and reclamation phase of the Project.

Table 1.2-1: Eagle Gold Project – Updated Schedule Summary

Project Phase	Period	Description
YESAA Review*	Q4 2010 – Q4 2012	Review of the Project Proposal, Executive Committee Screening and issuance of Screening Report by YESAB and issuance of Decision Document(s) from Government Decision Bodies to accept, reject, or vary the recommendations. Subject to the Decision Documents, the Project can then proceed to regulatory licensing and permitting processes for review and authorizations.
Regulatory Authorizations*	Q4 2012 – Q2 2013	Review and issuance of regulatory authorizations, licenses and permits required to construct and operate the Project including but not limited to a Type A Water Use License, Quartz Mining License and Fisheries Act Authorization.
Construction	Q4 2012 – Q4 2014	All construction and site preparation work that occurs prior to the start-up of mining and heap leach activities.
Operations	Q4 2014 – Q4 2023	The period of time from the start of mining operations to the end of active mining and ore processing. 10 years captures the final year, where there will be a gradual wind down of processing.
Closure and Reclamation	Q1 2024 – Q4 2033	The period of time where mining operations have ended and closure and reclamation activities are taking place.
Post-closure Monitoring	Q1 2034 – Q4 2039	Although environmental monitoring will occur throughout all phases of the Project, post-closure monitoring will be dependent on when reclamation activities are completed for each facility.

* Regulatory review process uncertainty may result in changes to the Project's schedule.

It should be noted that the overall schedule has been developed and provided for Project and regulatory planning purposes. Final scheduling will depend on the timing of regulatory authorizations, final decisions to proceed on the Project by VIT, and seasonal constraints.

The revised schedule reflects the earliest possible start of construction and operations and assumes that:

- The YESAA Decision Document(s) are complete and all Decision Bodies accept the recommendations set out in the Screening Report without referral back to YESAB in 2012.
- A Quartz Mining License is received in 2012.
- Construction activities, that do not require a Type A Water Use License, begin in January 2013.
- A Type A Water Use License is received in the second quarter of 2013.

- Construction activities, that require a Type A Water Use License, begin in the second quarter of 2013.
- All additional regulatory authorizations are received in the second quarter of 2013.

Victoria Gold Corp. will make a final decision on whether or not to proceed with construction of the Project after assessing the terms and conditions of the Decision Document, authorizations, and permits required for construction activities to begin. Timely actions by all parties including VIT, YESAB, and regulators are required to achieve this schedule.

1.2.4 Evaluation of Biophysical and Socio-economic Effects

Since the Project Proposal was filed in December 2010, current market conditions have changed (i.e., increased gold price) and engineering design of the Project has advanced via the completion of a Feasibility Study. However, the overall scope and fundamental design of the Project has not changed as a result of the Project refinements presented by the Feasibility Study (i.e., the Project remains an open pit, heap leach gold recovery operation).

This Supplementary Information Report (SIR) includes information that describes the increase of mineable ore, ore production rate, and the expansion of a number of facilities to accommodate the current market conditions and improved engineering design. This report includes a description of the expansion and relocation of certain facilities that may alter the interaction between proposed Project activities and Valued Components (VC) as described in the Project Proposal.

The approach used to evaluate the conclusions of the Project Proposal, with respect to predicted environmental and socio-economic effects, is consistent with the methodology described in Sections 6.1 – 6.3 of the Project Proposal. Project refinements have been evaluated for each bio-physical and socio-economic VC presented in the Project Proposal with respect to predicted effects. Detailed methods for the evaluation of the assessment of potential effects for each VC associated with the Project refinements is provided in Sections 6.1 – 6.3 of this SIR.

Environmental and Socio-economic VCs are defined as broad components of the biophysical and human environments that, if altered by the Project, would be of concern to First Nation of Na-Cho Nyäk Dun (FNNND) citizens, regulators, resource managers, scientists, and the general public. VCs, for the biophysical environment, represent major components or aspects of the physical and biological environment (e.g., air quality, fish and fish habitat, wildlife, and vegetation) that are widely recognized as important for ecological reasons and might be altered by the Project. VCs, for the socio-cultural and economic environment are aspects of the human environment that include such components as economy, employment and business, land use, community vitality or community life, and traditional use of land and resources.

Selection of VCs for the Project was based on information from a number of sources while scoping the Project Proposal. These included:

- YESAB Information Requirements and Guidelines.
- Discussions with YESAB.

- Open houses and meetings to-date with the FNNND and the Village of Mayo.
- Meetings with various government agencies.
- Review of the FNNND and the Village of Mayo Integrated Community Sustainability Plans.
- Extensive baseline studies that VIT has conducted on socio-economic, land tenure and use, and Traditional Knowledge and use.

In addition, decisions were based on the professional knowledge and experience of VIT and its consultants.

Table 1.2-2 below presents the VCs relevant to the Project and as presented in the Project Proposal. The table identifies and provides the rationale for the selection of those components to be VCs. Rationale is also provided for the determinations of the "other" components not being selected as VCs. Not being selected is not necessarily an indication that the component is not of importance. Rather, in the judgment of those consulted, and that of VIT and its consultants, it is not reasonably foreseeable that the Project would have a substantial effect, or an effect of concern, on these "other" components.

Table 1.2-2: Environmental and Socio-economic Valued Components Relevant to the Project

Environmental/ Socio-economic Component	Rationale for Determination
Components selected as Valued Components	
Surficial geology, terrain, and soils	▪ Soils will be removed and stockpiled in preparation of the mine site and could be affected by these activities and by the Project's emissions. ▪ Proper handling of soils is essential to successful closure and reclamation. ▪ Changes in hydrology and hydrogeology and potential effects on permafrost could affect surficial geology and terrain.
Water quality and aquatic biota	▪ Mine site water use, watercourse diversions, riparian vegetation clearing, soil removal, open pit development, the heap leach facility, and waste rock storage, among other Project activities, have the potential to affect water quality and aquatic biota.
Air quality	▪ Air emissions – including dust during construction, operations, and closure – have the potential to affect air quality.
Fish and fish habitat	▪ Fish and fish habitat will be altered in various watercourses on the mine site due to infrastructure construction. A fish habitat compensation plan will be developed as part of the request for authorization under the federal *Fisheries Act.*
Vegetation resources	▪ Vegetation clearing is required for the proposed mine site and support facilities. ▪ Vegetation could also be affected by the Project's emissions (dust deposition).

Environmental/ Socio-economic Component	Rationale for Determination
Wildlife resources	▪ Wildlife habitat will be altered through vegetation clearing, construction, and operations activities that will result in direct and indirect interactions with wildlife.
Heritage resources (historic and palaeontological)	▪ Construction activities have the potential to affect historic and palaeontological resources.
Employment and economic opportunities	▪ Five socio-economic VCs were assessed to address objectives and concerns of the FNNND and the Village of Mayo. These VCs were determined via consultation with these groups and in their Integrated Community Sustainability Plans. ▪ There is potential for the Project to result in effects on each of the five socio-economic VCs.
Traditional activities and culture	
Community vitality	
Human health and well-being	
Infrastructure and services	
Components not selected as Valued Components	
Aesthetics	Project refinements do not change the following rationale as presented in the Project Proposal: ▪ Consultations have not identified aesthetic values of concern that could be affected by the Project. ▪ The Project will not interfere with any viewscapes. ▪ The Project site is not a tourist destination. ▪ An objective of the reclamation plan is returning the site to a visual condition consistent with the surroundings. ▪ Project effects on aesthetics that may affect tourism or traditional use will be evaluated with the assessment of the VCs encompassing these activities.
Carbon management/climate change considerations	Project refinements do not change the following rationale as presented in the Project Proposal: ▪ Though not identified as a VC, a separate section in the Project Proposal addresses carbon management.
Human and ecological health	Project refinements do not change the following rationale as presented in the Project Proposal: ▪ A human and ecological health baseline and technical data report has been prepared, upon which other VC assessments (i.e., wildlife, fish and socio-economic) will draw upon and reference, as appropriate. ▪ The permitting process and existing worker safety regulations will ensure that employees and the public are protected. ▪ Potential effects of accidents and malfunctions are assessed in Section 8 of the Project Proposal.

Environmental/ Socio-economic Component	Rationale for Determination
Hydrology and hydrogeology	Project refinements do not change the following rationale as presented in the Project Proposal: A comprehensive Site Water Management Plan has been developed for the Project that discusses management of process water supply, potable water supply, sediment and erosion control, treatment of mine water, and required diversions as a result of mine site infrastructure. The Project Proposal includes technical data reports for hydrology and hydrogeology and geochemical characterization of all disturbed rock as a result of the Project (including assessment of potential acid rock drainage). However, there are not local end users that would be affected by potential effects on hydrology and hydrogeology resources. It is expected that changes to surface water flow downstream of the Project will not impact local placer mining operations. Rather, it is indirect effects on other VCs such as fishery resources, wildlife, and aquatic biota that require assessment. Consequently, project-related changes on hydrology and hydrogeology will be addressed as follows: ▪ Hydrology changes will be assessed in the fish habitat section, in terms of changes to watercourse flows and habitat availability. ▪ Hydrology data was used to develop the site water balance, which will be used in modeling changes to water quality in the receiving environment. ▪ Groundwater quality and quantity; geochemical changes; discharges from heap leach facility, open pit, waste rock storage areas; and other sources of metals and nutrients will be assessed in the water quality section (i.e., in the model developed to predict water quality). ▪ Total suspended solids changes in watercourses are assessed in the fish and fish habitat section rather than the water quality section.
Land and resource use	▪ This component is addressed, as appropriate, under the socio-economic VCs in Section 6.11 and Section 9 pertaining to effects on “Capacity of Renewable Resources.”
FNNND land use and interests	▪ Consideration of this component was integrated throughout the assessment of all VCs as appropriate, particularly in the assessment of the socio-economic VCs, fish and fish habitat, vegetation, and wildlife.

Project refinements do not result in the need for the addition or removal of VCs for assessment. The rationale for no change to the VCs selected for assessment is based upon the nature and scope of the Project refinements and no change to land users in the Project area since the Project Proposal was submitted. Project refinements do not result in new project activities or interactions of activities with bio-physical or socio-economic pathways previously selected for the Project Proposal.

1.3 SCOPE OF REPORT AND INSTRUCTIONS FOR USE

This SIR is supplementary to the Project Proposal that was filed with YESAB in June 2011 and is best reviewed in conjunction with, and as a companion piece to the comprehensive Project Proposal.

The SIR describes modifications to each facility, component or physical works of the Project based on the Project refinements and systematically evaluates whether there are any changes to the conclusions reached in the Project Proposal on the predicted residual and cumulative environmental and socio-economic effects from the Project. The SIR does not re-describe components or details of the Project Proposal that remain unchanged by the Project refinements.

For reference, the sections of the Project Proposal that have been updated and evaluated as a result of the Project refinements and the corresponding sections in the SIR are generally set-out in **Table** 1.3-1 below.

Table 1.3-1: Project Proposal / Supplementary information Report Concordance Table

Project Proposal Section	Project Proposal Section No.	Supplementary information Report (SIR) Section	SIR Section No.
Introduction	1	Introduction	1
Consultation	2	Consultation	2
Project Location	3	Project Location	3
Description of Existing Environmental and Socio-Economic Conditions	4	Description of Existing Environmental and Socio-Economic Conditions	4
Project Description	5	Project refinements	5
▪ Project Identification	5.1	▪ Project Identification	5.1
▪ Technologies	5.2	▪ Technologies	5.2
▪ Project Phases and Scheduling	5.3	▪ Project Phases and Scheduling	5.3
▪ Construction Phase	5.4	▪ Construction Phase	5.4
▪ Operations Phase	5.5	▪ Operations Phase	5.5
▪ Closure and Reclamation Phase	5.6	▪ Closure and Reclamation Phase	5.6
Environmental and Socio -economic Effects Assessment	6	Evaluation of Environmental and Socio-economic Effects Assessment	6
▪ Assessment Approach	6.1	▪ Assessment Approach	6.1
▪ Valued Environmental and Socio-economic Components	6.2	▪ Evaluation of Valued Environmental and Socio-economic Components	6.2
▪ Potential Environmental and Socio-economic Effects Assessment Methods	6.3	▪ Potential Environmental and Socio-economic Effects Assessment Evaluation Methods	6.3
▪ Surficial Geology, Terrain and Soils	6.4	▪ Surficial Geology, Terrain and Soils	6.4
▪ Water Quality and Aquatic Biota	6.5	▪ Water Quality and Aquatic Biota	6.5
▪ Air Quality	6.6	▪ Air Quality	6.6
▪ Fish and Fish Habitat	6.7	▪ Fish and Fish Habitat	6.7
▪ Vegetation Resources	6.8	▪ Vegetation Resources	6.8
▪ Wildlife Resources	6.9	▪ Wildlife Resources	6.9
▪ Heritage Resources	6.10	▪ Heritage Resources	6.10

Project Proposal Section	Project Proposal Section No.	Supplementary information Report (SIR) Section	SIR Section No.
▪ Socio-economic Environment	6.11	▪ Socio-economic Environment	6.11
Carbon Management Assessment	7	Evaluation of Carbon Management Assessment	
Assessment of Effects of Accidents and Malfunctions	8	Evaluation of Assessment of Effects of Accidents and Malfunctions	8
Capacity of Renewable Resources	9	Evaluation of Capacity of Renewable Resources Assessment	9
Effects of the Environment on the Project	10	Evaluation of Assessment of Effects of the Environment on the Project	10
Summary of Significance	11	Evaluation of Summary of Significance	11

2 FIRST NATIONS, OTHER GOVERNMENT AND COMMUNITY CONSULTATION

This Section of the SIR provides an update on consultation and engagement activities with the FNNND, the Village of Mayo (VoM) and other interested stakeholders since the submission of the Project Proposal in December 2010.

In general terms, consultation is the process that a proponent follows to inform and consult with those who may be affected by, or have an interest in, the potential project or development. This includes the mandated consultation activities with affected FNNND and any nearby communities (under the *Yukon Environmental and Socio-economic Assessment Act* as set out in Section 50[3]). It also includes the interactions with any individual property owners or land users (e.g., trappers and outfitters) and interested organizations (e.g., Yukon Conservation Society [YCS]) as well as discussions with government regulators as the Project evolves.

On January 21, 2011, the YESAB Executive Committee determined that VIT met the statutory requirement under Section 50(3) of the *Yukon Environmental and Socio-economic Assessment Act.* VIT has continued to engage in consultation with interested stakeholders subsequent to submission of the Project Proposal.

With respect to the Project refinements and environmental assessment evaluation presented in this report, VIT has consulted with the FNNND, YESAB and various regulators to pro-actively and fully communicate the nature and scope of the Feasibility Study and resulting refinement of the Eagle Gold Project.

2.1 COMPREHENSIVE COOPERATION AND BENEFITS AGREEMENT

Victoria Gold Corp. and the FNNND signed a comprehensive Cooperation and Benefit Agreement (CBA) on October 17, 2011. The CBA replaced an earlier Exploration Cooperation Agreement and applies to the proposed Eagle Gold Mine development and exploration activities conducted by VIT anywhere in FNNND Traditional Territory located south of the Werneke Mountains. This includes all of VIT's existing mineral exploration properties including Dublin Gulch, Aurex and Clear Creek (currently under option to Golden Predator). The CBA does not apply to any exploration or mining activities on FNNND Settlement Lands within FNNND Traditional Territory that are north of the Wernecke Mountains, unless agreed to by the FNNND.

The objectives of the CBA are to:

- Promote effective and efficient communication between VIT and the FNNND in order to foster the development of a cooperative and respectful relationship and FNNND support of VIT's exploration activities and the Eagle Gold Project.
- Provide business and employment opportunities, related to the Eagle Gold Project, to the FNNND and its citizens and businesses in order to promote their economic self-reliance.

- Establish a role for the FNNND in the environmental monitoring of the Eagle Gold project and the promotion of environmental stewardship.
- Set-out financial provisions to enable the FNNND to participate in the opportunities and benefits related to the Eagle Gold Project.
- Establish a forum for VIT and the FNNND to discuss matters related to the Eagle Gold Project and resolve issues related to implementation of the CBA.

2.2 COMMUNITY MEETINGS

Various community meetings, workshops, and open houses have been held with the FNNND leadership, staff, and citizens as well as the VoM leadership, residents, and other interested parties. These sessions provided Project updates as well as specific presentations on key aspects of the Project. In general, meetings and workshops have been attended by VIT corporate executives and have included a presentation followed by a formal question and answer session. Participants also had the opportunity to provide written comments on comment cards.

The community meetings and open houses held to-date, including those subsequent to the submission of the Project Proposal, are summarized in Table 2.2-1.

The Project refinements were presented as part of an overall Project update meeting in Mayo on March 22, 2012. The discussion included an overview of the Project refinements and an update to how the refinements will be incorporated into the assessment of the Project Proposal. No significant concerns were raised during the public meeting.

Table 2.2-1: Community Meetings and Open Houses to Date

Date	Location	Community or Organization	Purpose
November 3, 2009	Mayo	Village of Mayo, FNNND	Open house to introduce the Project to the community
December 2, 2009	Mayo	Village of Mayo, FNNND	Open house to provide an update on the Project
May 3, 2010	Mayo	Village of Mayo, FNNND	Open house to provide Project overview and update
June 10, 2010	Mayo	Village of Mayo, FNNND	Open house to provide a presentation on the heap leach process
September 21, 2010	Mayo	Village of Mayo, FNNND	Socio-economic Opportunities Workshop*
November 3, 2010	Mayo	Village of Mayo, FNNND	Closure and Reclamation Workshop
November 4, 2010	Mayo	Village of Mayo, FNNND	Accidents and Malfunctions Workshop
November 29, 2010	Mayo	Village of Mayo, FNNND	Pre-submission open house
November 30, 2010	Keno City	Village of Mayo, FNNND	Pre-submission open house
November 30, 2010	Pelly Crossing	Community of Pelly Crossing, Selkirk First Nation	Pre-submission open house
December 1, 2010	Carmacks	Village of Carmacks, Little Salmon Carmacks First Nation	Pre-submission open house

Date	Location	Community or Organization	Purpose
December 2, 2010	Whitehorse	City of Whitehorse, FNNND in Whitehorse	Pre-submission open house
March 12, 2011	Mayo	Village of Mayo, FNNND	Cyanide Use and Management Workshop sponsored by Yukon government
March 13, 2011	Whitehorse	City of Whitehorse	Cyanide Use and Management Workshop sponsored by Yukon government
August 24, 2011	Mayo	Village of Mayo, FNNND	YESAB sponsored public meeting for the Eagle Gold Project
December 12, 2011	Mayo	Village of Mayo, FNNND	Eagle Gold Project construction phase business opportunities open house
March 22, 2012	Mayo	Village of Mayo, FNNND	Eagle Gold Project public meeting with updates on exploration, environmental assessment, Feasibility Study and disclosure of Project refinements

2.3 MEETINGS WITH THE FNNND

Meetings with the FNNND Chief and Council, FNNND executive, management, and staff have taken place since 2009, immediately following VIT's acquisition of the Project property. Five formal meetings have occurred post-submission of the Project Proposal. These meetings are summarized in Table 2.3-1.

The Project refinements were presented as part of an overall Project update to the FNNND Chief and Council on March 23, 2012. The discussion included an overview of the Project refinements and an update to how the refinements will be incorporated into the assessment of the Project Proposal. No significant concerns were raised during the meeting.

In addition to these meetings, representatives from the FNNND have participated in or been invited to participate in ongoing environmental baseline monitoring conducted at Dublin Gulch for the Eagle Gold Project. VIT appreciates the participation and support provided by the FNNND to the baseline data collection that includes climate, hydrology, hydrogeology, and water quality.

Table 2.3-1: Meetings with First Nation of Na-Cho Nyäk Dun and Village of Mayo Government Officials to Date

Date	Location	Government	Purpose
May 5, 2009	Mayo	FNNND	Traditional knowledge study design and identification of participants
November 4, 2009	Mayo	FNNND Managers and Staff	Introduction to the Project
November 9, 2009	Mayo	FNNND Chief and Council	Update on the Project
December 1, 2009	Mayo	Village of Mayo representatives (council)	To provide progress on Project
August 3, 2010	Mayo	FNNND	To review public consultation schedule and approach
September 22, 2010	Mayo	FNNND	To review Socio-economic Baseline Report
September 22, 2010	Mayo	Village of Mayo	To review Socio-economic Baseline Report
June 24, 2011	Mayo	FNNND General Assembly	Update on Project
July 27, 2011	Mayo	FNNND and Village of Mayo	Ceremony to recognize donors to Mayo nursing station
October 17, 2011	Mayo	FNNND	Comprehensive Cooperation Benefit Agreement (CBA) signing ceremony and community dinner
December 12, 2011	Mayo	FNNND Chief and Council	Update on Project
January 23, 2012	Vancouver	FNNND Chief, one Council member and three Nacho Nyäk Dun Development Corporation (NNDDC) representatives	Update on Project
February 17, 2012	Mayo	FNNND Chief and Council	Update on project and discussed implementation of CBA
March 23, 2012	Mayo	FNNND Chief and Council	Update on Project, Feasibility Study , discussion of Project refinements , and progress on YESAB Supplementary Information Report

2.4 GUIDED SITE TOURS

2.4.1 Dublin Gulch

Since the submission of the Project Proposal in December 2010, VIT has sponsored three guided site tours for the FNNND leadership, elders, youth and staff, Village of Mayo, and the Mayo Renewable Resource Council. The purpose of the tours was to better understand the existing exploration activities at Dublin Gulch, the existing conditions of the location for the proposed Project, and the location of proposed Project facilities and components. Each site tour began with health and safety orientations and a review of the itinerary. While each tour was unique, each provided the tour group with an overview presentation and the opportunity to view the site from a variety of vantage points with description from VIT management of the construction, operation and closure of proposed

facilities. After the tours, the group reconvened for questions, answers, and comments. Tours were held on August 4, August 25, and September 11, 2011.

2.4.2 Fort Knox Gold Mine

A tour of the Fort Knox Gold Mine in Alaska (operated by Kinross Gold) was sponsored and coordinated by VIT on July 19 – 21, 2011. Tour participants included representatives from YESAB, Yukon government (YG), Environment Canada (EC), FNNND, Mayo District Renewable Resources Council (MDRRC), and the VoM. The Fort Knox site tour was preceded by a presentation and dinner in Fairbanks, Alaska on July 19, 2011, hosted by VIT. The presentation provided an overview of the entire gold mining process: open pit methods, heap leaching using sodium cyanide, and reclamation as well as project-specific information (project timelines, permitting and approvals status). The tour of the Fort Knox site was held on July 20, 2011. The comprehensive tour of all primary mine facilities, including the heap leach pad, was conducted by Kinross personnel and was followed by a question and answer period.

2.5 MEETINGS WITH REGULATORY AGENCIES

Engagement with assessors, federal and territorial regulators, and other agencies has been regular, pro-active, and ongoing since the submission of the Project Proposal. A key objective of VIT's regulatory engagement approach has been to ensure an understanding of assessment and licensing requirements and expectations. Ongoing discussions with YESAB and decision bodies have been conducted to support each stage of the assessment of the Project Proposal.

In the spirit of transparency, VIT informed YESAB of the public announcement of the Feasibility Study and the resulting engineering refinements to the Project. VIT has been in frequent contact with YESAB, representatives from YG, and other regulatory agencies to determine the scope of additional information that is required to complete the assessment of the Eagle Gold Mine Project Proposal.

In addition to the communication with YESAB and Decision Bodies in support of the Project Proposal review, VIT has engaged in regular contact with a host of regulatory agencies with respect to the scope and schedule of upcoming license, permit and authorizations required to construct and operate the Project.

2.6 MEETINGS WITH OTHERS

Victoria Gold Corp. continues to have dialogue with other stakeholders who are interested in the Project. Meetings have been conducted with the following stakeholders since the submission of the Project Proposal: MDRRC, the Yukon Conservation Society, Midnight Sun Outfitters, and the holders of Registered Trapping Concession 81.

2.7 NEWSLETTERS

Victoria Gold Corp. has provided various forms of information to the public and stakeholders. To date, five newsletters have been circulated by mail to all residents in the VoM and the FNNND citizens. Project-related information has also been posted on the VIT website and is regularly updated (http://www.victoriaresourcecorp.com).

3 PROJECT LOCATION

3.1 GEOGRAPHIC LOCATION

The geographic location of the Project is unchanged by the Project refinements. The Project is located in central Yukon, in the Traditional Territory of the FNNND, and within the Stewart River sub-basin of the Yukon River Watershed. The Project site is approximately 45 kilometres (km) north-northeast of the Village of Mayo (by flight) or approximately 85 km by existing access roads. The Project is approximately 350 km north of the Yukon capital of Whitehorse.

The majority of the Project site lies within the Dublin Gulch watershed. Dublin Gulch is a second order stream that is a tributary to Haggart Creek which flows to the South McQuesten River. Elevations in the vicinity of the Project range from 765 metres above sea level (m asl) near the confluence of Dublin Gulch and Haggart Creek, to 1,525 m asl at the base of the Potato Hills (which forms the eastern boundary of the Dublin Gulch watershed).

3.2 STUDY AREA BOUNDARIES

The study area boundaries the Project remain unchanged by Project refinement. The scope of the Project refinements and the limits of the physical Project footprint do not require a change to the study area boundaries as presented in the Project Proposal. The following information is consistent with the Project Proposal.

Multiple study areas have been delineated for the Project Proposal and the supporting socio-economic and environmental baseline studies and effects assessments. For the purposes of summarizing land tenures and land use relevant to the Project, a Local Study Area (LSA) and Regional Study Area (RSA) were defined in the Land Use and Land Tenure Report appended to the Project Proposal.

Local Study Area (LSA)

The LSA, with respect to land tenures and land use, identifies specific land uses and land parcels that may be directly affected by the Project. The LSA encompasses specific surface and sub-surface tenures, including quartz and placer claims, FNNND Settlement Land, adjacent developments, and outfitting and trapline concessions. The LSA includes a 500 m buffer on both sides of the access road (South McQuesten Road and Haggart Creek Road) and the Dublin Gulch watershed. The LSA with respect to land tenures and land use remains unchanged as presented in the Project Proposal as a result of Project refinement.

Regional Study Area (RSA)

The RSA for the purposes of land tenure and use information provides the regional context within which proposed Project activities have been considered. It encompasses broader land uses such as: recreational sport fishing and hunting areas, FNNND Settlement Land; trapline and outfitting concessions; game management areas; water licenses; and historical, existing or proposed developments. The boundaries of the RSA used for land use and land tenure enclose an area within

a 50 km radius of the Project Site. The LSA with respect to land tenures and land use remains unchanged as presented in the Project Proposal as a result of Project refinement.

3.3 LAND TENURE AND LAND USES

Land tenure in the RSA and LSA is composed of Yukon government crown land, FNNND Settlement Land, various mining claims and leases, and trapping and outfitting concessions. Other identified land uses include fishing, outdoor recreation and wilderness tourism activities.

3.3.1 Access Road and Highway Use

Project refinement does not alter the proposed access to the Project as presented in the Project Proposal. The Project property is located approximately 85 km northeast of the Village of Mayo via existing roads. Access to the Project site is from the Silver Trail (Highway 11) onto the existing South McQuesten Road (SMR) and Haggart Creek Road (HCR). Together, the SMR and HCR comprise a 45 km road divided by the South McQuesten River. The first 22.9 km of the route is on the SMR between Silver Trail and the South McQuesten River. From there the route follows the HCR for the last 22 km from the river to the Project site. Both are public roads, regulated under the Yukon *Highways Act;* however, the SMR is only maintained during summer by the Yukon Department of Highways and Public Works (HPW), whereas the HCR is considered a “public unmaintained” road. Figure 3.1-2 in the Project Proposal depicts the existing alignment of the SMR and HCR. Further information on the SMR and the HCR is included in the Project Proposal.

3.3.2 Land Tenure

Project refinement does not alter land tenure within and adjacent to the Project boundary as presented in the Project Proposal.

3.3.3 Registered Trapline Concessions

The degree of spatial overlap with registered trapline concessions remains unchanged as presented in the Project Proposal.

3.3.4 Outfitting Concessions

The degree of spatial overlap with outfitting concessions remains unchanged as presented in the Project Proposal.

3.4 TRADITIONAL TERRITORY

The Project is located with the Traditional Territory of the FNNND. There are several FNNND Settlement Land parcels located within the RSA and one within the LSA (Block NND R-20B). This Category B land parcel is approximately 4,367 ha and is located southeast of Haggart Creek, north of South McQuesten River, south of Snowshoe Creek, and west of Shanghai Creek. The proposed Project will not be located on FNNND Settlement Land.

3.4.1 Yukon First Nation Rights

The YESAB *Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions* with respect to land tenure information indicates that Project Proposals should identify:

> *"any other formalized First Nation rights to access land and resources. . . including land claims, aboriginal rights for hunting and harvesting rights, resource access rights and co-management agreements" (YESAB 2005 p.12).*

FNNND Settlement Land with respect to the Project location is described above.

The First Nation of Na-Cho Nyäk Dun Final Agreement (Final Agreement) provides for a comprehensive set of rights and obligations across a range of matters with respect to Settlement Land and the FNNND Traditional Territory. Provisions with respect to FNNND harvesting and wildlife rights within their Traditional Territory are set out in Chapter 16 (Fish and Wildlife) of the Final Agreement. This Agreement also speaks to trapping, access to land for harvesting, and commercial harvesting.

First Nation Water Rights

Chapter 14 of the Final Agreement sets out specific rights granted to the FNNND and Yukon Indian Persons with respect to water. Provisions under 14.8.0 of the Final Agreement provide the right to the FNNND to have water which is on or flowing through or adjacent to their Settlement Land to remain substantially unaltered as to the quality, quantity and rate of flow including seasonal flow.

As noted in the Project Proposal, the assessments regarding water quality, water quantity and the rate of flow of waters have concluded that with mitigations, there will be no significant Project related effects to waters downstream of Haggart Creek (water sampling location W29) including waters on or adjacent to FNNND Settlement Land. This conclusion remains unchanged as a result of Project refinement evaluated in this SIR.

4 DESCRIPTION OF EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

Section 4 of the Project Proposal presents summaries of existing conditions for bio-physical and socio-economic values (e.g., wildlife, water quality, employment and economic opportunities) that are of importance in considering potential environmental and socio-economic effects of the Project. Complete baseline reports for each of these values were appended to the Project Proposal. Information for the baseline reports was gathered through consultations with the FNNND, local communities, and government officials, as well as through literature reviews and field studies. Each value has a defined study area, the boundaries of which are based on the nature of the bio-physical or socio-economic value and how it may interact with potential effects as a result of the Project and potential cumulative effects of the Project with those of other projects and activities. Each value is distinct in how it might interact with the Project and potential cumulative effects. Consequently, for each value, a study area was determined by the extent of potential effects for that value. The study areas for each value are defined for the discussion of baseline conditions for each value in Section 4 of the Project Proposal.

The Project refinements result in a very limited increase of overall disturbance area via the Project footprint that is less than 4% in total area of that presented in the Project Proposal. Furthermore, the spatial extent of the Project refinements do not extend beyond the study areas originally defined by the Project Proposal for any value. Therefore, the Project refinements do not result in the need for additional baseline data to evaluate the conclusions of the assessment of potential effects as presented in the Project Proposal.

Victoria Gold Corp. has continued to collect environmental baseline data in support of upcoming permit and license applications where required. Continued baseline data collection has been carried out subsequent to the submission of the Project Proposal for the following disciplines: hydrology, hydrogeology, water quality, climate data, and wildlife. This additional data will be presented as part of the Type A Water Use License application upon successful completion of the YESAA review process and for other authorizations, as required.

5 PROJECT REFINEMENTS

5.1 PROJECT IDENTIFICATION

The following sections summarize the principal components of the Eagle Gold Project (the Project) in a format consistent with the Project Description as presented in the Project Proposal for ease of reference. The purpose of Section 5 below is to present modifications (Project refinements) to the Project as a result of further optimization of the engineering and increases in Mineral Reserves to be processed reflective of current gold market conditions. Some mine components have been unaffected by the Project refinements; these sections indicate that no further engineering optimization was necessary at this point in the Project.

5.1.1 Principal Project

Victoria Gold proposes to develop a bulk tonnage, heap leachable gold deposit on its Dublin Gulch property in Yukon, Canada (Figure 5.1-1). The Project will involve open pit mining at an increased production rate of approximately 10 million tonnes per year (Mt/y) ore and an average strip ratio (amount of waste: amount of ore) of 1.45:1.0 over a 9.2-year production life of the mine (operations phase). It is important to note that the current mine plan and production rate indicates that active mining will last over 9.2 years, however gold extraction and active water management will continue to occur for 1-2 years upon cessation of active mining operations depending upon metallurgical results (gold recovery rates) and market conditions. Therefore for the assessment of potential environmental effects, a 10 year mine life has been assumed in many cases unless stipulated otherwise.

The Project Proposal described a mine plan that included open pit mining at a production rate of approximately 9 million tonnes per year (Mt/y) ore and an average strip ratio of 1.04:1.00 over a 7.3 year production life of the mine. Current mineable reserves of leachable ore are 92 Mt at 0.78 grams per tonne (g/t) average head grade; whereas, the Project Proposal included mineable reserves of leachable ore of 66 Mt at 0.82 grams per tonne (g/t) average head grade. This increase is a reflection of market changes and additional drilling of the Eagle Zone since the completion of the pre-feasibility study (Scott Wilson, 2010) which formed the basis of the Project Proposal.

The open pit will be developed using standard drill and blast technology. Ore will be removed from the open pit by haul truck and delivered to the first stage crushing plant (the primary crusher), situated on the north side of the open pit rim. Waste rock will be removed from the open pit by haul truck and delivered to one of two waste rock storage areas (Platinum Gulch or Eagle Pup WRSAs) or will be used as haul road and infrastructure construction material. Figure 5.1-2 shows the General Site Arrangement (GSA) for the Project as included in the Project Proposal. Figure 5.1-3 provides a material process flow-sheet.

Ore will be crushed to a passing 80 percent (P80) particle size of 6.4 mm in a 3-stage crushing process (the Project Proposal included an average crush size of 5 mm). All three crushing stages will be located north of the open pit. The Project Proposal described the tertiary crushing as using High

Pressure Grinding Rolls (HPGR). The tertiary crushing unit will now use a cone crusher to achieve the final crush product. Ore will be conveyed between each crushing stage by covered conveyor. After the tertiary crushing stage, ore will be transported by covered conveyor into the HLF area and will be stacked on the heap leach pad by radial stacking conveyor.

Gold extraction will utilize cyanide heap leaching technology as described in the Project Proposal. Similar technology was employed in Yukon at the Brewery Creek mine in the late 1990s, and has been employed successfully in other cold climates such as the United States of America (Alaska) and Russia. Process solution containing cyanide will be applied to the ore to extract gold and then collected by the HLF leachate collection and recovery system.

Gold-bearing "pregnant" solution (pregnant leach solution [PLS]) will be pumped from the heap to the gold recovery plant. Gold will be recovered from the PLS by activated carbon adsorption and pressurized caustic desorption, followed by electro-winning onto steel anodes, and on-site smelting to gold Dore. This process is referred to as the adsorption, desorption, and recovery (ADR) process. The gold-barren leach solution that remains after passing through the carbon columns will be re-circulated back to the HLF.

5.1.1.1 Mine Components

The following sections provide summary level detail regarding key components of the Project. This section provides a similar level of detail by describing Project refinements that have been made to the mine's key components described in Section 5.1.1.1 in the Project Proposal. Section 5.1.1.1 of the Project Proposal should be referred to as necessary. Updated information and additional details are provided in sections below with respect to Project refinement throughout various Project phases.

Open Pit Mine: Gold-bearing ore and barren waste rock will be removed from the Eagle deposit by conventional drill, blast, shovel, and truck mining. The pit design has been optimized by engineering analysis and updated market conditions. The footprint of the pit has increased 30% to 85 ha (from 65.4 ha) and pit development will occur in three phases rather than four.

Crusher and Conveyor System: The average annual production rate has been increased from 26,000 tonnes per day by way of Project refinement to 29,500 tonnes per day. Ore will be delivered by haul truck to the first of three crushing plants, located on the rim of the open pit, at a rate of 26,000 tonnes per day (t/d). Ore will be crushed and then transported by covered conveyor to a building, where a second stage of crushing will occur. The secondary crusher product will be transported overland by covered conveyor to a crushed ore stockpile. Ore will be reclaimed from the stockpile and processed through a tertiary crushing circuit, and then transported by covered conveyor to the heap leach pad for stacking. The tertiary crushing circuit is also contained within a building. During a 100-day period each winter, ore will be temporarily stored on a prepared pad following primary crushing. The stored ore will be blended back into the crushing cycle when secondary and tertiary crushing resume each spring. Thus the tertiary crusher supply rate to the heap leach facility will be approximately 41,300 tpd.

Heap Leach Facility: Crushed ore will be delivered and stacked on a lined solution collection pad. Process solution containing cyanide will be applied to the ore to extract gold, and collected by the HLF pad leachate collection and recovery system (LCRS). The HLF pad will consist of a composite

liner system in the upper and lower reaches of the facility. The lower section of the HLF pad acts as an 'in-heap pond' for primary storage of pregnant solution. The in-heap pond (essentially a saturated zone within the lower extent of the HLF) can contain up to 459,349 m^3 of pregnant solution, but will typically operate at approximately 133,000 m^3, less than 30% of total capacity. Because the in-heap pond is saturated ore, there will not be open or exposed surface area of liquid sodium cyanide solution during normal operations.

Waste Rock Storage Areas: Barren waste rock will be deposited in one of two waste rock storage areas (WRSAs) or utilized in the construction of various mine facilities. During the first several years of production, waste rock will be delivered to both Platinum Gulch WRSA and Eagle Pup WRSA. For the remainder of the life of the Project, waste rock will be trucked to the Eagle Pup WRSAThis remains consistent with the description in the Project Proposal.

Process Plant: Gold containing solution collected from the heap leach facility will be processed via conventional gold recovery methods. Gold-bearing solution will be pumped from the in-heap pond to the process plant via heat traced pipes. Solution will be recycled back to the HLF after gold recovery. The process plant area will be located at the toe of the heap leach facility, and will include a cyanide detoxification plant, which allows for solution treatment for removal of cyanide in the event that solution discharge from the operation is required.This remains consistent with the Project Proposal description. Note that as a result of refinements all the process operations have been consolidated into one building, whereas, in the Project Proposal processing operations were designed to operate in separate structures.

Events Pond: Lined ponds external to the HLF will be constructed for the life of the Project to temporarily store excess process solution during freshet and precipitation events. The solution contained in these ponds will be recycled back into the heap leach circuit as required. The ponds will be sized to contain peak intensity storm events as well as repeat wet years. The ponds will be constructed to include a leak detection and recovery system underneath the main liner system. This remains consistent with the Project Proposal description.

5.1.1.2 Mine Infrastructure Components

Buildings: Project refinement utilizes expansion of the existing exploration camp, rather than construct a camp at a new location. The expanded camp will have permanent accommodations for 250 people and temporary accommodations for an additional 200 people during construction (total peak construction camp capacity at 400 people).

Fuel Storage Facilities: The largest storage facility will be located near the truck shop and will contain two 750,000 L diesel fuel tanks. The second, smaller fuel storage facility will be located adjacent to the ADR plant and will have a 100,000 L diesel fuel storage capacity. A 10,000 L storage tank that will store waste lubricating oil gathered from mine equipment will be located near the ADR plant, as well. The third fuel storage facility will be located adjacent to the permanent camp and will consist of three 5,000 gallon capacity propane tanks.

Fire Suppression System: The fire suppression system has been more fully described and has been designed to pump water through a pressurized main to the ADR plant. Fire protection water to

the site and facilities will be provided by pumping from groundwater wells located in the Dublin Gulch valley, into a common fire water tank located at the ADR plant area.

Explosives Storage Facility: Both of these structures have been re-located along the more uniform and less steepened slopes southwest of the Open Pit. This location is revised from that presented in the Project Proposal which described a general arrangement in a steeper portion of in the middle reaches of the Dublin Gulch Valley.

Mine Water Treatment Plant: The water treatment process will continue to involve several treatment technologies, including oxidation, high pH precipitation, low pH coagulation, pH adjustment, filtration, and de-chlorination. Sulfate removal, which was included in the Project Proposal, was deemed not necessary as a result of Project refinements.

5.1.2 Accessory Activities

Access Roads: The proposed upgrades to the access road to site are consistent with that described in the Project Proposal except that the three proposed road re-alignments are no longer necessary based on further engineering analysis of the access route. All other improvements remain as proposed in the Project Proposal to ensure road use capacity and operational and public safety, such as the construction of pull-outs, radio-control and on-going maintenance.

Transmission Line: The length of the transmission line has been decreased slightly to 44 km (from 45 km) and electricity will be distributed to within the site at 25 kV via two overhead lines as opposed to a single distribution line.

5.2 TECHNOLOGIES

As stated in the Project Proposal, the Project will utilize cyanide heap leaching technology as a gold extraction process. Similar process technology was employed in Yukon at the Brewery Creek mine in the late 1990s and has been employed successfully in cold climates elsewhere in the world. The description of this primary ore processing technology remains unchanged for the Project. No new, unproven technologies have been introduced via Project refinement.

5.3 PROJECT PHASES AND SCHEDULING

The anticipated start date for the beginning of construction has been updated from Q1 2012 to Q4 2012 to accommodate current permitting assumptions. This schedule change is irrespective of refinement of the Project. The duration of the construction and operations Project phases have changed as a result of the Project refinements. **Table** 5.3-1 compares the overall project schedule presented in the 2011 Project Proposal and the revised timing and duration of each Project phase.

Table 5.3-1: Updated Schedule of Project Phases

Phase	Project Proposal	Updated Project Schedule
Construction	Q1 2012 – Q3 2013	Q4 2012 – Q4 2014
Operations	Q4 2013 – Q4 2020	Q4 2014 – Q4 2023
Closure and Reclamation	Q1 2021 – Q4 2031	Q1 2024 – Q4 2033
Post-Closure Monitoring	Q1 2032 – Q1 2037	Q1 2034 – Q1 2039

5.4 CONSTRUCTION PHASE

The construction activities are generally consistent with those presented in Section 5.4 of the Project Proposal. Refinements to the construction phase include a consideration for the seasonal timing of certain activities as well as a slight increase the overall duration of construction to 25 months. - Construction activities are anticipated to begin in Q4 2012 rather than in Q1 2012. Construction start date and sequencing will continue to evolve due to the following factors:

1) Permitting process – receipt of required approvals, licenses, authorizations, and permits
2) Detailed engineering
3) Vendor selection / availability
4) Seasonal constraints for construction in sub-arctic climate
5) Procurement process
6) Project financing

Based on the schedule assumed in Table 5.3-1, a preliminary schedule of the major construction activities is listed below. Construction activities planned to be complete in 2012 (pending regulatory approval):

- Construction of construction camp
- Haggart Creek access road upgrade
- Site clearing and grubbing for these areas:
  - Hydro Line right-of-way
  - ADR plant
  - Silt borrow areas
  - Lower Dublin Gulch North Pond
  - Dublin Gulch Diversion Channel
- Construction of Lower Dublin Gulch North Pond

Major construction activities planned for completion in 2013:

- Site earthworks

- Construction of Events Ponds
- Construction of Lower Dublin Gulch South Pond
- Construction of surface water management infrastructure
- Installation of the permanent camp
- Construction of camp water intake and distribution infrastructure
- Construction of concrete foundations
- Upgrading of the existing access roads
- Stripping of leach-pad and clear, grub, and grade Heap Leach Pad and embankment site
- Construction of Dublin Gulch diversion channel
- Begin construction of HLF embankment
- Development of WRSAs
- Construction of fuel storage facility
- Removal of open pit overburden, and soil salvage
- Commencement of open pit pre-stripping.
- Erection of all buildings
- Installation of power distribution facilities
- Development of soil salvage and storage sites
- Complete power transmission lines
- Construction of emergency power generation facilities

Major construction activities planned for completion in 2014:

- Installation of the process facilities, including crushers, conveyors, and ADR plant
- Completion of the Heap Leach Pad
- Completion of the confining embankment
- Completion of final site roads
- Completion of fish habitat compensation area
- Commissioning of facilities.

5.4.1 Mine Development

Mine development has been optimized via the Feasibility Study and reflects new information from continued engineering investigations and updated geologic modeling, market conditions, and continued input from the environmental assessment process. While the overall mine concept

remains unchanged, the manner in which select Project elements are developed may have been refined during the Feasibility Study. Project refinements reflected in the Mine Development Phase are described below.

5.4.1.1 Construction Equipment

The type and size of construction equipment required for development of the Project is consistent with that presented in Section 5.4.1.1 of the Project Proposal.

5.4.1.2 General Site Preparation

Site preparation methods will remain the same as those presented in Section 5.4.1.2 of the Project Proposal. The area to be cleared is 4% larger than that described in the Project Proposal, which results in a slight increase in the total area to be cleared from 585 ha to 608 ha.

Vegetation Clearing and Grubbing

The methods of vegetation clearing and grubbing remain the same as those described in Section 5.4.1.2 of the Project Proposal. However, since the footprint of the Project has increased by 4%, the estimate of salvable timber from clearing of the mine site will increase from 19,700 m^3 to 20,488 m^3. Approximately 15,912 m^3 would come from clearing of the mine area and 4,576 m^3 from clearing the transmission line.

Construction Borrow, Quarry Site Development, and Waste Rock Management

The locations of borrow material and the methods of extraction remain the same as described in the Project Proposal. Volumes of required borrow materials have been updated to accommodate modifications to facility construction and based on geotechnical investigation of potential source materials. For example, the amount of silt/ fines required for the HLF has been reduced from over 560,000 m^3 to 7,500 m^3 as a result of using a geo-synthetic clay HLF liner component rather than local materials.

The amounts of required borrow materials are updated as follows:

- 7,500 m^3 of silt/fines for heap leach pad liner construction
- 2,000,000 m^3 of rock fill for the heap leach embankment
- 330,000 m^3 of fine gravel/coarse sand for leachate detection and recovery system
- 830,000 m^3 of general fill and/or structural fill for various earthworks structures, including pond berms, building pads and similar structural applications
- 65,000 m^3 of transition zone gravel
- 49,000 m^3 of Type 2 drainage system material (described as silty colluvium)
- 13,000 m^3 of rip rap
- 6,500 m^3 of coarse concrete aggregate
- 4,400 m^3 of fine concrete aggregate

Infrastructure Pads Construction

The construction of pads for the crushers, process plants, camp, and administrative buildings remains consistent with that described in Section 5 of the Project Proposal. Additional supporting geotechnical data and analyses are presented in Appendices 1 and 2.

Site Roads Construction

Two new site roads will be constructed on the site: one to the re-located explosives facility and open pit, and one to the HLF (Figure 5.1-2). The site roads will be constructed using the same methods and materials as presented in the Project Proposal. The width of the site haul roads will be increased from 24 to 31 m to accommodate the largest vehicle.

Soil Salvage Site Preparation

While the description of salvage and storage of soils is generally unchanged by the Project refinements, the locations and shapes of the stockpiles have been revised to accommodate the refined general arrangement as depicted in Figure 5.1-2.

Staging/Laydown Area Development

The construction of these areas is unchanged by the Project refinements and remains consistent with that described in Section 5 of the Project Proposal.

5.4.1.3 Open Pit Development

The open pit will be developed using conventional mining methods consistent with that described in section 5.4.1.3 and detailed in section 5.5.1 of this report.

5.4.1.4 Crusher and Conveyor System Construction

The construction of the crusher and conveyor system components remains consistent with that described in Section 5 of the Project Proposal. However, as described earlier, conventional crushing methods will be used for the tertiary stage (i.e., same method as with primary and secondary stages) rather than high pressure grinding rolls and the temporary cold weather ore storage has been relocated to a 100-day stockpile as a result of project optimization.

5.4.1.5 Heap Leach Facility Construction

Select elements of the HLF construction have been optimized. Details are presented in Appendix 4 including: the dimensions of the embankment and In-Heap Pond; the footprint of the HLF itself (Figure 5.4-1); and the material used in part of the liner construction. The Project still consists of a valley heap leach pad with the multiple components described below. The HLF will extend from within the Dublin Gulch valley and up the Ann Gulch valley. Dublin Gulch is a perennial second order stream whereas Ann Gulch is an ephemeral first order stream that flows only during spring snow melt or significant precipitation events.

HLF Construction Schedule

As with the entire construction schedule, construction of the HLF will begin later than was proposed in the Project Proposal. The HLF will, however, still be constructed in three phases following the overall construction schedule as presented in Table 5.4-1.

Table 5.4-1: Heap Leach Facility Construction Schedule

Activity	Date
Rough Earthworks	May 2013
Dublin Gulch Water Management features	May 2013
Cushion Layer Material	June 2013
Event Ponds	June 2013
Phase 1 – Heap Leach Pad and Embankment complete	September 2013
Phase 2 – Heap Leach Pad complete	September 2014
Phase 3 – Heap Leach Pad complete	September 2018

Overview

Based on the overall construction schedule shown in Table 5.4-2, construction of elements associated with the HLF (e.g. Dublin Gulch Diversion Channel) are planned to begin in Q4 2012 (depending upon environmental approvals). Construction of the HLF embankment and Phase 1 pad would be completed with a target date for loading ore by Q3/Q4 2014. Construction of the Phase 2 and Phase 3 pads would start at the beginning of Years 2 and 6 of operations, respectively. The footprints of the three HLF phases are illustrated in Figure 5.4-1.

A Gantt chart detailing the construction schedule for the HLF is provided in Figure 5.4-2.

Rough Earthworks

The rough earthworks associated with the construction of the HLF and ancillary structures have not changed as a result of the Project refinements. The anticipated subsurface conditions and foundation preparation methods are described in the (2012) HLF Feasibility Design Report (Appendix 4).

Overliner Drain Fill (Cushion Layer Material)

The Overliner Drain Fill (ODF) performs the same function as the “Cushion Layer Material” described in the Project Proposal. Specifically, the primary functions of the ODF are to:

- Minimize the hydraulic head on the liner to reduce the risk of process solution leakage
- Protect the synthetic liner from damage during ore placement
- Maximize the return of gold-bearing solution from the HLF for processing.

As a result of Project refinements, the material used to construct the ODF will be sourced from crushing rock and/or screening aggregate from borrow sources. Placement of the ODF is planned to begin in September 2014 (Figure 5.4-2).

Event Ponds

The schedule to construct the Event Ponds has been adjusted to reflect the Project refinements as illustrated in Figure 5.4-2.

Phase 1 HLF

The schedule has been adjusted to reflect the Project refinements as illustrated in Figure 5.4-2.

Phase 2 and 3 HLF

The HLF Phase 2 and 3 schedules have been adjusted to reflect the Project refinements as illustrated in Figure 5.4-2.

Dublin Gulch Water Management Features

Water management within the Dublin Gulch watershed has been optimized as a result of the Project refinements.

The major ancillary water management features related to the HLF development schedule are:

- Lower Dublin Gulch South Pond
- Lower Dublin Gulch North Pond
- Dublin Gulch Diversion Channel (DGDC)
- Drop Structures along the DGDC

The updated construction schedule for the HLF, including these water management structures, is shown in Figure 5.4-2.

Sediment Control Ponds and Surface Runoff Diversions Development

This Project activity / component is unchanged by the Project refinements. The schedule is illustrated in Figure 5.4-2.

Confining Embankment and Liner Ground Preparation

The HLF embankment has been optimized. Design requirements and the design basis are provided in Tetra Tech (2012) HLF Feasibility Design Report (Appendix 4).

The HLF embankment design includes an earth fill/rock fill structure with a geomembrane-lined upstream dam face, and filter/transition zones to ensure containment integrity. The fill placement for the HLF structures includes the use of conventional earth moving equipment, water wagons, roller compactors for earth fills, and vibratory compactors for rock fills. Fill materials will be produced from required excavations for the HLF structures, borrow areas and onsite mine pit excavations. The embankment fills will be moisture conditioned as needed for compaction.

The fill types include compacted rock fill material taken from selective excavations for placement in the central and downstream section of the HLF embankment. The pre-production overburden removal excavations are estimated to include sufficient quantities of materials suitable for embankment fill and site grading fills. More competent durable rock for production of required drain rock will be quarried and crushed from required site excavations and filter materials will be produced from screening of placer fill materials in the Dublin Gulch valley bottom that require excavation.

Rock fill material containing more than 30 percent of particles above 19 mm (3/4 inch) size may be considered for use as fill in areas for select applications where frost susceptibility and drainage are

less important such as the HLF containment embankment and the Dublin Gulch diversion embankment.

It will likely be necessary to use relatively weak, non-durable rock for construction of rock fill in the embankments. Rock fill derived from weak rock will have high fines content and therefore, will not be suitable in applications where subsurface drainage is important or where frost susceptibility is a concern. The construction of a rock fill developed with weak source rock will require careful quality control. The construction of a rock fill using locally derived meta-sediments will require the use of heavy vibratory rollers, use of thin lifts (i.e., 300 mm loose lifts) and application of water, similar to construction of an earth fill. Compaction control requirements for rock fill may be determined based on the results of a test fill. The test fill will be constructed and monitored in accordance with the U. S. Army Corps of Engineers (USACE) guidelines for test fill construction (USACE EM 1110-2-2301). In the event a source of higher quality rock is located capable of producing hard, durable rock particles, as expected from some of the waste rock derived from the open pit, the rock fill can be constructed in 1 m lifts and compacted by heavy construction traffic.

The rock fill specifications will require selection of competent waste rock with strength rating of R3 or harder as determined by International Society of Rock Mechanics (ISRM) procedures. Dozers will spread the dumped rock piles in controlled lifts for compaction by the loaded trucks or by large vibratory steel drum compactor rollers. The lift thickness and compactive effort for rock fill placement will be determined by the Engineer in test fills at the embankment site during startup of embankment construction and as required during construction or when material differing from the initial test materials is encountered.

The compacted earth and rock fill embankment section will be using compacted rock fill materials in the compacted rock fill zone for dam slope stability. A low-permeability earth fill section will be placed in the upstream section for seepage control with filter zones to provide transition from the upstream seal zone fill to the downstream rock fill section. The HLF embankment configuration and fill descriptions are provided in Table 5.4-2.

Table 5.4-2: Refined Project HLF Embankment Design Criteria

Component	Description
Embankment Configuration	Constructed in a single stage with a top crest width of 10 m for each stage and a final crest elevation of 891m and upstream and downstream slopes of 2.5H:1V.
Zoning	Upstream seal zone with 5m horizontal thickness as shown on the drawings. Filter / transition zone of 5m width.
Seal Zone Fill	Low-permeability fine-grained (silty) soil compacted in 0.15m lifts to a minimum 95 percent of the maximum dry density (ASTM D-698) within -2 to +1 percent of the optimum moisture content Soil liner material to be obtained from identified onsite excavations and/or silt borrow sources 75-mm maximum particle size with minimum 60 percent passing the No. 4 ASTM sieve size (4.75-mm) and minimum 35 percent passing the No. 200 ASTM sieve size (0.075-mm). Final outer upstream dam surface to be minus 19-mm material, compacted with a smooth drum roller to form a smooth, firm and unyielding surface in preparation for geomembrane placement. Plasticity Index (PI) at 15 or higher. Permeability at 1×10^{-7} m/sec or lower.
Fine Filter Zone	Derived from screened alluvial, placer fill or site soil borrow sources. 75-mm maximum particle size with minimum 70 to100 percent passing the No. 4 ASTM sieve size (4.75-mm) and maximum 5 percent non-plastic fines passing the No. 200 ASTM sieve size (0.075-mm). Coefficient of uniformity (C_u) shall be less than 6.
Coarse Filter Zone	Derived from crushed and screened alluvial or competent rock sources. 450-mm maximum particle size with minimum 30 percent passing the 150mm and maximum 5 percent non-plastic fines passing the No. 200 ASTM sieve size (0.075-mm). Coefficient of uniformity (C_u) shall be less than 6.
Compacted Rock Fill	Rock fill with compaction effort based on large-scale test fill results. Fill materials to consist mainly of rock fill excavated from mine pre-stripping operations that will generate a relatively high strength, durable and relatively clean marbleized limestone. Rock fill shall be competent material with a strength rating of R3 (medium strong rock) or harder as determine by ISRM procedures. Rock fill material will have more than 30 percent particles larger than 19 mm, and the maximum rock particle size to be no more than two thirds the fill loose lift thickness Place rock fill in maximum loose lifts and compact each lift according to specifications derived from the results of a test fill.

In-Heap Pond

The function of the in-heap pond remains unchanged by the Project refinements. However, some modifications have been made to the structure and capacities (Appendix 4). Pond capacities for the Project have been increased as summarized in Table 5.4-3. The table compares volumes from the Project Proposal to updated capacities based on Project refinement. As used in the table, freeboard means the capacity available above the In-Heap Pond total of 459,000 m^3, 1 m freeboard yields an additional volume of 48,000 m^3 for a total pond capacity of 507,000 m^3.

Table 5.4-3: Heap Leach Facility Solution Storage and Operating Capacities

Infrastructure	Project Proposal volume (m^3)	Optimized Volume (m^3)
Minimum In-Heap Pond Operational Volume	60,000	60,000
Maximum In-Heap Pond Operational Volume	194,000	194,000
1 in 100 year snowmelt volume to In-Heap Pond	52,000	65,000
1 in 100 year, 24 hour event storm volume to In-Heap Pond	93,400	132,000
In-Heap Pond Operational Volume for Upset Events	241,000	265,000
In-Heap Pond Total Capacity	435,000	459,000
In-Heap Pond freeboard	45,000	48,000
In-Heap Pond with freeboard	480,000	507,000
Event Ponds Maximum Operating Capacity	175,000	183,000
Event Ponds Maximum Operating Capacity with freeboard	229,000	217,000
Total Combined System Operating Capacity without freeboard	610,000	642,000
Total Combined System Operation Capacity with freeboard	709,000	724,000

The HLF will receive crushed ore from the open pit for the purpose of extracting gold. The in-heap pond will be located behind (upstream) of the HLF embankment. Although described as a pond, the in-heap pond is actually the saturated portion of stacked ore behind the embankment and there will be no exposed liquid. The maximum storage capacity of the in-heap pond is approximately 459,000 m^3, although operationally, the in-heap pond will be maintained between 60,000 m^3 and 194,000 m^3.

The solution level in the In-Heap Pond will be monitored with pond-level instrumentation and a fluid-flow meter measuring solution going into and out of the ADR plant. Solution management operating systems including level and flow measurement will be incorporated into the process plant supervisory control and data acquisition (SCADA) systems to enable real time process information. Therefore, solution flow into the In-Heap Pond and Events Ponds will be continuously calculated and monitored at all times, including during storm events for circuit balancing purposes.

The 1:100 year 24-hour design storm event (103.2 mm) would generate approximately 132,000 m^3 of water at maximum build-out and, conservatively assuming no evapotranspiration, and the maximum footprint area of 1,134,000 m^2. The heap pad surface design will force ~90% of this volume to infiltrate and drain to the In-Heap Pond. This will leave 134,000 m^3 to 282,000 m^3 of working volume [i.e., 459,000 – 60,000 – (132,000*0.9)] within the in-heap pond to provide for operational flexibility and/or to accommodate a short-period draindown. The 10% (13,200 m^3) that does not infiltrate will run off and flow to the Events Ponds.

The Events Ponds will be located just down-gradient of the HLF and provide additional storage capacity for runoff, snowmelt, and any short-term sediment build-up, in addition to the leach solution and makeup solution. The combined maximum operating capacity of the Events Ponds will be approximately 183,000 m^3 (Section 5.4.18), while the combined maximum capacity with freeboard will be 216,700 m^3. The total combined capacity of the in-heap pond and Events Ponds will be 642,000 m^3, without the added capacity from freeboard (in-heap pond and Events Ponds) and 724,000 m^3 including the added capacity from freeboard.

During the freshet, it is expected that there will be less control of runoff and so a larger portion of storm volume (perhaps as much as 25% or 33,000 m^3, plus some residual snowmelt will drain to the Events Ponds. Since almost all of the HLF will be south-facing, snowmelt timing is assumed to occur early during freshet, while the rates will not vary too much across the facility. In any case, all but 10% of the remaining snow volume is assumed to melt and contribute to flow of snowmelt during the month of May.

The design capacity of the Events Ponds accounts for rainfall and snowmelt. In general, because the heap operates in a negative balance (see Appendix 4), the Events Ponds are designed to capture all the residual pad runoff during freshet plus additional runoff from upstream sources such as sediment control ponds and open pit dewatering, when necessary. It is assumed that the Events Ponds will provide make-up solution storage during the summer and fall. Thus, there is a built-in capacity in freeboard to handle up to 34,000 m^3 (217,000 – 183,000 + 34,000), if a large storm event occurred immediately after the Events Ponds were filled in May. This is sufficient capacity in the Events Ponds (34,000 m^3) to accommodate the runoff portion from the pad (e.g., 13,200 m^3) during the 1:100 year storm event.

Further, the In-Heap Pond will be equipped with a back-up solution transfer pump capable of 693 m^3/hr. The solution pumps normal operating capacity will be 2,770 m^3/hr or 66,480 m^3/day. The additional pump could provide additional capacity that might be needed to account for any sequence of events that might include additional rainfall following a 1:100 year event, or reduced capacity due to ice or sediment build-up in the Events Ponds. At the same time, the In Heap Pond volume would slowly rise during this short-term period (over the month), but the increase would be easily accommodated by the ~265,000 m^3 of working volume, in the In-Heap Pond storage. Finally, additional capacity (i.e., 600 m^3/H or 24,480 m^3/day), is provided by the mine water treatment plant to help manage any residual volumes that may occur during peak intensities.

In summary, redundancies in pumping capabilities and excess storage capacities have been included in the HLF design to minimize the accumulation of high volumes of process leach solution in the Events Ponds and in the In-Heap Pond. For example, the combined pumping rate of treatment and solution recycling (i.e., 80,900 m^3/day) is more than twice the total daily volume that is estimated to drain to the Events Ponds during a 1:100 year 24 hour storm during freshet (i.e., 33,000 m^3). Similarly, the In-Heap Pond will be managed to operate between 13 and 42 percent of capacity. This is partly due to the overall negative water balance of the HLF, but also by design. The available process leach solution will be constantly recycled, while total solution in storage will generally range in volume between 60,000 m^3 and 194,000 m^3. The only time it is expected to be significantly higher would be during “a drawdown”, when the recycling rate is reduced or stopped.

In the unlikely event that the In-Heap Pond and both Events Ponds are at full capacity when an additional storm event occurs, the options for mitigation and management of process solution would include:

- Continue treatment of excess solution through the Mine Water Treatment Plant. Maximum treatment rate through the MWTP is 600 m^3/H (24,480 m^3/d), equivalent to the 1:100 year, 24-hour storm event volume including HLF runoff and runoff from other sources.
- Modification of the barren pipeline discharge point to allow process solutions to be pumped to a spray system on the top of the heap pad. The spray system would form snow during cold weather or encourage evaporation during warmer weather. This increased spray rate would reduce the amount of solution in the circuit.
- Utilize the back-up transfer pump to double solution recycling, and ultimately utilize more of the large storage capacity of the unsaturated portion of the heap.
- Incorporation of the Open Pit as a temporary storage facility to augment the Events Pond capacity. The Open Pit is estimated to have a capacity that will vary between approximately 50,000 and 275,000 m^3 depending on the phase of pit excavation.

If the unlikely event can be forecasted to occur with a month to spare, based on observed conditions (i.e., extremely deep snow during freshet with heavy rains forecasted, reduced storage capacities due to equipment shutdowns), an emergency onsite short-term storage pond with low permeability mine waste material could be constructed in a short-time period in the laydown area; this pond would be designed to contain only excess solution until capacity is recovered at a later time.

Groundwater Drainage System Installation

The majority of the updated groundwater drainage system design is consistent with that described in the Project Proposal with few modifications as follows. A groundwater drainage system will be installed beneath the lowest liner of the HLF to prevent the development of uplift pressures that could compromise the liner system. The drainage system will be a network trenches with vertical or 1H:1V side trench walls and constructed with geofabric wrapped around granular drain rock backfill materials to form a French drain system, instead of pipes placed in gravel-filled trenches and wrapped in geotextile (the Project Proposal underdrain pipe network would be constructed of 100 mm diameter slotted corrugated polyethylene pipes (CPP) placed in 300 mm high x 300 mm wide gravel filled trenches, spaced at 25 m intervals). These trenches will feed down slope into 200 mm diameter high-density polyethylene HDPE perforated corrugated collector pipes in 500 mm high x 1,000 mm wide gravel-filled trenches. The 200 mm HDPE pipes will not feed into a 300 mm HDPE pipe as described in the Project Proposal.

Groundwater collected in this system is at very low risk of coming in contact with pregnant solution, due to the HLF LDRS and multiple liner systems. Monitoring of flow quality and quantity will be done on a regular basis, to allow for early detection of affected groundwater. For this purpose, a sump will be installed at the embankment toe, with valves to isolate flow. Water that meets the effluent standards will be released via a pipeline to the Dublin Gulch Sediment Control Pond. If the water does not meet the required standards, it will be pumped to the Events Ponds to be used as process

make-up water. If make-up water is not required, then the water will be processed through the cyanide detoxification plant and MWTP prior to discharge to Haggart Creek.

HLF Pad Liner System Construction

The design of the HLF Pad Liner system has been optimized to include an integrated composite liner system that will be constructed within the HLF footprint limits. Within the in-heap pond footprint and on the upstream face of the dam embankment, a double Linear low-density polyethylene (LLDPE) Geomembrane liner system would be employed. Specifically, in addition to the geomembrane that underlies the entire HLF, a geosynthetic clay liner (GCL) will be used in the impoundment, and a low permeability soil zone would be constructed on the upstream face of the embankment.

The selected composite liner system consists of a primary geomembrane liner barrier in direct contact with a low permeability bentonite GCL barrier for containment. The liner system design includes an overdrain system above the liner to protect the liner during ore placement and to limit hydraulic heads on the geomembrane liner surface during operations. The components of the facility liner system are summarized in Table 5.4-4 and shown in Figure 5.4-4.

Table 5.4-4: Heap Leach Facility Liner System

Component	Description
GCL	CETCO Bentomat DNM, or equivalent, installed in entire HLF area.
Soil Liner	Low permeability seal zone constructed of compacted, low-permeability soil on the HLF confining embankment upstream slope
Primary Geomembrane	60 mil (1.5mm) Linear Low Density Polyethylene (LLDPE)
LDRS (In-heap pond area)	Leak Detection and Recovery System comprising High Load Geocomposite
Secondary Geomembrane (In-heap pond area)	60 mil (1.5mm) Linear Low Density Polyethylene (LLDPE)

HLF Liner Testing and Evaluation

The construction quality assurance (CQA) program described in the Project Proposal for the HLF and ancillary structures has been updated with the following Technical Specifications. Technical Specifications for materials will be finalized and then, during construction, laboratory tests including moisture content (ASTM D-2216), Atterberg limits (ASTM D-4318), gradation (ASTM D-422), moisture/density relationship (ASTM D-1557), permeability (ASTM D-5084) and other tests, where applicable, will be conducted by the Engineer on samples of fill to assess whether the materials are in compliance with these Technical Specifications.

Leak Detection and Recovery System Installation

The HLF Leak Detection and Recovery System (LDRDS) has been optimized and will consist of 375 mm pipe within a sand layer. Leakage reporting to the drain flows to a 1.5 m thick sand filled sump below the in-heap pond, from where it will be pumped back to the HLF.

Design Basis for Heap Leach Facility Components

The design requirements for the design and construction of the HLF and ancillary structures are based on applicable Canadian guidelines (specifically the Canadian Dam Association guidelines) and the Nevada State guidelines as minimum standards. These design requirements are consistent with what was used in the Project Proposal. More detail regarding the design requirements, design basis and engineering criteria are provided below including Table 5.4-5, which summarizes the main technical requirements for the key elements of the HLF design, and Table 5.4-6, which compares the criteria between what was provided in the Project Proposal and what is now used.

Table 5.4-5: Summary of Design Requirements for the HLF

Heap Leach Feature	Description
Leach Pad	System must have containment capability equal to or greater than that of a composite liner consisting of a synthetic liner over one foot of compacted soil at a permeability of 1×10^{-6} cm/s or 1×10^{-5} cm/s if a leak detection system is used beneath portions of the liner with the greatest potential for leakage.
	Synthetic liners must be rated as having resistance to fluid passage equal to a permeability of less than or equal to 1×10^{-11} cm/s.
Solution Ponds	System must have a primary synthetic liner and a secondary liner that meet the above-described liner specifications. The synthetic liners must be separated by a fluid transmission layer which is capable of transmitting leaked fluids at a rate that will ensure that excessive head will not develop on the secondary liner.
Solution Management and Containment	Process components must be demonstrated to have the capacity to "withstand" the runoff from a 100-year, 24 h precipitation event. In addition, facility fluid management systems must demonstrate the capability of remaining "fully functional and fully contain all process fluids including all accumulation resulting from a 25-year, 24 h precipitation event. The foregoing standards are minimal and additional containment capacity may be required if surface water bodies or human populations are in close proximity to the facility, or if groundwater is shallow.
Foundations	Consider static/dynamic loads and differential movement or shifting.
Construction QA/QC	Regulations require that each applicant develop and carry out a QA/QC program for liner construction. A summary of the QA/QC program must be submitted with as-built drawings after construction has been completed.
Neutralization/Detoxification of Spent Ore	Spent ore, whether it is to be left on pads or removed from a pad, must be rinsed until it can be demonstrated either the remaining solid material, when representatively sampled does not contain levels of contaminants that are likely to become mobile and degrade the waters of the state under the conditions that will exist at the site, or, the spent ore is stabilized in such a manner as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the state.

Table 5.4-6: Comparison of Engineering Design Criteria for the HLF

Item	Project Proposal-Quantity/Criteria	Project Refinements Quantity/Criteria
Mine Life	7.3 Years	10 years
LOM Ore Quantity to be Stacked on HLP	66 Mt	Up to 92 Mt
Crushing Rate Stages	Delivery to primary crusher 26,000 t/d Primary, secondary and tertiary crusher	Delivery to primary crusher 29,500 t/d (10.3 Mt/a) Primary, secondary and tertiary crusher
Final Ore Crush Size	5.0 mm	6.4 mm (P_{80})
Initial Stacking Capacity	Minimum of two years for Phase 1 pad	Minimum of two years for Phase 1 pad
Stacking Schedule	265 d/a	250 d/a
Stacking Rate	35,800 t/d	41,300 t/d
Stacking Method	Conveyor-stacker	Conveyor-stacker
Overall Slope Angle of Stacked Ore	2.5:1 (H:V) 22°	2.5:1 (H:V), 22°
Solution Application Method	Drip emitters (buried during cold weather operations)	Drip emitters (buried during cold weather operations)
Solution Application Flow	1950 m^3/h	2,770 m^3/h

Design Basis

The HLF design is based upon the following guidelines.

- Yukon Water Board Licensing Guidelines for Type A Quartz Mining Undertakings (2012)
- The design, construction, operation, maintenance and surveillance of dams and associated water management structures should be carried out in a manner which is consistent with the recommendations contained in the CDA Dam Safety Guidelines (January 2007) for the Very High Consequence Category, unless compelling reasons consistent with the CDA Dam Safety Guidelines for a lower consequence category are provided.
- Long-term dams and associated water management structures should be designed to withstand the MCE and pass the Probable Maximum Flood (PMF). Shorter-term structures may be built to lesser standards but a compelling rationale for the selected criteria must be provided.
- Rock dumps and heaps should be designed to have a minimum factor of safety under static loading of 1.3 for short term cases (i.e., within the mine life) and 1.5 for long term cases (i.e. abandonment) as described in the Investigation and Design of Mine Dumps (British Columbia Mine Dump Committee, 1991). The factor of safety for dams should be as recommended in the CDA Dam Safety Guidelines (January 2007).
- Designs for dams and associated water management structures, rock dumps, and heaps should recognize the probable presence of permafrost and should include appropriate

measures to manage permafrost and maximize the stability of the structures consistent with recommendations contained in the CDA Dam Safety Guidelines (2007).

Engineering Design Criteria

The parameters and criteria presented in Table 5.4-7 form the basis of design for the HLF. The HLF design report is presented in Appendix 4 and the seismic assessment for design is presented in Appendix 5. The results of agglomeration test work can be found in Appendix 6.

5.4.1.6 Waste Rock Storage Development

The number and location of the WRSAs remain the same as presented in Section 5.4.1.6 of the Project Proposal. However, the dimensions and capacities of the WRSAs have increased (Appendix 7). These increases and updated design basis are discussed in the following sections, along with a discussion of the design basis.

Platinum Gulch Waste Rock Storage Area

The footprint of the Platinum Gulch WRSA has expanded by 24% to 41 ha. The volume of waste rock placed in the Platinum Gulch WRSA will increase from 11 Mt to 13.7 Mt, a 25% increase.

Eagle Pup Waste Rock Storage Area

The footprint of the Eagle Pup WRSA has been expanded from approximately 80 ha to 103 ha. This represents a 29% increase in disturbed area. In addition to the increased area, the volume of waste rock placed in the Eagle Pup WRSA will increase from 55 Mt to 116.8 Mt, a 112% increase.

Geotechnical Design Basis for Waste Rock Storage Areas

Geotechnical design criteria selected for the Eagle Pup and Platinum Gulch WRSAs (Table 5.4-7) are generally based on those recommended by the Yukon Water board (2009) and the British Columbia Mine Waste Rock Pile Research Committee (1991). BGC recommends that under static loading conditions a minimum factor of safety of 1.3 be applied to short term developments (e.g., during mine operations) and that a minimum factor of safety of 1.5 be applied to the long term (e.g. post-closure) of the WRSAs. Under pseudo-static seismic loading conditions BGC recommends that a minimum factor of safety of 1.1 be applied. Based on an evaluation of appropriate seismic design criteria for the project site conducted by BGC (2010b) the recommended seismic design event for the WRSAs is an earthquake with a 1-in-475-year return period that generates a peak horizontal ground acceleration (PGA) of 0.14 g.

Table 5.4-7: Recommended Geotechnical Design Criteria

Criteria	Description
Statics Factor of Safety – short term (mine operations)	1.3
Static Factor of Safety – long term (post-closure)	1.5
Pseudo-static Factor of Safety – short and long term	1.1
Design Earthquake Return Period	1-in-475-year event

5.4.1.7 Process Plant Area Construction

The process plant components include a laboratory, offices, ADR plant, reagent storage, and cyanide detoxification plant. These components will be located within one building rather than several buildings as proposed in the Project Proposal. The method for construction remains consistent with that presented in the Project Proposal. Construction of the ADR plant has not been modified with respect to chemical storage. The following description of storage areas is reproduced from the Project Proposal.

The building will be of steel frame construction with insulated metal cladding. A 300 mm high curb-wall will contain spills or fugitive solutions within the building. Except for the barren solution tank, all solution tanks and associated pumps will also be located in this building. The heated barren-solution tank will be located just outside of the building, with pumps inside the building. Overflows and spills will report to a floor sump, which will gravity-drain to the events ponds through a 750 mm diameter HDPE pipe.

Except for lime and cement, chemical storage will be indoors on concrete slabs located adjacent to the adsorption area in the ADR building. Sodium cyanide, caustic, hydrochloric acid and smaller quantities of other miscellaneous chemicals will be supplied and stored. Lime and cement will be delivered in bulk pneumatic trucks and stored in large silos adjacent to the reclaim conveyor. The table below lists the monthly usages and storage requirements for each chemical. The individual storage areas for major reagents are sized to contain a minimum of two weeks storage. Flux storage will be sized for shrink-wrapped 1 tonne pallet shipments. Concrete curbing will separate each of the chemical storage areas to prevent any interaction between chemicals and provide a minimum of 110% containment in case of spills.

Laboratory Building

As discussed above, these functions have been consolidated into the ADR Plant.

Process Plant Office Building

As discussed above, these functions have been consolidated into the ADR Plant.

Process Plant Shop/Warehouse Building

As discussed above, these functions have been consolidated into the ADR Plant.

Adsorption, Desorption, and Recovery Building and Reagent Storage

As discussed above, these functions have been consolidated into the ADR Plant.

Cyanide Detoxification Plant

Water removed from the HLF system must be detoxified before being further treated through the Mine Water Treatment Plant (MWTP) and discharged to Haggart Creek. To accomplish this, a Cyanide Detoxification Plant (CDP) will be constructed adjacent to or within the MWTP, depending on the final arrangement. Consistent with that presented in the Project Proposal, the HLF water balance indicates that the CDP will not be required until the end of operations. Additionally, only the cyanide oxidation step will occur in the ADR Plant with the subsequent cyanate hydrolysis and ammonia stripping steps occurring in the adjacent MWTP building.

Cyanide Oxidation

This Project activity / component is consistent with that described in Section 5 of the Project Proposal.

Cyanate Hydrolysis

This Project activity / component is largely unchanged and remains consistent with that described in Section 5 of the Project Proposal with the exception that hydrochloric acid will be used instead of sulfuric acid to lower the pH to enhance the reaction rate.

Ammonia Stripping

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Detoxification Process Effluent

As part of Project refinements, detoxified water will be blended with other incoming waters in the MWTP Mix Tanks 1 and 2 where hypochlorite is added to oxidize redox active metals. Residual ammonia present in the water will also be converted to chloramines and nitrogen gas through the breakpoint chlorination mechanism.

Detoxification Process Solids

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Truck Shop/Warehouse/Cold Storage

The Project activity/component remains consistent with that described in Section 5.4 of the Project Proposal with the exception that the Truck Shop and warehousing facility will be located closer to the Open Pit and other camp facilities, as shown in Figure 5.1-2.

5.4.1.8 Pond Development

Water management at the site has been optimized and has resulted in a lower number of ponds but with approximately the same overall storage capacity, making the system more efficient. A comparison of maximum pond capacities (including the freeboard volume) between what was assessed in the Project Proposal and the current Project is shown in Table 5.4-8.

Table 5.4-8: Comparison of Maximum Pond Capacities (including freeboard volume)

Structure	Project Proposal		Project After Refinements	
	Without Freeboard	*With Freeboard*	*Without Freeboard*	*With Freeboard*
Events Ponds				
▪ Pond 1	95,138	112,502	92,153	109,253
▪ Pond 2	98,689	116,550	90,693	107,460
Subtotal	**193,827**	**229,052**	**182,846**	**216,713**
Mine Water Treatment Plant Ponds				
▪ Feed Pond	13,449	18,114	N/A	N/A
▪ Product Pond	13,449	18,114	N/A	N/A
Subtotal	**26,898**	**36,228**	**0**	**0**
Sediment Control Ponds				
▪ Platinum Gulch Pond	29,085	37,546	41,000	52,311
▪ Eagle Pup Pond	20,463	26,559	25,000	36,248
▪ Lower Dublin Gulch South Pond	N/A	N/A	30,000	49,749
▪ Lower Dublin Gulch North Pond	N/A	N/A	10,500	16,563
▪ Lower Dublin Gulch Sediment Control Pond (upstream)	9,985	14,954	N/A	N/A
▪ Lower Dublin Gulch Sediment Control Pond (downstream)	12,536	17,605	N/A	N/A
▪ Ann Gulch Sediment Control Pond East	20,904	27,132	N/A	N/A
Subtotal	**92,973**	**123,796**	**106,500**	**154,871**

Events Ponds

Storage capacities of the Events Ponds, and their design basis are described above in the subsection titled *In-Heap Pond* in Section 5.4.1.5 HLF Construction. The construction, development and foundation requirements of both events ponds is consistent with that presented in the Project Proposal.

The event ponds will have a primary and secondary geosynthetic liner separated by a high-load geonet drain or equivalent (LDRS layer) and a compacted soil layer between the secondary liner and the subgrade. Solution in the events ponds will be pumped to the process circuit within 72 hours.

Mine Water Treatment Plant Ponds

The feed and polishing ponds described in the Project Proposal have been replaced by the multi-functional Lower Dublin South Pond (Appendix 8). As discussed in Section 5.5.4.1, influent water will be introduced to the MWTP via Mix Tanks 1 and 2 and discharged to Haggart Creek after the final treatment step.

Sediment Control Ponds

The number of sediment control ponds (SCP) has decreased from five to four, while the total storage capacity has decreased from 123,796 m^3 to 106,500 m^3. The decrease is largely due to the multi-functional operation of the Lower Dublin South Pond, and the oversized capacities of the former sediment control ponds situated on the north side of the DGDC.

The ponds include the Eagle Pup SCP, Platinum Gulch SCP, Lower Dublin Gulch South Pond and Lower Dublin Gulch North Pond. The primary function of the Eagle Pup SCP will be to collect, contain and route contact water flows to the Lower Dublin Gulch South Pond. The Platinum Gulch SCP will also collect, contain and route contact water flows to the Lower Dublin Gulch South Pond.

The Lower Dublin South Pond is located immediately to the east of the camp and laydown area. The pond accumulates mine runoff water from the Upper Suttle Gulch area, which includes the 100 day storage facility, the three stage crushing circuit, the truck shop, and the camp. The Lower Dublin Gulch South Pond is primarily a holding pond that allows the mine operators to dispatch reclaimed contact waters to the heap leach circuit or to the MWTP, as operational requirements dictate. When water is not required for operational needs, the pond can function as a sediment control pond that discharges sediment-free water to the lower reach of the Dublin Gulch Diversion Channel, if water quality criteria are met.

The Lower Dublin Gulch North Pond is located to the west of the events ponds and process facilities on the north side of the Dublin Gulch Diversion Channel. This pond's sole function is to remove sediment from runoff generated within the sub-catchment defined by the western limit of the HLF and the northern side of the lower Dublin Gulch Diversion Channel. The Lower Dublin Gulch North Pond discharges sediment-free water directly into Haggart Creek.

5.4.2 Mine Site Support Infrastructure

5.4.2.1 Access Road

Access Roads Upgrades

The Haggart Creek Road (HCR) will be upgraded to a two-way single-lane radio controlled access road as described in the Project Proposal, with one exception. The Project Proposal included a description of the re-alignment of three sections of the HCR of approximately 700 m, 600 m and 1 100 m in length. Further engineering analysis indicates that these sections do not require re-alignment. Therefore the HCR will be upgraded without re-alignment of these sections as previously proposed. The engineering analysis indicates that the HCR can be upgraded using specific geometric parameters and Transportation Association of Canada (TAC) design standards for Low Volume Roads (LVR 50), as well as acceptable engineering practices for two-way one-lane access

roads without these re-alignments. VIT will ensure the road is upgraded to safely accommodate Project and multiple user traffic throughout the mine life.

Realignment Area #1

No longer necessary.

Realignment Area #2

No longer necessary.

Realignment Area #3

No longer necessary.

South McQuesten Parking Area

This Project activity / component is consistent with that described in Section 5 of the Project Proposal.

Construction Staging Areas and Borrow Source Requirements

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Traffic Volume

The Project activity component has been optimized by the Project refinements.

Traffic volume on the SMR and HCR during construction will increase by approximately 15% as a result of the Project refinements. Because of the longer construction phase over 25 months as opposed to 16 to 18 months as stated in the Project Proposal, the number of trips will increase to:

- 2,500 semi-trailer loads (round trip)
- 10 – 20, 1 to 5 tonne trucks per day on average (daily traffic estimate unchanged), or approximately 7,500 to 10,000 round trips

5.4.2.2 Energy Requirements

Construction of the transmission line is planned to begin in the Q2 2013 and be completed by Q3 2013. Electrical energy for the Project for operations, decommissioning, closure and post-closure phases is assumed to be available from the Yukon Energy transmission grid. Electricity at the site will be distributed at 25 kV. As a result of the Project refinements, the mine site will be connected to the transmission grid during construction, rather than after construction as stated in the Project Proposal. This will result in a decrease of diesel emissions during construction once the electrical supply (or a portion thereof) is switched from diesel generators on site to the grid.

Surveying and Clearing of Transmission Line RoW

Surveying and clearing of transmission line RoW remains consistent with that described in Section 5 of the Project Proposal.

Transmission Line Construction/Distribution

Transmission line construction and distribution remains consistent with that described in Section 5 of the Project Proposal.

Substation Construction

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal, with the exception that the mine substation will be 25 kV, rather than 13.2kV.

5.4.2.3 Mine Site Accommodations Facilities

Permanent Accommodation Facilities

Refinements to the Project will be to utilize and expand the existing exploration camp, rather than construct a camp at a new location. The expanded camp will have permanent accommodations for 250 people during operations.

Temporary Construction Camp

Accommodation during the construction phase will be provided by expansion of the existing advanced 100 man camp maintained and operated by VIT. The temporary modules will be added to provide accommodation for a peak construction workforce of 400 people.

Mine Administration Building

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Camp Water Source, Distribution, and Disposal Infrastructure

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Potable Water Treatment Plant

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Wastewater Treatment Plant

There will no longer be a wastewater treatment plant constructed on site. Instead, the camp will be constructed near the septic system that was constructed for the exploration camp. The septic system consists of a septic tank and soil absorption system and will be expanded to accommodate the larger number of personnel during construction and operation. The septic system will be designed, constructed, and operated per requirements set out in the Design Specifications for Sewage Disposal Systems May 2010 provided by Yukon Government Health and Social Services and required by the Yukon Sewage Disposal Systems Regulation.

5.4.2.4 Water Usage

Water usage for the camp facilities will not change from that described in the Project Proposal. However, water needed for construction is estimated to increase by 25% to approximately

3,754,000 L. This estimated increase is based on an increased understanding of water required for concrete production. The volume of water required during construction may be refined during detailed engineering design and will be addressed in the Water Use License application prepared by VIT.

5.4.2.5 Mine Water Treatment Plant

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal, with the exception that the third treatment process for sulfate removal is deemed no longer necessary. The rationale for this is described in Stantec 2011 (R8 and R9 in *Response to Request for Supplementary Information Report*) and in Appendix 10 (*Eagle Gold Project Water Quality Predictions Based on Project Refinements*).

5.4.2.6 Fuel and Explosives Facilities

Fuel Storage Facility

The description of this Project activity / component is consistent with what was described in Section 5 of the Project Proposal, with the exception that the fuel storage requirements have increased as a result of the refinements to include two 750,000 L tanks for bulk fuel for a total storage volume of 1.5 million L.

Explosives and Magazine Facilities

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal, except that the explosives and magazine sites will be located on a hillside southwest of the open pit.

5.4.3 Waste Management

The project activity / component, including waste types and the rates of waste generation, remains essentially unchanged as that described in Section 5 of the Project proposal. Additional brush area may be cleared by the end of operations to accommodate the slightly expanded overall mine site footprint (4%). Further, a septic system will be expanded to accommodate construction and operation personnel so that no sewage treatment plant will be required.

5.4.4 Water Management

The overall water management strategy, objectives and methods for construction of the water management facilities remain unchanged by the Project refinements, although some of the details of the facilities have been optimized. The optimized water management plan (Appendix 8) includes a more comprehensive sediment and erosion control plan for construction, which supersedes the discussion of construction provided in the Project Proposal.

Despite the increase in production, the overall disturbed footprint of the proposed mine development has changed very little. The disturbance remains contained within the boundaries of the Lower Dublin Gulch watershed.

A true water management design basis was not specified in the Project Proposal. A design basis has since been developed as part of the Feasibility Study. The design basis for the Project Proposal is

compared to what is now assumed based on water management and water balance optimizations is provided in Table 5.4.9.

Table 5.4-9: Comparison of Design Basis Used in the Project Proposal and the Current Water Management Plan (Appendix 8)

Common Infrastructure Element	Design Element	Project Proposal	Project after Optimizations
Temporary diversion or interceptor ditches	Design storm event	Not specified	1:10 year 24-hr
	Minimum depth	Not specified	300 mm
	Minimum grade	Not specified	0.30%
	Maximum grade (unlined/lined)	Not specified	2% / 5%-10%
	Side slopes (unlined/lined)	Not specified	2H:1V / 1H:1V
	Maximum velocity (unlined/lined)	Not specified	1.5 m/s / 4.0 m/s
Permanent diversion or interceptor ditches (not including Dublin Gulch Diversion)	Design storm event	Not specified	1:10 year 24-hr
	Minimum depth	Not specified	600 mm
	Minimum grade	Not specified	0.30%
	Maximum grade (unlined/lined)	Not specified	2% / 5%-10%
	Side slopes (unlined/lined)	Not specified	2H:1V / 1H:1V
	Maximum velocity (unlined/lined)	Not specified	1.5 m/s / 4.0 m/s
Culverts	Minimum diameter	Not specified	600 mm
	Design storm event (areas < 1 ha)	Not specified	1:10 year 24-hr
	Design storm event (areas > 1 ha)	Not specified	1:100 year 24-hr
	Design storm events (at stream conveyances)	Not specified	1:200 year 24-hr
Temporary sediment control ponds	Design storm event (capacity)	Not specified	1:100 year 24-hr
	Design storm event (sediment removal)	Not specified	1:10 year 24-hr
	Depth requirements:		
	Dead storage (sediment)	Not specified	0.5 m
	Live storage (liquid)	Not specified	1.5 m
	Minimum freeboard (200-year event)	Not specified	0.5 m
Permanent sediment control ponds	Design storm event (capacity)	1 in 100 year, 24-hr	1:200 year 24-hr
	Design storm event (sediment removal)	Not specified	1:10 year
	Depth requirements:		
	Dead storage (sediment)	Not specified	0.5 m
	Live storage (liquid)	Not specified	1.5 m
	Minimum freeboard (200-year event)	Not specified	0.5 m
	Dewatering (pumping capability)	Not specified	Full dewater in 24 hours

The design storm event, in terms of pond capacity, increased from the 1:100 year 24-hour event to the 1:200 year 24-hour event based on the perceived risk exposure of a longer Life-of-Mine (Table 5.3-1). This is consistent with industry standard practices.

The following sections describe refinements that have been made to the Project. The design basis for the Dublin Gulch diversion channel is discussed separately in Section 5.4.4.1.

5.4.4.1 Dublin Gulch Diversion Channel

The objective of the Dublin Gulch diversion channel (DGDC) remains unchanged by Project refinements: to safely convey runoff and intercepted base flow from the upper Dublin Gulch watershed and undisturbed areas located adjacent to the diversion channel as it passes through the mine site and into the fish compensation works located in the lower reach of Eagle Creek. The alignment and design basis has been optimized to reflect a better understanding of the local hydrology, climatic design factors, and the long term (beyond mine closure) need for the structure. Optimization has affected the orientation slightly (Figures 5.4-3 through 5.4-5), while only the top 1.6 km require the design basis to safely convey flows beyond the HLF and Event Ponds. There is more flexibility in the design criteria downstream of the Events Ponds, so that the last one km reach is assumed to have the design criteria of the fish habitat compensation channel and any other engineering constraints (e.g., to accommodate the bridge capacity of the mine access road).

The details of the DGDC design are provided in Section 5.13 of Appendix 6. The DGDC is a large structure, and will consist of the following major components:

- A turf reinforced armored “upper channel reach” with a slope of 1.0%.
- A series of concrete armored stepped “drop structures”. A drop structure consists of: an approach inlet channel (1.0% slope); a drop chute channel (50.0% slope), an energy dissipation pool (0.0% slope); and an outlet channel (1.0% slope).
- A turf reinforced armored “lower channel reach” with a slope of 1.0% with intermediate drop structures.

The diversion channel capacity and armoring is sized primarily for the 100-year, 24-hour storm event with 0.5 m of freeboard. Additionally, the channel will have the capacity to convey the 500-year, 24-hour event without freeboard. Armoring will not be sized to accommodate the 500-year event. The design of the diversion channels are presented in detail in Appendix 6C in the technical memorandum titled *Dublin Gulch Diversion Channel Design.*

The Project design criteria are compared to the optimized criteria in Table 5.4-10, and channel characteristics are compared in Table 5.4-11.

Table 5.4-10: Comparison of Design Criteria Assumed by the Project Proposal and After Design Refinements for the Dublin Gulch Diversion Channel

	Project	After Design Refinements
Design Storm	1 in 100 year, 24-hour event	1:100 year, 24-hour event plus freeboard 1:500 year, 24-hour event (no

		freeboard allowance)
Velocity Reduction Pond, Storage	Yes, 35,000 m^3	N/A
No. of Drop Structures	1 (“energy dissipator”)	5

Table 5.4-11: Comparison of Channel Characteristics Assumed by the Project Proposal and After Design Refinements for the Dublin Gulch Diversion Channel

Channel Section	Item	Project Proposal	Refined Project
Upper and Lower Channel Reaches	Armoring	Riprap	Woven Polypropylene Geotextile Turf Reinforcement
	Depth	3 m	1.5 m
	Bottom Width	5 m	4 m
Energy Dissipation Structure	Type	Continuous Sloped Chute	A Series of Concrete Armored and Stepped Drop Structures
	Armoring	Riprap	Articulated Concrete Block/Turf Reinforcement
	Depth	1 m	3 m
	Width	60 m	4 m – 8 m

5.4.5 Workforce Requirements

This Project activity / remains consistent with that described in Section 5 of the Project Proposal with the exception that a maximum of 400 employees will be housed on-site at any time.

5.4.6 Energy Requirements

There will be a demand for up to 500 kW of power during the construction phase; this is consistent with the estimated energy requirement in the Project Proposal. Electricity will be produced by on-site diesel generators until completion of the transmission line in Q3 2013. After the transmission line is completed, it will augment electricity produced by portable generators for the remaining construction phase. The temporary units will be kept on site until at least the end of the construction period and maintained as emergency power units.

5.5 OPERATIONS PHASE

5.5.1 Mine Operations

5.5.1.1 Open Pit Mining

There will be three mine phases (rather than four), with two push backs. The annual mine production rate will increase from 9.1 Mt per year to up to 10.6 Mt per year. This is reflected by a 13% increase in daily mining rate from 26,000 tonnes per day to 29,500 tonnes per day.

The pit dimensions have been optimized. The ultimate footprint of the open pit will be 85 ha, a 30% increase from total footprint presented in the Project Proposal. The optimized pit outline is compared to the outline of the Project Proposal pit in Figure 5.5-1. The final highwall crest will be 1,409 masl and the pit bottom will be at 847 masl, making the highwall 562 m tall. The first bench containing ore is at the 1,275 masl elevation. Mining pushbacks are illustrated in Figures 5.5-2 through 5.5-5. Mining development phases are shown in Figures 5.5-6 through 5.5-12.

Following the 1.5 year pre-production period, ore production will increase to 29,500 t/d. Ore production will begin October 2014 and continue for two months. In December 2014, ore production will cease for 100 days as the storage pad will not be in place until 2015. Stripping of waste material will continue through the 100-day period. Ore production will start again in March 2015, and ramp up to 33,000 t/d. In November 2015, ore production will then continue at the nominal production rate of 29,500 t/d for the LOM.

Table 5.5-1: Schedule of the Optimized Life of Mine Production

Year	Ore kT	Grade g/t Au	Waste kT	Contained Au Oz
2013	0	0.00	2,405	0
2014	1,284	0.89	3,488	36,866
2015	9,720	0.93	17,735	291,056
2016	10,607	0.96	15,214	327,930
2017	10,544	0.89	16,622	301,280
2018	10,589	0.80	17,921	273,688
2019	10,634	0.78	17,841	266,885
2020	10,647	0.79	12,908	268,626
2021	10,654	0.63	12,570	215,726
2022	10,302	0.59	11,767	195,375
2023	6,613	0.58	3,939	123,337
Total	**91,594**	**0.78 (avg.)**	**132,411**	**2,300,768**

Mining Equipment

The Project activity / component has been optimized as a result of the Project refinements. Most of the mining equipment remains the same as presented in the Project Proposal. However, because of the increase in ore throughput, the following equipment has been updated:

- There will be two classes of trucks; 91 t and 136 t instead of solely 91 t trucks.
- The maximum number of trucks required increased from nine (class 91 t only) to 13 (six 91 t trucks and seven 136 t trucks).
- There will be three hydraulic shovels. However, the original hydraulic shovels had capacities of 11 m^3, whereas, the optimized mine has shovels of 11 m^3 and 15 m^3.
- The size of the wheel loader has increased to a 12.0 m^3 capacity loader.

Open Pit Slope Design

Open pit slope design has been updated as a result of mineral resource update, mine plan options, and further geotechnical investigation. Further information regarding the open pit design may be found in the report entitled Feasibility Study Open Pit Slope Design completed by BGC Engineering Inc. for Victoria Gold in January 2012 (Appendix 3 of this SIR). The design criteria are proposed to reduce the likelihood of pit slope failures. Further engineering design has resulted in:

- The global bench face angle reduced from 65° to 60°.
- Catch bench widths have been adjusted to maintain the recommended interberm angle.
- A minimum 16 m geotechnical berm will be added to the slopes every 150 m in sections in which bench width is less than 16 m.

The bench height of 15 m was maintained while the safety berm widths varied for both mining options. To achieve the proposed pit slope angles, it is required to depressurize the highwall rock mass and to control blasting.

Based on open pit mining optimization, haul roads will be left in place from the primary crusher at 1,050 masl down to a deeper mining elevation of 847.5 masl. No ramps will be maintained inside the final pit above the crusher elevation to minimize waste stripping.

5.5.1.2 Drilling

As a result of Project refinements, rotary blasthole drills will be 203 mm in diameter and have a spacing of 6.6 m in order to provide suitable fragmentation for the proposed loading equipment. A diesel powered hydraulic percussion track drill will be used for secondary drilling and highwall slope work. This drill will drill 159 mm diameter blastholes.

5.5.1.3 Blasting

Based on Project refinements, blasting will be performed using bulk ANFO as the main explosive, with plastic hole liners in wet conditions. The average powder factor for the holes is expected to be 0.57 kg/m^3 (equal to 0.21 kg per tonne using average density of 2.66). Approximately 2,000 to 6,100 tonnes of explosives will be used annually during operations.

Explosives manufacture and storage will occur at the pre-prepared pads located southwest of the open pit (see attached site layout drawing).

It is anticipated that an explosives contractor will be hired to manufacture and deliver ANFO down the blast hole. The contractor will be expected to use an explosives mix truck to combine the ammonium nitrate and diesel fuel to prepare the ANFO explosives. A pre-prepared pad will be provided as the base of operations to store the ammonium nitrate and diesel fuel, manufacture the ANFO in the explosives mix truck, and to decontaminate and repair the explosives mix truck.

Estimated annual explosives requirements for the construction and operations phases of the Project are provided in Table 5.5-2.

Table 5.5-2: Estimated annual explosives requirements for the Eagle Gold Project

	Construction		Operations										
Year	**2013**	**2014**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
Explosives ore (kg) '000	-	-	275	2082	2272	2259	2269	2278	2281	2283	2207	1417	19627
Explosives waste (kg) '000	515	514	233	3800	3260	3561	3840	3823	2766	2693	2521	843	27343
Explosives total (kg) '000	515	514	508	5883	5533	5821	6109	6101	5047	4976	4729	2260	46971

5.5.1.4 Hauling

The Project activity / component has been optimized by the Project refinements.

As described above there will be two sizes and classes of trucks (rather than one), a 91t and a 136 t truck. The maximum number of trucks is increased from 9 (class 91t only) to 13 (6 trucks of 91t and 7 trucks of 136t).

5.5.1.5 Open Pit Dewatering

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

5.5.1.6 Low Grade Ore Stockpiles

Currently the Project does not include individual low-grade ore stockpiles. However, the need for temporary stockpiles will be reexamined over the life of mine and optimized on an annual basis.

5.5.1.7 Primary Crushing and Conveying

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

5.5.1.8 Secondary Crushing and Conveying

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

5.5.1.9 Reclaim and High Pressure Grinding Rolls

This Project activity / component has been optimized by Project refinements.

Based on Project refinements, the High Pressure Grinding Roll (HPGR) 2 x 2800 kW tertiary crusher will be replaced with four Shorthead Cone 4 x 750 kW crushers. This refinement resulted from testing that indicated that conventional cone crushing methods provided the best overall project economics. Additionally, the Heap Leach Feed Particle Size (P_{80}) has changed from 5 to 6.4 mm.

5.5.1.10 Heap Leach Operation

The overall operation of the HLF remains the same as that described in the Project Proposal. However, more detailed engineering has resulted in refinements in some of the operational details of the HLF. The capacity of the HLF has increased 39% and the disturbed area has increased 20% (Table 5.5-3).

Table 5.5-3: Comparison of the Project and Optimized HLF Capacity and Disturbance Area

Parameter	Project Proposal	Refined Project	Difference	
			Actual	%
HLF Capacity	66.0 Mt	92.0 Mt	26.0 Mt	39%
Disturbance Area	89.1 ha	106.6 ha	17.5 ha	20%

Based on Project refinements, the amount of ore delivered to the HLF and the mass of gold to be recovered have increased, along with the consumables used. A comparison of HLF parameters is provided below in Table 5.5-4. Additionally, ore mined during coldest part of winter (November to March) will be placed on the ore stockpile area in the mine area rather than on the heap leach pad. Furthermore, areas of the heap that will be under leach in the winter will have ore placed initially in 10 m lifts and the leach line "ripped in" to a depth of approximately 3 m. The heat exchanger used to raise the temperature of the barren solution has been specified as an 18 million BTU unit capable of elevating the solution temperature by approximately 1.7°C (3°F). The details of the expanded HLF facility are presented in Appendix 4.

Table 5.5-4: Comparison of HLF Parameters Based on Project Refinements

Description	Units	Project Proposal	Updated Project
Mineable Resource	Mt	66	92
Average Mining Rate (ore to process)	Mt/a	9.1	10.3
Crushing Rate, primary	tonnes/d	26,000	29,500
Crushing Plant Availability	%	75%	85%
Nominal Design Solution Flow, Yr 0-5	m^3/hr	1,950	2,770
(barren on to HLF) Yr 5 to closure	m^3/hr		3,690
Pregnant Solution Pumps Number	ea	4	5
Power	kW	186	186
CIC Tank Size (carbon columns)	m x m	3.5 x 4.5	4.62 x 5.2
Area "Under Leach"	m^2	195,000	277,000
Consumables Usage (approx.)			
Sodium Cyanide annual	kg/a	3,094,000	3,510,500
Diesel Fuel (process only)	L/a	2,248,352	3,100,000
Hydrochloric Acid	L/a	304,615	420,000
ADR (Process Plant) Area	m^2	4,314	4,314
Personnel (at project start, mine personnel varies by year)	ea	339	318
Gold Produced	ounces	1,253,892	1,672,492

Waste Rock Management

The Project activity / component has been optimized by the Project refinements.

Based on Project refinements, the Platinum Gulch WRSA reaches its ultimate volume of 13.7 Mt after three years (Table 5.5-5). The Eagle Pup WRSA will reach its ultimate volume of 116.8 Mt in 2023. Life of mine waste production is refined to 132 Mt, including overburden.

Figures 5.5-6 through 5.5-12 presents schematic of the development of the open pit and the WRSAs over the life of the mine.

Table 5.5-5: Comparison of Annual Waste Rock Production and Storage Area for the Project and Optimized Project

	2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023	
	Mt	ha	Mt	ha	Mt	ha	Mt	ha	Mt	Ha	Mt	Ha	Mt	Ha	Mt	Ha	Mt	ha	Mt	ha	Mt	ha
Platinum Gulch	1	6	2.8	25	5.8	33.2	0	33	0	33	0	33	0	33	0	33						
Eagle Pup	2	12	2.8	25	7.9	45	8.8	53	12.8	62	9.5	68	4	74	3.4	80						
TOTAL (Project Proposal)	**3**	**18**	**5.6**	**50**	**13.7**	**78**	**8.8**	**86**	**12.8**	**95**	**9.5**	**101**	**4**	**107**	**3.4**	**113**						
Platinum Gulch			0	0	6.8	33	2.3	8	4.6	0.3	0	0	0	0	0	0	0	0	0	0	0	0
Eagle Pup			2.9	20	7.6	17	14	33	11	56	17	98	20	101	13	101	11	0.1	16	2.9	4.2	0.5
TOTAL (Updated)			**2.9**	**20**	**14.4**	**50**	**16.3**	**41**	**15.6**	**56.3**	**17**	**98**	**20**	**101**	**13**	**101**	**11**	**0.1**	**16**	**2.9**	**4.2**	**0.5**

5.5.1.11 Gold Recovery Process

Adsorption

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Desorption and Recovery

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Acid Wash

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Carbon Regeneration

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Refining

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Reagent Addition

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Cyanide Detoxification Plant

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal with the exception that the cyanide detoxification processes have been split between the ADR Plant (cyanide oxidation) and the MWTP (cyanate hydrolysis and ammonia stripping).

Events Ponds Usage

The usage of the Events Ponds remains consistent with that described in Section 5 of the Project Proposal, with the exception of the capacity of the ponds.

The Events Ponds capacity are now designed to have an operating capacity of approximately 182,846 m^3 and a maximum capacity of 216,713 m^3.

5.5.2 Mine Site Support Infrastructure

5.5.2.1 Access Road

Traffic Volume

This Project activity / component remains consistent with that described in Section 5 of the Project Proposal, except that the total truck loads are estimated at 2,200 round trips per year rather than 1,944 as stated in the Project Proposal.

Maintenance

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

5.5.2.2 Power

The method of power distribution has been updated. Electricity will be distributed via two 25 kV lines then distributed at 600 V to feed smaller motors rated less than 190 kW (250 hp) and 4,160 V for larger motors. There has been a significant reduction in motor size for the crushing and conveying system. The connected load (kW sum of all electrical components) for the tertiary crushing stage is now 4,782 kW which is a reduction from the 6,000 kW in the Project Proposal. This reduction is primarily a function of the switch to conventional crushing from HPGR technology. The current design of the tertiary crushing stage has a maximum motor size of 746 kW in comparison to the 2,600 kW motors in the original Project Proposal. The use of multiple smaller motors in this crushing stage will provide operational flexibility to allow power demand to be managed.

The following voltages will be established in the ADR plant:

- **4,160 V**—Motors 190 kW (250 hp) and higher
- **600 V**—To feed motors rated less than 190 kW (250 hp) and other plant auxiliary loads
- **120/208 V**—Lighting, heating and motor load up to 0.55 kW (0.75 hp).

All major transformers will be oil filled, and will be located outdoors. Analog instrumentation signals will be 4 – 20 mA DC. Control signals, status signals and interlocks will be 120 V AC, 60 Hz.

Emergency Power

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal. Briefly, in the event of a power failure, three emergency diesel generation sets will be available for use. The emergency generator sets will be fuelled from a 2-week capacity fuel tank located adjacent to the emergency generators, which can be refuelled from the site fuel storage tank as required, resulting in sufficient fuel for long term emergency power supply.

5.5.2.3 Truck Shop Operation

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

5.5.2.4 Operating Fuel and Explosives Facilities

Storage facility details for fuel and explosives were provided in Section 5.4.2.6. This section provides further details specific to the operations phase.

Fuel Loading and Storage

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

Explosives Consumption and Delivery

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal.

5.5.3 Waste Management

The Project activity / component remains consistent with that described in Section 5 of the Project Proposal, except that the Refined Project will operate for 10 years rather than 7.3 years.

5.5.4 Water Management

The overall site water management strategy has not materially changed as a result of the Project refinements. The Project refinements have allowed for the opportunity to improve and optimize the design of water management facilities while introducing a higher level of understanding with respect to operational water management and the initial use and re-use of mine-influenced waters.

Water Management Plan

The objectives of the water management plan remain unchanged; however, some of the routing pathways and operational procedures within the proposed mine site have been optimized to provide more efficient and safer handling of water. Graphical representations of the flow of various streams of water through the site have been overlain on the project general arrangement for each of the major stages of the mine's life from construction through closure. The water management plan is depicted at each mine life stage on Figures 5.5-15 through 5.5-20.

From a surface water management perspective, the quantity and quality of water flowing through the mine site depends on the amount of mine impacted surface area within the Dublin Gulch watershed. In most cases, disturbed areas tend to yield higher rates of runoff due to reduced infiltration, and higher rates of sediment mobilization as many of the natural means of soil stabilization are removed or disturbed. The quality of mine-influenced water generated in the disturbed area may also be a concern (i.e., metals mobilized in runoff or seepage). These conditions predicate the handling and treatment of such mine-influenced waters.

Surface area assumptions for the optimized surface water balance model and water management plan is shown in Table 5.5-6. While the total mine footprint at LOM has increased by 3.9% from 585 ha to 608 ha, the area of disturbance within the footprint has increased from 319 ha to 416 ha, due primarily to the larger areas of the open pit, waste rock storage areas and heap leach facility. This represents a 6.1% increase in total disturbed area within the overall combined Dublin Gulch-Eagle Creek-Platinum Gulch watershed of 1585 ha. This increase may increase the amount of runoff and sediment, but this runoff will be managed to protect stream water quality.

Table 5.5-6: Surface Water Balance Model Disturbance Area Assumptions

	Project Proposal	Current Project
Overall Watershed Area (Dublin Gulch/Platinum Gulch)	1,585 ha	1,585 ha
Total Watershed Area Outside Footprint – Dublin Gulch/Platinum Gulch	1,000 ha	977 ha
% Total Watershed Area Outside Footprint – Dublin Gulch/Platinum Gulch	63.1%	61.6%
Total Disturbed Area within Footprint (LoM)	319 ha	416 ha
% Disturbed Area within Dublin Gulch/Platinum Gulch	20.1%	26.2%
% Increase in Disturbed Area of Overall Watershed		6.1%
Total Undisturbed Area within Footprint (LoM)	162 ha	193 ha
Total Area Contributing to Managed Flow (LoM)	481 ha	688 ha*
Total Footprint (LoM)	585 ha	608 ha
% Increase in Total Footprint		3.9%

*includes non-disturbed areas outside footprint in Eagle Pup and Platinum Gulch watersheds

The increase in ore reserves has resulted in a longer anticipated mine life. A comparison of respective schedules is provided in Table 5.5-7. For the purposes of closure and reclamation planning, the Closure phase has been subdivided into two logical stages – Active Care and Passive Care. The Active Care stage refers to the period of time when active mine water treatment is provided; whereas, the Passive Care stage refers to the period of time when active treatment of mine water is no longer required. Table 5.5-7 shows that the mine will operate for two years longer than was planned in the Project Proposal, and have three additional years of draindown.

Table 5.5-7: Comparison of Assumptions for Water Balance Model Timing for the Project

Mine Stage	Project Proposal	Current Project
Construction Phase	1.7 years	2.1 years
Operations Phase	7.3 years	9.2 years
Active Care Stage:		
▪ Supplemental Gold Recovery	1 year	1 – 2 years
▪ Detoxification	2 years	2 years
▪ Rinsing		
Passive Care Stage:		
▪ Drain Down	7 years	10 years
▪ Post-closure Monitoring	10 years	10 years

Open Pit Dewatering

The Project activity / component remains unchanged by the refinements.

Water Balance

The water balance model has been updated to reflect the optimizations that have occurred in the mine as a result of the refinements.

Updating of the model has included the migration from a proprietary spreadsheet based deterministic model to a GoldSim-based probabilistic model, which allows for a more robust statistical approach for forecasting future water balance scenarios.

The probabilistic approach quantifies uncertainty as a result of stochastic variability. The limitation of this approach lies in the subjectivity of the probability distributions. Where there is a greater understanding, history, or record of certain parameters deterministic processes are incorporated alongside the stochastic processes to reduce the sensitivity to the selection of probability distributions.

This approach is seen as a decision support tool that quantifies the objective likelihood of occurrence for a particular event rather than a tool that predicts specific output quantities. It is important to view the results of the probabilistic model first and foremost in a qualitative manner whereas the

quantitative outputs should be treated as order of magnitude estimates rather than fixed predictive values.

A comparison of the outputs of the original spreadsheet water balance model, a GoldSim port of the original model, and the GoldSim water balance model of the optimized Project is discussed in Appendix 8. The 'managed' inflow to the MWTP presented in Figure 5.5-21 and Figure 5.5-22 refers to operational rules that were applied to GoldSim water balance models to determine the design requirements (capacity and timing) for water management and treatment facilities. The models utilized an optimized water management scenario to simulate the recycling of excess discharge from the HLF back to the HLF or events ponds in that event that:

- The inflow in any month exceeds the design capacity of the MWTP of 600 m^3/hr
- The ratio of potential discharge from the MWTP versus Haggart Creek flow is less than 1:10.

The optimized water balance model focused on certain aspects of the Operations phase of the Project and specifically provided decision support with respect to the following:

- Timing and availability of water for process water make up requirements.
- Timing and magnitude of positive (water surplus) and negative (water deficit) water balance conditions.
- Assessment of storage capacity to provide guidance with respect to the sizing of on-site water storage.
- Assessment of active water treatment requirements (timing and order of magnitude) during operations, rinsing, and drain down.

Continued water management and water balance optimization is anticipated during the Water Use License and Quartz Mining License application processes.

5.5.4.1 Mine Water Treatment Plant and Sludge Management

The Mine Water Treatment Plant (MWTP) will be constructed to treat contaminated surface water and detoxified process solution. The MWTP will be located in the proximity of the process plant area and will be constructed as two independent trains, each capable of treating up to 300 m^3/hr. The MWTP will be primarily a metals removal plant and is intended to treat the site drainage collected at the Lower Dublin South Pond (LDSP) as well as to provide additional treatment for excess water from the Heap Leach Facility (HLF) after it has been pre-treated at the Cyanide Detoxification Plant (CDP). The treated effluent from the MWTP will be discharged by gravity to an outfall at Haggart Creek. The major MWTP processes and location equipment for each are summarized in Table 5.5-8.

Table 5.5-8: MWTP Process and Location/Equipment Summary

Process	Location/Equipment
Oxidation/Breakpoint Chlorination	Mix Tanks 1 & 2
High pH Adjustment (Lime)	Mix Tanks 3 & 4
Solids Precipitation	High pH Clarifiers 1 & 2
Low pH Adjustment (Ferric)	Mix Tanks 5 & 6
Solids Coagulation	Low pH Clarifiers 1 & 2
Final pH Adjustment	Mix Tanks 7 & 8
Dechlorination	Treated Water Holding Tank
Solids Dewatering	Filter Presses 1, 2, 3

The MWTP process proposed in the original Project Proposal (PP) included the following:

- chlorination for oxidation, lime softening for removing most of the metals of concern, such as copper, iron lead, manganese, nickel, thallium, uranium, and zinc, and ferric chloride coagulation for additional metals removal.
- A Sulf-IX ion exchange system for removing sulfate and nitrite.
- Dechlorination for the treated water when necessary with sodium thiosulfate to remove any residual chlorine. Once dechlorinated, the treated water would not be harmful to aquatic life when discharged and to pass the toxicity test as required by the Metal Mining Effluent Regulations (MMER).

Project refinements have eliminated the Sulf IX ion exchange system due to water management and balance optimizations and a better understanding of receiving water objectives. As described in Stantec 2011 (R8 and R9 in *Response to Request for Supplementary Information Report*) and in Appendix 10, sulphate toxicity and treatment methods indicate that during operations sulphate can be managed based on the solubility of gypsum (1,620 mg/L in effluent) rather than more active treatment. A simplified treatment process flow diagram is shown in Figure 5.5-23.

Water Quality Guidelines

End of pipe effluent criteria and downstream receiving environment quality have been be taken into consideration for the MWTP design. The design assumes the guideline concentrations are not to be exceeded downstream of the outfall location where the MWTP effluent will blend with the native flow of Haggart Creek. The Metal Mining Effluent Regulations (MMER) and the Canadian Council of Minister of the Environment (CCME) WQG discharge criteria are presented in Table 5.5-9.

Table 5.5-9: MMER and CCME End of Pipe Discharge Criteria

	MMER	CCME
Parameter	**WQG (mg/L)**	**WQG (mg/L)**
pH	6.0-9.5	6.0-9.5
TSS	15	-
Arsenic, T	0.5	0.01
Copper, T	0.3	0.006
Lead, T	0.2	0.008
Nickel, T	0.5	0.22
Zinc, T	0.5	0.06
Radium 226	0.37 Bq/L	NA
Cyanide (free)	1.0	0.01

Furthermore, because compliance with the WQG is determined by in-stream concentrations, the maximum allowable MWTP effluent concentration for each parameter depends on the Haggart Creek stream flow, the background concentration of each compound in Haggart Creek upstream of the MWTP, and the MWTP effluent flow rate. The water management plan was developed to maintain the dilution ratio at or above 10:1, which minimizes the requirement for unnecessary treatment. The water management plan is intended to provide the necessary flexibility to maintain dilution ratios at 10:1 or greater.

Additionally, the predicted source term concentrations assumptions used in the Project Proposal were evaluated by SRK 2012 (included as an attachment to Appendix 10) including primarily the effect of increased area and volumes of the HLF and waste rock storage areas. The memorandum suggested that the optimized facilities could result in some minor increases in concentrations at closure for a few parameters of interest to the aquatic effects assessment due simply to a greater volume to area ratio of material that is proposed for each facility. However, SRK (2012) highlighted that the potential concentration changes are difficult to predict and largely uncertain due to conservative assumptions inherent in the Project Proposal source term predictions. Accordingly, SRK (2012) concluded that the estimates of seepage quality emanating from the heap leach facility and waste rock storage areas are likely to be similar to values previously reported in the Project Proposal.

Based on area and volume alone and ignoring the already conservative nature of the upper bound values used for the source term estimates, SRK suggested that some of the parameters could increase by up to 40% for both the WRSAs and the HLF. These include fluoride, manganese, selenium, copper and mercury, while sulphate could increase by up to a factor of two. No changes are expected for the pit walls concentrations since they are limited by the relative low rock to water ratio. For the WRSAs, the parameters that exceed or are close to receiving water quality guidelines before treatment could increase slightly with the exception of sulphate concentrations, which could increase by up to a factor of two. For the HLF, once parameters related to processing complete the rinsing cycle from the heap, long term concentrations may show a minor increase.

In summary, the increase in sulphate, copper and manganese concentrations due to the Project refinements in the source term will not affect the MWTP effluent concentration since they are controlled by minimum solubility. However, it is expected that the pH sludge solids to be precipitated at the high pH clarifier and disposed will increase. The expected increase in mercury will result in a proportional increase in the effluent mercury concentration as a result of the increase of loadings to the MWTP. The expected increase in selenium and fluoride will result in an increase in effluent concentrations since the MWTP does not provide removal for these parameters.

However, because of the degree of uncertainty in source term predictions for mining facilities, the source term concentrations provided on the Project Proposal are considered appropriate for the Project. In addition, while the expected change in concentrations for the above parameters may have minimal impact in the MWTP project design, additional design and refinement is on-going.

Sludge Management

The MWTP will use three filter presses which will increase dewatering of the solids produced by the high pH precipitation step and the low pH coagulation step produced by the CDP and MWTP. Improved dewatering will reduce the required storage volume and footprint initially required by the freeze consolidation pads where sludge will be stored during operations. Dewatered sludge solids will be transferred to the heap during closure capping activities for permanent disposal.

5.5.5 Workforce Requirements

Workforce requirements have been adjusted to meet the needs of the Project based on refinements. Table 5.5-10 provides the updated estimated work force for the Project.

Table 5.5-10: Operations Phase Workforce Estimate

Department	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Mine	169	186	206	204	207	196	169	176			
Process	106	113	113	113	113	113	113	113			
General and Administrative	64	64	64	64	64	64	64	64			
Total Manpower	**339**	**363**	**383**	**381**	**384**	**373**	**339**	**353**			
Mine		138	228	212	224	232	229	210	226	206	166
Process		128	128	128	128	128	128	128	128	128	128
General and Administrative		72	81	80	81	82	81	79	81	79	75
Total Manpower – Refined		**338**	**437**	**420**	**433**	**442**	**438**	**417**	**435**	**413**	**369**

5.5.6 Energy Requirements

As a result of Project refinements there will be increased demand and consumption for power for the Project during the operations phase. In addition, the mine plan has been optimized to reduce energy requirements during winter months when overall demand from all Yukon customers tends to be highest.

As detailed in Section 5.5.2.2, the use of high pressure grinding rolls for the primary crushing stage has been changed to use conventional cone crushers resulting in a significant reduction in power demand at start up from the primary crushers. In addition to this change in equipment, the ore crushing plan has been modified to reduce winter power requirements to correspond with power supply cycles in Yukon. Specifically, the Project will no longer crush ore via the second and third crushing process for approximately 100 days during winter. These modifications to equipment and seasonal ore crushing plan will reduce Project energy requirements during winter. It is anticipated that these changes will reduce peak energy demands from the Project as previously proposed.

Electrical energy is measured by two related but different parameters: consumption and demand. Simply put, consumption is the total amount of energy used. Demand is the immediate rate of that consumption.

Estimated power consumption for construction and operations have been updated based on the Project refinements, and are outlined in Table 5.5.11 below. The first column describing Previous Estimated Annual Consumption reflects the estimates described in the Project Proposal and is provided for comparison and reference to the new estimates. Updated monthly load profiles are provided Figures 5.5-13 and 5.5-14).

The estimated annual electrical energy consumption for the Project has increased over the previous estimate by 19,919 MWh for operation years 1 to 4 and 45,306 MWh for operation years 8 to 10. The average monthly demand in summer has increased by 3,702 MWh (operation years 1 to 4) and 5,481 MWh (operation years 8 to 10) while the average monthly demand in winter has decreased by 2,970 MWh (operation years 1 to 4) to 860 MWh (operation years 8 to 10).

Energy demand for summer months will range from 15.4 MW during years 1-4 and 18.3 MW during years 8-10. Large crushing and pumping loads have been optimized to run at close to continuous load. Therefore peak demand is assumed to be very close to the seasonal average demand.

Table 5.5.11: Estimated Annual Power Loads and Consumption - Construction and Operations

Phase	Previous Annual Consumption (MWh)	Updated Annual Consumption (MWh)	Increase or (Decrease) Annual Consumption (MWh)	Previous Monthly Consumption (MWh)	Updated Total Summer Consumption (MWh)	Updated Total Winter Consumption (MWh)	Average Monthly Summer Consumption (MWh)	Average Monthly Winter Consumption (MWh)	Increase or (Decrease) Average Monthly Summer Consumption (MWh)	Increase or (Decrease) Average Monthly Winter Consumption (MWh)
Construction	**4,380**	**3,504**	**(876)**	**365**	**2,544**	**960**				
Operations Years 1 to 4	**94,832**	**114,751**	**19,919**	**7,902**	**98,491**	**16,261**	**11,274**	**4,932**	**3,3702**	**(2,970)**
Operations Years 5 to 6	**94,832**	**131,890**	**37,058**	**7,902**	**110,933**	**20,956**	**12,698**	**6,357**	**4,796**	**(1,545)**
Year 7	**94,832**	**133,510**	**38,678**	**7,902**	**112,110**	**21,400**	**12,832**	**6,491**	**4,930**	**(1,411)**
Years 8 to 10	**94,832**	**140,138**	**45,306**	**7,902**	**116,922**	**23,216**	**13,383**	**7,042**	**5,481**	**(860)**

As noted in the Project Proposal, power demand for the closure and reclamation phase has not been determined.

5.6 CLOSURE AND RECLAMATION PHASE

The objectives and methods for Closure and Reclamation of the Project presented in the Project Proposal remains unchanged by the Project refinements. However, Project Refinements have resulted in modifications of a number of Project facilities as described above that will require modification to the areal extent of reclamation activities and schedule for reclamation activities. Modifications reclamation activities are described in the following sections. The presentation below is consistent with corresponding sections from the Project Proposal.

5.6.1 Reclamation Strategy and Objectives

The Conceptual Closure and Reclamation Plan (CCRP) presented in the Project Proposal has not been revised as a result of the Project refinements. As discussed in the Project Proposal:

"VIT's overall strategy for the CCRP is to provide for an eventual "walk-away" closure condition with mine features decommissioned and reclaimed, and monitoring conducted until it is demonstrated that mitigation measures have achieved the required outcomes. The main focus of the reclamation program is to foster the return of the site to appropriate and functional ecosystems, similar to pre-development, and meet the key end-land use objective of wildlife and vegetation resources."

Closure and reclamation has been considered from the early planning and design stages of the Project. CCRP objectives have been developed to address the following main issues:

- Geochemical stability
- Water quality
- Physical stability (stable land forms)
- Land use, aesthetics and public health and safety.

Key objectives of the CCRP include:

- Prevent, minimize or mitigate adverse environmental impacts during closure and reclamation
- Reflect and address FNNND and stakeholder priorities and concerns
- Protect aquatic resources and prevent invasive plant establishment
- Reclaim land to the point that is can become, over time, comparable both visually and in land use to the undisturbed surrounding land
- Re-establish a productive land use that is of value for wildlife and mitigates the residual effects of mining on wildlife habitat, at-risk plant communities and the habitat of species at risk
- Ensure long term physical stability of the mine facilities (HLF and waste rock storage areas)
- Protect site water quality during and after closure
- Ensure that the site poses minimal risk to the public and native fauna

- Demonstrate that future risks and liabilities associated with the post-closure site have been eliminated or controlled to an acceptable level.

5.6.2 Reclamation Schedule

The timing of preliminary reclamation has been adjusted to reflect changes to the Project schedule and increased durations of the construction and operations phases (Table 5.6-1). Reclamation of the Project will begin in 2024. The period of time for reclamation will be 10 years, the same as was proposed in the Project Proposal.

Table 5.6-1: Preliminary Reclamation Schedule

Facility/Structure/Feature	Closure Conditions/Process	Project Proposal		Refined Project	
		Begin Date	End Date	Begin Date	End Date
EP WRSA					
WRSA cover	Recontour and cap as per WQ determined criteria	2021	2022	2024	2025
EP Sediment Control Pond	Maintain until meeting WQ criteria can be sustained for five years	2022	2027	2025	2030
PG WRSA					
WRSA cover	Recontour and cap as per WQ determined criteria	2016	2017	2019	2020
PG Sediment Control Pond	Maintain until water is not required for make-up and meeting WQ criteria can be sustained for five years	2021	2027	2024	2030
PG to open pit drainage ditch	Maintain until water is not required for make-up and meeting WQ criteria can be sustained for five years	2021	2027	2024	2030
100-Day Stockpile					
100-day stockpile	Recontoured and revegetated when mining stops	NA	NA	2024	2025
Open Pit					
Open Pit Sump	Open pit will be backfilled as geochemical conditions allow, small Pit Lake will form (2.5 ha) and drain to Platinum Gulch	2022	2022	2025	2025
Crusher Pad	Will be reclaimed when mining stops	2022	2022	2025	2025
Perimeter Wells	Will be abandoned or destroyed as mine open pit expands	2022	2022	2025	2025
Horizontal Drains	Will remain in place	NA	NA	NA	NA
Groundwater Wells	Will be abandoned when crushing has stopped	2022	2022	2025	2025

Facility/Structure/Feature	Closure Conditions/Process	Project Proposal		Refined Project	
		Begin Date	End Date	Begin Date	End Date
HLF					
HLF	Post-mining leaching of ore	2021	2021	2024	2024
	Rinsing/detoxification/recycle/discharge	2022	2024	2025	2027
	Cap heap	2025	2025	2028	2028
	Drain down heap to be treated on an as needed basis	2024	2030	2027	2035
Ann Gulch East Diversion Ditch	Stabilize for long-term – maintain drainage to Dublin Gulch	2022	2022	2025	2025
Ann Gulch West Diversion Ditch	Stabilize for long-term, route drainage to Haggart Creek when stabilized and WQ criteria met	2022	2027	2025	2030
Events ponds	Will keep until HLF cover built; afterwards runoff conveyed to the mine water treatment plant , passive treatment system or directly to a SCP for discharge – depending on WQ		2030		2035
Dublin Gulch SCP/Lower South Pond					
DG Sediment Control Pond/Lower South Pond	Will receive all discharge water until WQ criteria are met		2030		2035
Dublin Gulch Diversion Channel					
Upper Channel	Will stabilize for long-term (kept in place)	2022	2022	2025	2025
Energy Dissipator	TBD	2022	2023	NA	NA
Lower Velocity Reduction Pond	Will either stabilize for long-term of be eliminated based on fish enhancement options	2022	2023	NA	NA
Series of Drop Structures (replace energy dissipator and velocity reduction pond)	Will be stabilized for long-term	NA	NA	2025	2026
Lower Channel	Will be stabilized and enhanced for fish habitat	2022	2023	2025	2026
Camp					
Groundwater Well	Abandon at end of post-closure monitoring period		2035		2039

5.6.3 Reclamation Practices

The majority of reclamation methods are consistent with those proposed for the Project Proposal. and as set out in the Conceptual Closure and Reclamation Plan included in the Project Proposal (the Closure Plan) The sections below describe modifications to reclamation methods for each Project

facility / component where applicable. The CCRP was developed based on the Yukon Government Mine Site and Reclamation Policy, and through consultations with agencies, the community and FNNND.

5.6.3.1 Open Pit

The method and objectives for reclamation and closure of the open pit remains unchanged as a result of the Project refinements. As a summary, at closure the open pit will:

- flood with groundwater and runoff; the open pit is expected to flood to the level of the west side of the open pit;
- consist of open pit walls and benches;
- represent a total area of disturbance of 80.2 ha (increased from 65.4 ha);
- resloped down to the first rock bench and revegetated with suitable candidate vegetation species that will provide erosion and invasive plant control and are appropriate for the predicted post-closure ecosystem;

As stated in the Project Proposal, the open pit walls will be comprised of exposed metasediment and granodiorite rock. Geochemical characterization of these lithological units to date has indicated that they will be not acid generating. As such, the pH of the water in contact with the open pit walls (i.e., open pit wall run-off) is anticipated to be near neutral. Neutral pH metal leaching has, however, been identified as a potential issue for these materials. This may include elevated concentrations of elements such as arsenic and antimony in open pit wall run-off. Monitoring and mitigation of metal concentrations in water discharged from the open pit post closure remains unchanged as proposed in the Project Proposal.

5.6.3.2 Heap Leach Facility

The methods and objectives for closure and reclamation of the HLF remain unchanged by the Project refinements. The proposed conceptual closure measures for the HLF remain as follows:

- HLF Detoxification and Rinsing
- HLF Draindown
- HLF Contouring and Soil Cover.

At closure, the heap leach will be a completed valley HLF constructed by placement of ore on a pad behind a confining embankment. The HLF will comprise approximately 92 Mt of crushed ore over an area of 106.6 ha. At completion of leaching, the engineered composite liner system, the leachate collection and recovery system, and the leak detection and recovery system will remain in an operational state, and be utilized as required during closure and reclamation. The proposed CCRP is based on an initial, demonstrated active treatment technology, followed by a passive treatment system to facilitate the long term chemical stability of the heap prior to full closure of the site.

HLF Detoxification and Rinsing

Refinements to the HLF detoxification and rinsing are discussed below.

After mining has stopped at the end of 2023, the HLF will continue to operate for supplemental gold recovery during 2024. Solution will be recycled through the HLF to recover any gold resources remaining in the mined ore that was stacked on the leach pad.

The detoxification of the HLF will begin in 2025, and continue for a period of approximately 2 to 3 years. This process includes rinsing the HLF with a treated solution and raw water. The objective of rinsing the heap is to reduce the concentration of cyanide, cyanate, ammonia, nitrate, and dissolved in seepage originating from the heap after it has been decommissioned. HLF solution is processed through the cyanide detoxification circuit, which removes cyanide by oxidation, cyanate by acid hydrolysis, and ammonia by air stripping. The rinse solution will be recycled through the HLF after the initial cyanide oxidation step and/or after the complete detoxification circuit. Excess solution will be transferred to the MWTP for final treatment prior to discharge to Haggart Creek.

After cyanide, cyanate, and ammonia concentrations have been reduced to sufficiently low levels, the HLF will then be rinsed with raw water, which can either be sourced from groundwater or from MWTP effluent. Raw water will rinse out additional cyanide, cyanate, and ammonia, and will also reduce nitrate to acceptable levels prior to discharge.

Heap detoxification testwork has been conducted by Kappes, Cassiday and Associates. A summary of this testwork can be found in KCA's *Eagle Gold Project Interim Report of Metallurgical Test Work November 2010* (Appendix 26 of the Project Proposal) and KCA's *Eagle Gold Heap Leach Metallurgy &Neutralization Summary November 2010* (Appendix 27 of the Project Proposal).

HLF Draindown

The method of HLF draindown remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. Following rinsing, the HLF will begin to draindown. Within heap facilities, draindown processes are rapid during the first several months while slowly attenuating over time. In this case, and depending on hydroclimatic conditions, the draindown rate and duration may need to be managed by recycling excess seepage back onto the heap in the event that, in some months of the year, the amounts of water to be treated exceed the maximum treatment discharge rate needed to meet water quality objectives. Depending on hydroclimatic conditions, the effect may be to lengthen the overall draindown period. For the purposes of water balance modeling and post-closure reclamation planning, the draindown period is assumed to last eight years. In any case, in the first year of draindown, the HLF will be re-contoured and capped with a store and release type cover, which will minimize infiltration and allow the heap, over time, to reach equilibrium between infiltration and seepage. Initially, the draindown solution will be monitored and processed by the Cyanide Detoxification Plant then routed through to the MWTP before discharge. Later, the residual draindown or heap seepage may be routed through a passive treatment system prior to discharge to Haggart Creek.

HLF Contouring and Soil Cover

The method of HLF contouring and design criteria of soil cover remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. Following draindown, the top surface of the heap will be capped with a cover system to reduce infiltration of precipitation through the HLF. The store and release cover will reduce infiltration into the heap by storing infiltrated

precipitation within the soil matrix of the cover and then releasing the water back to the atmosphere via the process of evapotranspiration. The current design is a cover that limits infiltration to 20% of net precipitation.

The final configuration of the HLF will consist of a large flattened area at the top of the facility bounded by slopes to the north and south; total area has increased to approximately 106.6 ha.

The surface of the HLF will be re-contoured to promote the controlled runoff of precipitation, to eliminate localized depressions where surface ponding may occur, and to minimize seepage. The recontoured areas will then be capped with a minimum of 1 m of salvaged soil material. Soil material will be supplied from soil stockpiles. Soil will be hauled by dump trucks to the HLF and spread by dozer. Soils may require scarification before conducting revegetation treatments if the surface becomes compacted due to truck or equipment traffic.

Consistent with the Project Proposal, once the HLF has been capped, it will be:

- Planted with vegetation that is suitable to establish a long-term self-sustaining vegetation cover that is conducive to the establishment of productive ecosystems.
- Provided with a vegetation cover ratio of approximately 60% grass/legume/forb cover to 40% tree/shrub cover. This approach to revegetation allows for the establishment of tree/shrub cover on the slopes, providing visual breaks and cover for wildlife and diversity in habitat structure, while reducing the effects of surface erosion using grass/legume/forb strips. Any benches present on the HLF slopes will be planted to a tree/shrub cover.
- If required, slope stabilization measures will be implemented on the sloped sections of the HLF to prevent erosion and to retain the soil cover material. This will assist in the stabilization of the ground material while facilitating vegetation growth. Additional slope stabilization measures may include the installation of erosion control blankets, application of a bonded fibre matrix, installation of bioengineering structures such as wattle fences and modified brush layers, and dense seeding/planting rates.

5.6.3.3 Waste Rock Storage Areas

Reclamation of the WRSAs has been updated as a result of the Project refinements.

Progressive reclamation of the PG WRSA can be initiated after the third year of mine life assuming the waste rock storage area is no longer needed. Progressive reclamation will improve short term stability, reduce surface erosion and sedimentation and provide a means to evaluate large-scale reclamation techniques prior to actual mine closure. The following are preliminary recommendations for progressive reclamation and final closure of the WRSA:

- Maintain sloped grading of bench surfaces to minimize surface water infiltration and erosion of downstream slopes.
- Maintain surface water collection ditches and the sediment control pond to control surface drainage during operations and reclamation.

- The operational slopes, consisting of benches and raises, will be maintained at 2.25H:1V and will be re-graded to 2.5H:1V at closure. This approach removes the problems associated with the re-grading of long slopes and the corresponding erosion of drainage channels by runoff down long slopes.
- Surface runoff collection ditches and the sediment control pond will remain operational until vegetation on the storage area has reached a self-sustaining growth.

WRSAs will be capped with a minimum of 1 m of salvaged soil material. Soil material will be supplied from soil stockpiles. Soil will be hauled by dump trucks to the WRSA platforms and spread by dozer down the resloped dump face and across the platforms. The resloped 2.5H:1V WRSA slopes are at a gradient that will allow the dozer to operate effectively to spread overburden. Soil placed on the platform may require scarification before revegetation if the surface becomes compacted due to truck or equipment traffic.

Once the sites have been soil capped they will be revegetated using plants that are suitable for the predicted post-closure ecosystems. As areas of the WRSA become available, progressive final reclamation will be carried out wherever feasible. Interim reclamation treatments such as grass seeding will be carried out during operational mine life in order to provide soil stabilization for erosion control and invasive plant control.

On the WRSA slopes, it is proposed that candidate tree/shrub species for final reclamation be planted on flat benches and slopes less than 51%. Steeper slopes will be seeded with grass. In areas with long and uniform slopes, 20 to 30 m strips of tree/shrub plantings interspersed with grass seeding will control water surface flow velocities.

In some sections of the WRSAs, particularly at the Eagle Pup WRSA, full resloping may not be feasible due to space constraints. For these slopes, stabilization techniques, such as those used during heap contouring and soil cover (Section 5.6.3.2) will be implemented

5.6.3.4 Mine and Process Plant Facilities

Consistent with the Project Proposal, structures at the Project site will consist of the process offices, lab, shops and warehouse, process plant site and reagent refinery, primary and secondary crusher facilities, laydown area, gatehouse, main sub-station, camp/recreation area, mine water treatment plant and water tanks, and overland conveyors.

Some of the facilities at the site will be required beyond the duration of the operations phase. A portion of the process plant will be operational until gold recovery processing is no longer warranted. Whenever, any of the plant facilities are no longer required, they will be dismantled, and equipment will be sold for salvage value.

All structures and equipment will be removed in the closure and reclamation phase. The only features that will be permanently retained are key diversion channels and structures required to meet long-term water management objectives. Concrete building/structure foundations will be left in place if the concrete is steel-reinforced, otherwise they will be broken apart. Foundations left in place will be buried. Non-salvageable materials will be buried within the WRSAs and/or disposed of according to the site Waste Management Plan. A conceptual Waste Management Plan is provided in Appendix

30 of the Project Proposal, a detailed plan will be developed as required for the Quartz Mining License application.

Prior to soil replacement, the disturbance sites will be recontoured to similar grades and topography and pre-mining drainage patterns will be restored based on closure objectives as is feasible and necessary. Salvaged soil material that was windrowed adjacent to the disturbance sites will be spread directly by dozer, pushing from the windrow berms. Soil that was salvaged and stored in designated stockpiles will be hauled by dump trucks and placed at the disturbance sites; the soil will then be spread by dozer. Soil replacement will be to the approximately similar thickness that was originally salvaged from the disturbance site. One exception will be at the conveyor area; this disturbance site will be capped with a minimum of 1 m of soil material in order to adequately cover soil potentially affected by dust deposited from the conveyor system. Placed soil will require scarification prior to revegetation if the surface becomes compacted due to truck or equipment traffic.

Events, Solution, and Sediment Control Ponds

As discussed in Section 5.4.1.8, the number of ponds at the site has decreased and the overall capacity has increased by 30% (Table 5.4.7). However, the closure and reclamation methods for this water management infrastructure are consistent with those presented in the Project Proposal.

Water management structures will consist of events polishing ponds, sediment ponds and surface water diversion and collection ditches. These structures will at least remain in place until the reclamation earthwork activities, such as resloping WRSA slopes, have been completed and vegetation has been established to prevent surface erosion.

Once reclamation activities have been completed, ditches will be backfilled to approximate the original topography and capped with windrowed topsoil; original drainages will be re-established where practical to meet closure objectives. This will allow surface waters to flow along the natural local drainage pathways.

The SCPs may be re-purposed as passive or semi-passive water treatment facilities. If the ponds are not required for this purpose, they will be decommissioned and reclaimed. Accumulated sediment will be spread out over the adjacent land surface, graded to amenable slopes, and re-vegetated to stabilize the soil.

Soil replacement of constructed ditches will be to the same depth that was originally salvaged from the disturbance site; the material will be sourced from adjacent windrows or soil stockpiles.

During the operations phase, interim reclamation will be carried out on these disturbance features to prevent erosion and invasive plant establishment. If required, slope stabilization techniques will be undertaken during the operations and closure phases to stabilize pond slopes and diversion ditch banks. These would include techniques such as installation of erosion control blankets, application of a bonded fibre matrix, or installation of bioengineering structures such as wattle fences, and modified brush layers.

The DGDC will not be decommissioned and will permanently remain in place. The channel will be revegetated using interim reclamation species mixes (consisting of grasses/legumes) to stabilize slopes and prevent surface erosion. The structures may be planted with candidate tree/shrub

species if the structural integrity is not compromised by root penetration of deeper rooting species. If required, stabilization techniques such as erosion control blankets, bonded fibre matrix, rip-rap, rock filled gabion baskets, or bioengineering structures will be implemented to stabilize the slopes of this structure.

5.6.4 Mine Support Infrastructure

The Project activity / component remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal.

5.6.4.1 Roads

Site Roads

The Project activity / component remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. Following closure of the HLF and site facilities, the main access road within the Project area, from Haggart Creek (at the confluence with Dublin Gulch) to the process plant site, will be permanently closed and reclaimed. The two new roads on site will also be permanently closed and reclaimed. The one exception continues to be the road that provides access to the Potato Hills as this has been identified as an important area for traditional use. The remaining linear disturbances such as exploration roads, tote roads, trenches and drill sites will be progressively reclaimed during the life of the mine as they become available.

Prior to soil replacement on these road disturbances, the following permanent deactivation activities will be carried out:

- Removal of all culverts, bridges, and approaches
- Scarification of road beds
- Re-establishment of drainages across the former road corridor and stabilization with rock material
- Pullback of road sidecast material and backfilling of cutbanks to re-establish the original ground contours.

Soil replacement for these disturbances will be to the same depth that was originally salvaged from the disturbance site; the material will be sourced from adjacent windrows or soil stockpiles.

Main Access Road

The Project activity / component remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. The Haggart Creek Road will be left in place at the end of Project life, as a public unmaintained road.

5.6.4.2 Power and Transmission Line

Closure and reclamation of the power and transmission lines remain unchanged in the Refined Project from that presented in the Project Proposal. Ground cover vegetation along the transmission line route will be well established at mine closure and no further seeding will be required.

Transmission line removal would not significantly disturb established vegetation. To ensure that the RoW is left in a state that will allow for future land use or natural re-growth of the indigenous vegetation the transmission line decommissioning will be done in accordance with the following procedure:

- The line will be de-energized and grounded in accordance with the safety rules.
- Crossing of transmission lines, roads, and other objects will be secured.
- The conductors will be disconnected from the insulators, winded on conductor reels, and transported to designated storage.
- The structures will be removed from the foundations and disassembled.
- Crossarms, conductor fittings, insulators, pole hardware, and guys will be dismantled, sorted, counted, and packed separately.
- All guy anchors, the structure foundations grounding wires, and grounding rods will be removed from the ground.
- The foundation and anchor holes will be backfilled. In agricultural land, at least 0.3 m of topsoil will be spread on any excavation site.
- All materials will be removed from site. Materials that cannot be salvaged will be transported to an approved landfill site.
- The RoW will be inspected to ensure that the site is cleared of all transmission line materials.

5.6.4.3 HLF Water Treatment

The general concept of treating HLF seepage during closure remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. Additional information that describes the proposed post-closure treatment processes was provided subsequently in Stantec, December 2011 (*Eagle Gold Project, Response to Request for Supplementary Information - R10: A discussion on the predicted performance of the passive water treatment system likely for this Project,* and YESAB Assessment 2010-0267 (*Appendix 10 Post-closure Passive Treatment Systems)* . Active water treatment facilities will remain operational until the HLF has been detoxified and seepage quality is suitable for treatment via a passive engineered treated system and ultimately for direct release to Haggart Creek.

The quality of detoxified water from the heap was predicted based on results of a standard humidity cell conducted on a composite ore sample provided by KCA (Appendix 27 of the Project Proposal) and a modified humidity column of spent ore composite sample following cyanidation and detoxification in a metallurgical test column (Appendix 28 of the Project Proposal). As described in Section 5.6 of the Project Proposal, the predicted heap leach solution water quality during draindown is expected to have elevated concentrations of certain parameters. If these predictions are met, active and then passive treatment systems will be in place to maintain water quality objectives within Haggart Creek.

5.6.4.4 Fuel and Explosives Facilities

Despite the relocation of the fuel and explosives facilities, the method of reclamation of fuel and explosives facilities remain unchanged from that described in the Project Proposal. Methods proposed in the Project Proposal are reproduced below.

Prior to construction of the fuel and explosives facilities, soils will be salvaged and stockpiled locally in windrows adjacent to the disturbance sites or in designated soil stockpile areas.

All tanks and fuel storage facilities will be emptied of their contents before they are removed from their foundations. Tank residues will be disposed of as outlined in the Waste Management Plan. Contaminated soils will be remediated on site or removed from site for disposal at an approved waste disposal site on an as-required basis. Foundations and confining bunds/walls will be broken down and covered with overburden, pre-mining drainage patterns will be restored and re-enforced as required with rip-rap.

Prior to soil replacement, the disturbance sites will be re-contoured to approximate the original grades and topography, and pre-mining drainage patterns will be restored as practical to meet closure objectives. Salvaged soil material that was windrowed adjacent to the disturbance sites will be spread directly by dozer, pushing from the windrow berms. Soil that was salvaged and stored in designated stockpiles will be hauled by dump trucks and placed at the disturbance sites; the soil will then be spread by dozer. Soil replacement will be to approximately the same thickness that was originally salvaged from the disturbance site. Placed soil will require scarification prior to revegetation if the surface becomes compacted due to truck or equipment traffic.

5.6.5 Water Management

While some of the locations have shifted and the capacities of ponds and diversions have been enlarged or reduced as a result of the optimized mine plan, the general water management concepts during post-closure remain unchanged from Section 6.5 of the Project Proposal. The objective of water management during closure and reclamation is to safely convey and/or store water on the Project site while mine facilities are decommissioned and reclaimed. The routing of water around the mine site will change during reclamation as different facilities are decommissioned until only permanent water management structures remain.

Site-wide water management practices during reclamation will commence at the outset of the Closure Phase in all areas with the exception of the HLF, events ponds and water treatment/detoxification facilities. The heap will undergo a rinse stage in which most by-products of the leach process are removed or destroyed using physical, chemical and/or biological processes. The rinse stage will continue until such time that the heap effluent quality is suitable for environmental discharge or passive treatment measures, if required. Following rinsing, draindown will commence and then after one or two years a cover system will be installed on the surface of the HLF. With respect to water management, the draindown process is the effective dewatering of the in-heap storage such that the heap no longer retains the large volume of water as it did through operations. The dewatering is required to improve the long-term stability of the closed HLF. The cover system will be designed to shed surface runoff away from the heap leach pad while reducing the quantity of surface water that is allowed to infiltrate into the closed heap. Once the cover is

stabilized and vegetated, the runoff from the cover could be allowed to discharge out into the Dublin Gulch Diversion Channel or towards Haggart Creek, depending on site specific closure objectives.

5.6.5.1 Mine Water Treatment Plant and Sludge Management

At closure, the mine water treatment plant and cyanide detoxification plant will remain until heap seepage can be treated via a passive treatment system or until seepage can be discharged directly to the environment. Throughout its operations, the MWTP is estimated to produce an average of 117 tonnes of dry solids per year of low pH (ferric and barium) sludge which will require encapsulation. Sulphate will be managed by gypsum solubility and water management practices; there will be no active treatment for sulphate. Thus the quantity of caustic sludge produced during MWTP operations is estimated to decrease from an annual average of 660 tonnes per year to an average of 237 tonnes per year as a result of the project refinements.

Sludge produced by the MWTP during the operations phase will be placed on freeze consolidation pads adjacent to the MWTP. Sludge management will be the same as described in the Project Proposal, except that there will be much less sludge to manage. Freeze consolidation pads will be constructed as necessary adjacent to the MWTP for the purpose of managing solids during operation, and sludge will be kept on storage pads when consolidation is complete. The caustic sludge will be transferred to the heap and incorporated into the closure cap for final disposal.

The management of low pH sludge during closure will be as described in the Project Proposal. The low pH sludge will be encapsulated in an 80 mil HDPE liner, and covered with 200 mm of rock fill and 400 mm growth media. The cell will be underlain with 200 mm of drainage material. This pad will have sufficient capacity to contain all the ferric sludge produced over the life of mining and closure. Due to a possible frozen core, the ferric sludge may require two seasons for relocation to the final disposal site.

5.6.6 Workforce Requirements

The Project activity / component remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. As estimated in the Project Proposal, the reclamation and closure workforce will be a combination of VIT employees and construction contractor skilled and unskilled labour. Exact closure workforce requirements have not been determined, however staff requirements during reclamation are likely to initially be around 200, which will decrease over time as reclamation objectives are met and site moves to a monitoring stage.

5.6.7 Energy Requirements

The Project activity / component remains unchanged by the Project refinements from that presented in Section 5.6 of the Project Proposal. During the initial reclamation phase, while there remains considerable active management of water on the site to support gold extraction and recovery, energy requirements are likely to be on the order of 1-2 MW as high flow-rate pumps will be required during this period. Once gold extraction ceases completely and permanent closure water management plans are implemented, energy requirements will decrease and are not expected to be higher than 250 kW after HLF draindown and rinsing is complete.

5.6.8 Waste Management

The closure and reclamation phase will extend over 10 years during 2024 – 2033. The number of personnel in camp during this phase will drop from a maximum of 200 to an assumed minimum of 50.

The post-closure monitoring phase will extend from 2034 – 2039. No facilities will remain on site during this phase and no activities are anticipated other than monitoring. While the number of individuals on site has not been estimated, it will be substantially below the number at the end of reclamation, and their presence intermittent and limited to that required to collecting monitoring data. Any wastes generated by monitoring personnel will be minimal and will be removed off-site for disposal at the landfill. These wastes will consist of food items (lunch waste) and task-related activities (packaging, bags, PPE/equipment wrappers, etc.).

5.7 Post-closure Monitoring and Inspection Programs

Post-closure monitoring and inspection programs remain unchanged by the Project refinements. Please refer to the Conceptual Closure and Reclamation Plan for a summary of post-closure monitoring and inspection programs (Appendix 24 of the Project Proposal).

5.8 ALTERNATIVES AND CHOSEN APPROACH

Alternative methods of completing the Project were considered throughout the planning of the Project for engineering, environmental, regulatory and economic reasons. The Project as described in this Project Proposal was considered to be the best technically and economically feasible means of completing the Project in a way that maximizes environmental protection.

Additional alternatives have not been considered as the Project has not materially changed. Without construction of a mine at this site, it would not be possible to access the gold resource available in the Project deposit. The Project as proposed outlines a feasible method for extracting, processing, and marketing the gold while considering the effects of the Project on the surrounding environment, the FNNND, and the economic climate in Yukon.

The only alternative to this Project is not to mine the Project deposit. Not developing the deposit would negate any potential economic gains, sacrifice employment and training opportunities, and reduce infrastructure opportunities for residents of surrounding communities and Yukon.

During the course of evaluating the Project, eleven areas were evaluated for alternative means of carrying out specific aspects the Project. These eleven areas were:

- Production Capacity
- Mining Method
- Processing Method
- HLF Site Selection
- Process Solution Storage

- Cyanide Detoxification Method
- HLF Detoxification Technology
- Waste Rock Storage Area Site Selection
- Mine Accommodation Options
- Mine Site Access Road Route Selection
- Power Source Selection
- Transmission Line Route Selection.

Details on the alternative means of carrying out the Project for each of these eleven areas are provided in the Project Proposal. The Feasibility Study completed in 2012 has evaluated each of the above areas and has determined that the Project as presented in the Feasibility Study which is consistent with that described above in Section 5 of this SIR is the most economically viable and technically feasible means of carrying out the Project.

6 ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS ASSESSMENT EVALUATION

The Project Proposal applied methods for assessment of potential environment and socio-economic from YESAB's Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions. A detailed description of the methods to assess potential Project-specific effects, residual effects, and potential cumulative effects is provided in Sections 6.1 through 6.3 of the Project Proposal.

The Eagle Gold Project Proposal concluded that the Project will not result in significant environmental or socio-economic effects. VIT has subsequently evaluated each refinement described in Section 5 to determine if the characterizations of potential environmental and socio-economic effects as presented in the Project Proposal would change as a result of the refinements. The sections that follow describe the methods used to evaluate the original conclusions presented by the Project Proposal with respect to refinements.

6.1 ASSESSMENT APPROACH

The approach used to assess the effects of the Project as described in the Project Proposal involved the following steps:

- Identification of Valued Environmental and Socio-economic Components (VCs) relevant to the Project and the assessment;
- Examination of possible interactions between the Project and the VCs and identifying those interactions to be carried forward in the assessment (i.e. those interactions for which significant effects were reasonably foreseeable even with environmental protection practices);
- Assessment of Project-specific effects carried forward, which involved:
  - Description of effects
  - Mitigation of effects
  - Characterization of residual effects
  - Determination of significance of residual effects and the level of confidence in the characterization.
- Assessment of Project interactions with other projects (Cumulative Effects)

The initial step of the effects assessment described in the Project Proposal was to identify interactions between the Project and each of the VCs. Table 6.2-1 in the Project Proposal identifies the environmental and socio-economic VCs that were selected as being relevant to the Project and provides the rationale for their selection. This list of VCs was utilized in the evaluation of the effects of the Project refinements and is reproduced below in Table 6.3-1.

Project activities were identified based on the information provided in the Project Description (Section 5 of the Project Proposal). All interactions between each environmental VC and Project activity were then identified and ranked according to reasonably foreseeable effects. The potential interactions and their rank are summarized in Table 6.3-1. Higher-risk interactions - those for which it is reasonably foreseeable that there could be an effect of potential concern, even with the application of proven codified practices - scored "2" in the table and were carried forward for assessment.

The assessment of potential interactions between the Project and socio-economic VCs did not use the same ranking system used for bio-physical VCs. Consequently, Table 6.3-1 does not contain these VCs. Section 6.11.3 of this SIR lists the Valued Socio-economic Components for the Project. Unlike environmental VCs, specific Project activities do not generally interact with socio-economic VCs independently. Rather it is the Project as a whole that typically interacts with socio-economic VCs. Consequently the ranking used for the bio-physical VC in Table 6.3-1 is of limited use in identifying potential interactions of concern for socio-economic VCs. Instead, these determinations were informed largely by the YESAB Guide to Socio-economic Effects Assessment (YESAB 2006), Project specific consultation, and the professional expertise of the assessors.

The approach used to screen and evaluate the effects of project refinements was consistent with that described in the Project Proposal and relies primarily on the comprehensive baseline studies data and information used to develop the Project Proposal. Refinements were screened to determine if they changed the interaction between the Project and the VC. If they did not, their evaluation was not carried further. If they did change the interaction, those changes were evaluated to determine whether they changed the characteristics of the effects, the measures identified in the Project Proposal to mitigate the effects, the residual effects, the significance of the residual effects, and the contribution to cumulative effects that had been identified in the Project Proposal.

The evaluation of any effects to Valued Socio-economic Components resulting from the Project refinements was consistent with the methodology, baseline data, and approach for socio-economics effects assessment as presented in the Project Proposal. The scope and methodology followed in the Project Proposal for the socio-economic assessment of the Project is provided in Section 6.11.1 of the Project Proposal in detail.

6.2 VALUED ENVIRONMENTAL AND SOCIO-ECONOMIC COMPONENTS

The Valued Environmental and Socio-Economic Components (VCs) identified in the Project Proposal are the same as those used in the evaluation of the Project refinements. The Environmental and Socio-economic VCs for the Project are provided in Table 6.2-1 in the Project Proposal. As discussed in Section 1 of this SIR the VCs are unchanged by Project refinements. Because there are relatively no changes to the geographical extent of the Project, no new VCs have been introduced as a result of the Project refinements.

6.3 POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS

6.3.1 Project Activity Interactions with Valued Components

The effects assessment as presented in the Project Proposal identifies interactions between the Project and each of the VCs. Project activities and physical works were identified based on the information provided in the Project Description – Section 5 of the Project Proposal. All interactions between each bio-physical VC and Project activity were identified and ranked according to reasonably foreseeable effects. The potential interactions and their rank are summarized in Table 6.3-1. Higher-risk interactions, on which the assessments will focus, were scored “2” in the table. Low–risk interactions were scored “1” in the table and were not assessed in the Project Proposal. Low-risk interactions are: a) those, which based on past experience and professional judgment, would be nominal and not result in significant effects, even without mitigation (scored “0”); or b) those interactions that would not be significant due to the application of codified practices known to effectively mitigate the predicted effects (scored “1”). Lower-risk interactions were not carried forward in the effects assessment. High-risk interactions are those for which it is reasonably foreseeable that there could be an effect of potential concern even with the application of proven codified practices. Only those Project activities that ranked as a high risk-interaction (“2”) were carried forward for assessment.

Project refinements have not resulted in any changes to the ranks assigned to each bio-physical VC and Project Activities as presented in the Project Proposal. This conclusion was reached via evaluation of each modification to the Project as described in Section 5 of this report with respect to potential interactions with the Project using an approach consistent with the Project Proposal.

As noted above, the assessment of potential interactions between the Project and socio-economic VCs did not use the same ranking system used for bio-physical VCs. Instead, these determinations were informed largely by the YESAB Guide to Socio-economic Effects Assessment (YESAB 2006), Project specific consultation, and the professional expertise of the assessors. Detailed information on this approach is provided in section 6.11.

Table 6.3-1: Potential Project-Interactions with the Bio-physical Valued Components

Project Activities and Physical Works	Surficial Geology, Terrain, and Soils	Water Quality/Aquatic Biota	Air Quality	Fish and Fish Habitat	Vegetation Resources	Wildlife Resources	Heritage Resources
Construction Phase							
Site clearing and grubbing	2	1	2	2	2	2	1
Disposal of cleared vegetation (burning)	1	0	2	0	0	0	0
Salvaging and stockpiling of top and sub soils	2	1	2	1	1	1	1

Project Activities and Physical Works	Surficial Geology, Terrain, and Soils	Water Quality/Aquatic Biota	Air Quality	Fish and Fish Habitat	Vegetation Resources	Wildlife Resources	Heritage Resources
Site grading including blasting, overburden removal and overburden disposal	2	1	2	1	1	1	1
Borrow areas development and use	2	1	2	0	1	2	1
Access road upgrades	1	1	1	2	2	2	1
Camp construction (construction and operations camps)	1	1	2	0	1	2	1
Waste handling (liquid and solid)	1	1	0	0	0	1	0
Diesel power generation (1-2 megawatts)	1	0	1	0	0	2	0
Use of large construction vehicles and equipment	2	0	2	0	1	2	0
Construction of mine site infrastructure and haul roads	2	1	2	2	1	2	1
Water supply and usage	1	1	0	1	0	1	0
Site water-management (diversions and runoff)	2	2	0	2	1	1	1
Fish habitat-compensation	1	1	0	1	1	1	0
Vehicular traffic	1	1	1	1	1	2	0
Clearing of transmission line RoW	1	1	1	1	2	2	1
Installation of transmission line	1	0	1	0	1	1	1
Operations Phase							
Open-pit mining (blasting, ore/waste hauling, open pit dewatering)	2	1	2	1	2	2	0
Ore Processing (crushing, conveying and hauling)	2	0	2	0	2	2	0
Waste-rock disposal	1	1	1	1	1	1	0
Gold heap leach facility operation	0	1	2	0	1	2	0
Potable and non-potable water use	0	1	0	1	0	1	0
Mine water treatment and discharge	0	2	0	1	1	1	0
Solid-waste management	1	0	0	0	0	2	0
Camp operation	0	0	1	0	0	2	0
Vehicle traffic	1	1	1	0	1	2	0
Access road and transmission line presence and maintenance	1	1	1	1	1	2	1
Quarry/borrow pit operations	2	1	2	1	1	2	1
Diesel power generation	1	0	1	0	0	2	0
Fuel, Hazardous Materials, and Explosives Mgmt.	1	1	0	1	1	2	0
Closure and Reclamation Phase							
Reclamation of waste rock storage areas	1	2	1	2	1	1	0
Heap leach facility reclamation	1	2	1	2	2	2	0
Pit lake filling	2	2	1	2	2	2	0

Project Activities and Physical Works	Surficial Geology, Terrain, and Soils	Water Quality/Aquatic Biota	Air Quality	Fish and Fish Habitat	Vegetation Resources	Wildlife Resources	Heritage Resources
Plant and associated facility removal and site reclamation	1	0	1	0	1	1	0
On-going water treatment and discharge	0	2	0	2	1	1	0
Haul Roads closure and reclamation	1	1	1	1	1	1	0
Transmission line closure and reclamation	1	1	1	1	1	1	0

NOTE:

Project-Specific – Environment Interactions

0 = No interaction

1 = Interaction occurs; however, based on past experience and professional judgment the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of codified environmental-protection practices that are known to effectively mitigate the predicted environmental effects

2 = Interaction could result in an environmental effect of concern even with standard mitigation; consequently the potential environmental effects are considered further in the environmental assessment

Each Project Refinement identified in Section 5 of this SIR was categorized as a Project activity or physical work using the same organizational approach as in the Project Description (Section 5) of the Project Proposal. No new Project activities are introduced by the Project refinements. Each Project activity or physical work was screened against the Project refinements to determine if the scope of the activity or physical work as presented in the Project Proposal was modified. Each activity that has been modified by Project refinements is listed in subsequent Sections 6.4 – 6.10 as part of the evaluation of the conclusions of the Project Proposal as a result of Project refinements.

6.3.2 Screening of Project Activities as a Result of Project Refinements

The approach used to screen and evaluate the effects of the Project refinements is consistent with that described in the Project Proposal. Refinements as described in Section 5 of this report were screened to determine if they changed the interaction between the Project and the VC. If they did not, evaluation of potential effects from the interaction is not carried further. However if a refinement changes an interaction in any way without need to change the rank of 0, 1 or 2, those changes have been evaluated to determine whether they change the characteristics of the effects, the measures identified in the Project Proposal to mitigate the effects, the residual effects, and the significance of the residual effects or the contribution to cumulative effects that had been identified in the Project Proposal. More detail regarding methods of the evaluation of the effects assessment is provided in Section 6.3.5 below. Potential Project-Interactions with the Bio-physical Valued Components and their ranking on a scale from 0 to 2 has not changed as a result of Project refinements.

6.3.3 Temporal Boundaries

The temporal boundary for the assessment of each VC is defined based on the timing and duration of Project effects on the VC. The purpose of a temporal boundary is to identify when an effect may occur in relation to specific Project phases and activities. Section 6.3.2 of the Project Proposal

describes the temporal boundaries for the assessment of each VC based on the timing and duration of Project effects.

The sequence of Project phases remains unchanged, however the duration of the construction and operations phases have increased. The Project Proposal assessed a 20-month construction phase, a 7.3-year mining operations phase, and a 10-year closure and reclamation phase, followed by a 5 year post-closure monitoring phase.

Table 5.3-1 describes the updated Project schedule, which now results in a 25-month construction phase, a 10-year operations phase, and a 10-year closure and reclamation phase, followed by a 5-year post-closure monitoring phase. Each of these updated phases has been used for the evaluation of VCs in the below sections.

6.3.4 Spatial Boundaries

Section 6.3.4 of the Project Proposal describes the spatial boundaries of the Project as the Zone of Project influence beyond which the potential environmental, cultural, and socio-economic effects of the Project are expected to be non-detectable. Spatial boundaries were established for each VC and included both a Local Assessment Area (LAA) and a Regional Assessment Area (RAA).

No Local Assessment Area (LAA) or Regional Assessment Area (RAA) for any environmental or socio-economic VC has been changed with Project refinements.

Very few of the physical works related to the refinements occur outside the Project mine footprint presented in the Project Proposal. Most important to this evaluation of the effects assessment - none of the physical works extend beyond the LAA or RAA established in the Project Proposal for any VC. All physical works in all Project phases are within the Haggart Creek watershed, and are specifically addressed in the evaluation of the Project refinements on the VCs in Sections 6.4 – 6.11 of this report.

6.3.5 Effects Assessment Evaluation Methods

Each bio-physical VC was evaluated to determine whether the Project refinements changed the conclusions of the Project Proposal regarding characterization of effects, mitigation measures, residual effects, the significance of those effects and the cumulative effects of the Project. Where relevant, the spatial and temporal extents of refinements were taken into consideration as part of the effects assessment evaluation.

The methods to screen and evaluate refinements and modifications in relation to each bio-physical VC included:

- Screening of potential interactions between Project activities and the VC to determine whether the Project activities and physical works are changed
- Screening of potential interactions between Project activities and the VC to determine whether any changes to project activities could result in an environmental effect of concern even with standard mitigation (i.e. were ranked as a “2” in the Project Proposal)

- Evaluation of whether there is change to the characterization of the environmental effect that was predicted in the Project Proposal (for interactions that have changed as a result of Project refinements)
- Evaluation of characterization of the potential effects resulting from Project refinements that require revision of or additional mitigation measures
- Evaluation of whether there is any change to the prediction of residual effects of the Project or the significance of those residual effects
- Evaluation of whether the Project refinements alter the predicted interactions of the Project with other projects (cumulative effects).

6.4 SURFICIAL GEOLOGY, TERRAIN AND SOILS

6.4.1 Predicted Potential Effects from the Project

The Project activities that have the potential to interact with surficial geology, terrain and soils are provided in Table 6.3-1 of the Project Proposal. The potential environmental effects identified in the Project Proposal that could occur from interactions with Project activities are related to two components of the VC: *terrain stability* and *soil reclamation suitability*.

Project activities that interact with *terrain stability* and that were assessed in the Project Proposal included:

- Site clearing and grubbing
- Site water management (diversion and runoff)

Potential Project effects to *soil reclamation suitability* that were assessed include:

- Site clearing and grubbing
- Salvaging and stockpiling of top and sub soils
- Site grading including blasting, overburden removal and overburden disposal
- Borrow areas development and use
- Construction of mine site infrastructure and haul roads
- Site water management (diversion and runoff)
- Open-pit mining (blasting, ore/waste hauling, open pit dewatering)
- Ore processing (crushing and hauling)
- Quarry/borrow pit operations
- Pit lake infilling

The Project Proposal assessed potential effects to a third component of the VC - Surficial Geology as part of the soils component assessment. As this effect pertains only to the overburden to be used as a potential growth medium for reclamation and was indirectly addressed in the Project Proposal

as part of the soils assessment, potential effects to Surficial Geology was not assessed separately in either the Project Proposal or this SIR.

6.4.1.1 Changes to Terrain Stability

Change in terrain stability class due to permafrost thaw and/or the presence of geohazards in the clearing area (within the Project footprint) was selected as the measureable parameter to assess effects to Terrain Stability. The Project Proposal concluded that no residual adverse effects were predicted on terrain stability, providing there was full implementation of mine design mitigation measures (s 6.4.1.4) risk management (s 10), site-specific mitigation and monitoring measures and geotechnical investigations described for the clearing area (s 6.4.2.2) and, adaptive management plans (s 6.4.2.2).

6.4.1.2 Changes to Soil Reclamation Suitability

The second potential environmental effect on this VC is soil reclamation suitability for which the Project Proposal considered eight measurable parameters. These included: admixing, compaction, erosion, topsoil volume loss, soil cover loss, soil moisture change, soil contamination and soil fertility change. The Project Proposal concluded that, with full and effective implementation of all mitigation measures, any predicted change in measurable parameters would be minimal and would not result in an adverse effect on soil reclamation suitability. The only areas within the Project footprint unable to be successfully reclaimed are the small areas occupied by the Open Pit and Pit Lake.

No change in soil reclamation suitability class is predicted for any soil map unit in the LAA.

6.4.2 Evaluation of interactions between Project Refinements and Surficial Geology, Terrain, and Soils

The Project activities and physical works that have the potential to interact with Surficial Geology, Terrain and Soils are provided in Table 6.4-1. Not all Project activities that interact with this VC have been modified due to the Project refinements. Therefore, only Project activity interactions with this VC that were originally ranked as a “2” and that will be changed as a result of the Project refinements, have been moved forward for evaluation of the effects assessment conclusions as presented in the Project Proposal. Project refinements that modify Project activities interactions with Surficial Geology, Terrain and Soils are listed in Table 6.4-1.

Table 6.4-1: Potential Project Refinement Activity Interactions with Surficial Geology, Terrain, and Soils

Project Activities and Physical Works	Potential Environmental Effects	
	Adverse Change in Terrain Stability	Adverse Change in Soil Reclamation Suitability
Construction Phase		
Site clearing and grubbing	✓	✓
Salvaging and stockpiling of top and sub soils		✓
Site grading including blasting, overburden removal and overburden disposal		✓
Borrow areas development and use		✓
Use of large construction vehicles and equipment		✓
Construction of mine site infrastructure and haul roads		✓
Site water management (diversion and runoff)	✓	✓
Operations and Modification Phase		
Open-pit mining (blasting, ore/waste hauling, open pit dewatering)		✓
Ore processing (crushing and hauling)		✓
Quarry/borrow pit operations		✓
Closure and Reclamation Phase		
Pit lake filling		✓

NOTE:

Project Environmental Effects

Only Project-Environment interactions ranked as "2" in Table 6.3-1, the Project-Environment Interaction Table, are carried forward to this Table.

✓ Indicates that an activity is likely to contribute to the environmental effect.

In the Project Proposal, potential effects were assessed using multiple characterization criteria including, Direction, Magnitude, Geographical Extent, Timing and Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence. The Project refinements alter the magnitude, geographical extent, and duration criteria characterizations as follows:

Magnitude:

- An increase in the total volume of top soil and sub soil processed and stored by 4%

Geographical Extent:

- An increase to the total area of disturbed land outside of the original Project footprint during construction and operations by 23 ha (4%) consisting of:
  - Relocation of the Explosives Facilities and site access road to the facility
  - Additional site access road to the HLF

- Expansion of the Open Pit
- Expansion of the HLF
- Expansion of the WRSAs

Duration:

- An increase in the length of time during which soils will remain disturbed prior to reclamation

The criteria characterization conclusions for Timing and Frequency, Reversibility, Ecological Context and Probability of Occurrence criteria are not altered via Project refinements and therefore are not discussed further.

The Surficial Geology, Terrain and Soils LAA encompasses 1,606 ha, inclusive of a buffer around the original 585 ha Project footprint. The Project refinements represented by the relocated Explosives Facility, the road to the Explosives Facility, the relocated road to the HLF, and the slightly extended boundaries of the WRSAs, HLF and open pit, are outside the Project Proposal mine footprint and represent an increase of approximately 4% in the amount of land that will be disturbed (from 585 ha to 608 ha). However, all Project activities remain within the Surficial Geology, Terrain and Soils LAA.

The modifications to the above criteria are minimal due to the slight increase of land disturbance and duration of disturbance prior to reclamation. Consistent with the conclusions of the Project Proposal the magnitude of effects is rated as low, the geographic extent is unchanged within the LAA, and the duration is rated as long term.

Therefore none of the above criteria for the characterization of potential environmental effects will be modified with refinements to the extent that they would impact the conclusions of the Project Proposal.

6.4.3 Evaluation of Project Refinements on Project Mitigation and Residual Effects to Surficial Geology, Terrain, and Soils

The Project Proposal assessed potential effects of the Project on terrain stability and soil reclamation suitability.

With respect to terrain stability, the mitigation measures included measures provided in Section 6.4.2.2 of the Project Proposal as well as monitoring for the occurrence of mass wasting within the Project footprint. Mitigation measures in the Project Proposal are unchanged and will continue to apply. The primary mitigation measure involves additional geotechnical investigations to improve design of mine infrastructure. Additional geotechnical investigations have been conducted to include the additional disturbed areas that are encompassed by expanded facilities (e.g. HLF and WRSAs) or revised infrastructure locations (e.g. crusher, Dublin Gulch Diversion Channel) as a result of Project refinements and are presented in Sections 5.4 and 5.5 of this report and Appendices 1-7.

The Project Proposal concluded that, with full and effective implementation of mine design mitigation measures there would be no residual adverse change in terrain stability as a result of the Project. Given that additional geotechnical investigations have been conducted to support modifications to

facilities and infrastructure and given that the same mitigation measures will be applied as were provided in the Project Proposal, VIT concludes that the refinements do not change the conclusion in the Project Proposal -- that no residual adverse change in terrain stability is predicted as a result of the Project.

With respect to soil reclamation suitability, the Project Proposal outlined the mitigation measures intended to minimize Project effects on the measurable parameters directly relevant to soil reclamation suitability in Table 6.4-10 of the Project Proposal. These mitigation measures, together with the adaptive management plans identified in Section 6.4.3.2 of the Project Proposal are unchanged by and will be applied to the Project refinements. The Project Proposal characterized the residual change in soil reclamation suitability as adverse, low magnitude, local, continuous, long term, and reversible with a moderate probability of occurrence. The assessment considered the effects of the Project on admixing, compaction, erosion, topsoil volume loss, soil cover loss, soil moisture change, soil contamination, and soil fertility change and concluded that, with full and effective implementation of all mitigation measures, changes on those parameters were predicted to have minimal to no adverse effect on soil reclamation suitability.

Table 6.4-2 below provides the determination of the Project's residual effects on soil reclamation suitability, as well as the significance of those effects as presented in the Project Proposal. Each residual effect identified in the evaluation of the Project Proposal assessment follows the criteria definitions as presented in Tables 6.4-6 and 6.4-7 of the Project Proposal. Table 6.4-2 also includes an additional column entitled "Change to Characterization of Residual Effect due to Project refinements" which provides a conclusion regarding whether there is a change to the characterizations of residual effects from the Project as a result of the Project refinements.

Table 6.4-2: Residual Effects on Soil Reclamation Suitability from the Project and the Project Refinements

Criteria for Residual effect to Soil Reclamation Suitability	Characterization of Residual Effect: Project Proposal	Change to Characterization of Residual Effect due to Project Refinements
Direction	Adverse	No change Soil reclamation suitability worsens relative to baseline
Magnitude	Low	No change Effect on one or more of the measurable parameters is detectable, but within range of natural variation or baseline values, no change in soil reclamation suitability class
Geographic extent	Local	No change Effect confined to LAA
Timing & Frequency	Continuous	No change Effect occurs continuously
Duration	Long Term	No change Change in soil reclamation suitability lasts longer than 10 growing seasons
Reversibility	Reversible	No Change

Criteria for Residual effect to Soil Reclamation Suitability	Characterization of Residual Effect: Project Proposal	Change to Characterization of Residual Effect due to Project Refinements
		Effect will reverse over time
Ecological Context	Disturbed	No change Existing human-caused ground disturbances within LAA
Probability of occurrence	Moderate	No change Effect likely to occur
Significance of residual effects	Not significant	No change Confidence in this prediction is moderate and will be improved through specific monitoring programs

Potential effects from the Project refinements will not change the conclusion in the Project Proposal and that there will be no residual adverse change in soil reclamation suitability from the Project. The rationale for this conclusion is that:

- The new facilities are within the LAA where the Project Proposal found that no change in soil reclamation suitability class is predicted for any soil map unit in the LAA.
- Project refinements do not alter the criteria used to characterize Project effects to Surficial Geology, Terrain or Soils as described in the Project Proposal with the exception of minimal impacts to geographical extent, magnitude, and duration for activities on this VC.
- The net change to overall disturbance area is minimal at a 4% increase.
- Mitigation measures, including monitoring and adaptive management, described in the Project Proposal do not require revision to mitigate potential effects.

Consistent with the conclusion in the Project Proposal, potential effects to soil reclamation suitability are limited to the construction phase of the Project as this is when disturbance to soils will occur. There are no additional effects considered during operations – there are no additional effects during any other phase than construction.

The evaluation of the Project refinements determined that none of the mitigation measures, effects monitoring or commitments in the Project Proposal for Surficial Geology, Terrain and Soils, change as a result of the Project refinements.

6.4.4 Evaluation of Project Refinements on the Significance of the Project's Residual Effects to Surficial Geology, Terrain, and Soils

As defined in the Project Proposal, the threshold for determining significance of adverse change in soil reclamation suitability would be reached if soil reclamation suitability within a soil map unit is irreversibly reduced by one or more class relative to baseline, and where such a change would impede or prevent successful reclamation within the Project footprint. Based on this significance threshold, the Project Proposal concluded that the residual adverse change in soil reclamation

suitability was predicted to be minimal and the adverse change was predicted to be not significant. The confidence in this prediction was moderate.

Given that the refinements to the Project do not change the conclusions of residual effects, the evaluation has determined that there is no change the significance rating prediction - namely that the adverse changes from the Project on soil reclamation suitability will not be significant. Therefore, the refinements do not change the significance rating of the Project's effect on surficial geology, terrain and soils. As defined in the Project Proposal, the threshold for determining significance of adverse change in soil reclamation suitability would be reached if soil reclamation suitability within a soil map unit is irreversibly reduced by one or more class relative to baseline, and where such a change would impede or prevent successful reclamation within the Project footprint. Based on this significance threshold, the Project Proposal concluded that the residual adverse change in soil reclamation suitability was predicted to be minimal and the adverse change was predicted to be not significant. The confidence in this prediction was moderate.

Given that the Project refinements do not change the conclusions of residual effects, the evaluation has determined that there is no change the significance rating prediction - namely that the adverse changes from the Project on soil reclamation suitability will not be significant. Therefore, there is no change to the significance rating of the Project's effect on surficial geology, terrain and soils.

6.4.5 Evaluation of Project Refinements on the Project's Contribution to Cumulative Effects on Surficial Geology, Terrain, and Soils

The Project Proposal identified placer mining as the only activity that might interact cumulatively with Project-related effects to soil reclamation suitability in the RAA. The Project was screened for cumulative effects on admixing and soil loss where placer mining intersected with the Project footprint. The Project Proposal concluded that there is not a reasonable expectation that the Project's contribution to cumulative effects has the potential to measurably change soil reclamation suitability in the RAA. The Project refinements do not extend beyond the LAA and do not result in an increase of the interaction pathway between Project activities and areas that have been disturbed by placer mining. Therefore, VIT concludes that the Project's contribution to cumulative effects does not have the potential to measurably change due to these Project refinements.

6.5 WATER QUALITY AND AQUATIC BIOTA

6.5.1 Predicted Potential Effects from the Project Proposal

The full suite of Project activities that have the potential to interact with water quality and aquatic biota are provided in Table 6.3-1 of the Project Proposal. The potential environmental effects that could occur from interactions with Project activities are related to two components of the biophysical Valued Component: water quality and aquatic biota. Project activities that interact with water quality and aquatic biota include:

- Site water management (diversions and runoff)
- Mine water treatment and discharge during operations
- Waste rock storage and reclamation

- Heap leach facility reclamation
- Open pit filling and discharge after closure
- Ongoing water treatment and discharge during closure and post-closure

The potential environmental effects to water quality and aquatic biota considered in the Project Proposal were grouped into the following categories:

- Change in surface water quality (TSS, metals, nutrients, sulphate, cyanide)
- Change in aquatic biota (abundance and composition of periphyton and benthic invertebrates).

The potential for effects on sediment quality were also considered; however, it was concluded that the likelihood of interaction with the Project was low, given the extensive use of sediment control and erosion protection measures, sediment control ponds and TSS criteria to be met for effluent from the mine water treatment plant. Accordingly, sediment quality effects were not considered further in the Project Proposal.

Surface water affected by Project activities will be classified as either contact or non-contact:

- **Non-contact water**—clean water that has had no contact with exposed ore or industrial processes. This will be diverted around mine facilities and into adjacent surface waters.
- **Contact water**—water that has been in contact with ore or industrial processes. This includes water from the open pit and waste rock storage areas (to be collected and either recycled for mine operations or treated and released to surface waters) and water from the heap leach facility (to be recycled during operations and then treated prior to release during closure and reclamation).

Implementation of the Water Management Plan (Appendix 8 of this SIR), erosion and sediment control provisions in the Environmental Management Plans and the commitment to treat contact water will ensure that water released to area streams will meet applicable standards and minimize the potential for environmental effects.

6.5.2 Evaluation of Interactions between Project Refinements and Water Quality & Aquatic Biota

Potential interactions between specific Project components and water quality and aquatic biota are identified and ranked in Table 6.3-1 of the Project Proposal. Those interactions that could result in an environmental effect of concern, even with mitigation (e.g. ranked as a “2” in Table 6.3-1) are described below and assessed further in Section 6.5.2. Those ranked as a “1” in Table 6.3-1 (interaction occurs; however, based on past experience and professional judgment the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of codified environmental protection practices known to effectively mitigate the predicted environmental effects) are not assessed further.

The activities for which there are potential interaction between water quality and aquatic biota are presented in Table 6.5-1.

Table 6.5-1: Potential Project Interactions with Water Quality and Aquatic Biota

Project Activities and Physical Works	Potential Environmental Effects	
	Change in Water Quality	Change in Aquatic Biota
Site water management (diversions and runoff)	✓	✓
Mine water treatment and discharge during operations	✓	✓
Ongoing water treatment and discharge during closure and post-closure	✓	✓

NOTE:

Project Environmental Effects

Only Project-Environment interactions ranked as 2 in Table 6.3.1, the Project-Environment Interaction Table, are carried forward to this Table.

✓ = Indicates that an activity is likely to contribute to the environmental effect.

In the Project Proposal, potential effects were assessed using multiple characterization criteria including, Direction, Magnitude, Geographical Extent, Timing and Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence. The Project Refinements have the potential to alter the magnitude and duration criteria characterization as follows:

Magnitude:

- An increase in the total volume of ore processed in the Heap Leach Facility from 66 MT to 92 MT that may result in increased contaminant concentrations including TSS, metals, metalloids, sulphate, and nutrients discharged or the impairment of the ability of watercourses to sustain aquatic life.
- An increase in the total volume of waste rock stored in the two WRSAs from 66 MT to 132 MT that may result in increased contaminant concentrations including TSS, metals, metalloids, sulphate, and nutrients discharged or the impairment of the ability of watercourses to sustain aquatic life.

Duration:

- An increase in the length of time for the operations phase and the mine water treatment plant is required for water treatment prior to closure.

The characterizations of the following criteria are not altered via Project Refinements and therefore are not discussed further: Geographical Extent, Timing and Frequency, Reversibility, Ecological Context and Probability of Occurrence.

The main water quality and aquatic biota interaction is through the discharge of treated mine water to area streams. During operations and early in the closure phase, several activities within the mine footprint (storage of waste rock, development of the open pit, operation of the heap leach facility, reclamation of waste rock facilities and reclamation of the heap leach facility) will not result in unmanaged discharges to streams. Rather, contact water will be delivered to the mine water treatment plant before being discharged. The other possible Project interaction with water quality would be through potential uncontrolled releases, i.e., seepage of contact water during operations or closure into groundwater, which could then discharge additional metals to area streams. For the

post-closure phase, it is anticipated that seepage water and non-contact surface runoff water from the reclaimed facilities will be delivered to passive treatment systems to limit contaminant loadings to receiving streams. These post-closure passive treatment discharges also have the potential for environmental effects to water quality and aquatic biota.

Project refinements do not increase the interaction between diversions and changes in water quality or aquatic biota. The rationale for this conclusion is based on the refinement of the Dublin Gulch Diversion Channel, which will be reduced by total length and width from that assessed in the Project Proposal (see Section 5 of this SIR for further detail on the refined dimensions of the DGDC). In addition, the methods for diversion of non-contact water around mine site facilities have not changed as a result of Project refinements. Therefore, the potential effects of site water management of diversions and runoff are unchanged from the Project Proposal and are not considered further in this SIR.

The water balance optimizations associated with the Project refinements have the potential to alter the interaction of mine water treatment and discharge during operations and post closure and are evaluated further below.

6.5.3 Evaluation of Project Refinements on Mitigation Measures and Residual Effects to Water Quality and Aquatic Biota

6.5.3.1 Mitigation Measures

Water quality mitigation measures proposed in the Project Proposal during construction include implementation of an erosion and sediment control plan to prevent sediment release to watercourses and a sewage treatment plant to treat sewage from the construction workforce.

The erosion and sediment control plan is unchanged by the Project refinements and will be effective in mitigating the release of sediments to receiving watercourses. The sewage treatment plant is no longer planned as Project refinements include the expansion of the existing septic field to be sized appropriately to effectively treat sewage waste during construction. Details of the septic field are located in Section 5.4.3.

Water quality mitigation measures to be implemented during operations include operation of a mine water treatment plant (MWTP) to treat all contact water prior to discharge to the receiving environment. The MWTP will involve several treatment technologies, including oxidation, high pH precipitation, low pH coagulation, pH adjustment, filtration, and dechlorination. Specific sulfate treatment was included in the Project Proposal. However, as a result of project refinements, no sulfate treatment, beyond that achieved through precipitation of gypsum ($CaSO_4$) is currently proposed. Based on gypsum solubility, sulfate concentrations would not exceed 1620 mg/L.

The MWTP has been designed to treat up to 1,020 m^3/hr (24,480 m^3/d), instead of 620 m^3/hr (14,880 m^3/d) as presented in the Project Proposal. The increased design capacity would permit treatment of the 1 in 100 year, 24-hour storm event volume (including HLF runoff and runoff from other sources) within several days of the event occurring. Inputs to the MWTP are expected to be low at the start of operations phase, increase as the mine facilities become developed, and reach a maximum during the first two years of heap leach facility draindown during decommissioning.

During operations, the MWTP will receive flows of any contact water not needed for the heap leach facility or not suitable for direct discharge to the Dublin Gulch diversion channel or Haggart Creek. This includes flows from the open pit (including the Platinum Gulch seepage collection pond) and the Eagle Pup seepage collection pond. If needed, discharges from the sediment control ponds and ditches will also be sent to the treatment plant. Effluent from the treatment plant will be discharged to Haggart Creek through a diffuser pipe on the creek bed. Discharge will occur mainly in May through October.

The MWTP is designed to reduce levels of metals, nitrogen, and phosphorus. The MWTP end of pipe effluent criteria have been initially set at two times the WQG (CCME or BC WQO) in Haggart Creek for each parameter of interest. These criteria are conservative and considered stringent as the assimilative capacity of Haggart Creek will be greater than that assumed by this initial conservative assumption. The updated MWTP will be effective at treating contact water from the Project to meet WQG or SSWQG for all contaminants prior to discharge.

For the closure and post-closure phase of the Project, several design features and mitigations have been incorporated to maintain surface water quality at levels suitable for aquatic life, including extended operation of the MWTP, cyanide detoxification plant, and soil and vegetation covers on reclaimed HLF and waste rock storage areas. Groundwater wells around the waste rock storage areas will be monitored to assess whether seepage is affecting groundwater quality and to assess accuracy of predictions made in the environmental assessment.

As stated, the MWTP will remain in operation during the early years of closure to remove metals and nitrogen in the large volumes of contact water coming from HLF draindown. Additional closure mitigation measures proposed include the limitation of net precipitation infiltration through the HLF and WRSAs as well as passive treatment systems to potentially treat elevated concentrations of several metals from the HLF and WRSAs if necessary. These post-closure mitigation measures to protect water quality remain unchanged by the project refinements.

6.5.3.2 Predicted Residual Effects

Residual effects of the Project on water quality and aquatic biota were evaluated in the Project Proposal through the use of a mass loading water quality model.

Water Quality Model

In the Project Proposal, a mass loading water quality model was developed to provide predictions of water quality at relevant locations within the Haggart Creek watershed during the operation, closure and post-closure phases of the Project. Table 6.5-2 summarizes key input to the model and comments on any changes relative to the Project refinements.

Table 6.5-2: Key Inputs of Data/Information for Project Proposal Water Quality Model

Key Inputs for Water Quality Model	Discussion in Project Proposal	Material Modifications as a Result of Project Refinements
Baseline surface water quality	Appendix 25 - *Water Quality Model Technical Report*	***NO*** - Updated to include 2011 data but largely unchanged from Project Proposal
Site-wide and process flows water balance	Appendix 21 - *Surface Water Balance Model Report*	***YES*** - Updated GoldSim Water Balance Model [(Knight Piesold 2012) (Appendix 8)] to account for larger facilities and optimized water use
Predicted geochemical source terms for mine contact water	Appendix 8 - *Eagle Gold Project Geochemical Characterization and Water Quality Predictions Report*	***NO*** - Potential for increases in some parameters (SO_4 and Se) but owing to conservative assumptions employed, Project Proposal source terms remain valid following project refinements
MWTP Effluent Quality	Appendix 20 - *Eagle Gold Project Technical Memorandum: Mine Water Treatment Conceptual Evaluation*	***NO*** - Effluent criteria unchanged and established at two times receiving WQO. Sole exception for SO_4, which will be controlled through gypsum solubility at a maximum of 1620 mg/L

As illustrated in Table 6.5-2, most of the key inputs for the Project Proposal water quality model are essentially unchanged following the project refinements. The geochemical source terms developed for the Project Proposal were further evaluated by SRK Consulting (SRK) to determine if increasing both the tonnage of waste rock and heap leach ore, as well as each facilities footprint, would materially change the source term predictions employed in the Project Proposal water quality model. Specifically, SRK evaluated Project refinements with respect to source term predictions in a memorandum titled: Narrative on expected effects of Feasibility Study refinement of project design on the predicted source term concentrations (Appendix 10). SRK's evaluation used simplified assumptions regarding the increased capacity of the HLF and WRSA facilities. The memorandum suggested that some minor increases could occur in source term concentrations at closure for a few parameters of interest for the waste rock and heap leach facilities, due simply to a greater volume to area ratio of material that is proposed for each facility. However, SRK (2012) highlighted that the potential concentration changes are difficult to predict and largely uncertain due to the already conservative assumptions inherent in the Project Proposal source term predictions. Accordingly, SRK (2012) concluded that the estimates of seepage quality emanating from the heap leach facility and waste rock storage areas following project refinements are likely to be similar to values previously reported in the Project Proposal.

In contrast, the water balance model has been updated to reflect the changed conditions of the larger mine development including expanded facilities and the format of the water balance model has shifted from a spreadsheet-based deterministic model to a GoldSim-based probabilistic model. During operations, the revised water balance model for the Project refinements predicts larger

monthly flow volumes to the MWTP when compared to Project Proposal water balance model. The increased flows result from the larger footprints and assumed higher runoff coefficients from the mine facilities. Larger monthly flows to the MWTP are also predicted during the closure phase of the Project considering the project refinements as compared to the Project Proposal water balance model for the same period. It should be noted that the revised water balance includes the 'optimized' water management strategy, which simulates the recycling of excess heap infiltrated runoff/seepage back onto the heap in the event that the predicted MWTP inflow volumes exceed the maximum treatment inflow rate, as defined by the water management objectives. Therefore, the MWTP inflows for the revised water balance are controlled at the upper limits and results in treatment being required for a longer duration compared to the Project Proposal model. Although the flow through volumes have changed for the project refinements, the water management strategy is unaltered.

A primary feature of the Water Management Plan and key mitigation strategy is the operation of the MWTP. During operations and the early closure phase, all mine contact water will be delivered to the MWTP to yield effluent concentrations to meet water quality objectives in the receiving environment. Following reclamation activities on the waste rock and heap leach facilities and complete draindown of the latter, if necessary, passive treatment systems are proposed for seepage water emanating from the heap leach facility, Eagle Pup waste rock facility and the combined Platinum Gulch waste rock facility and open pit areas. As such, the active and passive treatment systems effectively negate the effect that potential changes to source term concentrations could have on receiving water quality resulting from expanded facilities.

Most important to the evaluation of the impact of project refinements on potential Project effects to water quality and aquatic biota as presented in the Project Proposal: the Project's treated effluent (i.e., MWTP and passive treatment) concentrations are effectively the same as those presented in the Project Proposal and therefore effluent water quality delivered to the receiving environment has not undergone modifications

In consideration of the above, no new water quality modeling has been performed as part of this SIR. The highly conservative approach adopted for source term development and the commitment to operate a MWTP throughout operations and draindown phases would not result in material changes to estimates of contact water chemistry during operations and closure for the Project refinements. The timing of completing construction of the MWTP will be based on advanced engineering optimization and water licensing requirements. As such, water quality model results, supporting the effects assessment within the Project Proposal, extend to the Project refinements. A memorandum describing in detail the rationale and support for this approach is presented in Appendix 10.

Summary of Residual Effects for Water Quality and Biota

The Project Proposal concluded that, with full and effective implementation of mine design mitigation measures there would be no residual adverse change in water quality or aquatic biota during any phase of the Project. In the Project Proposal, predicted residual effects were assessed and characterized for changes to water quality aquatic biota were provided for each phase of the Project. Each is reproduced below followed by an evaluation of the each predicted residual effect with respect to Project Refinements.

Construction

The residual environmental effects of diversion of non-contact water in the LAA on water quality will be neutral, negligible in magnitude, local in geographic extent, continuous, and occurring in perpetuity. Changes will occur in an area already disturbed by placer mining and stream diversions, and are reversible.

The residual environmental effects of diversion of non-contact water in the LAA on aquatic biota are considered to be the same as for water quality: neutral, negligible in magnitude, local in geographic extent, continuous, and occurring in perpetuity. Changes will occur in an area already disturbed by placer mining and stream diversions, and are reversible.

The above characterization of predicted residual effects to water quality and aquatic biota are unchanged by project refinements. The majority of water diversions of non-contact water remain consistent with that described by the Project Proposal. The one exception is the optimized design of the Dublin Gulch Diversion Channel which results in a shorter and more narrow diversion of water with fewer downstream impacts to water quality and aquatic biota.

Operations

The residual environmental effects of discharge of effluent from the mine water treatment plant into Haggart Creek during operations are considered neutral in direction, negligible to low in magnitude for metals and nutrients, regional in extent (beyond the confluence of Platinum Gulch), continuous, and long term in duration (throughout operations). The effect has a moderate likelihood of occurring (given the conservative predictions) and would be reversible when discharge ceases. The effluent will also result in some increases in levels of major anions and cations (e.g., hardness, sodium, chloride and sulfate), increasing the conductivity or ionic strength of the water however metal levels will be controlled through the MWTP. Although, MWTP flows are anticipated to be higher considering the project refinements, a threshold analysis (Appendix 10) has indicated that the controlling parameter on receiving water quality is the MWTP effluent limits with a much lesser influence from changes in discharge volumes. The latter is, in part, a function of the revised water balance that optimizes MWTP discharges to periods when a minimum physical dilution of 10:1 exists in Haggart Creek (Appendix 9). The MWTP effluent limits are essentially unchanged from the Project Proposal, with the sole exception of sulfate which becomes relevant later in the mine life during early closure and is discussed further below.

Any changes to water quality are not expected to result in aquatic toxicity. Moreover, discharges will occur in an area already disturbed by placer mining. Any predicted changes in water quality of Haggart Creek will be assessed through detailed monitoring of both surface water quality and groundwater.

The residual environmental effects of effluent discharge on aquatic biota (benthic algae and invertebrate communities) are predicted to be adverse, low to moderate in magnitude through Haggart Creek downstream to Lynx Creek (regional extent), continuous (but expressed seasonally), and will occur through the operations phase (long-term). The effect has a moderate likelihood of occurring (given the conservative predictions) and would be reversible (when discharge ceases). Given that placer mining has occurred in the tributaries of Haggart Creek, the change will occur in an area already disturbed by human activities.

Early Closure and Reclamation and Post-Closure Monitoring

Residual environmental effects on water quality of Haggart Creek from the discharge of treated effluent from the MWTP during HLF draindown are predicted to be adverse, moderate in magnitude, local in geographic extent, continuous, and long term. Once begun, the effect would be reversible (ceasing once the major draindown volumes have been released). The measureable change in water quality of Haggart Creek is predicted to be within WQG or SSWQO for metals (unless they reflect existing exceedances for baseline). Changes to sulfate concentrations in Haggart Creek are also anticipated and could exceed 100 mg/L. A SSWQO for sulfate of 644 mg/L was proposed in Stantec (December 2011) *Response to Request for Supplemental Information (YESAB Assessment 2010-0267)*. The threshold analysis presented in Appendix 10 indicated that the Project refinements could easily achieve sulfate concentrations in Haggart Creek well below the proposed SSWQO of 644 mg/L. Increases in levels of major anions and cations are anticipated and a change in nutrient levels from oligotrophic to mesotrophic. These conclusions are unaffected by the Project refinements.

Residual environmental effects on aquatic biota of the discharge of treated effluent from the mine water treatment plant to Haggart Creek during HLF draindown are predicted to be adverse, moderate in magnitude (potential change in one trophic level), local in geographic extent, continuous, and long term (reversible, ending after the three year peak of draindown volumes). There is a high probability of the effect occurring, given the predicted characteristics of the MWTP effluent. Conditions will be confirmed through monitoring of surface water quality and groundwater.

The residual environmental effects on water quality of discharge of heap leach facility runoff and seepage during closure are expected to be adverse, low to moderate in magnitude, local in geographic extent, continuous, and in perpetuity. Once begun, the effect will be irreversible. The effect will occur in an area already disturbed by historic placer mining. Surface water and groundwater quality monitoring will be performed during all phases of the mine life to evaluate the predictions. The passive treatment system mitigation measure for the HLF seepage is proposed to reduce levels of metals in the discharge to concentrations lower than MMER effluent limits. The Project refinements are anticipated to result in a moderate increase in the closure seepage flows from the HLF to the passive treatment system (Table 6.5-3). Modifications to the passive treatment system retention time design will be required but the performance of the passive system is assumed to be equally effective. As such, the conclusions of the residual effects assessment are unchanged by the Project refinements.

Table 6.5-3: Comparison of Inflow Rates Reporting to Passive Treatment Systems for Project Proposal and Updated Project Refinements

Mine Water Stream	Project Proposal *Freshet Flow* (L/s)	Project Proposal *Average Flow* (L/s)	Updated *Freshet Flow* (L/s)	Updated *Average Flow* (L/s)
Eagle Pup WRSA	31	8	35	13
Platinum Gulch WRSA and Open Pit Overflow	44	11	53	17
Heap Leach Facility	8	2	13	3

The residual environmental effects on aquatic biota of discharge of heap leach facility runoff and seepage during closure are expected to be adverse, low to moderate in magnitude, local in geographic extent, continuous, and in perpetuity. Once begun, the effect would be irreversible. The effect will occur in an area already disturbed by historic placer mining. Aquatic biota will be monitored during all phases of the mine life to evaluate the predictions.

Residual environmental effects on water quality of discharge of runoff and seepage from the Eagle Pup WRSA, after passage through a passive engineered treatment system, to the Dublin Gulch diversion channel during closure, are considered adverse, moderate in magnitude, local in geographic extent, continuous, and perpetual (at least several decades). Once begun, the effect would be irreversible, and would occur in an area disturbed by previous placer mining. The project refinements are anticipated to result in a minor increase in the closure seepage flows from the Eagle Pup WRSA to the passive treatment system (Table 6.5-3). Modifications to the passive treatment system retention time design will be required but the performance of the passive system is assumed to be equally effective. Monitoring of surface water quality during operations and closure will provide an evaluation of these predictions and identify whether any passive treatment system is required.

Residual environmental effects on aquatic biota of discharge of runoff and seepage from the Eagle Pup waste rock storage area, after passage through a passive engineered treatment system and with a tighter cover, to the Dublin Gulch diversion channel during closure, are considered adverse, moderate in magnitude, local in geographic extent, continuous, and perpetual. Once begun, the effect would be irreversible. Monitoring during operations and closure will provide an evaluation of these predictions and identify whether a treatment system is required.

The residual effect of post-closure discharges to Haggart Creek downstream of Platinum Gulch over the short term and long term, with use of passive engineered treatment system below the reclaimed facilities, is considered adverse, low to moderate in magnitude, local in geographic extent, continuous and perpetual. The effect will be irreversible, once begun, and occur in an area already disturbed by placer mining. The project refinements are anticipated to result in a minor increase in the closure seepage flows from the Platinum Gulch WRSA and open pit overflow to the passive treatment system (Table 6.5-3). Modifications to the passive treatment system retention time design will be required but the performance of the passive system is assumed to be equally effective.

Residual environmental effects of runoff from the Platinum Gulch waste rock storage area and open pit on water quality of Platinum Gulch during closure are expected to be adverse, moderate to high magnitude, site-specific in geographic extent (restricted to the ephemeral and intermittent Platinum Gulch), continuous, and perpetual (at least several decades). Once begun, the effect will be irreversible, as seepage will continue over time. The measureable change in water quality of Platinum Gulch will be confirmed through monitoring of both surface water quality and groundwater.

The residual effect on aquatic biota of post-closure discharges to Haggart Creek downstream of Platinum Gulch over the short term and long term, with mitigations, is considered adverse, low to moderate in magnitude, local in geographic extent, continuous and perpetual. The effect will be irreversible once begun and will be expressed in an area already disturbed by placer mining.

6.5.4 Evaluation of Project Refinements on the Significance of the Project's residual effects to Water Quality and Aquatic Biota

For water quality and aquatic biota, a significant adverse residual environmental effect is defined in the Project Proposal as a Project-related environmental effect that results in either of the following:

- A discharge of a deleterious substance into fish habitat (Haggart Creek, Dublin Gulch diversion channel, Eagle Creek) that is not authorized under the *Fisheries Act* (using effluent standards defined by MMER) and/or Water Use License, including ongoing effluent discharge or an isolated accidental release.
- An impairment of the ability of the watercourses to sustain aquatic life (ultimately, the ability to sustain fish populations at levels similar to Project pre-development).

The Project Proposal concluded that the environmental effect of effluent discharge from the MWTP on water quality and aquatic biota of Haggart Creek or of seepage of contact water into groundwater then into streams during operations is considered not significant. Evaluation of the modifications via project refinements indicates that this conclusion remains valid and appropriate. The effluent discharges will meet regulatory requirements for effluent and for receiving waters of Haggart Creek, Dublin Gulch diversion channel, and Eagle Creek (MMER, Water Use License) and the concentrations will not impair the ability of the watercourses to sustain aquatic life.

Contact water will be treated prior to discharge and water quality in Haggart Creek will meet WQG (unless a parameter already exceeds the WQG) or a SSWQO. Many parameters are predicted to remain near baseline levels, and the increase in phosphate levels will not be high enough to trigger a change in trophic status. There is a high probability of the effect occurring, with a moderate degree of confidence in this prediction, given the uncertainties (conservative worst-case predictions) of source terms, which tend to overestimate the modeled concentrations in the streams. There is a high degree of confidence in baseline conditions in the streams and effectiveness of mitigations incorporated in the treatment technologies for the mine water treatment plant.

During closure and post-closure, the Project Proposal concluded that residual environmental effects of Project discharges on water quality and aquatic biota are considered not significant, given that, with mitigation measures, the effluent discharges and resulting water quality in the streams will meet regulatory requirements (MMER effluent criteria, Yukon Water Board permits, WQG or SSWQO). There will be no unauthorized release of a deleterious substance (as defined under the *Fisheries*

Act) into waters frequented by fish and no impairment of the streams to sustain aquatic life. These conclusions are equally applicable upon evaluation of the updated project refinements.

While the well-defined baseline dataset provides a reliable basis for making predictions of water quality, overall, there is a moderate confidence in the prediction of effects being not significant related to:

- The amount of conservatism built into the worst case predictions for the geochemical source terms and hydrology regimes (concentrations are likely to be lower than predicted).
- The effectiveness of and range in mitigation measures available to manage effluent quality (high probability of very effective treatment via the MWTP and cyanide detoxification plant. Passive systems are well known to be effective; while maintenance requirements are considered low, however further bench and pilot research using site water chemistry will be required to formalize the design of these systems during operations.

Given that the project refinements do not result in a change of the conclusions of residual effects, the evaluation has determined that the project refinements do not change the significance rating predictions - namely that the adverse changes from the Project on water quality and aquatic biota will not be significant during any phase of the Project. Therefore, the project refinements do not change the significance rating of the Project's effect on water quality and aquatic biota.

6.5.5 Evaluation of Project Refinements on the Project's contribution to Cumulative Effects on Water Quality and Aquatic Biota

The Project Proposal identified placer mining as the only activity that might interact cumulatively with Project-related effects to water quality and aquatic biota in the RAA. The Project was screened for cumulative effects between potential placer mining in the Haggart Creek or Dublin Gulch watersheds. The assessment of environmental effects on water quality indicates there will be a demonstrable residual environmental effect on water quality of Haggart Creek, Dublin Gulch, and Eagle Creek, due to discharge of treated effluent from the mine water treatment plant during operation and from reclaimed waste rock storage areas and the HLF during and after closure. These discharges are predicted to release metals, nutrients, suspended solids and other constituents to Haggart Creek, and this change in water quality could interact with discharges from other activities.

In March 2012, VIT submitted a proposal to the Mayo Designated Office to undertake placer mining activities in Dublin Gulch and Haggart Creek over a 5-year period beginning in 2012 and ending in 2017. Water used in placer mining activities will be treated via staged settling ponds for the removal of total suspended solids prior to discharge to Haggart Creek or Dublin Gulch. Areas proposed for placer mining are highly disturbed from recent and historic placer mining operations. These areas will be reclaimed as part of the Project. Therefore, these operations will not result in increased cumulative effects with respect to suspended sediment or detrimental effects to water quality.

There is no reasonable expectation that the Project's contribution to cumulative effects has the potential to measurably change the health or sustainability of water quality and aquatic biota. For the Project, the predicted residual effects on water quality will be to meet WQG or SS WQG in Haggart Creek, and no further interactions with other projects are anticipated for Haggart Creek. Arsenic will

meet a SSWQO that would be developed recognizing baseline levels. The small increase in nitrogen and phosphorus levels may contribute to a small increase in productivity, but no change in the overall trophic status from oligotrophic to mesotrophic. Mitigation measures are proposed to protect the health and sustainability of water quality and aquatic biota, and environmental effects of the Project on water quality and aquatic biota are predicted to be not significant. The project refinements do not extend beyond the LAA and do not result in an increase of the interaction pathway between Project activities and areas that have been disturbed by placer mining. Therefore, VIT concludes that the Project's contribution to cumulative effects does not have the potential to measurably change from that described in the Project Proposal due to project refinements.

6.6 AIR QUALITY

6.6.1 Predicted Potential Effects from the Project

Project activities that result in release of substances to the air that, owing to their physical and chemical properties, are classed as air contaminants. These emissions are activity dependent. Environmental effects to air quality occur when emissions of air contaminants exceed regulatory emission standards (contaminants or pollutants referred to as Criteria Air Contaminants or CACs). The Project activities that were assessed in the Project Proposal are as follows:

Construction Phase

- Site clearing and grubbing will be done with large construction vehicles. Soil disruption during site preparation will generate PM emissions.
- Disposal of cleared vegetation will cause PM emissions.
- Salvaging and stockpiling of top and sub soils will cause PM emissions.
- Blasting, site grading, and overburden removal and disposal will cause soil disruption at the Project site, discharging PM from the surface.
- Development of quarry and borrow areas and the salvaging and stockpiling of top and sub soils will cause soil disruption and PM emissions.
- Development of the construction and operations camps will require site preparation and installation of camp infrastructure, generating CACs.
- Use of large vehicles and mining equipment will cause combustion CAC emissions.
- Construction of mine site infrastructure will cause soil disruption and PM emissions.

Operations and Modifications Phase

- Open-pit mining including blasting, and ore and waste hauling will cause soil disruption and PM emissions.
- Ore processing, including crushing, hauling, and the use of conveyor systems will cause PM emissions at transfer points. Gold heap leach facility operations will require finely-ground ore transferred to the heap leach facility, causing PM emissions.

- Quarry and borrow area activities during normal open pit operations will cause soil disruption and generate PM emissions.

The CACs that were selected as measurable parameters for changes to air quality include: Respirable Particulate Matter (PM2.5), Total Suspended Particulates (TSP), PM Deposition, Nitrogen Dioxide (NO2), Carbon Monoxide (CO), and Sulphur Dioxide (SO2).

The air quality local assessment area is 30 km by 30 km, centred on the mine site. Due to its size, this area is referred to as the RAA and a separate LAA is not considered.Project CAC emission effects will occur primarily during the construction and operations phases. During the Project closure phase, emissions will be minimal and will cease entirely after facility closure.

The effects analysis methods and the assessment of CAC emission effects are provided in Sections 6.6.1 and 6.6.2 of the Project Proposal, respectively. Project emissions were predicted from 'point sources' (i.e. CAC combustion emissions from generators, boilers and regenerator kiln) and 'fugitive emissions' from area sources that move within a defined area (i.e. vehicle exhaust and dust emissions).

Predictions were based on air dispersion modeling for both CACs and dustfall. In addition, detailed equipment lists and emission estimates were used to predict CAC emissions. The maximum predicted CAC concentrations in comparison with regulatory objectives are presented in the Project Proposal for both the Construction Phase and the Operations Phase in Project Proposal Tables 6.6-6 and 6.6-8, respectively. All predicted maximums are well below the regulatory objectives except for TSP and PM 2.5 during Construction and TSP during Operations. In both cases, maximum concentrations are predicted at the south perimeter of the mine site (at or outside the mine disturbance boundary) in an area where the terrain rises rapidly. Plumes impinge upon steep terrain in this area, and this phenomenon commonly leads to overestimates in dispersion modeling exercises. The area where these values are predicted to exceed the regulatory objectives is minimal and very small relative to the total RAA.

The modeling did not take into account wet scavenging effects. Wet scavenging refers to natural dust suppression by rain and snow, which is an important naturally occurring means to remove airborne TSP through deposition. Inclusion of wet scavenging would have resulted in lower predicted ambient CAC concentrations and higher dustfall deposition within the RAA. Further rationale for the exclusion of wet scavenging effects was provided in a supplementary information report provided by VIT to YESAB in December 2011.

The Project Proposal expressed with a high degree of confidence that emissions from dust were over-estimated and, that if wet scavenging is considered, actual exceedances of ambient regulatory objectives are unlikely. With mitigation measures, concentrations of CACs above the regulatory objectives are expected to be very rare, local, short in duration and reversible. Further, it was concluded that the effects of Project activities on air quality are not significant.

6.6.2 Evaluation of Interactions between Project Refinements and Air Quality

The Project activities and physical works that have the potential to interact with air quality are provided in Table 6.6-2. Not all Project activities that interact with air quality have been modified due

to Project refinements. Therefore only Project activity interactions with this VC that were originally rated as a "2" and that will be changed as a result of the Project refinements, are listed in Table 6.6-2. Only these interactions that have been modified have been moved forward for evaluation of the effects assessment conclusions as presented in the Project Proposal.

Table 6.6-2: Potential Project Refinement Interaction with Air Quality

Project Activities and Physical Works	Potential Environmental Effects
	Criteria Air Contaminants
Construction Phase	
Site clearing and grubbing	✓
Disposal of cleared vegetation	✓
Salvaging and stockpiling of top and sub soils	✓
Site grading including blasting, overburden removal and overburden disposal	✓
Borrow areas development and use	✓
Use of large construction vehicles and equipment	✓
Construction of mine site infrastructure and haul roads	✓
Operations and Modification Phase	
Open-pit mining (blasting, ore/waste hauling, open pit dewatering)	✓
Ore processing (crushing and hauling)	✓
Quarry/borrow pit operations	✓

The Project refinements will result in an increase in dust generation due to an increase in the area that will be cleared, grubbed, and graded, the amount of ore that will be produced, and the length of time over which the activities will take place; and increase in the CACs that will be released because of increased diesel generation during construction and operations..

In the Project Proposal, potential effects were assessed using multiple characterization criteria including, Direction, Magnitude, Geographic Extent, Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence. Of these criteria, the Project refinements alter the magnitude and duration as follows:

Magnitude:

- Increased emissions of PM via land clearing during construction
- Decreased emissions of CACs via decreased use of diesel generators during construction
- Increased emissions of CACs via increased construction and operations vehicle traffic

- Increased emissions of PM via increased blasting resulting from higher production during operations
- Increased emissions of PM via increased ore production rate (crushing) during operations

Duration:

- An increase in the length of time during which the emissions will occur during construction and operations

The characterization criteria of Direction, Geographic Extent, Frequency, Reversibility, Ecological Context and Probability of Occurrence will not be altered via Project refinements and therefore are not discussed further.

The magnitude of predicted emissions of CACs and PM will increase and decrease during construction due to increases in the number of vehicles and a slight increase to cleared area. During operations CACs will increase due to the increase in blasting and removal of ore and diesel generation. However, the increases in CACs and PM are anticipated to be modest and within the regulatory objectives. In addition, diesel emissions are confidently predicted to decrease from those estimated in the Project Proposal, given that a portion of the power required during the construction phase will be supplied by the transmission line (and significantly decrease the use of diesel generators on site). The potential effects will remain local and temporary. The RAA is not changed as a result of the physical works or activities identified in the Project refinements.

6.6.3 Evaluation of Project Refinements on Project Mitigation and Residual Effects to Air Quality

The mitigation measures to control Project dust and combustion emissions are identified in Subsection 6.6.2.2 of the Project Proposal. They include measures to minimize fugitive dust emissions, the Combustion Source Control Plan to promote minimization of combustion emissions, a Fugitive Dust Control Plan and an ambient air quality monitoring plan. The ambient air quality monitoring plan was provided as part of a supplementary information report in December 2011 per a request from YESAB. While the details of this plan are not in the Project Proposal, they were included in the December Supplementary Information Report. These mitigation measures remain unchanged for the Project refinements.

During construction, the Project Proposal concluded that with implementation of mitigation measures, residual effects are minimal and will be significantly reduced with natural dust suppression and the Fugitive Dust Control Plan. While the direction is adverse and the magnitude is high, the effect will be local and reversible. If the effect of wet scavenging is considered, actual exceedances of ambient regulatory objectives are unlikely. It is anticipated that the characterizations of potential effects resulting from the Project refinements will not change: the effect will remain high magnitude, short in duration, and is reversible. CAC emissions will significantly decrease through use of grid power for the construction phase as well.

During operations, the Project Proposal considered heavy equipment CAC combustion emissions to be insignificant and not of concern. Predicted ambient 24-hour TSP concentrations exceed the

federal National Ambient Air Quality Objectives on occasion at or very near the south boundary of the mine site. The area outside of the mine site with TSP concentrations exceeding regulatory objectives is very small. It was concluded that residual effects would be minimal and significantly reduced with natural dust suppression, the Fugitive Dust Control Plan and the Combustion Source Control Plan.

Furthermore, the ambient air quality monitoring plan will provide the ability to adaptively manage exceedances during construction and operations. While the direction is adverse and the magnitude is high, the effect will be local in extent and reversible. If the effect of wet scavenging is considered, actual exceedance of ambient regulatory objectives was considered to be unlikely. It is anticipated that the characterization of potential effects resulting from the Project refinements will not change: the effect will remain high in magnitude, short in duration, and is reversible.

The Project refinements do not introduce any new activities that will change the nature of Project-related CACs and do not modify the characterization of effects on air quality to the extent that the conclusions of the Project Proposal will change. As there is not a need to change the mitigation measures provided in the Project Proposal, it is concluded that refinements do not change the conclusion in the Project Proposal that the Project will have no residual effects on air quality during construction or operation.

6.6.4 Evaluation of Project Refinements on the Significance of the Project's Residual Effects to Air Quality

As defined in the Project Proposal, the threshold for determining significance of adverse change in air quality would be reached if ambient concentrations of air contaminants are likely to exceed relevant regulatory criteria for ambient air quality beyond the Project RAA.

The Project Proposal stated that emission rates are typically representative of maximum possible values, based on a combination of estimated emission factors, engineering estimates and manufacturer's specifications. In reality, actual emissions vary from hour to hour and day to day. With inclusion of wet scavenging, there is a high degree of confidence that emissions are being over-estimated. Given the conservative nature inherent in the air quality modeling, and the location and limited area over which predicted TSP concentrations are in exceedance, it was concluded that the residual Project effects for all phases of the Project are not significant.

Given that the Project refinements do not require additional or revised mitigation measures, or result in a change to the characterization of potential effects, the evaluation of the assessment has determined that the Project refinements do not change the significance rating prediction; namely that the effects of Project activities on air quality are not significant.

6.6.5 Evaluation of Project Refinements on the Project's Contribution to Cumulative Effects on Air Quality

The Project Proposal applied the screening process for cumulative effects on the conclusions for residual effects on air quality. The assessment determined that there are no other industrial activities in the RAA and that predicted CAC concentrations (except for small local areas with TSP exceedance) will be well below relevant regulatory objectives. As the baseline concentrations are

expected to be minimal and no change in sustaining current air quality is expected, no further cumulative effects assessment was warranted. Given there is minimal change to the magnitude and no change to the geographic extent of residual effects to air quality as a result of Project refinements, VIT concludes that the Project refinements do not change this conclusion; namely that the Project will not make a contribution to cumulative effects on air quality.

6.7 FISH AND FISH HABITAT

6.7.1 Predicted Potential Effects from the Project

In Yukon, regulation of fish habitat protection is shared by Fisheries and Oceans Canada (DFO) and the Yukon Government (Environment Yukon) under a combination of federal legislation and regulations, delegation of management authority, territorial administration, and policy. The primary legislation governing fish habitat management in Yukon is the federal *Fisheries Act* and its supporting regulations.

DFO has developed a series of pathways of effects (PoEs) flow charts within its Integrated Risk Management Framework that identify potential effects associated with land-based and in-water activities. Each of these PoE identified effects are used to define a measurable parameter for assessment of the effects on change or loss of fish habitat and change in fish/egg mortality.

Measurable parameters selected to provide evidence of ecosystem quality or of trends or changes in quality in relation to fish habitat availability include: changes in habitat structure, change in sediment concentrations, change in water temperature, change in food and nutrient concentration, change in contaminant concentrations, and change in access to habitats. Measurable parameters selected for fish mortality risk include: changes in fish/egg mortality and change in contaminant concentrations.

Potential Project activities that interact with fish and fish habitat and that were assessed in the Project Proposal include:

- Removal and alteration of riparian vegetation for construction of the mine site, access road upgrades, and transmission line right-of-way
- Access road upgrades including road crossings over watercourses
- Construction of mine infrastructure within instream and riparian areas:
  - Water intake and discharge structures
  - Watercourse infilling for waste rock storage, pit development, and construction of the heap leach facility
  - Haul road construction
- Water usage and disposal during construction and operations
- Site water management including the diversion of watercourses and site runoff

The primary Project interactions with fish and fish habitat will result from the construction of mine components that require infilling of watercourses within the mine site and the creation of diversion channels to direct surface drainage around mine infrastructure.

Both qualitative and quantitative analyses supported by baseline data and the literature, were used to assess the potential effects of the Project on changes in habitat availability and changes in fish mortality risk. Primary Project effects relate to the aerial extent of Project impacts on habitat and fish distribution characterized during baseline studies.

Average channel widths and the length of the watercourse sections directly affected within the mine footprint were used to calculate the aerial extent of lost or altered fish habitat (HADD). Potential losses in wetted area of Haggart Creek (between Dublin Gulch and Eagle Creek), due to the diversion of Dublin Gulch flows, were calculated using cross-sectional survey data and monthly surface water balance flow rates during the summer low-flow fish rearing period. Wetted perimeters were modeled for both baseline and operational conditions using HEC-RAS hydraulic modeling software. Results of the two scenarios were compared and used to calculate the predicted loss of instream habitat (HADD) due to reduced base flows in a 1.8 km section of Haggart Creek between the current mouth of Dublin Gulch and the mouth of Eagle Creek. This area will lose some base flow due to the diversion of Dublin Gulch to discharge to Eagle Creek, as opposed to directly to Haggart Creek.

Mitigation measures to minimize or avoid effects on the availability of fish habitat are provided in Table 6.7-6 of the Project Proposal. Principal among these mitigation measures are those incorporated directly into the Project design. Key elements include the Dublin Gulch diversion channel design, a mine water treatment plan capable of meeting water quality guidelines for aquatic life, and the construction of a fish habitat compensation area to off-set any loss of habitat that occurs as a result of mine infrastructure construction. No potential Project effects with a number “2” ranking in Table 6.3-1 were anticipated during operations. Closure related effects in relation to the protection of water quality were provided in the Water Quality and Aquatic Biota assessment (Section 6.5 of the Project Proposal).

The effects of change in fish access to habitat are expected to be neutral, occur once, be negligible in magnitude, site-specific in geographic extent, and medium term in duration. All residual effects of changes in access to habitats are predicted to be reversible and not significant.

6.7.2 Evaluation of interactions between Project Refinements and Fish & Fish Habitat

The Project activities and physical works that have the potential to interact with fish and fish habitat are listed in Table 6.7-1. Not all Project activities that interact with fish and fish habitat have been modified due to Project refinements. Therefore only Project activity interactions with this VC that were originally rated as a “2” and that will be changed as a result of the Project refinements, are listed in Table 6.7-1. Only those interactions that have been modified by Project refinements have been moved forward for evaluation of the effects assessment conclusions as presented in the Project Proposal.

Table 6.7-1: Potential Project Refinement Interactions with Fish and Fish Habitat

Project Activities and Physical Works	Potential Environmental Effects	
	Changes in Fish Habitat Availability	Change in Fish Mortality Risk
Construction		
Site clearing and grubbing		✓
Construction of mine site infrastructure		✓
Site water-management (diversions and runoff)		✓
Operations		
No Project-environment interactions ranked as 2 for fish and fish habitat		
Closure and Reclamation		
Reclamation		✓
Heap leach facility		✓
Pit lake		✓
On-going water treatment and discharge		✓

NOTE:

Project Environmental Effects

Only Project-Environment interactions ranked as "2" in Table 6.3-1, the Project-Environment Interaction Table, are carried forward to this Table.

✓ Indicates that an activity is likely to contribute to the environmental effect.

In the Project Proposal, potential effects were assessed using multiple characterization criteria including, Direction, Magnitude, Geographical Extent, Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence. Of these criteria, the Project refinements may alter only the magnitude of potential effects as follows:

Magnitude:

- Potential for increased concentrations of contaminants from mine operations due to expanded facilities

The criteria of Direction, Geographical Extent, Timing and Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence will not be modified via Project refinements and are therefore not discussed further.

With respect to potential effects of Project refinements on changes in fish access to habitat, none will result in an increase to the HADDs or a change in food or nutrient concentrations as predicted in the Project Proposal. This is based on the following rationale:

- HADDs and food and nutrient concentration impacts are based on the areal extent of disturbance to watercourses by construction of infrastructure.
- Modification of the DGDC does not result in changes to the areal extent of fish habitat or change in access of fish to habitat.

- Expansion of Project facilities (HLF, WRSAs and Open Pit) does not result in changes to the areal extent of fish habitat or change in access of fish to habitat.
- Relocated site roads (Explosives Facility, HLF) do not cross fish bearing watercourses and therefore do not result in changes to the areal extent of fish habitat or change in access of fish to habitat.
- Project refinements will not result in changes to base flows in Haggart Creek below thresholds as predicted in the Project Proposal; the diversion of Dublin Gulch stream flow into Eagle Creek will not change as a result of the Project refinements. Therefore this potential effect pathway remains unchanged as assessed in the Project Proposal.

With respect to potential effects of Project refinements on fish mortality risk, the Project refinements potentially alter the interactions of specific Project activities such as water treatment and discharge of treated effluent. The primary discussion around Project Refinement effects to water quality is included in the Water Quality and Aquatic Biota assessment evaluation (Section 6.5). To avoid redundancy, this discussion has not been repeated here. As they relate to fish, water quality issues are considered in relation to established targets for aquatic species. All water flowing into fish-bearing streams during construction, operations, and reclamation, whether flowing from the mine treatment facility during operations or from the passive treatment system post closure, will either:

- Adhere to water quality parameter limits as set out in the Canadian Water Quality Guidelines for the Protection of Aquatic Life, or
- Meet site-specific water quality objectives that reflect background levels of specific metal concentrations.

The modifications to the magnitude of predicted effects to Fish and Fish Habitat as a result of the Project refinements are negligible due to no change in areal extent of direct loss of fish habitat and no change to predicted effects to water quality. Consistent with the conclusions of the Project Proposal the magnitude of effects is rated as low.

Therefore none of the above criteria for the characterization of potential environmental effects will be modified to the extent that it will impact the conclusions of the Project Proposal with respect to Fish and Fish Habitat.

6.7.3 Evaluation of Project Refinements on Project Mitigation and Residual Effects to Fish and Fish Habitat

Mitigation measures to minimize or avoid effects on the availability of fish habitat are provided in subsection 6.7.2.8 and Table 6.7-6 of the Project Proposal. Mitigation measures to prevent adverse effects to a potential change in contaminant concentrations that could impact fish habitat availability or mortality risk were provided in the Water Quality and Aquatic Biota assessment in the Project Proposal. As discussed in Section 6.5 of this report, mitigation measures to protect water quality have not changed as a result of Project refinements.

The primary mitigation measure for effects to fish habitat is the Fish Habitat Compensation plan which includes the commitment by VIT to construct fish habitat to increase overall productivity of the watershed while off setting habitat losses as the result of mine infrastructure construction and water

diversions. The conceptual Fish Habitat Compensation Plan (FHCP) is provided as Appendix 23 of the Project Proposal. The FHCP has not been revised because the Project refinements do not result in any increase to the HADDs of fish habitat. However, a detailed FHCP that includes detailed engineering design of the conceptual compensation plan will be submitted to DFO as required for authorization to construct the Project required under the Fisheries Act.

As stated in the preceding section, Project refinements do not increase the level of interactions between Project activities and fish habitat availability due to the lack of increase of HADDs to fish habitat or decreased base flows for Haggart Creek.

As stated in this evaluation, there is potential for a change to the interaction between Project activities and water quality which could in turn increase fish mortality risk. The evaluation of the Project refinements determined that none of the mitigation measures, effects monitoring or commitments in the Project Proposal for Fish and Fish Habitat, require modification as a result of the Project refinements. Therefore it is concluded that potential effects on changes in fish mortality risk are predicted to be adverse or neutral, negligible to low in magnitude, site-specific or local in geographic extent, short- or medium-term in duration, occur only once and reversible, all of which is consistent with the characterization of effects from the Project Proposal.

6.7.4 Evaluation of Project Refinements on the Significance of the Project's Residual Effects to Fish and Fish Habitat

The Project Proposal concluded that the residual effects of the Project are predicted to be not significant, after mitigation and compensation measures are implemented. This conclusion is based on Project design and, the use of proven mitigation measures and construction of fish habitat compensation area where habitat loss cannot be avoided.

The potential effect of effluent discharges during operations (in the event discharge is necessary) or post closure on sediment quality, aquatic biota and water quality is relevant to Fish / Egg Mortality risk. The change in Fish or Egg mortality risk due to water quality issues was found to be not significant given the mitigation measures applied.

Given the Project refinements do not require additional mitigation measures or change the conclusions of residual effects, the evaluation has determined that the Project refinements do not change the significance rating prediction - namely that the adverse changes from the Project to fish habitat availability or fish mortality risk will not be significant. Therefore, VIT concludes that the Project refinements do not change the significance rating of the Project's effect on fish and fish habitat.

6.7.5 Evaluation of Project Refinements on the Project's Contribution to Cumulative Effects on Fish and Fish Habitat

The Project Proposal concluded that the residual effects of the Project are predicted to be not significant, after mitigation and compensation measures are implemented. This conclusion is based on Project design and, the use of proven mitigation measures and construction of fish habitat compensation area where habitat loss cannot be avoided.

The potential effect of effluent discharges during operations (in the event discharge is necessary) or post closure on sediment quality, aquatic biota and water quality is relevant to Fish / Egg Mortality risk. The change in Fish or Egg mortality risk due to water quality issues was found to be not significant given the mitigation measures applied.

Given the Project refinements do not require additional mitigation measures or change the conclusions of residual effects, the evaluation has determined that the Project refinements do not change the significance rating prediction - namely that the adverse changes from the Project to fish habitat availability or fish mortality risk will not be significant. Therefore, VIT concludes that the Project refinements do not change the significance rating of the Project's effect on fish and fish habitat.

6.8 VEGETATION RESOURCES

6.8.1 Predicted Potential Effects from the Project

The key issue for vegetation is the sustainability of ecosystems and plants in the Project footprint and vicinity. The potential environmental effects that may result from interactions of the Project with vegetation were identified in the Project Proposal as:

- Vegetation loss due to the direct effects of clearing and grubbing of land associated with Project activities
- Changes in abiotic conditions necessary for the sustainability of existing communities or vegetation development due to effects such as ground disturbance (i.e. changes in soil compaction, alteration of texture), changes in drainage patterns, and dust suppression
- Changes in the structure and/or composition of vegetation communities due to the direct effects of clearing or alteration of the underlying soil resources or due to a variety of indirect effects in area adjacent to Project disturbance (i.e. invasive species).

The Project activities that have the potential to interact with vegetation are provided in Table 6.8-4 of the Project Proposal. Project activities and physical works that may result in a significant environmental effect to vegetation resources from the Project (those ranked "2" in Table 6.3-1) and that were assessed in the Project Proposal include:

Construction Phase

- Mine site clearing and grubbing
- Access road upgrades
- Clearing of transmission line RoW

Operations Phase

- Open pit mining
- Ore processing (crushing and hauling dust deposition)

For the purposes of the vegetation assessment the Project Proposal assumed that all areas within the clearing boundary of the mine site would be cleared and grubbed. The LAA for vegetation

includes the Dublin Gulch watershed and several smaller sub-watersheds as well as a 50m buffer to either side of the transmission line and access road.

The Project Proposal assessment considered the effects of the Project on five measurable vegetation parameters - rare plants, wetlands, riparian areas, old forest, and traditional use plants.

The approach to assessment of the Project's effects on vegetation was both quantitative and qualitative. As a result, the criteria for assessing characterization of effects were not used until the assessment of residual effects and their significance. One of two approaches was used to measure (quantify) the direct effects of Project activities on vegetation. In the case of rare plants, the number of plants or populations affected was measured against the total number known at baseline. For wetlands, riparian and old forest, effects were characterized in terms of the spatial extent (in hectares) of the change due to the Project. These changes were determined from the Project-specific ecosystem mapping. The condition of each of the key indicators at baseline was compared spatially with their condition in the Maximum Disturbance and Post-closure scenarios.

In the case of rare plants, the Project Proposal determined that there was only one rare plant species and only one population of island purslane (*Koenigia islandica*) in the LAA. As this population was outside the Project footprint and would not be subject to disturbance from clearing activities, it was concluded that there would be no effect or residual effect to known occurrences of rare plants. Given the population of island purslane is at some distance from and does not overlap with the physical works and activities of the Project, the evaluation determined that there will be no interaction between the Project refinements and the sole rare plant population identified in the LAA. The assessment was not carried further in the Project Proposal and consequently, the evaluation of changes to effects on rare plants as a result of Project refinements is not carried forward in this SIR.

6.8.1.1 Changes to Vegetation Loss

Wetland Ecosystems

The environmental effect of the Project on wetland ecosystems was assessed with a spatial analysis that overlaid the Project footprint and the LAA boundary on the Terrestrial ecosystem map (TEM). An area summary of the wetland ecosystems intersected by Project footprint was generated and summarized for both the baseline and maximum disturbance scenarios. Wetland ecosystems include: black spruce-sphagnum, sedge fen, marsh, open water, and willow-sedge.

The Project Proposal determined that where clearing and grubbing associated with the Project footprint overlaps directly with wetland ecosystems, direct loss of wetlands is predicted to occur during the maximum disturbance scenario. Indirect effects on wetland ecosystems may occur at the edge of the Project footprint. The wetland disturbed by the Project, inclusive of the transmission RoW was calculated to be very small (0.01 ha) - so small it may not be measurable. The Project refinements will make a minor alteration to the transmission line RoW therefore the conclusions of potential effects to wetlands are unchanged.

Riparian Ecosystems

The method for assessing the environmental effect of the Project on riparian areas was similar to that used for wetland ecosystems. The Project Proposal determined that where the Project footprint overlaps with riparian areas, it is assumed that direct loss will occur. Indirect effects to riparian areas may occur along the edge of the Project footprint. At maximum disturbance, the Project will affect 20.2 ha of total riparian area, which is less than 1% of the total riparian area in the RAA.

Old Forest

The method for assessing the environmental effect of the Project on old forest was similar to that used for wetland ecosystems. The Project Proposal determined that where the Project footprint overlaps directly with old forest, it is assumed that direct loss will occur. Indirect effects to old forest may occur along the edge of the Project footprint.

Traditional Use Plants

With respect to traditional berry sites, no specific berry harvesting areas were identified within the mine site area during the FNNND traditional knowledge and use study, and many participants in the study indicated that the mine site "is already so disturbed by past mining activities that they cannot use it for berry picking". Nevertheless, approximately 7.6 ha and 30.8 ha of the high and moderate traditional use berry sites, respectively, will be lost at post-closure – both of which represent a loss of <1% of these classes in the RAA compared to baseline.

6.8.1.2 Changes in Abiotic Conditions

The three activities that have the potential to interact with abiotic conditions are mine site clearing and grubbing, access road upgrades, and clearing of the transmission line Right-of-Way.

Abiotic conditions are non-living components of the environment such as soil or hydrology that affect living organisms and, when affected by Project activities, can indirectly affect vegetation outside the maximum disturbance footprint identified for direct effects. While construction of the WRSAs and HLF will change abiotic conditions in the mine site during the operations phase, the Project Proposal determined that there are few wetlands in the LAA in the vicinity of the mine site and measurable effects to wetlands located outside the footprint as a result of the mine construction and operations are not expected.

As the increase to the Project footprint resulting from the Project refinements is modest, immediately adjacent to the original footprint described by the Project Proposal and not in an area where measurable effects from the Project were expected, evaluation of changes in abiotic conditions was not carried further.

6.8.1.3 Changes to Vegetation Community Structure and Composition

The three activities that have the potential to interact with changes to vegetation community structure and composition conditions are clearing and grubbing for Project facilities, access road upgrades, and clearing of the transmission line RoW.

The assessment of potential effects from changes to vegetation community structure and composition was conducted on three relevant parameters - wetland and riparian ecosystems and ecosystems with high potential for traditional plant use.

There is some potential for changes in the structure and composition of wetland and riparian ecosystems to occur during the construction and operations phases. Best management practices, in concert with environmental management measures, are expected to effectively limit the potential change to the structure and compositions of wetlands, except for a small area along the RoW. In this area, clearing of trees could have a positive effect on traditional use berry production areas (i.e. increased light due to tree removal). Management of invasive species has been identified as a key mitigation measure.

The Project Proposal assessment of changes to ecosystem structure or composition was quantitative. In each case, the maximum disturbance scenario described a total loss of the vegetation community at zero to less than 0.01% ha in the Mine footprint. Tables 6.8-12, 6.8-13, and 6.8-14 in the Project Proposal, indicated a total loss of wetlands of 0.1 ha at the Project mine site, and a total loss of zero ha for loss of riparian and of berry production areas at the Project mine site.

Given that the Project refinements do not change either the transmission RoW or the access road and they increase the Project mine footprint only negligibly, evaluation of the Project refinements on changes to vegetation community structure and composition was not carried forward in the SIR.

6.8.2 Evaluation of interactions between Project Refinements and Vegetation

The Project activities that have the potential to interact with vegetation resources are provided in Table 6.8-1. Not all Project activities that interact with vegetation have been modified due to Project refinements. Therefore only Project activity interactions with this VC that were originally rated as a “2” and that will be changed as a result of the Project refinements, have been moved forward for evaluation of the effects assessment conclusions as presented in the Project Proposal.

As the Project Proposal assumed all lands within the Project footprint would be disturbed, the evaluation of the Project refinements is limited to the proposed physical works and activities outside of the original footprint assessed in the Project Proposal. Those physical works consist of an additional site road to the HLF, the revised location for a site road to the explosives facility, the new location of the explosives factory and magazine and expanded footprints of the open pit, HLF and WRSAs. The only activity during the Construction Phase that was ranked “2”, as having the potential to result in an environmental effect of concern, and that has changed as a result of a Project Refinement, is site clearing and grubbing. Project activities during the Operations Phase that have changed as a result of the Project refinements and that are ranked as a “2” include open-pit mining and ore processing. These three activities have been moved forward for evaluation and are presented in Table 6.8-1.

Table 6.8-1: Potential Project Refinement Interactions with Vegetation Resources

Project Activities and Physical Works	Potential Environmental Effects		
	Loss of Vegetation	Changes in Abiotic Conditions	Change in Structure and/or composition of vegetation communities
Construction Phase			
Site clearing and grubbing	✓	✓	✓
Operations and Modification Phase			
Open-pit mining (blasting, ore/waste hauling, open pit dewatering)		✓	
Ore processing (crushing and hauling)		✓	

Project Environmental Effects

Only Project-Environment interactions ranked as "2" in Table 6.3-1, the Project-Environment Interaction Table, are carried forward to this Table.

✓ Indicates that an activity is likely to contribute to the environmental effect.

Potential residual effects were quantitatively and qualitatively assessed In the Project Proposal using a combination of surveys, multiple characterization criteria including, Direction, Magnitude, Geographical Extent, Timing and Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence. Predicted Geographic Extent was quantified. Of these criteria, the Project refinements that are located outside the boundaries of the Project Proposal mine site footprint, modify the geographical extent, and duration of the effect as follows:

Geographical Extent:

- An increase to the total area of disturbed land outside of the original Project footprint during construction and operations by 23 ha (from 585 ha to 608 ha or 4%) consisting of:
  - Relocation of the Explosives Facilities and site access road to the facility
  - Additional site access road to the HLF
  - Expansion of the Open Pit
  - Expansion of the HLF
  - Expansion of the WRSAs

Duration:

- An increase in the length of time during which Project-related disturbance will result in vegetation loss

Project refinements that are outside the Project Proposal mine footprint are all located within the Vegetation LAA. The Project Refinement physical works and related activities will increase the mine footprint described in the Project Proposal by 23 ha which is approximately a 1% increase in area within the 2,153.36 ha Vegetation LAA that was assessed in the Project Proposal. Nevertheless, mine site clearing and grubbing within this area during construction is carried forward for assessment in this SIR.

The effects on vegetation will occur primarily during construction and will carry on throughout operations until reclamation has been completed. All of the operations activities will occur in areas previously cleared of vegetation during construction. Consequently, Project refinements to open pit mining and ore processing will not change the effects of the Project on vegetation during operations.

Of the three activities that have the potential to interact with abiotic conditions, access road upgrades and clearing of the transmission line Right-of-Way will not be changed by the Project refinements and are not considered further in this evaluation.

Of the three activities that have the potential to interact with changes to vegetation community structure and composition conditions, access road upgrades, and clearing of the transmission line RoW are not modified by Project refinements so are not considered further in this assessment.

6.8.3 Evaluation of Project Refinements on Project Mitigation and Residual Effects to Vegetation

Mitigation measures that are standard and those that are specific for vegetation loss, abiotic conditions and vegetation community structure and composition are described in Subsections 6.8.1.4, 6.8.2.2, 6.8.3.2 and 6.8.4.2 of the Project Proposal, respectively. The key mitigation for vegetation loss will be reclamation. The objectives and methods to achieve post-closure reclamation are provided in the Preliminary Closure and Reclamation Plan (Appendix 24 to the Project Proposal). These objectives and methods will not need to be changed as a result of the Project refinements. The scale of the areas affected by this plan will be changed to match the changes to the volumes of soil and water that will be disturbed as a result of the Project refinements. Given that the Preliminary Closure and Reclamation Plan is conceptual and will need refinement from time to time to ensure its objectives are met, no changes to mitigation measures are required for the Project refinements.

The residual effects of the Project on vegetation loss, abiotic conditions and on vegetation community structure and composition are provided in Subsections 6.8.2.3, 6.8.3.3 and 6.8.4.3 of the Project Proposal. In each case, the Project Proposal determined that the effects, with mitigation measures, would not be significant on vegetation. The Project refinements do not change this conclusion. The area of vegetation that is represented by the Project refinements is small in the context of the vegetation LAA (approximately 1% change). At the greatest extent of disturbance during operations, this increased area will be negligible. At the end of reclamation, the area of vegetation affected will be equivalent to the area identified in the Project Proposal.

As a result, modification to the criteria for characterization of the effects as a result of the Project refinements, is minimal. Evaluation of the Project refinements indicates that the magnitude remains negligible to low (i.e. from no effects occur to effect occurs but might or might not be detectable, and does not comprise ecological economic or social/cultural values), the geographic extent remains local and confined to the LAA, and the duration remains permanent (far future). Therefore, it is anticipated that none of the above criteria for the characterization of potential effects will be modified to the extent that it will impact the conclusions of the Project Proposal.

The evaluation therefore determines that the Project refinements do not change either the mitigation measures or the residual effects of the Project on vegetation community structure or composition. The results of the evaluations on each of the environmental effects follow.

Changes to Vegetation Loss

As the wetlands disturbed by the Project was calculated to be very small (0.01 ha), the Project Proposal considered the Project-related loss to wetlands along the road re-alignment and in the mine site footprint to be permanent but small. Mitigation included buffering and avoidance of wetlands wherever possible. As a consequence, the Project Proposal determined that, with mitigation, effectively no wetland loss is anticipated during construction and operations. At post-closure a very small area of wetlands will be irreversibly lost as a result of construction of the permanent access road upgrades. Including reclamation, the effect of wetland loss is expected to be negative in direction, negligible in magnitude, local in extent, permanent, and irreversible. However, the very small magnitude of the loss will not affect the sustainability of wetlands in the RAA in the future.

The primary mitigation for ecosystems that support riparian, traditional use plants and forested areas is reclamation. At maximum disturbance, the Project will affect 20.2 ha of total riparian area (<1% of total riparian area in the RAA). Following de-commissioning, reclamation will result in an overall increase of about 9 ha (<1%) in the amount of riparian ecosystems within the RAA.

With respect to traditional berry sites, no specific berry harvesting areas were identified within the mine site area during the FNNND traditional knowledge and use study and many participants in the study indicated that the mine site “is already so disturbed by past mining activities that they cannot use it for berry picking”. Nevertheless, approximately 7.6 ha and 30.8 ha of the high and moderate traditional use berry sites, respectively, will be lost at post-closure – both of which represent a loss of <1% of these classes in the RAA compared to baseline. Following implementation of mitigation measures, the residual effect of the Project on traditional use berry sites ranked as having a high and moderate potential, is expected to be negative in direction, negligible in magnitude, local in extent, permanent and reversible.

There will be a residual loss of 90.8 ha of old forest as a result of the Project (7.3% of the old growth present in the RAA at baseline). The residual effect is negative in direction, occurs once, is local in extent, permanent in duration and is only reversible in the far-future (>140 years). The loss is low in magnitude and within the range of natural variability in boreal forest ecosystems.

Overall, the Project Proposal determined that the residual effect of vegetation loss is not considered a threat to the sustainability of the resource or indicators in the region. As the increase in the geographic extent of the Project refinements is negligible, it is not anticipated that any of the characterizations of Project effects on vegetation loss will be changed by the Project refinements.

Based on the criteria and definitions used to characterize residual environmental effects on vegetation in Section 6.8-6 of the Project Proposal, a summary of the conclusions of the assessment of vegetation loss on each of the measurable parameters, is provided in Table 6.8-2.

Table 6.8-2: Residual Effects of the Project on Vegetation and Changes as a Result of the Project Refinements

Criteria for Residual Effects from Vegetation Loss	Parameters	Characterization of Effect: Project Proposal	Change to Characterization of Residual Effect as a Result of Project refinements
Direction	Wetlands	Negative (loss is so small it may not be measurable)	No change
	Riparian	positive	No change
	Berry Sites	negative	No change
	Old Forests	negative	No change
Magnitude	Wetlands	negligible	No change Effect on one or more of the measurable parameters is detectable, but within range of natural variation or baseline values, no change in soil reclamation suitability class
	Riparian	negligible	No change Effect on one or more of the measurable parameters is detectable, but within range of natural variation or baseline values, no change in soil reclamation suitability class
	Berry Sites	negligible	No change Effect on one or more of the measurable parameters is detectable, but within range of natural variation or baseline values, no change in soil reclamation suitability class
	Old Forests	low	No change Effect occurs but might /might not be detectable and does not comprise ecological, economic or social/cultural values
Geographic extent	Wetlands	local	No change– is within Vegetation LAA
	Riparian	local	No change– is within Vegetation LAA
	Berry Sites	local	No change– is within Vegetation LAA
	Old Forests	local	No change– is within Vegetation LAA
Timing & Frequency	Wetlands	once	No change - ‘once’ is applied to all clearing and grubbing activities)

Criteria for Residual Effects from Vegetation Loss	Parameters	Characterization of Effect: Project Proposal	Change to Characterization of Residual Effect as a Result of Project refinements
	Riparian	once	No change - 'once' is applied to all clearing and grubbing activities)
	Berry Sites	once	No change - 'once' is applied to all clearing and grubbing activities)
	Old Forests	once	No change - 'once' is applied to all clearing and grubbing activities)
Duration	Wetlands	permanent	No change – effect extends >25 years beyond the life of the Project
	Riparian	permanent	No change – effect extends 20 to 25 years
	Berry Sites	permanent	No change – effect extends >25 years beyond the life of the Project
	Old Forests	permanent	No change – effect extends >25 years beyond the life of the Project
Reversibility	Wetlands	irreversible	No change
	Riparian	reversible	No change Effect will reverse over time with application of mitigation measures. Reclamation objectives and methods will not change as a result of the Project refinements
	Berry Sites	reversible	No change Effect will reverse over time with application of mitigation measures. Reclamation objectives and methods will not change as a result of the Project refinements
	Old Forests	Only reversible in far future	No change Effect will reverse over time with application of mitigation measures. Reclamation objectives and methods will not change as a result of the Project refinements
Ecological Context	All parameters except rare plants which will be undisturbed	Disturbed	No change Existing human-caused ground disturbances within LAA
Probability of occurrence	all	High	No change Effect likely to occur
Significance of	all	Residual loss of for	No change to significance of effects on

Criteria for Residual Effects from Vegetation Loss	Parameters	Characterization of Effect: Project Proposal	Change to Characterization of Residual Effect as a Result of Project refinements
residual effects		all indicators was determined to be not significant Residual effect on Vegetation Loss is Not significant	individual indicators or on Vegetation Loss

Changes in Abiotic Conditions

The Project Proposal determined that in addition to the standard mitigation measures, in general, mitigation measures (identified in Section 6.8.3.2 of the Project Proposal) that minimize the loss of vegetation are also applicable to the mitigation of changes to abiotic conditions. The potential effect of changes to abiotic conditions to the three relevant parameters (wetland and riparian ecosystems and ecosystems with high potential for traditional plant use) was as follows:

Wetland ecosystems: given that there are few wetlands in the LAA in the vicinity of the mine site and measurable effects to wetlands located outside the footprint as a result of the mine construction and operations are not expected, the Project Proposal predicted that there would be no residual effects to wetland ecosystems as a result of the changes to abiotic conditions.

Riparian Ecosystems: soil moisture may be reduced in the upper reaches of Olive, Bawn Boy and Cascallen Gulches where riparian ecosystems are narrow and defined by the landscape. This was not expected to eliminate the riparian area because the sites are located in the moisture receiving portion of the landscape and standard mitigation measures and best management practices are expected to address potential effects. Accordingly, the Project Proposal predicted that residual effects on soil moisture is negligible to low in magnitude, local in extent, and reversible.

Ecosystems with High Potential for Traditional Plant Use: arsenic concentrations are predicted to increase in soil resources but no lands in the high or moderate ranked traditional use berry potential class are affected by this loading, and presence of increased levels in the soil does not translate proportionately to levels of arsenic in plant tissue. The Project Proposal concluded that it is unlikely that there would be a significant increase in arsenic exposure for either humans or wildlife in the LAA, given the limited areas of potential arsenic deposition, and the conservatism built into the modeling. However, soil and vegetation monitoring for metals loading will be undertaken during all phases of the Project. The residual effects to the sites ranked with moderate traditional berry use potential as a result of arsenic loading are considered to be negative, negligible in magnitude, frequent in occurrence, far future in extent and irreversible. The probability of occurrence is moderate. No residual regional effect to high and moderate ranked lands, based on metals loading, is predicted for the RAA.

Overall, the Project Proposal determined that the residual effect of changes to abiotic conditions, including increases in arsenic loading, in relation to loss of high and moderate traditional use berry sites is small in area, in the context of the amount of land ranked with high and moderate potential in the RAA at baseline. The losses represent less than 1% of the high potential class and 1.7% of the moderate potential class compared to baseline conditions. As no new activities are being introduced by the Project refinements and the geographic extent of the Project refinements is negligible, it is not anticipated that any of the characterizations of Project effects on changes to abiotic conditions will be changed by the Project refinements.

Changes to Vegetation Community Structure and Composition

The Project Proposal concluded that the residual effect to wetland ecosystems, even with inclusion of the transmission RoW, is expected to be neutral, negligible in magnitude, local in extent, and reversible over time. The transmission RoW is not modified by Project refinements.

With respect to riparian ecosystem structure and composition, mitigation measures such as retention of vegetated buffers between disturbances and riparian areas will minimize changes to structure and composition of riparian ecosystems. At post-closure, the structure of the riparian area affected by construction and operations is expected to return to pre-disturbance conditions. With environmental protection and mitigation measures, the Project Proposal concluded that the residual changes to riparian ecosystems due to change in stand structure or composition is expected to be neutral, negligible in magnitude, local in extent and reversible.

Berry production is dependent on several factors ranging from physical site characteristics, annual weather conditions to light availability. Clearing of trees during construction will alter the structure of forested ecosystems, resulting in conversion to early seral shrub-herb communities. Until trees can re-establish on all ecosystems with potential to develop forest structure in the post-closure phase, application of best management practices and the Invasive Plant Management Plan are intended to eliminate any Project-related spread of invasive species into the local plant communities beyond existing areas of disturbance. Assuming application of the prescribed mitigation measures, the area change in high and moderate berry potential classes is expected to be neutral in direction and negligible in magnitude, local in extent and reversible following closure.

As the increase to the geographic area as a result of the Project refinements is negligible (4%), and as the area of vegetation affected by the Project refinements at the end of reclamation will be equivalent to the area identified in the Project Proposal, VIT has concluded that the Project refinements do not change either the proposed mitigation measures or the residual effects of the Project on vegetation community structure or composition.

6.8.4 Evaluation of Project Refinements on the Significance of the Project's Residual Effects to Vegetation

For each of the vegetation measureable parameters assessed, the Project Proposal concluded that, with implementation of mitigation measures, there would be no residual effects on vegetation.

In the absence of well-defined criteria or thresholds, a qualitative approach was adopted based on characterization of effects and professional judgment, to the determination of significance of effects on vegetation resources. That approach entailed consideration of the residual environmental effect in

the context of the sustainability of the key indicator within an appropriate ecological context. If the sustainability of the existence or ecological function of key vegetation indicators is not threatened by the Project in the RAA, then the residual effect is determined to be not significant. The Project Proposal concluded that: the residual effect of vegetation loss is not considered a threat to the sustainability of the resource or indicators in the region.

- The residual effect of vegetation loss is not considered a threat to the sustainability of the resource or indicators in the region.
- indirect changes to abiotic conditions beyond the Project footprint as a result of Project activities were not significant on vegetation resources
- The potential effect of changes to structure and composition for the indicators selected to assess this effect were determined to be not significant, leading to the conclusion that Project-related effects to ecosystem structure and composition are not significant on vegetation resources.

In summary, the Project Proposal determined that the Project's effects on vegetation resources for all indicators was not significant and therefore concluded, with a high level of confidence, that the residual effects on vegetation would be not significant.

As the Project refinements do not change the characterization of the Project's effects on vegetation, it is concluded that the significance conclusions in the Project Proposal that the Project did not have a significant effect on vegetation, are unchanged by the Project refinements.

6.8.5 Evaluation of Project Refinements on the Project's Contribution to Cumulative Effects to Vegetation

The Project Proposal identified placer mining as the one future activity that may interact with Project-related effects to vegetation resources in the RAA. As the Project's effects on vegetation are not expected to measurably change the health or sustainability of any of the vegetation key indicators and there are no residual effects on vegetation that are expected to interact with placer mining, the Project Proposal concluded that there were no predicted cumulative effects from the Project on vegetation. As the Project refinements do not change the residual effects or the interaction with placer mining, they do not change the cumulative effects prediction reached in the Project Proposal that there are no predicted cumulative effects from the Project on vegetation.

6.9 WILDLIFE RESOURCES

6.9.1 Predicted Potential Effects from the Project

The key issues identified in the Project Proposal for wildlife are:

- Compliance with *Migratory Birds Convention Act* and the Yukon *Wildlife Act* with respect to the destruction of nests and nesting birds
- Management of species at risk, consistent with the requirements of the *Species at Risk Act*
- Management of species important to the FNNND

The assessment focused on potential high risk interactions between the Project and wildlife that could result in significant effects (i.e. potential interactions that scored a "2" as identified in Table 6.3-1 in the Project Proposal and Table 6.3-1 in this SIR). Low risk interactions were not carried forward in the assessment.

The potential environmental effects identified in the Project Proposal that could occur from the Project's interaction with wildlife are: changes to wildlife habitat, changes to wildlife mortality and changes to wildlife movement patterns. Potential interactions between Project activities and wildlife include as described in the Project Proposal include the following:

- Site clearing and grubbing
- Site grading including blasting, overburden removal and overburden disposal
- Borrow areas development and use
- Access road upgrades
- Camp construction
- Diesel power generation (construction)
- Use of large construction vehicles and equipment
- Construction of mine site infrastructure and haul roads
- Vehicular traffic (construction)
- Clearing of transmission line RoW
- Open-pit mining (blasting, ore/waste hauling, open pit dewatering)
- Ore processing (crushing and hauling)
- Heap leach facility operation
- Solid waste management
- Camp operation
- Vehicular traffic (operations)
- Access road and transmission line presence and maintenance
- Quarry/borrow pit operations
- Diesel power generation (operations)
- Fuel, hazardous materials, and explosives management

The assessment focused on five 'focal species' selected because they are of special interest and/or overlap with a broad spectrum of other wildlife species and specific high value habitats. Those species and the rationale for their selection are provided in Table 6.9-3 of the Project Proposal. The focal species include: moose, grizzly bear, American marten, olive-sided flycatcher and rusty blackbird.

Measurable parameters against which an environmental effect on wildlife could be considered were selected and are provided in Table 6.9-5 of the Project Proposal. Some parameters allowed for the quantitative assessment of the magnitude of the effects on wildlife (habitat), some were qualitative (wildlife movement) and some were both quantitative and qualitative (mortality). Once the magnitude of the effect on habitat, mortality and movement were determined, and, after consideration of mitigation measures, the residual effect on each of the focal species was determined. A determination of significance of the residual effect was made and a screening for cumulative effects was conducted.

6.9.1.1 Changes to Wildlife Habitat

The Project Proposal considered that the habitat used by the focal species consisted of wetlands, riparian areas, and old forest, and that these habitat types within the LAA would be changed by the Project activities with which they had the potential to interact. The residual effect of the changes to wildlife habitat would be adverse, probable, local, long term, and reversible. The Project Proposal concluded that these residual effects, with implementation of mitigation measures, were not significant.

6.9.1.2 Changes to Wildlife Mortality

The Project Proposal considered that Project-related changes that would affect wildlife mortality would arise from clearing of vegetation (particularly for nesting birds, if done during breeding season), bird interactions with transmission lines, vehicle collisions, hunting or poaching, lethal control of problem wildlife, or poisoning from the only toxin that was not contained – cyanide. Overall, the Project Proposal considered the Project effects on the risk of wildlife mortality to be adverse, of moderate magnitude, local, and long term. With mitigation commitments, the Project was not expected to pose a substantial mortality risk for wildlife and effects on mortality were considered not significant.

6.9.1.3 Changes to Wildlife Movement

The Project Proposal identified that traffic levels and the presence of roads would be the key activities that would affect changes to wildlife movement. Section 6.9.4.1 of the Project Proposal provides mitigation measures and residual effects on changes to movement for each of the focal species on which road traffic might have an effect. It concluded that Project effects on wildlife movement patterns are expected to be adverse, low magnitude, local, frequent and long-term. Given that mine site related disturbance and traffic will decline at closure, the effect would be low magnitude and reversible.

6.9.2 Evaluation of interactions between Project Refinements and Wildlife

The Project refinements introduce some new physical works and change the location of some physical works within the Project Proposal mine footprint. The Project refinements also expand physical works that were wholly within the Project Proposal mine site footprint and introduce new physical works within the Project mine site footprint. The Project activities that have the potential to interact with wildlife resources are provided in Table 6.9-1. Not all Project activities that interact with

wildlife have been modified due to Project refinements. Therefore only Project activity interactions with this VC that were originally rated as a "2" and that will be changed as a result of the Project refinements, have been moved forward for evaluation of the effects assessment conclusions as presented in the Project Proposal.

Table 6.9-1 Potential Project Refinement Interaction with Wildlife Resources

Project Activities and Physical Works changed by Project Refinements	Potential Environmental Effects		
	Habitat	Mortality	Movement
Site clearing and grubbing	✓	✓	✓
Site grading including blasting, overburden removal and overburden disposal	✓	✓	✓
Camp construction (construction and operations camps)	✓	✓	
Diesel power generation (1 – 2 megawatts)	✓	✓	✓
Use of large construction vehicles and equipment		✓	✓
Construction of mine site infrastructure and access roads	✓	✓	
Vehicular traffic	✓	✓	✓
Operations			
Open-pit mining (blasting, ore/waste hauling, open pit dewatering)	✓		✓
Ore processing (crushing and hauling)	✓		
Gold heap leach facility operation	✓	✓	
Solid waste management		✓	
Camp operation	✓		
Diesel power generation	✓		✓

The Project Proposal assumed that all of the land within the clearing boundary of the Project footprint would be disturbed (cleared and stripped) and natural habitat removed. As a consequence, only the Project refinements located outside the footprint assessed in the Project Proposal are evaluated.

The physical works that are outside the Project Proposal mine footprint via refinements include: the site road to the HLF, the expanded HLF footprint, the expanded Eagle Pup WRSA footprint, the expanded open pit footprint, the expanded Platinum Gulch WRSA footprint, the site road to the explosives facilities, the relocated explosives storage facility and magazine. Project refinements increase the total mine footprint from 585 ha to 608 ha, a total increase of 23 ha (4%).

In the Project Proposal, potential effects were assessed using multiple characterization criteria including: Direction, Magnitude, Geographical Extent, Timing and Frequency, Duration, Reversibility, Ecological Context and Probability of Occurrence. Of these criteria, the Project refinements modify the magnitude, geographical extent, frequency and duration of the Project's potential effects as follows:

Geographical Extent:

- An increase to the total area of disturbed land outside of the original Project footprint during construction and operations by 23 ha (from 585 ha to 608 ha or 4%) consisting of:
  - Relocation of the Explosives Facilities and site access road to the facility
  - Additional site access road to the HLF
  - Expansion of the Open Pit
  - Expansion of the HLF
  - Expansion of the WRSAs

Frequency

- An increase of traffic volume during operations which may increase levels of wildlife mortality and have an adverse effect on wildlife movement

Duration

- An increase in the length of time wildlife habitat will be disturbed and risk of increased wildlife mortality may occur

Although the above criteria are slightly modified by the Project refinements, all Project activities that have been changed by the Project refinements are within the LAA for wildlife. The LAA for wildlife consists of an area of approximately 115 km^2 that encompasses the locations for the proposed Project refinements (see Figures 6.9-1 through 6.9-5 in the Project Proposal). As such, Project-related activities within the LAA during Operations have been assessed for changes to wildlife habitat, mortality, and movement patterns. The Project refinements do not introduce new activities and do not change the wildlife LAA that was assessed in the Project Proposal.

The modifications to the above criteria as a result of the Project refinements are not anticipated to modify the characterization of potential environmental effects on wildlife to the extent that it would impact the conclusions of the Project Proposal. The rationale for this conclusion is based on the following:

- The LAA for wildlife consists of an area of approximately 115 km^2 that encompasses the locations for the proposed Project refinements (see Figures 6.9-1 through 6.9-5 in the Project Proposal). As such, Project-related activities within the LAA during Operations have been assessed generally for changes wildlife habitat, mortality and movement patterns. Based on the mapping conducted in support of the Project Proposal and described in Figures 6.9-2 to 6.9-5 of the Project Proposal:
  - moose winter shelter habitat is moderate to moderately high
  - moose winter feeding habitat suitability is low
  - grizzly bear spring feeding habitat is very low
  - grizzly bear fall feeding habitat availability is very low
- The Project refinements expand the mine footprint from 585 ha to 608 ha, which represents an increase of 23 ha or 0.0156% of disturbed habitat, much of which will be reclaimed by the

end of closure. In terms of habitat availability, this increase is minimal with respect to the LAA and RAA.

- The Project refinements do not include new activities from those assessed in the Project Proposal (e.g. no new mining method, no new transportation method such as aerodrome, no new ore processing method etc.), therefore there no new mitigation measures required to prevent adverse effects or commitments that were provided in the Project Proposal for protection of wildlife resources.
- The Project will result in an increase in linear density of 0.006 km/km^2, inclusive of the South McQuesten-Haggart Creek access road and the transmission corridor. The increase in linear density as a result of the road connecting the relocated explosives facility in the Project refinements will be reduced by the removal of the road to the explosives facility in the Project Proposal. While the two new roads in the Project refinements may increase linear density, the resulting linear density will be well below the 0.6 km/km^2 threshold considered significant for Grizzly Bear.
- The Project refinements will increase traffic volume which may in turn increase the risk to wildlife mortality. Previously, it was assumed that truck loads would equal approximately 1,944 round trips per year (or 5.4 per day), the Project refinements estimate 2,200 round trips per year (or 6.1 per day) for a total of a 12% increase in traffic volume on the access road. While the magnitude of the potential effect to wildlife mortality and movement is increased by this additional volume, it is not necessary to modify the mitigation measures to reduce or prevent wildlife /traffic collisions. Traffic volumes remain low therefore increased traffic from the Project is not expected to prohibit wildlife from crossing the access road and the effect on wildlife mortality is considered low, site specific, rare, reversible and improbable.

6.9.3 Evaluation of the Project Refinements on Project Mitigation and Residual Effects to Wildlife

The Project Proposal identified two types of commitments to address potential effects on wildlife: mitigation measures and effects monitoring. The Project Proposal describes the mitigation measures in Table 6.9-16 and summarizes effects monitoring in Section 6.9.7. These commitments are unchanged by and will apply to the Project refinements. Any adaptive management and monitoring will be adjusted to reflect the increased operations phase and change to the overall schedule.

Residual effects of changes to wildlife habitat

The Project Proposal predicted that the residual effect of changes to wildlife habitat would be adverse, probable, local, long term, and reversible. Based on the criteria and definitions used to characterize residual environmental effects on wildlife in Section 6.9-6 of the Project Proposal, a summary of the residual effects of habitat change on the focal species, and the significance of these residual effects, are provided in Table 6.9-2.

Table 6.9-2: Changes to Wildlife Habitat by Focal Species

Criteria for Residual Effect on Wildlife Habitat	Characterization of Effect: Project Proposal					Change to Characterization of Residual Effect due to Project Refinements
	Moose	Grizzly Bear	American Marten	Rusty Black-bird	Olive-sided Flycatcher	
Direction	adverse	adverse	adverse	neutral	adverse	No change to the conclusion that the direction is neutral for Rusty Blackbird or negative compared to baseline habitat or population status for the other focal species
Magnitude	net loss of habitat at closure would be 8% of winter feeding habitat and 11% of winter shelter habitat.	net loss of fall feeding habitat would be 37% of the LAA and an increase in spring feeding habitat by 21% of baseline	low	the loss of 20 ha of riparian area presents less than 1% of the area required by one nesting bird.	low	No change to the conclusion that the effect(s) are either detectable but has no measurable effect on the resource within the RAA or, as with moose and Grizzly bear, the measurable effects are unlikely to pose a risk to the sustainability of the wildlife resource within the RAA
Geographic extent	local	local	local	Site-specific	Site-specific	No change to the conclusion that the environmental effect(s) occur within the LAA or, in the case of Rusty Blackbird and Olive-sided Flycatcher, are confined to the Mine site and access road
Frequency	frequent	frequent	frequent	frequent	frequent	No change to the conclusion that the effect will occur daily
Duration	long-term	long-term	long-term	long-term	long-term	No change to the conclusion that the effect is measurable until completion of reclamation activities
Reversibility	reversible	reversible	reversible	reversible	reversible	No change to the conclusion that the effect(s) are reversible with reclamation and/or natural succession and/or decommissioning
Ecological context	disturbed	disturbed	disturbed	disturbed	disturbed	No change to the conclusion that there are existing disturbances within the LAA
Probability of occurrence	probable	probable	probable	Improbable given the small area affected	improbable	No change to the conclusion that the effect(s) are likely to occur, with the exception that the effect(s) are not likely to occur for Rusty Blackbird or the Olive-sided Flycatcher
Significance	Not significant	Not significant	Not significant	Not significant	Not significant	No change in the conclusion that net habitat loss will be well below the threshold at which reductions in wildlife habitat are considered significant

The Project Proposal concluded that the overall residual effects on wildlife as a result of changes to wildlife habitat were adverse, low, local, frequent, long-term reversible and probable. It was not considered to be significant because 98% of the RAA would remain as vegetated natural habitat. The evaluation of Project refinements did not change these conclusions, the rationale for which is more fully described at the end of this section.

Changes to Risk in Wildlife Mortality

With implementation of mitigation measures, the Project Proposal made the following determinations regarding residual effects on wildlife mortality:

- Vegetation clearing: adverse, low magnitude, site specific, rare, short-term, reversible and improbable
- Traffic-related mortality: adverse, low, site-specific, rare, long-term, reversible and improbable
- Cyanide toxicity: adverse, low in magnitude, site-specific, short-term, irreversible, rare and improbable.

The risk of additional hunting mortality would be minimized by bussing Project employees and contractors to site and restricting the presence and use of firearms on the Project site. This is unchanged by Project refinements.

The effect of the Project on mortality for each of the focal species in relation to the above noted parameters was assessed. Based on the criteria and definitions used to characterize residual environmental effects on wildlife in Section 6.9-6 of the Project Proposal, a summary of the results of that assessment are provided in Table 6.9-3.

Table 6.9-3: Changes to Wildlife Mortality by Focal Species

Criteria for Residual Effect on Wildlife Mortality	Characterization of Effect: Project Proposal					Change to Characterization of Residual Effect due to Project Refinements
	Moose	Grizzly Bear	American Marten	Rusty Blackbird	Olive-sided Flycatcher	
Residual effect	**Characterization of Effect: Project Proposal**	**Change to Characterization of Residual Effect due to Project refinements**	adverse	Neutral to adverse	Neutral to adverse	No change to the conclusion that the direction is neutral to adverse for Rusty Blackbird and Olive-sided Flycatcher, and is negative compared to baseline habitat or population status for the other focal species
Magnitude	moderate	moderate	low	low	low	No change to the conclusion that the effect(s) are either detectable but have no measurable effect on the resource within the RAA for Rusty Blackbird and Olive-sided Flycatcher, and, for Moose and Grizzly bear, the effects are unlikely to pose a risk to the sustainability of the wildlife resource within the RAA
Geographic extent	local	local	local	Site-specific	Site-specific	No change to the conclusion that the environmental effect(s) occur within the LAA, except that in the case of Rusty Blackbird and Olive-sided Flycatcher, are confined to the Mine site and access road
Frequency	rare	rare	marten change their use behavior to avoid areas of high human use so it is expected they will avoid the mine site thereby reducing mortality risk	rare	rare	No change to the conclusion that the effect will occur monthly
Duration	long-term	long-term	long-term	short-term	short-term	No change to the conclusion that the effect is measurable until completion of reclamation activities or, in the case of Rusty Blackbird and Olive-sided Flycatcher, that the effect is measurable for less than one month
Reversibility	reversible	reversible	reversible	reversible	reversible	No change to the conclusion that the effect(s) are reversible with reclamation and/or natural succession and/or decommissioning

Criteria for Residual Effect on Wildlife Mortality	Characterization of Effect: Project Proposal					Change to Characterization of Residual Effect due to Project Refinements
	Moose	Grizzly Bear	American Marten	Rusty Blackbird	Olive-sided Flycatcher	
Ecological context	disturbed	disturbed	disturbed	disturbed	disturbed	No change to the conclusion that there are existing disturbances within the LAA – hunting is already occurring
Probability of occurrence	probable	improbable	probable	Improbable	improbable	No change to the conclusion that the effect(s) are likely to occur for Moose and American Marten but are not likely to occur for Grizzly Bear, Rusty Blackbird or Olive-sided Flycatcher
Significance	Not significant	Not significant	Not significant	Not significant	Not significant	No change in the conclusion that Project effects on wildlife mortality are not considered significant

Overall, the Project Proposal considered the Project effects on the risk of wildlife mortality to be adverse, of moderate magnitude, local, and long term. With mitigation commitments, the Project is not expected to pose a substantial mortality risk for wildlife and effects on mortality risk were considered not significant. The evaluation of Project refinements did not change these conclusions, the rationale for which is more fully described at the end of this section.

Changes to Wildlife Movement Patterns

The Project Proposal identified that traffic levels and the presence of roads would be the key activities that could affect changes to wildlife movement. Section 6.9.4.1 of the Project Proposal provides mitigation measures for and potential residual effects on changes to movement for each of the focal species that might be impacted by road traffic. It concluded that Project effects on wildlife movement patterns are expected to be adverse, low magnitude, local, frequent and long-term. Given that mine site related disturbance and traffic will decline at closure, the effect would be low magnitude and reversible.

Based on the criteria and definitions used to characterize residual environmental effects on wildlife in Section 6.9-6 of the Project Proposal, a summary of the conclusions reached in the Project Proposal in relation to each of the focal species is provided in Table 6.9-4.

Table 6.9-4: Changes to Wildlife Movement by Focal Species

Criteria for Residual Effect on Wildlife Movement	Characterization of Effect: Project Proposal			Change to Characterization of Residual Effect due to Project Refinements
	Moose	Grizzly Bear	American Marten	Change due to Project Refinements
Direction	adverse	adverse	adverse	No change to the conclusion that the direction is adverse
Magnitude	low	low	low	No change to the conclusion that the effect(s) are detectable but have no measurable effect on the resource within the RAA
Geographic extent	local	local	local	No change to the conclusion that the environmental effect(s) occur within the LAA,
Frequency	rare	rare	rare	No change to the conclusion that the effect will occur monthly except for winter when Grizzly Bear are in hibernation and the effect will not occur at all
Duration	long-term	long-term	long-term	No change to the conclusion that the effect is measurable until completion of reclamation activities
Reversibility	reversible	reversible	reversible	No change to the conclusion that the effect(s) are reversible with reclamation and/or decommissioning
Ecological context	disturbed	disturbed	disturbed	No change to the conclusion that there are existing disturbances within the LAA
Probability of occurrence	probable	probable	probable	No change to the conclusion that the effect(s) are likely to occur
Significance	Not significant	Not significant	Not significant	No change in the conclusion that Project effects on wildlife movement are not considered significant

Project effects on wildlife movement patterns were expected to be adverse, low magnitude, local, frequent and long-term. Given that mine site related disturbance and traffic will decline at closure, the low magnitude effects on movement are reversible and the residual effect is anticipated to be not significant. However, as the confidence of this prediction was moderate, monitoring was proposed both as a mitigation measure and an adaptive management measure. Monitoring and adaptive management measures will be adjusted to the longer operations phase as necessary. The evaluation of Project refinements did not change the Project Proposal residual effects conclusions in relation to wildlife movement, the rationale for which is more fully described in the following section.

An evaluation of the Project refinements concludes that modifications introduced by the Project refinements will not change the residual effects on wildlife that were identified in the Project Proposal. The rationale for this conclusion is that the Project refinements:

- are within the LAA for wildlife and the effects and potential effects related to disturbance area have therefore been assessed by the Project Proposal;
- will involve the same activities during Construction, Operations and Closure as the activities described in the Project Proposal except for their geographic extent, magnitude, frequency and duration;
- will be physically located immediately adjacent to the Project footprint described in the Project Proposal and in wildlife habitat conditions considered to be similar to those within the mine footprint and ubiquitous to the area;
- will be subject to the same mitigation measures applicable to wildlife resources as are provided in the Project Proposal;
- will increase the Project mine site footprint by approximately 23 ha. This increase in the Project footprint from 585 ha, to 607.8 ha represents an increase of 4%, a negligible area of habitat loss in either the LAA or the RAA;
- will contribute to a negligible increase in the Project footprint and the amount of habitat disturbed that will still leave 98% of the RAA covered with natural vegetation;
- will contribute to a negligible increase in the linear density that will be well below the threshold for linear density considered significant for Grizzly Bear; and,
- will introduce a 12% increase in traffic volume on the Silver Trail and SMR/HCR access roads. The mitigation measures and commitments made by VIT (summarized in Table 6.9-16 of the Project Proposal) will adequately address the magnitude and frequency of potential impacts on wildlife mortality and movement patterns from traffic.

Tables 6.9-1, 6.9-2 and 6.9-3 provide the Project's potential residual effects and their significance, as predicted in the Project Proposal, on changes to wildlife habitat, mortality, and movement, respectively. These tables also describe the changes to those determinations, if any, as a result of the Project refinements. Each residual effect identified in the assessment is characterized using the definitions presented in the Project Proposal in Table 6.9.1.8. The evaluation has determined that none of the residual effects from the Project would change as a result of the Project refinements.

6.9.4 Evaluation of Project Refinements on the Significance of Residual Effects to Wildlife

The Project Proposal concluded that the appropriate context for consideration of the Project's potential effects on wildlife was at the regional level. At baseline, 750 ha of the RAA is covered by anthropogenic disturbances and greater than 99% of the RAA is covered with natural habitat. At the height of disturbance during operations, the disturbed area will increase to 1,385 ha (this includes the mine site and transmission line RoW / access road corridor), leaving 98% of the RAA as natural habitat. Given that reductions in wildlife habitat are only considered significant when greater than 40% of the natural habitat is removed by disturbance, the Project Proposal concluded the Project's effect on wildlife habitat is considered not significant. The confidence level for this determination was high.

Overall, the Project Proposal considered potential effects on the risk of wildlife mortality to be adverse, of moderate magnitude, local, and long term. With the commitment to implement measures to ensure compliance with the *Yukon Wildlife Act* and the federal *Migratory Bird Convention Act*, and *Species at Risk Act*, effects on wildlife mortality rate are not considered significant in terms of the legal threshold for significance established for the Project. Given the Project design, and the suite of mitigation measures and commitments from VIT, the Project is not expected to pose a substantial mortality risk for wildlife and effects on mortality were considered not significant. However, as the prediction confidence was moderate, monitoring is proposed both as a mitigation measure and an adaptive management measure.

Project effects on wildlife movement patterns were considered to be not significant given that mine site related disturbance and traffic will decline at closure, making the low magnitude effects on movements reversible.

The Project refinements do not change the significance conclusions reached in the Project Proposal regarding any of the Project's effects on wildlife. The rationale for this conclusion is based on the findings that:

- The Project refinements do not change the residual effects of the Project on wildlife habitat availability, mortality, or movement for the reasons provided in subsection 6.9.3 above.
- The high level of confidence surrounding the conclusion that the significance of the Project's residual effects would not be significant. The conclusions of this evaluation are provided in Tables 6.9-1, 6.9-2 and 6.9-3.

6.9.5 Evaluation of the Project Refinements' Contribution to Cumulative Effects to Wildlife

The Project Proposal identified placer mining and Haldane Silver as the activities that might interact cumulatively with changes in wildlife habitat. It identified trapping, hunting and fishing as activities that might interact with changes in wildlife mortality. No activities were identified that might interact cumulatively with Project-related effects to wildlife movement patterns.

The Project Proposal concluded that although the Project will act cumulatively with other known projects, given that 98% of natural habitat will remain in the RAA even during Project operations, there was not a reasonable likelihood that habitat loss will affect the viability of wildlife populations in the RAA.

The activities that could affect wildlife mortality in the RAA are three trapline concessions and an outfitting concession, all of which are within Game Management Zone 2. The mortality effects of these activities are already occurring at baseline levels and can be adjusted as needed through hunting management. Given the commitments made by Victoria Gold to prevent hunting by employees and monitor vehicle interactions / road collisions, the risk to the population viability of the species assessed was considered low.

The Project Proposal concluded that no further assessment of cumulative effects of the Project on wildlife was warranted because there was not a reasonable expectation that the Project's contribution to cumulative effects will affect the viability of wildlife populations. As the Project

refinements do not change the residual effects of the Project, there is not a reasonable expectation that the Project refinements will change the conclusion in the Project Proposal regarding the Project's contribution to cumulative effects to wildlife.

6.10 HERITAGE RESOURCES

6.10.1 Predicted Potential Effects from the Project

No Project activities were ranked "2" in Table 6.3-1 in the Project Proposal – at least not with codified protection practices. Under the Historic Resources Act approval is required from the Minister of Tourism and Culture before an effect can occur.

The effect on heritage resources would be information loss either directly through disruption via surface preparation and construction or unplanned disturbance as a result of improved access into sensitive areas.

6.10.2 Evaluation of interactions between Project Refinements and Heritage Resources

The Project Proposal assumed that all of the land within the Project mine footprint would be disturbed and removed from natural habitat. This assumption is conservative, as not all land will be disturbed within the Project footprint. The scope of the LAA was defined in the FMA Heritage Inc. 2011 Historic Resources Environmental Baseline Report prepared for the Eagle Gold Project (Appendix 4 of the Project Proposal). That report referenced archaeological reports written in 1995 and 1996 that had used a study area that extended from the mine site south to Lynx Creek and west to Ray Gulch. The 2011 report defined the Local Study Area as the Project footprint, which was "the area in which Project effects on archaeological and historic period sites could occur", and includes the SMR / HCR access road from the Project mine site to the junction of Highway 11.

The Project refinements introduce physical works that are outside the footprint of the Project Proposal mine site footprint, including the HLF, the open pit, the WRSAs, the relocated road to the HLF, the road to the relocated explosives facilities, and the relocated explosives facilities. These Project refinements fall within the LAA for heritage resources and do not change the boundaries of the LAA.

6.10.3 Evaluation of Project Refinements on Project Mitigation and Residual Effects

The preferred mitigation measure to address effects is to avoid heritage resource sites and VIT committed to doing so, particularly in relation to all pre-contact archaeological and historic sites along the access road. Victoria Gold voluntarily conducted a paleontology field program in which members of the FNNND participated. No concerns were expressed by FNNND participants regarding any specific pre-contact archaeological issues related to the Project. VIT recorded historic sites and structures in the Dublin Gulch area and, in the Project Proposal, committed to a discovery protocol to recover and report the chance discovery of heritage resources during Project activities. For those heritage resource sites that cannot be avoided during construction, VIT will follow mitigation measures as required by the Yukon Government Department of Tourism and Culture.

The Project Proposal concluded that all potential Project-specific effects will not be significant with the application of mitigation measures. The degree of confidence in this prediction was high.

The physical footprint of the Project minimally extend the Project footprint assessed in the Project Proposal. The overall mine site footprint disturbance area increases from 585 ha to 608 ha as a result of the Project refinements for a total of 4%. Commitments made by VIT to implement the following mitigation measures remain unchanged by and will be applied to the Project refinements:

- avoid heritage resource sites where possible,
- implement a discovery protocol to recover and report the chance discovery of heritage resources during Project activities, and
- Follow mitigation measures as required by the Department of Tourism and Culture.

As there is no reasonable indication that the Project refinements will involve activities that could be ranked as "2" on Table 6.3-1, Victoria Gold has concluded that the Project refinements do not change the residual effects of the Project on Heritage Resources.

6.10.4 Evaluation of Project Refinements on the Significance of the Project's Residual Effects on Heritage Resources

The Project Proposal concluded that, with the implementation of codified protection practices, no Project activity will cause effects of concern to heritage resources. It determined that all potential Project-specific effects will not be significant. As the Project refinements do not change the mitigation measures or the significance ratings of the Project Proposal, VIT has concluded that the Project refinements will not change the conclusion of the Project Proposal that the Project will not result in significant effects on heritage resources.

6.10.5 Evaluation of the Project Refinements' contribution to the Cumulative effects on Heritage Resources

The Project Proposal concluded that all potential Project-specific effects and contributions to cumulative effects will not be significant to heritage resources. As the Project refinements do not change the mitigation measures or residual effects of the Project, Victoria Gold has concluded that the Project refinements do not change the Project's contributions to cumulative effects on heritage resources.

6.11 SOCIO-ECONOMIC EFFECTS – UPDATE AND EVALUATION WITH PROJECT REFINEMENTS

6.11.1 Approach

The evaluation of the Socio-economic effects assessment of the Project is supplementary to the Project Proposal filed with YESAB in June 2011, and should be reviewed in conjunction with the Project Proposal. This SIR describes each VC and sub-component in relation to the Project refinements, and evaluates whether there are any changes to the conclusions reached in the Project

Proposal on the predicted residual and cumulative socio-economic effects from the Project, as a result of the Project refinements.

The evaluation does not re-describe in detail components of the Project Proposal that remain unchanged by the Project refinements, and it relies on the socio-economic baseline data, information, and context provided in the Project Proposal.

The evaluation concluded that the Project refinements will generally provide for increased positive effects of the Project – including additional employment and economic opportunities and benefits, for a longer period of time. None of the Project refinements are predicted to change the outcomes of the socio-economic effects assessment conclusions as conducted and detailed in the Project Proposal. All mitigation measures as proposed in the Project Proposal will be applied, and adjusted to meet the extended duration of the Operations Phase. Any monitoring or adaptive management plans will be extended for the updated mine life.

6.11.2 Scope of Assessment for the Socio-economic Evaluation Approach

The evaluation of any changes or additional interactions with Valued Socio-economic Components resulting from the Project refinements was consistent with the methodology, baseline data, and assessment approach for socio-economics effects in the Project Proposal. The scope and methodology followed in the Project Proposal for the socio-economic assessment of the Project is provided in Section 6.11.1 of the Project Proposal in detail.

The spatial boundaries included two assessment areas:

- The Local Assessment Area (LAA)
  - FNNND Traditional Territory
  - Village of Mayo (VoM)
- The Regional Assessment Area (RAA)
  - Whitehorse
  - Yukon

There are no changes to the spatial boundaries of the socio-economic assessment as a result of the Project refinements.

The temporal boundaries described in the Project Proposal included a 20-month construction phase, a 7.3-year operations mining phase, and a 10-year closure and reclamation phase, followed by a 5-year post-closure monitoring phase.

The temporal boundaries of the Project have been updated as a result of the Project refinements and are reflected in Table 1.2-1 of this SIR above. Temporal boundaries now reflect a longer mine life, and associated changes to the timing and duration of the Construction and Operations Phases as follows:

- Construction - Q4 2012 – Q4 2014 (25 months).
- Operations - Q1 2014 – Q4 2023 (10 years).
- Closure and Reclamation - Q1 2024 – Q4 2033 (10 years).
- Post-closure Monitoring - Q1 2034 – Q4 2039 (5 years).

Accordingly, the duration of the Construction phase has increased to 25 months, whereas the active mining phase is extended from 7.3 to 9.2 years (total operations phase is slightly longer at 10 years). These updated temporal boundaries and timing of Project phases are used in evaluation of socio-economic components in the sections below.

6.11.3 Identification and Consideration of Socio-economic Valued Components

Five Socio-economic Valued Components were assessed in the Project Proposal to address objectives and concerns of the First Nation of Nacho Nyak Dun (FNNND) and the Village of Mayo (VoM). Socio-economic VCs were determined via consultation with these groups, through their Integrated Community Sustainability Plans (referenced in more detail in the Project Proposal) and with regulatory agencies.

The VCs identified in the Project Proposal include:

- Employment and Economic Opportunities
- Traditional Activities and Culture
- Community Vitality
- Human Health and Well-being
- Infrastructure and Services

Socio-economic VCs are unchanged by the Project refinements. Consultation with the FNNND, VoM and regulatory agencies has continued on the Project since the Project Proposal was submitted to the YESAB and has included information on the Project refinements considered in this SIR. Details on these consultations are described in earlier sections of this SIR. For reference, the VCs and sub-components are listed below in the order they are provided in the Project Proposal.

6.11.4 Evaluation of interactions between Project Refinements and Project Activities

There are five modifications introduced by the Project refinements that have the potential to interact with socio-economic valued components:

- increase to the length of the operations phase;
- additional employees present at the mine site during operations phase;
- increase in total ore production;
- removal of the activity of shipping sewage from the mine site to the VoM sewage for treatment; and,
- increase in annual energy requirements -- with reduced energy requirements during winter.

An evaluation of the Project socio-economic assessment as a result of these modifications is provided below. Each socio-economic VC, and their respective components, was screened to determine whether the above changes introduced by the Project refinements would interact with the VC and, if so, whether there would be any modifications to the potential effects from the Project

predicted in the Project Proposal. Where no change to the conclusions reached in the socio-economic assessment as a result of Project refinements, the evaluation was not carried forward.

6.11.5 Employment and Economic Opportunities

In general, capital costs of the Project is predicted to increase from $281 million to $399.7 million, as well more than $144.9 million of operating and sustaining capital expenditures annually. These increased expenditures will provide benefits to the FNNND, VOM local community, the Yukon Government and the Government of Canada.

The benefits to the governments of Canada and Yukon are predicted based on current tax and royalty regimes. As noted in the Project Proposal, the extent of benefits locally and regionally will depend on a number of factors such as available labour, degree of skills and training; availability of businesses and services that can support the mining activities.

Predicted Potential Effects From the Project

The following potential effects on employment and economic opportunities were identified for socio-economic assessment in the PP, and have been screened and, where warranted, evaluated with respect to the Project refinements:

- Opportunities for Employment
- Contracting Opportunities
- Royalties and Taxes
- Expenditures

Other Local or Regional Economic Activities:

- Commercial Trapping
- Commercial Fishing
- Forestry and Agriculture
- Oil and Gas
- Local Services and Businesses.

The Project Proposal predicted that the effects of the Project on employment and economic opportunities would be positive. This includes employment opportunities through all phases of the Project, contracting opportunities for local businesses, royalties and taxes, expenditures and indirect or induced (“spin-off”) effects to the local and regional economy.

These positive effects will be increased with Project refinements as outlined below – increased expenditures and potential employment opportunities with benefits to the local and regional economy. The Project refinements are not anticipated to modify effects on Other Local or Regional Economic Activities so these components were not carried forward for further evaluation.

6.11.5.1 Employment

Project refinements that affect economic and employment opportunities largely relate to the increase in ore production and duration of the operations phase. This results in an increase in the number of employees, potential opportunities, and economic benefits. The Project Proposal provides a detailed description of the estimated number of employees with respect to opportunities for each phase of the Project along with assumptions and qualifications to the predictions in Section 6.11.

Construction Phase Employment

As a result of Project refinements, the construction phase of the Project will be increased from 20 months, to approximately 25 months. The construction workforce makeup is unchanged, and will be a combination of VIT employees and construction contractor skilled and unskilled labour. The expected construction work force schedule would continue to be three weeks on, one week off at 11 hours per day.

Based on Project refinements and continued planning, manpower estimates indicate that 30-110 people will be in camp during the initial construction phase, this could grow to up to 400 people during the main construction effort in the first season, and then down to 80-210 people during the second season. The camp has been designed to accommodate up to 400 people at any given time.

Table 6.11-3 of the Project Proposal provides a breakdown of the approximate number and types of jobs during the Construction Phase. The types of jobs have not changed – estimated numbers for specific types of job opportunities and positions will increase and /or be adjusted as more detailed planning progresses.

Operations Phase Employment

The operations phase is now estimated to be approximately 10 years in duration, (an increase from 7.3 years). Manpower estimates based on Project refinements indicate that approximately 300 to 450 people would be on the payroll during operations, however, there will be approximately 200 people on site at any given time (a slight increase from 190 per the Project Proposal).

Table 6.11-4 of the Project Proposal, estimated the workforce during operations with a range from 339 to 384, depending on the year. Table 6.11-2 below provides an update to Operations phase workforce estimate based on Project refinements, with a range of 338-442 employees, depending on the year.

Table 6.11-2: Operations Workforce Estimate

Department	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Mine	138	228	212	224	232	229	210	226	206	166
Process	128	128	128	128	128	128	128	128	128	128
General and Administrative	41	41	41	41	41	41	41	41	41	41
Contract (catering)	31	40	39	40	41	40	38	40	38	34
Total Workforce	338	437	420	433	442	438	417	435	413	369

Scheduling during operations are unchanged: the majority of Project personnel will work 12-hour shifts on a rotation of two weeks on and two weeks off. Four work crews are required for 24-hours per day, year-round coverage. General and administrative employees will work a weekly rotation of 10-hour days, four days on, three days off, for a 40-hour workweek.

As noted in the Project Proposal, with respect to both construction and operations phases, the precise number of local and Yukon individuals who will enter the mine workforce and remain employees at the mine is not known.

Closure and Reclamation Phase Employment

As noted in the Project Proposal, during the closure and reclamation phase there will be fewer jobs available at the Project: those jobs will be primarily for reclamation and ongoing monitoring. The reclamation and closure workforce will be a combination of VIT employees and construction contractor skilled and unskilled labor. Initial staff requirements during reclamation continue to be estimated at 200, which will decrease over time as reclamation objectives are met and site activities move to a monitoring stage.

Section 6.11.2.8 of the Project Proposal describes contracting opportunities arising from the Project. Project refinements may increase to contracting opportunities due to the extended duration of construction and operations. During the construction phase of the Project, numerous major contracts will be utilized. The major contracts will likely have several smaller associated sub-contracts. Victoria Gold Corp. remains committed to the approach and commitments detailed in the Project Proposal to providing contracting and employment opportunities.

6.11.5.2 Royalties and Taxes

Royalties: A major economic benefit to Canada, Yukon, and by extension to the local community, are the royalties and taxes that a successful mine will pay during the operations phase to the various levels of government. As a result of the Project refinements, royalties and taxes will increase relative to the increased production and duration of the Project. Context for predicted royalties based on Yukon and federal is consistent with VIT's understanding as provided in Section 6.11.2.12 of the Project Proposal with respect to Yukon rates as provided in statutes, and provisions under the Devolution Transfer Agreement (DTA), and with respect to sharing of royalties with the FNNND

under the Final Agreement. Estimated taxes have been updated based on the Project refinements and described below.

Taxes: The Project refinements will increase estimated taxes from the Project as follows:

Total federal income tax generated by the Project between 2014 and 2023, will be approximately US $48.8 million (increased from US $32 million); Territorial income tax will increase to approximately US $76.8 million (from US $32 million) for the same period. Territorial mining tax will be approximately US$67.3 million (increased from US $17 million). Changes to Project taxes as a result of the Project refinements are provided in Table 6.11-3 below.

Table 6.11-3: Project Taxes (US$ '000)

Form of Tax	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Federal Income Tax				$ -	$ -	$13,381	$20,490	$11,793	$ -	$3,194
Territorial Income Tax				$ -	$18,544	$22,820	$20,490	$11,793	$ -	$3,194
Territorial Mining Tax	$374	$11,028	$14,985	$11,596	$ 8,792	$ 8,447	$7,346	$ 1,583	$2,837	$ 299
Total Tax	**$374**	**$11,028**	**$14,985**	**$11,596**	**$27,336**	**$44,648**	**$48,326**	**$25,169**	**$2,837**	**$6,687**

The total tax generated by the Project during its Operations phase is estimated to increase to approximately US $193 million (up from US $82 million) between the years 2018 and 2023 (operations phase). These estimates are based on the price of gold at $1,325.

In addition, there will be other taxes and payments to other levels of government, such as GST on goods and services, and the income taxes paid federally and territorially by employees and contractors, which will increase relative to the increases with respect to Project refinements and the longer project duration.

6.11.5.3 Expenditures

Section 6.11.2.16 of the Project Proposal describes Expenditures and assumptions for Capital Costs (Construction and Operations). Project refinements will increase the major financial investments being made during these phases – now 25 months for construction and 10 years for operations. Capital costs have increased by an estimated $118.7 million for the construction phase. Estimated Project expenditures for each phase is provided in Tables 6.11-4 and 6.11-5 below.

Table 6.11-4: Capital Costs (000)

Q4 2012 /2013	2014
199,850	199,850

Total estimated capital costs for construction of the Project are projected to increase from approximately $281 million to $399.7 million. As noted in the Project Proposal, VIT estimates that up to 70% of capital expenditures would be made at the local or regional level, which on this basis, would increase the Project Proposal estimate from $195 to $279.8 million dollars, and potentially spent through contracts with engineering, construction, and service provision companies.

Operating Costs will also increase as a result of the Project refinements, Table 6.11-5 below updates the estimated numbers for operating costs for the Operations Phase (from 2014 – 2023).

Table 6.11-5: Project Operating Costs - estimated (000)

2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
$15,700	$118,700	$129,500	$128,700	$129,300	$129,800	$129,800	$129,800	$125,800	$80,700

6.11.5.4 Other Local or Regional Economic Activities

Effects on other local or regional activities as a result of the Project were evaluated and predicted in Section 6.11.2.19 of the Project Proposal, including for:

- Placer and Quartz Mining
- Outfitters and Tourism
- Commercial Trapping
- Commercial Fishing
- Forestry and Agriculture
- Oil and Gas
- Local Services and Businesses

Potential effects on each of these activities were evaluated with respect to relevant changes as a result of the Project refinements. Given that the spatial boundaries of the Project mine site have been expanded modestly by from 585 ha to 608 ha (4%), there are no changes to the interactions between these activities and the Project refinements with the exception of the extended mine life.

With respect to Placer and Quartz Mining, Outfitters and Tourism, and Commercial Trapping, the Project Proposal predicted some effects – either positive or adverse. This evaluation determined that these effects would not change in magnitude but that their duration would be extended for approximately an additional two years during operations. As this does not change the characterization of the effect for these activities (from medium term in the case of outfitting and tourism, and from medium to long term in the case of trapping and local businesses and services) and there are no changes to the proposed mitigation measures, it was determined that the Project refinements do not result in a change to the conclusions from the Project Proposal.

Commercial Fishing, Forestry and Agriculture were not brought forward for residual or cumulative effects assessment in the Project Proposal, are not affected by the Project refinements, and have not been considered further in this SIR.

The Project Proposal predicted that Local Services and Businesses may experience positive direct, indirect and induced effects as a result of the Project. Based on the extended mine life, these effects may be positively enhanced.

6.11.5.5 Evaluation of Project Refinements on Employment and Economic Opportunities

The Project refinements do not change the conclusions of the effects assessment for employment and economic opportunities – the increased mine life, ore production rate, expenditures and employment opportunities are expected to result in additional positive effects. Increased expenditures represent an increase in potential benefits to Yukon and the region. VIT remains committed to providing employment opportunities throughout all phases of the Project and Project refinements will result in more job and employment opportunities for a longer period of time. VIT will strive to hire as many FNNND citizens and other local and Yukon residents as practical to fill employment positions.

Residual effects to other local economic activities such as for commercial trapping, outfitting and placer operations, due to the extended mine life, are not predicted to change the significance ratings, and mitigation measures will continue to be subject to ongoing discussions between VIT and local operators.

Victoria Gold Corp.'s commitments for employment and economic opportunities are consistent with those outlined in the Project Proposal in the Summary of Commitments for Employment and Economic Opportunities at Section 6.11.2.26 of the Project Proposal and in Table 6.11.32: Summary of Commitments, Socio-economic Commitments, Mitigation measures, Monitoring and Adaptive Management which is reproduced in this SIR in Section 6.11.12 below for reference. Any mitigation measures and implementation of adaptive management or monitoring plans with respect to the extended operations phase and Project schedule with respect to Employment and Economic Opportunities will be adjusted accordingly.

The Project Proposal conducted a screening of the Project's potential contribution to the cumulative effects of past, current and announced future projects. Four potential effects were carried forward for an assessment of cumulative effects:

- Opportunities for employment
- Contracting opportunities
- Royalties and taxes
- Effects from Expenditures.

The Project Proposal concluded that there could be both positive and adverse effects of the Project in combination with other projects in the local area and Yukon, if those projects proceeded or proceeded at the same time as the Project. The results of the cumulative effects assessment can be found in Section 6.11.2.23 of the Project Proposal. Positive effects included: transferrable skill sets for those workers who obtain training and experience working at the Project; employment and contracting opportunity benefits to FNNND citizens, other residents of Mayo, and workers from elsewhere in Yukon and Canada; increased royalties and taxes payable to the Yukon and federal governments directly of which FNNND will receive a portion.

Adverse effects included the potential for: competition for labour, increased cost of labour: and diversion of currently employed persons away from local businesses, organizations, or in various seasonal activities (and thereby resulting in increased strain on the capacity of local businesses to provide servicers in the community).

The Project Proposal did not propose any additional mitigation measures with respect to cumulative effects on employment, contracting or royalties and taxes.

As the Project refinements are not predicted to change the conclusions provided in the Project Proposal with respect to residual effects or mitigation measures, on employment and economic opportunities, it was concluded that the Project refinements did not change the conclusions of the Project Proposal in relation to the Project's contribution to cumulative effects.

6.11.6 Traditional Activities and Culture

Potential effects to the following Traditional and Cultural activities were assessed in Section 6.11.3.2 of the Project Proposal:

- Subsistence Harvesting
  - Hunting
  - Fishing
  - Trapping
  - Plants and Medicines
- Language Preservation and Revitalization
- Other Cultural Activities
- Heritage Sites and Special Places

Each of these activities was screened with respect to the Project refinements. Given that the spatial boundaries of the Project mine site have been expanded modestly by 4%, it was found that, with the exception of the extended operations period (by 2.7 years), there were no changes to the interactions between these activities and the Project refinements. Therefore mitigation measures as proposed will be effective to mitigate potential effects to Traditional Activities and Culture.

In addition, no Heritage Sites or Special Places identified through research and consultation with the FNNND in development of the Project Proposal will be affected with the Project refinements.

Activities with respect to Traditional Activities and Culture components have therefore not been brought forward for further evaluation. Mitigation measures and VIT's approach to Traditional Activities and Culture are consistent with those outlined in the Project Proposal and in Table 6.11-8 below. Any mitigation measures and implementation of adaptive management or monitoring plans with respect to the extended operations phase and Project schedule will be adjusted accordingly.

6.11.7 Community Vitality

Section 6.11.4 of the Project Proposal assessed potential effects to Community Vitality for potential effects on the following:

- Population
- Local Educational Facilities and Services Education and capacity development

- Crime

Each of these components was considered with respect to the Project refinements particularly the increase in personnel at the mine site. Given the Project refinements do not change the proposed approach for a fully self-contained camp operation (with employees transferred to and from the site), there were no meaningful changes to the interactions between these activities and the Project refinements. As a result there were no changes which would modify the characteristics of the effects predicted for Community Vitality, the conclusions of the assessment, or the proposed mitigation measures.

Community Vitality components have therefore not been brought forward for further evaluation as a result of Project refinements Mitigation measures and VIT's approach to Community Vitality are consistent with those outlined in the Project Proposal and in Table 6.11-8 below. Any mitigation measures and implementation of adaptive management or monitoring plans with respect to the extended operations phase and Project schedule will be adjusted accordingly.

6.11.8 Human Health and Well Being

Section 6.11.5 of the Project Proposal screened potential effects to the following with respect to Human Health and Well Being:

- Local health and social facilities
- Mental health and additions

Potential effects on each of these activities were screened with respect to relevant changes as a result of the Project refinements. The Project Proposal concluded that there would be no direct or adverse effects with respect to local health and social facilities or mental health and addictions as a result of the Project.

Given that the Project refinements do not change the proposed approach to the camp (fully self-contained) there were no changes to the interactions between these activities and the Project refinements.

These components have therefore not been brought forward for further evaluation as a result of Project refinements. Mitigation measures and VIT's approach to Human Health and well-being are consistent with those outlined in the Project Proposal and in Table 6.11-8 below.

6.11.9 Infrastructure and Services

The Project Proposal assessed potential socio-economic effects for the following infrastructure and services:

- Housing
- Emergency Services (RCMP, Fire Department, Ambulance service)
- Community Services and Public Works (Landfill, Village of Mayo Lagoons)
- Child Care
- Transportation (Roads, Airport)
- Electrical Power Supply

The Project Proposal predicted various potential effects on Infrastructure and Services. Each of these is updated and evaluated below with respect to the specific components and Project refinements.

6.11.9.1 Housing

With respect to Housing, the Project Proposal predicted that there would be no effects on housing in Mayo with the fully self-contained camp operation for the Project. Project refinements do not introduce any changes the Project approach for a fully self-contained camp operation with employees transported to and from the site as required. Additional mine personnel required for increased operations (and for the extended duration of the operations phase) will continue to be housed and accommodated on-site, and transported from Whitehorse or Mayo as required. This component has therefore not been brought forward for further evaluation in this SIR.

6.11.9.2 Emergency Services

Emergency Services (including RCMP, Fire Department, and Ambulance Services) were predicted to have no, or minor residual effects (and no significant adverse effects) on Emergency Services.

Project refinements will result in some additional traffic on public roads (described below in Section 6.11.11.1) for a longer period of time (during construction and operations) and more personnel at the mine-site during operations. However, these increases are not anticipated to change either the interactions or the characterization of effects predicted in the Project Proposal for Emergency Services, including estimated potential call-outs to RCMP to the Project site (potentially 5-10 per calls per year), road incidents requiring Fire Department response servicing portions of the access route, or Ambulance Services for transportation incidents or patient transfer from mining company first aid vehicles.

Effects on Housing and Emergency Services have therefore not been brought forward for further evaluation with respect to Project refinements

The mitigation measures and approach provided in the Project Proposal with respect to Emergency Services remain the same and are included in Table 6.11-8.

6.11.9.3 Village of Mayo Lagoons

The Project Proposal proposed to ship sewage sludge from the sewage treatment plant to Mayo for disposal in the Mayo sewage lagoons. This has changed as sewage will now be disposed of at site via a septic field. No sewage sludge will be produced and therefore no shipment is proposed to Mayo. This component has therefore not been evaluated further with respect to potential effects on the VoM Lagoons.

6.11.9.4 Landfill

Section 6.11.6.18 of the Project Proposal assessed potential effects on the landfill or recycling including the use of the VoM landfill for selected streams (solid waste, construction waste) of Project waste material and subsequent effects on landfill capacity.

Predicted Potential Effects from the Project

The Project Proposal concluded that in the absence of mitigation measures, the effect on the capacity of the Mayo landfill as it currently exists could be moderate to substantial. With proposed mitigation measures and planning with the Yukon Government and local community, the effects could be reduced to low. These findings are not changed by the Project refinements as described below.

Modifications to Project Activities as a Result of Project Refinements

Project refinements do not introduce changes to the proposed approach to use of the landfill for solid and construction waste: the decision to incinerate or deposit all or part of the solid waste in a landfill (construction and operations phases) has not yet been determined. This will be determined during the detailed design and licensing phase - the Project design continues to assume that all waste will be transported off-site for disposal.

The Project is currently designed to transport all waste off-site for disposal, and there have been early discussions with the VoM about the capacity of the community landfill to accept waste from the Project. In addition, VIT understands that VoM is continuing to work with Yukon Government to identify plans and options for the community landfill.

The extended operations phase and additional employees at the mine site as a result of Project refinements has been further evaluated, given the potential for additional waste to be produced and transported to the landfill.

In their 2006 Village of Mayo Integrated Community Sustainability Plan, the VoM identified as an objective the decrease of waste entering the landfill. At the same time, the VoM is also indicating that it is contemplating as a business opportunity the development of an enlarged or regional landfill and possibly a recycling facility, both of which would require a steady source of waste to be sustainable.

Victoria Gold Corp. will continue discussions with the VoM and the Yukon Government to identify options and a waste management approach consistent with community objectives for the landfill and economic development opportunities.

6.11.9.5 Evaluation of Project Refinements on Project Mitigation and Residual and Cumulative Effects on the Landfill

The Project Proposal predicted that the Project could produce an average of 1.3 kilograms per person per day of solid waste (general waste produced in camp, including food scraps) for the construction and operations phases. Assuming the presence of approximately 200 people in camp at any time, with year-round operations, a total of 94,900 kg or approximately 95 tonnes of solid waste is estimated each year.

These assumptions remain unchanged by the Project, recognizing that there may be more or less waste generated through the construction and operations phases depending on the number of people on site at any given time. It is not anticipated that any additional volumes of waste would significantly increase for the periods where there may be more than 200 people on site during construction, when averaged out for the overall period.

If the Project's estimated 95 tonnes of solid waste per year are shipped to the Mayo landfill, this would continue to represent a potential 25% increase in the current landfill demand of 365 tonnes per year. This would reduce the landfill's projected lifespan (estimated in 2006 to be approximately 15 years) and the extended operations phase of the Project (2.7 years) would continue that trend.

The overall relative contribution of solid waste from the Project would be reduced if the Project was allowed to dispose of its solid waste at a new or expanded facility in the region. Victoria Gold Corp. is also continuing to pursue the possibility of incinerating solid waste at the site. The volume of solid waste from the Project would be reduced significantly if the Project were to obtain permission to incinerate solid waste at site.

In the absence of either of these mitigation measures, the effect on the capacity of the Mayo landfill as it currently exists could be moderate to substantial with the Project refinements. However, VIT remains of the view that a solution can be found to accommodate the current and planned industrial activities in the region. Through ongoing discussions with the VoM and Yukon Government a balance can be established between the community desire to reduce the generation of waste on a per capita basis and the desire to accommodate growth and industrial development. With implementation of successful mitigation measures as proposed, (i.e., if some of the Project's solid waste is incinerated and some or all is deposited in a regional land fill) the effect of the Project on the capacity of the current Mayo landfill would be reduced to Low.

6.11.10 Child Care

Potential effects on child care services are described in Section 6.11.6.26 of the Project Proposal. The Project Proposal determined that the Project demand on local child care services would not be significant, although this cannot be predicted with certainty.

Given that the Project refinements do not change the proposed approach for a fully self-contained camp operation (with employees transferred to and from the site), there are no changes to the interaction between the Project refinements and child care and no changes to the characteristics of the effects predicted for child care, the conclusions of the assessment, or the proposed mitigation measures.

Any demand for child care services as a result of the increase in Project employees and the mine life is not predicted to be sizeable, given the current available capacity at the Dunena Ko'Honete Ko Day Care and the alternative of private home care. As committed in the Project Proposal, Victoria Gold will assist in ensuring the appropriate agencies can plan for changes in demand, and will maintain a continued open line of consultation and exchange of information.

6.11.11 Transportation

The Project Proposal screened potential effects on transportation infrastructure with respect to the Project for:

- Roads
- Mayo airport
- Electrical power supply

Each of these has been evaluated with respect to the Project refinements below.

6.11.11.1 Roads

Section 6.11.6.30 of the Project Proposal screened potential effects on roads with respect to the following:

- Traffic Volume (Construction and Operations Phases)
- Access Road Maintenance

The Project refinements do not change the overall approach to the use of public and Project site roads for the Project. The Project will operate year round and therefore the South McQuesten Road (SMR) and Haggart Creek Road (HCR) will be maintained with snow clearing to provide access year round. This will result in winter access on the SMR and HCR, which is not currently possible via wheeled vehicles.

Road maintenance is essential to ensure user safety, preserve the existing condition of the road, and ensure convenient and efficient travel to the Project site. Maintenance of the SMR up to the South McQuesten Bridge will continue to be conducted by Yukon Government Highways and Public Works (HPW).

Regular maintenance of the HCR will be performed by VIT throughout all phases of the Project. Victoria Gold Corp. will coordinate with Yukon Department of Highways and Public Works to develop and undertake a maintenance plan for all sections of the road to meet Project needs for year round operations.

Following closure, the main access road from Haggart Creek (at the confluence with Dublin Gulch) to the process plant site and the two new access roads described in Section 5 of this SIR (within the Project area), will be permanently closed and reclaimed consistent with the closure and reclamation plan and objectives. The road that provides access to the Potato Hills has been identified as an important area for traditional use so the HCR will be left in place at the end of Project life as a public unmaintained road.

Predicted Potential Effects from the Project

The Project Proposal concluded that there would be no significant effect on roads with respect to capacity and safety, based on estimated loads and traffic volumes, proposed mitigation measures, and VIT's approach to vehicle access and operations, and for road maintenance.

In development of the Project Proposal, the Yukon Department of Highways and Public Works indicated to VIT that the predicted level of traffic from the Project is insignificant in terms of affecting the publicly maintained roadways along the access route (Silver Trail and SMR), and can be accommodated. Victoria Gold Corp. will maintain the HCR during construction and operations. Traffic loads and volumes have not substantially changed, but due to the increases, and longer operations phase as a result of the Project refinements, these have been updated and evaluated below.

Modifications to Project Activities as a Result of Project Refinements

Project refinements do not change the overall approach to use of the roads as described above, or any proposed mitigation measures or traffic management plans as described in the Project Proposal. Employees from Mayo and the surrounding communities will be transported to the Project site by a transfer van service utilizing upgraded existing roads. Employees from outside the local area will be flown in from Whitehorse to Mayo. All employees will be bussed the remaining distance to the mine site.

Adverse effects related to speeding vehicles will be minimized or eliminated through a variety of measures described in the Project Proposal (see Table 6.11-8).

Project refinements will result in a modest increase in use of public roads and traffic during operations (and for a longer period of time). Updated information is provided below on traffic with respect to construction and operations phases of the Project.

Traffic Volume – Construction

As described in Section 5 of this report, during construction, increased vehicle and truck traffic will be required for the Project on the SMR and HCR. The largest vehicles will be B-Train vehicles, trucks with long loads (steel members, crane components), and trucks with wide loads (truck boxes, tanks, pre-fabricated camp modules). Loads would be adjusted for seasonal load restrictions, and volumes would coincide with construction and operational needs.

There are no changes to the estimated traffic volume for the construction phase, except that construction traffic will take place over a slightly longer period of time (25 months) resulting in an overall increase of loads over the construction phase.

Traffic Volume - Construction (25 months):

- 2,500 semi-trailer loads (round trip) over the construction phase
- 10 – 20, 1 to 5 tonne trucks per day on the average, or 7,500 - 10,000 round trips over the construction phase
- 10 passenger car or pickup trucks per day

Traffic Volume – Operations

Traffic volume during operations is as follows:

- Crew shift changes are expected to occur approximately every two weeks. Personnel will travel from Mayo to the mine site by bus. This will involve approximately 100 – 120 round trips per year. This is unchanged from the Project Proposal.
- Total truck loads are increased by the Project refinements, and are now estimated at 2,200 trucks per year (round trips). As with estimates for the construction phase, these numbers do not account for potential seasonal load limits, which would determine potential truck size and load types.

As noted in the Project Proposal, traffic estimates do not include traffic use by exploration programs, placer mining operations, or public/tourism. Information available from HPW on current and historical traffic volumes for the Silver Trail, the SMR, and the HCR were included in the effects assessment in

the Project Proposal in terms of road use. In addition, volume of traffic will vary throughout the year, with higher volumes expected during peak construction times and after freshet/prior to freeze up.

6.11.11.1 Evaluation of Project Refinements on Project Mitigation and Residual and Cumulative Effects on Roads

The modest increase in traffic and extension of the mine life does not change the predicted effects or conclusions of the assessment of the Project as a result of Project refinements on roads. The additional volumes of traffic associated with the Project may result in additional wear and tear, or exceed the capacity of these roads in terms of volume or speed limits, but this is not predicted to be significant, or to change the predictions in the Project Proposal regarding the characterization of effects, their significance, or the proposed mitigation measures. Positive or beneficial effects for other users will result from the physical and maintenance improvements to the SMR and HCR as a result of the Project. With the longer operations phase, these potential positive benefits will extend for an additional 2.7 years.

6.11.11.2 Airport

Section 6.11.6.36 of the Project Proposal assessed potential effects on the Mayo airport. No residual adverse effects were predicted as a result of the Project – it was concluded that Project charter flights would not significantly increase flight volumes.

The Project refinements do not change the interaction between the Project and the airport or introduce any modifications with respect use of the Mayo airport, with the exception that there may be some additional charter flights, and that the occurrence of those flights may take place over a longer period of time during the operations phase to accommodate the transport of additional employees to and from the mine site.

Project employees from Mayo and the surrounding communities (e.g., within Dawson – Carmacks radius) will be transported to Mayo by van or bus service utilizing existing roads. Victoria Gold Corp. workers and contractors from more distant locations will fly from Whitehorse to Mayo. All employees will be bussed the remaining distance from Mayo to the mine site.

Air North has indicated that they are working to schedule a regular flight on the Whitehorse—Mayo route and VIT understands that a regular charter to support the Bellekeno Project has now been established. Victoria Gold Corp. plans to transport employees travelling from Whitehorse to Mayo using chartered aircraft and bus services. Victoria Gold Corp. will continue to investigate opportunities for flight “seat sharing” that would allow local residents, on a user-pay basis, to use empty seats on charter aircraft or busses coming to and from Mayo to Whitehorse or other communities. With the extended operations phase there may be a continued positive benefit to local residents as a result of seat sharing opportunities on charter flights.

6.11.11.3 Electrical Power Supply

Section 6.11.6.38 of the Project Proposal assessed the potential effects related to electrical power supply as a result of the Project. The following potential effects related to electrical power supply were assessed:

- Relative demand on electrical power supply as a result of the Project, and availability of supply to meet the needs of the Project and other customers (industrial, small business, residential and government)
- Effects on electricity pricing as a result of the Project
- Possible disruption in electrical service in electrical power supply to other users.

6.11.11.4 Predicted Potential Effects from the Project

Electricity Pricing and Power Disruptions

The Project Proposal predicted there would be no effects to electrical pricing or potential disruption in electrical power supply for other users as a result of supplying power to the Project. Based on Yukon's rate structure and regulations, VIT continues to assume that each industrial customer is required to pay for all of the costs to connect them to the utility grid; and there will be no costs to other customers in this regard.

With respect to potential power disruptions, changes to power supply to existing customers as a result of power needs of the Project were not anticipated. Victoria Gold Corp. will continue to meet the criteria of Yukon Energy Corporation in design of the transmission line as required to ensure the infrastructure meets the needs of YEC.

Consequently, no changes to the Project Proposal predictions of the effects to electrical pricing, or disruption to power for existing customers are anticipated as a result of Project refinements. These two potential effects have therefore not been carried forward for further evaluation as a result of Project refinements.

Electricity Demand

With respect to demand on electrical power supply as a result of the Project, and availability of supply to meet the needs of the Project and other customers, the Project Proposal concluded that the demand for electrical power could be accommodated within existing generation capacity within Yukon, with forecast industrial use potentially requiring that existing diesel generation capacity be utilized.

Under the Project Proposal, the electrical power demands associated with the operations phase of the Project were estimated at 95 GWh/year -- representing approximately 13% of the existing installed generation capacity (hydroelectric and diesel, 750 GWh annually) -- or a 25% increase in the current electrical load (approximately 375 GWh annually) in Yukon. It was concluded that while this represents a relatively significant demand, it would lie well within existing installed capacity and there were no significant adverse or residual effects predicted. As there is potentially an interaction between the Project refinements and electricity demand, this parameter is evaluated below.

Potential Effects on Electricity Demand as a Result of the Project Refinements

There are two modifications introduced in the Project refinements that have the potential to change the interactions and effects of the Project with respect to availability of power supply from Yukon Electric Corporation. The changes include:

- an increase in annual power consumption and a seasonal consumption profile with higher consumption during the 250 day heap leach stacking season and reduced energy requirements during the 100 day winter operations (100 d Storage Pad loading) season
- an increase in the duration of the operations phase.

The ore crushing plan has been modified in part to reduce winter power requirements to correspond with power supply cycles in Yukon. Specifically, the Project will no longer crush ore via the second and third crushing process for approximately 100 days during winter. In addition to this seasonal change, the modification from high pressure grinding roll crushing to conventional cone crushing in the third stage of the crushing circuit decreases motor size and electrical demand year round for the crushing circuit component of the Project. This will reduce Project energy requirements during the winter months.

For the purposes of this evaluation, assumptions with respect to Yukon's existing capacity are based on those described in the Project Proposal: Yukon's power needs are being met using hydroelectric and diesel generation. YEC has existing installed generating capacity (hydroelectric and diesel) to supply 750 GWh of electricity annually on average. The current electrical load continues to be estimated at about 375 GWh annually.

Since preparation of the Project Proposal, YEC has been working to upgrade power generation capacity through completion of the Mayo Hydro Enhancement Project and connecting the north and south Yukon transmission grids (the Carmacks-Stewart Transmission Project Stage 2). The Mayo Hydro Enhancement project has added additional generating capacity to the grid. YEC is also updating its 2006 20-year Resource Plan to reflect increasing use of renewable energy in meeting new future loads. Baseline environmental and social-economic studies are underway on several hydro supply options, and feasibility work is being conducted on geothermal, wind, and waste gasification and demand-side management.

Additional details on the Project power requirements are found in Section 5.5.6 of this SIR. Assumptions and design with respect to power infrastructure are unchanged from those described in the Project Proposal: power to the Project site will be provided via a new 44 km transmission line connecting to the grid, routed along the SMR/HCR access road. The 69 kV transmission line will feed a main substation on site.

Updated estimated electricity consumption for the various phases of the Project are described below:

Construction Phase

During the construction period, power will be generated on-site by diesel generators prior to the completion of the power transmission line.

Operations Phase

As a result of Project refinements overall requirements have been modified. There will be increased demand and consumption for power for the Project during the operations phase. In addition, the mine plan has been optimized to reduce energy requirements during winter months when overall demand from all Yukon customers tends to be highest.

As detailed in Section 5.5.2.2. the use of high pressure grinding rolls for the primary crushing stage has been changed to use conventional cone crushers resulting in a significant reduction in power demand at start up from the primary crushers. In addition to this change in equipment, the ore crushing plan has been modified to reduce winter power requirements to correspond with power supply cycles in Yukon. Specifically, the Project will no longer crush ore via the second and third crushing process for approximately 100 days during winter. These modifications to equipment and seasonal ore crushing plan will reduce Project energy requirements during winter.

Electrical energy is measured by two related but different parameters: consumption and demand. Simply put, consumption is the total amount of energy used. Demand is the immediate rate of that consumption.

Estimated power consumption for construction and operations have been updated based on the Project refinements, and are outlined in Table 5.5.6. The first column describing Previous Estimated Annual Consumption reflects the estimates described in the Project Proposal and is provided for comparison and reference to the new estimates. Updated monthly load profiles are provided Figures 5.5-13 and 5.5-14).

Energy demand for summer months will range from 15.4 MW during years 1-4 and 18.3 MW during years 8-10. Large crushing and pumping loads have been optimized to run at close to continuous load. Therefore peak demand is assumed to be very close to the seasonal average demand.

6.11.11.5 Evaluation of Project Refinements on Project Mitigation and Residual and Cumulative Effects on Power Supply

While the increased electrical power demands associated with the operations phase of the Project in combination with existing and possible future mines represent increased demand on the Yukon electricity supply, known future demand still lies within existing installed capacity. This conclusion is strengthened given recent YEC's increase to grid capacity with the Mayo B Hydro Project and the connection of the north-south grid (Carmacks-Stewart Transmission line). The contribution of additional new supply options currently being studied, and demand management, will also offset a portion of the cumulative demand from mining projects.

Discussions with YEC are continuing with respect to a purchase-power agreement for the Project, and YEC has indicated that, it can supply power to the Project within Yukon's grid capacity.

Cumulative Socio-economic Effects – Infrastructure and Services Screening of Cumulative Environmental Effects

A screening of the Project's potential contribution to the cumulative effects of past, current, and announced future projects was done per the procedures described in Section 6.3.8 and have been evaluated for the purposes of this SIR and the Project refinements.

As a result of the screening process, two potential effects were carried forward for an assessment of cumulative effects on Infrastructure and Services in the Project Proposal and have been further evaluated with respect to Project refinements:

- Effects on the Mayo landfill
- Demand on and Availability of Electrical Power Supply

A screening of the Project's potential contribution to the cumulative effects of past, current, and announced future projects was done per the procedures described in Section 6.3.8 and have been evaluated for the purposes of this SIR and the Project refinements.

As a result of the screening process, two potential effects were carried forward for an assessment of cumulative effects on Infrastructure and Services in the Project Proposal and have been further evaluated with respect to Project refinements:

- Effects on the Mayo landfill
- Demand on and Availability of Electrical Power Supply.

Village of Mayo Landfill

If the Project's estimated 95 tonnes of solid waste per year are shipped to the Mayo landfill, this would represent a 25% increase in the current landfill demand of 365 tonnes per year. In addition to local residential, commercial and institutional waste, the landfill is also receiving unknown quantities of waste from the recently operational Bellekeno mine, local placer mining, the Mayo B project (to be completed in 2011), as well as the exploration projects underway in the area (e.g., Rau Gold, Haldane Silver, Gold Dome). Waste quantities would likely increase if any of these exploration projects move into development.

The VoM is currently considering development of a Regional Landfill as a business opportunity, and the availability of a new or expanded facility would mitigate the overall cumulative effect of solid waste disposal from existing users and from the Project and other mines. The Project Proposal predicted that the cumulative effect on the capacity of the VoM landfill could be significant, if the landfill is not expanded. However, VIT remains of the view that a solution can be found to accommodate the current and planned industrial activities in the region. Through ongoing discussions with the VoM and Yukon Government a balance can be found between the community desire to reduce the generation of waste on a per capita basis and the desire to accommodate growth and industrial development.

With implementation of successful mitigation measures as proposed, (i.e., if some of the Project's solid waste is incinerated and some or all is deposited in a regional landfill) the effect of the Project on the capacity of the current Mayo landfill would be reduced as would the Project's contribution to cumulative effects on the Mayo landfill.

If some or all of the solid waste at the Project or other mines is incinerated, there would be reduced pressure on the Mayo landfill capacity. While the Project refinements would increase the Operations Phase of the Project and relative amounts of estimated waste to be transported to the landfill, these are not anticipated to change the conclusions of the cumulative effects assessment.

Electrical Power Supply

The Minto mine became operational in 2008, and is accounted for in the YEC's 2009 load figure of 375 GWh. Alexco Resource Corporation's Bellekeno mine became operational in late 2010; its annual power usage is estimated at 14 GWh a year (Hopper 2010). Future mining projects (e.g., Western Copper Corp.'s Carmacks Copper mine, Yukon Zinc's Wolverine project) will place additional demands on Yukon's power supply. The Carmacks Copper Project (the operational date

for which is not known at the date of writing) is expected to contribute an additional 50GWh of demand annually.

YEC has indicated that it has existing installed capacity to supply approximately 750 GWh annually; studies are underway on additional supply options (including renewable energy) and demand-side management. YEC's Resource Plan is currently being updated.

The electrical energy demands associated with the operations phase of the Project are estimated to be between 114 GWh/year to 140 GWh/year depending on the year of operations (see Table 5.5.5). This demand will represent approximately 15 - 19% of the existing installed generation capacity (hydroelectric and diesel, 750 GWh annually) -- or a 30 -37% increase in the current electrical load in Yukon (approximately 375 GWh annually).

While the additional electrical power demands associated with the operations phase of the Project, in combination with existing and possible future mines represent a relatively significant demand on the Yukon electricity supply, known future demand is within existing installed capacity. The contribution of additional new supply options which are currently being studied and, together with demand management, will offset a portion of the cumulative demand from mining projects.

No adverse cumulative effect on electrical power supply is predicted as a result of Project refinements and the determined effects, conclusions and mitigation measures of the Project Proposal have not changed with respect to electrical power supply.

6.11.12 Socio-economic Effects, Mitigations, Commitments

Based on the evaluation of the Project refinements with respect to socio-economic VCs, it is concluded that none of the effects predictions, conclusions or mitigation measures will change as a result of modifications introduced by the Project refinements. With the longer operations phase providing additional employment and economic benefits, the positive effects of the Project to the local and Yukon economy will be enhanced.

Mitigation measures with respect to socio-economic effects and interactions of Project activities are consistent with those outlined in Table 6.11.32 of the Project Proposal: Summary of Commitments, Socio-economic Commitments, Mitigation measures, Monitoring and Adaptive Management which is reproduced in this SIR below for reference as Table 6.11-8. Any mitigation measures and implementation of adaptive management or monitoring plans with respect to the extended operations phase and Project schedule will be adjusted accordingly.

Table 6.11-8: Summary of Commitments, Socio-economic Commitments, Mitigations, Monitoring and Adaptive Management

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
Cross-Cutting Socio-economic Monitoring/Adaptive Management and Commitments VIT has identified monitoring and adaptive management and other commitments that are common to two or more VCs: ▪ Socio-economic change is not solely within the control of VIT. However, the company will cooperatively develop a process with FNNND, VoM, the Yukon Government and others for confirming socio-economic indicators, reporting and responding to monitoring results. Key socio-economic indicators for the Project will be monitored by VIT ▪ Ongoing negotiation of a comprehensive CBA with the FNNND ▪ Continued liaison and dialogue with FNNND, the VoM, Yukon Government and others throughout all Project phases	
1. Employment and Economic Opportunities	
Employment Opportunities ▪ Direct positive effect on employment opportunities during construction, operations and closure and reclamation for local , Yukon and Canadian residents.	▪ VIT will strive to hire as many FNNND citizens, other local and Yukon residents as practical. ▪ VIT will provide advice, expertise, mentorship and program development assistance to employment training programs, to be developed by Yukon College, the FNNND, the Yukon Mine Training Association. ▪ VIT will offer summer employment aimed at students who are returning to school.
Contracting Opportunities ▪ Direct positive effect on contracting opportunities during construction, operations and closure phase for local , regional and Yukon businesses.	▪ VIT will develop a Business Opportunities pamphlet. ▪ VIT will establish a database of local and Yukon businesses. ▪ VIT will seek to 'right-size' contracts where practical to facilitate greater access for local contracting opportunities. ▪ VIT will assist in facilitating the exchange of information between parties who are interested in possible joint ventures.
Royalties and Taxes ▪ Direct positive effect from royalties and taxes will be significant benefit to the Yukon and Federal governments.	▪ N/A
Effects from Expenditures ▪ Direct, indirect and induced positive effect from expenditures on the local, regional and Yukon economies.	▪ N/A

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
Effects on Other Local and Regional Economic Activities	▪ VIT will continue to communicate its plans and timing of proposed activities to other resource users (e.g., trappers, outfitters, quartz and placer miners, and known subsistence harvesters).
▪ Placer and Quartz Mining operations may benefit from improved access along the SMR and HCR.	▪ VIT has contacted placer mine operators in the area to advise them of the Project and to discuss any questions or potential concerns they may have.
▪ Outfitters and Tourism operators may experience moderate increases in activity as a result of the Project.	▪ VIT has contacted the two outfitters operating in the area to arrange meetings to advise them of the Project, and to discuss any questions or potential concerns they may have with the proposed Project. These discussions are ongoing.
▪ Commercial Trapping – pending the completion of discussions with the RTC owners, the potential effects of the Project on trapping cannot be conclusively stated.	▪ VIT has contacted the owners of Registered Trapline Concessions that overlap the Project to address their interests and concerns. If required, there is a compensation process available under the *Wildlife Act.*
▪ No effects on Commercial Fishing, Forestry and Agriculture, Oil and Gas.	▪ N/A
▪ There will be residual direct, indirect and induced benefits from the Project on local businesses and services in Mayo, and to a lesser extent to those located in Keno City and elsewhere on the Silver Trail.	▪ N/A
Potential Cumulative Effects on Employment and Economic Opportunities ▪ The Project, in combination with other Projects in the local area and Yukon, will result in significant positive cumulative effects on employment, contracting, and taxation and royalties. ▪ The competition for the eligible labour pool may result in capacity challenges for local organizations or businesses. ▪ Indirectly, improved capacity and skills development of both individual workers and contractors will result from the Project and other mining projects in the region.	▪ N/A

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
	Other Commitments for Employment and Economic Opportunities: ▪ VIT will commit to provide employment and business opportunities to qualified FNNND citizens, the Na-Cho Nyäk Dun Development Corporation, other local or Yukon businesses. ▪ VIT will provide advice, expertise, mentorship and program development assistance as it relates to educational programs, to be developed by Yukon College, the FNNND, the Yukon Mine Training Association, and potentially other organizations. ▪ VIT will engage with FNNND, Yukon College, MTA, and the Yukon Government to promote mining-related training programs. ▪ VIT has committed to a range of safety and health measures to ensure the well-being of workers at the Project. ▪ Commitments related to Wildlife, Vegetation Resources, and Fish and Fish Habitat are relevant in terms of potential effects on 'Other Local or Regional Economic Activities' (e.g., outfitting, tourism, trapping and maintenance of traditional subsistence lifestyles).
2. Traditional Activities and Culture	
Subsistence Harvesting ▪ Positive/negative effects on participation in subsistence harvesting ▪ Adverse, but reversible loss of road access to Potato Hills ▪ No effects on fishing ▪ No effects on berry picking ▪ Unknown effect on registered trapline concessions	▪ Improvements and radio-controlled access for a portion of the South McQuesten Road in a fashion that minimizes the loss or disruption of access to subsistence harvesting areas. ▪ A pull-off or parking area proposed at key fishing areas. ▪ VIT will develop a policy restricting Project-related employees and contractors from hunting and fishing while on the job at any time throughout the life of the Project. ▪ A revegetation program using indigenous flora will be implemented. ▪ VIT will communicate plans and timing of activities to other resource users who may be affected by the Project.
Language Preservation and Revitalization ▪ No effects on language preservation and revitalization	▪ N/A
Other Cultural Activities ▪ No effects on other cultural activities	▪ VIT will provide Cultural Awareness Training for all employees.
Heritage Sites and Special Places ▪ No effects on heritage sites or special places	▪ N/A
Potential Cumulative Effects on Traditional Activities and Culture ▪ No cumulative effects on traditional activities and culture	▪ N/A

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
	Other Commitments for Traditional Activities and Culture: ▪ The effects monitoring activities identified in for Fish and Fish Habitat, Vegetation Resources, Wildlife will serve to identify potential Project-related effects on Traditional Activities and Culture. ▪ Continued liaison with the FNNND, VoM and the MDRRC ▪ Provide support for FNNND and VoM community events ▪ Provide opportunities for FNNND citizens to participate in ongoing environmental monitoring activities ▪ Hire a Community Liaison person ▪ Use indigenous species during reclamation and closure
3. Community Vitality	
Population and Demographics ▪ No effect on the population levels in Mayo area ▪ Positive effect if small number of families move to community	▪ The Project will be a fully self-contained camp operation, employees will be transported to and from Whitehorse.
Local Educational Facilities and Services ▪ No effect on the enrolment at J.V. Clark School ▪ Moderate increase in demand at the Mayo campus of Yukon College	▪ Support for programs and initiatives at both J.V. Clark School and the Mayo campus of Yukon College
Crime ▪ No direct effect on local crime levels	▪ All employees will be transported directly to the Project and housed on-site to restrict unwanted access to Mayo. ▪ There will be a 'zero tolerance' policy with respect to drugs and alcohol on the mine site for employees and contractors. ▪ Policies and procedures will be established with respect to the use of local roads and highways. ▪ Cultural awareness training for all Project employees will reduce the potential for conflict.
Community Involvement ▪ No effect on community involvement if there are no new residents in Mayo	▪ VIT will provide support for FNNND and VoM community events. ▪ VIT will encourage its employees, who are residents of Mayo, to continue or initiate involvement in community activities or organizations.
Potential Cumulative Effects on Community Vitality ▪ No cumulative effects on community vitality	▪ N/A

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
4. Human Health and Well-being	
Local Health and Social Facilities and Services ▪ No direct adverse effects on the operation of the Mayo Health Centre or regional hospitals ▪ No adverse effects on the level or quality of local or regional health and social services	▪ VIT will have on-site first-aid and trained emergency personnel to provide primary care. ▪ Will establish an Emergency Response Plan for the Project
Mental Health and Addictions ▪ No effects with transient employees or contractors disrupting local community as a result of substance use ▪ No direct adverse effects on mental health or addiction levels of FNNND citizens or residents of Mayo	▪ Employees and their families will have access to benefits programs. ▪ VIT will make known the government and community agencies that are taking the lead on prevention, awareness, and treatment programs for mental health and addictions ▪ VIT will have a 'zero tolerance' policy for Project employees and contractors with respect to drug and alcohol use at the site. ▪ VIT will work with the Mayo Health Centre to provide drug and alcohol testing services.
Potential Cumulative Effects on Human Health and Well-being ▪ No effects on local health and social facilities ▪ Potential positive cumulative effects on improved quality of life for individuals and families	▪ N/A
	Other Commitments for Human Health and Well-being: ▪ VIT has committed to a range of safety and health measures to ensure the well-being of workers at the Project. ▪ VIT will work with Mayo Health Centre to discuss all necessary staffing and equipment to meet Project needs. ▪ VIT will have an employment policy that will ensure the health and safety requirements of the company. ▪ VIT will provide life and employment skills (e.g., budgeting and finances; dealing with rotational shifts and family challenges) opportunities for Project employees.

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
5. Infrastructure and Services	
Housing ▪ No effect on housing stock in Mayo (self-contained camp operation)	▪ VIT will work with FNNND and VoM to develop contingency plans to address accommodation needs of Project employees due to weather or other emergencies.
Emergency Services ▪ Minor effect of increased calls to Mayo RCMP. ▪ Minor effect on Mayo and other RCMP detachments between Whitehorse and Mayo in relation to possible road incidents. ▪ No effect on the Mayo fire department's service in terms of calls to Project site. ▪ Minor effect on Mayo fire department's service or other fire departments between Whitehorse and Mayo in relation to possible road incidents. ▪ Minor effect on Mayo ambulance service. ▪ Other ambulance services with jurisdiction along portions of the access route (from Whitehorse to Mayo) may be affected.	▪ VIT will work with emergency service providers (RCMP, fire department, ambulance service) to identify training and equipment required. ▪ VIT will implement a policy of zero tolerance for drug and alcohol use on the mine site. ▪ VIT will implement best practices and policies with respect to health and safety and for transportation (e.g., speed, safe driving practices). ▪ A Spill Contingency Plan and Emergency Response Plan will be cooperatively developed. ▪ Provision of on-site security will alleviate potential demand for RCMP services. ▪ VIT will have on-site personnel with the appropriate first aid training.
Landfill ▪ Effect on capacity of VoM landfill could be significant, if the landfill is not expanded. ▪ Minimal or no effect if the Project's solid waste is incinerated.	▪ A Waste Management Plan has been developed for the Project. ▪ VIT will engage with the VoM to discuss anticipated waste volumes and determine the availability of appropriate waste management facilities and programs.
Lagoons ▪ No significant adverse effects on lagoon capacity are anticipated from the disposal of sewage sludge waste produced by the Project.	▪ N/A

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
Child Care ▪ Project demand is not significant, given the current available capacity at the Dunena Ko'Honete Ko Day Care and in private home care.	▪ N/A
Roads ▪ Project is insignificant in terms of affecting the roadways (capacity, safety) ▪ Positive or beneficial effects for other users will result from the physical and maintenance improvements to the SMR and HCR	▪ No public vehicle access will be allowed at the mine site—Emergency response organizations that service the access road will be trained in terms of the types of materials transported and appropriate response. ▪ VIT will develop an Emergency Response Plan. ▪ VIT will control vehicle speeds of employees and contractors along the access route. ▪ Prior to commencement of radio control use on the HCR, a Radio Use Policy will be established. ▪ A pull-off or parking area is proposed at South McQuesten Bridge fishing area. ▪ VIT will perform regular maintenance on the HCR to ensure safety, maintain road condition. ▪ VIT will utilize the International Cyanide Management Code to guide the use and management of cyanide at the Project.
Mayo Airport ▪ In 2009 – 2010, there were almost 2700 aircraft movements; this is significantly less than the 8,800 movements that were experienced in 1981. Project charter flights will not significantly increase flight volume. ▪ Possible benefit resulting from 'seat sharing' would allow local residents to use empty seats on charter aircraft or buses coming to and from Mayo to Whitehorse or other communities.	▪ VIT plans to transport employees travelling from Whitehorse to Mayo using chartered aircraft and bus services. ▪ VIT will investigate opportunities for 'flight sharing' that would allow local residents, on a user pay basis. ▪ VIT will engage with FNNND, VoM, YG and others to determine if upgrades to the Mayo airport facilities or services are needed. ▪ VIT will support in principle the FNNND, VoM and YG in their efforts to encourage resumption of scheduled air service between Whitehorse and Mayo.

VCs	Mitigation, Monitoring and Adaptive Management, Commitments
Electrical Power Supply ▪ The electrical power demands associated with the operations phase of the Project represent 13% of the existing installed generation capacity or a 25% increase in the current electric load in Yukon – but is within existing installed capacity. ▪ Each industrial customer is required to pay for costs to connect to the utility grid; there are no costs for other customers. ▪ YEC has stated that it does not anticipate changes in the reliability of power supply to existing customers as a result of power needs of Project.	▪ VIT will meet the design criteria of Yukon Energy Corp. in design of the transmission line to supply the Project.
Potential Cumulative Effects Infrastructure and Services ▪ The cumulative effect on the capacity of the VoM landfill could be significant, if the landfill is not expanded.	▪ N/A
	Other Commitments for Infrastructure and Services: ▪ VIT will discuss any specific needs that may result from the Project with program and service delivery agencies, both the FNNND, and VoM. Collectively VIT, FNNND, and VoM may engage in discussions with the Yukon Government as appropriate on matters of shared interest

7 EVALUATION OF CARBON MANAGEMENT ASSESSMENT

Operations Phase

The Project Proposal estimated that during the operations phase, CO_{2e} emissions would amount to 7,765 tonnes per year—representing a 2.2% per year increase for Yukon measured against its 2008 emissions levels of 350 kt of CO_{2e}.

Project refinements may result in an estimated increase in emissions by approximately 1,048 tonnes, to 8,813 tonnes per year during the operations phase. This has been calculated conservatively, based on a 13.5% increase in average annual ore production as a relative measure for increased energy use for vehicles and equipment (from 26 000 tonnes to 29 500 tonnes). The total emissions for the Project operations phase is also increased from 56 684 tonnes to 88 130 tonnes to reflect the extended operations phase (from 7.3 years to 10 years).

At the end of year 9 of operations, active mining will cease and only gold extraction from the HLF will continue during year 10. Therefore there will be less power demand than in earlier years of operations, however for the purposes of this evaluation and updated estimates, the same average CO_{2e} (8,813 tonnes) has been extrapolated over all 10 years of operations to provide a conservative approach. Based on these conservative estimates, operational GHG emissions are predicted to increase by a modest amount with Project refinements. This will equate to approximately a 0.001% increase per year measured against Canada‘s 2008 emissions of 734,000 kt of CO_{2e}.

Construction and operations sources of GHG emissions are discussed in detail in Appendix 9 in the Project Proposal, and updated in Section 6.6 of this SIR. While the Project‘s CO_{2e}. can be estimated and have been updated based on Project refinements, as noted in the Project Proposal, the actual contribution to or impact on climate change cannot be measured or determined. The proposed design and operation of the Project remains consistent with existing mines in Yukon and Canada, and complies with all existing federal and territorial regulatory requirements. VIT has also continued to incorporate climate change considerations into its Project planning.

An example of this is VIT‘s consideration of two scenarios for power sources as described in the Project Proposal. The first scenario, Option 1, was based on 100% diesel generated power. The second scenario, Option 2, was a combination of diesel generated power and power supplied by the Yukon Energy Corporation electrical transmission grid. Option 2—Power provided by the Yukon Energy Corporation electrical transmission grid was determined to be the most economically and environmentally favourable option. Grid power is favourable over diesel power generation from an environmental perspective, as increased diesel emissions from diesel generators will result in increased GHG emissions.

With the refined Project and updated schedule, it is now assumed that power during construction will no longer be primarily diesel but also supplied by the transmission line, which further improves the environmental performance of the Project with respect to emissions contributions and climate

change considerations. Discussions between VIT and Yukon Energy Corporation are ongoing at this time. By working with Yukon Energy Corporation to develop a transmission line to the Project site for both construction and operational phases, VIT has further reduced the Project's reliance on diesel generators, and in doing so, decreased potential GHG emissions by a substantial margin.

VIT remains committed to further minimizing the Project's contribution to emissions as described in the Project Proposal in Section 7.3 including:

- Using Best Available Technology Economically Achievable (BATEA) measures and best Practices
- Using BATEA to meet or exceed relevant regulatory emission standards for all mine equipment
- Enforcing low speed limits for all mobile mine equipment
- Ensuring all mine equipment is properly tuned and maintained
- Reducing vehicle idling times

In addition, the Yukon government is considering reporting territorial GHG emissions through the "Climate Registry" in an effort to reduce its operational emissions (Yukon Government 2009a). The registry is a third party verification organization, which provides tools and support in tracking GHG emissions. The reporting mechanism will allow Yukon to measure and track progress towards achieving the goals identified in the Yukon Climate Change Action Plan (2009). As committed in the Project Proposal, if the registry does become active, VIT will support territorial initiatives to minimize GHG emissions during the Construction and Operations phase of the Project.

8 EVALUATION OF ASSESSMENT OF ACCIDENTS AND MALFUNCTIONS

Section 8 of the Project Proposal presented the assessment of potential effects to environmental and socio-economic VCs that could occur in the event of an accident or malfunction associated with the Project. The assessment took into consideration legislation applicable to the Project as well as industry best practices. The purpose of the assessment at the preliminary stage of Project design was to establish an understanding of the types of events that might occur and to assess whether or not it is reasonable to expect that design and management practices can reduce potential effects to a level that is not significant. The review of potential accidents and malfunctions and the means for prevention and response will be conducted in detail as Project design advances and during the permitting and licensing phases.

8.1 SCOPE OF THE ASSESSMENT

The potential accidents and malfunctions considered in the Project Proposal assessment included:

- Transportation accident
- Hazardous materials spill
- Heap leach facility (HLF) breach
- Slope failure (open pit and WRSAs)
- Water conveyance and storage infrastructure failure
- Power failure
- Fire and/or explosion

8.1.1 Regulatory/Policy Setting

Section 42(1)(c) of the *Yukon Environmental and Socio-economic Assessment Act* (YESAA) states that in conducting an assessment, the Yukon Environmental and Socio-economic Assessment Board (YESAB) shall take into consideration:

- The significance of any environmental or socio-economic effects of the project or existing project that have occurred or might occur in or outside Yukon, including the effects of malfunctions or accidents.

The YESAB “Proponent’s Guide to Information Requirements for Executive Committee Project Proposal Submissions” provides additional guidance and was consulted with respect to information contained in this Section. In addition transportation and use of materials such as fuels and explosives are governed by a number of federal and territorial regulations and guidelines administered by various agencies (at the territorial and federal level). Further information regarding Federal and territorial legislation and guidelines, and industry best practices establish requirements

for pre-emptive planning for, responding to, and reporting of, accidents and malfunctions may be found in Section 8.1.1 of the Project Proposal.

8.2 APPROACH

Section 8.1.2 of the Project Proposal sets out the approach taken to assess the effects of potential accidents and malfunctions. The approach taken to each potential accident and malfunction followed the same approaches described in Section 6.1 for the individual VC assessments which, as set out in the Project Proposal, involved the following:

1. Potential interactions with each VC were identified (Table 8.1-3).
2. Mechanisms of interaction between each accident or malfunction and each VC was described.
3. Project design measures that minimize the potential for an accident or malfunction, and the emergency response, mitigations, and follow-up monitoring to minimize the environmental effect were described.
4. The subsequent likelihood of occurrence (Table 8.1-4) and environmental consequence (Table 8.1-5) was described to provide context to the assessment.
5. The potential residual environmental or socio-economic effects to each VC were described using the measurable parameter(s) and other effect characterization terms identified in the individual VC assessment sections (Section 6.4 to 6.11).
6. The significance of the predicted effect or change was then evaluated within the context of the potential consequence of the effect and the likelihood of the event occurring. (Section 6.3.7).

Each of the above steps and conclusions presented in the Project Proposal were evaluated for change to predictions or required mitigation measures with respect to the Project refinements.

8.2.1.1 Event Interactions with the Biophysical and Human Environment

The assessment of potential effects to VCs in the Project Proposal was based on an initial screening and ranking of the interactions between potential accident and malfunction events and each VC to identify areas of higher risk. The ranking of interactions was completed as described in Section 6.3.1 of the Project Proposal.

Higher risk interactions were ranked as ‘2‘ and carried forward for more detailed assessment, similar to those carried out for individual VCs (Section 6.3). Lower-risk interactions (ranked as ‘1‘) are defined as: a) those, which based on past experience and professional judgment, would be nominal and not result in significant effects, even without mitigation; or b) those interactions that would not be significant due to the application of codified practices known to effectively mitigate the predicted effects. These interactions are described, but not carried forward for detailed assessment. Where no interaction is anticipated a ranking of ‘0‘ is assigned. Table 8.2-1 provides the rankings assigned to each event-VC interaction. These interactions are further described in Section 8.2.

Table 8.2-1: Interaction of Project Related Accidents and Malfunctions with Environment

Accident and Malfunction Event Scenarios	Surficial Geology, Terrain, and Soils	Water Quality and Aquatic Biota	Air Quality	Fish and Fish Habitat	Vegetation Resources	Wildlife Resources	Heritage Resources	Employment and Economic Opportunities	Traditional Activities and Culture	Community Vitality	Human Health and Well-being	Infrastructure and Services
Transportation accident	0	0	0	0	0	1	0	0	0	0	0	1
Hazardous materials spill	2	2	1	2	1	1	0	0	1	0	1	1
Heap leach facility breach	2	2	0	2	1	1	0	1	1	0	1	1
Slope failure (open pit and WRSAs)	2	2	1	2	1	0	0	0	0	0	0	0
Water conveyance and storage infrastructure failure	1	2	0	2	0	0	0	0	0	0	0	0
Power failure	0	0	0	0	0	0	0	0	0	0	0	0
Fire and/or explosion	0	1	2	1	2	1	0	0	1	0	1	1

PROJECT-ENVIRONMENT INTERACTIONS

0 = No interaction

1 = Interaction occurs; however, based on past experience and professional judgment the interaction would not result in a significant environmental or socio-economic effect, even without mitigation; or interaction would not be significant due to application of codified environmental protection practices that are known to effectively mitigate the predicted environmental or socio-economic effects

2 = Interaction could result in an environmental or socio-economic effect of concern even with mitigation; the potential environmental and socio-economic effects are considered further in environmental assessment

8.2.1.2 Event Likelihood and Consequence

Based on information from previous mining projects and the professional judgment of the Project team, a classification of likelihood and of consequence were assigned to each event. The purpose of assigning a likelihood category is to ensure consistency in how likelihood is estimated for different events, and to provide context for assessing potential effects. A consequence rating provides a broad view of how severe a potential event could be if it occurred.

Table 8.2-2 list the likelihood and Table 8.2-3 consequence classification definitions used for the assessment consistent with the Project Proposal

Table 8.2-2: Event Likelihood Classification

Likelihood	Description
Very unlikely	Not expected to occur during life of the Project
Unlikely	Low probability of occurrence during life of the Project
Likely	Could happen during life of the Project
Highly likely	Expected to happen during life of the Project

Table 8.2-3: Event Consequence Classification

Consequence	Description
Very low	Effects are localized and reversible through mitigation
Low	Effects extend beyond event site and persist over the short-term, but are reversible through mitigation
Moderate	Effects extend to the larger Project site, and persist over the life of the Project, but are reversible through mitigation
High	Effects extend beyond the Project site and persist beyond the life of the Project

8.2.1.3 Effects Assessment

The accidents and malfunctions assessment in the Project Proposal screened each potential accident and malfunction to identify the following:

- Project design measures to minimize risk;
- the likelihood and consequence if the event occurred; and,
- the potential effects if the event occurred.

The Project Proposal concluded that in most cases Project design and Project-specific mitigations took into account the potential for these events and either eliminated or reduced the potential effect to a level that would not be significant. Other identified potential effects were judged to be adequately addressed through the application of codified practices and industry accepted best management practices. In those cases where the potential for effects of concern could not be eliminated, it was found that the likelihood of the event occurring could be reduced to a level where they were unlikely or very unlikely to occur during the life of the Project. In tandem with this, VIT's commitment to the development of a Project-specific emergency response plan (Appendix 33 in the Project Proposal) for all reasonably foreseeable potential accidents and malfunction is a key mitigation to limiting the scope of potential effects in case an event did occur. With mitigations in place and the likelihood of occurrence reduced to unlikely or very unlikely, it was determined that accidents and malfunctions do not pose a significant threat to the Valued Components described in the Project Proposal.

8.2.1.4 Modifications introduced by the Project Refinements

Project refinements have the ability to modify the interactions of potential accidents and malfunctions risks with valued components in a limited number of ways. Potential accidents and malfunctions that are ranked with a "1" or a "2" AND that are modified by the Project refinements include:

- Transportation accident: Project refinements include increased estimated traffic volume during construction and operations phases
- Hazardous materials spill: Although no new hazardous materials are introduced by the Project refinements, increased estimated traffic volume during construction and operations phases will result in slightly higher risk of spills

- Heap leach facility breach: Project refinements include an expanded heap leach facility; however the design criteria for the HLF is based on industry practice, using this design basis the engineering design has been improved which decreases risk of breach.
- Slope failure (open pit and WRSAs): Project refinements include an expanded open pit and WRSA facilities; however additional geotechnical investigations engineering analyses has been completed as part of the Feasibility Study which improves continued design of the open pit and WRSAs to prevent pit wall and slope failures among other things.
- Water conveyance and storage infrastructure failure: The Project refinements include an optimized water management plan that includes a design basis for conveyance and storage infrastructure that reduces risk of failure from that proposed in the Project Proposal.
- Power failure: Project refinements reduce winter energy requirements however criteria for back-up power capacity required during operations remains unchanged.

The above modifications and resultant changes to the accidents and malfunctions assessments are described in the sections that follow.

8.3 EVALUATION OF ACCIDENTS AND MALFUNCTIONS ASSESSMENT

8.3.1 Transportation Accident

The vast majority of materials required for Project construction, operations, closure and reclamation will be transported to the site by truck from Whitehorse to Stewart Crossing on Highway 2 (Klondike Highway), northeast toward Mayo on Highway 11 (Silver Trail), and then west and northwest along the South McQuesten Road (SMR) and Haggart Creek Road (HCR). A small quantity of materials or personnel may come to the site from Dawson City or from Keno City. This preliminary plan is not modified by Project refinements. The SMR and HCR will be upgraded to accommodate the payloads and traffic volumes required for the Project. This section evaluates the potential effects of the "accident" per se, not the effects that might result from the spilling of cargo. Potential effects of hazardous materials spills are considered in Section 8.2.2 of the Project Proposal.

The major risks associated with materials transportation include equipment failure, poor road conditions, multiple vehicle accidents, wildlife crossings, and human error. Assuming a single incident, the magnitude of the largest loss would be restricted to the capacity of the largest load. Without appropriate emergency response, a transportation accident could result in a release of hazardous materials into the environment. Depending on the accident location and the type of material involved, effects could spread significant distances from the accident site if hazardous materials were to reach moving water.

The Project Proposal estimated that Project-related traffic volumes would include:

- Construction (20 months):
  - 1,500 to 1,800 semi-trailer loads (round trip)

  - 10 to 20, 1 to 5 tonne trucks per day on average (6,000 to 8,000 total round trips)
  - 10 passenger car or pickup trucks per day.
- Operations (7.3 years):
  - 1,944 trucks per year (round trip)
  - 100 to 200 buses per year (round trip)

Project refinements result in the following increases to traffic volume estimates:

- Construction (25 months):
  - 2,500 semi-trailer loads (round trip)
  - 10 – 20, 1 to 5 tonne trucks per day on average or 7,500 to 10,000 total round trips
  - 10 passenger car or pickup trucks per day.
- Operations (9 years):
  - 2,200 trucks per year (round trip)
  - 100 to 200 buses per year (round trip)

8.3.1.1 Project Design Measures to Minimize Risk of Transportation Accidents

Section 8.2.1.1 of the Project Proposal lists a number of design measures and proposed mitigation that have been or will be implemented to minimize the potential for transportation accidents for the Project. These measures are unchanged by the Project refinements and will be effective in reducing the likelihood and consequences of transportation accidents to non-significant effects.

8.3.1.2 Transportation Accident Likelihood and Consequence

Section 8.2.1.2 of the Project Proposal provides an estimate of the likelihood of potential traffic accidents associated with the Project. It was estimated that following traffic accident categories will be likely over the life of the Project:

- accident due to equipment failure
- accident due to poor road conditions
- accidents involving wildlife, particularly in spring, fall, and winter. Risks of wildlife collisions are common throughout Yukon and are a hazard to both bulk carriers and regular vehicle traffic

The likelihood of these accident categories occurring over the life of the Project are unchanged by Project refinements – they remain likely.

These conclusions of likelihood of a transportation accident are unchanged by Project refinements and estimated increases to traffic volume over the life of the Project. VIT recognizes that the risk of transportation related accidents is positively correlated with traffic volume. Nevertheless, VIT's goal for the Project will be zero accidents. To ensure traffic safety and to minimize the potential for transportation accidents for the Project, VIT outlined proposed measures it will implement to ensure

human and environmental health and safety and to ensure Project vehicle safety. Those measures and mitigations, identified in Section 8.2.1.1 of the Project Proposal, remain the same for the Project refinements.

Consistent with the Project Proposal, the consequence of an accident due to any of the above causes is considered very low, as effects would be limited to the accident site and could be dealt with by a small number of first-responders, likely from the mine site.

8.3.1.3 Potential Effects of Transportation Accidents

Based on the screening of potential interactions between transportation accidents and valued components, transportation accidents are not expected to result in an environmental or socio-economic effect of concern by implementing codified mitigation and industry best management practices. The potential effects of spills resulting from transportation accidents are discussed in Section 8.3.2. The potential interactions ranked as '1' are discussed below.

Wildlife Resources—Effects to wildlife associated with increased traffic are discussed in Section 6.9.3 of the Project Proposal. While the rates of wildlife mortality due to current or projected traffic volumes are not known, it is expected mortality risk will be minimized through implementation of proven mitigation measures described in the Project Proposal with consideration of the increase of traffic volume. The Project is not expected to pose a substantial mortality risk for wildlife and effects on mortality are considered not significant. These conclusions are unchanged by refinement of the Project.

Infrastructure and Services—Effects to emergency services associated with transportation accidents are discussed in Sections 6.11.6.4 to 6.11.6.6 of the Project Proposal. Consistent with the conclusions provided in the Project Proposal, based on the types of Project-related accidents that could occur and the mitigation measures proposed, potential transportation accidents are not expected to have a significant adverse effect on infrastructure and services.

8.3.2 Hazardous Materials Spills

Hazardous materials required for Project construction, operations, and closure and reclamation were grouped into four major categories in the Project Proposal:

- Petroleum products (diesel fuel, gasoline)
- Reagents (sodium cyanide, lime, sodium hydroxide, hydrochloric acid, hydrogen peroxide, smelting fluxes)
- Lubricants (oils, degreasers, solvents)
- Blasting compounds.

These groups of hazardous materials were assessed as each could be accidentally released during product transportation, storage, and use, and have the potential to contaminate soil, air or water, damage vegetation, and be toxic to humans and wildlife, either within the facility boundaries or along roads used to transport materials. The magnitude and extent of spills to the terrestrial or aquatic

environment will depend on the severity of the spill (e.g., type of product, quantity, location, duration), environmental conditions at the time (e.g., season, weather), and the timing and effectiveness of spill response activities.

Hazardous materials are identified by the TDGR, and their effects are categorized in Material Safety Data Sheets (MSDSs) as, for example, combustible, carcinogenic, or toxic. Table 8.2-1 in the Project Proposal lists hazardous materials that will be used for the Project, and presents an overview of the potential effects of each substance on human and ecological health.

The types of hazardous materials have not changed as a result of Project refinements. However the volumes of hazardous materials will be increased slightly to account for the increased production rate and these materials will be in use for a longer duration to account for the increased duration of the construction and operations phases of the Project. The impact of these modifications are discussed in subsequent sections related to likelihood and potential effects.

8.3.2.1 Project Design Measures to Minimize Risk of Hazardous Materials Spills

Section 8.2.1.2 of the Project Proposal lists proposed mitigation measures that will be implemented to minimize the potential for hazardous materials spills. These measures are unchanged by the Project refinements and will be effective in reducing the likelihood and consequences of hazardous materials spills to non-significant effects.

8.3.2.2 Hazardous Materials Spills Likelihood and Consequence

The likelihood and consequence of a hazardous materials spill during transportation, storage and use are presented in section 8.2.2.2 of the Project Proposal. In summary, the Project Proposal concluded that the likelihood of a hazardous materials spill during transportation is expected to be lower than the likelihood of a transportation accident due to the containment methods used for transport. While based on transportation accidents statistics, accidents due to equipment failure, road conditions, and wildlife are considered likely during the life of the Project, it is considered unlikely that these types of accidents would result in a hazardous materials spill. The consequence of a spill during transportation could range from very low to moderate, depending on the quantity, location, and product type. In the unlikely event that a transportation accident was to result in a spill, and if the spill was near a watercourse, and the spill were to enter the watercourse, effects could extend for several kilometres downstream, affecting aquatic species and habitats. The transportation of hazardous materials is highly regulated and will limit the quantities of materials transported per truck, therefore, the quantity of material that could be spilled is unchanged by Project refinements. Increased traffic volumes are a result of Project refinements and the increased risk with this change are discussed above in traffic accidents.

Based on the standards used for design of storage and containment facilities, a spill escaping to the external environment during product storage is considered unlikely. The consequence of a spill in the vicinity of storage areas is considered low to very low, as these areas will generally be designed for containment (lined or concreted areas) and free of vegetation, and designed with drains and oil/water separators to manage potential spills. In addition, all surface water from the mine site will be treated

as required before it is discharged to the environment. The standards used for design of storage and containment have not changed as a result of Project refinements, therefore this likelihood remains unchanged.

The potential for a spill during product use will vary depending on the frequency and quantities used level of handling risk, and handling methods. However, based on the overall frequency of hazardous materials use at the site, a hazardous materials spill during handling is considered likely, but the consequence of a spill during handling is considered low to very low, for the reasons described above related to spills during storage. The standards to be applied to use of materials have not changed as a result of Project refinements, therefore the likelihood of spills during use remains unchanged.

Upon consideration of the proposed mitigation measures, the Project refinements do not alter the conclusions of likelihood or consequences of hazardous materials spills presented in the Project Proposal and reproduced above.

8.3.2.3 Potential Effects of Hazardous Materials Spills

Based on the screening of potential interactions between a hazardous materials spill and VCs receiving a "2" in Table 8.3-2, the VCs that are most likely to be adversely affected include:

- Surficial Geology, Terrain, and Soils
- Water Quality and Aquatic Biota
- Fish and Fish Habitat.

Interactions with VCs ranked as "1" in Table 8.3-2 are described below.

Air Quality—the Project Proposal concludes that potential spills would not result significant effects to air quality and therefore air quality concerns associated with spills are low. This conclusion is based on the fact that for any spill, it is anticipated that under calm conditions, the area in which the gas or particulate would disperse would be limited (<1 km²) and short-term (4 to 8 hours). Under windy conditions the dispersion area could be larger (<5 km²), but the duration for dissipation would be reduced. The dispersion rates of the material spilled is unchanged by Project refinements; therefore this conclusion remains consistent with that presented in the Project Proposal.

Vegetation Resources—the potential for spills is higher within the mine site boundaries, which will be cleared of vegetation. Spills during transport could affect vegetation in the immediate vicinity of the roadway, however effects would be localized, mitigated through clean-up and restoration of the area, and not expected to persist over the long-term. Quantities of hazardous materials transported will not be increased to a degree that will change this conclusion; therefore this conclusion remains consistent with that presented in the Project Proposal.

Wildlife Resources—spills during transport of hazardous materials would indirectly affect wildlife through damaged terrestrial habitat. Effects would be short-term and localized, and are not expected to have a significant effect on wildlife species. Spills will be contained and remediated within a short period of time; therefore the risk of wildlife exposure to hazardous materials is very low. As

discussed above, spills within the mine site boundaries would not affect vegetated areas and would be contained and treated onsite, therefore no effects to wildlife are anticipated. Quantities of hazardous materials transported will not be increased to a degree that will change this conclusion; therefore this conclusion remains consistent with that presented in the Project Proposal.

Traditional Activities and Culture—Effects to traditional activities due to a spill would be associated with effects to fish, wildlife, or vegetation. As discussed above, effects to these VCs would vary depending on the nature of the spill event. Spills within mine site boundaries are not expected to pose a risk to these VCs, and spills within the road right of way are expected to be localized and reversible through clean-up and restoration efforts. Spills which enter a watercourse could have more severe and/or longer term effects to fish and fish habitat, which have been described below. Should a spill result in areas of contamination, a fish and fish habitat monitoring plan will be developed, which will take into consideration potential effects to fish species used for traditional purposes and follow-up monitoring and reporting will be required. Quantities of hazardous materials transported will not be increased to a degree that will change this conclusion; therefore this conclusion remains consistent with that presented in the Project Proposal.

Human Health and Well-being—The magnitude of potential effects on human health will depend on the severity of the spill (e.g., substance, location, quantity, timing), as well as whether it remains localized. Table 8.2-1 lists potential effects on human health of an accidental release or misuse of hazardous materials that will be used at the mine. With the implementation of standard mitigation measures and use of prescribed personal protective equipment for use of hazardous materials and first-response efforts, no effects to human health are anticipated.

Infrastructure and Services—Hazardous materials spills have the potential to place additional pressure on public emergency response resources. Initial spill response activity will be managed internally and VIT will ensure first responders with training specific to hazardous materials used for the Project (e.g., cyanide) are on hand at the mine site at all times. Based on the quantities of materials transported and stored for the Project, it is anticipated VIT and their contractors would be able to manage spill response internally without placing additional burden on public resources, therefore adverse effects to infrastructure and services are not anticipated.

Evaluation of those VC for which there could be an interaction of concern with hazardous materials spills (those interactions scored “2”) are discussed below.

Potential Effects to Surficial Geology, Terrain, and Soils

The Project Proposal predicts residual effects of a spill on soil quality is expected to be short term, reversible, and site-specific. The magnitude is considered low, as the contaminated area will be remediated and equivalent land capability returned. Potential residual effects could be significant if important habitat, infrastructure, or human safety are affected; however, these effects can be reduced and managed with the application of a well-defined Emergency Response Plan, complemented by additional measures identified in a follow-up and monitoring plan as required. It is anticipated the effects would be temporary and prior land uses could be re-established within a one year timeframe. This prediction is unchanged because no changes to mitigation measures and

emergency response plans are required for the increased use of materials over the increased duration of the Project.

Potential Effects to Water Quality and Aquatic Biota

The risk of a hazardous materials spill into a water body exists only during transport as the mine site is designed to capture and treat potential spills and mine contact water before it is discharged to the environment. While the Project design, mitigation and emergency response measures render a spill entering a water body unlikely, if such an event were to occur, it could have a significant short-term effect on water quality and could lead to sub-lethal or lethal effects on sensitive aquatic species. Its magnitude and geographical extent may be significant depending on the spill volume and characteristics of the receiving watercourse. However, a well-designed emergency response plan can limit the spatial and temporal effects of such a spill. Emergency response planning may be complemented by additional mitigation measures as determined by follow-up monitoring. The Project Proposal determined that given the mitigations that will be in place and that the spill of a hazardous material into a watercourse during the life of the Project is unlikely, the potential for such a spill is not considered to pose a significant threat to water quality and aquatic biota.

Magnitude and geographical extent of the spill may be significant depending on the spill volume and characteristics of the receiving watercourse (e.g., flow, depth, velocity). However, a well-designed emergency response plan can limit the spatial and temporal effects of such a spill. Emergency response planning may be complemented by additional mitigation measures as determined by follow-up monitoring. Potential residual effects of a hazardous material spill are considered temporary (zero to four years) and reversible.

The Project refinements do not modify the list of hazardous materials that will be required by the Project but do modify the quantity of hazardous materials to be transported, stored and used on site. This will increase the frequency with which the materials will be transported and the duration the hazardous materials will be stored and used on site. This in turn may increase the likelihood of an accidental release. However, as neither the methods nor the mitigation measures for transporting, storing or using hazardous materials have been modified, it is not anticipated that the Project refinements will alter the predicted potential effects to water quality and aquatic biota. Given the mitigations that will be in place and that the spill of a hazardous material into a watercourse during the life of the Project is unlikely, the potential for such a spill is not considered to pose a significant threat to water quality and aquatic biota.

Potential Effects to Fish and Fish Habitat

A hazardous material spill event will impact water quality and aquatic environment that fish depend on as their habitat. A discussion of effects of such spill on water quality and aquatic environment is provided in the previous section. Fish dependent on invertebrates as a food source may be adversely affected by contaminated organisms as such a spill may cause mass mortality of invertebrates and planktons. Levels of fish contamination will be a function of contaminant levels in sediments and invertebrates. A sediment monitoring program will assess and evaluate the potential and type of adverse effects on fish species that are directly dependent on sediments and

benthic invertebrates. Magnitude and geographical extent of a spill may be significant depending on the type and volume of the spill and characteristics of the receiving environment. However, a well-designed emergency response plan can limit the spatial and temporal effects of such a spill. Emergency response planning may be complemented by additional mitigation measures as determined by follow-up monitoring. The Project Proposal determined that potential residual effects of a hazardous material spill are considered temporary (zero to four years) and reversible.

The Project refinements do not modify the list of hazardous materials that will be required by the Project but do modify the quantity of hazardous materials to be transported, stored and used on site. This will increase the frequency with which the materials will be transported and the duration the hazardous materials will be stored and used on site. This in turn may increase the likelihood of an accidental release. However, as neither the methods nor the mitigation measures for transporting, storing or using hazardous materials have been modified, it is not anticipated that the Project refinements will alter the predicted potential effects to fish. Given the mitigations that will be in place, and that the spill of a hazardous material into a watercourse during the life of the Project is unlikely, the potential for such a spill is not considered to pose a significant threat to fish and fish habitat.

8.3.3 Heap Leach Facility Breach

A review of HLF failures resulting in the release of leach solution, found that effects were limited to temporary contamination of surface and ground water. These releases occurred due to extreme climatic conditions and in a few cases from leaks. The consequence of failures is most critical during operations, when pregnant solution is being circulated through the HLF; therefore the assessment presented in the Project Proposal focused on the operations phase.

Potential areas of risk associated with the HLF include:

- Seismic and slope stability of the HLF and confining embankment
- Hydrological water balance
- Infiltration and leaching process
- Liner leaks

Site selection for the HLF was based on a two stage assessment of the suitability of potential locations (Section 5.8.2.4). Stage 1 considered significant engineering criteria for each potential site, and Stage 2 considered a Project-wide assessment of impacts for each option. The results of this assessment established a clear site location preference for the current location (within the Dublin Gulch valley and up the Ann Gulch side-valley). Further discussion on site selection is provided in the December 2011 Supplementary Information Report provided by VIT to YESAB.

Quantitative modelling analyses have been used in the design of all critical components of the HLF, such as the in-heap pond, events ponds, and for assessing potential effects to the environment under worst case conditions. Details of HLF design and construction are provided in Section 5.4.1.5. Additional details are provided in the HLF Feasibility Design Report (Appendix 4).

8.3.3.1 Project Design Measures to Minimize Risk of Heap Leach Facility Breach

Design measures and proposed mitigation measures will be implemented to minimize potential for a HLF breach resulting in release of cyanide solution to the environment. Updated HLF Design is described in Section 5.4.15 of this SIR and additional details are provided in Appendix 6 of this SIR.

The Heap Leach Facility design standards adopted for the project include:

- The regulatory requirements of Yukon and Canada;
- The Yukon Water Board Licensing Guidelines (2012);
- Guidelines from the Canadian Dam Association (2007); and
- Permitting requirements of the State of Nevada. These are not regulatory requirements in the Yukon, but are considered as standards for best practice.

There are currently no published international standards for the design and construction of Heap Leach Facilities. Nevada State Guidelines provide minimum standards for heap leach facilities and have been adopted for the Project. North American standards for the design of embankment dams were used where applicable, specifically the Canadian Dam Association guidelines. Table 4.1 of Appendix 4 summarizes the main technical and permitting requirements for the State of Nevada for the key elements of the HLF design.

The following is a summary of pertinent design measures with respect to potential breach of the HLF:

Stability of HLF and Confining Embankment

- A seismic hazard analysis (SHA) was performed by Tetra Tech. The SHA includes results from both deterministic and probabilistic methods. Deterministic analyses were performed using five equally weighted attenuation relationships to evaluate seismic hazards resulting from a maximum credible earthquake (MCE). The design basis has a considerate level of conservatism inherent to a deterministic analysis, and the added conservatism discussed in the SHA. The HLF and confining embankment have been designed using a PGA of 0.27g for high hazard facilities, based on an MCE of moment magnitude 7.0 generated in the Ogilvie Mountains area (Appendix 6).
- Further engineering analyses and geotechnical assessment of the HLF including the embankment have been completed since submission of the Project Proposal and are appended to this report as Appendix 6.
- The HLF was evaluated for both static and pseudo-static (earthquake) conditions using a Maximum Design Earthquake (MDE) and a 50 percent horizontal ground acceleration factor for the analyses. The engineering design criteria are presented in Section 4.4 of Appendix 6 and provides for an operational minimum static factor of safety of 1.3 for the ore heap (non-impounding areas) and 1.5 for the confining embankment. The minimum factor of safety for pseudo-static conditions is 1.0.

HLF Liner Leak

The liner for the leach pad and event ponds will consist of a composite geomembrane and underlying low-permeability bedding material, which is the standard practice for heap leach facilities liner systems.

- Differential settlement on the liner system due to variable loading conditions was considered in the liner design
- The GCL surface provides rock puncture protection to the overlying geomembrane liner, and only requires a smoothed and compacted subgrade surface graded to drain and support the composite pad liner system
- Piezometers will be installed within the liner cover fill at strategic locations to monitor the hydraulic head on the liner system during pad operation
- The in-heap pond will have a double-geomembrane liner together with a leak detection system. The leak detection system will be installed between the two geomembranes to monitor and contain any leaks through the top geomembrane
- LLDPE geomembranes were selected for the leach pad including the in-heap pond geomembrane, and HDPE geomembranes were selected for the event ponds for the following reasons:
    - LLDPE geomembrane has significantly better elongation performance, puncture resistance, interface friction strength, and stress cracking resistance compared to HDPE geomembrane;
    - LLDPE geomembrane remains flexible at temperatures well below freezing to about -25°C with a low temperature brittleness of -70°C according to ASTM D-746;
    - HDPE geomembrane has better chemical and UV resistance; and
    - LLDPE geomembrane can be readily seamed to HDPE geomembrane.
- A 1.5-mm (60-mil) LLDPE geomembrane was selected for the leach pad, based on performance requirements and past design and construction experience. The geomembrane will be double-side textured above the GCL to enhance heap stability and construction safety. The event pond geomembrane will be 2.0-mm (80-mil) single-side textured HDPE with the textured side up for traction

Water Balance Issues

- The in-heap pond is designed to accommodate maximum operational volume combined with a storm event and draindown for Phase 1 of development (Years 1 and 2). In Phases 2 and 3, the events ponds will provide additional storage.
- Should the capacity of the in-heap pond be exceeded, excess solution would flow into two lined events ponds (with leak detection and recovery systems underneath the main liner).

- Events ponds will be maintained empty to allow 100% of the total potential draindown volume to be stored (in combination with the in-heap pond) throughout the life of the Project in all precipitation conditions.
- The In-heap pond and events ponds will be managed to accommodate concurrently the total draindown volume after 72 hours plus the runoff and infiltration from both an extreme snowmelt and an extreme precipitation event throughout the life of the Project.
- The HLF will be operated to allow for adequate storage in the event of an emergency or extreme precipitation event.
- Measures to prevent ice formation, which can reduce storage capacity in the HLF due to reduced pore space in the ore will include:
  - Utilizing boiler heat to warm leachate solution during winter
  - Burying the solution irrigation system within the top 2-3 m of each lift within the HLF to retain heat
  - Installation of thermistors and water level sensors to monitor parameters within HLF
  - Excluding the placement of ore on the HLF during the coldest period of the year (mid-November to March - approximately 100 days per year) to avoid formation of permanent ice lenses within the HLF.

Adaptive Management for Liner Leaks

HLF liners, when properly installed, are essentially leak free. Nevertheless, there are always minute flaws, even under optimal installation, which could allow for solution leakage through one or more layers of the liner. The Nevada State Guidelines for HLF development recognize this potential for leakage, and has developed permitted flow rates from leak detection systems, which will be adhered to for this Project. According to the Nevada Guidelines, if flow rates from the Leak detection and recovery system (LDRS) exceed permit limitation, a site- specific evaluation must be conducted by the proponent to assess the need for any additional process component or site monitoring. VIT has developed an adaptive management approach to dealing with potential liner leaks that was presented in Section 8.2.3.1 of the Project Proposal. This approach is unchanged by refinement of the HLF design and will serve as an integral component of the detailed Environmental Monitoring Plan for the Project that will be submitted for review by the Yukon Water Board and Yukon Government Energy Mines and Resources as part of the Water License and Quartz Mining License applications respectively.

8.3.3.2 Heap Leach Facility Breach Likelihood and Consequence

The likelihood and consequence of a hazardous materials spill during transportation, storage and use are presented in section 8.2.3.2 of the Project Proposal. In summary, the Project Proposal concluded that based on the HLF design criteria, inspection, testing, and monitoring proposed for the HLF, it is considered very unlikely that cyanide solution will be released into the environment during the life of the Project. In the event of HLF breach due to embankment failure, the consequence

would be high if cyanide solution and high volumes of sediment reached the Dublin Gulch Diversion Channel and receiving environment in Haggart Creek. Consequence of a liner leak would depend on the magnitude of the leak. In a worst case scenario involving catastrophic failure of the liner, the consequence would be considered high, as high volumes of solution would be leaking at a high rate, and would be likely to reach groundwater and potentially Haggart Creek.

Upon consideration of the HLF Design criteria and proposed monitoring and adaptive management plan, the Project refinements do not alter the conclusions of likelihood or consequences of a HLF breach presented in the Project Proposal.

8.3.3.3 Potential Effects of Heap Leach Facility Breach

Based on the screening of potential interactions between a HLF breach and VCs (Table 8.1-5), the VCs that are most likely to be adversely affected (ranked as 2) include:

- Surficial Geology, Terrain, and Soils
- Water Quality and Aquatic Biota
- Fish and Fish Habitat.

Interactions with VCs ranked as 1 are as follows:

Vegetation Resources—The Project Proposal predicts that adverse residual effects of a HLF breach on vegetation are not anticipated. This prediction is unchanged by Project refinements because the HLF design criteria is unchanged with a number of design improvements introduced by the refinements which increases the confidence of this prediction.

Wildlife Resources—Potential effects to wildlife of a HLF failure would be associated with cyanide exposure. Liner leaks would not result in any cyanide being released above-ground, and, as discussed above, vegetation is not expected to lead to accumulate in plant tissues which could be ingested by wildlife. In the event of an embankment failure, the in-heap pond could release cyanide to the environment where wildlife could be exposed. In the event of this unlikely occurrence, the area would be immediately isolated in accordance with the Emergency Response Plan (Appendix 33 of the Project Proposal). Emergency response efforts will include measures to ensure any areas of ponded cyanide solution are covered or isolated to avoid exposure to birds and wildlife, and no adverse effects to wildlife are anticipated. This prediction is unchanged by Project refinements as the mitigation measures proposed in the Project Proposal will be sufficient to mitigate potential consequences of a HLF breach.

Employment and Economic Opportunities—In a worst case scenario, a HLF breach could require the mine to shut down for an extended period of time, which could affect employment opportunities. In such a case, it is expected much of the man-power at the mine would be needed to help with reclamation and clean-up efforts, and therefore a sudden and significant decrease in the number of jobs at the mine is not anticipated. This prediction is unchanged by Project refinements.

Traditional Activities and Culture—Potential effects of a HLF failure on traditional activities and culture would be associated with effects to vegetation (traditional use plants), fish and wildlife used

for traditional purposes. Potential effects to fish are described below. As described above, no effects to vegetation or wildlife are anticipated. This prediction is unchanged by Project refinements.

Human Health and Well-being—Potential effects of a HLF failure on human health would be associated with cyanide exposure through inhalation, ingestion, or skin contact. In the highly unlikely event of a HLF breach, the area would be immediately isolated and appropriate evacuation distances identified in accordance with the Emergency Response Plan Due to its rapid breakdown in the environment, cyanide does not biomagnify in food webs or cycle extensively in ecosystems; therefore no adverse effects to human health are anticipated. This prediction is unchanged by Project refinements.

Infrastructure and Services—A HLF failure has the potential to place additional pressure on public emergency response resources. Initial emergency response activity will be managed internally and VIT will ensure first responders with training specific cyanide hazards are on hand at the mine site at all times. VIT and their contractors will be able to manage emergency response efforts internally without placing additional burden on public resources, therefore adverse effects to infrastructure and services are not anticipated. This prediction is unchanged by Project refinements.

Evaluation of those VC for which there could be an interaction of concern with a potential break of the HLF (those interactions scored “2”) are discussed below.

Potential Effects to Surficial Geology, Terrain, and Soils

The Project Proposal predicted that potential residual effects are not anticipated to change soil reclamation suitability; therefore no significant effects to soils are anticipated. This prediction is unchanged by Project refinements as the mitigation measures proposed in the Project Proposal will be sufficient to mitigate potential consequences of a HLF breach.

Potential Effects to Water Quality and Aquatic Biota

The Project Proposal predicted that residual effects of an HLF failure may include direct mortality of fish and other aquatic organisms, and eutrophication due to the increase in nitrates resulting from the breakdown of cyanide compounds. However, all potential residual effects of a HLF failure are considered temporary and reversible, and given the very unlikely possibility of such an event occurring during the life of the Project, the threat that an HLF failure poses to water quality and aquatic biota is not considered significant.

This prediction is unchanged by Project refinements, as the mitigation measures proposed in the Project Proposal will be sufficient to mitigate potential consequences of a HLF breach. Specifically in the event of a HLF failure, an emergency response plan will be in place to contain the leachate and prevent its entry into the aquatic environment. A water quality monitoring program will also be implemented to monitor the concentration of cyanide compounds (free cyanide, weak acid dissociable (WAD) cyanide, and total cyanide).

Potential Effects to Fish and Fish Habitat

The Project Proposal predicted that residual effects of an HLF failure may include eutrophication of downstream habitats due to the increase in nitrates resulting from the breakdown of free cyanide. All potential residual effects of an HLF failure are considered temporary and reversible. Given this, that affected fish populations could be naturally repopulated from unaffected watercourses, and that the likelihood of a HLF breach is highly unlikely, the threat to fish and fish habitat is considered not significant. This prediction is unchanged by Project refinements as the mitigation measures proposed in the Project Proposal will be sufficient to mitigate potential consequences of a HLF breach on fish and fish habitat.

8.3.4 Slope Failure (Open Pit and Waste Rock Storage Areas)

The design of the open pit will ensure that any slope failures result only in the movement of material into the pit itself, and no effects to environmental resources are anticipated due to potential slope failure. The major risk associated with a catastrophic failure of the pit high wall is worker safety.

The magnitude of potential effects of slope failure or slumping of the WRSAs would depend on the timing and extent of the failure. Slope failure within either of the WRSAs could lead to mixing of contact and non-contact surface water through disturbance of subsurface drainage, seepage ponds, and drainage channels, allowing surface contact water to bypass treatment and flow directly into Eagle Creek or the Dublin Gulch diversion channel. Following capping of the WRSAs post closure, slope failures could damage vegetation in reclaimed areas and treatment wetlands at the base of the WRSAs and alter the infiltration rates through the caps. Post-closure slope failures could lead to increased contact water entering passive treatment system and changes to routing of contact water, for example, from the pit lake.

8.3.4.1 Project Design Measures to Minimize Risk of Slope Failure

The following design measures and proposed mitigation are reproduced from the Project Proposal. The measures are unchanged by Project refinements and have been or will be implemented to minimize the potential for slope failure in the open pit and WRSAs:

- Pit slopes and benches will be designed using ongoing geotechnical investigations and mining best practices.
- During dewatering of the open pit, pit perimeter well and horizontal bench wells will be used to extract groundwater and depressurize pit walls. Pumping wells will also be used to aid in depressurization of pit slopes as required. This will increase pit wall stability.
- Regular inspections will identify areas of potential instability and result in mitigative measures to decrease the likelihood of failure.
- WRSA design has considered the operational and post-closure extreme events of seismic loading under an operational and maximum design earthquake, and probable maximum precipitation.

- Permafrost zones within the proposed WRSAs will be excavated to encourage thawing and drainage or will be left intact for buttressed capping and stabilization and ensure stability before placement of waste rock.

Project refinements result in the expansion of the open pit as well as WRSAs. To support these modifications, VIT retained BGC Engineering Inc. to conduct a geotechnical site investigation and design study for the open pit to support feasibility level designs of the pit slope angles and geotechnical assessment and design of the WRSAs. These reports are appended to this SIR as Appendix 1 and 4 respectively.

The pit has been divided into design sectors based on proposed slope heights and the potential for structurally controlled failures. The slope designs developed for each design sector include: bench height, catch bench width, bench face angle, interberm / interramp angle, interberm / interramp height, geotechnical berm width, and overall angle. Designs have been developed for each of the geotechnical units; maximum interberm / interramp angles range from 31° to 43°.

The WRSA assessment selected design criteria based on those recommended by the Yukon Water Board (2009) and the British Columbia Mine Waste Rock Pile Research Committee (1991). The proposed Eagle Pup WRSA meets the recommended factors of safety for most of the cases considered. The stability analyses indicate that the overall stability of the Platinum Gulch WRSA meets the recommended factors of safety with some exceptions which are detailed in the report. Recommendations to improve stability and for further assessment and analysis are provided in the report and are underway.

The geotechnical investigations for the open pit and WRSAs provide the information necessary to inform engineering design of these facilities to effectively mitigate the risk of slope failure and decrease the likelihood of occurrence. Further investigation is underway to support detailed design.

8.3.4.2 Slope Failure Likelihood and Consequence

The likelihood and consequence of a slope failure are presented in section 8.2.4.2 of the Project Proposal. In summary, minor slope failures are considered likely during development of the open pit due to the ongoing nature of the drill and blast activities and the potential to encounter areas of instability. These minor failures are anticipated as part of the development process, and the consequence is considered very low, as material will be contained within the open pit and worker safety would not be affected. Major slope failures within the open pit are considered very unlikely based on the geotechnical design considerations and ongoing monitoring proposed. The environmental consequence of a major slope failure within the open pit would be low, as all material would be contained within the open pit area.

Slope failure within the WRSAs areas is considered very unlikely, based on the geotechnical studies and engineering criteria used in their design and construction. In the unlikely event of a slope failure in these areas, which may affect water conveyance and storage infrastructure and cause contact water to flow directly into Eagle Creek or the Dublin Gulch diversion channel, the consequences would be high.

8.3.4.3 Potential Effects of Slope Failure

Based on the screening of potential interactions between slope failure and environmental and socio-economic VCs, potential effects of concern which have been considered in detail (i.e., ranked as '2') include:

- Surficial geology, terrain, and soils
- Water quality/aquatic biota
- Fish and fish habitat.

The following interactions were ranked as '1' for reasons described below:

Air Quality—The Project Proposal predicted that effects would be short-term, localized, and reversible, and would not be significant to air quality (as defined in Section 6.6.1.9). The Project refinements do not change this prediction as the consequence of a slope failure is marginally increased due to expanded facilities. Should a slope failure occur, dust suppression measures would be implemented as soon as possible.

Vegetation Resources—The Project Proposal predicted that effects to vegetation resources due to slope failure would only be expected in the case of slope failure affecting already reclaimed portions of the WRSAs. In this case, damaged areas would be revegetated as described in the Conceptual Closure and Reclamation Plan (Appendix 24), and no long term effects to vegetation resources are anticipated. The Project refinements do not change this prediction as the mitigation measures proposed will be applied as proposed.

Surficial Geology, Terrain, and Soils—The Project Proposal predicted that effects to terrain stability would be low in magnitude, site-specific, short-term, and reversible. Potential residual effects could be significant if important habitat, infrastructure, or human safety are affected however, these effects can be reduced and managed with the application of a well-defined Emergency Response Plan, complemented by additional measures identified in a follow-up and monitoring plan as required. It is anticipated the effects would be temporary and prior land uses could be re-established within a one year timeframe. The Project refinements do not change this prediction as the mitigation measures proposed will be applied as proposed including a detailed Emergency Response Plan and Environmental Monitoring Plan.

Evaluation of those VC for which there could be an interaction of concern with slope failure (those interactions scored "2") are discussed below.

Potential Effects to Water Quality and Aquatic Biota

The Project Proposal classified local and regional effects of slope failure in the open pit or WRSAs as:

- Toxicity effects
- Eutrophication effects
- Sedimentation effects.

In the event of a slope failure, an emergency response plan will be in effect to contain the contamination and restore the failed structure. A water quality monitoring program will also be implemented to monitor the concentration of toxic metals (and cyanide compounds in case of HLF failure after the mine closure) in affected surface waters.

Residual effects of a slope failure of WRSAs and HLF (after closure) may include deterioration of water quality, mortality of periphyton and aquatic invertebrates, and eutrophication. All potential residual effects of a slope failure are considered temporary and reversible. Geographic extent of effects may be considered as regional (as a result of potential eutrophication downstream) and magnitude of effects may be considered significant.

The above identified potential effects were evaluated in the Project Proposal within the context of the likelihood of the event occurring. For both the open pit and the WRSAs, slope failure is considered to be very unlikely—not expected to occur during the life of the Project. Given this and the mitigations and response plans that will be in place, slope failure is not considered to pose a significant threat to water quality and aquatic biota. The Project refinements do not change this prediction as the mitigation measures proposed will be applied as proposed including a detailed Emergency Response Plan and Environmental Monitoring Plan.

Potential Effects to Fish and Fish Habitat

The Project Proposal predicted potential effects of a slope failure on fish and fish habitat as:

- Constriction/blockage of stream channel and potential dewatering of downstream habitat
- Release of sediments into watercourses
- Release of toxic chemicals and nutrients into watercourses
- Loss of habitat in the impacted area
- Increased turbidity and deterioration of water quality downstream
- Mortality of fish and incubating eggs.

The effects of a slope failure on fish and fish habitat are a function of the extent and location of the failure. While a minor failure in the open pit could happen during the life of the Project, slope failures in WRSAs are considered very unlikely. The effect of such a failure would be limited to the release of nutrients and toxic chemicals (i.e., toxic metals) and sediment plumes. Sediment plumes can be harmful to fish, and degrade fish habitat and spawning areas (through sedimentation of spawning gravel and suffocation of incubating eggs). A major slope failure in the WRSAs may affect watercourses through total blockage and release of relatively high volumes of sediments to the aquatic environment. The blockage may cause disconnection of a section of the watercourse and dewatering of downstream fish habitat that may result in fish and invertebrate mortality.

In the event of a slope failure near fish habitat, immediate mitigation will involve the removal of debris from the watercourse to prevent channel restriction and potential dewatering of downstream habitat; and to restore fish passage and re-establish connectivity of the aquatic habitat.

Water quality will be monitored downstream of the impact (i.e., failure) to identify the downstream extent of effects on turbidity and critical habitat (e.g., spawning habitat). Critical habitats downstream of the failure will be surveyed to determine potential effects of increased sedimentation as a result of the failure.

Residual effects of a slope failure will depend on the magnitude of the failure and the size of watercourse (e.g., total versus partial blockage), and may range from temporary restriction of flow to total obstruction. Release of large amounts of sediment to the aquatic habitat may cause temporary deterioration of water quality, increased turbidity, and degradation of downstream spawning habitat. Other residual effects of a slope failure may include direct mortality of fish and invertebrates buried by debris. Depending on the magnitude, a mitigation and compensation plan may be required to offset the adverse effects of a slope failure on fish and fish habitat.

Magnitude and geographic extent of residual effects may vary considerably depending on the size of the watercourse and the scale if the slope failure. However, potential residual effects are considered temporary and reversible and given that it is highly unlikely that a major slope failure would occur the threat to fish and fish habitat is considered is considered to be not significant. The Project refinements do not change this prediction as the mitigation measures proposed will be applied as proposed including a detailed Emergency Response Plan and Environmental Monitoring Plan.

8.3.5 Water Conveyance and Storage Infrastructure Failure

The Project Proposal described water management infrastructure based on the Water Management Plan developed at that time. The Project refinements include a revised Water Management Plan that include the following water conveyance and storage infrastructure. A description of the refined Water Management Plan is found in Section 5.4.4 of this report and the revised Water Management Plan is included as Appendix 8.

- **Events ponds:** to provide storage capacity for intercepted surface runoff from the HLF as well as excess pregnant leach solution when the ADR facility is at capacity or undergoing maintenance; the events ponds also provide short-duration storage routing for make-up water that is collected from the greater mine site area; upon closure, the events ponds will be used to facilitate the draindown process by acting as the downstream sink for leach solution and rinse water.
- **Operations ponds:** placed at the base of each WRSA to capture surface runoff and seepage, and at the western end of Dublin Gulch to capture sediment-laden surface water and treated contact water from the mine water treatment plant.
- **Dublin Gulch diversion channel:** designed to convey streamflow safely past the HLF and divert the water to the Eagle Creek drainage downstream of the Project site facilities.
- **Surface water diversions and interceptor ditches**: placed around the perimeter of the HLF, ponds, open pit, plant site and yards to convey natural runoff water (non-contact) away from the structures and into SCPs.

The Water Management Plan (Appendix 8) establishes the protocol for the control and management of non-contact (i.e., from undisturbed basins or areas) and contact (i.e., from areas or facilities developed for the Project) water during all Project phases.

During the life of the Project, it is possible one or more components of the water conveyance and storage infrastructure could fail, potentially resulting in release of contact surface water (nutrients, metals, cyanide, suspended solids) to adjacent watercourses, depending on the systems affected. Potential failure mechanisms include:

- Inadequate engineering
- Poor construction (Quality control / Quality assurance)
- Unexpected precipitation events in excess of the design storm event for any given facility
- Seismic events
- Terrain instability
- Debris compromising water conveyance.

8.3.5.1 Project Design and Operational Measures to Minimize Risk of Water Conveyance and Storage Infrastructure Failure

A water management design basis was not specified in either the initial Project refinements or the Project Proposal. A design basis has since been developed as part of the Feasibility Study. A comparison of the water management design basis for both the Project Proposal mine configuration and the Refined Project mine configuration is provided in Table 5.4.9. The water management plan design basis has been incorporated into Project design to minimize the potential for water conveyance and storage infrastructure failure. In addition to the design basis in Table 5.4.9, the following measures will be implemented to reduce the likelihood of failure for water conveyance infrastructure

- All water management facilities have been designed to a sufficient design storm event that corresponds to the relative risk as a function of consequence and likelihood of failure during the anticipated operating life of each facility.
- Diversion ditches will be built incorporating erosion protection measures to minimize potential for instability.
- Diversion channels will be sized for the maximum flow velocities expected based on estimated surface runoff volumes.
- Regular inspection of diversion channel and diversion ditches for debris and snow/ice blockage.

In addition to this design basis and these mitigation measures, a failure modes and effects analysis (FMEA) will be completed prior to detailed engineering design of water management infrastructure. The FMEA is required for the application for a Type A Water Use License under the *Yukon Waters Act*. Briefly, FMEA is a step-by-step approach for identifying all possible failures in a design, a

manufacturing or assembly process, or a product or service. “Failure modes” means the ways, or modes, in which something might fail. Failures include all potential accidents or malfunctions of the system, in this case water management systems. “Effects analysis” refers to the consequences of those failures. Failures are prioritized according to the severity of consequences are, frequency and detection probability. The FMEA will enable VIT and its engineering team to eliminate or reduce failures that may result in severe consequences.

8.3.5.2 Water Conveyance and Storage Infrastructure Failure Likelihood and Consequence

Consistent with the conclusions presented in the Project Proposal, the risk of failure for the Project when taking into account refinements and the revised water management plan is unlikely based on the design criteria, water balance and storm water modelling, monitoring, and contingency measures proposed for the water conveyance and storage infrastructure at the mine site. A failure resulting in the release of untreated contact water, sediment, or cyanide solution to the environment is considered very unlikely. The consequence of a failure which resulted in the release of untreated contact water or cyanide solution to the environment would be moderate to high, depending on the volume of water released and the location of the release.

8.3.5.3 Potential Effects of Water Conveyance and Storage Infrastructure Failure

Measures to minimize the potential for water conveyance and storage infrastructure failure were set out in section 8.2.5.1 of the Project Proposal. The Project Proposal concluded that based on design criteria, water balance and storm water modelling, monitoring and contingency measures proposed for the water conveyance and storage infrastructure at the mine site, a failure resulting in the release of untreated contact water, sediment, or cyanide solution to the environment is very unlikely. The consequence of a failure resulting in the release of untreated contact water or cyanide solution to the environment would be moderate to high, depending on the volume of water released and the location of the release. The Project refinements do not change the likelihood of failure of water conveyance and storage infrastructure (very unlikely) and do not change either the mitigation measures to minimize the occurrence of an event or the emergency response measures if a failure event were to occur.

Based on the screening of potential interactions between water conveyance and storage infrastructure failure and environmental and socio-economic VCs, potential effects of concern which have been considered in detail (i.e., ranked as ‘2’) include:

- Water quality and aquatic biota
- Fish and fish habitat.

The following interactions were ranked as ‘1’ for reasons described below:

Surfical Geology, Terrain, and Soils— The Project Proposal predicted no significant effects to soil or terrain stability are anticipated as a result of failure of water conveyance infrastructure. This prediction is unchanged after evaluation of the Project refinements due to improvements to the design basis and water management plan. In the event of failure, efforts to immediately contain the release and re-route any water away from the failure area would be implemented. Following

containment of the release, restoration activities would be undertaken to identify failure mechanisms and repair damaged infrastructure. Restoration activities would include monitoring for erosion and instability issues and implementation of mitigation measures as required to address stability issues.

Evaluation of those VC for which there could be an interaction of concern with slope failure (those interactions scored “2”) are discussed below.

Potential Effects to Water Quality and Aquatic Biota

As stated in the Project Proposal, in the event of a failure in water conveyance and storage systems, an emergency response plan will be in effect to contain the contamination and restore the failed structure. A water quality monitoring program will also be implemented to monitor the concentration of toxic chemicals in affected surface waters. These measures are unchanged by the Project refinements.

The predictions presented in the Project Proposal indicate that potential residual effects of a failure of water conveyance and storage system on water quality and aquatic biota are considered temporary and reversible. The effects being temporary and reversible and their occurrence being very unlikely, the threat to water quality and aquatic biota is considered to not pose a significant threat. This prediction is unchanged after evaluation of the Project refinements due to improvements to the design basis and water management plan.

Potential Effects to Fish and Fish Habitat

Mitigation and clean-up in the case of a water conveyance or storage infrastructure failure include immediate containment of the breached storage facility to contain the release of toxic chemicals and sediment into adjacent watercourses. Follow-up monitoring may be required according to the type of failure. The magnitude and geographical extent of potential residual effects on fish and fish habitat may be substantial in the event of a failure of cyanide containing storage facilities, and will be dependent on the physical characteristics of the receiving environment. A well-defined emergency response plan will limit the potential effects of such an incident on fish and fish habitat. These measures are unchanged by the Project refinements.

The predictions presented in the Project Proposal indicate that potential residual effects are considered temporary and reversible, and because of very unlikely probability of an event occurring, the threat to fish and fish habitat is considered not significant. This prediction is unchanged after evaluation of the Project refinements due to improvements to the design basis and water management plan.

8.3.6 Power Failure

The Project area, including Mayo, is within the Mayo-Dawson electrical grid, powered by the Mayo hydroelectric plant. Yukon Energy is currently constructing the second stage of the Carmacks-Stewart Transmission Project and the Mayo Hydro Enhancement Project (Mayo B), which will more than double the electrical generating capacity of the current Mayo plant, and the Carmacks-Stewart Transmission Project will connect the Mayo – Dawson grid with the Whitehorse – Aishihik – Faro grid.

Project refinements include modifications to power requirements as described in Section 5.5.6 of this SIR. Refinements to the project have not increased estimated energy requirements during construction. Power required during construction will be produced by on-site diesel generators until completion of the transmission line in September 2013. Generators will be maintained as emergency power units during operations. As described in Section 5.5.6, the average annual forecasted operating loads for the operations phase increase from 11 MW to between 15.4 and 18.3 MW and will vary between winter and summer seasons. Estimated power loads and consumption for construction and operations have been updated based on the Project refinements, and are outlined in Table 5.5.5.

8.3.6.1 Project Design Measures to Minimize Risk of Power Failure

The following measures are unchanged with those presented in the Project Proposal and will be implemented to minimize the potential for power failure:

- Transmission and distribution lines will be inspected regularly and after severe storm events.
- In siting the transmission line, zones of permafrost, steep slopes, and wetlands will be avoided if possible or mitigation measures will be implemented such as longer spans and special foundations.
- Areas of terrain instability along the transmission line route will be identified and monitored on a regular basis, and slope stabilization measures implemented as required.
- Danger trees will be assessed and removed within and adjacent to the transmission line RoW.
- The transmission line poles will be placed outside the desirable clear zone (DCZ), as defined by the *Roadside Design Guide*, issued by Alberta Infrastructure and Transportation to minimize the risk of damage from vehicle collisions.
- The transmission line will be designed and constructed in accordance with Yukon Energy best practices.
- In the event of a power failure, three emergency diesel generation sets will provide back-up power. Each unit will be rated at 1,500 kW, 575 V with a 575 V/25 kV transformer and will supply power to pregnant and barren solution pumps, carbon stripping circuit, camp and buildings, fire and freshwater distribution systems, and fire, alarm and security systems.
- In the event that back-up power fails, redundancies in pumping capabilities and excess storage capacities have been included in the HLF design to minimize the accumulation of high volumes of process leach solution in the Events Ponds and in the In-Heap Pond. Further discussion regarding additional storage and pumping capacity for the HLF has been provided in Section 5.4.1.5.

8.3.6.2 Power Failure Likelihood and Consequence

Power outages are common in the Village of Mayo, and it is highly likely over the life of the mine that a storm event could result in loss of power to the mine site. In this situation, the back-up generators

would provide power to ensure the HLF pumps remain operational. In the event of a prolonged power outage and loss of road access to site, the mine site will have sufficient diesel stored to run emergency back-up generators for approximately two weeks. As the back-up power onsite is sufficient to continue running the pumps for extended periods, the consequence is considered very low.

In the highly unlikely event that the back-up power source fails, the consequence would remain low, as the in-heap pond and events ponds have the capacity to ensure cyanide solution is not released to the environment.

8.3.6.3 Potential Environmental Effects of Power Failure

Based on the Project design measures proposed to ensure back-up power to the site, and the capacity of Project infrastructure to contain potential releases should back-up power fail, no effects to environmental or socio-economic VCs have been identified due to power failure.

8.3.7 Fire and/or Explosion

A fire and/or explosion at the mine site could endanger worker health and safety, as well as damage infrastructure. Should a fire escape Project controls within the mine site, a forest fire could be ignited, which could affect a number of VCs in the surrounding area. Fire and explosion hazards are those situations or conditions created by a combination of a fuel source, an oxygen source, and a source of ignition.

A number of potential fuel sources will be stored and used on the Project site including explosives emulsions, engine fuels and hydraulic oils. Combustion of fuel sources can lead to release of harmful gases which can travel various distances, depending on atmospheric conditions. In addition, if a forest fire is ignited, combustion of vegetation would emit carbon dioxide, particulate matter, and other gases.

Explosives will be stored in two separate structures one for explosives and the other for blasting caps. The explosives areas will be isolated from other infrastructure and operational areas. Although the location of the facilities have changed as a result of refinements, the magazines will be separated from each other, and from other buildings, roads, and watercourses as required by Blasting Explosives and Initiation Systems: Storage, Possession, Transportation, Destruction and Sale (NRCan 2008).

8.3.7.1 Project Design Measures to Minimize Risk of Fire and/or Explosion

Fire and explosion hazards will be managed through a systematic approach including identification of risks, determination of how to manage these risks, identifying specific control measures to prevent fires or explosions, and implementing the control measures. To minimize the potential for fire and/or explosion, the following measures will be implemented:

- The fire suppression system has been more fully described and has been designed to pump water through a pressurized main to the ADR plant. Fire protection water to the site and facilities will be provided by pumping from groundwater wells located in the Dublin Gulch valley, into a common fire water tank located at the ADR plant area.

- Fire sensors will be located at critical points throughout the mine site facilities.
- Firefighting equipment will be readily available throughout the mine site and staged at appropriate locations dependent upon the detailed Fire Response Plan. The process offices, laboratory and shop/warehouse will be fitted with sprinkler systems.
- Portable fire extinguishers will be provided in all buildings.
- Vegetation that could provide fuel for fire will be removed from around mine infrastructure.
- Brushing and clearing along the transmission line and road RoWs will be conducted during low fire danger periods.
- Explosives will be housed in two separate structures. One building will house explosives, while the other will house blasting caps. These buildings will be designed and operated in accordance with the magazine license issued by Natural Resources Canada.
- A Fire Response Plan will be developed as part of the Emergency Response Plan, which will include details of standard fire prevention measures and procedures to be implemented, as well as standard equipment, training and emergency response measures to be used for the Project.
- Regular inspections specifically looking at fire risk will be carried out in all areas of the Project site.
- A fully equipped and trained Emergency Response Team will be maintained at all times.

None of the above measures are changed by Project Refinement and will be equally sufficient to mitigate the risk of fire or explosion for the Project.

8.3.7.2 Fire and/or Explosion Likelihood and Consequence

Based on the Project design and prevention measures in place, it is considered very unlikely that a fire would escape Project controls and ignite a wildfire. Should a wildfire ignite due to Project activities, the consequence could be high, depending on the aerial extent of the damage. This prediction is unchanged as a result of the Project refinements due to the lack of changes to mitigation measures proposed above.

8.3.7.3 Potential Environmental Effects of Fire and/or Explosion

Based on the screening of potential interactions between fire and/or explosion and environmental and socio-economic VCs, potential effects of concern which have been considered in detail (i.e., ranked as ‘2’) include:

- Air quality
- Vegetation resources

Evaluation of potential effects to VCs assessed in section 8.2.7.3 of the Project Proposal indicates that the predictions presented in the Project Proposal concluded that no significant effects to VCs are

anticipated based on the proposed mitigation measures and the low likelihood of a fire escaping Project controls.

The Project refinements will result in a slight increase of overall volume of fuel sources that will be stored and used on site and the length of time those fuel sources will be on site – up to a 15% increase. However, the types of fuel sources remain unchanged as do the structures for their containment and the procedures for their use. The explosives facilities have been relocated and will continue to be separated from each other and from other infrastructure as required by the NRCAN Explosives regulation (i.e. one storage facility for explosives, and a separate storage facility for blasting caps and of adequate minimum distance from operational facilities etc.).

Likewise the design criteria for storage, mitigation measures for storage and use, and response measures in the event of a fire and/or explosion remain unchanged. Consequently, the conclusion reached in the Project Proposal that the potential effects of fire or explosion would not have a significant effect on air quality or vegetation remain unchanged by the Project refinements.

8.4 EFFECTS OF ACCIDENTS AND MALFUNCTIONS ASSESSMENT EVALUATION

The potential for accidents and malfunctions exists with every project. They can be due to design and construction errors, human error, and natural events such as storms and earthquakes. While the potential for accidents and malfunctions can never be eliminated, their likelihood can be reduced to a minimum with careful planning, precautionary design work that anticipates and addresses potential causes, and protocols that assure proper implementation. Potential effects can also be minimized with anticipatory planning and with pre-placement of procedures, personnel, and equipment for immediate response and subsequent remediation work.

The assessment of effects arising from potential accidents and malfunctions related to the Project focused on seven possible events:

- Transportation accident
- Hazardous materials spill
- HLF breach
- Slope failure (open pit and WRSAs)
- Water conveyance and storage infrastructure failure
- Power failure
- Fire and/or explosion.

The selection of these events was based on input from consultations, regulators, and the public and also on the professions judgment of VIT and its contractors of what events were most like to create effects of concern. In most cases Project design and Project-specific mitigations took into account the potential for these events and either eliminated or reduced the potential effect to a level that

would not be of concern. Other identified potential effects were judged to be adequately addressed through the application of codified practices and industry accepted best management practices.

In those cases where the potential for effects of concern could not be eliminated, it was found that the likelihood of the event occurring could be reduced to a level where they were unlikely to very unlikely to occur during the life of the Project. In tandem with this, VIT's commitment to the development of a Project-specific emergency response plan (Appendix 33 of the Project Proposal) for all reasonably foreseeable potential accidents and malfunction is a key mitigation to limiting the scope of potential effects in the case that an event did occur. With mitigations in place and the likelihood of occurrence reduced to unlikely to very unlikely, it was found that accidents and malfunctions do not pose a significant threat to the VC assessed in the Project Proposal.

Evaluation of modifications to the Project introduced by the Project refinements, examined the effects of accidents and malfunctions on each of the VCs where there might be an interaction of concern. The evaluation determined that there were no changes to the ranking of any of the interactions (i.e. no movement to a "1" or "2" by a "0" or a "1"), no changes to any of the prevention measures for design and mitigation, and no changes to the likelihood of the occurrence of an event or the response to such an event. In addition consideration of additional events are not warranted given that the overall scope of the Project has not changed (e.g. no new potential accidents or malfunctions as a result in change of manner of construction, operations or closure). Consequently, evaluation of Project refinements concluded that there was no change to the conclusion presented in the Project Proposal, that accidents and malfunctions do not pose a significant threat to any of the VCs.

9 EVALUATION OF CAPACITY OF RENEWABLE RESOURCES

The Project Proposal assessed potential Project effects on the capacity of renewable resources to meet the needs of the present and future generations, in consideration of both Project-specific and cumulative effects. YESAA Part 2 Section 42(2) (b) states the assessment should consider: "...the capacity of any renewable resources that is likely to be significantly affected by the project or existing project to meet present and future needs." However, YESAA does not specifically define the term renewable resources. The assessment of effects on the capacity of renewable resources to meet the needs of the present and future generations in the Project Proposal defined renewable resources as resources used or consumed that can maintain or reestablish themselves. Assessment of potential effects on renewable resources is a principal consideration throughout various sections of the Project Proposal and has been reconsidered as part of the evaluation of Project refinements in this Supplementary Information Report (SIR).

Specifically, potential effects on renewable resources were assessed in detail in Section 6—Environmental and Socio-economic Effects Assessment— and the conclusions of the assessment have been evaluated with respect to Project refinements in Section 6 of this SIR. The biophysical components that may be considered as renewable resources assessed included Surficial Geology, Terrain, and Soils (Section 6.4), Water Quality and Aquatic Biota (Section 6.5), Air Quality (Section 6.6), Fish and Fish Habitat (Section 6.7), Vegetation Resources (Section 6.8), and Wildlife Resources (Section 6.9).

In addition, Sections 6.11 of the Project Proposal and this SIR assessed and evaluated the socio-economic implications of potential Project effects on activities such as fishing, hunting, trapping, gathering, public recreation, and tourism that rely on renewable resources. Assessments and evaluation of Project refinements were based on a range of ecological considerations and included consideration of cumulative environmental effects with other existing or reasonably foreseeable future projects.

VIT has determined that, consistent with the conclusions of the Project Proposal, the Project will not have significant residual or cumulative effects on any renewable resource. This conclusion is based on consideration of the Project refinements described in Section 5, use of best management practices, and the implementation of Project specific mitigation measures to prevent or reduce environmental effects.

While the means of determining significance is specific to each resource considered, generically, significance thresholds are based on community values or management objectives. None of the Project's residual or cumulative effects exceed either thresholds or standards established by regulation or thresholds established for this Project's specific circumstances. Therefore, based on the Project refinements evaluated in this SIR, the Project's effects on the capacity of renewable resources are determined to be not significant. The aforementioned sections of the Project Proposal and this SIR contain assessment details that support this conclusion.

10 EVALUATION OF THE ASSESSMENT OF EFFECTS OF THE ENVIRONMENT ON THE PROJECT

10.1 APPROACH

Section 10 of the Project Proposal outlines the requirement for and the approach taken for identification of the potential effects of the environment on the Project. YESAA requires that potential effects of the environment on the Project be characterized and that critical site conditions that would affect the timing of operations for the Project, as well as the manner in which they would affect it, be described. Potential effects of the environment on the Project were characterized as ranging from minor (e.g., inconveniences) to major (e.g., causing the operations to cease for some period). Consideration was also given as to whether they could affect one or more components of the Project.

The Project refinements were screened to determine whether any of the proposed modifications would be affected by the environmental conditions that had the potential to adversely affect the Project. Of the five environmental conditions assessed in the Project Proposal, only one – terrain instability – was carried forward for evaluation due to a lack of material change to Project components that would alter the interactions of environmental conditions with each component or facility.

10.2 POTENTIAL EFFECTS ON THE PROJECT

Environmental conditions with the potential to adversely affect the Project during construction, operations, closure and reclamation, and post-closure monitoring phases of the Project include:

- Terrain instability (landslides, avalanches , and permafrost disturbance)
- Seismic activity
- Extreme weather events (extreme wind, rain, snow, ice, or drought)
- Forest fire
- Climate change

10.3 EFFECTS OF THE ENVIRONMENT ON PROJECT REFINEMENTS

Project refinements that have the potential to be affected by the environment include expansions to the open pit, WRSAs and HLF; and re-located explosives facilities.

The timelines for the Project are anticipated to be 25 months for construction with an operations phase of 10 years.

Of the environmental conditions assessed in the Project Proposal as being events that could affect the Project, the interactions between Project facilities and seismic activity, extreme weather, forest fire and climate change are not altered as described by the Project Proposal. This conclusion is based on:

- The location major facilities and Project components have not changed as a result of Project refinement therefore:
    - the seismic hazard classification is unchanged from that described in the Project Proposal
    - the predicted extreme weather events (wind, rain, snow, ice or drought conditions) are unchanged from that described in the Project Proposal
    - the risk of forest fire is unchanged from that described in the Project Proposal
    - potential effects of climate change is unchanged from that described in the Project Proposal
- The overall footprint of the Project has increased by 4% (23 ha). If a seismic, extreme weather, forest fire or climate change event were to occur, it would occur in similar measure to the Project's physical works and activities. There would be no change to the likelihood of the event, or to the direction, magnitude, geographic extent, timing, duration and reversibility.
- The proposed mitigation measures will be applied and will be appropriate to prevent or limit adverse effects of the environment on the Project upon consideration of the expansion of major facilities (Open Pit, HLF, and WRSAs)
- Engineering design of expanded facilities has been advanced from that described in the Project Proposal. As a result improved engineering design continues to decrease the risk of potential effects of the environment on the Project.

Consequently, the four environmental conditions of seismic event, extreme weather events, forest fire, and climate change in relation to the Project refinements are not evaluated further.

10.3.1 Terrain Instability

Terrain instability has the potential to have an effect on the modifications introduced in the Project refinements. Terrain instability can arise from both human-induced and natural factors including thawing permafrost and the freeze and thaw cycle causing mass wasting. Unstable terrain has the potential to damage Project infrastructure, cause adverse environmental effects, and pose a threat to health and safety.

The Project is in an area that is relatively stable, with shallow surficial deposits and bedrock exposed at the surface near the tops of the hills. A terrain stability assessment was conducted as part of the Project Proposal that included stability mapping of the Project area. In addition historic and active terrain hazards were assessed. All of these materials were provided to Project engineers to aid in Project design, to minimize risk to Project facilities, and to ensure Project development does not accelerate or exacerbate natural geoprocesses.

Mitigations identified in the Project Proposal are described in detail in section 10.1.2. Among the commitments made by VIT as a consideration of site-specific environmental attributes and risks, was to undertake further terrain assessment to confirm preliminary findings and to modify design criteria as required during the feasibility phase of the Project engineering. This has been done in relation to

modifications represented by the Project refinements. Further geotechnical investigations have been conducted to include the additional disturbed areas included in the Project refinements as expanded facilities (e.g., Open Pit, HLF, and WRSAs) or revised infrastructure locations (e.g. crushers, Dublin Gulch Diversion Channel). Geotechnical investigations and engineering analysis completed subsequent to the submission of the Project Proposal are presented in Appendices 1 – 7 and include:

1. 2011 Mine Site Infrastructure Foundation Report
2. 2011 Mine Site Infrastructure Geotechnical investigations
3. Feasibility Study Open Pit Slope Design
4. Heap Leach Facility Feasibility Design
5. Dublin Gulch Seismic Design
6. Technical Memo – HLF Permeability / Agglomeration Test Work
7. Geotechnical Assessment and Design of the Waste Rock Storage Areas

All other mitigations and commitments in section 10.1.2 of the Project Proposal to avoid or reduce potential effects of terrain instability on Project infrastructure will be applied in equal measure to the Project as proposed.

10.4 SUMMARY OF POTENTIAL EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Optimized design specifications for the Project have taken into account the potential for environmental conditions. Therefore, the conclusions reached in the Project Proposal that no adverse effects to the Project or Project timing are anticipated due to effects of the environment are unchanged by the Project refinements.

11 EVALUATION OF SUMMARY OF SIGNIFICANCE

In accord with Section 42(1) (c) and (d) of the Yukon Environmental and Socio-economic Assessment Act, Chapter 11 of the Project Proposal provides the summary of the significance of the Project's environmental and socio-economic effects and the significance of any of the Project's adverse cumulative environmental or socio-economic effects in combination with other known projects or activities. Chapter 11 of the Project Proposal provides the conclusions on the significance of the effects the Project is predicted to have on each Valued Component. Section 6 of this SIR evaluates the changes, if any, the Project refinements will have on those significance conclusions.

Based on the evaluation of the Project refinements in section 6 of the SIR, this section summarizes the significance of the environmental and the socio-economic effects of the Project and the changes, if any, introduced by Project refinement.

11.1 ENVIRONMENTAL (BIOPHYSICAL) EFFECTS

Table 11.1-1 of the Project Proposal provides a summary of potential effects and the significance of those effects, in relation to each environmental VC. VC-specific mitigation measures and potential residual effects are described within Sections 6.4 to 6.10 of the Project Proposal.

Sections 6.4 through 6.10 of this SIR consider whether the Project refinements change the conclusions presented in the Project Proposal on the effects of the Project on the biophysical environment. Table 11-1 below incorporates the conclusions of the evaluation of the Project refinements in Section 6 of this SIR with the Project Proposal conclusions. The evaluation indicates that the Project refinements will not change the significance of any of the predicted effects of the Project on the biophysical VCs.

Table 11.1-1: Summary of Potential Environmental Effects, Significance of those Effects as Determined in the Project Proposal, and Changes to Significance due to the Project Refinements

VC	Potential Effects identified in Project Proposal	Significance Determination in Project Proposal	Change to significance determination due to Project Refinements
Surficial Geology, Terrain, and Soils	Adverse Change in Terrain Stability	Not significant	No change
	Adverse Change in Soil Reclamation Suitability	Not significant	No change
Water Quality and Aquatic Biota	Change in Water Quality	Not significant	No change
	Change in Aquatic Biota	Not significant	No change
Air Quality	Change in Criteria Air Contaminants	Not significant	No change
Fish and Fish Habitat	Change in Fish Habitat Availability	Not significant	No change
	Change in Fish Mortality Risk	Not significant	No change
Vegetation Resources	Vegetation Loss	Not significant	No change
	Changes to Abiotic Conditions	Not significant	No change
	Changes to Community Structure and Composition	Not significant	No change
Wildlife Resources	Change in Wildlife Habitat	Not significant	No change
	Change in Wildlife Mortality	Not significant	No change
	Change in Wildlife Movement Patterns	Not significant	No change
Heritage Resources	Disruption of Heritage Resources	Not significant	No change

11.2 SOCIO-ECONOMIC EFFECTS

Table 11.2-1 of the Project Proposal provides a summary of potential effects and the significance of those effects in relation to each socioeconomic VC. VC-specific mitigation measures and potential residual effects are described within Sections 6.4 to 6.11 of the Project Proposal.

Sections 6.11 of this SIR consider whether the Project refinements change the conclusions presented in the Project Proposal on the effects of the Project on the socio-economic environment. Table 11-2 below incorporates the conclusions of the evaluation of the Project refinements in Section 6 of this SIR with the Project Proposal conclusions. The evaluation indicates that the Project

Refinements will not change the significance of any of the predicted effects of the Project on the socio-economic VCs. The positive effects on employment and economic opportunities will be increased and enhanced with Project refinements.

Table 11.2-1: Summary of Potential Socio-Economic Effects, Significance of those Effects as determined in the Project Proposal, and changes to the Significance Determination due to Project Refinements

VC	Potential Effects	Significance Determination	Change to significance determination due to project refinement
Employment and Economic Opportunities	▪ Employment Opportunities	Positive	No change
	▪ Contracting Opportunities	Positive	No change
	▪ Royalties and Taxes	Positive and significant	No change
	▪ Expenditures	Positive and significant	No change
	▪ Other Local and Regional Activities	Not significant (placer mining, outfitting or commercial trapping) Positive (local tourism)	No change
Traditional Activities and Culture	▪ Subsistence Harvesting	Not significant	No change
	▪ Language Preservation and Revitalization	Not significant	No change
	▪ Other Cultural Activities	Not significant	No change
	▪ Heritage Sites and Special Places	No effects predicted – Not significant	No change
Community Vitality	▪ Effects on Population and Demographics	Not significant	No change
	▪ Local Educational Facilities and Services	Not significant	No change
	▪ Crime	Not significant	No change
	▪ Community involvement	Not significant	No change
Human Health and Well-being	▪ Local Health and Social Facilities and Services	Not significant	No change
	▪ Mental Health and Addiction	Not significant	No change
Infrastructure and Services	▪ Facilities for emergency services	Not significant	No change
	▪ Landfill	Not significant	No change
	▪ Sewage lagoons	Not significant	No longer proposed N/A
	▪ Child Care	Not significant	No change
	▪ Roads	Not significant	No change
	▪ Mayo Airport	Not significant	No change
	• Power Supply	Not significant	No change

11.3 CUMULATIVE EFFECTS

Section 11.4 of the Project Proposal summarizes the Project's predicted cumulative effects. In relation to the bio-physical VCs, the Project Proposal concluded that the isolation of the area makes it highly unlikely that residual effects resulting from the Project could interact with effects of any other project or activities except for placer mining, fishing, hunting trapping and plant gathering. For these exceptions, the Project Proposal concluded that with mitigation measures in place there is not a reasonable expectation that the Project's contribution to cumulative effects could affect the viability or sustainability of any of the bio-physical VCs.

In relation to the socio-economic VCs the Project Proposal concluded there were substantial cumulative effects predicted and that overall, they were positive outcomes. The predicted potentially adverse effects can be readily mitigated if they occur. Any mitigation measures, monitoring and adaptive management programs will adjusted and extended to align with the updated and longer mine life schedule as a result of Project refinements.

By way of conclusion the Project Proposal stated that VIT is not aware of any industrial or other activity with which the Eagle Gold Project would interact to create significant cumulative effects that are adverse.

Sections 6.4 through 6.11 of this SIR screen and assess the contributions, if any, of the Project's effects to cumulative effects as a result of the modifications in the Project refinements. The Project refinements do not change the conclusion in the Project Proposal of any of the findings in relation to the Project. Consequently, the Project refinements do not change the conclusion in the Project Proposal that Victoria Gold is not aware of any industrial or other activity with which the Eagle Gold Project would interact to create significant cumulative effects that are adverse.

11.4 ASSESSMENT CONCLUSIONS

Based on the conclusions reached in the evaluation of the Project refinements in Section 6 of this SIR, the Project refinements do not change the conclusions of the Project Proposal environmental and socio-economic assessment that the potential residual effects of the Project will not be significant and will not interact to create significant cumulative effects that are adverse. The positive effects of the Project on Employment and Economic opportunities will continue to be significant and be enhanced.

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Geotechnical design criteria selected for the Eagle Pup and Platinum Gulch WRSAs (Table 5.4-7) are generally based on those recommended by the Yukon Water board (2009)

Data Sources; Government of Canada, Victoria Gold Corp.

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Victoria GOLD CORP

GENERAL LOCATION MAP

EAGLE GOLD PROPERTY
YUKON TERRITORY

PROJECTION: UTM - ZONE 8	DRAWN BY: LS
DATUM: NAD 83	CHECKED BY: RS
DATE: 8-November-2010	FIGURE NO.: 5.1-1

NOTES:

1. ALL ELEVATIONS ARE IN METERS.
2. CONTOUR DATA RECEIVED FROM UNDERHILL (FEBRUARY 2011) UTM NAD83.
3. 25m CONTOUR INTERVALS SHOWN.

LEGEND

UPPER HAGGART CREEK BASIN BOUNDARY
(ENVIRONMENTAL DATA SUMMARY REPORT PREPARED BY STANTEC, JUNE 2011)

PROJECT FOOTPRINT SUBMITTED IN PROJECT PROPOSAL

FISH HABITAT COMPENSATION AREA
(PRELIMINARY FISH HABITAT COMPENSATION PLAN PREPARED BY STANTEC, DECEMBER 2010)

STOCKPILE AREA, TOPSOIL

7102000 N
7101000 N
7100000 N
7099000 N
7098000 N
461000 E
460000 E
459000 E
500m BLAST RADIUS
250m BLAST RADIUS
EAGLE PUP ROCK STORAGE
STEWART GULCH
DUBLIN GULCH
HEAP LEACH PHASE 3
HEAP LEACH PHASE 2
HEAP LEACH PHASE 1
TERTIARY CRUSHING
SECONDARY CRUSHING
PRIMARY CRUSHING
EAGLE PUP POND
FS FINAL PIT
PLATINUM GULCH ROCK STORAGE
UPPER HAGGART CREEK BASIN BOUNDARY
DUBLIN GULCH DIVERSION CHANNEL
HEAP CONFINING EMBANKMENT
HEAP LEACH ACCESS ROAD/CONVEYOR CORRIDOR
STUTTLE GULCH
100 DAY STORAGE
PLATINUM GULCH POND
PLATINUM GULCH
EVENT POND #1
EVENT POND #2
FUEL STORAGE
TRUCK SHOP
LOWER DUBLIN SOUTH POND
PROCESS BLDG. C/W ASSAY LAB AND ADMIN.
WATER TREATMENT PLANT
HEAP LEACH ACCESS ROAD
LAYDOWN AREA
SUBSTATION
GUARD HOUSE
MAGAZINE STORAGE FACILITY
EXPLOSIVES STORAGE FACILITY
FISH HABITAT COMPENSATION AREA
HAGGART CREEK
LOWER DUBLIN NORTH POND
CAMP/RECREATION AREA

120 0 120 240 360 480 600M
SCALE: 1:7500

DWG. NO.	REFERENCE DRAWINGS
10100-10-005	ANCILLARY BUILDINGS, GENERAL ARRANGEMENT, PLAN
10100-10-004	PROCESS PLANT, GENERAL ARRANGEMENT, PLAN
10100-10-003	OVERALL SITE, GENERAL ARRANGEMENT, CRUSHING PLAN
10100-10-002	CAMP, RECREATION, AND, LAYDOWN AREA, GEN. ARRANGEMENT, PLAN

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
G	1	ISSUED FOR JULY MONTHLY REVIEW MEETING	10AUG11	DP
N	1	GENERAL REVISION	07MAY11	RHW
M	1	FINAL ISSUE FOR FEASIBILITY STUDY	22FEB11	JGH
L	1	ISSUED FOR FEASIBILITY STUDY	23FEB12	JGH
K	1	REVISION K IN PROGRESS	——	DP
J	1	ISSUED FOR CAPEX REDUCTION	23NOV11	AIR
H	1	ISSUED FOR CAPEX H8 REFERENCE	03NOV11	RHW

CLIENT, PROJ.MAN., PROJ.ENG., PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

SECTION:	LAYOUT
SCALE:	1:7500
DESIGN. BY:	DH 21FEB11
DRAWN BY:	DP 24FEB11
CHECK. BY:	AIR 09FEB12
APP. BY:	

Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP
A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
OVERALL SITE GENERAL ARRANGEMENT PLAN

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
1010010001.DWG	11548601.00	FIGURE 5.1-2	N

A1
PATH
HR:MM
YY.MM.DD

ROM ORE
PRIMARY CRUSHER
SECONDARY CRUSHER
TERTIARY CRUSHING
100 DAY WINTER ORE STORAGE
LIME SILO
LIME SILO
CEMENT SILO
CEMENT SILO
NEW ORE
UNDER IRRIGATION
LEACHED ORE
REAGENT
WATER
BARREN SOLUTION TANK
SOLUTION HEATING
DISCHARGE
NEUTRALIZATION TANKS
CARBON COLUMNS
EVENT POND No. 2
EVENT POND No. 1
VENDOR PACKAGE (ADR) PLANT
FRESH CARBON
CARBON SAFETY SCREENS
FRESH CARBON CONDITIONING & DEWATERING
CARBON STORAGE
ACID MIX TANK
ACID WASH TANK
ELUTION COLUMN
REGENERATION FEED DEWATERING SCREEN
CARBON REGENERATION KILN
FINE CARBON STORAGE TANK
FINE CARBON FILTER PRESS
CARBON FINES
QUENCH TANK
ELUTION SOLUTION HEATING
STRIP SOLUTION TANK
ELECTROWINNING CELLS
SLUDGE FILTER
FURNACE
DORE

PROCESS SOLUTION FLOWPATH
CARBON FLOWPATH INTERMITTENT
SOLUTION FLOWPATH INTERMITTENT

DWG. NO. | REFERENCE DRAWINGS

CLIENT, PROJMAN, PROCESS, ELECTR., INSTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LANDS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
F	1	REVISED FOR 29,500 tpd THROUGHPUT	16 JAN 12	RHW
E	1	ISSUED FOR CLARIFICATION – AUGUST REVIEW	15 JUNE11	JW
D	1	REVISED WITH POWER UPDATES	27MAY11	RHW
C	1	ISSUED FOR CLIENT REVIEW	20MAY11	RHW
B	1	ISSUED FOR CLIENT REVIEW	05APR11	DP
A	1	ISSUED FOR INTERNAL REVIEW	30MAR11	DP

SECTION:	PROCESS	
SCALE:	NONE	DATE
DESIGN. BY:		
DRAWN BY:	JTR	15FEB11
CHECK. BY:		
APP. BY:		

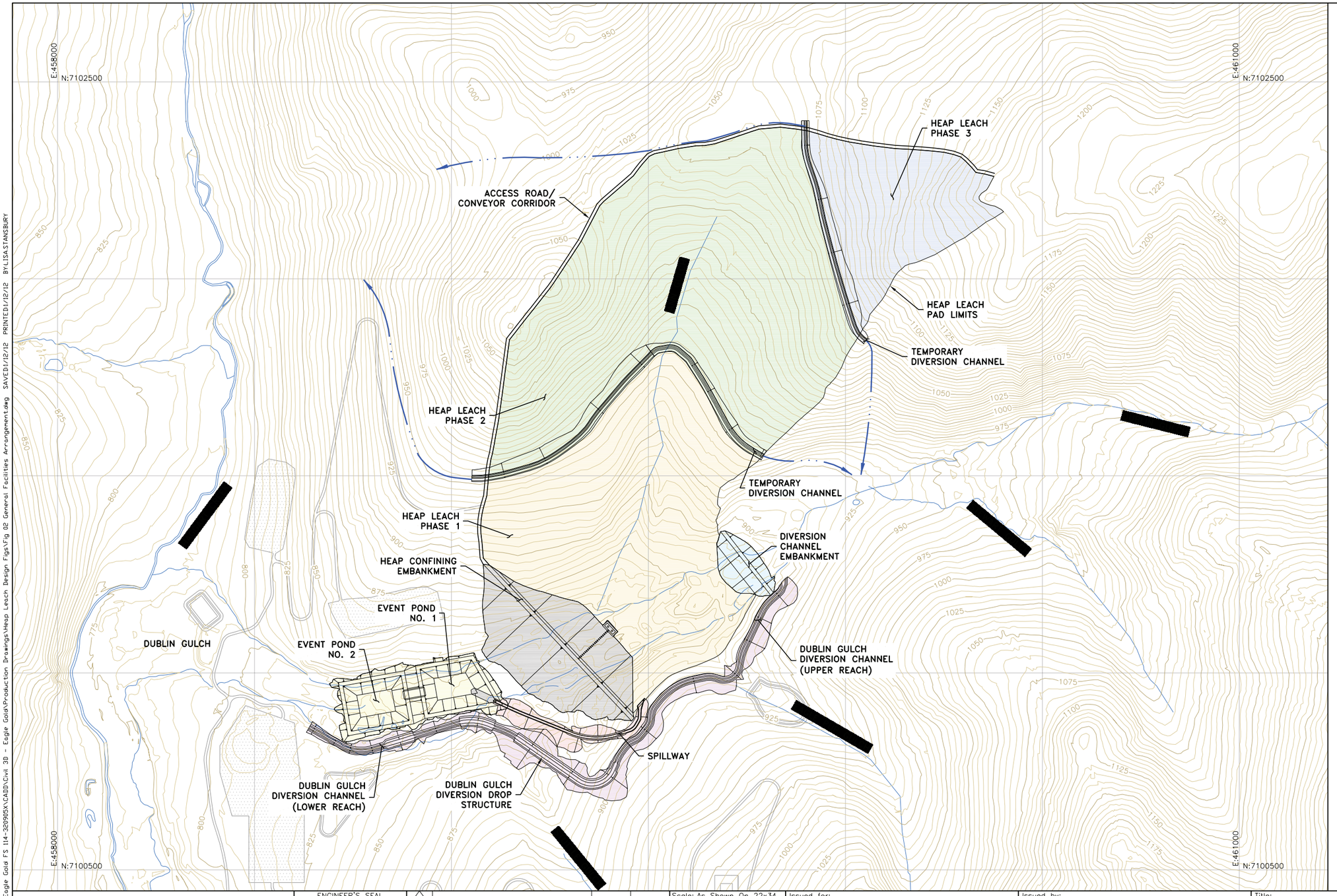
Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
SIMPLIFIED OVERALL FLOWSHEET
PROCESS FLOWSHEET No. 1

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
101000901.DWG	11548601.00	FIGURE 5.1-3	F

A1
U:\T-Z\VICTORIA GOLD CORP – 5486\11548601.00 – EAGLE GOLD FEASIBILITY STUDY\09-PROCESS\PFD\10100-09-01.DWG
11/05/27 14:30



N

SCALE

50m 0 150m

CONTOUR INTERVAL 5m

GENERAL LEGEND

℄ – CENTERLINE
DIA. – DIAMETER
EL. – ELEVATION
GCL – GEOSYNTHETIC CLAY LINER
HDPE – HIGH DENSITY POLYETHYLENE
LCRS – LEAK COLLECTION AND REMOVAL SYSTEM
LLDPE – LINEAR LOW DENSITY POLYETHYLENE
MAX. – MAXIMUM
MIN. – MINIMUM
NOM. – NOMINAL
ODF – OVERLINER DRAIN FILL
PE – POLYETHYLENE
ROM – RUN–OF–MINE
TYP. – TYPICAL
50m – DIMENSION IN METERS
2.5:1 – 2.5 HORIZONTAL TO 1 VERTICAL SLOPE
~ – APPROXIMATLY

1020 EXISTING CONTOURS (m)
1020 PROPOSED GRADING CONTOURS (m)
EXISTING ROAD
EXISTING TELEPHONE LINE (OVERHEAD)
EXISTING ELECTRIC LINE (OVERHEAD)
EXISTING DRAINAGE
CP-5 CONTROL POINT
CHANNEL
DRAINAGE CHANNEL
HEAP EMBANKMENT
DIVERSION CHANNEL EMBANKMENT
EVENT PONDS
DIVERSION CHANNEL
SPILLWAY
PHASE 1 PAD
PHASE 2 PAD
PHASE 3 PAD

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Victoria GOLD CORP

Issued by:

TETRA TECH
3031 West Ina Road
Tucson, Arizona 85741
(520) 297-7723 (520) 297-7724 fax

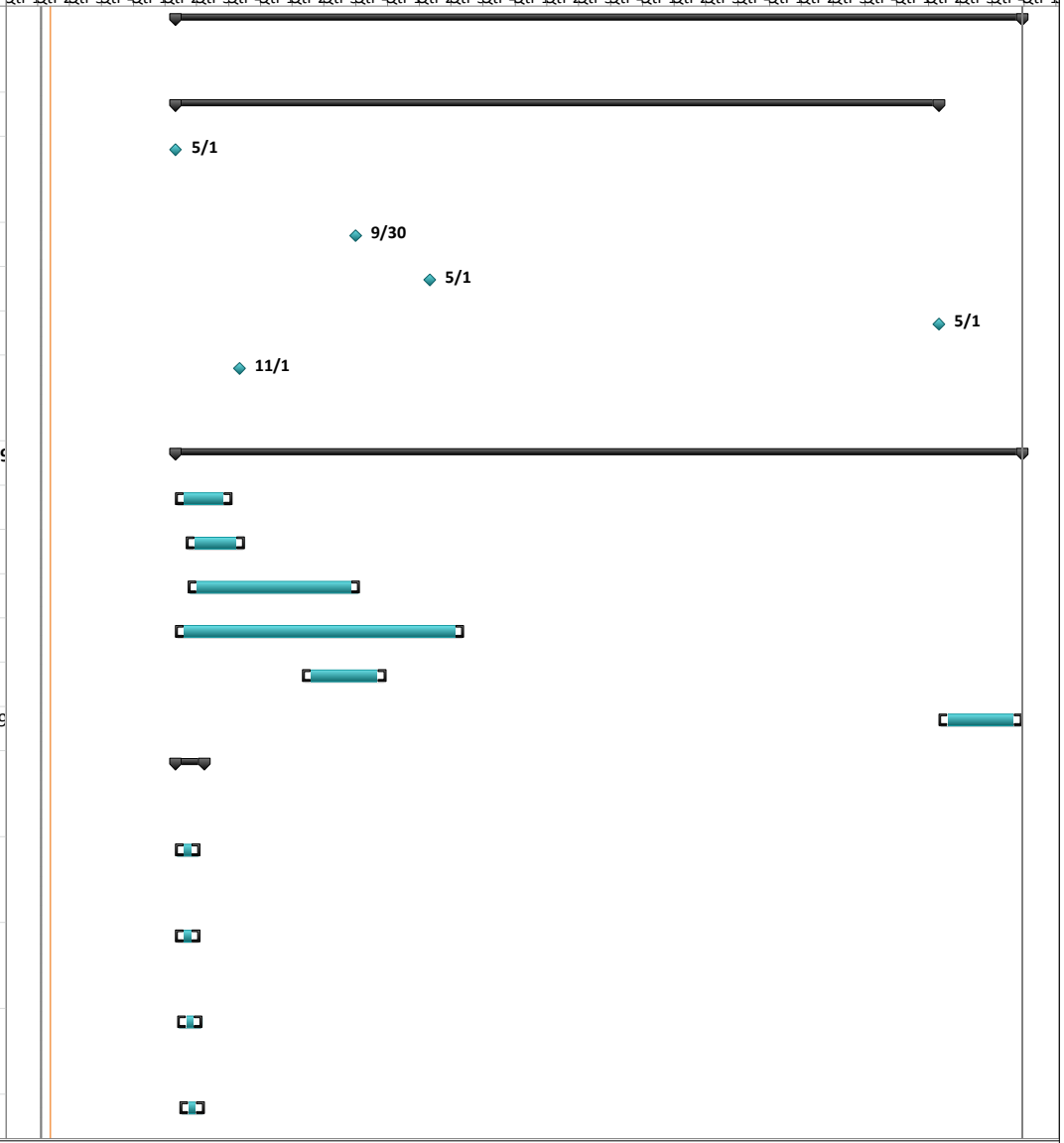
Title:

EAGLE GOLD PROJECT
HEAP LEACH FACILITY
GENERAL FACILITIES ARRANGEMENT

C REVISION

Project: EAGLE GOLD PROJECT HEAP LEACH FACILITY
Project no.: 320905X
Figure no.: Figure 5.4-1
Location: DUBLIN GULCH, YUKON, CANADA
Date: 01/12

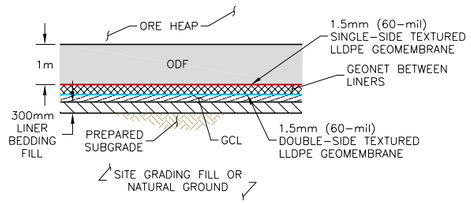
ID	Task Mode	Task Name	Duration	Start	Finish
1		**HEAP LEACH DEVELOPMENT SCHEDULE**	**1736 days**	**Wed 5/1/13**	**Wed 12/25/19**
2		**KEY TASKS & MILESTONES**	**1565 days**	**Wed 5/1/13**	**Wed 5/1/19**
3		Start Heap Leach Facility Construction	0 days	Wed 5/1/13	Wed 5/1/13
4		Delier Ore to Heap Leach Pad	0 days	Tue 9/30/14	Tue 9/30/14
5		Start Stage 2 Construction	0 days	Fri 5/1/15	Fri 5/1/15
6		Start Stage 3 Construction	0 days	Wed 5/1/19	Wed 5/1/19
7		Connect Upper and Lower Diversion Channel	0 days	Fri 11/1/13	Fri 11/1/13
8		**HEAP LEACH PAD**	**1736 days**	**Wed 5/1/13**	**Wed 12/25/19**
9		Rough Earthworks	116 days	Wed 5/1/13	Wed 10/9/13
10		Cushion Layer Material	120 days	Sat 6/1/13	Thu 11/14/13
11		Event Ponds	351 days	Fri 6/7/13	Fri 10/10/14
12		Phase 1- Heap Leach Pad	591 days	Wed 5/1/13	Wed 8/5/15
13		Phase 2 - Heap Leach Pad	171 days	Thu 5/1/14	Thu 12/25/14
14		Phase 3 - Heap Leach Pad	171 days	Wed 5/1/19	Wed 12/25/19
15		**Dublin Gulch Water Management Features**	**59 days**	**Wed 5/1/13**	**Mon 7/22/13**
16		Lower Dublin Gulch South Pond	50 days	Wed 5/1/13	Tue 7/9/13
17		Lower Dublin Gulch North Pond	50 days	Wed 5/1/13	Tue 7/9/13
18		Dublin Gulch Diversion Channel	50 days	Tue 5/7/13	Mon 7/15/13
19		Drop Structures	50 days	Tue 5/14/13	Mon 7/22/13



Project: Figure RP HLF Schedule_r
Date: Mon 5/7/12

Task	External Tasks	Manual Task	Finish-only		
Split	External Milestone	Duration-only	Deadline		
Milestone	Inactive Task	Manual Summary Rollup	Progress		
Summary	Inactive Milestone	Manual Summary			
Project Summary	Inactive Summary	Start-only			

Figure 5.4-2
Heap Leach Facility Construction Schedule



2 05 05 **IN-HEAP PAD LINER DETAIL**
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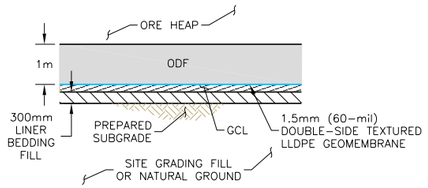

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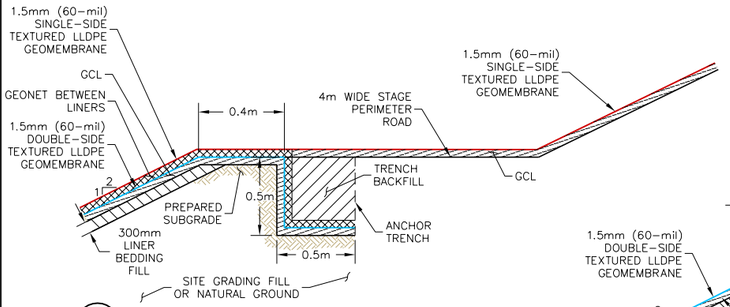

5 05 05 **IN-HEAP PAD GEOMEMBRANE ANCHOR DETAIL**
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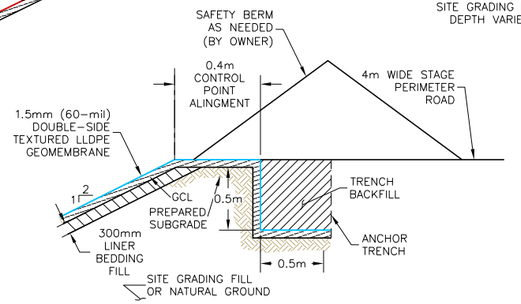

6 05 05 **PAD GEOMEMBRANE ANCHOR DETAIL**
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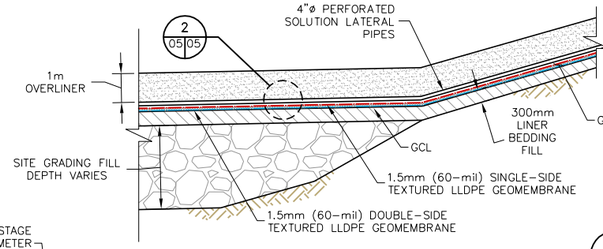
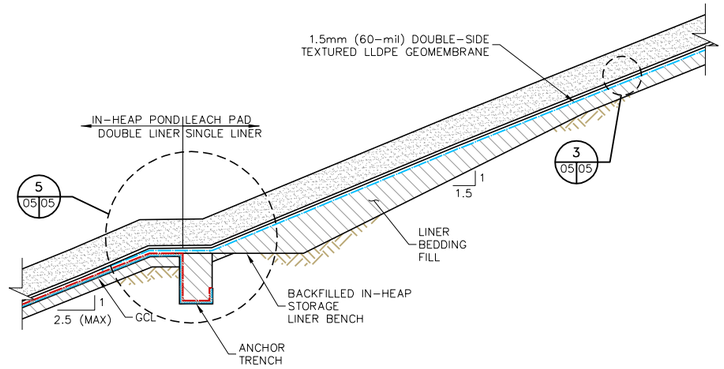


4 05 05 **TYPICAL TRANSITION FROM IN-HEAP STORAGE POND**
NTS



7 05 05 **TYPICAL STAGE PERIMETER ROAD**
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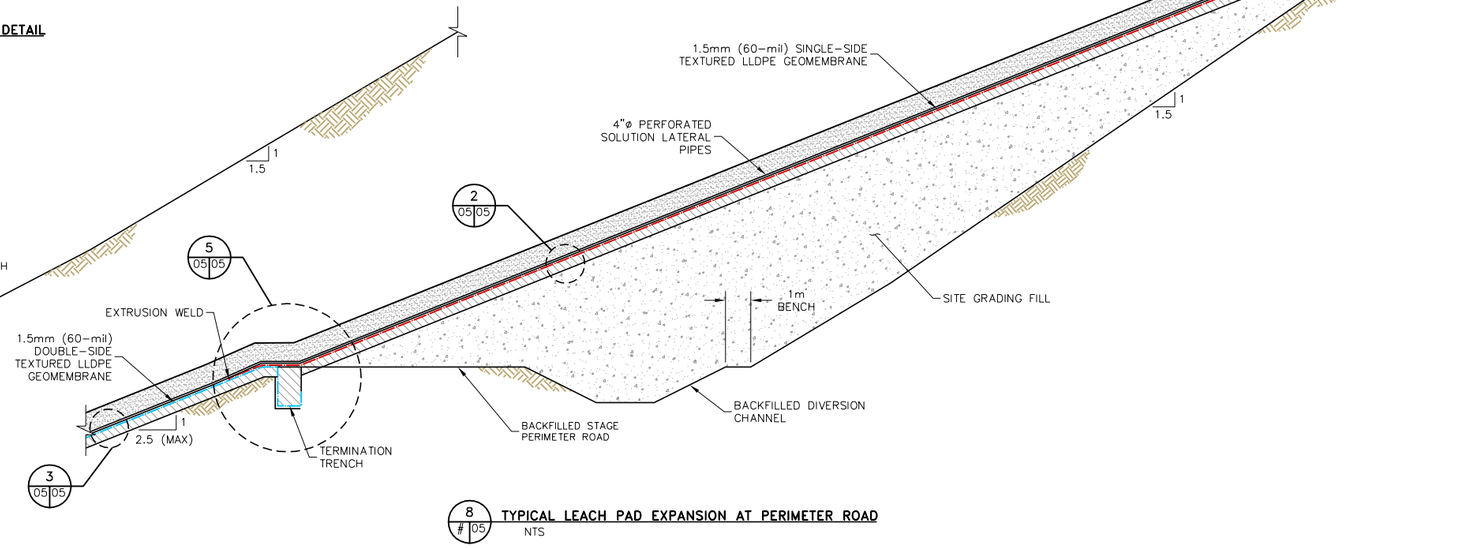

8 # 05 **TYPICAL LEACH PAD EXPANSION AT PERIMETER ROAD**
NTS

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HEAP LEACH FACILITY
HEAP LEACH DETAILS

C REVISION

Project: EAGLE GOLD PROJECT HEAP LEACH FACILITY
Project no.: 320905X
Location: DUBLIN GULCH, YUKON, CANADA
Date: 01/12
Figure no.: Figure 5.4-1

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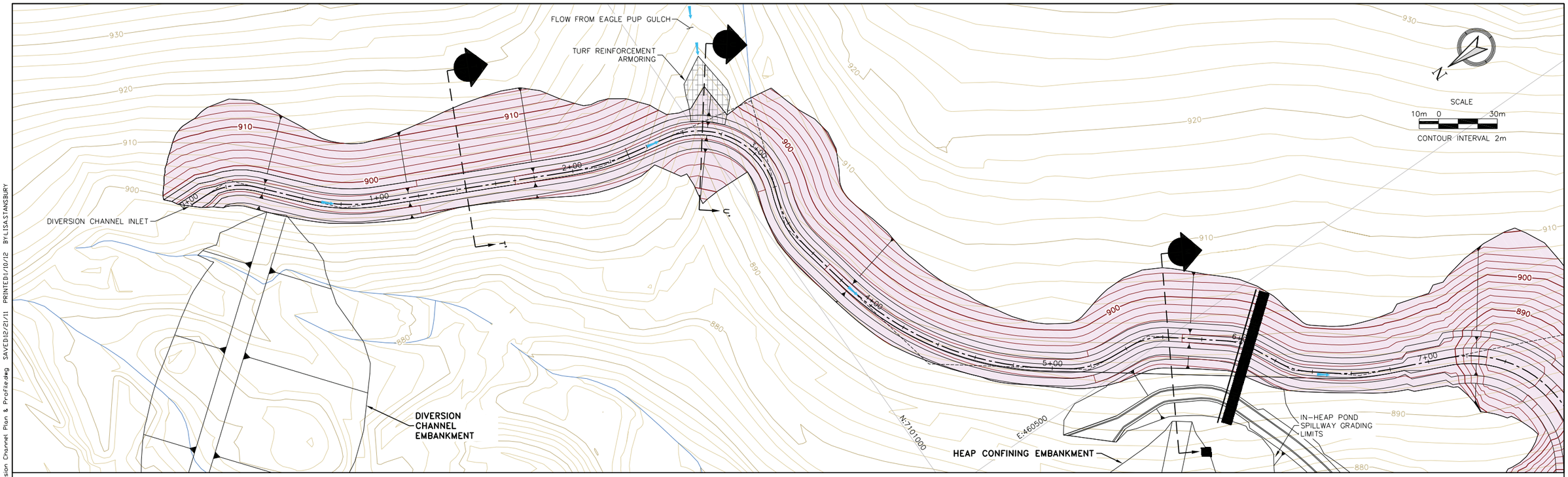

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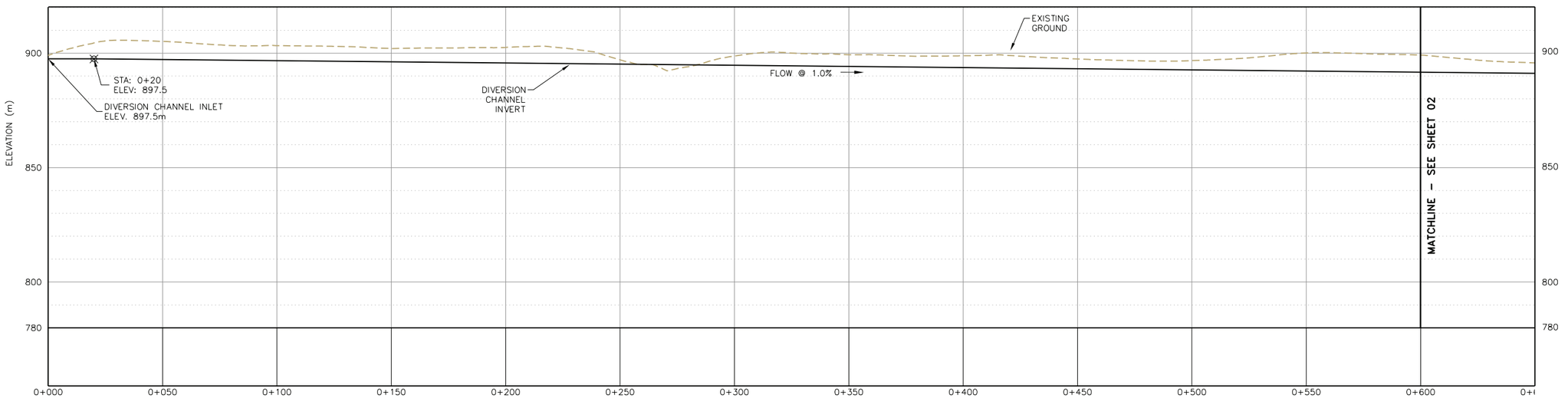

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DUBLIN GULCH DIVERSION CHANNEL
PLAN & PROFILE
SEGMENT A

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Project no.: 320905X
Figure no.: Figure 5.4-1
Location: DUBLIN GULCH, YUKON, CANADA
Date: 01/12

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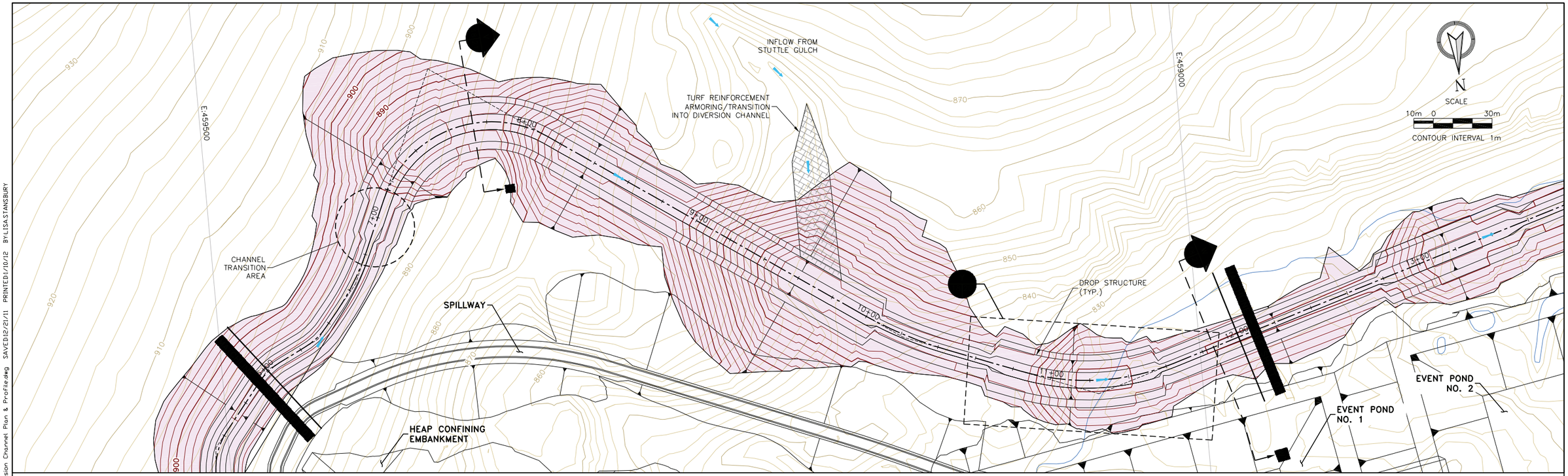

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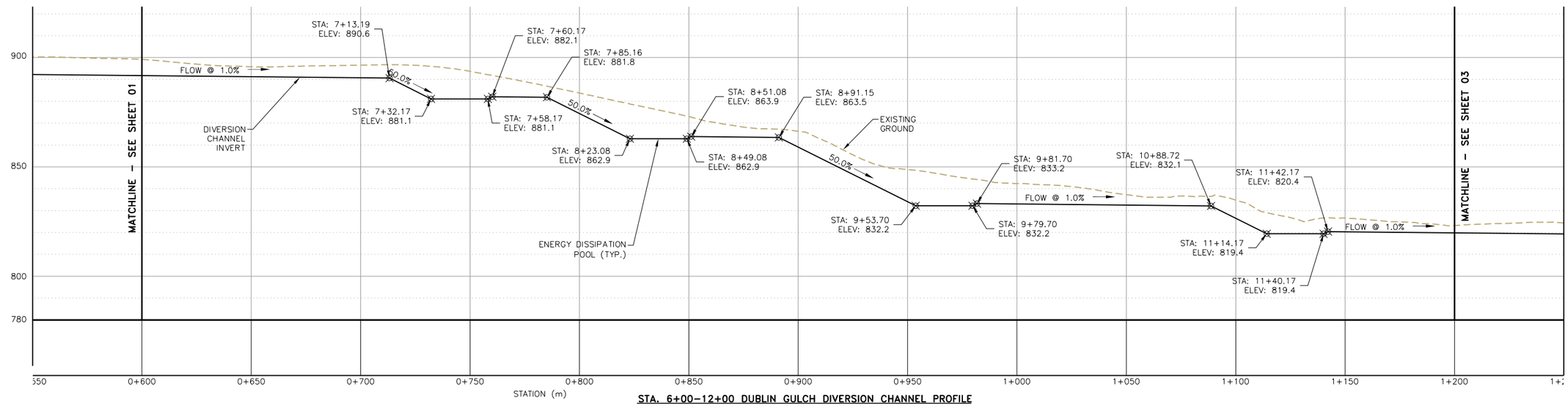

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SEGMENT B

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Project: EAGLE GOLD PROJECT HEAP LEACH FACILITY
Project no.: 320905X
Figure no.: Figure 5.4-5
Location: DUBLIN GULCH, YUKON, CANADA
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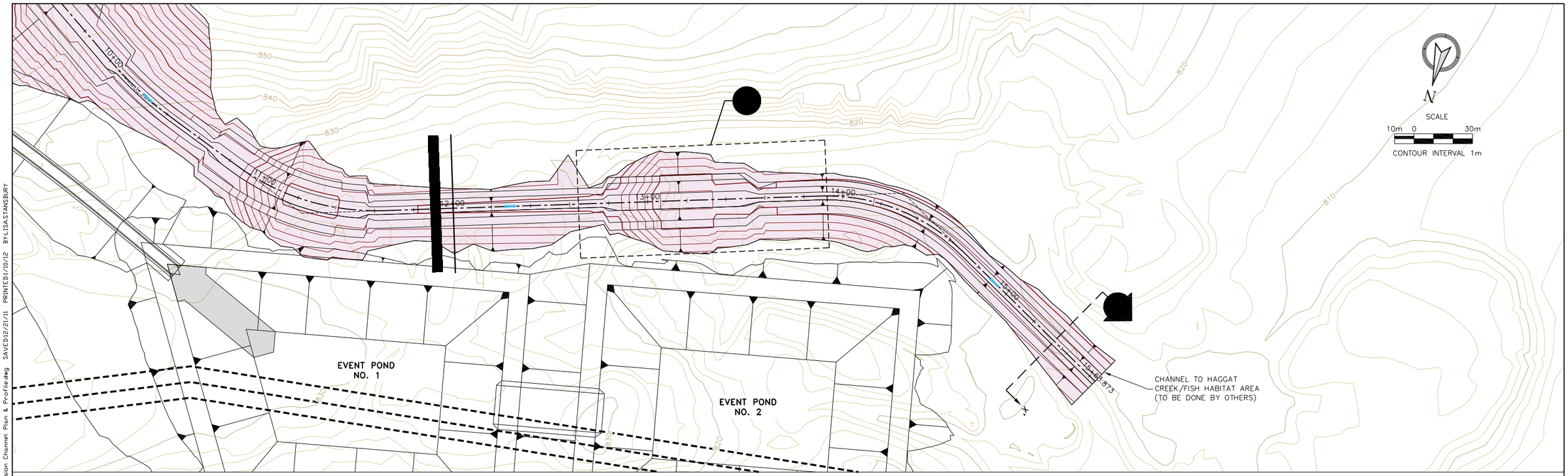

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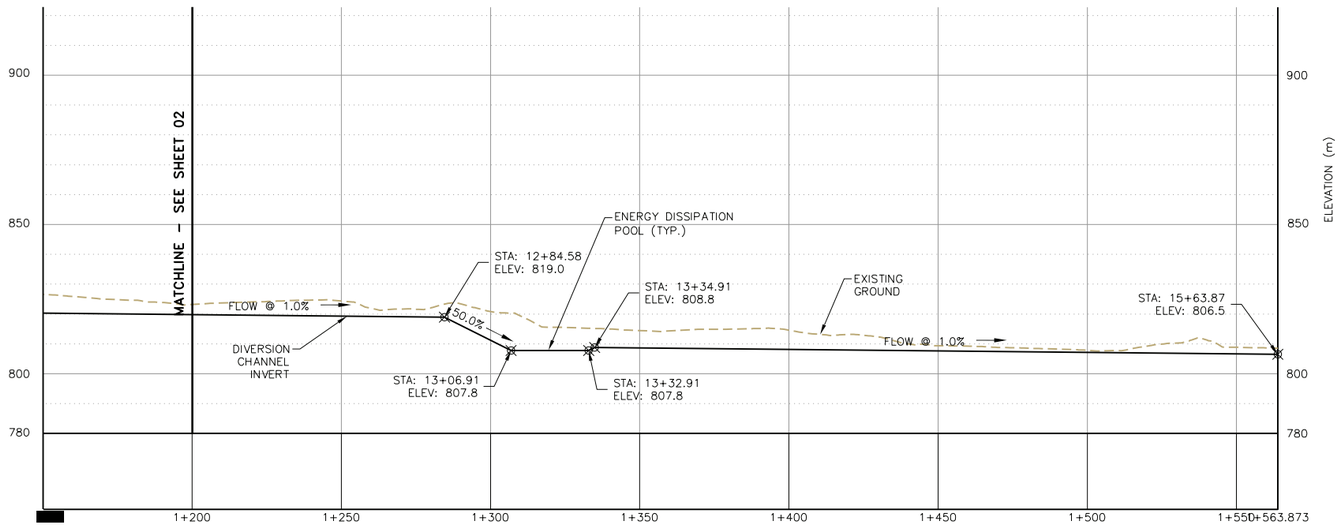

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Project: EAGLE GOLD PROJECT HEAP LEACH FACILITY
Project no.: 320905X
Figure no.: Figure 5.4-6
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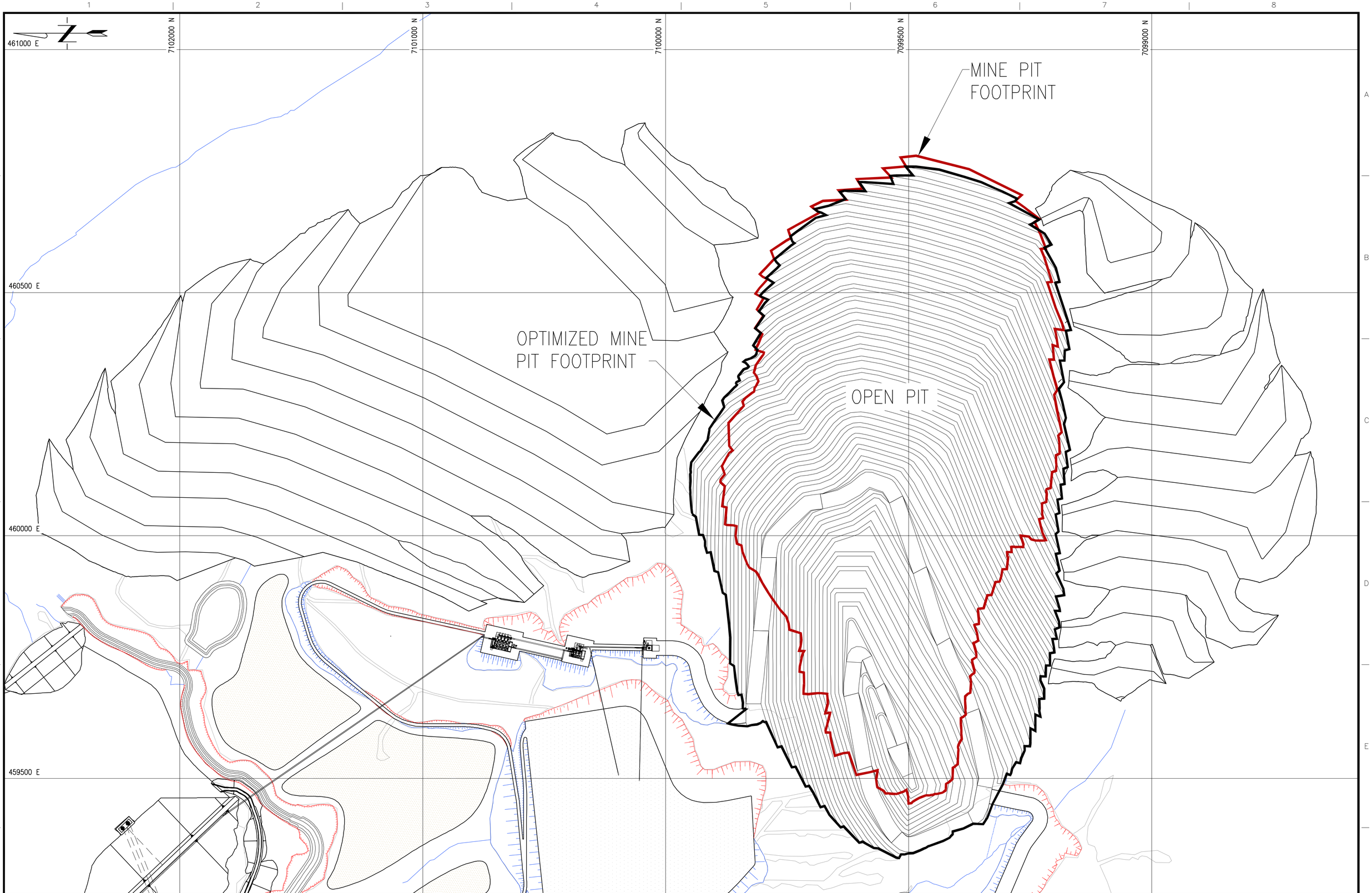

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FIGURE-PIT.DWG	11548601.00	FIGURE 5.5-1	A

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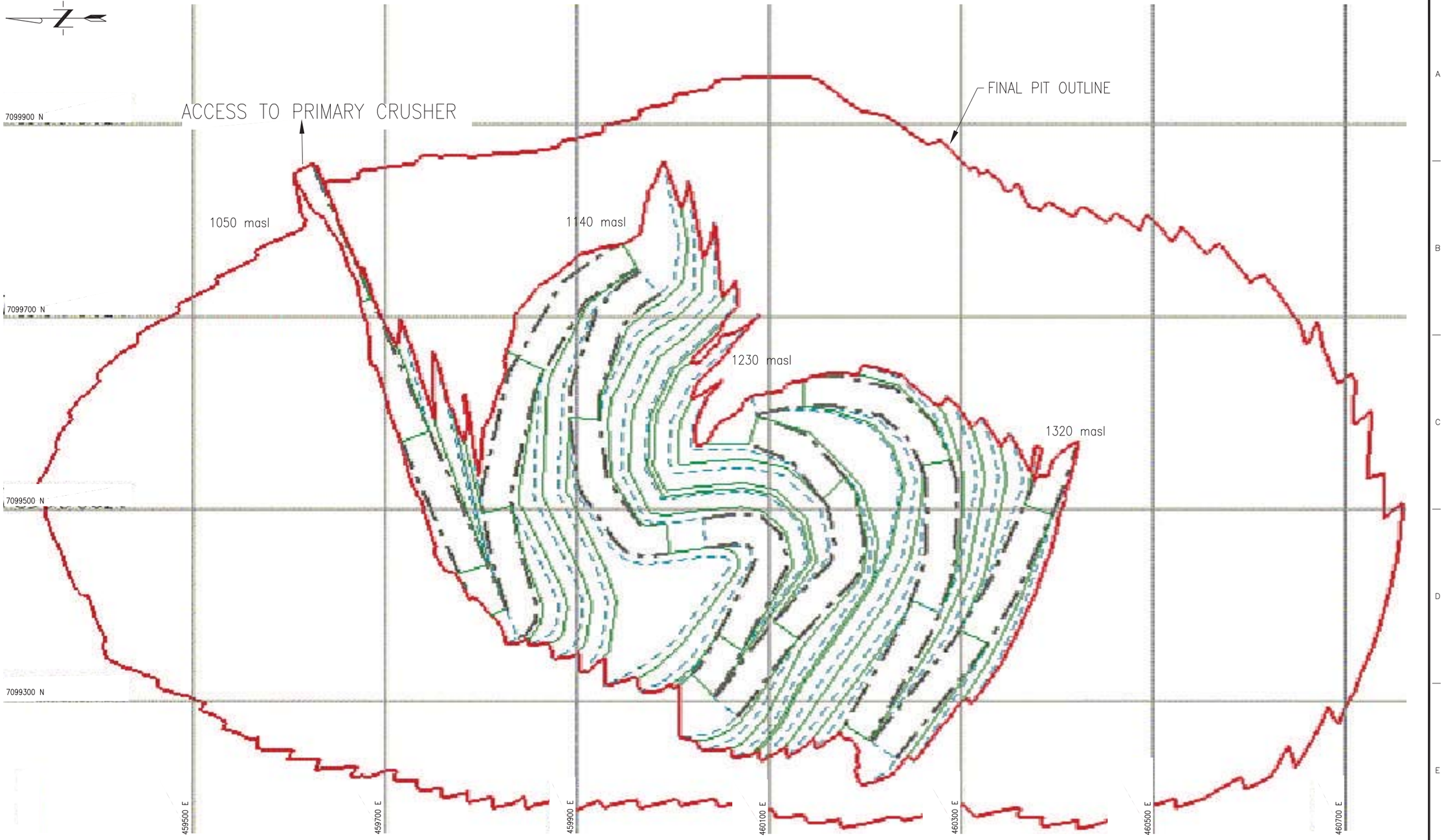

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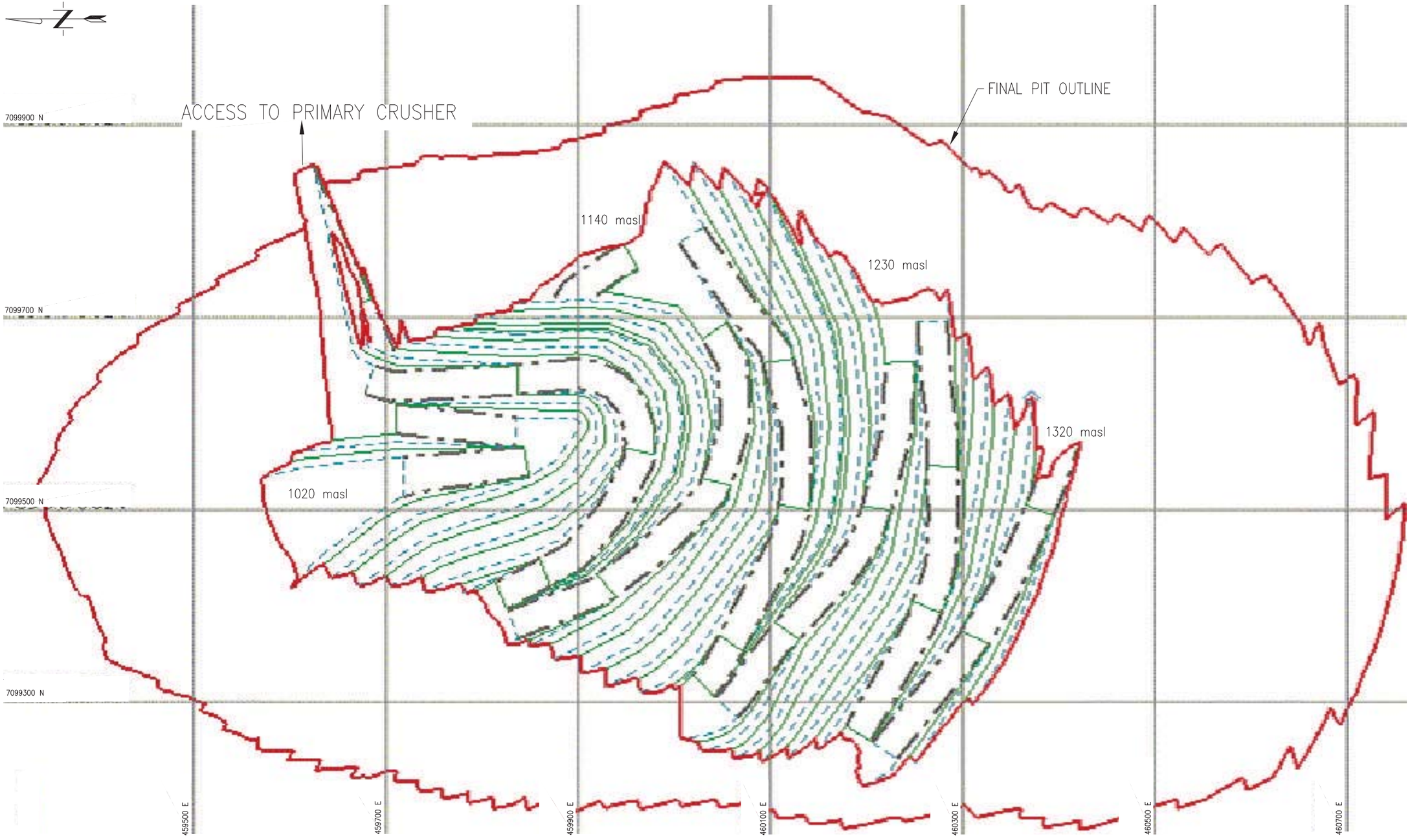

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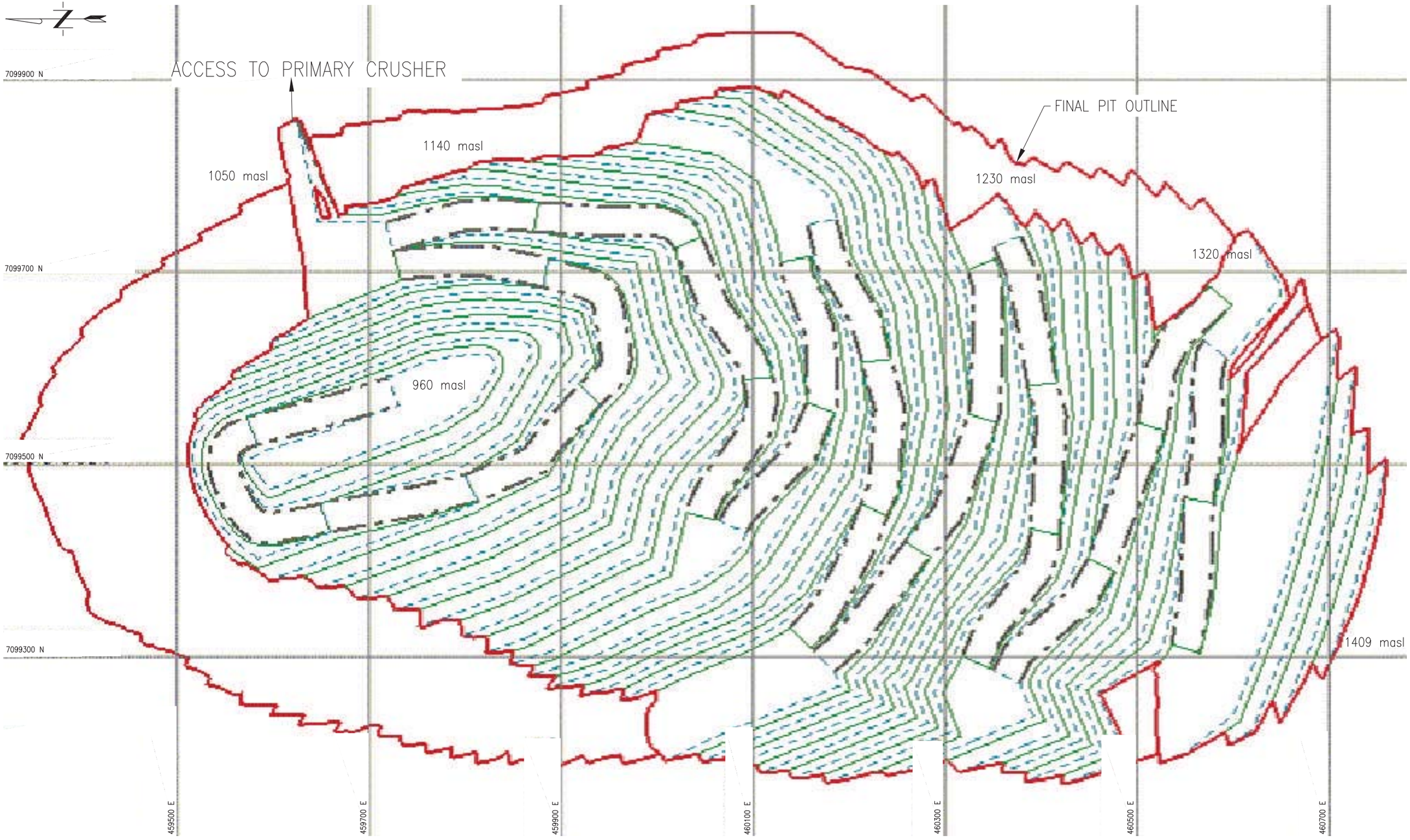

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FIGURE---.DWG	11548601.00	Figure 5.5-4	A

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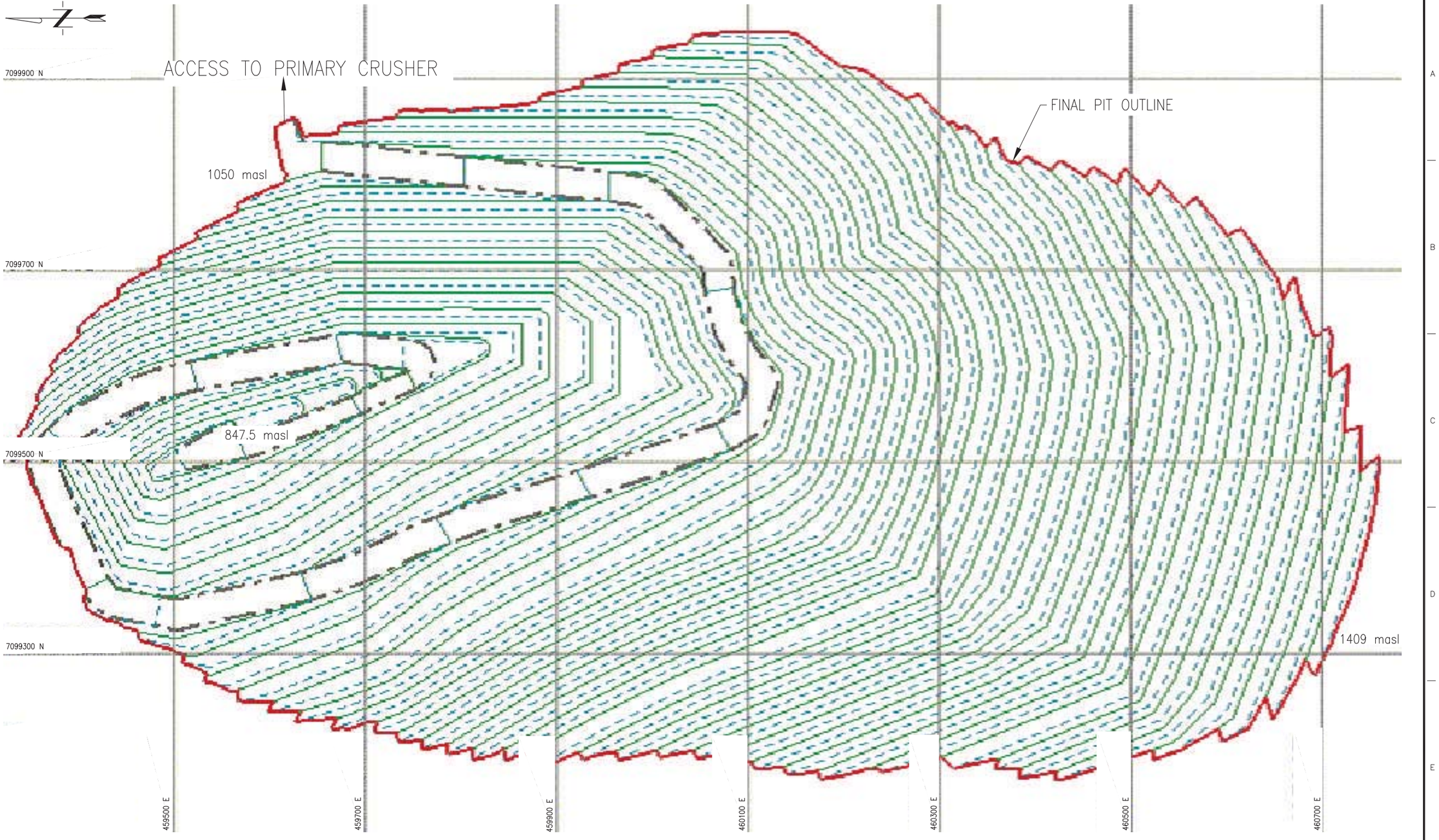

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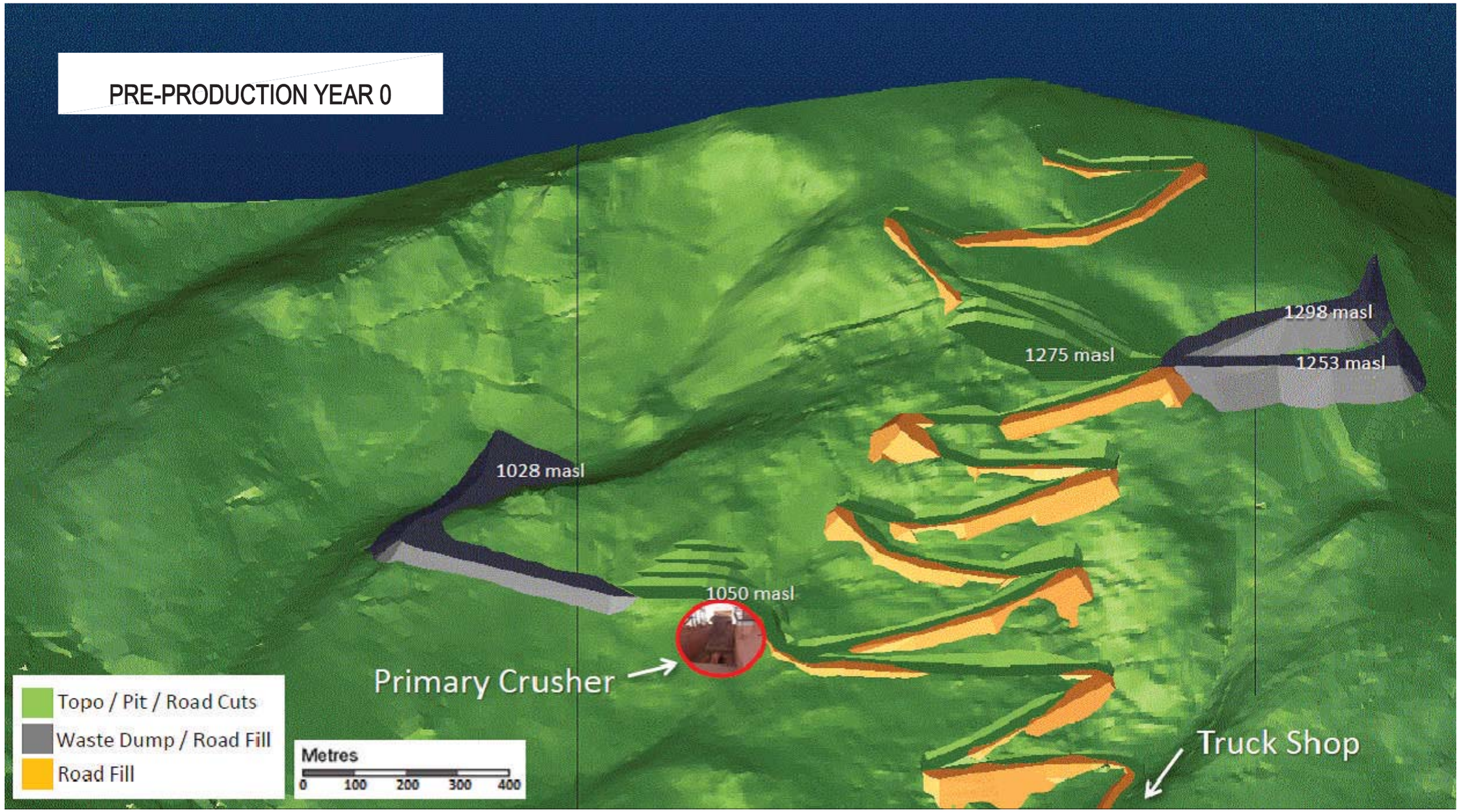

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CIVIL
PIT AND WASTE ROCK STORAGE AREA (WRSA)
PRE-PRODUCTION

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FIGURE---.DWG	11548601.00	Figure 5.5-6	A

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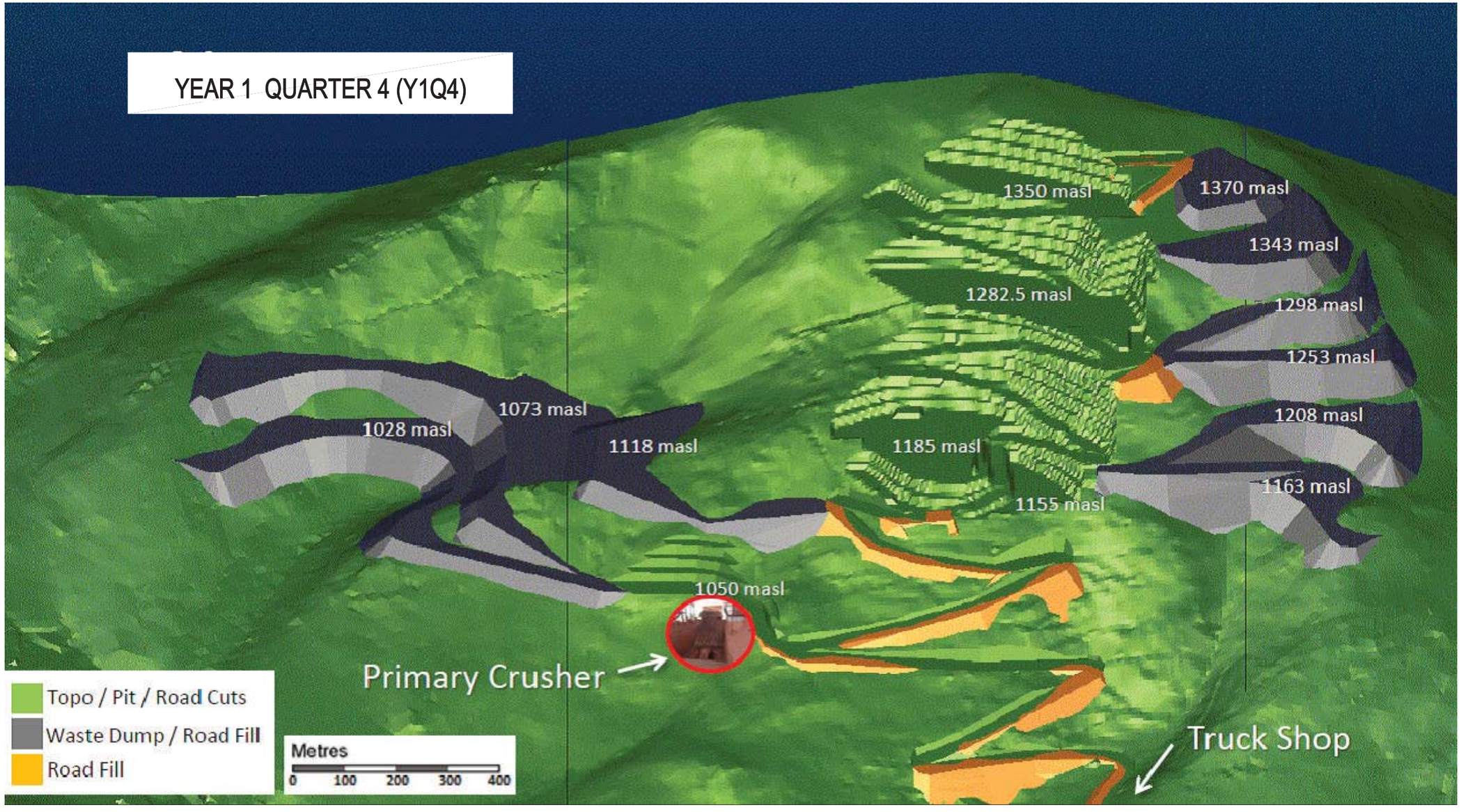

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CLIENT: Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
CIVIL
MINE STATUS
YEAR 1 QUARTER 4

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
FIGURE---.DWG	11548601.00	Figure 5.5-7	A

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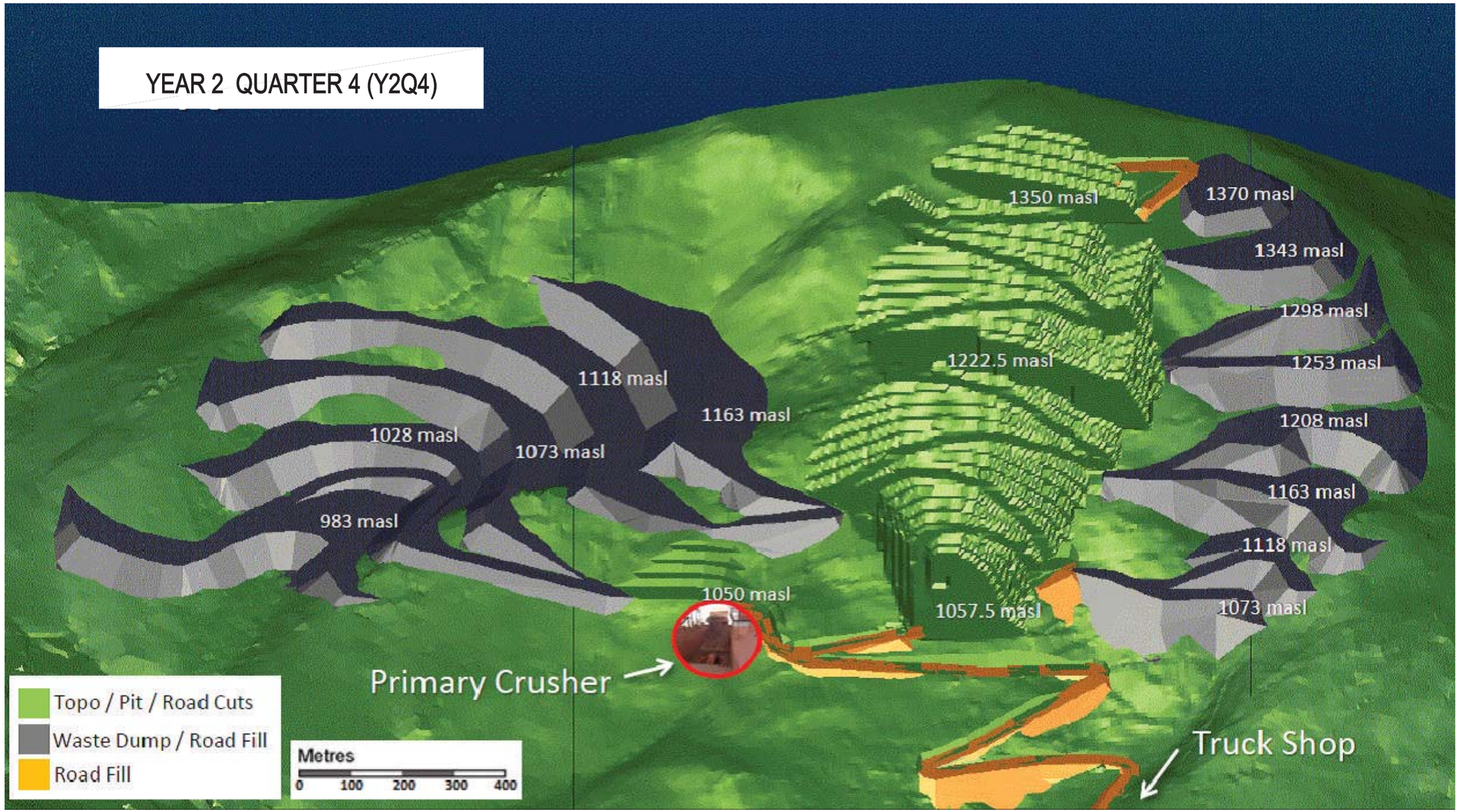

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CLIENT: Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
CIVIL
MINE STATUS
YEAR 2 QUARTER 4

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
FIGURE---.DWG	11548601.00	Figure 5.5-8	A

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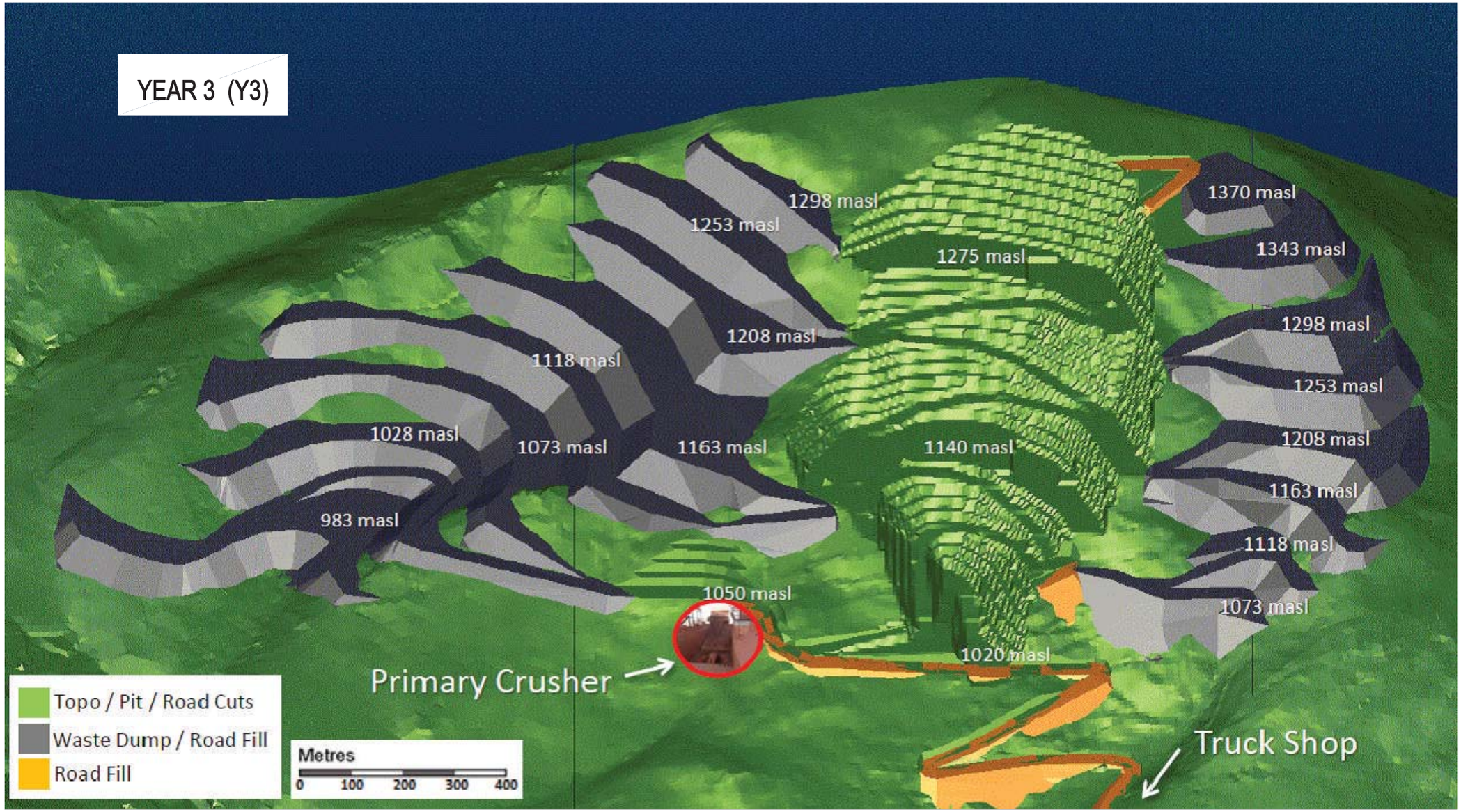

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SCALE:	--
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DATE	04APRIL12

CLIENT: Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
CIVIL
MINE STATUS
YEAR 3

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
FIGURE---.DWG	11548601.00	Figure 5.5-9	A

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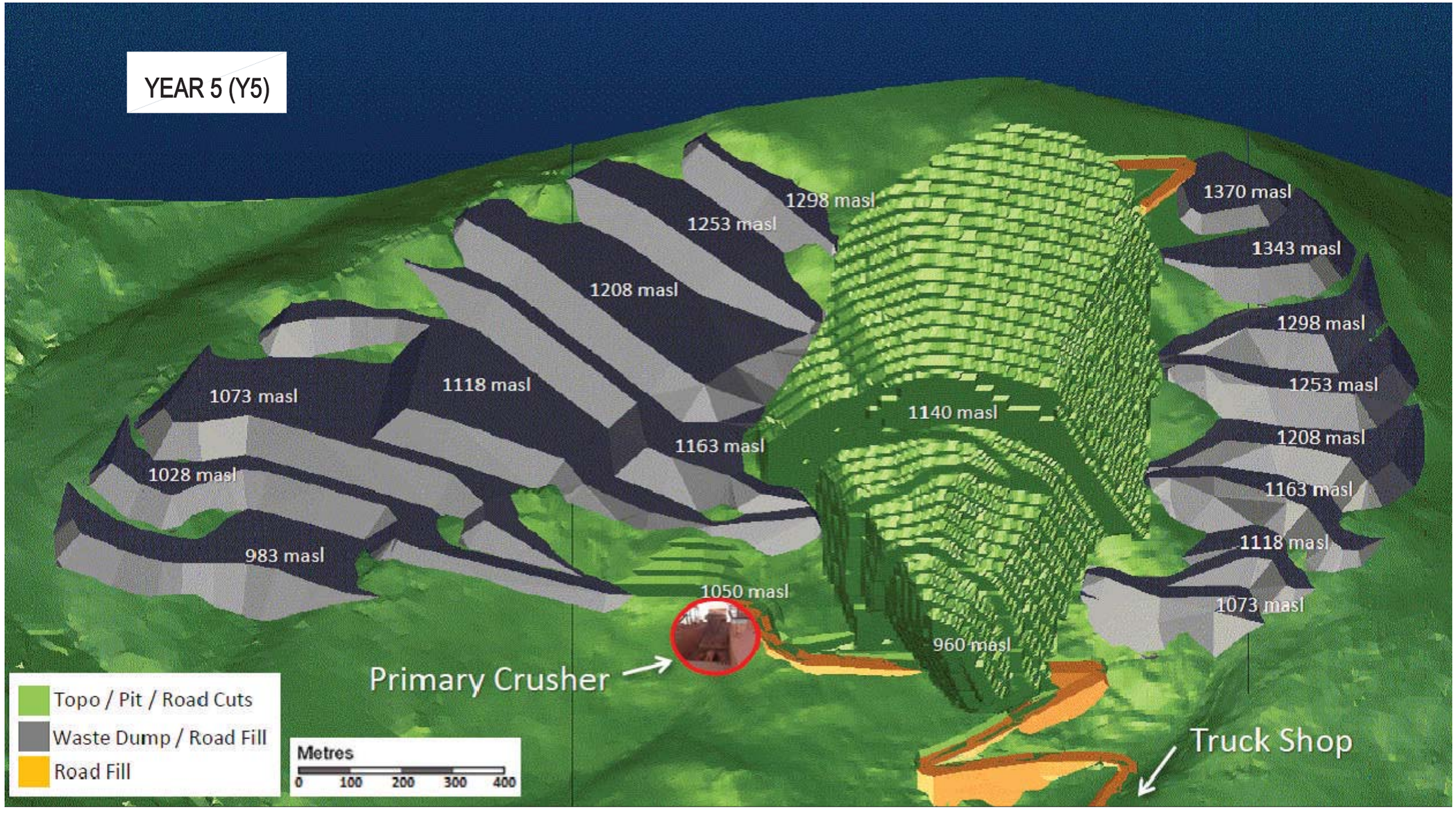

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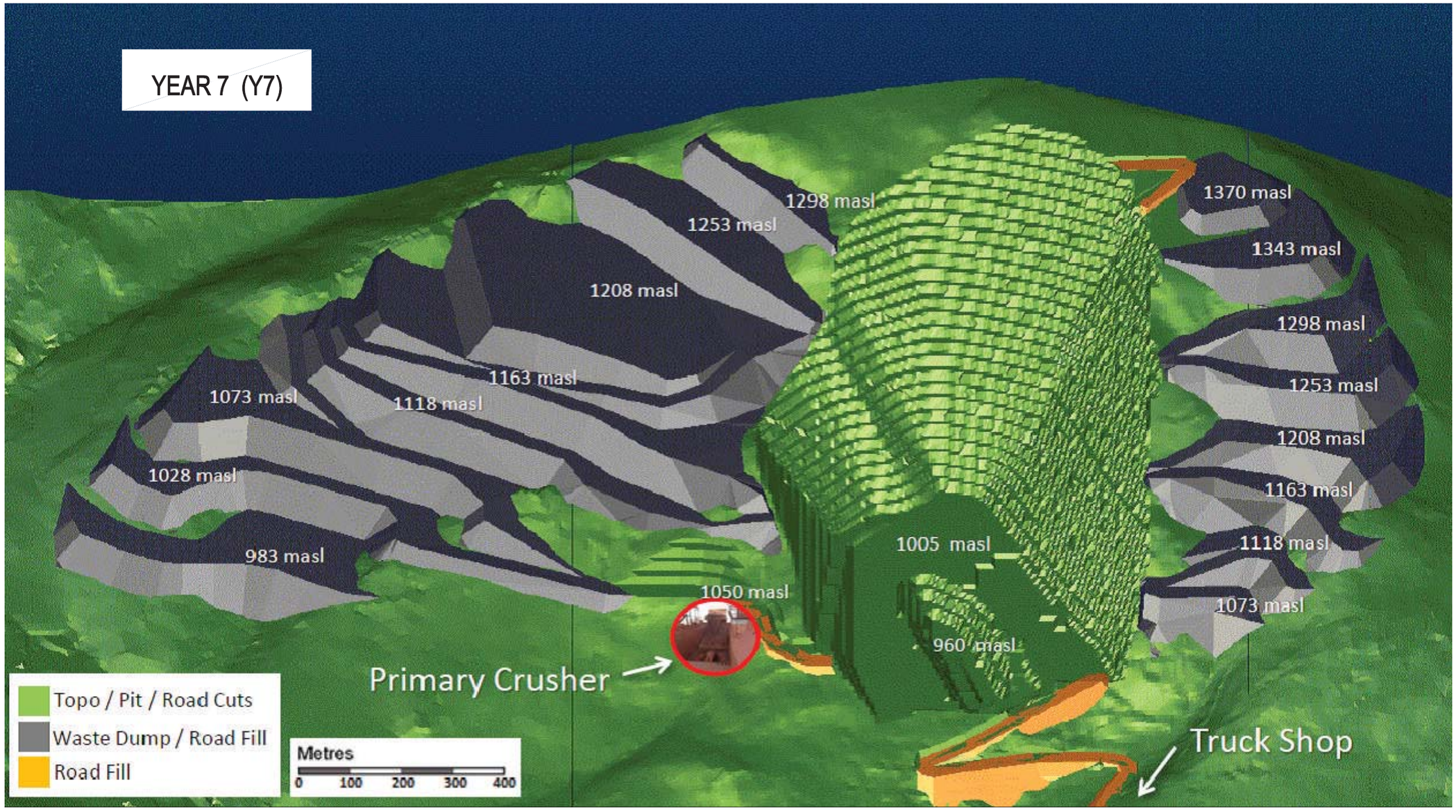
CLIENT: Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
CIVIL
MINE STATUS
YEAR 5

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
FIGURE---.DWG	11548601.00	Figure 5.5-10	A



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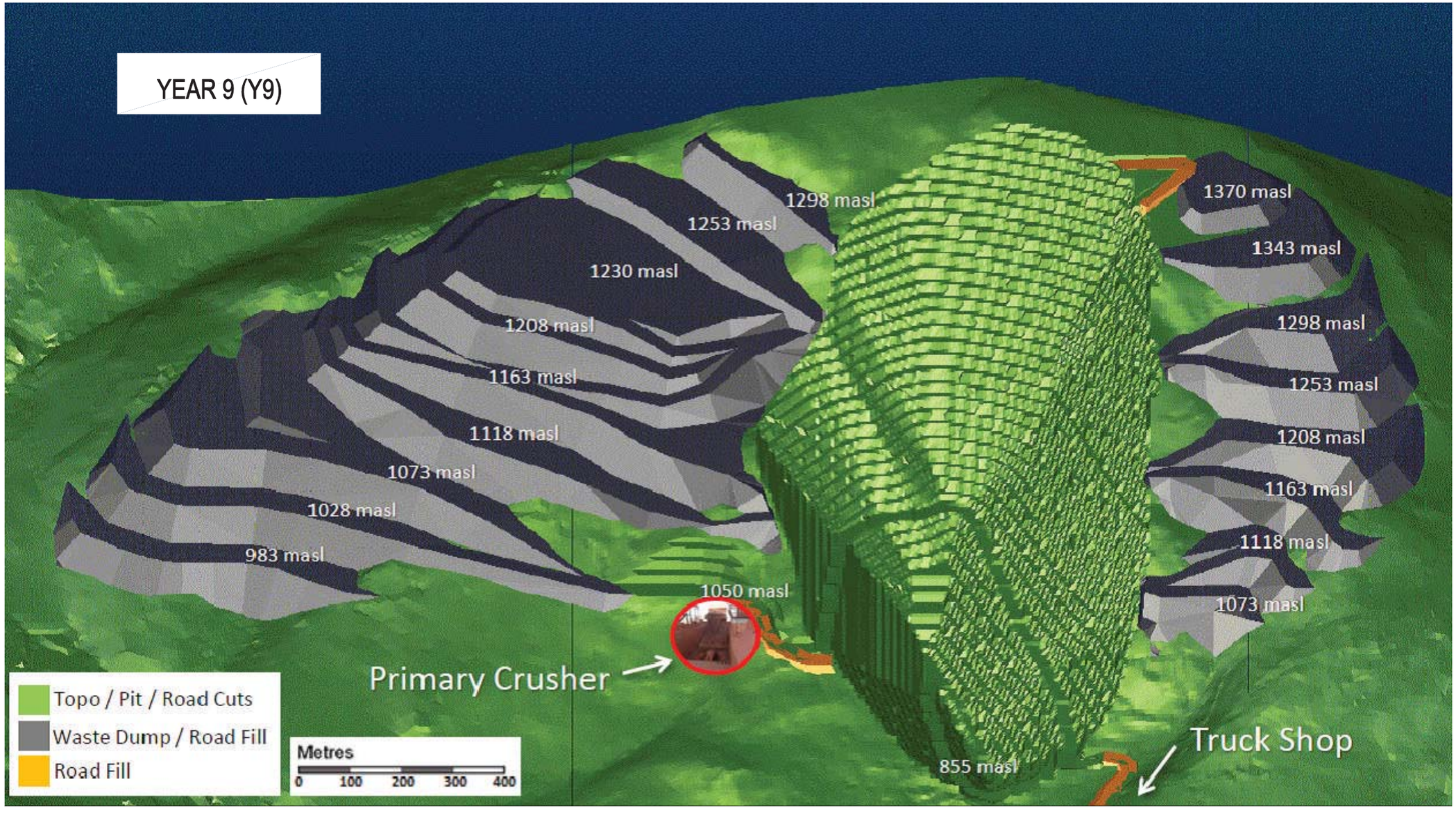
CLIENT: Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
CIVIL
MINE STATUS
YEAR 7

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
FIGURE---.DWG	11548601.00	Figure 5.5-11	A

U:\T-Z\VICTORIA GOLD CORP - 5486\11548601.00 - EAGLE GOLD FEASIBILITY STUDY\20-CIVIL-EARTH_DWG\MINE SITE AREA\FIGURE - PIT PDF'SR.DWG



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CLIENT PROJMAN PROJENG PROCESS ELECTR. INSTR. PIPING MECH. STRUCT STORAGES ARCH. LAYOUT

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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SECTION:	CIVIL	
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APP. BY:	-	——

CLIENT: Victoria GOLD CORP
YUKON

TETRA TECH
WARDROP A TETRA TECH COMPANY

TITLE
EAGLE GOLD PROJECT (FEASIBILITY)
CIVIL
MINE STATUS
YEAR 9

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
FIGURE---.DWG	11548601.00	Figure 5.5-12	A

I:\T-Z\VICTORIA GOLD CORP - 5486\11548601.00 - EAGLE GOLD FEASIBILITY STUDY\20-CIVIL-EARTH_DWG\MINE SITE AREA\FIGURE - PIT PDFSR.DWG

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Figure 5.5-13: Load Profile Years 1 through 4

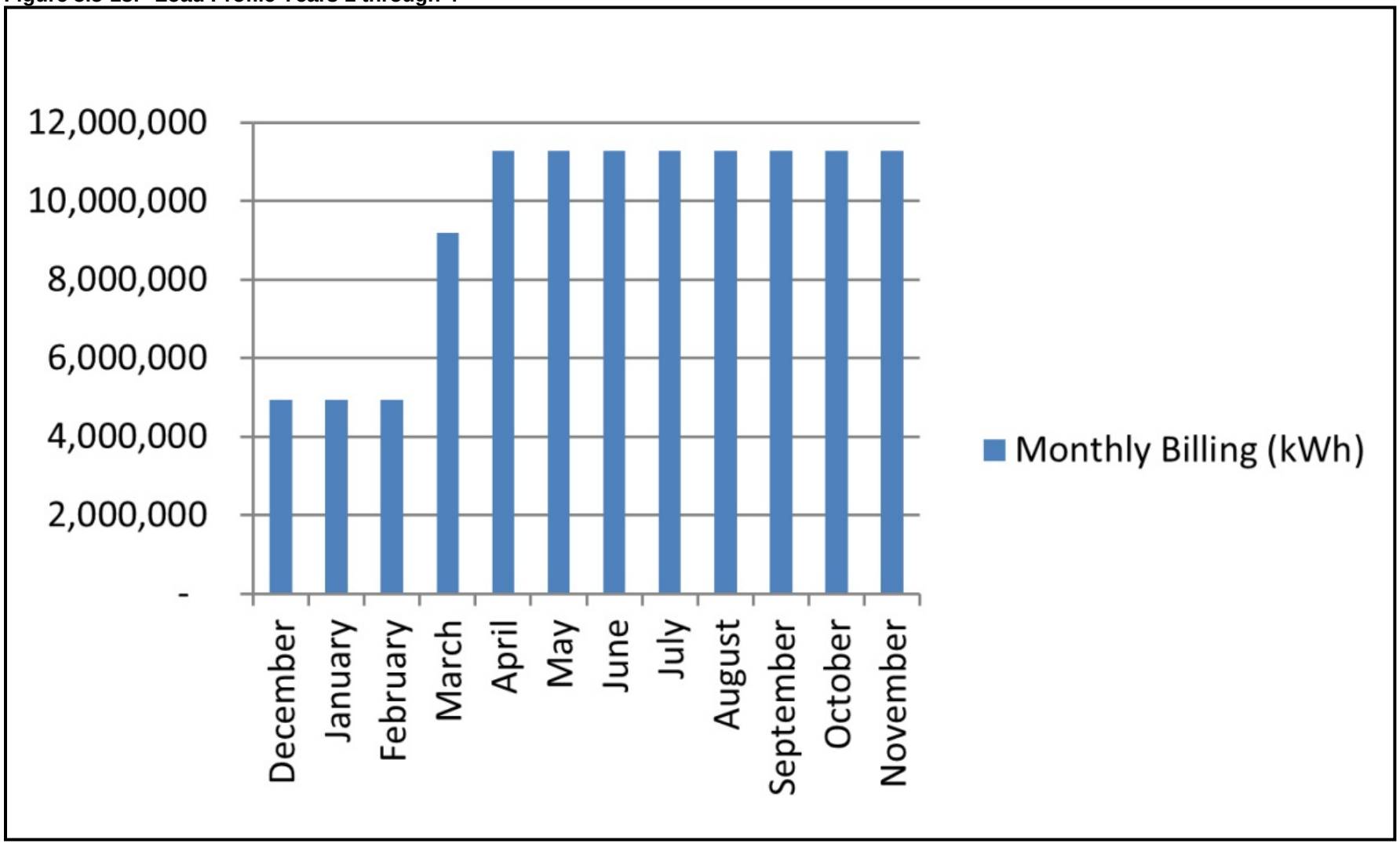
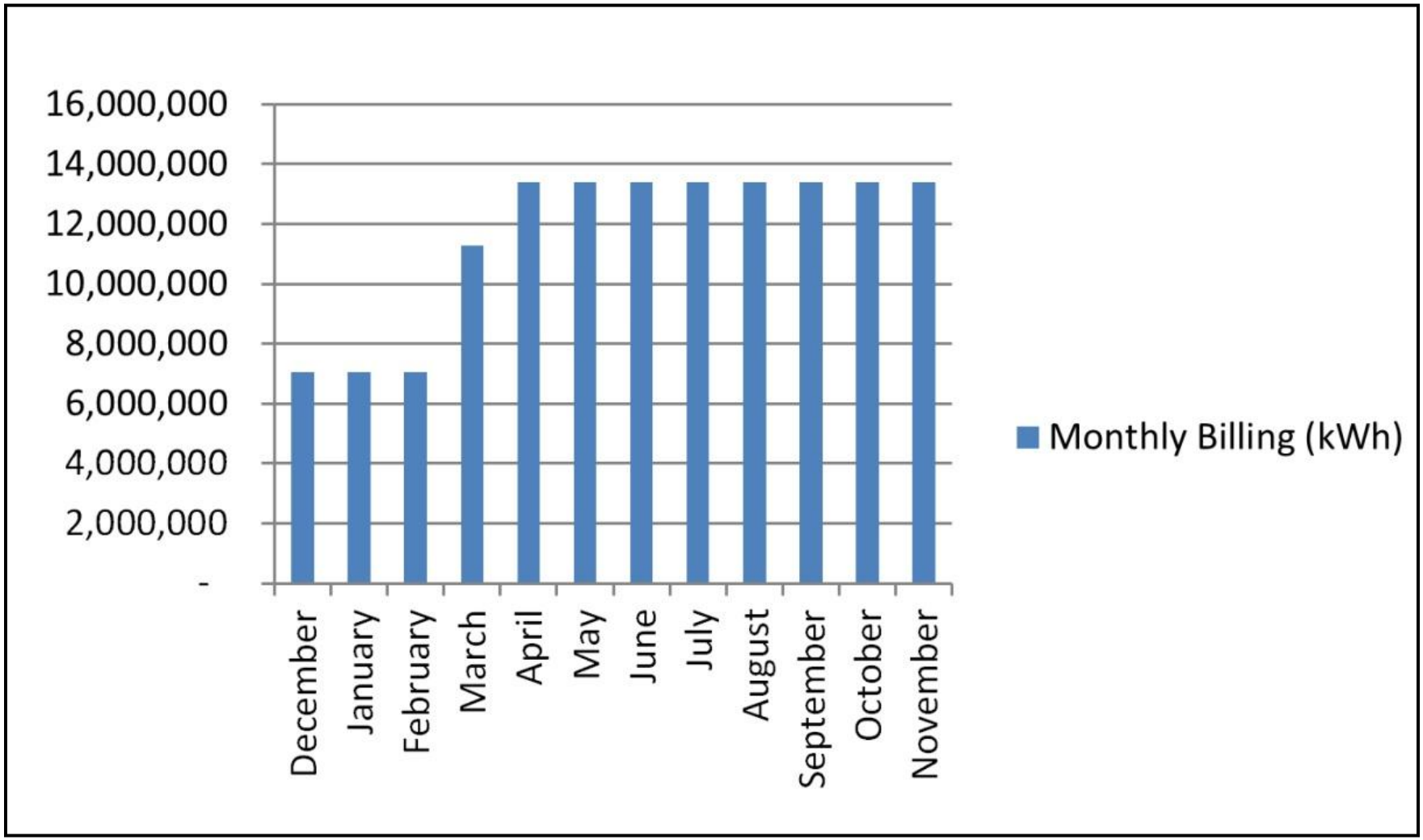
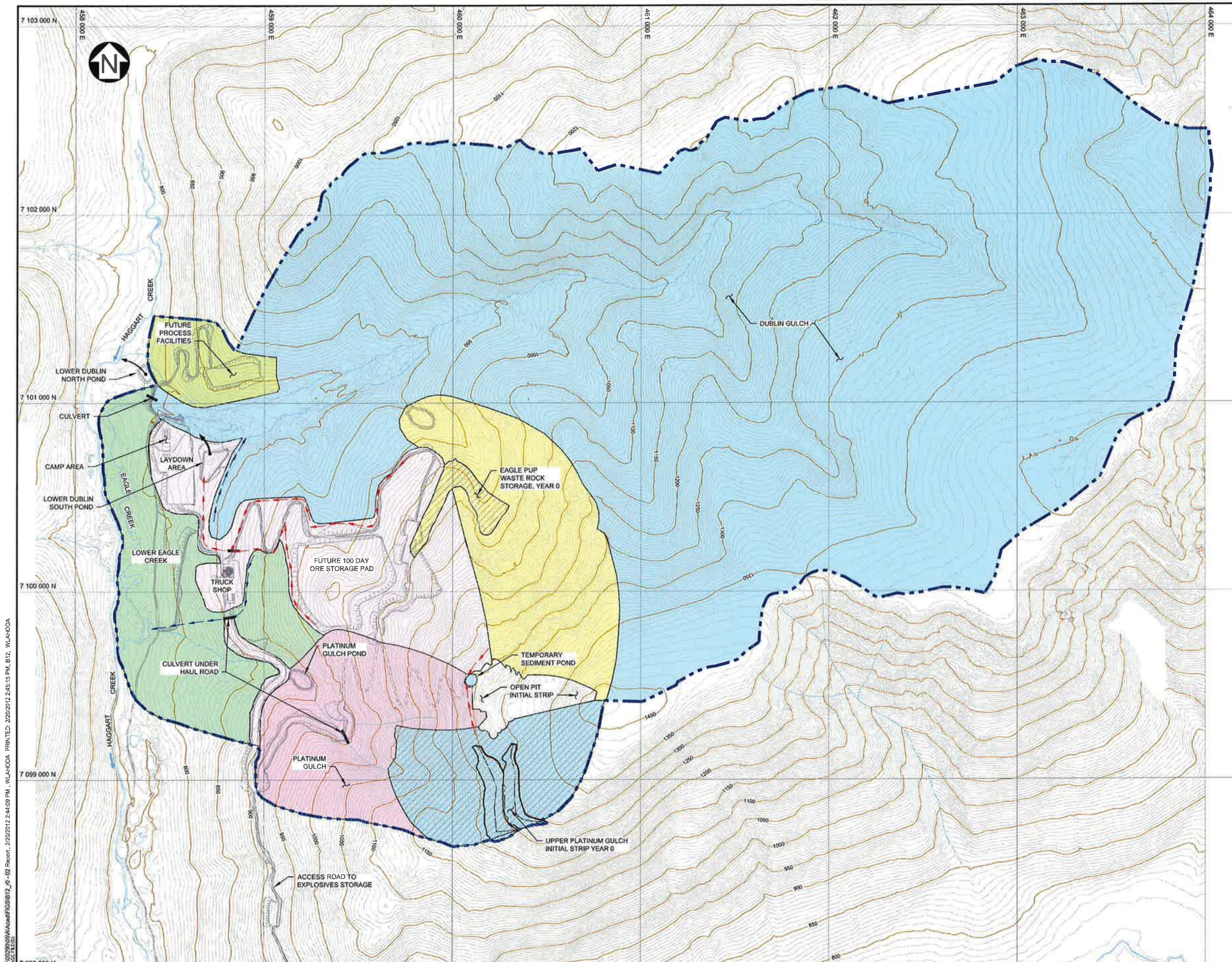


Figure 5.5-14: Load Profile Year 8 through End of LOM





CATCHMENT AREAS

DESCRIPTION	ha
DUBLIN GULCH	1070
OPEN PIT (INITIAL STRIP)	14
EAGLE PUP WRSA (INITIAL STRIP)	8
LAYDOWN, TRUCK STOP, ORE STORAGE & CRUSHING	107
LOWER PLATINUM GULCH	79
PROCESS FACILITIES	39
LOWER EAGLE CREEK	96
UPPER PLATINUM GULCH	58
EAGLE PUP (UNDISTURBED)	133
TOTAL	1604

LEGEND:

SEDIMENT CONTROL POND

CONTACT WATER

SECONDARY ROUTING

CONTACT WATER DITCH

NON-CONTACT WATER

NON-CONTACT WATER DITCH

DRAINAGE DIVIDE

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 8.
2. CONTOUR INTERVAL IS 5 METRES.

SCALE A 200 100 0 200 400 600 800 1000 m

VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

WATER MANAGEMENT PLAN CONSTRUCTION PHASE YEAR -2

Knight Piésold CONSULTING

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FIGURE 5.5-15 | REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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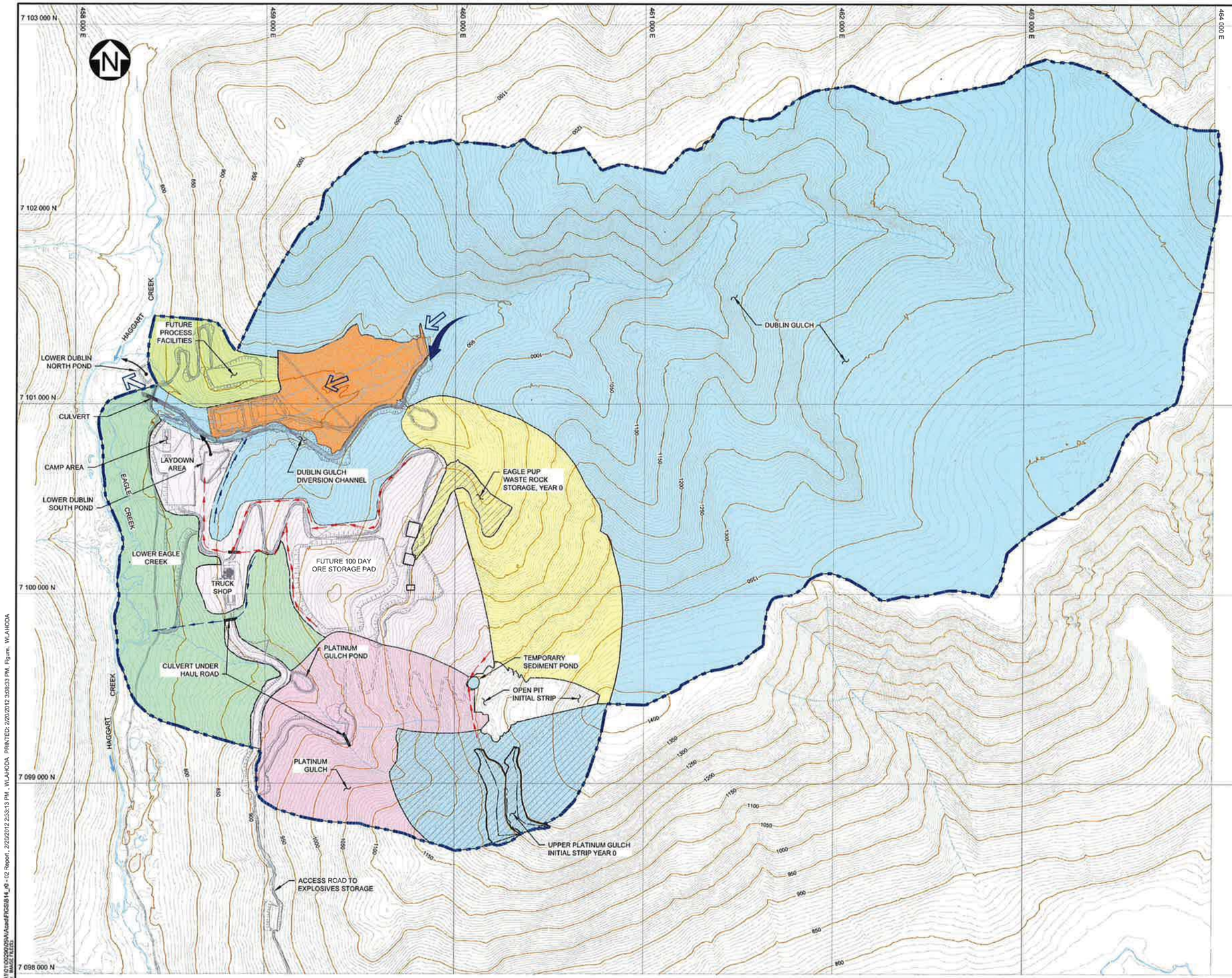

CATCHMENT AREAS	
DESCRIPTION	ha
DUBLIN GULCH	1034
OPEN PIT (INITIAL STRIP)	14
HEAP LEACH & EVENTS PONDS	38
EAGLE PUP WRSA (INITIAL STRIP)	8
LAYDOWN, TRUCK STOP, ORE STORAGE & CRUSHING	107
LOWER PLATINUM GULCH	79
PROCESS FACILITIES	39
LOWER EAGLE CREEK	96
UPPER PLATINUM GULCH	58
EAGLE PUP (UNDISTURBED)	133
TOTAL	1604

LEGEND:

- SEDIMENT CONTROL POND

CONTACT WATER

- SECONDARY ROUTING
- CONTACT WATER DITCH

NON-CONTACT WATER

- NON-CONTACT WATER DITCH
- DRAINAGE DIVIDE
- DUBLIN GULCH FLOW DURING DIVERSION CHANNEL CONSTRUCTION
- DUBLIN GULCH FLOW DURING DIVERSION HEAP EMBANKMENT CONSTRUCTION

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 8.
2. CONTOUR INTERVAL IS 5 METRES.

SCALE A: 200 100 0 200 400 600 800 1000 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

WATER MANAGEMENT PLAN CONSTRUCTION PHASE YEAR -1

Knight Piésold CONSULTING

P/A NO. VA101-290/5 | REF NO. 2 | REV 0

FIGURE 5.5-16

CATCHMENT AREAS	
DESCRIPTION	ha
UPPER DUBLIN GULCH (NON-CONTACT)	934
LOWER DUBLIN GULCH (NON-CONTACT)	46
OPEN PIT	49
HEAP LEACH & EVENTS PONDS	53
EAGLE PUP WRSA	61
LAYDOWN, TRUCK STOP, ORE STORAGE & CRUSHING	106
LOWER PLATINUM GULCH	64
PROCESS FACILITIES	39
LOWER EAGLE CREEK	96
PLATINUM GULCH WRSA	54
EAGLE PUP	59
ANN GULCH UNDISTURBED WEST	24
TOTAL	1585

LEGEND:

- SEDIMENT CONTROL POND
- PUMP

CONTACT WATER

- PRIMARY ROUTING
- SECONDARY ROUTING
- CONTACT WATER DITCH

NON-CONTACT WATER

- PRIMARY ROUTING
- NON-CONTACT WATER DITCH

TREATED WATER

- TREATED WATER

PROCESS WATER

- PREGNANT SOLUTION
- BARREN SOLUTION
- DRAINAGE DIVIDE

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 8.
2. CONTOUR INTERVAL IS 5 METRES.

SCALE A: 200 100 0 200 400 600 800 1000 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

WATER MANAGEMENT PLAN
OPERATIONS: PHASE I
YEAR 2

Knight Piésold CONSULTING

P/A NO.: VA101-290/5 | REF NO.: 2 | REV: 0

FIGURE 5.5-17

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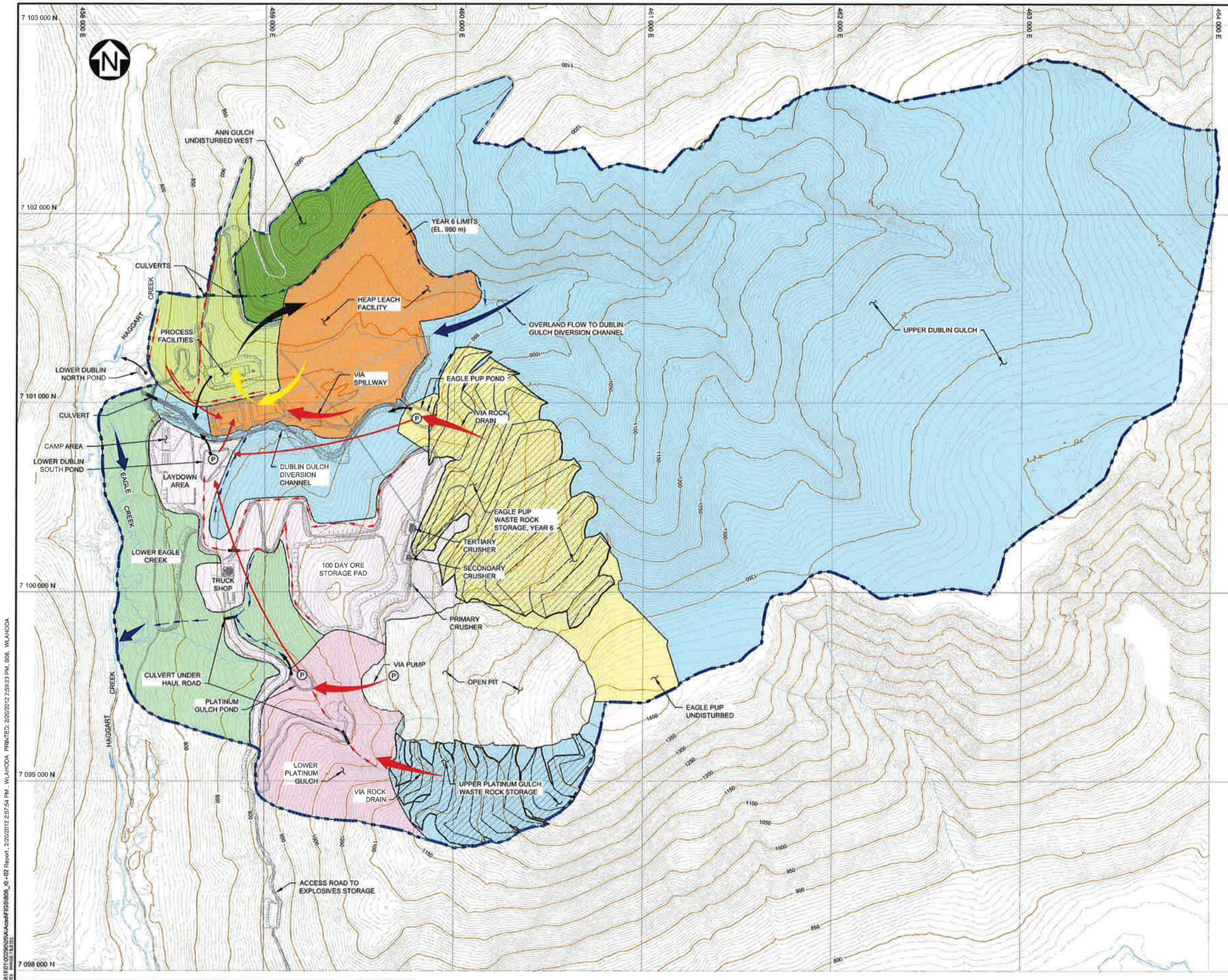

CATCHMENT AREAS	
DESCRIPTION	ha
UPPER DUBLIN GULCH (NON-CONTACT)	910
LOWER DUBLIN GULCH (NON-CONTACT)	46
OPEN PIT	71
HEAP LEACH & EVENTS PONDS	83
EAGLE PUP WRSA	94
LAYDOWN, TRUCK STOP, ORE STORAGE & CRUSHING	95
LOWER PLATINUM GULCH	59
PROCESS FACILITIES	43
LOWER EAGLE CREEK	96
PLATINUM GULCH WRSA	48
EAGLE PUP	30
ANN GULCH UNDISTURBED WEST	29
TOTAL	1604

LEGEND:

- SEDIMENT CONTROL POND
- PUMP

CONTACT WATER

- PRIMARY ROUTING
- SECONDARY ROUTING
- CONTACT WATER DITCH

NON-CONTACT WATER

- PRIMARY ROUTING
- NON-CONTACT WATER DITCH

TREATED WATER

- TREATED WATER

PROCESS WATER

- PREGNANT SOLUTION
- BARREN SOLUTION
- DRAINAGE DIVIDE

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 8.
2. CONTOUR INTERVAL IS 5 METRES.

SCALE A: 200 100 0 200 400 600 800 1000 m

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VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

WATER MANAGEMENT PLAN
OPERATIONS: PHASE II
YEAR 6

Knight Piésold CONSULTING

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FIGURE 5.5-18 | REV 0

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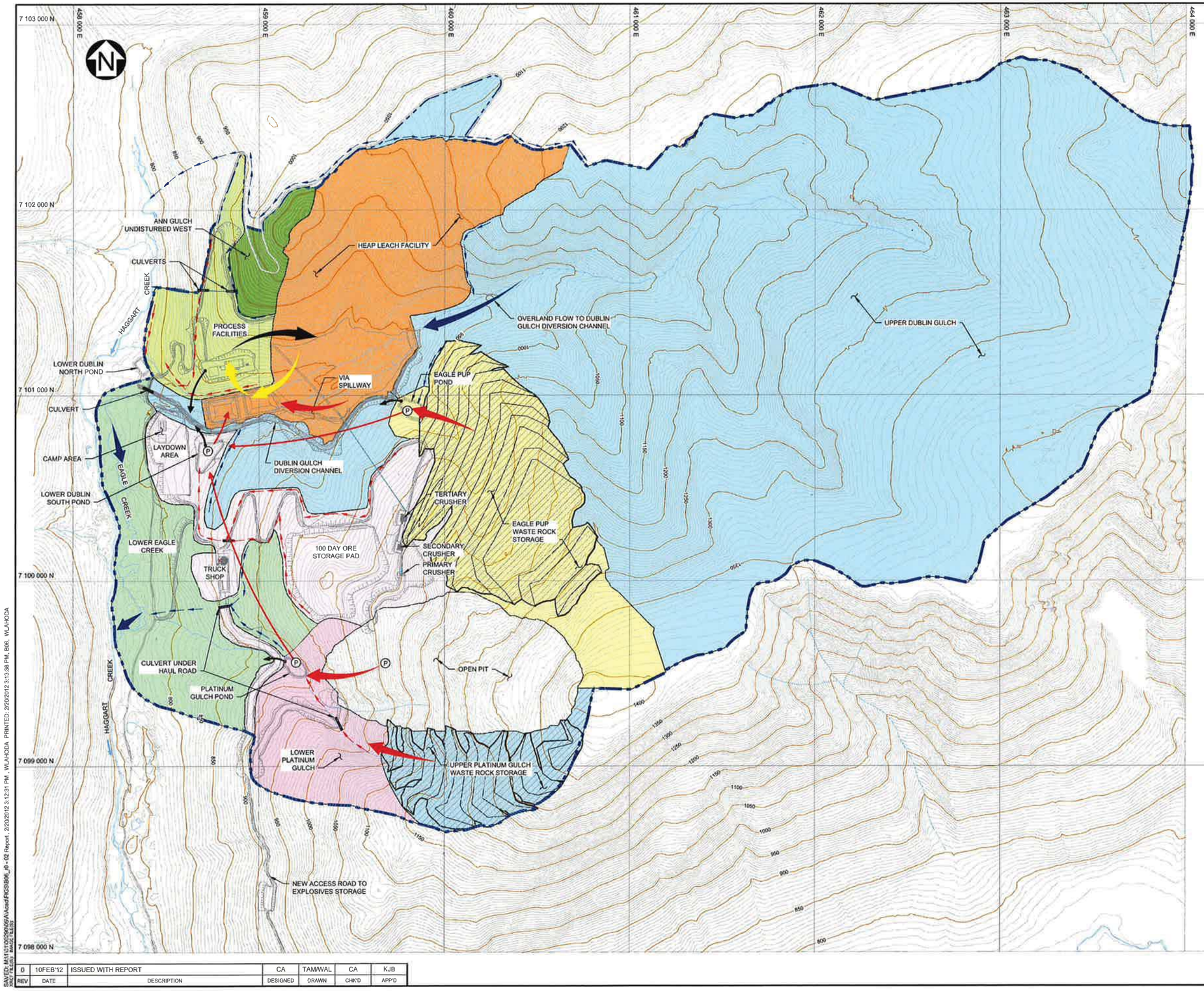

CATCHMENT AREAS	
DESCRIPTION	ha
UPPER DUBLIN GULCH (NON-CONTACT)	862
LOWER DUBLIN GULCH (NON-CONTACT)	46
OPEN PIT	81
HEAP LEACH & EVENTS PONDS	142
EAGLE PUP WRSA	98
LAYDOWN, TRUCK STOP, ORE STORAGE & CRUSHING	93
LOWER PLATINUM GULCH	50
PROCESS FACILITIES	43
LOWER EAGLE CREEK	96
PLATINUM GULCH WRSA	47
EAGLE PUP	30
ANN GULCH UNDISTURBED WEST	16
TOTAL	1604

LEGEND:

- SEDIMENT CONTROL POND
- PUMP

CONTACT WATER

- PRIMARY ROUTING
- SECONDARY ROUTING
- CONTACT WATER DITCH

NON-CONTACT WATER

- PRIMARY ROUTING
- NON-CONTACT WATER DITCH

TREATED WATER

- TREATED WATER

PROCESS WATER

- PREGNANT SOLUTION
- BARREN SOLUTION
- DRAINAGE DIVIDE

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 8.
2. CONTOUR INTERVAL IS 5 METRES.

SCALE A: 200 100 0 200 400 600 800 1000 m

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VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

WATER MANAGEMENT PLAN
OPERATIONS: PHASE III
YEAR 9

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FIGURE 5.5-19 | REV 0

CATCHMENT AREAS	
DESCRIPTION	Ha
UPPER DUBLIN GULCH (NON-CONTACT)	858
LOWER DUBLIN GULCH (NON-CONTACT)	45
OPEN PIT	73
HEAP LEACH & EVENTS PONDS	143
EAGLE PUP WRSA	110
LAYDOWN, TRUCK STOP, ORE STORAGE & CRUSHING	101
LOWER PLATINUM GULCH	31
PROCESS FACILITIES	33
LOWER EAGLE CREEK	81
PLATINUM GULCH WRSA	48

LEGEND:

- RECLAIM AREA
- SEDIMENT CONTROL POND
- PUMP

CONTACT WATER

- PRIMARY ROUTING
- CONTACT WATER DITCH

NON-CONTACT WATER

- PRIMARY ROUTING
- NON-CONTACT WATER DITCH

TREATED WATER

- TREATED WATER

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 8.
2. CONTOUR INTERVAL IS 5 METRES.

SCALE A: 200 100 0 200 400 600 800 1000 m

VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

WATER MANAGEMENT PLAN
POST CLOSURE

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FIGURE 5.5-20 | REV 0

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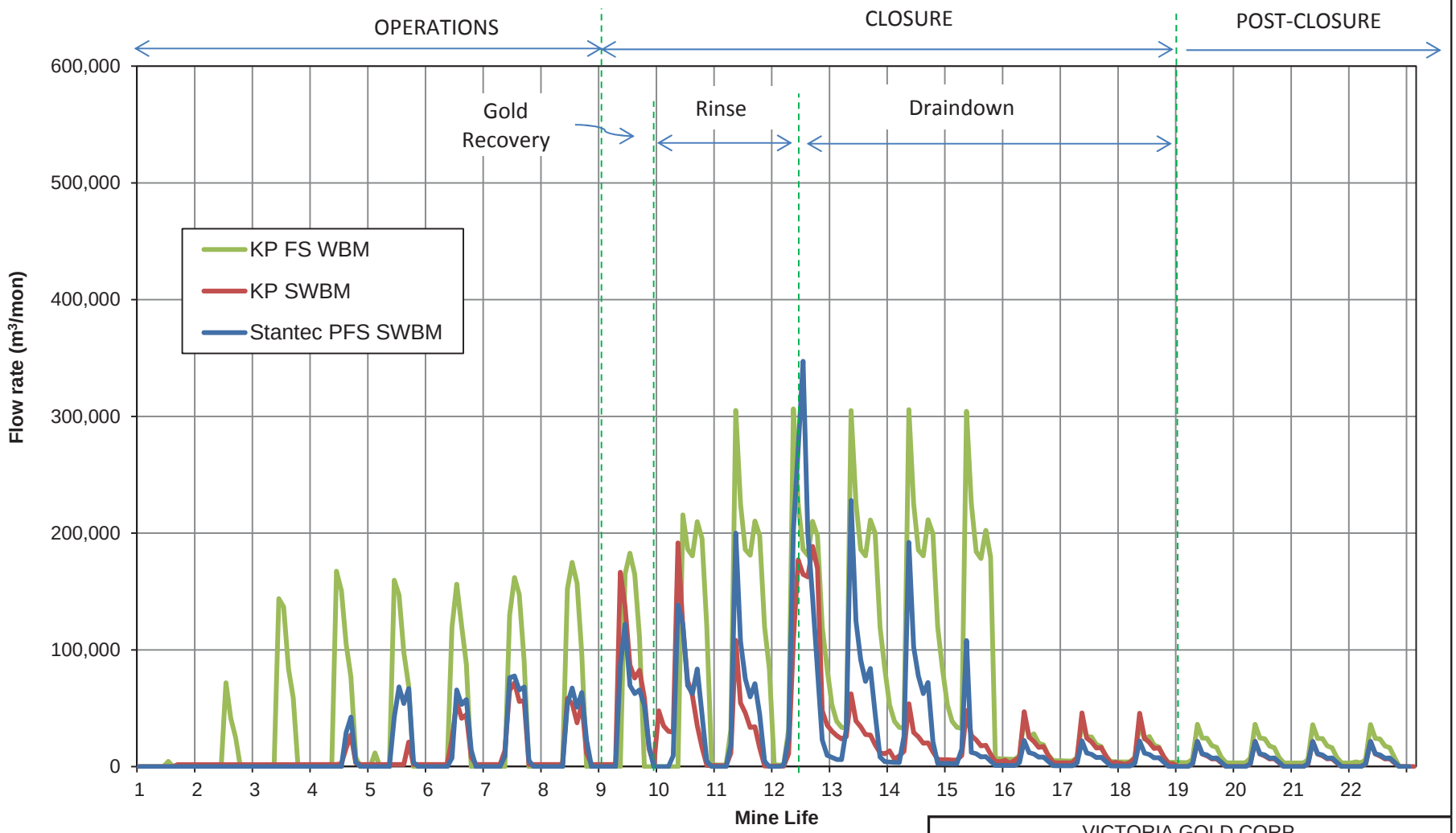

NOTE:

1. OPERATION, CLOSURE AND POST-CLOSURE SCHEDULE BASED ON THE PFS.

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VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

MANAGED MONTHLY INFLOW TO THE MINE WATER TREATMENT PLANT MEDIAN SCENARIO

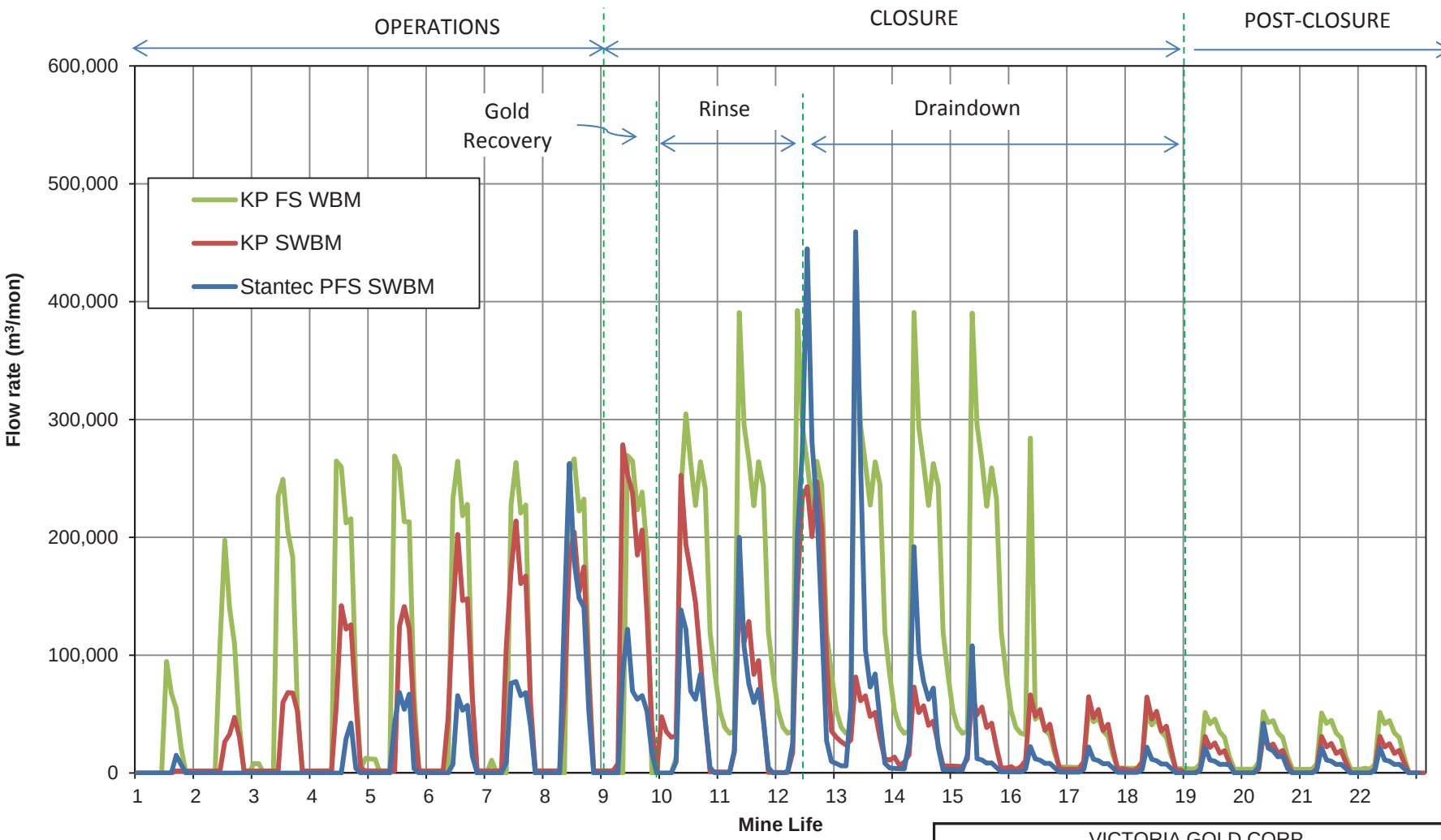
Knight Piésold CONSULTING

P/A NO. VA101-290/6

REF NO VA12-00744

Figure 5.5-21

REV 0



NOTE:

1. OPERATION, CLOSURE AND POST-CLOSURE SCHEDULE BASED ON THE PFS.
2. THE STANTEC PFS SWBM ONLY MODELLED WET YEAR PRECIPITAITON IN YEARS 8, 12-13 AND 19-20. THE REMAINING YEARS OF THE MODEL USE THE MEDIAN PRECIPTIATION CONDITIONS.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
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VICTORIA GOLD CORP.

EAGLE GOLD PROJECT

MANAGED MONTHLY INFLOW TO THE MINE WATER TREATMENT PLANT WET SCENARIO

Knight Piésold CONSULTING

P/A NO. VA101-290/6

REF NO VA12-00744

Figure 5.5-22

REV 0

Figure 5.5-23: Diagramatic Illustration of the Water Treatment Process for the Refined Project